Auburn Basketball Centre

Acoustic Impact Assessment Development Application

Cumberland City Council

Report Reference: 230674 – Auburn Basketball Centre – Acoustic Impact Assessment Development Application – R5

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1 INTRODUCTION

Pulse White Noise Acoustics (PWNA) has been engaged by Cumberland City Council to undertake an Acoustic Assessment as part of the Development Application for the proposed development at Auburn Basketball Centre, located at Wyatt Park, Church Street, Lidcombe, NSW 2141. This acoustic assessment has been prepared in accordance with Section 4.12 of the *Environmental Planning and Assessment Act 1979*.

The development application prepared for the proposed development located within Wyatt Park, includes the construction of the new High Performance Facility (HPF) building. This acoustic assessment will evaluate the potential impact of the proposed new development to nearby noise sensitive receivers. This acoustic assessment identifies and addresses the following items:

- Noise sensitive receivers potentially affected by the project noise;
- Existing noise environment at sensitive receivers;
- Project noise objectives;
- Predicted operational noise level at sensitive receivers of the proposed High Performance Facility.
- Construction noise and vibration assessment.

The development will be assessed against relevant statutory regulations and guidelines including the Cumberland Council Development Control Plan (DCP) 2021 and the Environment Protection Authority's (EPA) *Noise Policy for Industry (NPI) 2017*.

1.1 Pre-Development Application meeting minutes

As per pre-Development Application meeting minutes below, this report has addressed section 3 Environmental Health item c which is stated as following:

3. Environmental Health

c) It is requested that an acoustic assessment be submitted to Council from a suitably qualified acoustic consultant with the proposal. The acoustic assessment must demonstrate that the development will comply with the NSW EPA's Noise Policy for Industry (NPfI) and any relevant noise requirements of Council's DCP. The report should give consideration to all noise impacts on any sensitive receivers in the vicinity of the proposed development that may be caused by the development including, but not limited to:

- *mechanical plant;*
- *vehicles entering and leaving the premises;*
- *all operational activities carried out at the development,*
- *demolition*
- *Construction*
- *Vibration.*

The report must also give recommendations where noise attenuation measures are required.

2 SITE DESCRIPTION

The proposed new Auburn Basketball Centre is located at Church Street, Lidcombe. The proposal is situated across two lots legally described as Lot 1 DP 581438 and Lot 7046 DP 1065005. It is understood that the process of amalgamation of the two lots is currently underway and the proposal will sit wholly within one lot.

The proposal forms part of the Auburn Basketball Centre Expansion Project which will include the construction a new dedicated training and development high-performance facility which is to cater for a full spectrum of participation and athlete pathway development. The Centre will be utilised by the Syndey Kings and Sydney Flames Basketball teams.

The new facility will be located approximately 40 metres south west of the existing Auburn Basketball Centre. The following description is a broad summary of works proposed at this site:

- Two additional training basketball courts;
- Retractable spectator seating;
- Gym (including hot and cold athlete recovery spaces);
- Sports science and sports medicine spaces;
- Film room for player development and education;
- Sports administration spaces with 50+ workstations and associated meeting rooms;
- Associated player and spectator amenities;
- Retail store and café associated with the courts; and
- Storage areas.

The new HPF development is proposed to have the following operating hours:

- Weekdays: Monday to Friday 8:00 am to 10:00 pm
- Weekends: Saturday and Sunday 8:00 am to 5:00 pm

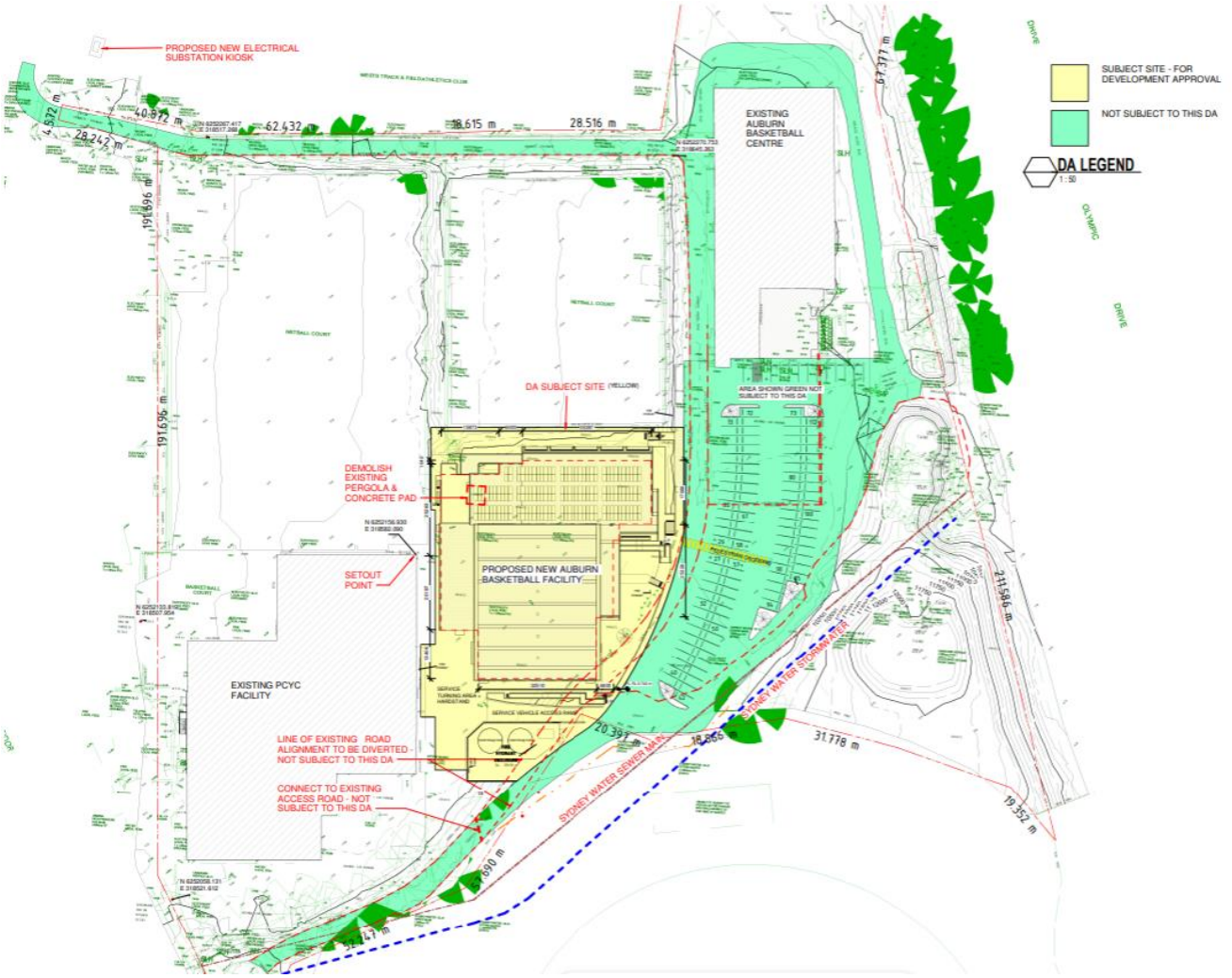
The site is accessed via vehicle from Church Street with emergency egress to/from Olympic Drive. On-site parking and servicing of the site is provided. The site is also within proximity to Auburn and Lidcombe Train Stations and other public transport routes.

The site is located on Crown Land and is under the control and management of Cumberland City Council. The Auburn Basketball Centre is part of a larger reserve known as Wyatt Park that includes athletics clubs, netball courts, a Scout Hall, a Girl Guides club, a youth centre, off leash dog area, oval, sports fields, tennis courts, an aquatic centre and associated parking. The other facilities locFated within Wyatt Park will continue to operate during construction and operation of the Basketball Centre.

This report and associated calculations are based on the architectural drawings supplied by Facility Design Group dated the 8 February 2024. Drawing No A.050.

The proposed project site plan is shown below in Figure 1 below.

Figure 1 Proposed project site plan - 8 February 2024



3 NOISE SENSITIVE RECEIVERS

The majority of the potentially affected residential receivers are located on the east side of the Olympic Drive.

The nearest noise sensitive receivers to the development are detailed below:

Receiver 1: Existing residential receiver to the east of site situated at 81 Yarram Street, Lidcombe. Approximately 175 m from the site.

Receiver 2: Existing residential receiver to the east of site situated at 79 Yarram Street, Lidcombe. Approximately 175 m from the site.

Receiver 3: Existing residential receiver to the east of site situated at 77 Yarram Street, Lidcombe. Approximately 170 m from the site.

Receiver 4: Existing residential receiver to the east of site situated at 75 Yarram Street, Lidcombe. Approximately 165 m from the site.

Receiver 5: Existing residential receiver to the east of site situated at 73 Yarram Street, Lidcombe. Approximately 175 m from the site.

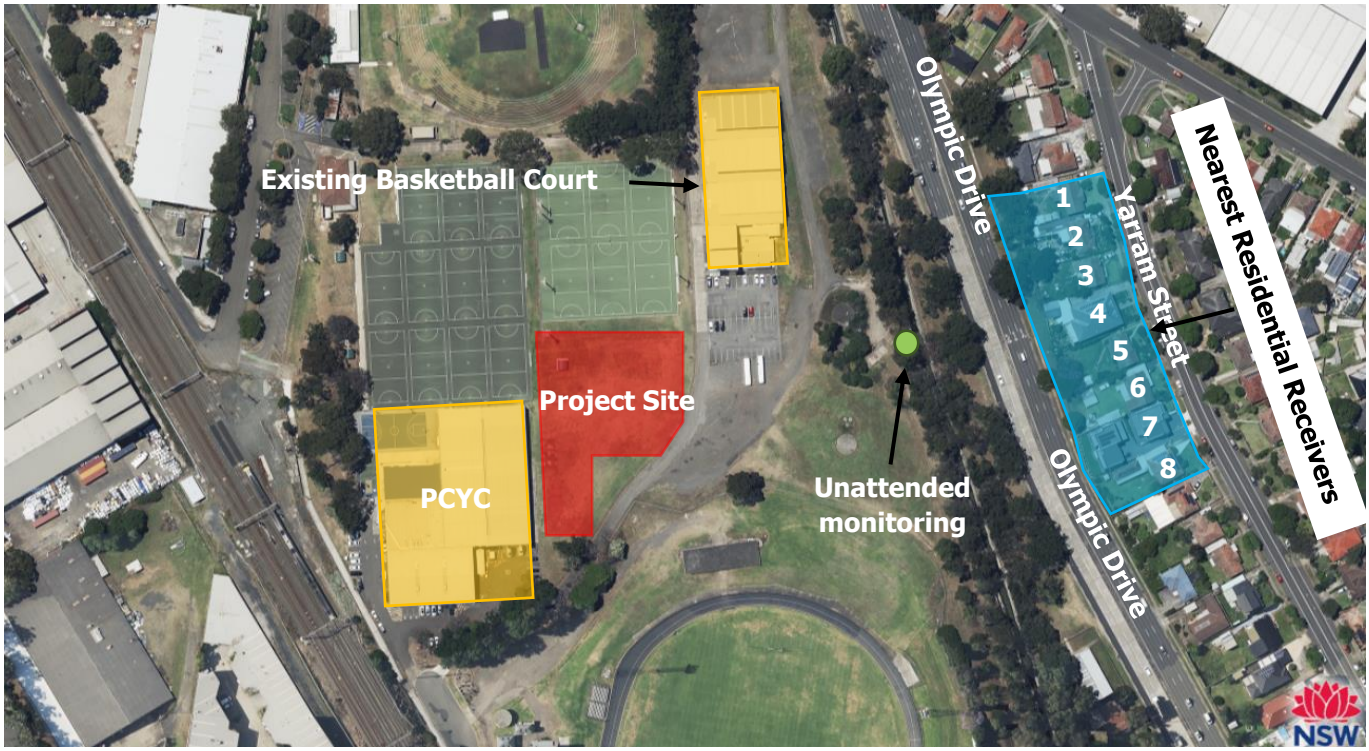
Receiver 6: Existing residential receiver to the east of site situated at 71 Yarram Street, Lidcombe. Approximately 185 m from the site.

Receiver 7: Existing residential receiver to the east of site situated at 69 Yarram Street, Lidcombe. Approximately 175 m from the site.

Receiver 8: Existing residential receiver to the east of site situated at 67 Yarram Street, Lidcombe. Approximately 175 m from the site.

The location of the project site and sensitive receivers are shown in Figure 2.

Figure 2 Project site location (Sourced from SixMaps)



4 EXISTING ACOUSTIC ENVIRONMENT

The project site is located within close proximity to Olympic Drive, which carries high traffic volumes.

The site's closest residential receivers are located within an area which is classified as a *suburban* area as defined in EPA's Noise Policy for Industry and includes the following:

1. Has local traffic with characteristically intermittent traffic flows.
2. Some limited commerce or industry.
3. Area is often characterised by evening ambient noise levels defined by the natural environment and human activity.

4.1 Noise Descriptors and Terminology

Environmental noise constantly varies in level with time. Therefore, it is necessary to measure noise in terms of quantifiable time periods with statistical descriptors. Typically, environmental noise is measured over 15-minute periods and relevant statistical descriptors of the fluctuating noise are determined to quantify the measured level.

Noise (or sound) consists of minute fluctuations in atmospheric pressure capable of detection by human hearing. Noise levels are expressed in terms of decibels, abbreviated as dB or dBA, the "A" indicating that the noise levels have been frequency weighted to approximate the characteristics of normal human hearing. Because noise is measured using a logarithmic scale, 'normal' linear arithmetic does not apply, e.g. adding two sound sources of equal values result in an increase of 3 dB (i.e. 60 dBA plus 60 dBA results in 63 dBA). A change of 1 dB or 2 dB in the sound level is difficult for most people to detect, whilst a 3 dB – 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change roughly corresponds to a doubling or halving in loudness.

The most relevant environmental noise descriptors are the L_{Aeq}, L_{A1}, L_{A10} and L_{A90} noise levels. The L_{Aeq} noise level represents the "equivalent energy average noise level". This parameter is derived by integrating the noise level measured over the measurement period. It represents the level that the fluctuating noise with the same acoustic energy would be if it were constant over the measured time period.

The L_{A1}, L_{A10} and L_{A90} levels are the levels exceeded for 1%, 10% and 90% of the sample period. These levels can be considered as the maximum noise level, the average repeatable maximum and average repeatable minimum noise levels, respectively.

Specific acoustic terminology is used in this assessment report. An explanation of common acoustic terms is included in Appendix A.

4.2 Unattended Acoustic Monitoring

4.2.1 Monitoring Details

To determine the background noise levels at nearby receivers, long term unattended noise monitoring was conducted at a representative receiver location. The location of the noise monitor is shown Figure 2 above.

4.2.2 Monitoring Instrumentation

Instrumentation used for the noise survey comprised of a Svan 977A sound level meter (serial number 81348) fitted with a microphone windshield. The calibration of the loggers was checked prior to and following the measurements. Drift in calibration did not exceed ±0.5 dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Charts presenting summaries of the measured daily noise data are attached in Appendix B. These charts, representing each 24-hour period, shows the L_{A1}, L_{A10} and L_{A90} levels measured over 15-minute time periods.

Logging was conducted between Thursday 30th November and Friday 8th December 2023. The measured results have been filtered to remove data affected by adverse weather conditions, such as excessively windy or rainy time periods, as recorded by the nearest Bureau of Meteorology. Detailed noise logging results are shown in Appendix B.

4.2.3 Measured Ambient Noise Levels

The measured ambient noise data collected by the noise monitor was processed in accordance with the recommendations contained in the NSW Environment Protection Authority's (EPA) *Noise Policy for Industry* (NPI).

The Rating Background Noise Level (RBL) is the background noise level used for assessment purposes at the nearest potentially affected receiver. It is the 90th percentile of the daily background noise levels measured during each assessment period, being day, evening and the night. The RBL $L_{A90(15minute)}$ and L_{Aeq} noise levels are presented in Table 1 for the unattended logging. The measured noise levels are considered to be representative of the levels to be expected at the nearest and most affected residences to the proposed development.

Table 1 Measured ambient noise levels in accordance with the NSW NPI

Measurement Location	Daytime[1] 7:00 am to 6:00 pm		Evening[1] 6:00 pm to 10:00 pm		Night-time[1] 10:00 pm to 7:00 am	
	L_{A90}[2]	L_{Aeq}[3]	L_{A90}[2]	L_{Aeq}[3]	L_{A90}[2]	L_{Aeq}[3]
79 Yarram Street, Lidcombe	53	63	53	62	42	60

Note 1 For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.

Note 2 The L_{A90} noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.

Note 3 The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

4.3 Attended Acoustic Noise Monitoring

In addition to the unattended noise measurement undertaken at project site, PWNA carried out attended noise measurements of activities which were considered to be representative of those expected from sporting activities proposed for the development.

PWNA provided attended noise measurements of a number of scenarios associated with the operation of the existing indoor basketball centre on the evening of Wednesday 13 December 2023 during the period when the basketball court is operational. The following results given in Table 2 presents a summary of the noise levels measured on the project site. These levels are also considered to be representative of the activities associated with the proposed basketball court.

Table 2 Attended noise measurement result

Noise Sources	Overall $L_{Aeq.t}$	Comments
Noise associated with operation of the basketball court		
Game on 2 adjacent courts – Internal reverberant noise level.	80	15 mins noise measurement of internal noise level of 2 courts with 20 players during competition.
Whistle blown with hard strength (Internal)	114	Instant L_{AFmax} noise level

Based on the attended noise measurement, PWNA have noted that the highest frequent noise level events which are associated with the operation of the facility, are whistle blowing from the referees and the basketball games. This noise level of the whistle blowing events were observed to be consistent on each occasion.

5 ACOUSTIC CRITERIA

5.1 The Cumberland Council Development Control Plan (DCP) 2021

A review of the Cumberland City Council Development Control Plan (DCP) 2021 indicates that no numerical acoustic requirements are nominated for sporting developments. In the absence of any objective requirements in the DCP, the NSW EPA *Noise Policy for Industry* (NPI) 2017 will be adopted for the noise emission criteria. See below.

5.2 NSW EPA Noise Policy for Industry (NPI) 2017

In NSW, the control of noise emissions is the responsibility of Local Government (Council) and the NSW Environment Protection Authority (NSW EPA).

The NSW EPA has recently released a document titled *Noise Policy for Industry* (NSW NPI 2017) which provides a framework and process for determining external noise criteria for the assessment of noise emission from industrial developments. The NSW NPI criteria for industrial noise sources have two components:

- Controlling the intrusive noise impacts for residents and other sensitive receivers in the short term; and
- Maintaining noise level amenity of particular land uses for residents and sensitive receivers in other land uses.

5.2.1 Intrusive Noise Impacts (Residential Receivers)

The NSW NPI states that the noise from any single source should not intrude greatly above the prevailing background noise level. Industrial noises are generally considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (L_{Aeq}), measured over a 15-minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB(A). This is often termed the Intrusiveness Criterion.

The 'Rating Background Level' (RBL) is the background noise level to be used for assessment purposes and is determined by the methods given in the NSW NPI. Using the rating background noise level approach results in the intrusiveness criterion being met for 90% of the time. Adjustments are to be applied to the level of noise produced by the source that is received at the assessment point where the noise source contains annoying characteristics such as tonality or impulsiveness.

5.2.2 Protecting Noise Amenity (All Receivers)

To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.2 of the NSW NPI. That is, the ambient L_{Aeq} noise level should not exceed the level appropriate for the particular locality and land use. This is often termed the 'Background Creep' or Amenity Criterion.

The amenity assessment is based on noise criteria specified for a particular land use and corresponding sensitivity to noise. The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. These criteria relate only to other continuous industrial-type noise and do not include road, rail or community noise. If the existing (measured) industrial-type noise level approaches the criterion value, then the NSW NPI sets maximum noise emission levels from new sources with the objective of ensuring that the cumulative levels do not significantly exceed the criterion.

5.2.2.1 Area Classification

The NSW NPI characterises the "Suburban" noise environment as an area with an acoustical environment which shows the following:

- 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.

The residential area to the east of the project site is within a "Suburban" area classification in accordance with Table 2.3 of the NSW NPI. For residential and non-residential receivers, the recommended amenity criteria are shown in Table 3 below.

Table 3 NSW NPI – Recommended L_{Aeq} Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day [1]	Recommended Amenity Noise Level ($L_{Aeq, period}$) [2]
Residence	Suburban	**Day**	**55**
		Evening	**45**
		Night	**40**
	Urban	Day	60
		Evening	50
		Night	45
Commercial	All	When in use	65
Industrial	All	When in use	70

Note 1 For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.

Note 2 The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

When the existing noise level from industrial noise sources is close to the recommended "Amenity Noise Level" (ANL) given above, noise from the new source must be controlled to preserve the amenity of the area in line with the requirements of the NSW NPI.

Where existing road traffic noise is high enough to render stationary industrial noise sources effectively inaudible, the ANL can be modified so that the amenity criteria is not unduly stringent in an environment where road traffic noise is the dominant source of environmental noise. If all the conditions below are satisfied, the ANL becomes $L_{Aeq,traffic}$ minus 15 dBA. The conditions are:

- The road traffic noise is the dominant noise source.
- The existing noise is 10dB(A) or more above the acceptable ANL for the area.
- It is highly unlikely the road traffic noise levels would reduce in the near future.

5.2.3 Maximum Noise Level Assessment

Section 2.5 of the NPI states the following:

> *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:*
>
> - *$L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
> - *L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*
>
> *a detailed maximum noise level event assessment should be undertaken.*

As outlined in section 4.2 above, the measured rating background noise level during the night hours (10:00pm to 7:00am) is 42 dBA L_{A90}. Therefore, the resulting RBL + 15dBA is 57dBA L_{AFMax}.

5.2.4 Project Specific External Noise Emission Criteria

The intrusive and amenity criteria for industrial noise emissions, derived from the measured data, are presented in Table 4. These criteria are nominated for the purpose of determining the operational noise limits for development which can potentially affect noise sensitive receivers.

For each assessment period, the lower (i.e., the more stringent) of the amenity or intrusive criteria are adopted. These are shown in bold text in Table 4.

Table 4 External noise level criteria in accordance with the NSW NPI

Location	Time of Day [1]	Project Amenity Noise Level, $L_{Aeq, period}$ [2] (dBA)	Measured $L_{A90, 15\ min}$ (RBL) [3] (dBA)	Measured $L_{Aeq, 15\ min}$ [4] (dBA)	Intrusive $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA)	Amenity $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA)
Residential Receiver	Day	50	53	63	58	**51**
	Evening	40	53	62	58	**50**
	Night	35	42	60	**47**	48
Commercial	When in Use	60	-	-	-	**63**

Note 1 For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 1:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 1:00 am.

Note 2 Project Amenity Noise Levels corresponding to "Suburban" areas, equivalent to the Recommended Amenity Noise Levels minus 5 dBA.

Note 3 LA90 Background Noise or Rating Background Level.

Note 4 The LAeq is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

*Note 5 Project Noise Trigger Levels are shown in **bold**.*

Note 6 According to Section 2.2 of the NSW NPI, the LAeq, 15 minutes is equal to the LAeq, period + 3 dB.

In addition, a maximum noise level criterion of 57dBA L_{AFmax} during the night period (10:00pm to 7:00am) at residential receivers also applies.

5.3 NSW DECCW - NSW Road Noise Policy (RNP) 2011

For existing residences and other sensitive land uses affected by additional traffic on existing roads, the NSW Road Noise Policy states that for noise associated with increased road traffic generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB during both day and night-time periods. An increase of 2 dB represents a minor impact that is considered barely perceptible to the average person.

6 CONSTRUCTION NOISE AND VIBRATON ASSESSMENT

This section of the report details the assessment of construction noise and vibration during the construction stages of the project.

6.1 Construction Noise Assessment

This section of the report details the assessment of noise associated with the proposed construction activities associated with the development. The assessment has been undertaken to assess the potential noise impacts from construction and demolition on surrounding receivers to the site.

The proposed construction activities to be undertaken on the site include the site preparation and earth works. The development will then be constructed using normal construction processes.

6.1.1 Construction Noise

The assessment of construction noise impacts generated from the site has been undertaken in accordance with the requirements of the EAP Interim Construction Noise Guideline.

The EPA's Interim Construction Noise Guideline defines normal day time hours as the following:

The recommended standard hours for construction work are shown in Table 5 below; however, they are not mandatory. There are some situations, as described below, where construction work may need to be undertaken outside of these hours. The likely noise impacts and the ability to undertake works during the recommended standard hours should be considered when scheduling work.

Table 5 Recommended standard hours

Work type	Recommended standard hours of work
Normal construction	Monday to Friday 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sundays or public holidays
Blasting	Monday to Friday 9:00 am to 5:00 pm Saturday 9:00 am to 1:00 pm No blasting on Sundays or Public holidays

Note 1: The relevant authority (consent, determining or regulatory) may impose more or less stringent construction hours.

6.2 Approved Hours of Work

Works on the site will be undertaken in accordance with the requirements of the project specific *Conditions of Consent* when available.

6.2.1 Expected Construction Appliances

The expected construction appliances which will be used as part of the demolition and construction of the project are detailed in the table below.

Table 6 Noise Level from Expected Construction Appliances

Tasks	Equipment	Sound Power Levels per task dB(A) L_{10}	Aggregate Sound Power Level per Task dB(A) L_{10}
Site Demolition works	Jack hammer mounted on excavator	118	122
	Excavators and bulldozers	115	
	Hand held jack hammer	111	
	Concrete saw	119	
	Skid steer	110	
	Power hand tools	109	
	Materials Movements	105	
Site Excavations	Jack hammer mounted on excavator	118	122
	Saw cutting	119	
	Excavators and bulldozers	115	
	Materials Movements	105	
	Bulldozers	115	
	Trucks	109	
Construction Works	Piling	115	120
	Welder	101	
	Saw cutter	109	
	Dump truck	109	
	Concrete saw	119	
	Power hand tools	109	
	Cranes	110	

Note: Noise levels of proposed equipment to be used on the site based on the Australian Standard AS2436-2010 and noise level measurements previously undertaken of similar equipment on construction sites.

6.3 Construction Noise Criteria

This section of the report details the relevant construction noise criteria which is applicable to the site including the EPA's *Interim Construction Noise Guideline* (ICNG).

6.3.1 Interim Construction Noise Guideline

Noise criteria for construction and demolition activities are discussed in the *Interim Construction Noise Guideline* (ICNG). The ICNG also recommends procedures to address potential impacts of construction noise on residences and other sensitive land uses. The main objectives of the ICNG are summarised as follows:

- Promote a clear understanding of ways to identify and minimise noise from construction works;
- Focus on applying all "feasible" and "reasonable" work practices to minimise construction noise impacts;
- Encourage construction to be undertaken only during the recommended standard hours unless approval is given for works that cannot be undertaken during these hours;
- Streamline the assessment and approval stages and reduce time spent dealing with complaints at the project implementation stage; and
- Provide flexibility in selecting site-specific feasible and reasonable work practices in order to minimise noise impacts.

The ICNG contains a quantitative assessment method which is applicable to this project. Guidance levels are given for airborne noise at residences and other sensitive land uses.

The quantitative assessment method involves predicting noise levels at sensitive receivers and comparing them with the Noise Management Levels (NMLs). The NML affectation categories for receivers have been reproduced from the guideline and are listed in the table below.

Table 7 Noise Management Levels from Construction

Receiver Type	Time of Day	Noise Management Level $L_{Aeq(15minute)}$ [1,2]	How to Apply
Residential	Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays OR, during approved construction hours	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.

Receiver Type	Time of Day	Noise Management Level $L_{Aeq(15minute)}$[1,2]	How to Apply
		Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences. 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
	Outside recommended standard hours or approved working hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB above the noise affected level, the proponent should negotiate with the community.

Table 12 Continued vibration acceleration criteria (m/s²) 1 Hz-80 Hz

Receiver Type	Time of Day	Noise Management Level $L_{Aeq(15minute)}$[1,2]	How to Apply
offices, retail outlets: external	When is use	$L_{Aeq\ (15\ min)}$ 70 dB(A)	During construction, the proponent should regularly update the occupants of the commercial and industrial premises regarding noise levels and hours of work.

Note 1 Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Note 2 The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the NSW Industrial Noise Policy (EPA 2000).

Based on the table above the suitable construction noise management levels for works undertaken on the site is detailed in Table 6 below.

Table 8 Site Construction Noise Management Levels

Noise Source	Time Period	Receiver Type	Construction Noise Management Level[1]	'High Noise Affected' Level[1]
Construction Noise	During normal working hours or approved construction hours	Residential Receivers	58 dB(A) L_{Aeq} (15min)	75 dB(A) L_{Aeq} (15min)
	When in use	Commercial receivers	70 dB(A) L_{Aeq} (15min)	75 dB(A) L_{Aeq} (15min)

Note 1: Construction noise management levels based on the Interim Construction Noise Guideline

6.4 Construction Noise Management

Based on the assessment conducted of the expected construction noise levels generated from the site, levels are generally expected to require the building contractor to engage in management of activities on the site and engagement with the local community.

Notwithstanding, the following management controls are recommended to mitigate construction noise levels on the site:

1. Construction to be undertaken within the approved hours detailed within the projects *Conditions of Consent.*
2. All plant and equipment are to be maintained such that they are in good working order.
3. A register of complaints is to be recorded in the event of complaints being received, including location, time of complaint, nature of the complaint and actions resulting from the complaint.
4. If required a noise level measurement of the offending plant item generating complaints is to be conducted and noise mitigations undertaken to reduce noise levels to within Noise Management levels in the event magnitude of noise levels is found to be above suitable levels.
5. The use of percussive and concrete sawing should be undertaken behind a closed façade when possible.
6. The use of percussive equipment including hydraulic hammering should be limited such that they are not undertaken prior to 7.30am on weekdays and prior to 8.30am on Saturdays.
7. Where possible any excavation to be undertaken on the site is to include ripping of material where possible.

In addition to the recommended mitigations above details of the proposed construction (including demolition) works to be conducted on the site, including type of activities to be conducted as well as the expected duration of activities should be provided to the neighbouring receivers.

In the event noise levels are found to required additional noise reduction then all possible and practical mitigations are required to be included in the construction of the project. Possible acoustic treatments and controls may include the following:

1. Use of alternative appliances to complete the required works which result in reduced noise impacts on surrounding neighbours.
2. Period when noisy appliances are undertaken, such as undertaking noisy works on locations with the greatest distance to residential receivers during morning periods if possible.
3. Construction of acoustic screening to permanently located high noise generating equipment such as pumps and generators.
4. Scheduling of high noise generating works outside of noise sensitive periods if possible.
5. Other site specific treatments and controls which may become possible once works commence.

6.5 Construction Vibration Assessment

This section of the report details the assessment of construction vibration impacts on surrounding receivers.

Effects of ground borne vibration on buildings may be segregated into the following three categories:

- Human comfort – vibration in which the occupants or users of the building are inconvenienced or possibly disturbed. Refer to further discussion in Section 5.1.
- Effects on building contents – where vibration can cause damage to fixtures, fittings and other non-building related objects. Refer to further discussion in Section 5.2.
- Effects on building structures – where vibration can compromise the integrity of the building or structure itself. Refer to further discussion in Section 5.3.

6.5.1 Vibration Criteria – Human Comfort

Vibration effects relating specifically to the human comfort aspects of the project are taken from the guideline titled *"Assessing Vibration – A Technical Guideline"*. (AVTG) This type of impact can be further categorised and assessed using the appropriate criterion as follows:

- Continuous vibration – from uninterrupted sources (refer to Table 9).
- Impulsive vibration – up to three instances of sudden impact e.g. dropping heavy items, per monitoring period (refer to Table 13).
- Intermittent vibration – such as from drilling, compacting or activities that would result in continuous vibration if operated continuously (refer to Table 14).

Table 9 Continuous vibration acceleration criteria (m/s²) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day or night-time	0.020	0.014	0.040	0.028
		0.04	0.029	0.080	0.058
Workshops	Day or night-time	0.04	0.029	0.080	0.058

Table 10 Impulsive vibration acceleration criteria (m/s²) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	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

Table 11 Intermittent vibration impacts criteria (m/s$^{1.75}$) 1 Hz-80 Hz

Location	Daytime		Night-time	
	Preferred Values	Maximum Values	Preferred Values	Maximum Values
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

6.5.2 Vibration Criteria – Building Contents and Structure

The vibration effects on the building itself are assessed against international standards as follows:

- For transient vibration: British Standard BS 7385: Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration" (BSI 1993); and
- For continuous or repetitive vibration: German DIN 4150: Part 3 – 1999 "Effects of Vibration on Structure" (DIN 1999).

6.5.3 Standard BS 7385 Part 2 - 1993

For transient vibration, as discussed in standard BS 7385 Part 2-1993, the criteria are based on peak particle velocity (mm/s) which is to be measured at the base of the building. These are summarised in

Table 12 and illustrated in the Figure below.

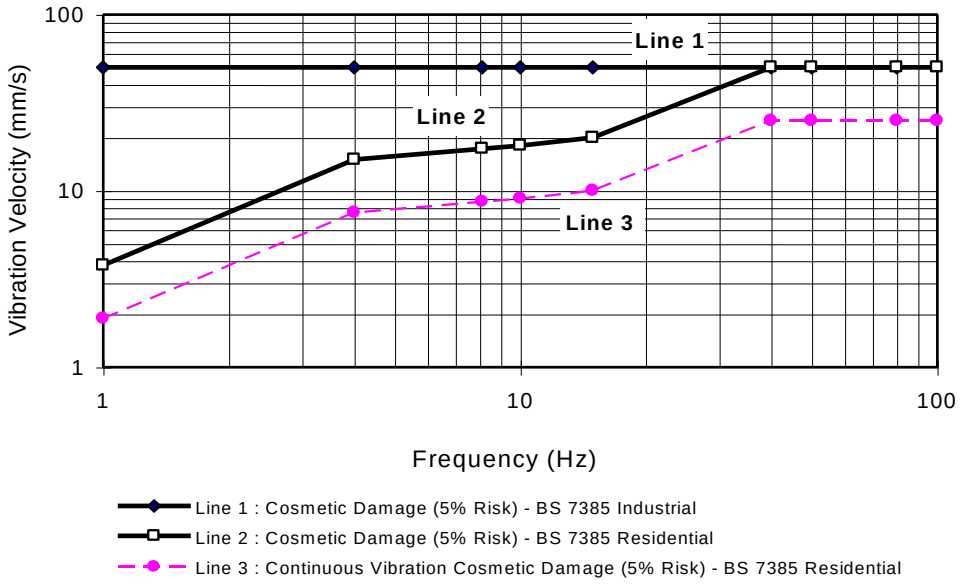
Table 12 Transient vibration criteria as per standard BS 7385 Part 2 - 1993

Line in Figure 3	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Standard BS 7385 Part 2 – 1993 states that the values in Table 18 relate to transient vibration which does not cause resonant responses in buildings.

Where the dynamic loading caused by continuous vibration events is such as that results in dynamic magnification due to resonance (especially at the lower frequencies where lower guide values apply), then the values in Table 18 may need to be reduced by up to 50% (refer to Line 3 in the Figure below).

Figure 3 BS 7385 Part 2 – 1993, graph of transient vibration values for cosmetic damage



In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the recommended values corresponding to Line 2 are reduced. Below a frequency of 4 Hz where a high displacement is associated with the relatively low peak component particle velocity value, a maximum displacement of 0.6 mm (zero to peak) is recommended. This displacement is equivalent to a vibration velocity of 3.7 mm/s at 1 Hz.

The standard also states that minor damage is possible at vibration magnitudes which are greater than twice those given in Table 18, and major damage to a building structure may occur at values greater than four times the tabulated values.

Fatigue considerations are also addressed in the standard and it is concluded that unless calculation indicates that the magnitude and number of load reversals is significant (in respect of the fatigue life of building materials) then the values in Table 18 should not be reduced for fatigue considerations.

6.5.4 Standard DIN 4150 Part 3 - 1999

For continuous or repetitive vibration, standard DIN 4150 Part 3-1999 provides criteria based on values for peak particle velocity (mm/s) measured at the foundation of the building; these are summarised in 19. The criteria are frequency dependent and specific to particular categories of structures.

Table 13 Structural damage criteria as per standard DIN 4150 Part 3 - 1999

Type of Structure	Peak Component Particle Velocity, mm/s			
	Vibration at the foundation at a frequency of			Vibration of horizontal plane of highest floor at all frequencies
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz[1]	
Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
Structures that, because of their sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Note 1 For frequencies above 100Hz, at least the values specified in this column shall be applied.

6.6 Project Vibration Criteria

Based on the details included in the sections above the project specific vibration criteria to protect the surrounding residential receivers from structural or architectural damage includes the following:

1. Project construction vibration criteria at all surrounding building structures – 7 mm/s
2. Project construction vibration criteria for heritage building structures – 2.5 mm/s to supersede all other vibration limit.

6.6.1 Construction Vibration Impacts

An assessment of the potential for vibration generated as part of the required construction activities on the project (including excavation, demolition and construction) has been undertaken.

As the proposed building to be demolished on the site are not attached to neighbouring structures and the proximity of neighbouring structures to the development site (which include mainly commercial receives) vibration levels generated from the proposed demolition and construction on the site are expected to comply with all vibration criteria detailed in this report.

In the event excavation is required on the site including removal of stone, the following management technique should be included in the excavation methodology:

- A saw cut at the perimeter of any excavation within rock on the excavation boundary if adjacent to any neighbouring residential properties are required to include a saw cut to the rock prior to use of any excavation or ripping.

6.7 Noise and Vibration Measurement and monitoring

As part of the management of noise from the proposed demolition, excavation and construction activities to be undertaken on the site the following noise and vibration measurements are recommended to be undertaken:

1. Noise – Attended noise level measurements of typical demolition if required, excavation and construction activities should be undertaken at site.

   Attended construction noise surveys of the site and surrounding impacts on neighbours should be undertaken during the following as a minimum:

   a. Commencement of any rock breaking or sawing on the site.
   b. In response to any ongoing complaints received from neighbours.

2. Vibration – Based on the proximity of the surrounding receivers to the works attended vibration measurements of typical demolition, excavation and construction activities should be undertaken at site.

   Attended construction vibration measurements at representative locations to the neighbouring building structures should be undertaken at the following times as a minimum:

   a. Commencement of any rock breaking or sawing on the site required to be conducted within rock during the excavation stage of the project.
   b. In response to any ongoing complaints received from neighbours.

6.8 Community Engagement

During the proposed construction of the project (including demolition, excavation and construction) the building contractor is required to engage in community interaction. The community interaction and notification is required to include the following:

1. Notification of the proposed works to be undertaken on the site and the periods when works will be conducted, including information regarding the programme of works such as demolition and excavation. This should include the expected period when activities such as hydraulic hammering, rock breaking, concrete or rock sawing is required to be undertaken.

2. Details of the relevant site representative where complaints can be registered.

3. Details of the methodology to respond to complaints raised from the surrounding receivers.

A register of complaints, to be kept on site including record of time and nature of the complaint as well as the outcomes and comments regarding investigations resulting from the complaint.

7 OPERATIONAL NOISE IMPACTS

Predictive noise modelling was carried out using the ISO 9613 algorithm within SoundPLAN 8.2. The SoundPLAN software package allows a 3D computational model of the site and surrounding area to be created. Inputs into the noise model included terrain, ground absorption, receiver locations and noise sources.

7.1 Noise Generating Scenarios

The site is likely to have additional noise sources such as mechanical plant associated with air-conditioning. Given the project is still in the planning stages, equipment selections are not available. However, locations for mechanical plant are recommended to installed facing away from sensitive receivers.

Once the proposed locations of major plant and the controls become available, all mechanical plant and equipment will be designed to comply with the relevant noise emissions requirements. Experience with similar projects indicates that it is both possible and practical to achieve compliance by using typical building services attenuation such as internally lined ductwork, acoustic screening, and/or silencers. Final details of the nature of these attenuation measures would be confirmed in detailed design process when plant requirements and selections are available.

This section includes assessment of the potential operational noise with the sport activity facilitated by the proposed development.

Given the information above, the noise generating scenarios for the typical worst case 15-minute day, evening and night-time scenarios, are shown below:

Day Scenario (8am and 6pm)

- 100 light vehicle movements (i.e., arriving and leaving the premises)
- Fully operational, two games running for both courts with 415 seats fully occupied.

Evening Scenario (6pm and 10pm)

- 100 light vehicle movements (i.e., arriving and leaving the premises)
- Fully operational, two games running for both courts with 415 seats fully occupied.

Night-time Scenario (10pm and 7am)

- 100 light vehicle movements (i.e., arriving and leaving the premises)
- Fully operational, two games running for both courts with 415 seats fully occupied.

The modelled sound power levels of the light vehicle movement sources are shown in Table 14 below.

Table 14 Attended Noise measurement result used for modelling

Noise Sources	Overall $L_{Aeq.t}$	Duty Factor
Noise associated with operation of the basketball court		
Game on 2 adjacent courts – Internal reverberant noise level.	84	15 mins noise measurement of internal noise level.
Light vehicle manoeuvring	58	Lw/m, Moving source, 10km/h, 15mins assessment period

Noise Sources	Overall $L_{Aeq.t}$	Duty Factor
Roof Ventilation Fan	85	Sound Power Level, Lw/unit
Air conditioning units for internal areas	75	Sound Power Level, Lw/unit
Noise Breakout from door (assumed open)	91	Sound Power Level, Lw/unit
Noise Breakout from ventilation louver x 2	91	Sound Power Level, Lw/unit
Noise Breakout through roof	81	Sound Power Level, Lw/unit
Noise Associated with sleep disturbance		
Whistle blown with hard strength (Internal)	114	Instant L_{AFmax} noise level
Car Door Closing	88	Instant L_{AFmax} noise level

7.2 Predicted Operational Noise Impacts

The predicted noise levels identified in Table 15 identify that noise impacts from the site are compliant with the NPfI project noise trigger levels, and below existing ambient noise levels in the area. Noise emissions from the site will not impact the amenity of the neighbourhood.

Table 15 Noise modelling results

ID	Address	Predicted Noise Level $L_{Aeq,15mins}$ dB(A)	Project Noise Trigger Level $L_{Aeq,15mins}$ dB(A)			Compliance
			Day	Evening	Night	
R1	81 Yarram Street	<45	51	50	47	**Yes, full compliance during all time periods based on the management controls outlined below section 7.2.1.**
R2	79 Yarram Street	<45				
R3	77 Yarram Street	<45				
R4	75 Yarram Street	<45				
R5	73 Yarram Street	<45				
R6	71 Yarram Street	<45				
R7	69 Yarram Street	<45				
R8	67 Yarram Street	<45				

7.2.1 Operational Management Controls

- Proposed operation hours as outlined in section 2 of this report.
- All areas have background music at 70 dBA LAeq (Sound Pressure Level).
- A contact number must be displayed for the purposes of receiving any complaints if they arrive.
- Sign must be displayed at all exits reminding players to be mindful of noise when leaving the premises.

7.3 Car Parking Operational Noise Emissions

The proposed development includes ground level carparking for the sport activities occurring each day on site, as well as staff carparking. Traffic noise has been considered due to the typical operation of the Development. The proposed development aims to increase the number of the parking spots to support the future operation of the basketball court. Based on the parking assessment completed by pdc Consultants document reference *TRAFFIC IMPACT ASSESSMENT - Auburn Basketball Centre Expansion, Dated 12 December 2023*. The proposed traffic generation for the new HPF has been assessed, section 5.1 of the traffic assessment stated that the expected traffic generation during the morning peak is 63 per hour between Monday to Friday. 148 Vehicle trips per hour for Saturday peaks.

Car park activities noise emission over a 15-minute period is to be assessed to comply with the established NPfI project trigger noise levels at the nearby noise sensitive receivers.

The following worst-case scenario assumptions have been adopted in the assessment of car park activities noise emission from the development over a 15-minute period. The worst-case assessment has been determined by referencing the "*Guideline to Traffic Generating Development – 3.11.3"*, whereby for a development containing a maximum capacity of the worst-case traffic per 15-minute period is determined to be 100 vehicle movements. A conservative approach has been taken to increase the number of vehicles modelled to 100 within a 15-minute period which represent. This is assuming a worst-case scenario if all carparking spaces were to be filled within a 15-minute period during a 15-minute period.

- 100 x vehicles manoeuvring in the car park with maximum speed of 10 km/h, sound power level of 85 dBA. This has been applied to all 100 vehicles as a worst-case scenario (i.e. all vehicles exiting).

The results of the carparking noise assessment are given in Table 16 below.

Table 16 Results for Car Parking Noise Assessment

No.	Address	Predicted noise levels, dBA $L_{eq,\ 15mins}$	NPfI night-time criteria, dBA $L_{eq,\ 15mins}$	Compliance Comments
R1	81 Yarram Street	<20	47	**Yes**
R2	79 Yarram Street	<20	47	**Yes**
R3	77 Yarram Street	<20	47	**Yes**
R4	75 Yarram Street	<20	47	**Yes**
R5	73 Yarram Street	<20	47	**Yes**
R6	71 Yarram Street	<20	47	**Yes**
R7	69 Yarram Street	<20	47	**Yes**
R8	67 Yarram Street	<20	47	**Yes**

7.4 Maximum noise level assessment

Maximum noise levels were modelled for the worst-case operations of the site, and the predicted noise impacts were assessed against the NPfIs maximum noise level screening noise levels. Compliance with the screening criteria is achieved at all locations and further consideration of impacts and noise mitigation is therefore not required.

The predicted Lmax noise levels identified in Table 17 identify that noise impacts from the site are compliant with the NPfI project noise trigger levels for the sleep disturbance, and below existing ambient noise levels in the area. Noise emissions from the site will not impact the amenity of the neighbourhood.

Table 17 Noise modelling results L_{AFmax}

ID	Address	Predicted Noise Level dB(A)	PNTL dB(A)	Compliance
R1	81 Yarram Street	42	57	**Yes, full compliance during all time periods based on the management controls outlined in section 7.2.1.**
R2	79 Yarram Street	42	57	
R3	77 Yarram Street	42	57	
R4	75 Yarram Street	43	57	
R5	73 Yarram Street	42	57	
R6	71 Yarram Street	43	57	
R7	69 Yarram Street	44	57	

7.5 Operational Traffic Noise Impacts

The change in proposed site would result in minor changes to local road traffic in the area. Light vehicle travelling to and from the site have been assessed as additional traffic movements to the local area. This provides a conservative, and worst-case assessment of the road traffic noise impacts.

Light vehicle would access the site from the church Street from Olympic Drive.

PWNA have review the Traffic Impact Assessment by pdc consultants, dated 12 December 2023. The traffic generation assessment confirms that the development will generate in the order of 63 vehicle trips / hour in the AM peak, 44 vehicle trips / hour in PM peak and 77 vehicle trips / hour in the Saturday peak. These traffic generations are considered to be a net increase above existing conditions as the existing Auburn Basketball Centre building will remain and continue to operate independently of the proposed HPF development.

Based on the review of the traffic engineer report, while existing road traffic noise levels are high on Olympic Drive. The morning peak and afternoon peak time consist of approximately 4000 car on Olympic drive. The increase in noise is predicted to be approximately 0.1 dB, significantly lower than the change in noise threshold of 2 dB. Given the change in noise from the additional traffic is indiscernible, consideration of noise management and mitigation measures is not required.

8 CONCLUSION

Pulse White Noise Acoustics has been engaged by Cumberland City Council to undertake an Acoustic Assessment as part of the development application for the proposed work at Auburn Basketball Centre located within Wyatt Park, Lidcombe. External noise emissions in relation to the operation with the proposed HPF building have been assessed and detailed in accordance with the NSW Environmental Protection Authorities Noise Policy for Industry 2017. In addition, construction noise and vibration impact associated with the development have also been reviewed in section 6 of the report. A detailed Construction Noise and Vibration Management (CNVMP) is recommended during the construction stage upon receive the condition of content.

Based on the assessment, the modelled and calculated noise emission to the nearest residential receivers have complied with the NPfI 2017 and established project noise criteria in section 5 of the report. Based on the findings, it is in our professional opinions that the noise emission of the proposed new HPF will comply with the EPA NPfI criteria.

An assessment of additional traffic noise generated by vehicles by the project site has been undertaken and calculated noise levels comply with the requirements of the EPA's Road Noise Policy.

For any additional information please do not hesitate to contact the person below.

Regards,

Jack Liang

Acoustic Engineer

Pulse White Noise Acoustics

APPENDIX A. APPENDIX TERMINOLOGY

Sound power level	The total sound emitted by a source
Sound pressure level	The amount of sound at a specified point
Decibel [dB]	The measurement unit of sound
A Weighted decibels [dB(A])	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows:
	0 dB(A) Threshold of human hearing 30 dB(A) A quiet country park 40 dB(A) Whisper in a library 50 dB(A) Open office space 70 dB(A) Inside a car on a freeway 80 dB(A) Outboard motor 90 dB(A) Heavy truck pass-by 100 dB(A) Jackhammer/Subway train 110 dB(A) Rock Concert 115 dB(A) Limit of sound permitted in industry 120 dB(A) 747 take off at 250 metres
Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
Ambient sound	The all-encompassing sound at a point composed of sound from all sources near and far.
Equivalent continuous sound level [L_{eq}]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
Reverberation	The persistence of sound in a space after the source of that sound has been stopped (the reverberation time is the time taken for a reverberant sound field to decrease by 60 dB)
Air-borne sound	The sound emitted directly from a source into the surrounding air, such as speech, television or music
Impact sound	The sound emitted from force of one object hitting another such as footfalls and slamming cupboards.
Air-borne sound isolation	The reduction of airborne sound between two rooms.
Sound Reduction Index [R] *(Sound Transmission Loss)*	The ratio the sound incident on a partition to the sound transmitted by the partition.
Weighted sound reduction index [R_w]	A single figure representation of the air-borne sound insulation of a partition based upon the R values for each frequency measured in a laboratory environment.
Level difference [D]	The difference in sound pressure level between two rooms.
Normalised level difference [D_n]	The difference in sound pressure level between two rooms normalised for the absorption area of the receiving room.
Standardised level difference [D_{nT}]	The difference in sound pressure level between two rooms normalised for the reverberation time of the receiving room.
Weighted standardised level difference [$D_{nT,w}$]	A single figure representation of the air-borne sound insulation of a partition based upon the level difference. Generally used to present the performance of a partition when measured in situ on site.
C_{tr}	A value added to an R_w or $D_{nT,w}$ value to account for variations in the spectrum.

Impact sound isolation	The resistance of a floor or wall to transmit impact sound.
Impact sound pressure level [L_i]	The sound pressure level in the receiving room produced by impacts subjected to the adjacent floor or wall by a tapping machine.
Normalised impact sound pressure level [L_n]	The impact sound pressure level normalised for the absorption area of the receiving room.
Weighted normalised impact sound pressure level [$L_{n,w}$]	A single figure representation of the impact sound insulation of a floor or wall based upon the impact sound pressure level measured in a laboratory.
Weighted standardised impact sound pressure level [$L'_{nT,w}$]	A single figure representation of the impact sound insulation of a floor or wall based upon the impact sound pressure level measured in situ on site.
C_I	A value added to an L_{nW} or $L'_{nT,w}$ value to account for variations in the spectrum.
Energy Equivalent Sound Pressure Level [$L_{A,eq,T}$]	'A' weighted, energy averaged sound pressure level over the measurement period T.
Percentile Sound Pressure Level [$L_{Ax,T}$]	'A' weighted, sound pressure that is exceeded for percentile x of the measurement period T.
Speech Privacy	A non-technical term but one of common usage. Speech privacy and speech intelligibility are opposites and a high level of speech privacy means a low level of speech intelligibility. It should be recognised that acceptable levels of speech privacy do not require that speech from an adjacent room is inaudible.
Sound Pressure Level, LP dB	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.
Sound Power Level, Lw dB	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt
Noise Reduction	The difference in sound pressure level between any two areas. The term "noise reduction" does not specify any grade or performance quality unless accompanied by a specification of the units and conditions under which the units shall apply
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Background Sound Low	The average of the lowest levels of the sound levels measured in an affected area in the absence of noise from occupants and from unwanted, external ambient noise sources. Usually taken to mean the LA90 value
Character, acoustic	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
LMax	The maximum sound pressure level measured over a given period.
LMin	The minimum sound pressure level measured over a given period.
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L90	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.

APPENDIX B. UNATTENDED NOISE MONITORING

79 Yarram St, Lidcombe

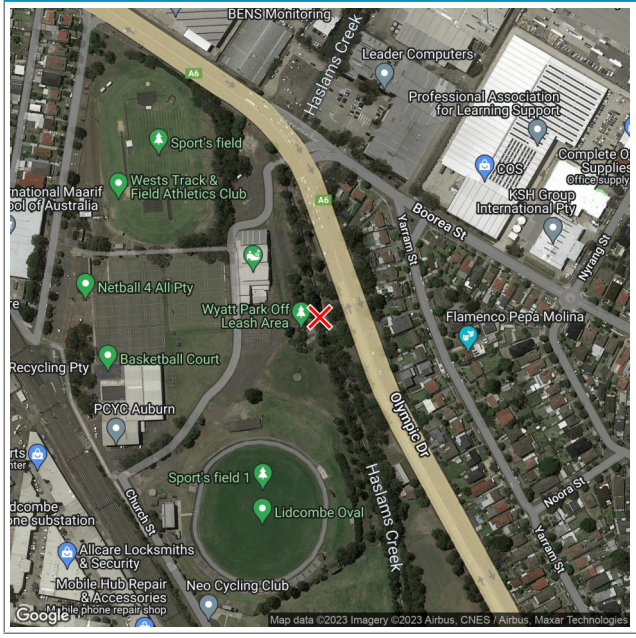
Ambient noise monitoring report

Item	Information
Logger Type	Savn 977
Serial number	81348
Address	79 Yarram St, Lidcombe
Location	79 Yarram St , Lidcombe
Facade / free field	Free field
Environment	

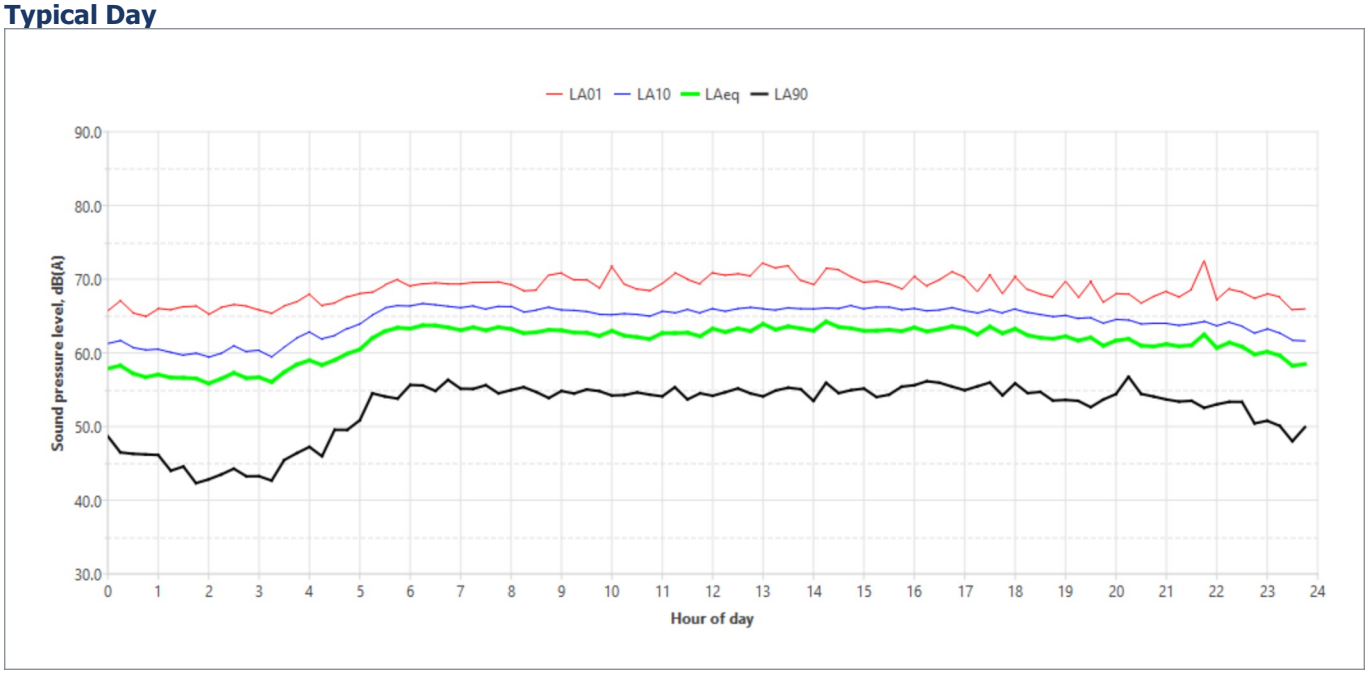
Measured noise levels

Logging date	Rating Background Level			$L_{Aeq,period}$		
	Daytime 7am-6pm	Evening 6pm-10pm	Night-time 10pm-7am	Daytime 7am-6pm	Evening 6pm-10pm	Night-time 10pm-7am
Thu 30 Nov 2023	54	54	42	63	63	61
Fri 01 Dec 2023	54	50	44	63	62	61
Sat 02 Dec 2023	52	54	43	62	64	59
Sun 03 Dec 2023	51	53	42	63	62	58
Mon 04 Dec 2023	53	52	40	63	62	60
Tue 05 Dec 2023	52	53	42	64	62	60
Wed 06 Dec 2023	54	53	46	64	62	60
Thu 07 Dec 2023	54	52	42	63	62	60
Fri 08 Dec 2023	-	-	-	63	-	60
Summary	**53**	**53**	**42**	**63**	**62**	**60**

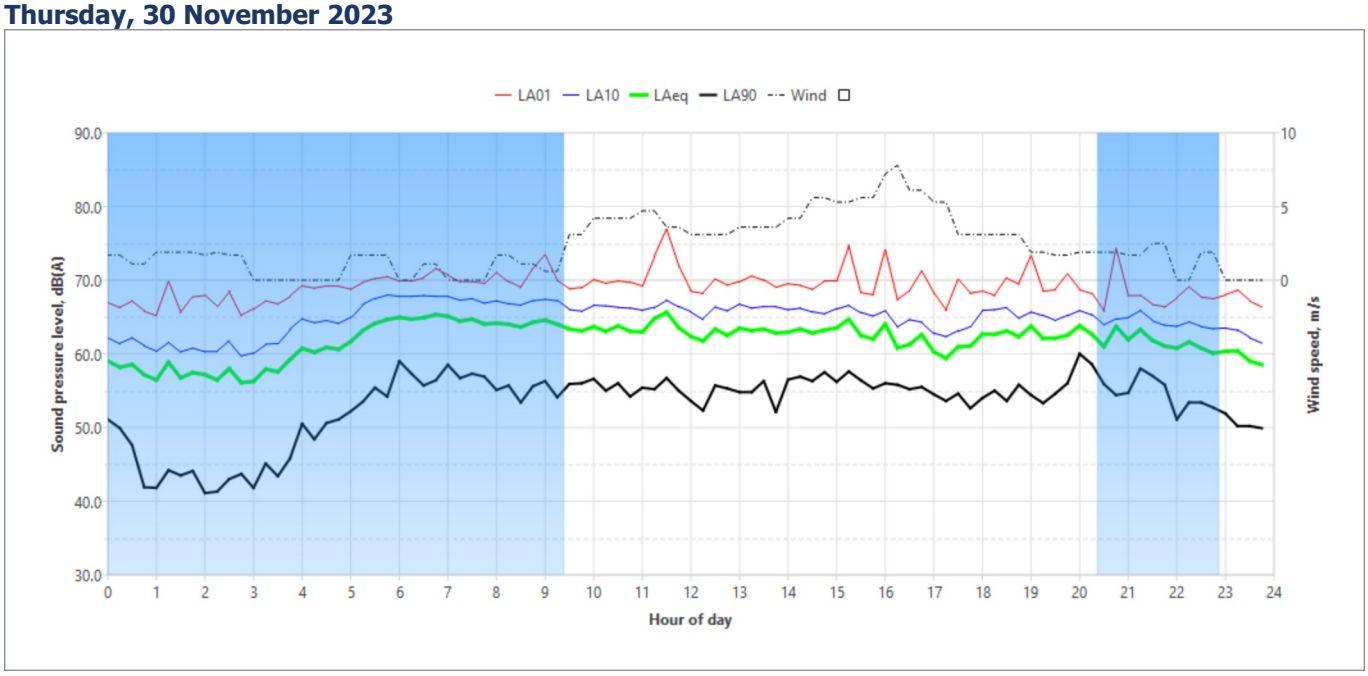
Note: Results with a '-' identify that there were not enough measurements available to correctly calculate the level, in accordance with the Noise Policy for Industry. The data has been excluded either from weather or manual exclusions. See the charts for more information

Logger location	Logger deployment photo
	

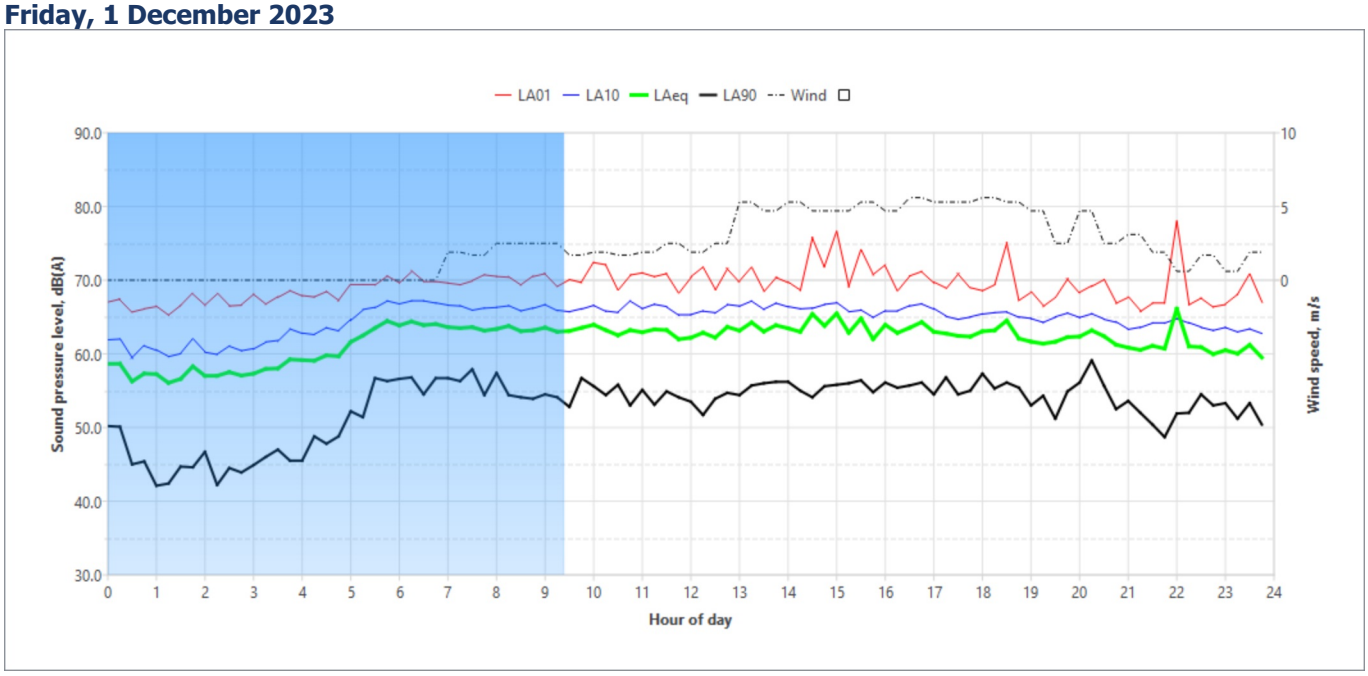
Typical Day



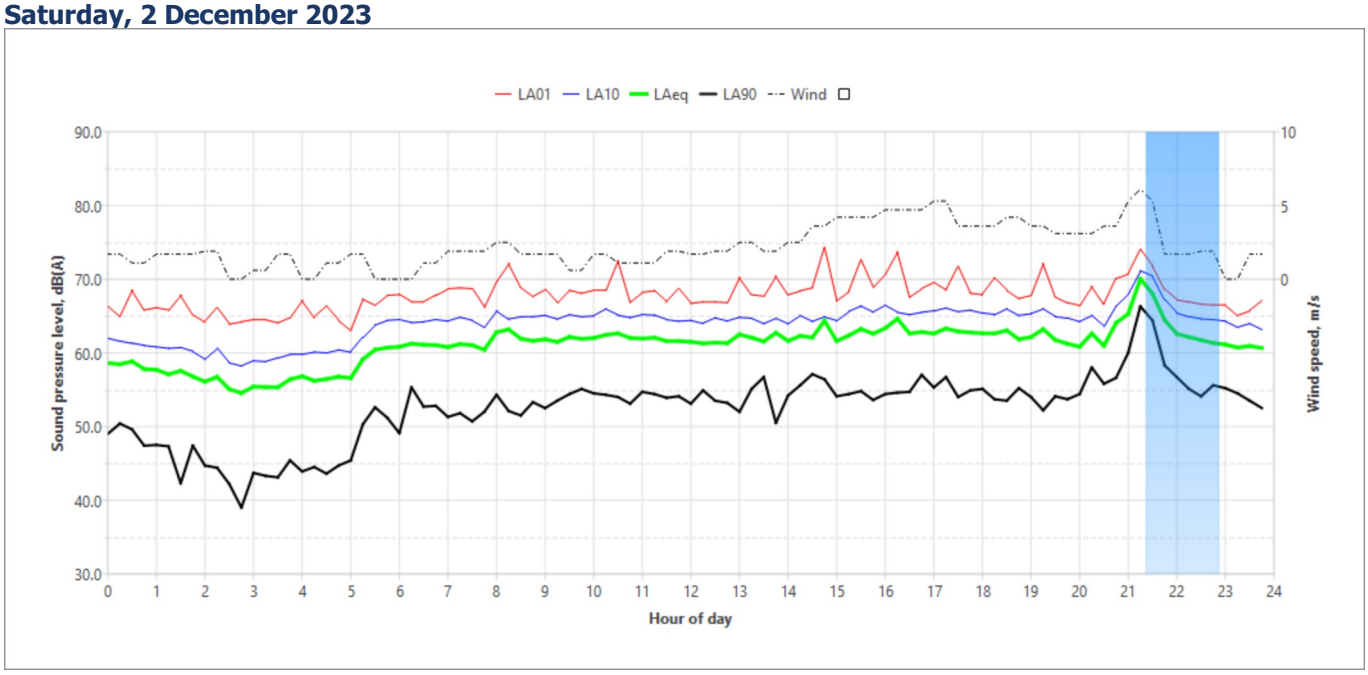
Thursday, 30 November 2023



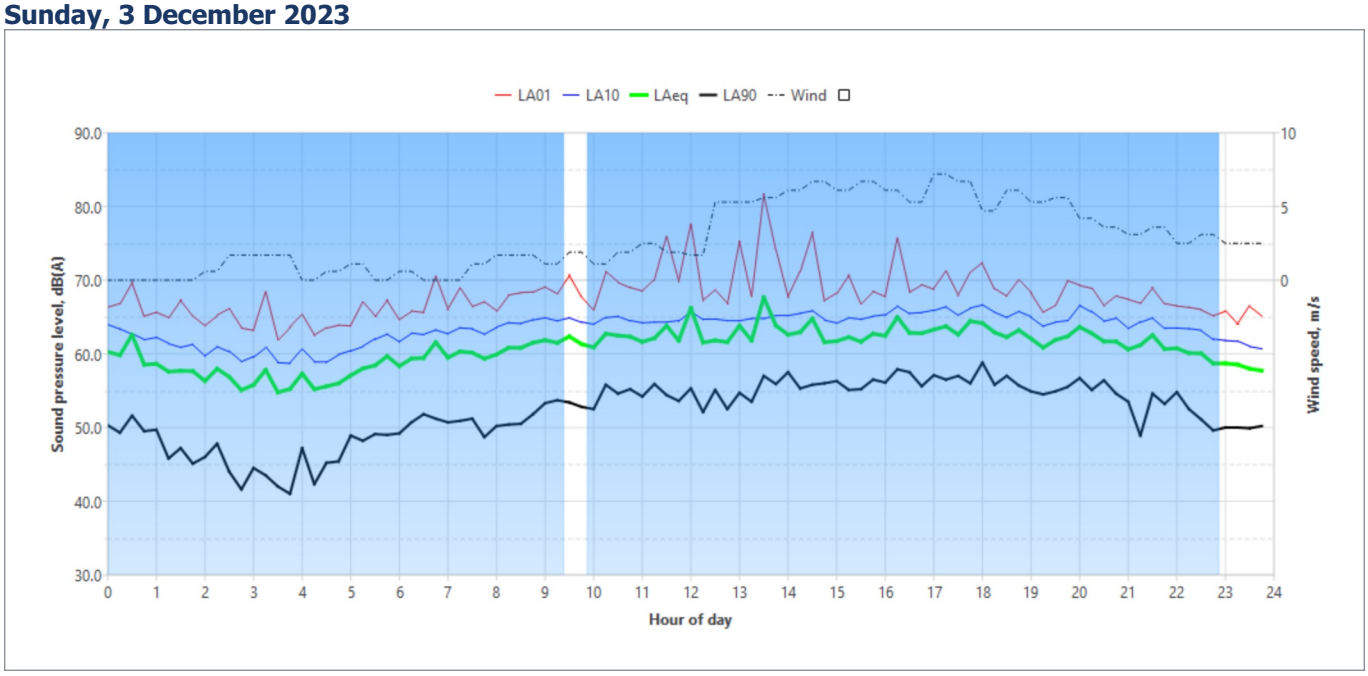
Friday, 1 December 2023



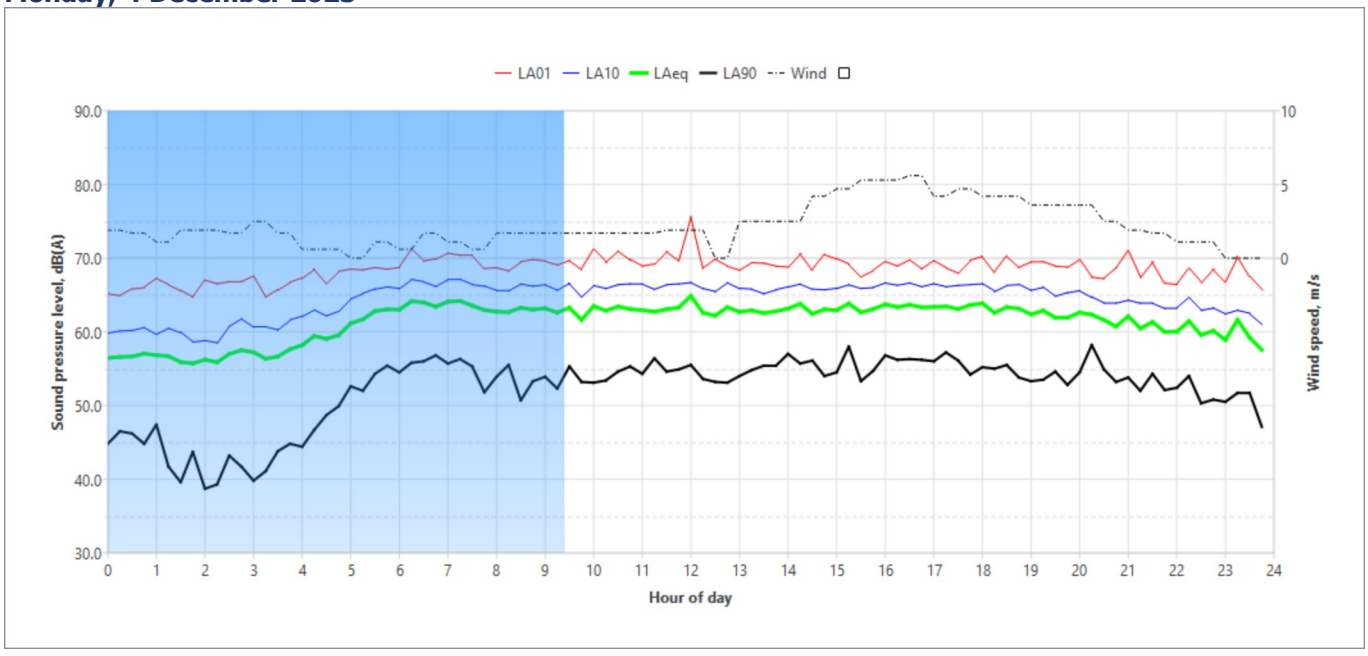
Saturday, 2 December 2023



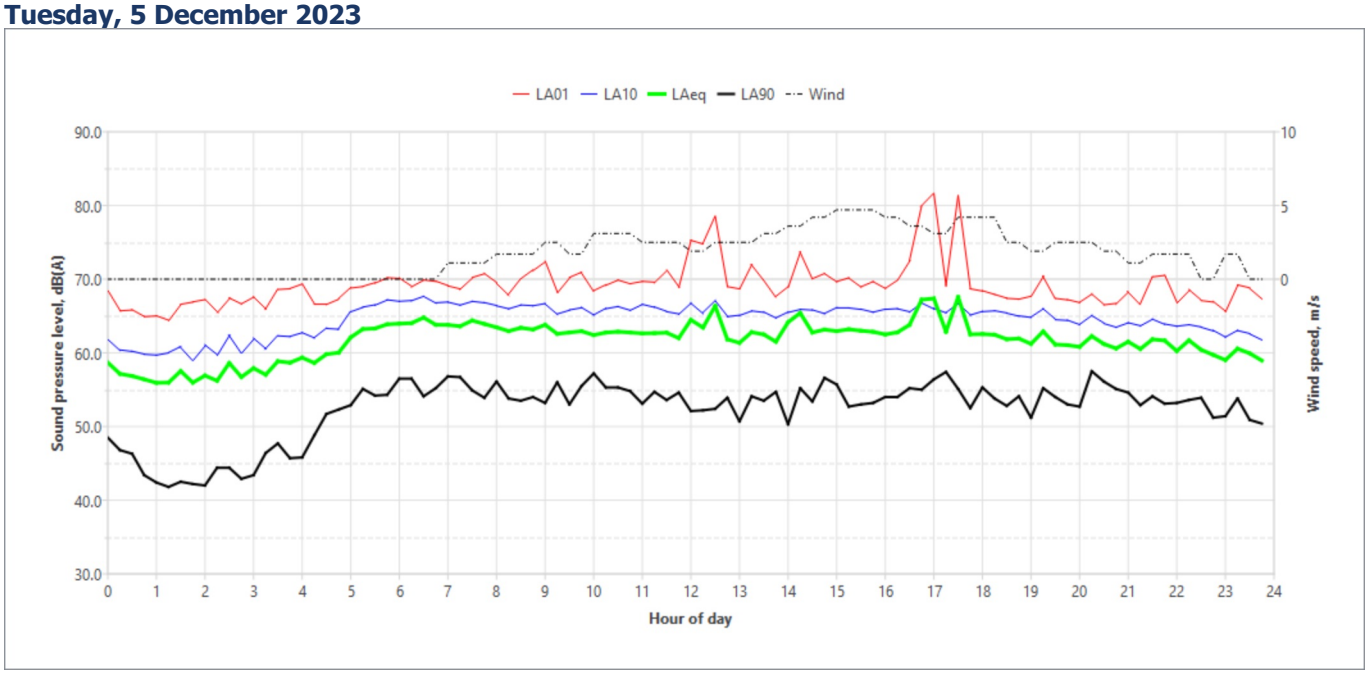
Sunday, 3 December 2023



Monday, 4 December 2023

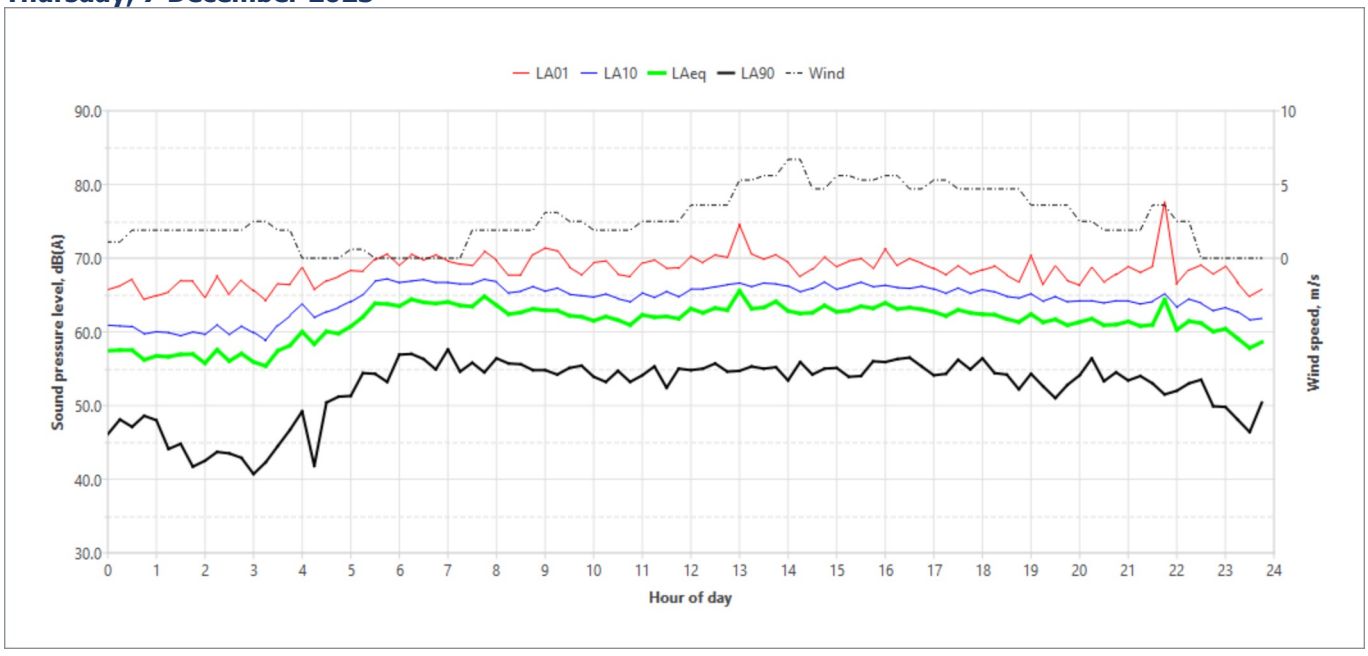


Tuesday, 5 December 2023



Wednesday, 6 December 2023

Thursday, 7 December 2023



Friday, 8 December 2023