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TLC Ivanhoe

321 Lower Heidelberg Road, Ivanhoe East

Acoustic Report – Environmental Noise Emission Assessment

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1. Introduction

The proposal includes the construction of a new Integrated Community Facility at the site described as 321 Lower Heidelberg Road, Ivanhoe East.

The new facility will include:

- Early learning centre.
- Community centre/gallery.
- Medical centre.
- Café.
- Gymnasium.
- Health and wellbeing centre.
- Indoor pool and outdoor splay area.

Watson Moss Growcott Acoustics (WMG) has been engaged to undertake a review of the proposal and provide advice in relation to assessment of potential noise emissions associated with the proposed use.

This report presents the findings of the assessment and includes indicative noise mitigation strategies to ensure that calculated noise emissions achieve compliance with relevant criteria at sensitive receptors in proximity to the site.

2. Noise Assessment Terminology

Noise assessment terminology used within this report is defined within Table 1 below.

Table 1: Noise Assessment Terminology

Terminology	Definition
dB(A)	Decibels recorded on a sound level meter, which has had its frequency response modified electronically to an international standard, to quantify the average human loudness response to sounds of different character
L_{eq}	The equivalent continuous level that would have the same total acoustic energy over the measurement period as the actual varying noise level under consideration. It is the noise measure defined by the EPA as the measure of the noise to use in assessing compliance with noise limits.
L_{90}	The level exceeded for 90% of the measurement period, which is representative of the typical lower levels in a varying noise environment. It is the noise measure defined by the EPA as the measure of the background noise level to use in determining noise limits.
Sound Power Level (Lw)	The sound power level of a source is a measure of the amount of energy in the form of sound emitted from the source. The sound power level of a source is an inherent characteristic of that source and does not vary with distance from the source or with a different acoustic environment. The sound power level equals the sound pressure level at a distance from the source plus 10 times the logarithm (to base 10) of the measurement surface area (m^2), and is relative to a reference sound power of 1pW, (10-12 Watts).
Sound Pressure Level (Lp)	Sound that we can hear with our ears or measure with a sound level meter is actually small variations in the pressure of the air around us. The magnitude of the pressure fluctuations vary over a very wide range from the very lowest levels we can just hear to the very high levels we need to be protected from, and for that reason sound is measured on a logarithmic scale. The sound pressure level equals 10 times the logarithm (to base 10) of the sound pressure divided by a reference pressure, which is 20 µPa. The sound pressure level reduces with increasing distance from a source and is influenced by the surroundings.

3. Measurement Equipment

As part of the assessment works, WMG used the equipment described in Table 2 below.

Table 2: Measurement Equipment List

Equipment Designation	Use of Equipment
Rion NA27 Precision Sound Level Meter	Handheld Noise Measurements
Ngara Real Time Sound Acquisition System	Fixed Position Unattended Noise Monitoring

The field calibration of the equipment was checked with a Bruel & Kjaer Type 4230 Sound Level Calibrator at the commencement and completion of the noise measurements and found to be within the correct calibration range.

4. Proposed Site Layout and Operations

As part of preparation of this report, WMG has been provided with architectural drawings prepared by VIA Architects including:

- TP-10-001 BASEMENT LEVEL 02.
- TP-10-002 BASEMENT LEVEL 01.
- TP-10-003 LOWER GROUND FLOOR PLAN.
- TP-10-004 GROUND FLOOR PLAN.
- TP-10-005 UPPER GROUND FLOOR PLAN.
- TP-10-006 LEVEL 1 FLOOR PLAN.
- TP-10-007 ROOF PLAN.

Based on the documentation provided, it is understood that the proposal will include the following.

Table 3: Summary of Proposed Development

Level Designation	Area Description
Basement 02	▪ Carparking areas. ▪ Services/storage.
Basement 01	▪ Carparking areas. ▪ Services/storage. ▪ Waste room.
Lower Ground Floor	▪ Community centre/gallery. ▪ Café. ▪ Early learning centre. ▪ Medical centre. ▪ Back of house pool plant. ▪ Substation.
Ground Floor	▪ Early learning centre. ▪ Gymnasium.
Upper Ground Floor	▪ Indoor pool. ▪ Outdoor splash area. ▪ Garden terrace ▪ Health & wellbeing centre
Level 1 Floor	▪ Health & wellbeing centre upper.
Roof	▪ Roof mounted solar panels.

The relevant floor plans for the proposal are included within Appendix 1.

For the purposes of this review, WMG has considered that the subject site operations will generally be limited to the hours of 7:00am to 10:00pm, Monday to Sunday.

Hours associated with the early learning centre are anticipated to be between 7:00am and 6:00pm Monday to Friday.

5. Site and Surrounding Environment

The site is located at 321 Lower Heidelberg Road, and abuts Maltravers Road to the north, King Street to the south, existing residential dwellings to the east and Lower Heidelberg Road to the west.

The site is currently occupied by several buildings, an external carparking area and an outdoor tennis court which will be demolished as part of the proposal. The existing church building at the site will remain.

When addressing noise emissions from operations occurring at the subject site, the closest, and in this instance, most relevant receptors will include:

- **R01** – 8 Maltravers Road.
- **R02** – 4 Maltravers Road.
- **R03** – 2 Maltravers Road.
- **R04** – 304 Lower Heidelberg Road.
- **R05** – 302 Lower Heidelberg Road.
- **R06** – 300 Lower Heidelberg Road.
- **R07** – 24 Withers Street.
- **R08** – 292 Lower Heidelberg Road.
- **R09** – 1 King Street (East Ivanhoe Primary School).
- **R10** – 10 King Street.
- **R11** – 7 Maltravers Road.

Figure 1 below provides an aerial photo of the subject site and surrounds including the sensitive receptors which has been considered as part of the noise emission assessment.

Figure 1: Proposed subject site and surrounding environment

6. Site Noise Monitoring

To investigate the existing acoustic environment at and around the subject site, WMG has undertaken attended and unattended noise monitoring during the following dates and times:

- Attended site survey during the period 12:45pm to 2:00pm on Monday 10th December 2018.
- Attended site survey during the period 9:30pm to 10:30pm on Wednesday 12th December 2018.
- Attended site survey during the period 6:30pm and 7:00pm on Wednesday 24th November 2021.
- Attended site survey during the period 11:30am and 12:30pm on Monday 22nd November 2021.

The primary purpose of the attended and unattended noise monitoring was to measure noise levels associated with the existing acoustic environment at the site which includes dominant traffic contributions, and to measure ambient background noise levels to form a basis for determining noise emission criteria.

An aerial photograph identifying the noise monitoring locations is shown below in Figure 2.

Figure 2: Aerial image including attended and unattended monitoring locations

7. Commercial Noise Emission Assessment

7.1. Noise Assessment Criteria

Within the State of Victoria, noise emissions from commercial operations consistent with the subject site are governed by the legislative framework within the Environment Protection Act 2017 (The Act).

The approach within The Act focuses on prevention of pollution impacts rather than managing the impacts after they have occurred and is based on a person or entities General Environmental Duty (GED) for the protection of human health and the environment from pollution and waste.

The GED is explained within Part 3.2 of The Act and stipulates that 'a person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable'.

Determining what is deemed 'reasonably practicable' is explained within EPA Publication 1856 and relates to the implementation of controls that are proportionate to the potential risk.

It relates to the potential for harm to occur, the potential impacts on the environment, and considers what controls are available to reduce the risk, and their associated costs.

It is deemed the responsibility of the operator to understand and assess the risks which their operations may pose on human health or the environment, and once understood, implement proportionate controls to mitigate or minimise the risk of harm.

The definition of harm within The Act introduces the concept of what is deemed 'unreasonable' generally, and in particular 'unreasonable noise'. The Environment Protection Regulations 2021 (The Regulations) under the Act essentially define unreasonable noise as noise that exceeds the noise limit that applies under the Noise Protocol (EPA Publication 1826.4) at the time the noise is emitted.

Methodologies, specific criteria, and guidance regarding unreasonable noise emissions are included within the following Regulations and guideline documentation referred to within The Act and provided by the Environment Protection Authority (EPA):

- The Regulations.
- Noise Protocol.
- Environmental Reference Standard (ERS).
- EPA Publication 1996 Noise Guideline – assessing low frequency noise.
- EPA Publication 1856 Reasonably practicable.

With the above considered, whilst evaluating risks and implementing reasonably practicable measures are necessary to comply with the GED, the basis for any noise emission assessment will be ensuring that noise emissions are not deemed 'unreasonable'

7.2. EPA Publication 1826.4 – Noise Protocol

7.2.1. General Methodologies

The subject site and the relevant receptors are located within a 'major urban area'.

In accordance with the Noise Protocol, noise limits for site operations will be determined in accordance with Part I, A1 of the Noise Protocol document referenced as the 'urban area method'.

Using the 'urban area method', relevant 'zoning levels' are calculated using the area of differing land zoning types surrounding residential receptors as described in Clause 17-15 of the Noise Protocol.

The calculated 'zoning levels' vary depending on the time of the day, evening, or night with the highest permitted values occurring during day periods and the lowest during night periods.

The relevant day, evening, and night assessment periods are shown in Table 4.

Table 4: Details of EPA Assessment Periods

EPA Assessment Period	Relevant Days	Relevant Time Periods
Day	Monday to Saturday	7:00am to 6:00pm
Evening	All Days	6:00pm to 10:00pm
	Sunday, Public Holidays	7:00am to 6:00pm
Night	All Days	10:00pm to 7:00am

Further derivation of the 'noise limits' applicable for the site operations are based on measurement of the existing ambient background noise level at nearby sensitive receptors in accordance with Clause 39-51 of the Noise Protocol.

Where ambient background noise levels at sensitive receptors fall within the range considered 'neutral' in accordance with the Noise Protocol methodologies, the calculated 'zoning levels' will apply as noise limits for the site operations.

The 'neutral' range represents an ambient background noise level which is considered 'typical' for the relevant land zoning types surrounding the receptor location.

Where ambient background noise levels are measured to be higher or lower than the 'neutral range', background level adjusted noise limits will apply for the site operations.

7.2.2. Determination of Noise Protocol Noise Limits

Based on analysis of the noise monitoring obtained at the subject site, the adopted ambient background noise levels for the assessment are included in Table 5.

Table 5: Adopted Ambient Background Noise Levels

EPA Assessment Period	Relevant Days	Time Periods	Ambient Background Levels	
			West Boundary	East Boundary
Day	Monday to Saturday	7:00am to 6:00pm	40 dB(A) L_{90}	55 dB(A) L_{90}
Evening	All Days	6:00pm to 10:00pm	38 dB(A) L_{90}	53 dB(A) L_{90}
	Sunday, Public Holidays	7:00am to 6:00pm		
Night	All Days	10:00pm to 7:00am	30 dB(A) L_{90}	39 dB(A) L_{90}

Using the measured ambient background noise levels as the basis for the assessment, Table 6 provides a summary of the adopted Noise Protocol noise limits.

Table 6: Noise Protocol Noise Limits

EPA Assessment Period	Relevant Days	Time Periods	Noise Protocol Noise Limits	
			West Boundary	East Boundary
Day	Monday to Saturday	7:00am to 6:00pm	51 dB(A) L_{eq}	61 dB(A) L_{eq}
Evening	All Days	6:00pm to 10:00pm	45 dB(A) L_{eq}	56 dB(A) L_{eq}
	Sunday, Public Holidays	7:00am to 6:00pm		
Night	All Days	10:00pm to 7:00am	38 dB(A) L_{eq}	42 dB(A) L_{eq}

The noise limits must be met within a 'noise sensitive area', which for this site will be within the boundary of any nearby sensitive receptor, and within 10 metres of the outside of the external walls of the dwelling or building.

The relevant assessment period will be 30 minutes.

When addressing noise impacts at the R9 receptor which is an educational facility, only the periods during which the facility will be occupied will be relevant. As a result, it would be expected that commercial noise impacts associated with the subject site will only be relevant during the day period at this receptor.

7.2.3. Noise Protocol Assessment Adjustments

When considering noise impacts at residential receptors, Noise Protocol methodology includes relevant adjustment factors which account for the potential for the noise source to impact on the acoustic amenity of the noise sensitive receptor. The relevant adjustments include:

- Tonal Adjustment
- Impulsive Adjustment.
- Intermittency Adjustment.
- Reflection Adjustment.
- Duration Adjustment.

Clarification regarding each of the adjustments is shown below in Table 7.

Table 7: Noise Protocol Assessment Adjustments

Relevant Adjustment	Description
Tonal Adjustment	When the noise is tonal in character then an adjustment shall be made as follows: ▪ When the tonal character of the noise is just detectable then + 2 dB(A). ▪ When the tonal character of the noise is prominent then + 5 dB(A).
Impulsive Adjustment	When the noise is impulsive in character then an adjustment shall be made as follows: ▪ When the impulsive character of the noise is just detectable then + 2 dB(A). ▪ When the impulsive character of the noise is prominent then + 5 dB(A).
Intermittency Adjustment	An intermittency adjustment applies when the noise increases in level rapidly by at least 5 dB, on at least two occasions during a 30-minute period and maintains the higher level for at least one minute duration. The relevant intermittency adjustments applicable include: ▪ When the level increase is >10 dB during the day period, then apply an adjustment of +3 dB(A). ▪ When the level increase is 5-10 dB during the night period, then apply an adjustment of +3 dB(A). ▪ When the level increase is >10 dB during the night period, then apply an adjustment of +5 dB(A).
Reflection Adjustment	When the measurement point is located outdoors and the microphone is located from 1 to 2 metres from an acoustically reflecting surface, an adjustment of -2.5 dB shall be made.
Duration Adjustment	When the noise emissions do not occur over the whole of a continuous 30-minute period, then a duration adjustment based upon the total amount of time for which the noise occurs over that continuous 30-minute period shall be determined.

Where applicable, adjustments are applied to the measured / predicted values at noise sensitive receptor locations to determine the 'effective' noise level impacting on the receptor.

7.3. Environment Reference Standard

The ERS provides environmental values which have been developed to reflect the ambient soundscape associated with different land use settings, from highly urbanised areas to natural environments.

Through consideration of land zoning types, and varying assessment periods for the day and night, it is understood that the ERS intends to provide consideration of noise levels which may impact on:

- Sleep during the night.
- Domestic and recreational activities.
- Normal conversation.
- Child learning and development.
- Human tranquility and enjoyment outdoors in natural areas.
- Musical entertainment.

Whilst being included within the Act, the ERS is not a compliance standard and clearly states that 'the objectives for each land use category are typical ambient sound level values and are neither noise limits nor noise design criteria'.

It understood that the primary function of the ERS is to provide environmental assessment benchmarks to assist 'decision makers' with evaluating noise emissions within areas not already captured within the Regulations and Noise Protocol.

The ERS will not require consideration when addressing noise emissions to the nearby residential premises as these are captured by the Noise Protocol. The ERS has therefore not been considered further within the assessment.

7.4. EPA Noise Guideline – Assessing Low Frequency Noise

As defined in the Act, *a person must not, from a place or premises that are not residential premises emit an unreasonable noise or permit an unreasonable noise to be emitted.*

In the Regulations, unreasonable noise is based on exceedances determined in accordance with the Noise Protocol, however, the Regulations also include consideration of the frequency spectrum associated with a noise emission.

To provide some basis for addressing low frequency noise emissions and determining whether the noise emission is deemed 'unreasonable' the EPA released Publication 1996 Noise Guideline – assessing low frequency noise.

The guideline document provides 'threshold levels for assessing low frequency noise' which are not set limits, but levels that indicate a potential risk of problematic low frequency noise.

The threshold levels for indoor and outdoor measurements are included within Table 8 below.

Table 8: Indoor and outdoor measurement one-third octave band noise level thresholds

Measurement Location	One-third octave band noise levels Hz												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Indoor noise dB L_{eq}	92	87	83	74	64	56	49	43	42	40	38	36	34
Outdoor noise dB L_{eq}	92	89	86	77	69	61	54	50	50	48	48	46	44

Whilst Publication 1996 is presented as a guideline, it is understood that the EPA will require reasonably practicable measures to be considered where values are measured or predicted to be higher than the thresholds.

The main source of noise which may have the potential to include low frequency noise as part of the proposed use will include general services equipment.

It is envisaged that low frequency noise can be addressed within the detailed design phase of the project to comply with relevant Noise Protocol noise limits and the low frequency thresholds as required. In consideration of the above, low frequency noise intrusion and noise emissions have not been considered further within this assessment.

7.5. General Commercial Noise Control Strategies

Relevant site noise sources which may have the potential to generate noise emissions and will require consideration in accordance with the Noise Protocol will include:

- Services equipment associated with the base building and the commercial café tenancies.
- Substation equipment.
- Waste collection events.
- Goods deliveries.

In addition, the client will need to consider potential noise emissions in accordance with the GED and what may be deemed 'reasonably practicable' for the proposed use.

7.5.1. Commercial Café Tenancy

The proposal includes a café tenancy located at lower ground level.

Operations regarding the café are unknown at this stage, however due to the location of the café relative to the highly trafficked Lower Heidelberg Road, it is anticipated that noise emissions due to the use will not impact adversely on the surrounding sensitive receptors.

It would be recommended that once the café design and operating parameters are finalised, an acoustic consultant is engaged to consider noise emissions associated with the use and provide advice to ensure compliance with suitable noise criteria at sensitive receptors.

7.5.2. General Commercial Services Equipment

The mechanical services design for the proposal has not been completed at this stage, however the client has advised that commercial services equipment will likely be located within the lower ground plant room located adjacent to the eastern site boundary.

Based on the location of the equipment area, it is expected that noise control strategies including the selection of low noise units, and dedicated acoustic attenuation (attenuators, acoustic louvres etc) will adequately address potential noise emissions from the plant area.

Despite the above, the primary recommendation for the proposal will be that once a mechanical services design has been completed and equipment selections have been made, an acoustic consultant be engaged to undertake a review to ensure noise emissions are predicted to comply with relevant criteria at nearby noise sensitive receptor locations.

7.5.3. Substation Equipment

The proposal includes a substation room at basement 01 level (NGL to King Street) adjacent to the southern boundary of the subject site. The substation will include a transformer unit which would be expected to emit noise emissions including a prominent tonal character.

It is expected that the unit will be operated by a third party (ie Citipower) who will be responsible for assisting with ensuring that noise emissions comply with relevant criteria.

Despite the above, it would be recommended that an acoustic consultant is engaged during detailed design to assist in ensuring that the transformer selection, ventilation system and room configuration ensure compliance with noise criteria at sensitive receptors.

7.5.4. Waste Collection Events

The client has advised that waste collection will occur within the basement level of the building. As a result, noise associated with waste collection events will generally be limited to vehicle noise as the waste vehicle enters and exits the basement via the ramp located in the southwestern corner of the site abutting King Street.

Given the access requirements for the basement level, it is understood that the waste collection vehicle will be a light rigid truck consistent with a Hino 300 fitted with a 'Miner' or 'Bantam' rear compactor (Garwood International).

WMG has measured a Hino 300 with a Bantam compactor unit as part of a previous independent investigation, and calculated sound power levels in the order of 90-92 dB(A) when the vehicle was travelling at slow speeds.

Based on noise level calculations, predicted values due to waste vehicles entering and exiting the basement will comply with Noise Protocol noise limits at sensitive receptors located within site proximity.

In order to further minimise the potential for noise associated with the vehicles entering / exiting the basement level to impact adversely on the amenity of the adjoining sensitive receptors, WMG recommend the following:

- The access road and basement level carpark must not include road surface finishes which promote audible wheel screech.
- The gradient of the entry/exit ramp should be kept as flat as possible to minimise the need for vehicle operators to rev engines to enter/exit the basement level.
- Speed humps are recommended to be omitted from the project generally.
- Driver's angle of view sufficient to ensure that horns are not required to alert pedestrians when exiting the site. Angled mirrors may also assist with minimising the need for horns.
- If a spoon grate is installed as part of the proposal, it must be bolted into position rather than rely on gravity to be held in place.
- Access gates should be fitted with rubber bump stops to prevent any impact generated noises.

Further to the above, waste collection events should be carried out in accordance with guidance provided within EPA Publication 1254.2 – Noise Control Guidelines. The document provides guidelines regarding commercial use waste collection including:

- Refuse bins should be located at sites that provide minimal annoyance to residential premises.
- Compaction should be carried out whilst the vehicle is moving and ideally off site.
- Bottles should not be broken up at the collection site.
- Routes which services predominantly residential areas should be altered regularly to reduce early morning disturbances.
- Noisy verbal communication between operators should be avoided where possible.
- For one collection per week, the schedule should be limited to 6:30am to 8:00pm Monday to Saturday, and 9:00am to 8:00pm Sunday and Public Holidays. For two or more collections per week, the schedule should be limited to 7:00am to 8:00pm Monday to Saturday, and 9:00am to 8:00pm Sunday and Public Holidays.

7.5.5. Goods Deliveries

It is understood that goods deliveries will also occur within the basement level of the proposed building.

It would be expected that vehicles delivering goods to the site will be small vans or private vehicles and unloading / loading activities will be done by hand and will not include any mechanical systems generating potentially intrusive noise emissions.

Given the determined Noise Protocol compliance associated with the waste collection vehicle events, noise emissions associated with small vans, private vehicles or light rigid trucks making deliveries at the site would be expected to also comply with Noise Protocol noise limits at sensitive receptors.

8. Childcare Noise Emission Assessment

8.1. Proposed Configuration and Operations

The proposal includes an early learning centre located at lower ground and ground level.

The centre will include two rooms at lower ground level which have been identified as 'nursery' and 'infant' rooms, in combination with four additional rooms at ground level designated for 'toddler' and 'kinder' use.

The lower ground level includes an outdoor play area which will be located in proximity to the residential boundary of 10 King Street. At ground level, the proposed outdoor play areas face inward toward the site base building and are shielded from the nearest noise sensitive receptors.

For the purposes of this assessment and based on previous correspondence with the client, WMG has adopted that the centre will operate during the period 7:00am to 6:00pmn Monday to Friday.

Figure 3 below provides the ground level floor plan for the proposal and identifies the lower ground and ground level outdoor play areas.

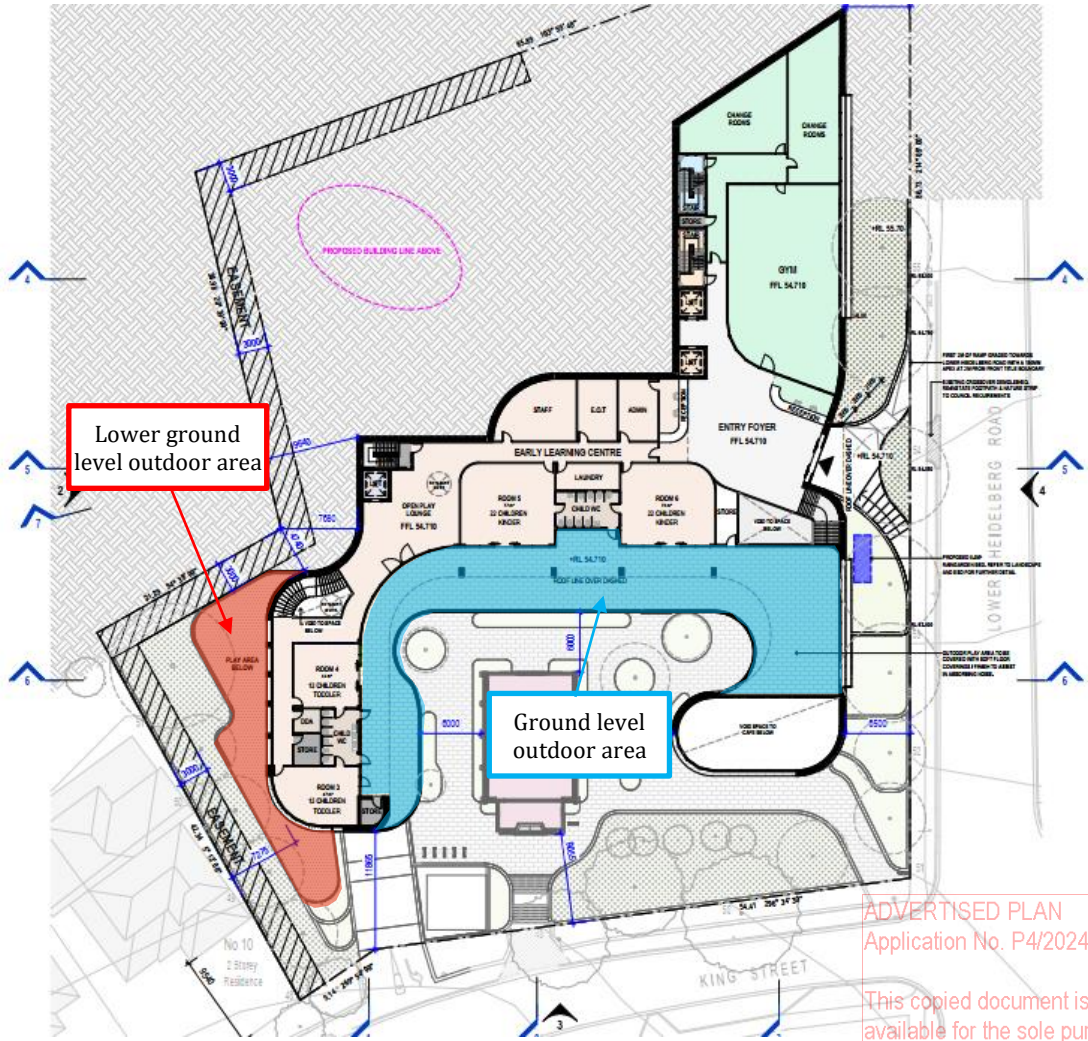


Figure 3: Ground level site plan including lower ground level and ground level

8.2. Outdoor Play Noise Assessment Guideline Discussion

Many previous VCAT determinations for childcare centres have repeatedly reinforced the principle that centres can and should be a compatible use within residential areas.

In support of the above, WMG has previously provided recommendations for practical noise control screening for outdoor play areas to minimise the potential for adverse noise changes when assessed at existing residences.

In the absence of quantitative noise assessment procedures within the legislative framework, several members of the Association of Australasian Acoustical Consultants (AAAC) in NSW developed a qualitative assessment procedure.

This procedure was adopted as a AAAC guideline published document and has included updates during October 2013 and in September 2020.

The guidance in the AAAC document indicates that noise associated with children playing in outdoor areas should not exceed ambient background noise levels by more than 5-10 dB(A) depending on the usage of the outdoor play area.

Previous iterations of the Guideline have nominated more restrictive assessment criteria for centres where children play outside for greater than 2 hours per day. The practical experience of this firm and others adopting the assessment procedures often resulted in a perceived need for excessively tall noise barriers due to typical usage of outdoor areas including greater than 2 hours per day.

The latest iteration of the Guideline has now set a threshold of 4 total hours including 2 hours of play in the morning and 2 hours of play in the afternoon.

Where children play outdoors for less than 4 hours during the day (2 in the morning, 2 in the afternoon), the Guideline nominates that noise emissions should not exceed the background noise level by more than 10 dB. For greater than 4 hours, the nominated criteria is reduced to 5 dB above the background noise level.

For the proposed childcare use and many others, there may be instances where the intent will be for children to play outdoors for greater than 4 hours, and hence the guideline assessment procedures would apply the more restrictive criterion of background noise + 5dB.

Whilst acknowledging that the AAAC Guideline is of assistance for understanding potential noise emissions, previous VCAT determinations, including Tamoe Investments Pty Ltd v Glen Eira CC [2015] VCAT 719, have identified that the document is not a reference document in the Scheme nor is it an adopted Policy of Council.

In addition to the above, there are various determinations and approvals from Council and VCAT including Rosenberg v Glen Eira [2016] VCAT 1433 which have considered the background noise + 5 dB criteria as conservative given that childcare centre use is typically limited to the weekday daytime periods only, and occupation of outdoor areas is often intermittent rather than continuous.

Residual noise levels at sensitive receptors equivalent to the background + 10dB guideline value have commonly been considered as appropriate by relevant Authorities including Council and VCAT.

For this project, WMG has reverted to the general principle of including practical height noise barriers around outdoor play areas which will be occupied by children and has then considered the outcomes at sensitive receptors relative to the guidance provided within the AAAC documentation.

8.3. AAAC Guideline Assessment Values

In order to determine the ambient background noise levels associated with the acoustic environment at the site, WMG has considered noise measurements obtained as part of the previous investigations carried out during 2018, as well as continuous monitoring carried out as part of the 2021 works.

The monitoring periods and monitoring locations are identified in Section 6.

Based on analysis of the data obtained during the 2018 and 2021 site investigations, the ambient background noise levels toward the western boundary of the subject site were measured to be in the range 40-44 dB(A) L_{90}.

In accordance with assessment methodologies nominated by the EPA, the lowest ambient background noise level of 40 dB(A) L_{90} has been considered and adopted for dwellings abutting the western boundary of the subject site.

Due to the location of Lower Heidelberg Road, measured ambient background noise levels progressively increased across the subject site, and were measured to be highest and in the order of 56 dB(A) L_{90} adjacent to the eastern site boundary.

When considered toward the western site boundary, the described measured values would result in AAAC Guideline values of 45 dB(A) L_{eq} for greater than four hours of outdoor play, and 50 dB(A) L_{eq} for less than four hours of outdoor play. Toward the eastern site boundary, AAAC Guideline values would be 61 dB(A) L_{eq} for greater than four hours of outdoor play, and 66 dB(A) L_{eq} for less than four hours of outdoor play.

8.4. Source Noise Levels

As part of previous investigations at childcare centres, WMG has observed and carried out noise measurements associated with children playing in outdoor areas. The number of children and the noise that they generate in play areas varies from time to time and for different facilities.

Children tend to distribute themselves in groups throughout the available play area and slightly towards the central parts of the play area where items of play equipment will often be located.

For this assessment, WMG has considered the source sound power levels provided within the AAAC Guidelines which are summarised within Table 9 and relate to groups of 10 children playing.

Table 9: AAAC Guideline Values: Effective Sound Power Levels for groups of 10 Children Playing

Number of Age of Children	dB(A)	Sound Power Levels [dB] at Octave Band Centre Frequencies [Hz]							
		63	125	250	500	1000	2000	4000	8000
10 children 0-2 years	78	54	60	66	72	74	71	67	64
10 children 2-3 years	85	61	67	73	79	81	78	74	70
10 children 3-5 years	87	64	70	75	81	83	80	76	72

For effective sound power levels of a specific number of children, the guideline provides the following formula:

Effective Sound Power Level for 'n' children = **Effective Sound Power Level for 10 children + 10log (n/10)**

The sound power level of a noise source will be independent of environment and is a common method for quantifying the acoustic power of a noise source.

The noise level will be a variable produced at a particular distance and surrounding environment from a source of a particular sound power level.

This is much the same concept as a light bulb having a certain rated power wattage and producing a different level of light at different distances and in differing surrounding environments.

Noise measurements recorded by WMG during previous investigations produced average measured values in the order of 58 dB(A) L_{eq} when measuring a group of 28 pre-school children at 10 metres from a dedicated outdoor play area boundary, and 18 metres from children playing within the outdoor area in the absence of any noise barrier shielding.

In consideration of the above, the measured values recorded by the writer correlate well with the AAAC guideline range of values given for the 2-3 year old children and 3-5 year old children.

8.5. Noise Modelling

8.5.1. Noise Prediction Methodology

Modelling of operational noise emissions from the site has been conducted using DataKustik CadnaA environmental noise modelling software.

Relevant information regarding site elevations, site buildings and the surrounding environment has been provided by the client and sourced from online databases including Nearmaps, VicMaps and topography from the ANZLIC Committee on Surveying and Mapping

The model has been developed with sufficient detail for appropriate noise emission calculations to be undertaken.

For this assessment, the modelling software has implemented the calculation procedures defined within International Standard ISO 9613-2: 1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613).

The described standard has been considered and approved as part of many previous projects requiring noise emission assessment works.

Through implementation of the Standard using CadnaA, the model considers the following attenuation measures:

- Geometrical spreading.
- Atmospheric absorption.
- Ground attenuation.
- Meteorological effects.
- Source / Receiver height effects.
- Attenuation due to the surrounding environment including existing buildings / structures.

The modelling input parameters also incorporate assessment methodology requirements of EPA Victoria including:

- Residual noise levels at noise sensitive receptor locations have been considered when weather conditions assist with propagation of emissions in the direction of the relevant receptor.
- Predicted values have been considered within 10 metres of the noise sensitive external facades.

For the purposes of this assessment, the relevant ground level noise impact assessment height has been adopted as 1.5m above ground level.

The client has not been able to obtain information regarding the relative height of upper-level windows associated with adjoining sensitive receptors. In consideration of the above, WMG has adopted a receptor height 4.5m above ground level outside potentially sensitive windows.

8.5.2. Noise Modelling Input Parameters

Noise predictions due to children playing within outdoor play areas have been based on information provided by the client which includes the number of children, the age of the children, and the rooms where children will be located.

These designations include:

- Room 01 and 02 are designated for nursery and infant occupation. WMG has adopted that these children will be in the age bracket 0-2 years.
- Room 03 and 04 are designated for toddler occupation. WMG has adopted that these children will be in the age bracket 2-3 years.
- Room 05 and 06 are designated for kinder occupation. WMG has adopted that these children will be in the age bracket 3-5 years.

A summary of the sound power levels adopted to consider the noise emissions from children playing in the outdoor areas is included within Table 10.

Table 10: Summary of adopted noise model input parameters

Room Designation	Number of Children	Age Group	Adopted Sound Power Level per 10 Children
Room 01	16	0 – 2 years old	78 dB(A) L_{eq}
Room 02	12	0 – 2 years old	78 dB(A) L_{eq}
Room 03	12	2 - 3 years old	85 dB(A) L_{eq}
Room 04	12	2 – 3 years old	85 dB(A) L_{eq}
Room 05	22	3 – 5 years old	87 dB(A) L_{eq}
Room 06	22	3 – 5 years old	87 dB(A) L_{eq}

In determining the residual noise levels at noise sensitive receptors, WMG has modelled simultaneous occupation of the outdoor area by all children at the facility.

Therefore, using the source data from the AAAC Guideline as a basis, the predicted noise emissions will represent the higher levels of noise which may occur at sensitive receptors.

During other times when fewer children are located within the external area, lower noise levels would be expected at each of the receptors.

In addition to the above, WMG has utilised the following input parameters for the noise model:

- Proposed barriers to be constructed at the subject site are as described in section 8.6 of this report.
- Outdoor areas will include soft floor coverings eg: grass (not concrete).
- Children play in the external areas as recommended within this report.
- Sound power levels have been distributed uniformly around available outdoor areas in proximity to the activity rooms where those children will be located.

8.5.3. Noise Prediction Results

Noise emissions due to children playing within the outdoor play areas will be reduced by distance separation between the outdoor areas and the sensitive receptors, as well as noise shielding provided by the proposed acoustic barrier/s and/or other operational measures.

When addressing noise emissions from the proposal, residual noise levels have been predicted at sensitive residential facades including openable window / door sections.

In addition, predicted values include consideration of external occupiable areas located within 10m of the dwelling external facades which aligns with the assessment methodologies contained within the Environment Protection Act 2017 reference documentation. External carparking areas and / or driveways have generally not been considered as noise sensitive as part of the assessment.

Due to the location of the early learning centre, and in particular the associated outdoor areas, the critical receptors will be R9, R10 and R11 which immediately abut or overlook the outdoor areas.

Based on the incorporation of the proposed practical height barrier/s, the predicted noise levels at each of the critical receptors during the adopted operating conditions are summarised below in Table 11.

Table 11: Predicted Noise Levels at Critical Receptors Surrounding Subject Site

Receptors	Address	Predicted Noise Level
R9	1 King St	46 dB(A) L_{eq}
R10	10 King St	49 dB(A) L_{eq}
R11	7 Maltravers Rd	48 dB(A) L_{eq}

Based on the above, WMG has determined the noise emissions due to children playing in the outdoor areas will result in noise levels in the range 6-9 dB(A) higher than the ambient background noise levels measured at the subject site and adopted as the basis for the assessment.

When considered relative to the AAAC guideline values, the predicted noise levels at the most exposed sensitive receptors will generally align with the guideline values applicable for occupancy of two hours during the morning and two hours during the afternoon, but on occasion will be higher than the guideline values applicable for continuous occupancy of greater than two-four hours.

8.6. Early Learning Centre Noise Control Strategies

The following noise control strategies include suitable treatments to minimise noise emissions to residential locations and achieve compliance with relevant criteria at sensitive receptors.

The strategies included within the report are tentative in nature.

Should other initiatives or provisions be incorporated within the development which ensure that the relevant criteria are met, the treatments herein may be amended at the approval of a suitably experienced acoustic consultant.

8.6.1. Operational Noise Management

Based on the findings of the assessment, WMG provides the following strategies regarding minimising noise emissions associated with the proposed early learning centre.

Given the early stages of the proposal, it would be recommended that once an operator has been selected and the proposal has been finalised, an acoustic consultant is engaged to undertake an assessment of the proposal.

- Operating hours should be limited to between 7:00am and 6:00pm Monday to Friday. If it is deemed appropriate that operating hours extend beyond this time, occupation of the outdoor play areas should be limited to the described period.
- The operational age bracket and room designation should align with the information nominated as the basis for the assessment. This includes the youngest, and least noisy children located at the critical sensitive interface in the southwestern corner of the site. The older children should be limited to the ground level outdoor play areas which are shielded and setback from sensitive use boundaries.
- Part of controlling noise emissions associated with the proposed use will rely on facility management being active and aware of potential noise issues. Guideline recommendations for general operations include the following:
  - Implementing management plans for non-typical events (eg. crying) within outdoor areas to ensure that the events are relocated to indoor areas and resolved promptly.
  - Communication with parents/guardians relating to expectations during arrival/departure from the subject site. This will include minimising loud communication, and operating vehicles in 'reasonable' manner.
  - Clear signage within car parking areas which notifies parents / guardians to be aware of their surroundings and to conduct themselves in a 'reasonable' manner.
  - Provision of facility contact details for parents and neighbours to facilitate communication and to resolve any neighbourhood issues that may arise due to operation of the Centre.
  - Staff to be educated to control their volume of voice when located outdoors.

  It may be suitable for the proposed facility to prepare a noise management plan which identifies potential issues and includes set processes to minimise noise emissions which includes the above.

8.6.2. Proposed Acoustic Barriers

Due to the proximity of the sensitive receptors located at 1 King Street, 10 King Street and 7 Maltravers Road, WMG has recommended acoustic barriers around the outdoor play areas to minimise noise emissions from outdoor play in the direction of the critical receptors.

In order to provide the necessary noise reduction qualities, the acoustic barriers must be constructed as follows:

- Manufactured of materials weighing at least 12 kg/m^2.
- Suitable materials may include 9mm cement sheet, 3no. layers of 0.48 mm colorbond steel sheet, 6mm glass, 15mm polycarbonate or 25mm thick timber panels.
- If constructed from timber or plywood, the structure must be stable so that the materials do not crack or warp during the life of the acoustic fence.
- Installed in a manner that does not allow gaps between the fence and the ground, between panels or between the edge of the fence and any adjoining walls or surfaces.
- A common acoustic paling fence will be constructed from a minimum of 25 mm thick x 150 mm wide treated vertical timber boards, butted together and with 50 mm cover strips. Fencing will include a barge board partially buried in the ground.
- If access doors are to form part of acoustic barrier fences, then the doors must be constructed as per the fence and include an overlapping section to minimise the gaps around the perimeter of the openable section. Rubber seals must also be included to eliminate gaps between the openable section and the ground below as well as the adjoining fixed panels.
- The location of the barriers must align with site boundaries which typically have the highest ground elevation to maximise the noise reduction provided by the barrier.

The proposed acoustic barrier configuration is marked up below in Figure 4.

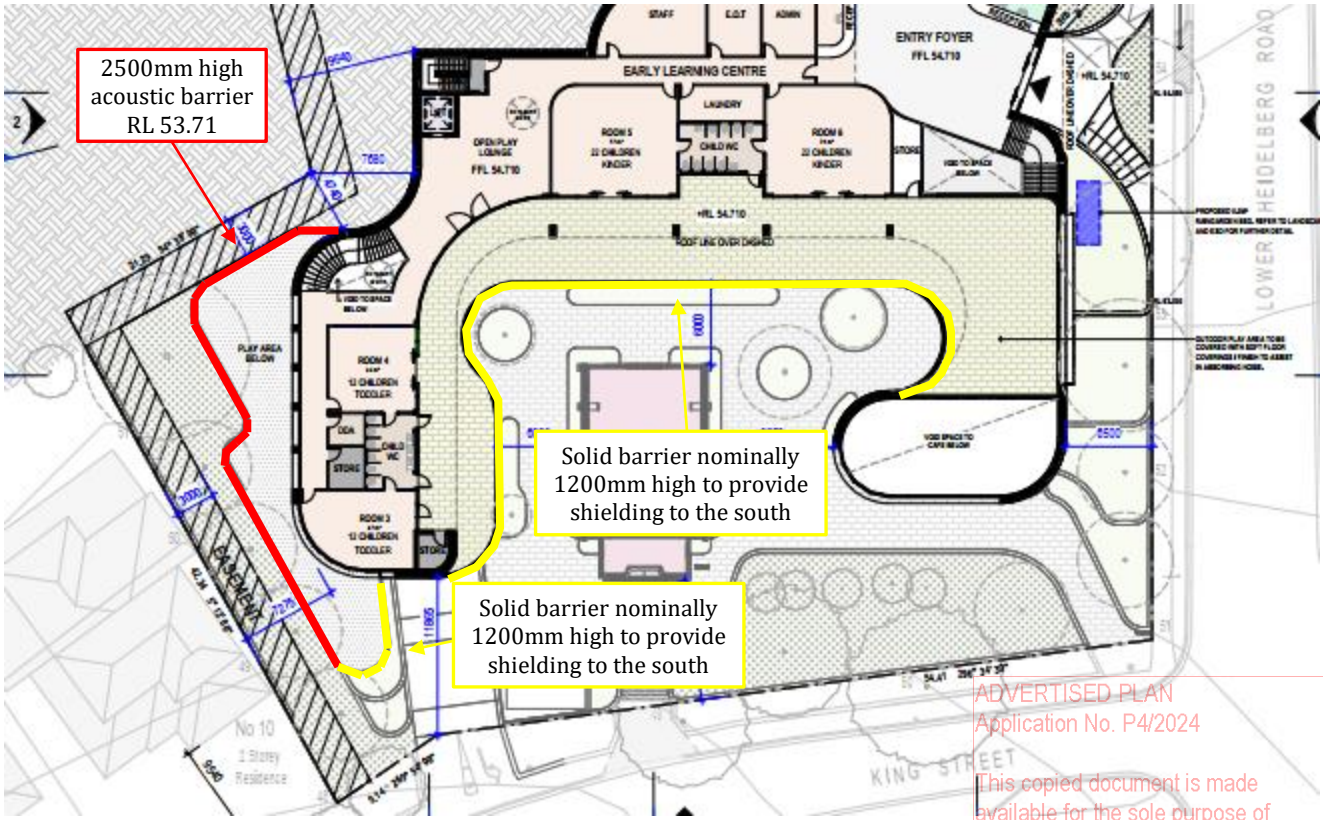


Figure 4: Acoustic Barrier Markup

9. Consideration of Occupiable Outdoor Areas

It is noted that the proposal includes general outdoor areas associated with the garden terrace, as well as the outdoor splash area where people will occupy and may generate noise emissions.

Based on discussions with the client, it is understood that the garden terrace will essentially be used as a transient space for access to the health and wellbeing building and pool facilities. As a result, it would be expected that patrons occupying the area would only be doing so for a short period of time and would be communicating as they walk and hence not creating significant noise emissions.

The outdoor splash area will be used by patrons and likely younger children during typical operating hours. The area is elevated, and setback from sensitive receptors by 30-50 metres. Furthermore, the area is in proximity to the highly trafficked Lower Heidelberg Road which has been observed and measured to dominate the acoustic environment at the nearest sensitive receptors.

Despite the above, and in accordance with the operators general environmental duty, it may be considered reasonable that the operator introduces a noise management plan for the use which addresses potential noise emissions due to patrons using the garden terrace, and outdoor splash area.

The intent would be to avoid 'unreasonable' behaviour in the described areas which may generate significant noise impacts on the nearby residential receptors. This would likely be most relevant within the garden terrace which is in closer proximity to existing sensitive uses.

It would be envisaged that the noise management plan would be prepared in consultation with an acoustic consultant to ensure that it adequately addresses potential noise impacts.

10. General Environmental Duty

In accordance with the requirements of the general environmental duty, the client must consider the potential risks associated with the proposed use and reduce these risks as far as reasonably practicable.

This assessment has identified a risk that site noise emissions will exceed relevant noise criteria at sensitive receptors in the absence of any specific noise control and has therefore provided suitable noise control strategies for addressing site noise emissions.

It would be expected that including the nominated noise control strategies within the proposed design, and adopting the operating parameters included in this report will align with the client fulfilling their general environment duty.

Further to the above, and in accordance with the requirements of The Act, the client would be deemed to be in breach of the GED if they fail to do any of the following in the course of conducting the business or the undertaking so far as reasonably practicable:

- use and maintain plant, equipment, processes and systems in a manner that minimises risks of harm to human health and the environment from pollution and waste;
- use and maintain systems for identification, assessment and control of risks of harm to human health and the environment from pollution and waste that may arise in connection with the activity, and for the evaluation of the effectiveness of controls;
- use and maintain adequate systems to ensure that if a risk of harm to human health or the environment from pollution or waste were to eventuate, its harmful effects would be minimised;
- ensure that all substances are handled, stored, used or transported in a manner that minimises risks of harm to human health and the environment from pollution and waste;
- provide information, instruction, supervision and training to any person engaging in the activity to enable those persons to comply with the general environmental duty.

The described items will likely be internal processes involving training and documentation to address any potential emissions from the site in the event that they occur.

11. Conclusion

WMG has undertaken an assessment to address potential acoustic implications associated with the new Integrated Community Facility proposed for construction at 321 Lower Heidelberg Road, Ivanhoe East.

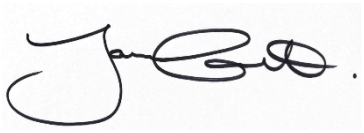
As part of the assessment, WMG has undertaken noise monitoring at the site to measure noise levels associated with the existing acoustic environment and identify sensitive receptors in proximity to the site.

Using site measurement data, WMG has provided relevant information in relation to the following:

- Derivation of suitable noise assessment criteria at sensitive receptors for addressing noise emissions associated with services equipment and general commercial operations forming part of the proposal.
- Preliminary noise control strategies which should be implemented to minimise the potential for adverse impacts at noise sensitive receptors.
- Practical noise control strategies including operating parameters to minimise the potential for adverse impacts at noise sensitive receptors due to children playing in outdoor areas at the proposed use.

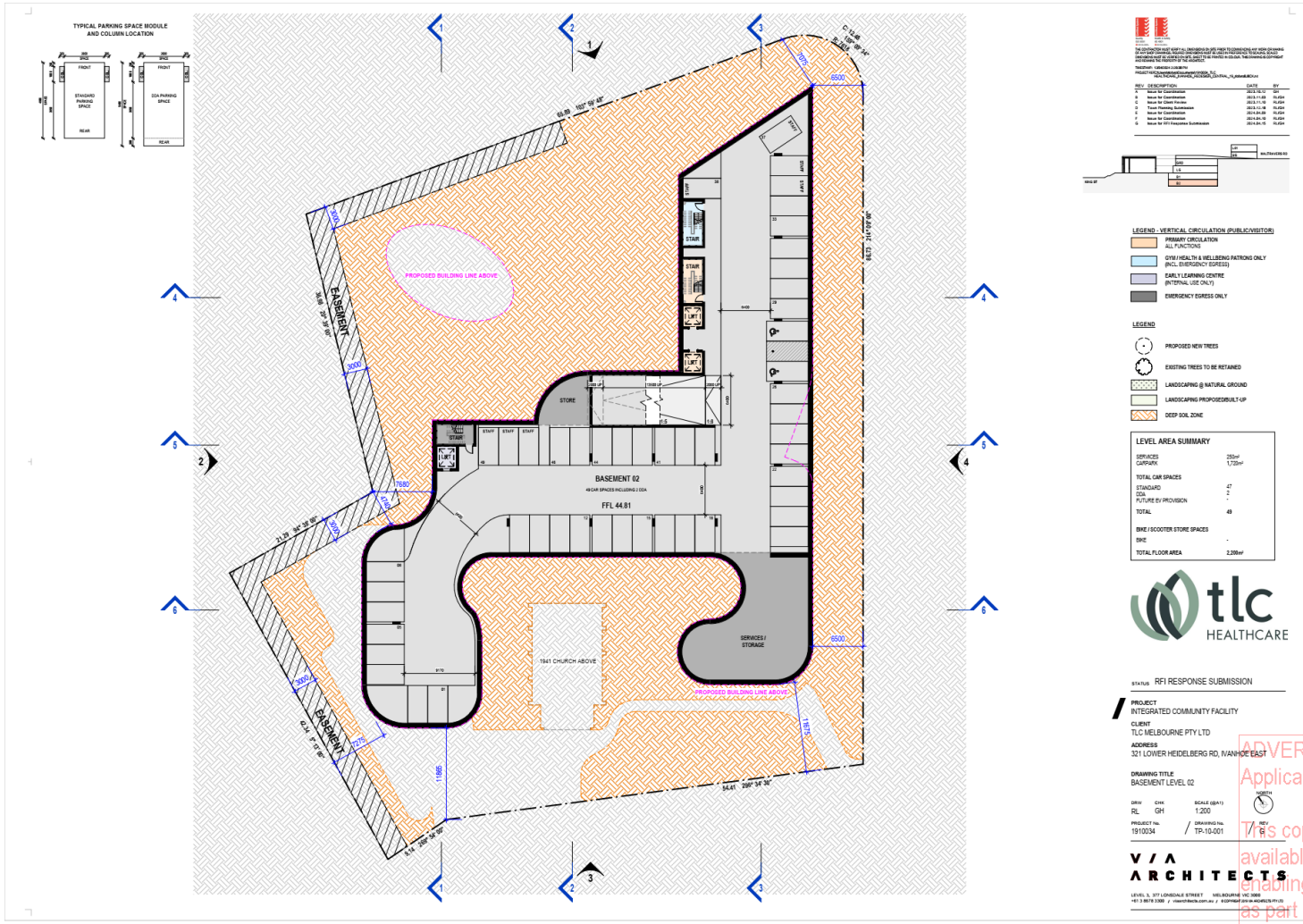
The above are discussed in Section 7.5, Section 8.6, and Section 10.

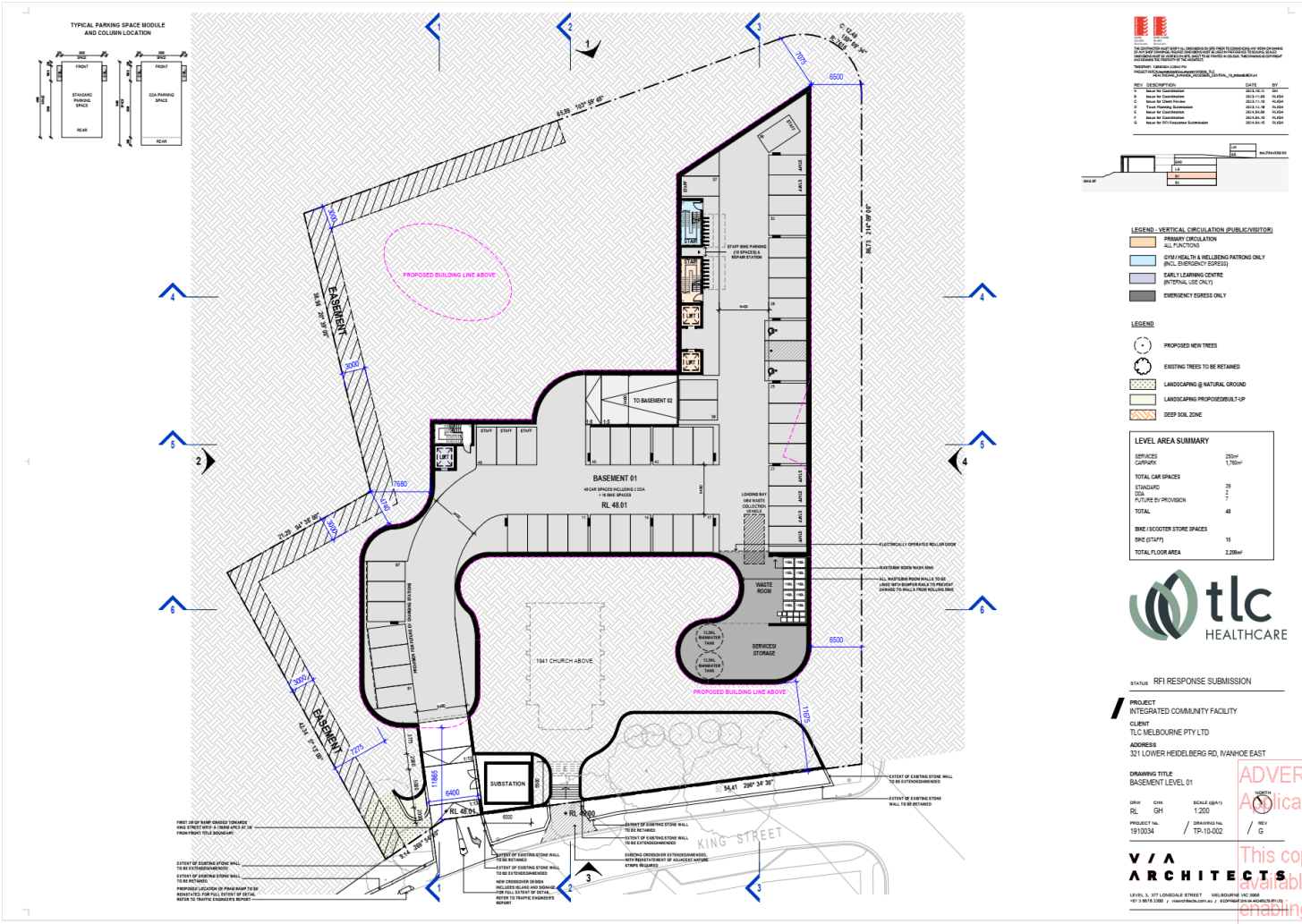
Given the early stages of the proposal, it is recommended that an acoustic consultant is engaged during detailed design for the project, to ensure that potential noise emissions from the site are adequately addressed.

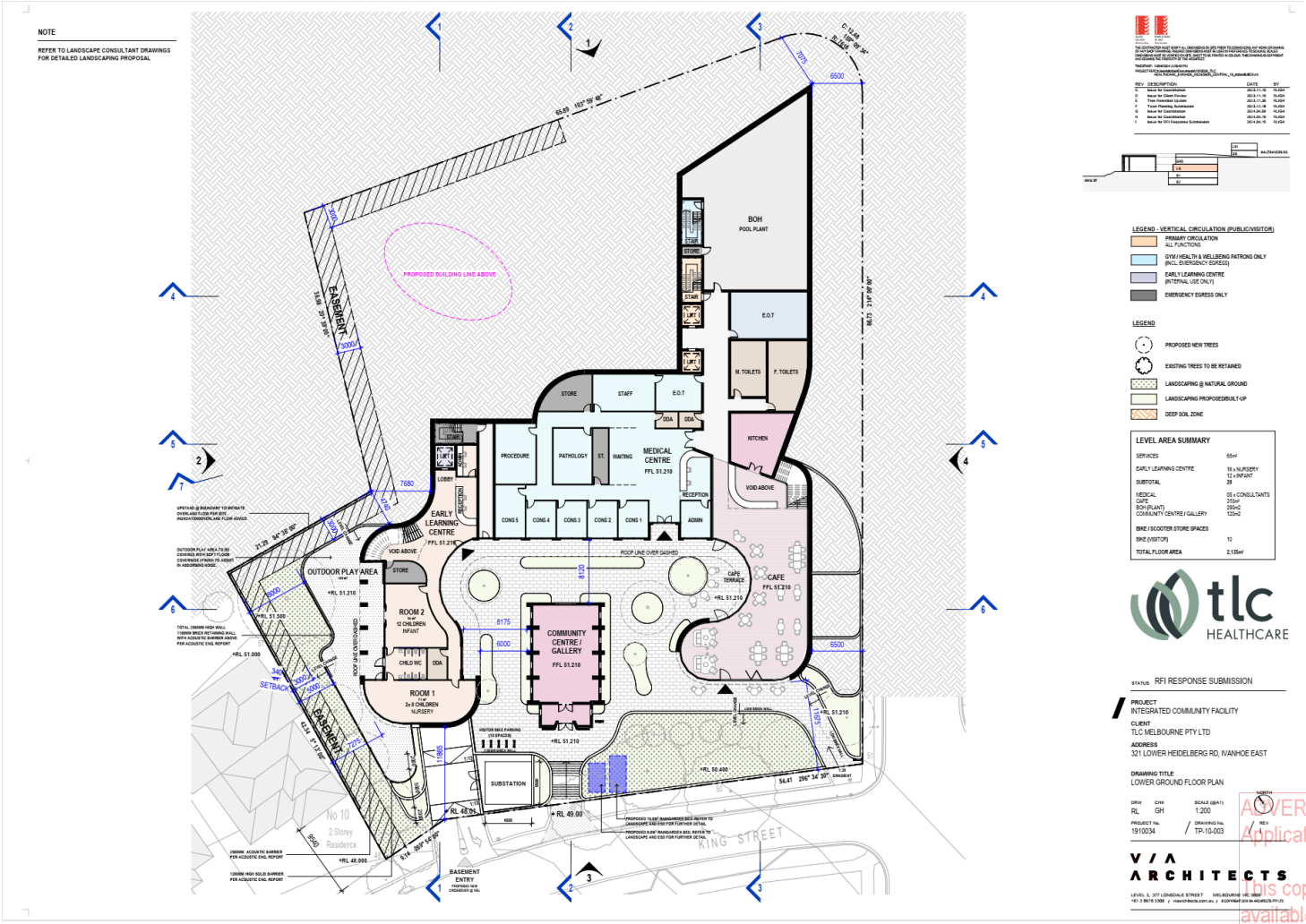


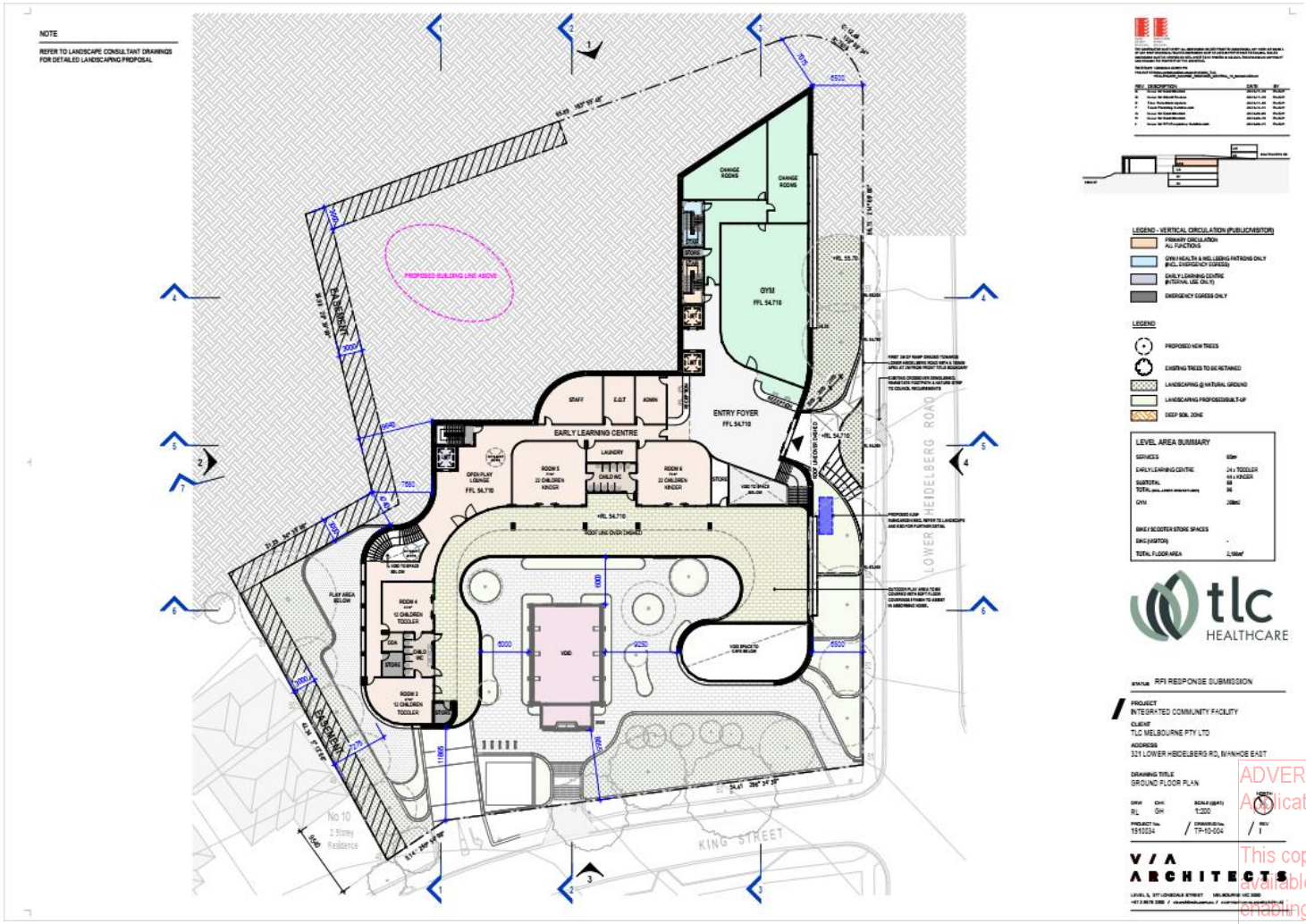
JORDAN GROWCOTT
WATSON MOSS GROWCOTT
ACOUSTICS PTY LTD

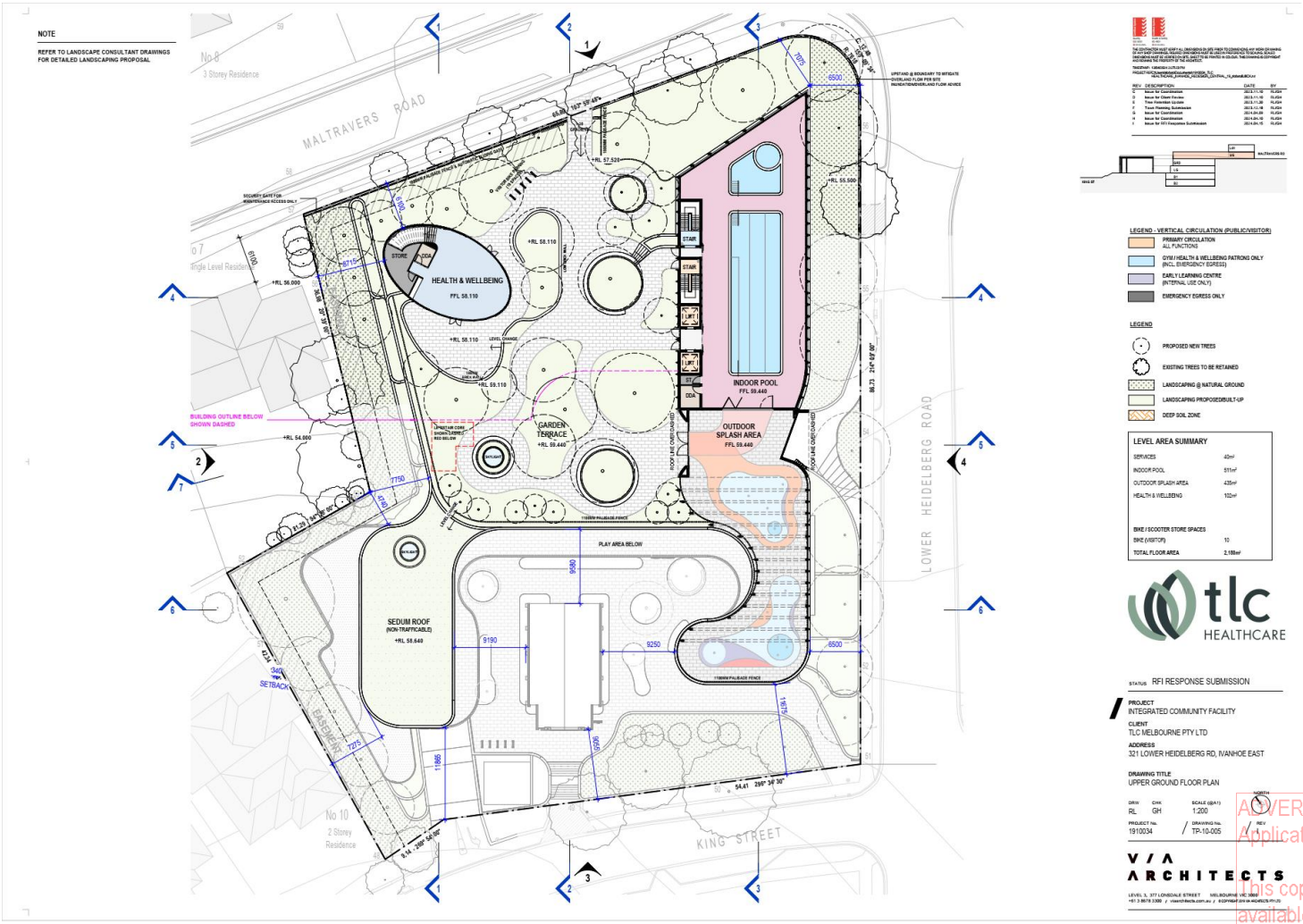
Appendix 1 – Project Floor Plans

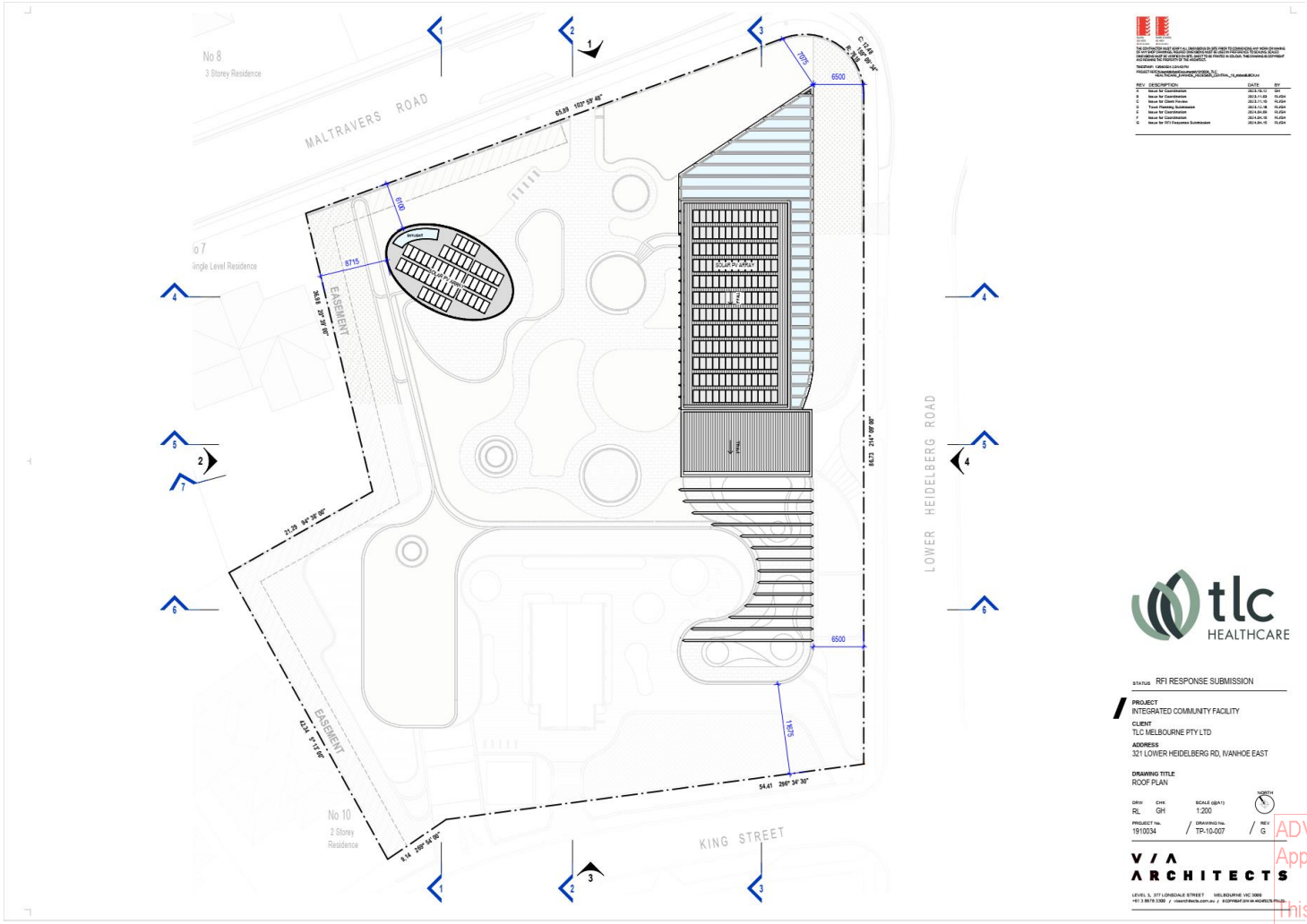












tlc HEALTHCARE

STATUS RFI RESPONSE SUBMISSION

PROJECT
INTEGRATED COMMUNITY FACILITY

CLIENT
TLC MELBOURNE PTY LTD

ADDRESS
321 LOWER HEIDELBERG RD, IVANHOE EAST

DRAWING TITLE
ROOF PLAN

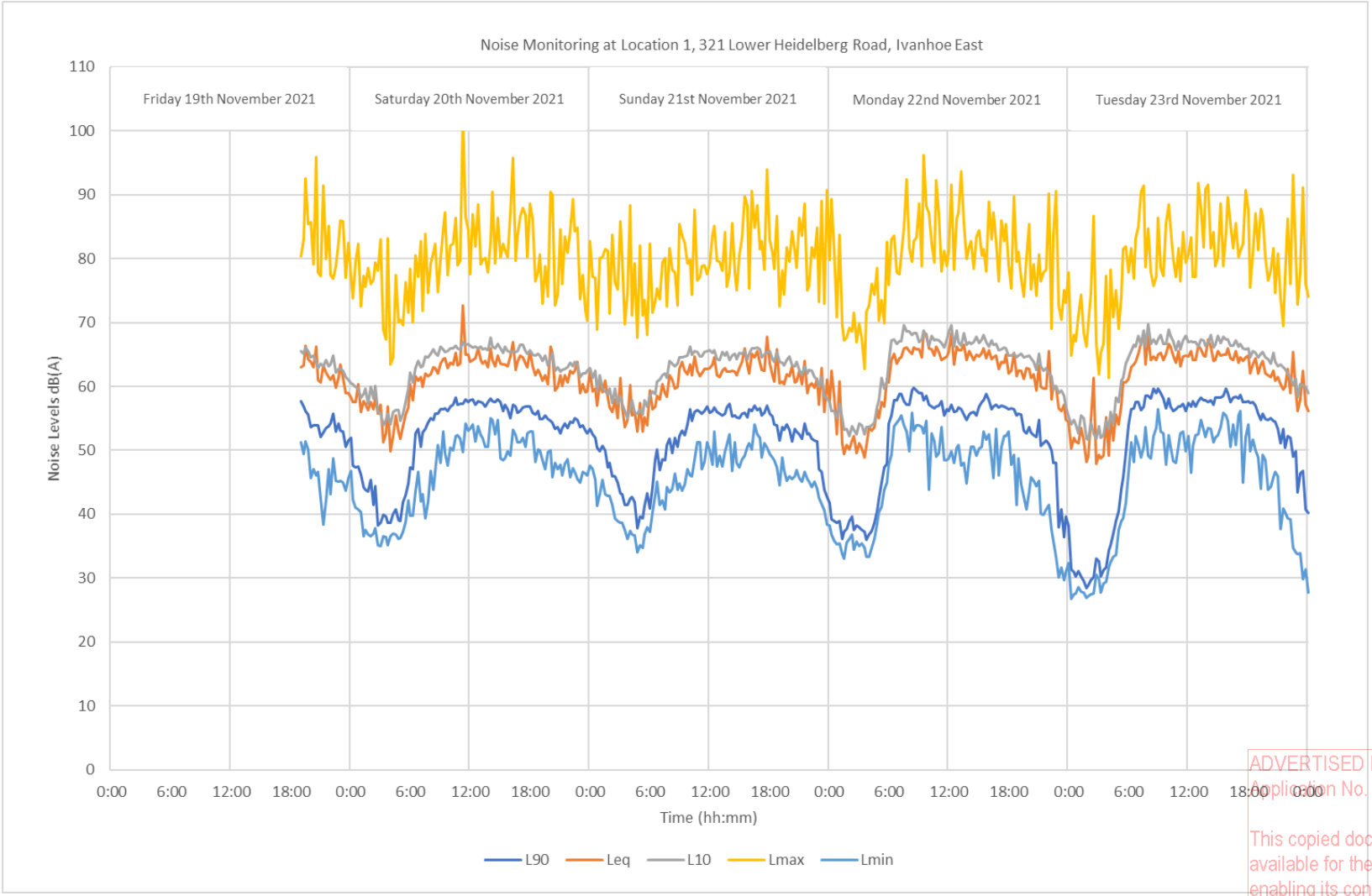
DRW RL CHK GH SCALE (@A1) 1:200 NORTH

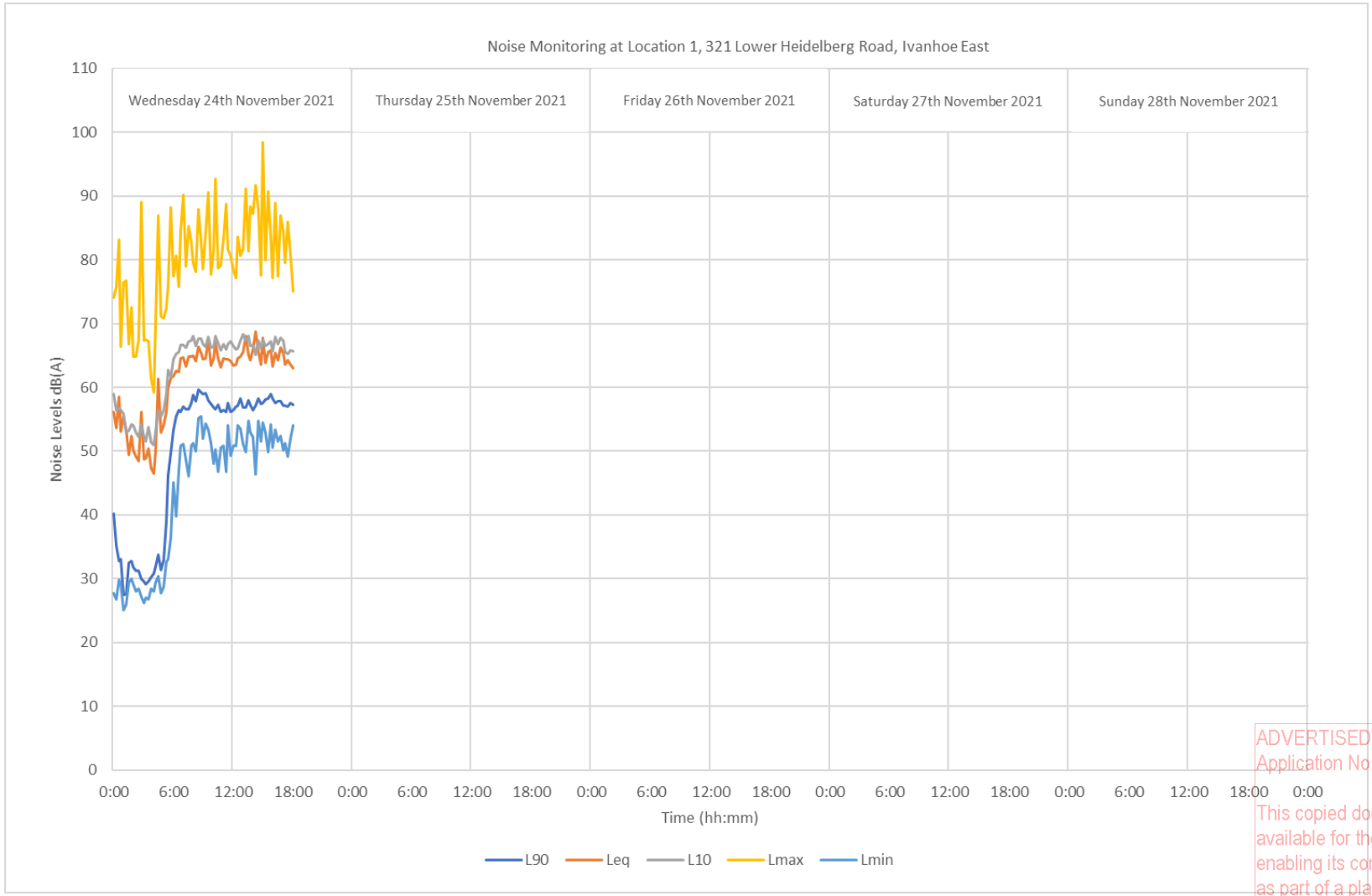
PROJECT No. 1910034 / DRAWING No. TP-10-007 / REV G

V/A ARCHITECTS

LEVEL 3, 377 LOVEDALE STREET MELBOURNE VIC 3000

Appendix 2 – Unattended Noise Monitoring Results (Location 1)





Appendix 3 – Unattended Noise Monitoring Results (Location 2)