Canterbury Olympic Ice Rink Redevelopment

Noise Impact Assessment Report

Prepared for: The Ice Skating Club of NSW Co-Operative Limited C/-Hunter Scott

Project No: SYD2599
Date: 2 August 2024
Revision: 04

Project:	Canterbury Olympic Ice Rink Redevelopment
Location:	17A Phillips Ave, Canterbury, NSW 2193
Prepared by:	ADP Consulting Pty Ltd Level 6, 33 Erskine Street Sydney NSW 2000
Project No:	SYD2599
Revision:	04
Date:	2 August 2024

Rev	Date	Comment	Author	Signature	Technical Review	Signature	Authorisa-tion & QA	Signature
01	01/07/2024	Issue	Ann-Katrin Glanzner	AG	Will Gouthro	WG	Will Gouthro	WG
02	01/07/2024	Issue	Will Gouthro	WG	Will Gouthro	WG	Will Gouthro	WG
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04	2/08/2024	Issue	Will Gouthro	WG	Will Gouthro	WG	Will Gouthro	WG

Project Team	
Client / Principal	The Ice Skating Club of NSW Co-Operative Limited C/-Hunter Scott
Architect	Kennedy Associates Architects

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1. Introduction

ADP Consulting Pty Ltd has been engaged by *The Ice-Skating Club of NSW Co-Operative Limited* to provide acoustic engineering services for the proposed redevelopment of the Canterbury Olympic Ice Rink at 17A Phillips Ave, Canterbury NSW 2193.

The following are addressed:

> Noise impacts to the proposed development and treatment recommendations to meet acoustic requirements.

> Potential noise impacts from the operation of the proposed redevelopment and treatment recommendations to meet acoustic requirements for the amenity of the surrounding noise sensitive receivers.

The acoustic design criteria and treatment concepts in this report demonstrate the pathways by which these shall be addressed by ADP Consulting and the project team through further analysis, recommendations, and coordination as the design progresses.

1.1 Referenced Drawings, Codes and Standards

The following drawings, conditions, guidelines, standards, regulatory requirements, and other project-specific information have been referenced in preparing this report:

> Architectural drawings (project number 2221) dated 31 May 2024 provided by Kennedy Associates Architects.

> Canterbury Bankstown Council Development Control Plan (DCP) 2023.

> AS 2670.2:1990 *Evaluation of Human Exposure to Whole-Body Vibration Part 2: Continuous and Shock-Induced Vibration in Buildings* (1 to 80 Hz) (AS 2670.2).

> BS 6472–1992 – *Evaluation of Human Exposure to Whole-Body Vibration in Buildings (1 to 80 Hz)* (BS 6472).

> AS/NZS 1668.1:2015 *The Use of Ventilation and Air Conditioning in Buildings Part 1: Fire and Smoke Control in Buildings* (AS/NZS 1668.1).

> AS/NZS 2107:2016 *Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors* (AS/NZS 2107).

> NSW Department of Environment and Conservation *Assessing Vibration: A Technical Guideline* dated February 2006 (AVTG).

> NSW EPA *Noise Policy for Industry*, dated October 2017 (NPfI).

> Transport & Infrastructure *State Environmental Planning Policy* 2021 (SEPP).

> NSW EPA *Road Noise Policy*, dated March 2011 (RNP).

1.2 Project Summary

This report presents an analysis of the noise impacts associated with the proposed redevelopment of the Canterbury Olympic Ice Rink located at 17A Phillips Ave, Canterbury NSW 2193. The proposed redevelopment will include an expansion of the existing building to the north-west towards Tasker Park Playground as outlined in Figure 1 and Figure 2 below.

The current operational hours of the rink are between 5:30am and 11:30pm 7 days a week and activities at the rink include figure skating, ice hockey and public skating. There is no proposed change to the operation hours or activities in the building including no change to deliveries or waste removal in front of the building.

Figure 1 Ground floor with proposed expansion (in green) and existing spaces (in orange)

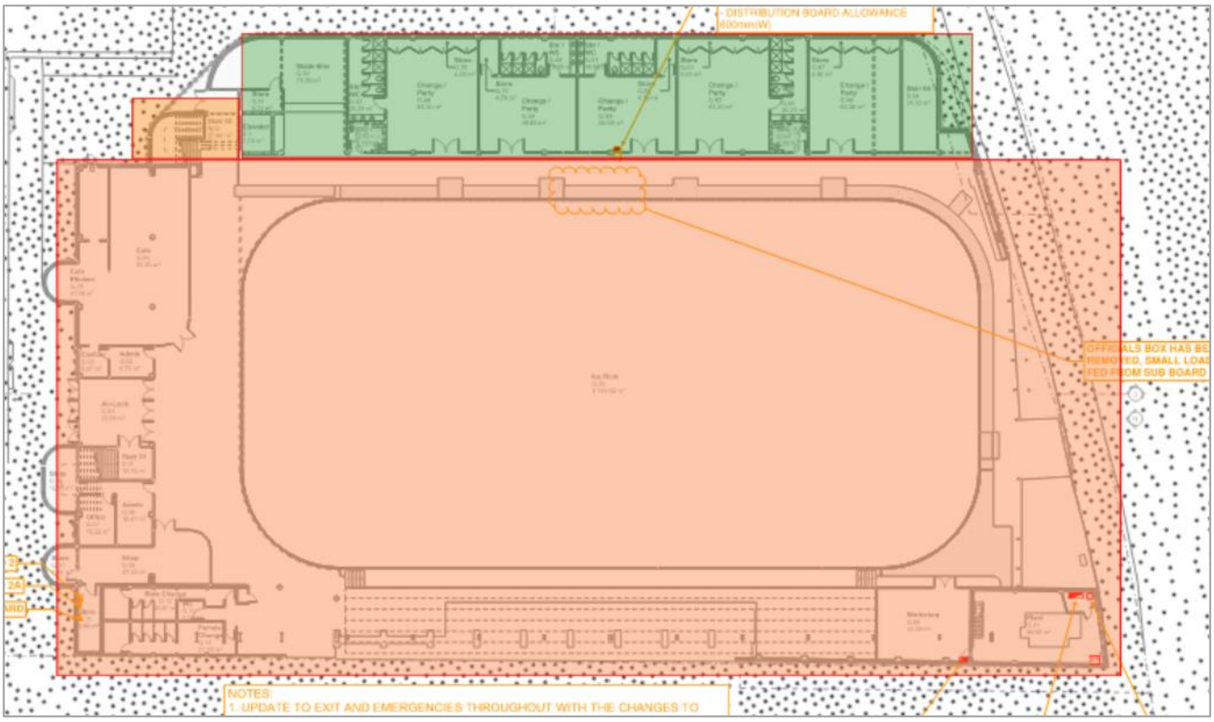
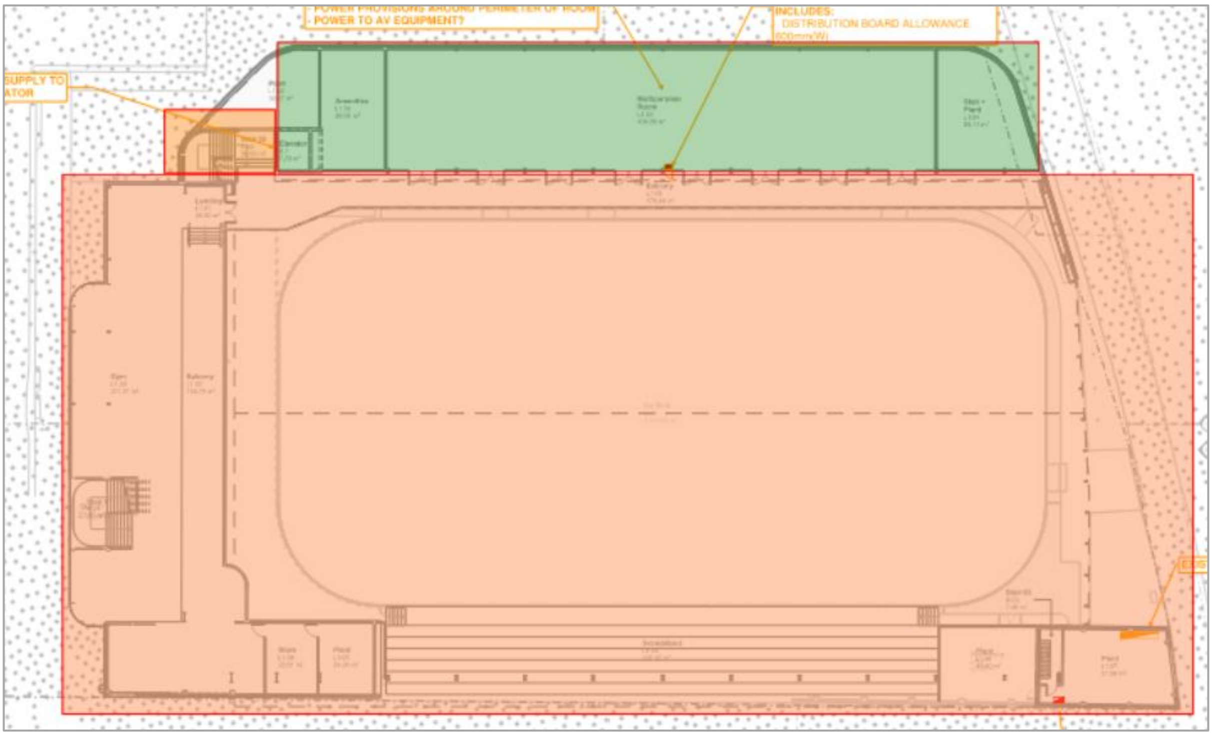


Figure 2 First floor with proposed expansion (in green) and existing spaces (in orange)



The proposed redevelopment includes new spaces to improve the amenities previously provided and are as follows:

- Ground floor level:
  - Change rooms
  - Skate workshop and hire area
  - Storage space
- First floor level:
  - Multipurpose room
  - Change rooms
  - Plant room

The existing building includes:

- Ground floor level:
  - Entry area
  - Café with kitchen space
  - Shop
  - Cashier room
  - Offices
  - Admin spaces
  - Existing storage spaces
  - Storage space and workshop for ice machines
  - Plant rooms
  - Ca. 1.700m^2 ice rink
- First floor level:
  - Grandstand
  - Warm-up area
  - Kitchen
  - Existing plant rooms
  - Storage spaces

The existing and proposed building includes thermally insulated panels limit noise emission from internal activities. Noise emission from internal activities is not expected to increase based on no change to the activities or number of patrons, only an improvement in amenities previously provided.

Additional services associated with the new spaces may introduce noise and are assessed.

1.3 Site Analysis

The development site is located at 17A Phillips Ave, Canterbury NSW 2193.

A site investigation was undertaken to identify noise sources that will potentially impact the project redevelopment, as well as the nearest noise sensitive receivers that will potentially be impacted by the proposed redevelopment.

The subject site is bounded by the following traffic and rail noise sources:

- Wairoa Street directly to the west which carries low to medium volumes of traffic flow.
- Phillips Avenue directly to the south which carries low to medium volumes of traffic flow.
- T2 and T3 Rail Line directly to the north.

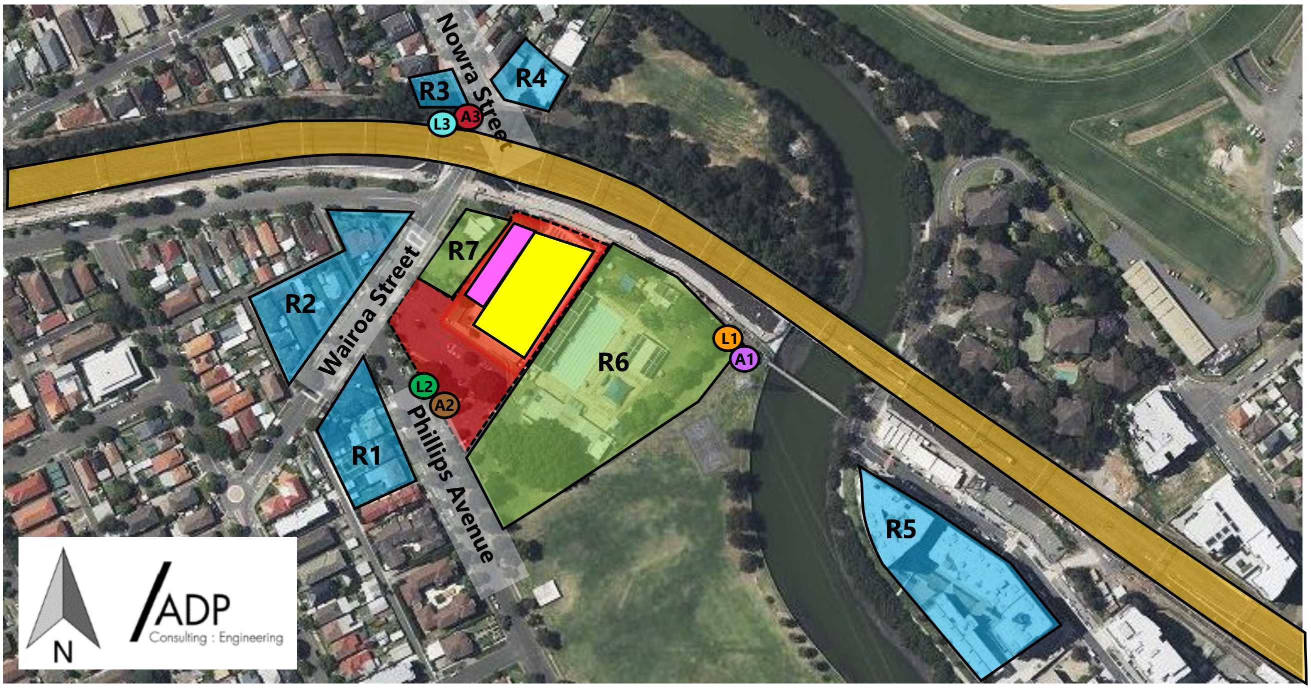
The following nearest most affected noise sensitive receivers were identified:

- Residential receivers:
  - Receiver 1 (R1) – One to two-storey residential buildings located at 34 to 40 Phillips Avenue and 3-5 Wairoa Street, opposite of the project site to the south.

- Receiver 2 (R2) – One to two-storey residential buildings located at 8-12 Wairoa Street and 2 S Parade, opposite of the project site to the west.
  - Receiver 3 (R3) – Two-storey residential building located at 4 Nowra Street to the north of the proposed redevelopment, behind the railway line.
  - Receiver 4 (R4) – Two-storey residential buildings located at 1 Nowra Street and 4 E Parade to the north of the project site, behind the railway line.
  - Receiver 5 (R5) – Ten-storey residential apartment building located at 15 Charles Street, east of the proposed redevelopment site.
- Public Recreation receivers:
  - Receiver 6 (R6) – Canterbury Leisure and Aquatic Centre directly to the east of the project site.
  - Receiver 7 (R7) – Tasker Park Playground directly to the west of the project site.
- The development itself that includes:
  - Plant and equipment requiring noise attenuation and vibration isolation to meet indoor noise level criteria in occupied areas and compliance with noise emission regulations.
  - An expected standard of amenity compliant with all applicable codes, regulatory requirements, client brief and/or other standards.

An aerial photograph including details of the proposed redevelopment is presented below in Figure 3.

Figure 3 Subject site and surrounding receivers zoning (Resourced from SIX Maps).



Subject site
Existing building
Proposed Expansion
Nearest residential noise sensitive receivers
Nearest public recreation zone
T2 and T3 Rail Line
L1: Long-term noise monitoring location 1
L2: Long-term noise monitoring location 2
L3: Long-term noise monitoring location 3
A1: Attended noise measurement (At logging location L1, next to T2 and T3 Rail Line)
A2: Attended noise measurement (At logging location L2)
A3: Attended noise measurement (3m away from kerb of Nowra Street, at logging location L3)

2. Existing Acoustic Environment

2.1 Instrumentation

The following instrumentation was used for noise measurement and analysis:

> Bruel and Kjaer 2250 Integrating Sound Level Meter (S/N: 3011318).
> Bruel and Kjaer type 1 microphone – comprising of:
  – ZC 0032 preamplifier (S/N: 25754).
  – 4189 capsule (S/N: 3087045).
> Bruel and Kjaer Sound calibrator Type 4231 (S/N: 3018299).
> Three (3) NSRT mk3 Sentry Noise Loggers.

Equipment is laboratory calibrated and certified within the last two years thus conforming to Australian Standards. Equipment was also field calibrated prior to and after noise surveys. Calibration drift was found to be less than 0.2dB during measurements, therefore no adjustments for instrument drift during the measurement period were warranted.

2.2 Long-term Noise Monitoring

Long-term noise monitoring was conducted between Monday 17th June and Monday 24th June 2024 at the following locations (also shown in Figure 3):

> **Location L1**: At the eastern side boundary of the Leisure and Aquatic Centre, approximately 2m above ground level.
> **Location L2**: At the southern site boundary towards residential receivers on Phillips Avenue, approximately 2m above ground level.
> **Location L3**: North of the T2 & T3 Rail Line, at residential receiver R3, approximately 1.5m above ground level.

Measured background noise levels were corrected for meteorological conditions (wind above 5m/s and/or rain), as required by Section 3.4 of the EPA Noise Policy for Industry.

Background noise levels (L_{A90}) at locations L1, L2 and L3 are summarised in Table 1 below. Appendix B – Long-term Noise Monitoring Data presents detailed results of the unattended noise monitoring of logger locations L1, L2 and L3.

Table 1 Unattended noise measurements at Locations L1, L2 and L3, dB(A)

Noise Measurement	Daytime (7am-6pm)	Evening (6pm-10pm)	Night-time (10pm -7am)
Location L1 Rating Background Level (RBL) – L_{A90}	46	44	38
Location L2 Rating Background Level (RBL) – L_{A90}	45	44	39
Location L3 Rating Background Level (RBL) – L_{A90}	41	40	34

2.3 Attended Noise Measurements

Attended noise measurements were conducted around the project site at 17A Phillips Ave, on Monday 17th June and Monday 24th June 2024 at the following locations:

> **Location A1**: Attended 10-minute background noise measurement was undertaken at the eastern boundary of the Leisure and Aquatic Centre. The microphone was placed 1.5m above ground floor level.

> **Location A2**: Attended 10-minute background noise measurement was undertaken at the southern site boundary towards residential receivers on Phillips Avenue. The microphone was placed 1.5m above ground floor level with 180 degrees view of Phillips Avenue.

> **Location A3**: Attended 10-minute traffic noise measurement was undertaken at residential receiver R3, 3m away from the kerb of Nowra Street. The microphone was placed 1.5m above ground floor level with 180 degrees view of Nowra Street.

The noise measurements detailed above were used to qualify and quantify the long-term measured noise levels of the area. Table 2 presents the noise levels of the attended measurements at the locations shown in Figure 3.

Table 2 Attended noise measurements, dB(A).

Location	Start Time	Date	dB(A), $L_{eq,t}$	dB(A), L_{A90}
A1	12:45pm-13:00pm	17/06/2024	58	53
A2	15:05pm-15:10pm	24/06/2024	57	45
A3	14:55pm-15:05pm	24/06/2024	65	42

3. Noise Emission Criteria

Noise emissions from the operation of the proposed development to noise sensitive receivers shall be assessed for compliance criteria presented in this section.

The following sections outline the applicable policies, standards and guidelines that apply to environmental noise emission, and a summary of applicable environmental noise criteria is shown in Section 0.

3.1 Canterbury Bankstown Council Development Control Plan (DCP) 2023

The planning and design guidelines for the proposed development are presented in the Canterbury Bankstown Council Development Control Plan 2023. The DCP does not specify criteria regarding noise emission criteria for commercial developments and therefore is not considered further for this assessment.

3.2 NSW Noise Policy for Industry (NPfI)

The NPfI requires compliance with specific *project noise trigger levels*, which are determined from the lower (that is, the more stringent) value of the project *intrusiveness noise level* and project *amenity noise level*. The NPfI also includes the application of modifying factors for undesirable noise characteristics such as tonality or impulsiveness, up to a maximum of 10dB.

3.2.1 Noise Intrusiveness

The NPfI states that the intrusiveness of an industrial noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15-minute period, does not exceed the background noise level (L_{A90}) measured in the absence of the source by more than 5dB.

The relevant noise intrusiveness levels applicable to this project are shown in Table 3, Table 4 and Table 5.

Table 3 Noise intrusiveness noise levels Residential receivers R1 and R2

Time of operation	Background noise Level dB(A)L_{90}	Intrusiveness criteria, $L_{Aeq,15min}$ (Background+5dB)
Day (7am to 6pm)	45	50
Evening (6pm to 10pm)	44	49
Night (10pm to 6am)	39	44

Table 4 Noise intrusiveness noise levels Residential receivers R3 and R4

Time of operation	Background noise Level dB(A)L_{90}	Intrusiveness criteria, $L_{Aeq,15min}$ (Background+5dB)
Day (7am to 6pm)	41	46
Evening (6pm to 10pm)	40	45
Night (10pm to 6am)	34	39

Table 5 Noise intrusiveness noise levels Residential receiver R5

Time of operation	Background noise Level dB(A)L_{90}	Intrusiveness criteria, $L_{Aeq,15min}$ (Background+5dB)
Day (7am to 6pm)	46	51
Evening (6pm to 10pm)	44	49
Night (10pm to 6am)	38	43

3.2.2 Amenity Noise Levels

The NPfI describes methodology to limit gradual increases in noise levels from the introduction of new noise sources in an area.

The *recommended amenity noise levels* represent the objective for total industrial noise at a receiver location, whereas the *project amenity noise level* represents the objective for noise from this project. The *project amenity noise level* for industrial developments = *recommended amenity noise level* (Table 2.2) minus 5 dB(A). 3 dB is then added to convert from an L_{Aeq}, period to $L_{Aeq,\ 15min}$.

NPfI Table 2.2 specifies maximum amenity noise levels for different types of receivers. The relevant amenity noise levels applicable to this project are shown in Table 6.

Table 6 Recommended amenity noise levels and project amenity noise levels

Receiver	Noise Amenity Area	Time of day	Recommended amenity noise levels, $L_{Aeq, period}$	Project amenity noise levels, $L_{Aeq, 15min}$
Residential	Suburban	Day	55	53
		Evening	45	43
		Night	40	38
Public recreation area	All	When in use	50	-

Note 1: Table 2.1 of the NPfI has four categories of residential areas: rural, suburban, urban and urban/industrial. The nearest noise sensitive residential receivers around the proposed development are considered as “suburban”.

3.2.3 Modifying Factors

Undesirable characteristics such as tonality, low frequency, impulsiveness and intermittency, adjustments (as per Fact Sheet C of the NPfI) shall be assessed. These modifying factors include a 5dB penalty for each undesirable characteristic. A maximum penalty of 10dB for 2 or more undesirable characteristics applies.

3.2.4 Sleep Disturbance

NPfI establishes sleep disturbance criteria for residential noise sensitive receivers for noise events during the night period. The sleep disturbance criteria are summarised below:

- $L_{Aeq,15min}$ 40 dB(A) or prevailing RBL plus 5dB, whichever is greater, and/or
- L_{AFmax} 52 dB(A) or prevailing RBL plus 15dB, whichever is greater.

Table 7 Sleep disturbance criteria

Receivers	Night-time level dB(A) L_{90}	Sleep disturbance level
Residential Receivers R1 and R2	39	$L_{Aeq,15min}$ dB(A) 44 L_{AFmax} dB(A) 54
Residential Receivers R3 and R4	34	$L_{Aeq,15min}$ dB(A) 40 L_{AFmax} dB(A) 52
Residential Receiver R5	38	$L_{Aeq,15min}$ dB(A) 43 L_{AFmax} dB(A) 53

3.3 Summary of Noise Emission Criteria

A summary of noise emission criteria that applies at residential receivers from the use of the proposed development is presented in the following tables.

The 'project trigger levels' are the most stringent noise criteria that apply in each instance, i.e., they are expected to be the 'driving' criteria.

Table 8 Noise emission criteria – Residential receivers R1 and R2

Time of operation	Intrusiveness criteria, $L_{Aeq,15min}$ (Background+5dB)	Recommended amenity noise levels, $L_{Aeq, period}$	Project amenity noise levels, $L_{Aeq, 15min}$	Project trigger levels, $L_{Aeq, 15min}$
Day (7am to 6pm)	50	55	53	**50**
Evening (6pm to 10pm)	49	45	43	**43**
Night (10pm to 6am)	44	40	38	**38** Sleep Disturbance 44$L_{Aeq\ (15min)}$ / 54L_{Max}

Table 9 Noise emission criteria – Residential receivers R3 and R4

Time of operation	Intrusiveness criteria, $L_{Aeq,15min}$ (Background+5dB)	Recommended amenity noise levels, $L_{Aeq, period}$	Project amenity noise levels, $L_{Aeq, 15min}$	Project trigger levels, $L_{Aeq, 15min}$
Day (7am to 6pm)	46	55	53	**46**
Evening (6pm to 10pm)	45	45	43	**43**
Night (10pm to 6am)	39	40	38	**38** Sleep Disturbance 40$L_{Aeq\ (15min)}$ / 52L_{Max}

Table 10 Noise emission criteria – Residential receiver R5

Time of operation	Intrusiveness criteria, $L_{Aeq,15min}$ (Background+5dB)	Recommended amenity noise levels, $L_{Aeq, period}$	Project amenity noise levels, $L_{Aeq, 15min}$	Project trigger levels, $L_{Aeq, 15min}$
Day (7am to 6pm)	51	55	53	**51**
Evening (6pm to 10pm)	49	45	43	**43**
Night (10pm to 6am)	43	40	38	**38** Sleep Disturbance 40$L_{Aeq\ (15min)}$ / 52L_{Max}

Table 11 Noise emission criteria – Public recreation receivers R6 and R7

Receiver	Time of operation	Site specific noise limits	
		Recommended amenity, $L_{Aeq, Period}$	Project trigger levels, $L_{Aeq, 15min}$
R6 / R7	When in use	50	-

4. Internal Noise Requirements

External noise sources that can potentially affect the proposed development include road traffic passing the site. Noise intrusions to the proposed development from this noise source will be assessed in accordance with the criteria presented in this section.

4.1 Canterbury Bankstown Council Development Control Plan (DCP) 2023

The planning and design guidelines for the proposed development are presented in the Canterbury Bankstown Council Development Control Plan 2023. The DCP does not specify criteria regarding noise intrusion to commercial developments and therefore is not considered further for this assessment.

4.2 State Environmental Planning Policy (Transport and Infrastructure) 2021

Clauses 2.119 and 2.120 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP), specifies indoor noise level requirements for development in frontage to classified road and land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with annual average daily traffic volume of more than 20,000 vehicles (based on the traffic volume data published on the website of TfNSW).

The nearest classified road to the proposed development is approximately 450m to the south-east (A34). Therefore, the SEPP criteria are not applicable to this project.

4.3 Australian/ New Zealand Standard AS/NZS 2107:2016

The internal noise criteria for the proposed expansion of the facility will be based on AS/NZS 2107:2016 Acoustics – Recommended Design Sound Levels for Building Interiors (AS/NZS 2107) internal design levels. Recommended indoor noise levels for the proposed redevelopment are summarised in Table 12 below.

Table 12 Internal design sound pressure levels for offices within the development

Type of occupancy (Commercial / sports buildings	**Time period**	**Design SPL, L_{Aeq}, dB(A)**
Change rooms	When in use	45 to 55
Corridors and lobbies	When in use	45 to 50
Toilets / showers	When in use	45 to 55
Multipurpose room	When in use	40 to 45
Skate Hire / Skate Workshop	When in use	< 50
Storage	-	-
Plant rooms	-	-

5. Environmental Noise Emission Assessment

Noise emissions from the proposed redevelopment will need to be assessed to ensure compliance with the noise emission criteria as presented in Section 0.

5.1 Noise Assessment of Proposed Plant

The proposed plant changes include:

> An external air handling unit located at on the COIR north east boundary
> 2 internal air handling units located in enclosed plantrooms and ducted to external louvres
> Fan Coil Unit outside air louvres
> Exhaust fan louvres

An assessment of the introduced noise sources is as follows:

Based on typical AHU noise data, the noise criteria provided in Section 3 of this report is predicted to be met based on:

> The proposed plant and equipment by ADP mechanical services with consideration to noise output.
> Selection of low noise fans, allowance for smooth airflow conditions in ductwork, and lined duct work while minimising regenerated noise at bends, take-offs and transitions.

5.2 Vehicle Noise Assessment on Carpark

The proposed development is not expected to significantly increase patron numbers or existing car park operation; therefore, a new assessment is not required.

5.3 Patron Noise Assessment

The proposed development is not expected to significantly increase patron numbers or existing café operation; therefore, a new assessment is not required.

6. Noise Intrusion Assessment

The recommended building envelope acoustic treatments to control external noise are presented below, based on achieving the internal noise criteria presented in Section 4. The main source of external noise that will affect the proposed expansion of the existing building is road traffic along Wairoa Street as well as rail noise of T2 and T3 rail lines.

Treatments were determined based on the noise levels recorded at the site and presented in Section 2, and internal noise criteria outlined in Section 4. Calculations were undertaken considering the orientation of windows, barrier effects (where applicable), the total area of glazing, facade transmission loss and room sound absorption characteristics.

6.1 Glazing

Based on measured ambient sound pressure levels and the internal noise level criteria will be satisfied with a minimum glazing thickness of 6mm float glass. Thicker glazing, or double-glazed units may be required for thermal, structural or safety purposes. Where thicker glazing is required, this will also be acoustically acceptable.

Any openable windows and external doors are required to be fitted with polyurethane foam seals (Q-Lon or similar). Mohair seals are not acceptable.

6.2 External Walls

External masonry walls will not require any additional acoustic treatments. If penetrations are required to the external skin of the external walls, they shall be sealed with an acoustic-grade sealant.

6.3 External Doors/ Entry Doors

External solid core doors will be sufficient for acoustic purposes. External glass doors should comply with the minimum glazing performance requirements presented in Section 6.1.

Door seals are recommended (Q-lon seals by Schlegel or similar – mohair seals should be avoided).

6.4 Roof Construction

Roofs that feature a concrete slab construction will not require any additional acoustic treatment. If penetrations are required, they shall be sealed with an acoustic-grade sealant.

7. Conclusion

ADP Consulting has completed an acoustic assessment for the proposed redevelopment and expansion of the Canterbury Olympic Ice Rink at 17A Phillips Ave, Canterbury NSW 2193.

Noise emission criteria were setup in Section 3 based on:

- Long-term noise monitoring results.
- NSW Environmental Protection Authority (EPA) Noise Policy for Industry (NPfI) 2017.

Provided the recommended treatments in this report are adopted, the proposal will comply with the presented internal noise criteria in Section 3:

- NSW Environmental Protection Authority (EPA) Noise Policy for Industry (NPfI) 2017.

A noise emission assessment has been undertaken and concludes that the mechanical plans and plant selections comply with the external noise criteria.

Appendix A
Glossary of Acoustic Terms

Air-borne sound

The sound emitted directly from a source into the surrounding air, such as speech, television or music.

Ambient sound

Of an environment: the all-encompassing sound associated with that environment, being a composite of sounds from many sources, near and far. This is normally taken to be the L_{Aeq} value.

Background noise level

The average of the lowest levels of the noise levels measured in an affected area in the absence of noise from occupants and from unwanted external ambient noise sources. Usually the L_{A90} value represents the background noise level.

dB(A)

Unit of acoustic measurement weighted to approximate the sensitivity of human hearing to sound frequency.

Decibel scale

The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. Therefore, a 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. It is generally accepted that a 10 dB increase in the sound pressure level corresponds to a perceived doubling in loudness.

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

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.

L_{90}, L_{10}, etc

A statistical measurement giving the sound pressure level which is exceeded for the given percentile of a measurement period (i.e. L_{90} is the level which is exceeded for 90 percent of a measurement period). L_{90} is commonly referred to as a basis for measuring the background sound level.

$L_{Aeq,T}$

The equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

L_{Amax}

The maximum sound pressure level measured over the measurement period.

L_{Amin}

The minimum sound pressure level measured over the measurement period.

Day

Referred to as the period between 7am and 6pm for Monday to Saturday and 8am to 6pm for Sundays and Public Holidays.

Evening

Referred to as the period between 6pm and 10pm for Monday to Sunday and Public Holidays.

Night

Referred to as the period between 10pm and 7am for Monday to Saturday and 10pm to 8am for Sundays and Public Holidays.

Assessment background level (ABL)

The overall background noise level on each day, evening and night periods for each day of the noise monitoring.

Rating background level (RBL)

The overall background level on each day, evening and night periods for the entire length of noise monitoring.

Reverberation

The persistence, after emission by the source has stopped, of a sound field in an enclosure.

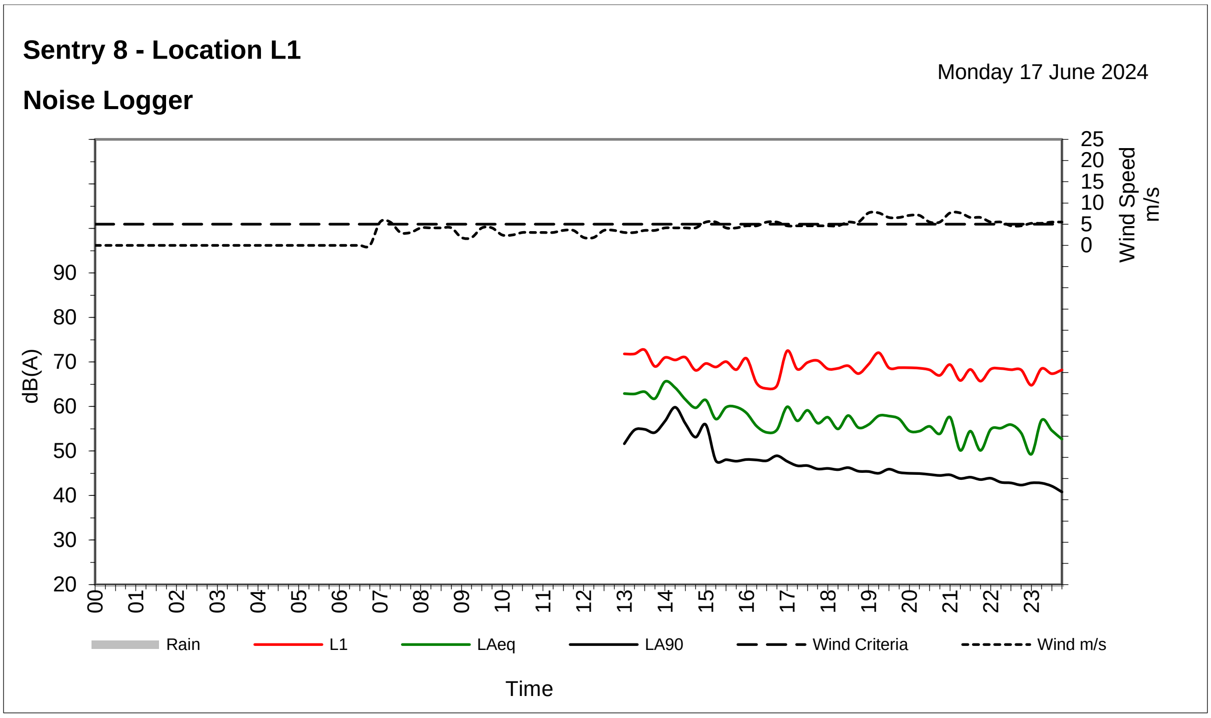
Sound isolation

A reference to the degree of acoustical separation between two spaces. Sound isolation may refer to sound transmission loss of a partition or to noise reduction from any unwanted noise source. The term 'sound isolation' does not specify any grade or performance quality and requires the units to be specified for any contractual condition.

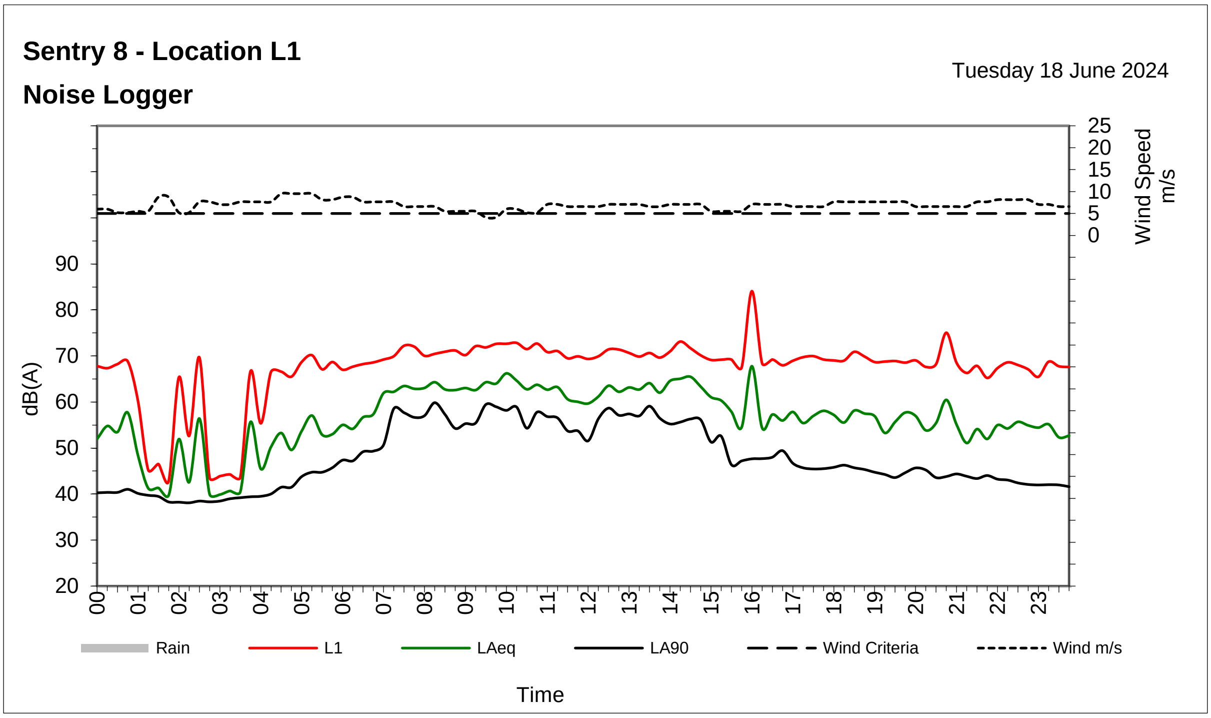
Sound pressure level, L_p, dB of a sound

A measurement obtained directly obtained 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 R.M.S. sound pressure to the reference sound pressure of 20 micro-Pascals.

Appendix B
Long-term Noise Monitoring Data



Sentry 8 - Location L1
Noise Logger
Monday 17 June 2024
dB(A)
Wind Speed m/s
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time

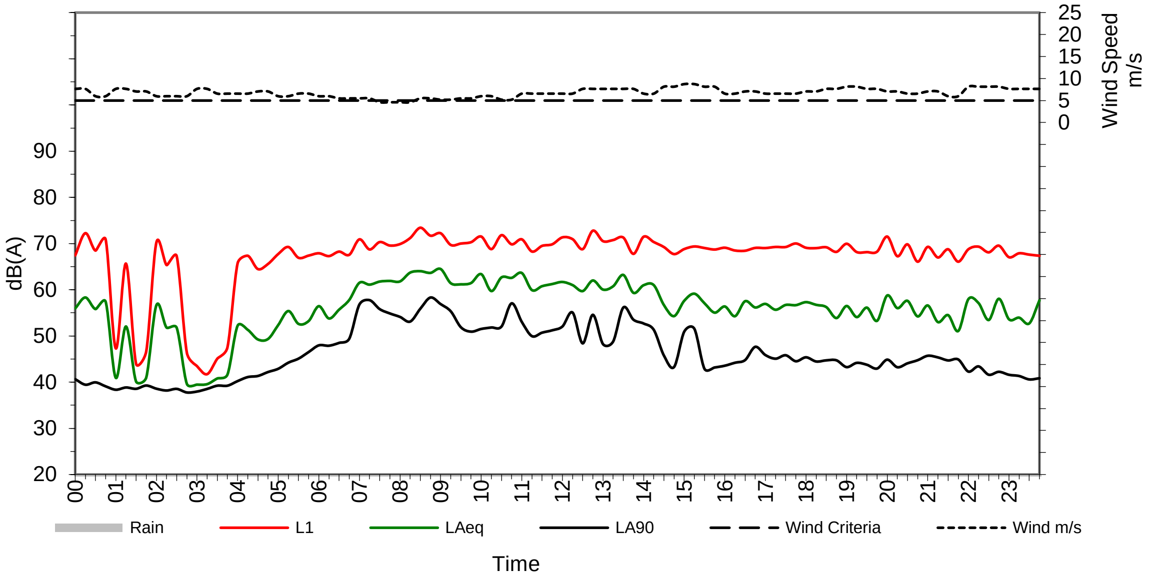


Sentry 8 - Location L1
Noise Logger
Tuesday 18 June 2024
dB(A)
Wind Speed m/s
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time

Sentry 8 - Location L1

Noise Logger

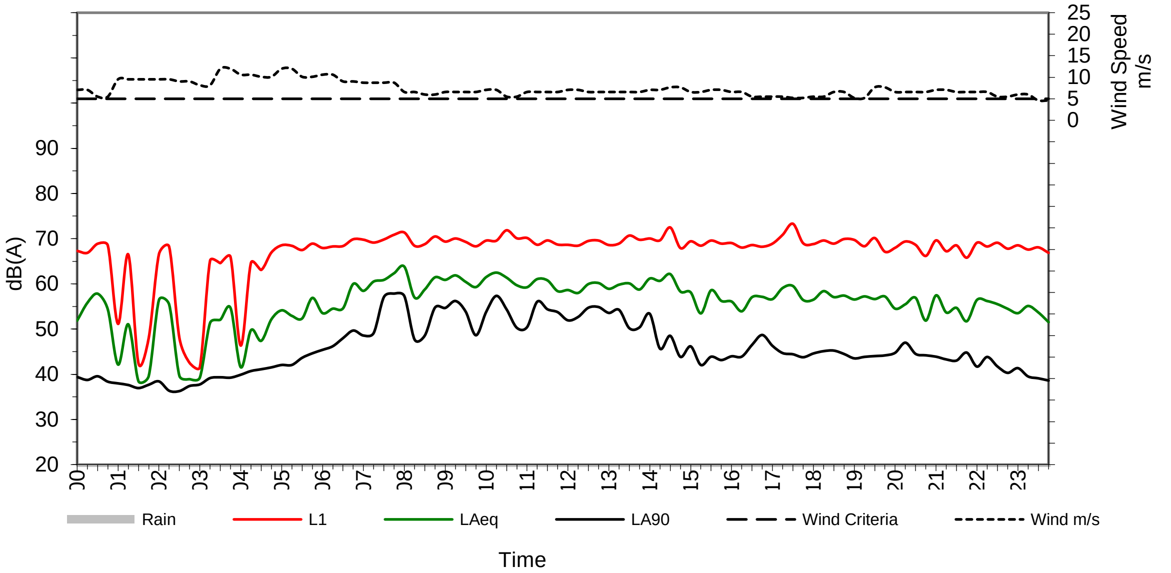
Wednesday 19 June 2024

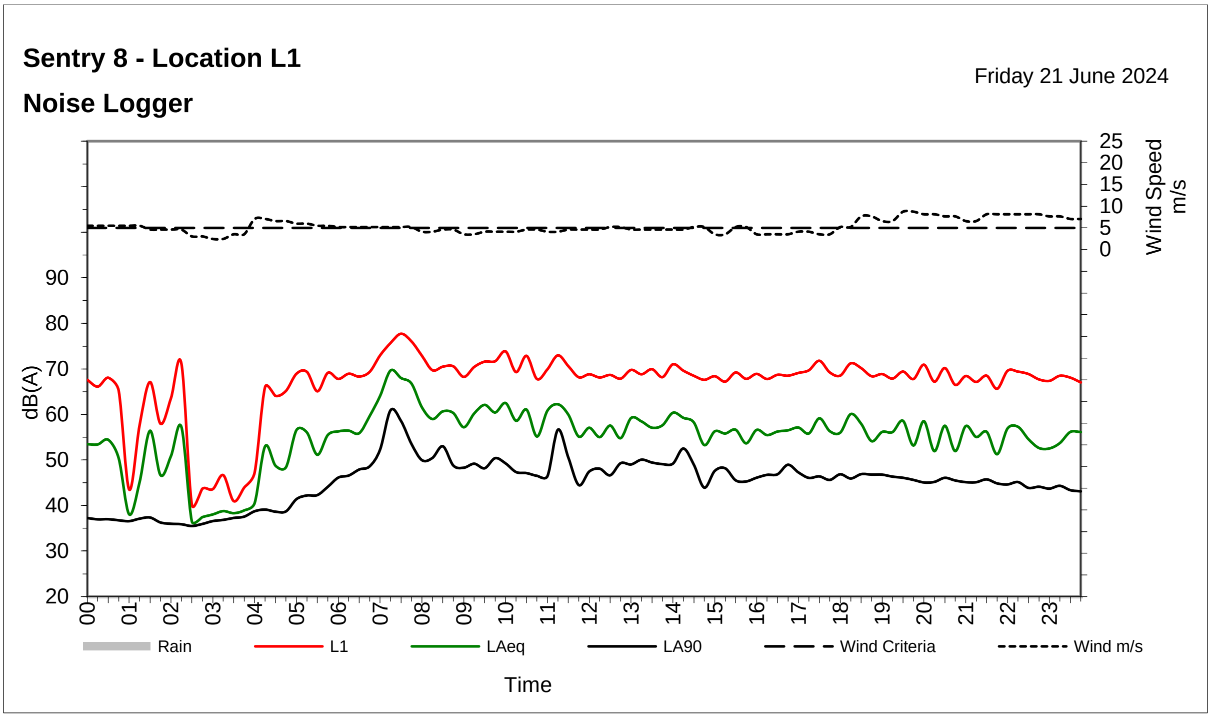


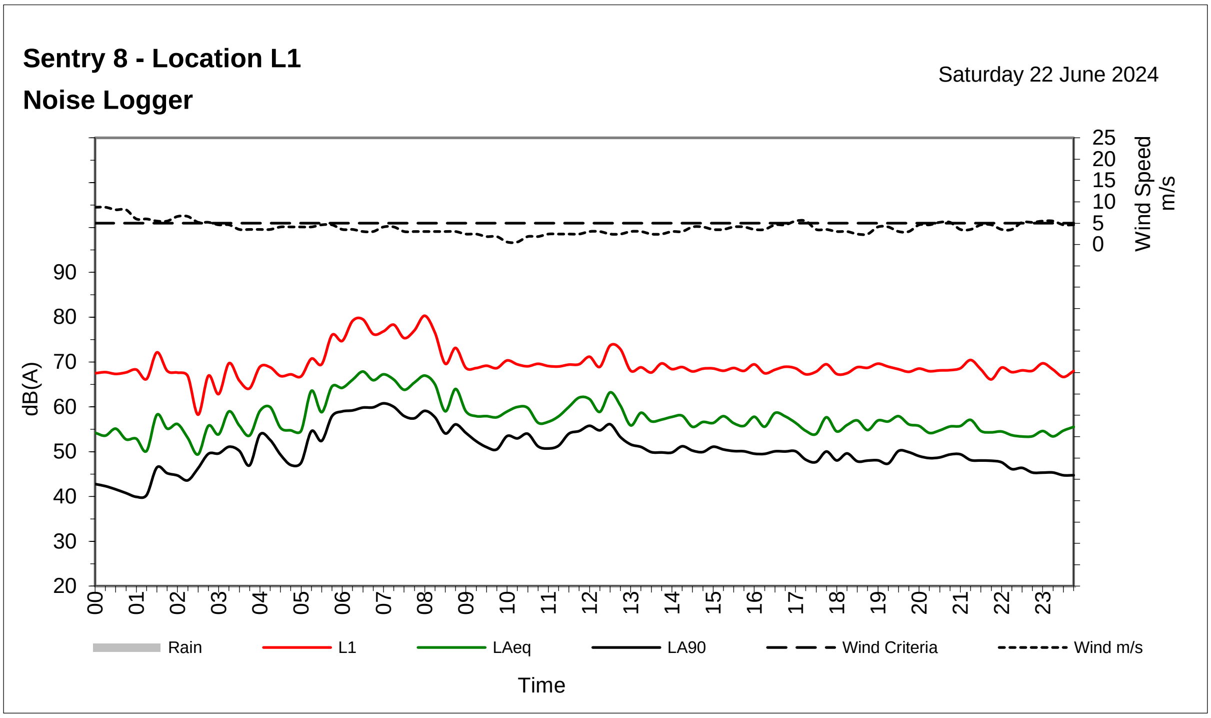
Sentry 8 - Location L1

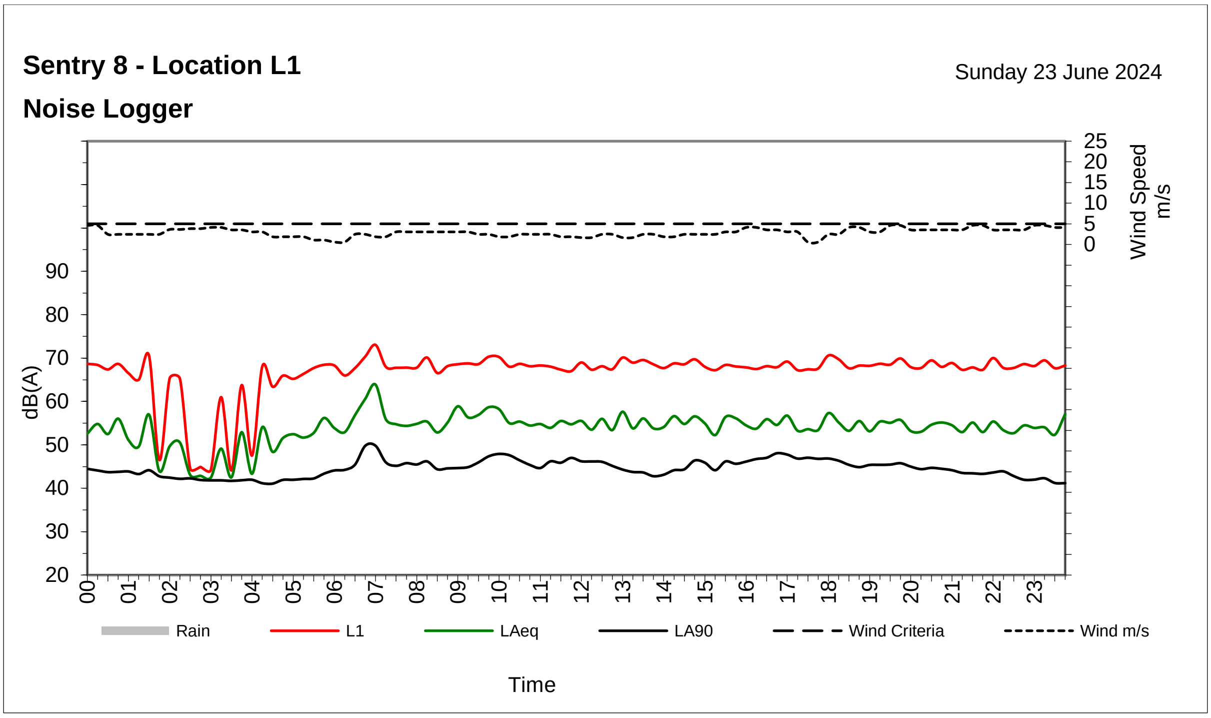
Noise Logger

Thursday 20 June 2024

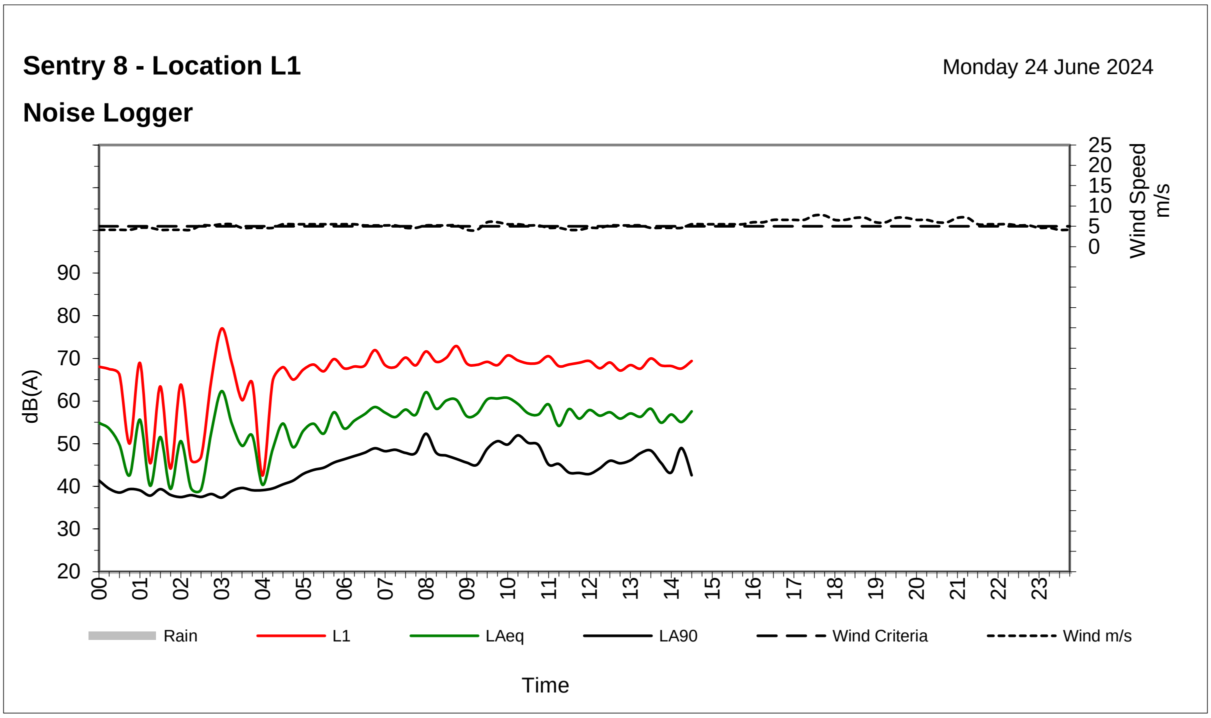



Sentry 8 - Location L1
Noise Logger
Friday 21 June 2024
dB(A)
Wind Speed m/s
Time
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s


Sentry 8 - Location L1
Noise Logger
Saturday 22 June 2024
dB(A)
Wind Speed m/s
Time
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s



Sentry 8 - Location L1
Noise Logger
Sunday 23 June 2024
dB(A)
90
80
70
60
50
40
30
20
25
20
15
10
5
0
Wind Speed m/s
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time

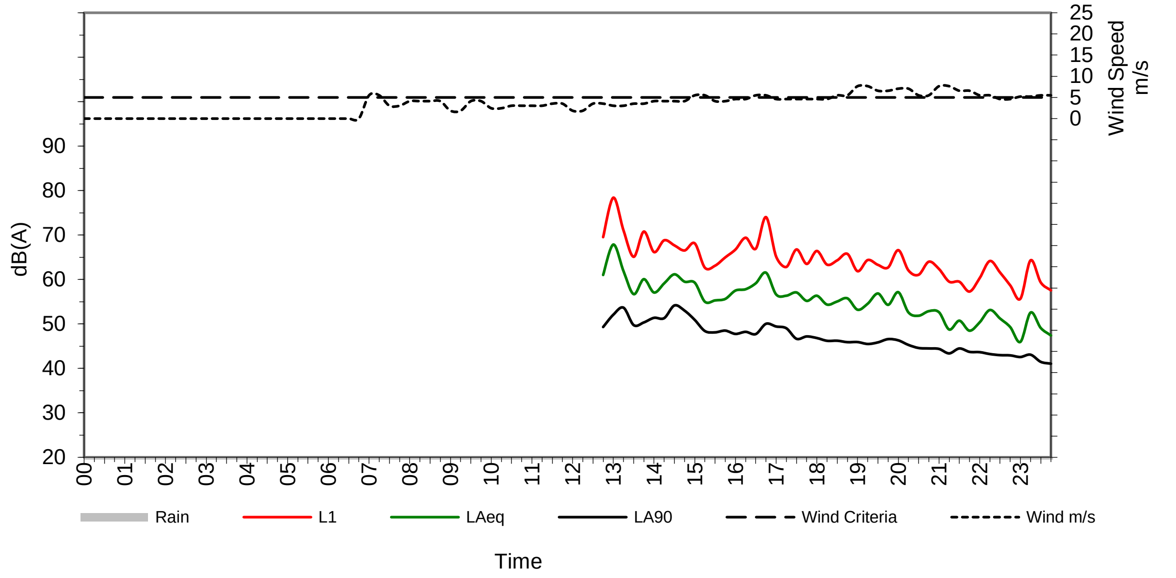


Sentry 8 - Location L1
Noise Logger
Monday 24 June 2024
dB(A)
90
80
70
60
50
40
30
20
25
20
15
10
5
0
Wind Speed m/s
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time

Sentry 1 - Location L2

Monday 17 June 2024

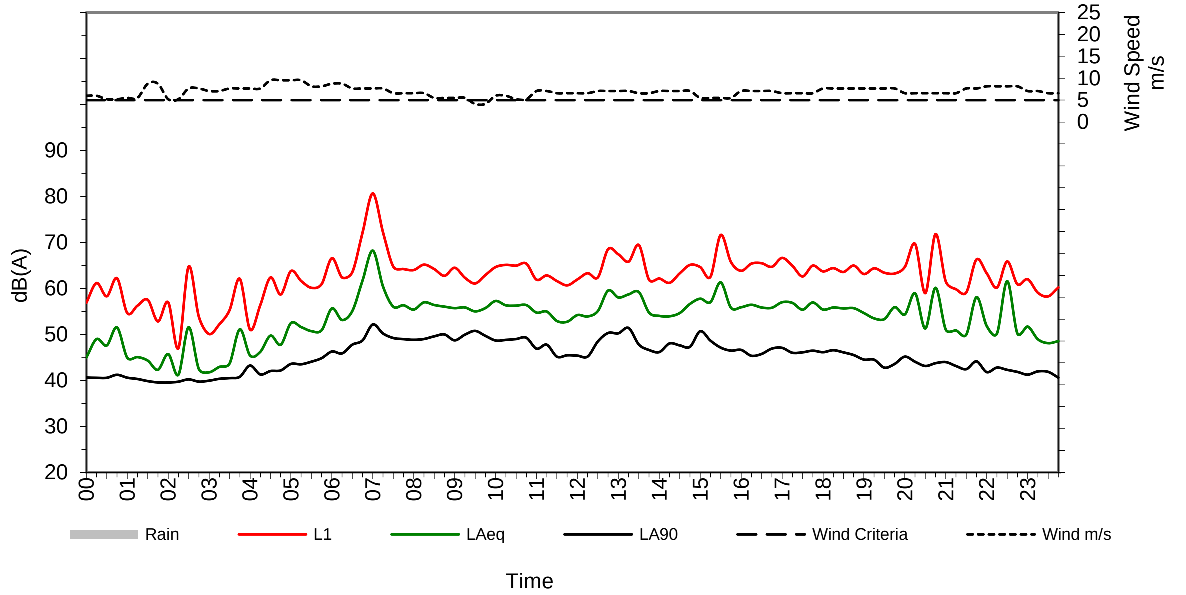
Noise Logger

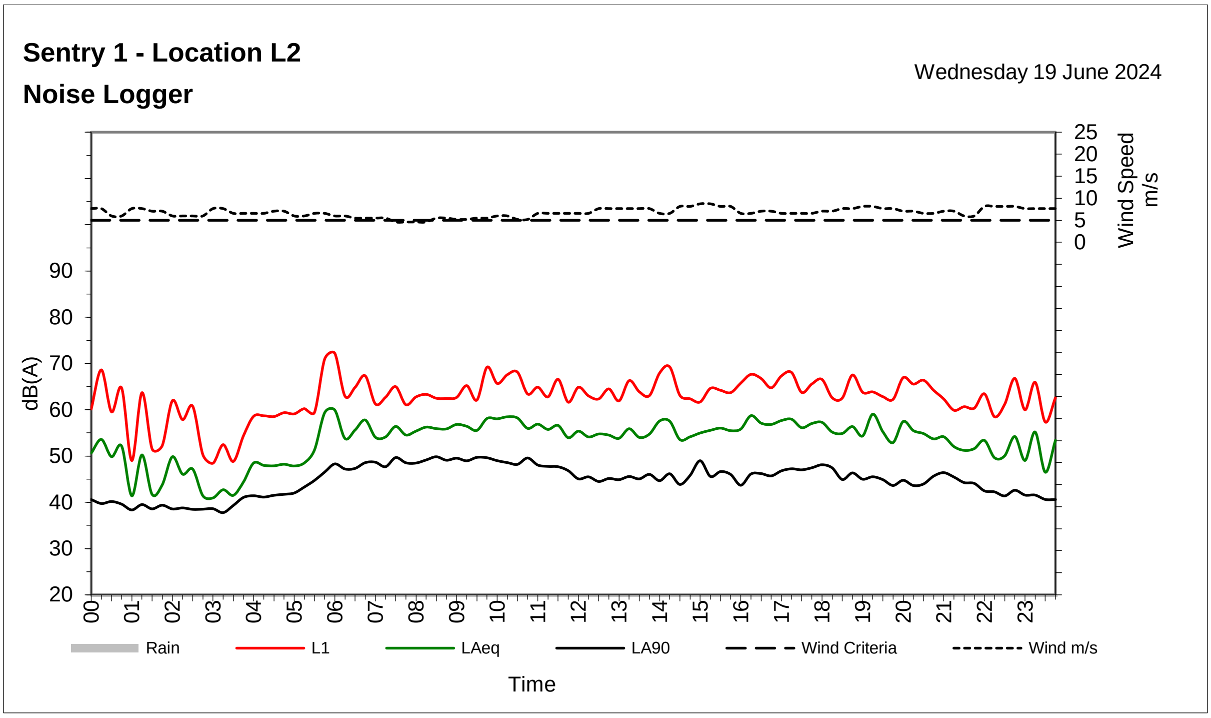


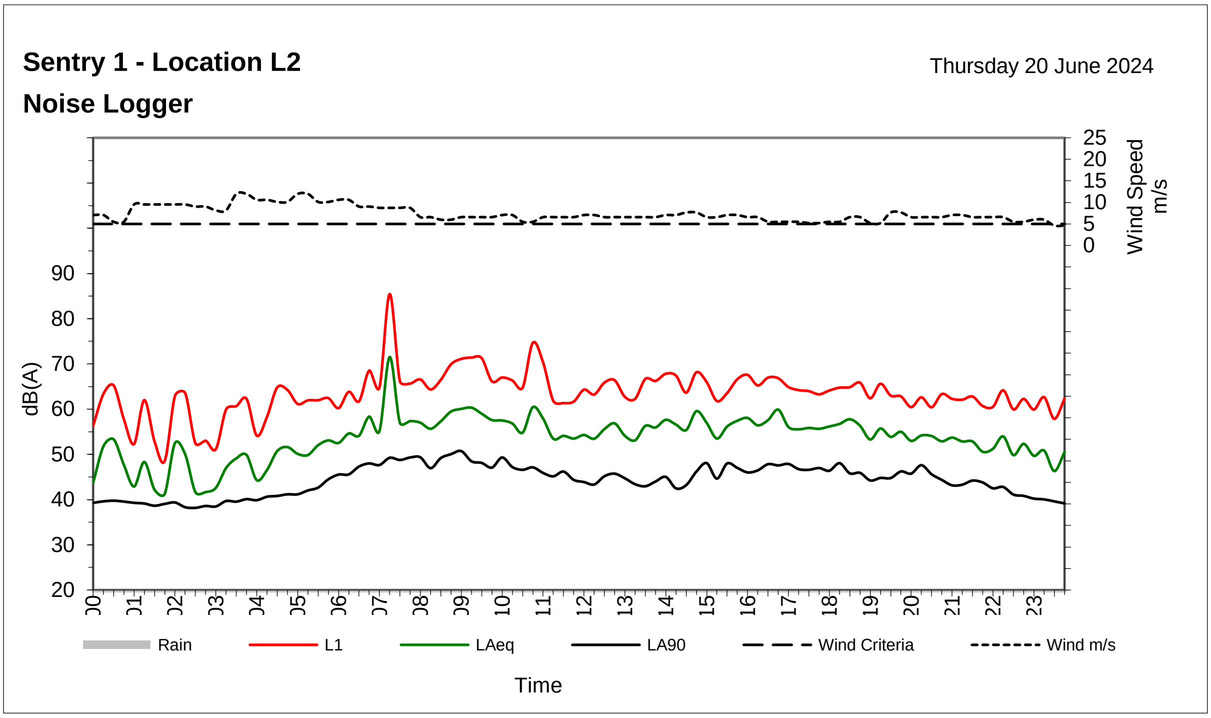
Sentry 1 - Location L2

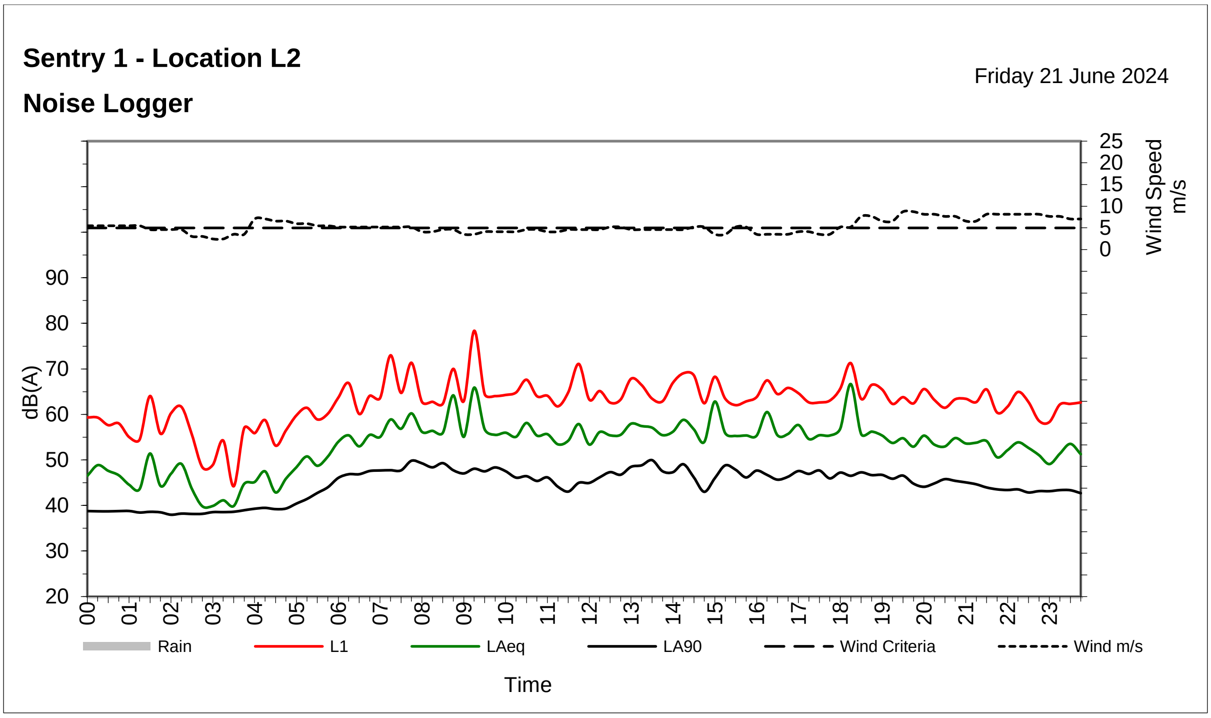
Tuesday 18 June 2024

Noise Logger

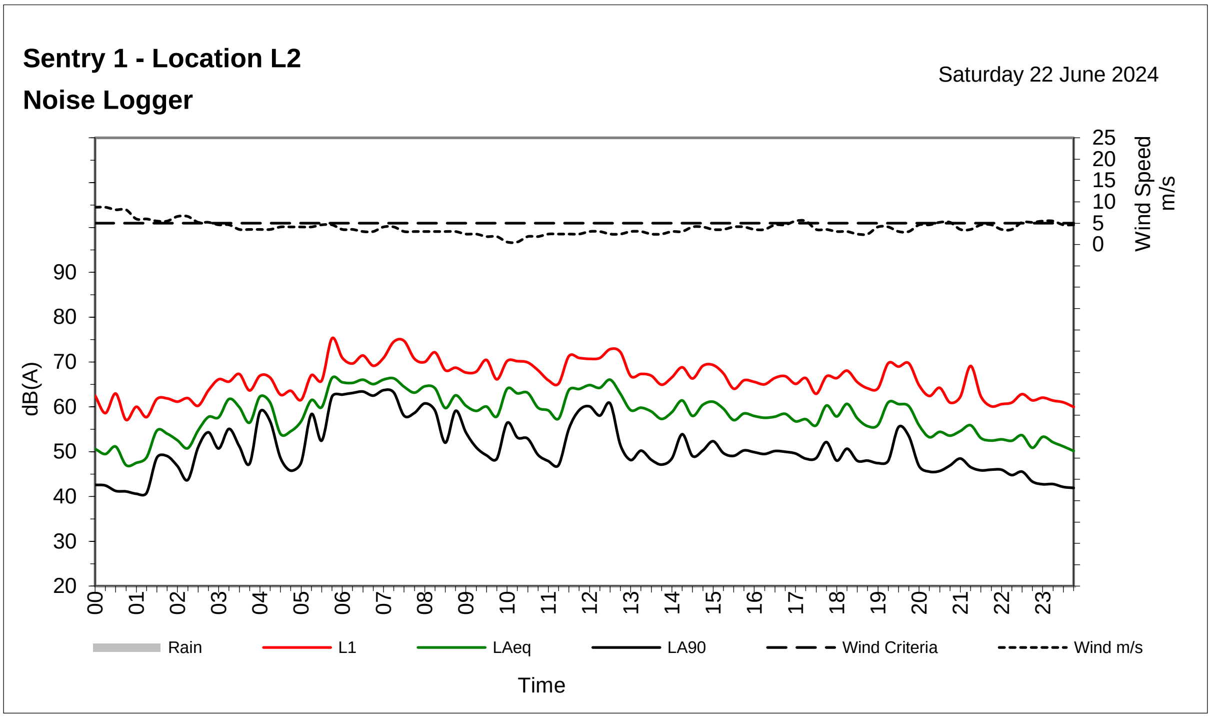



Sentry 1 - Location L2
Noise Logger
Wednesday 19 June 2024
dB(A)
20
30
40
50
60
70
80
90
Wind Speed m/s
0
5
10
15
20
25
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time

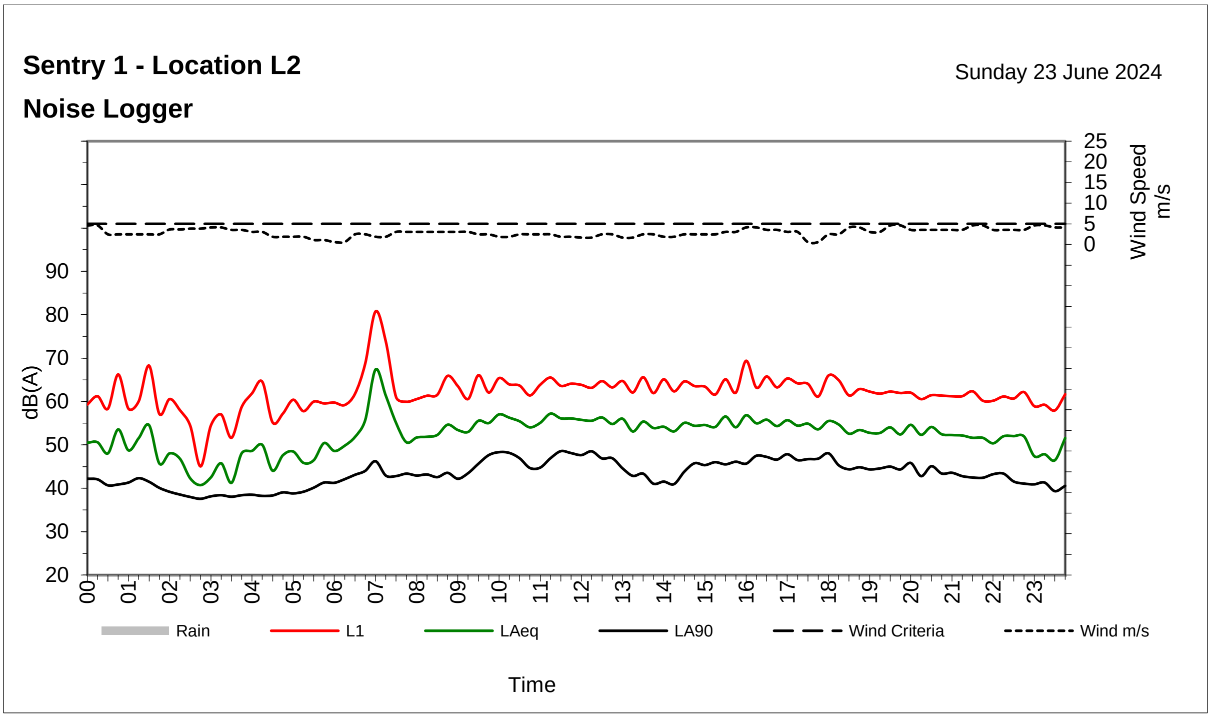

Sentry 1 - Location L2
Noise Logger
Thursday 20 June 2024
dB(A)
20
30
40
50
60
70
80
90
Wind Speed m/s
0
5
10
15
20
25
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time

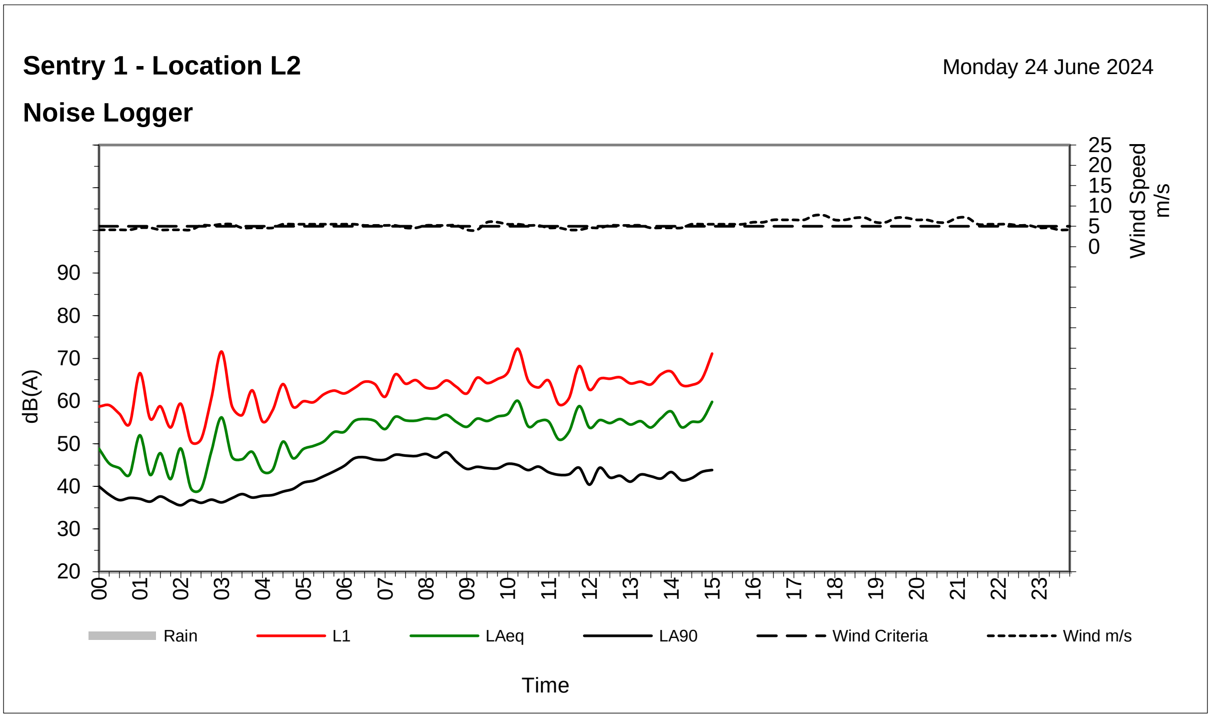


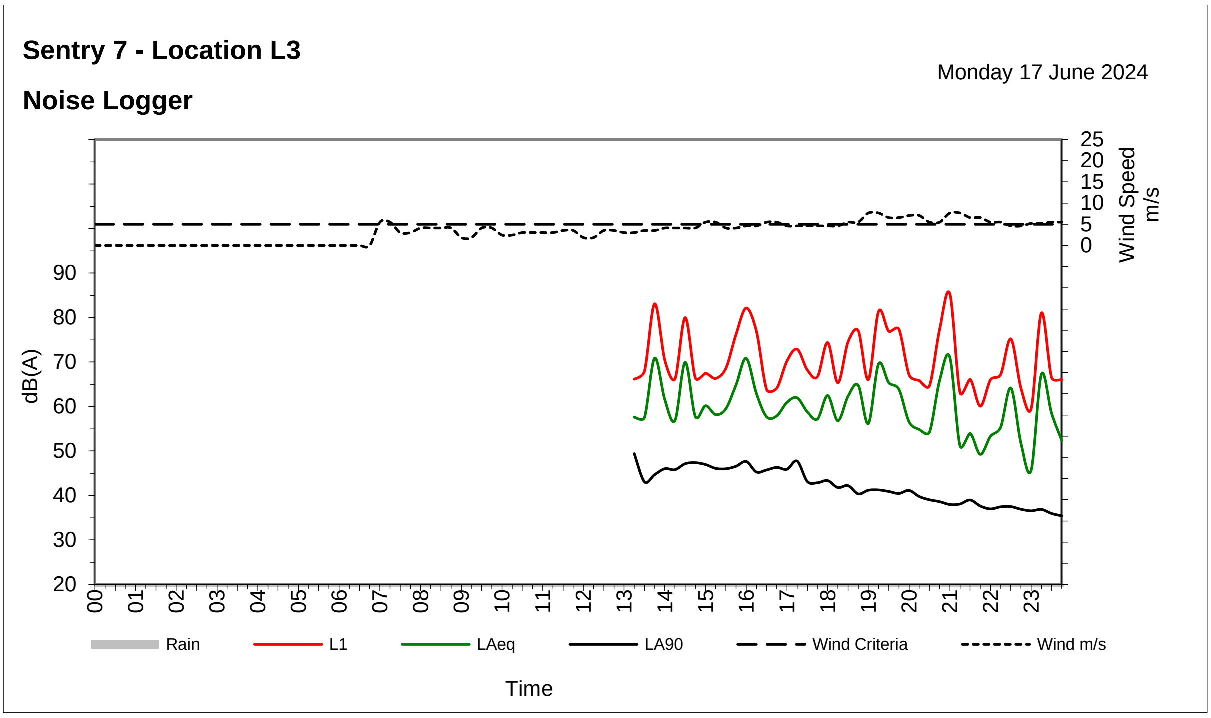
Sentry 1 - Location L2
Noise Logger
Friday 21 June 2024
dB(A)
90
80
70
60
50
40
30
20
25
20
15
10
5
0
Wind Speed m/s
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time

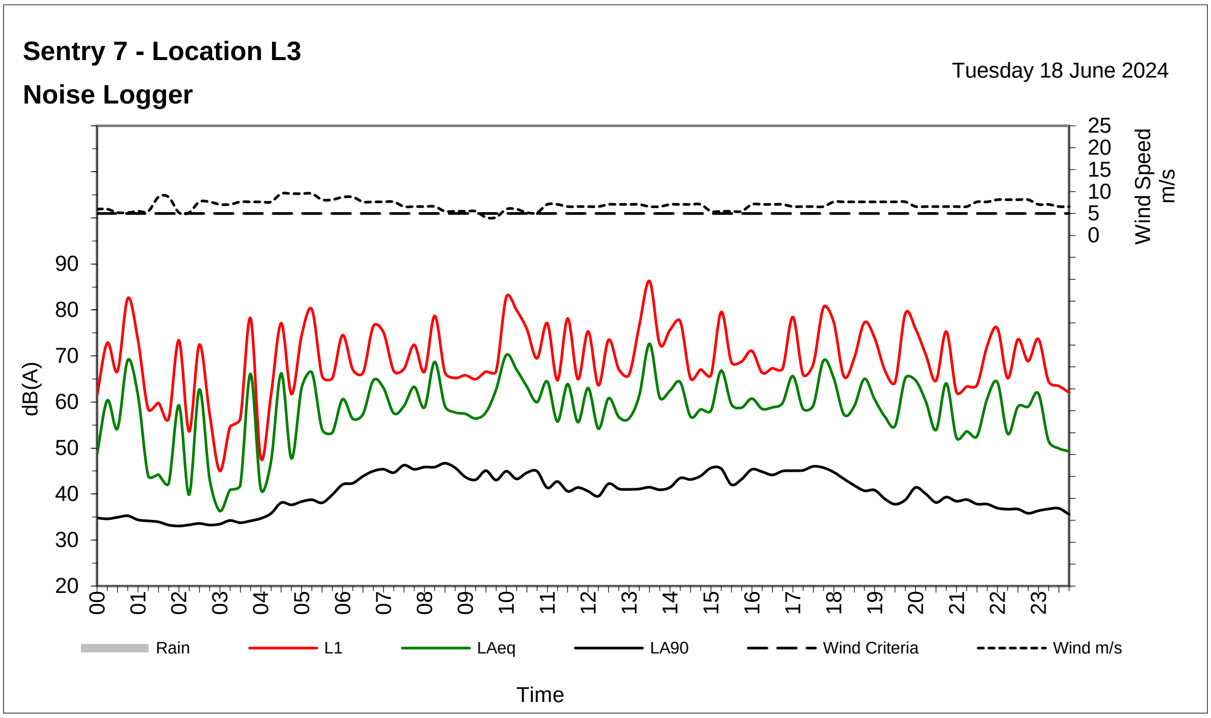


Sentry 1 - Location L2
Noise Logger
Saturday 22 June 2024
dB(A)
90
80
70
60
50
40
30
20
25
20
15
10
5
0
Wind Speed m/s
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time


Sentry 1 - Location L2
Sunday 23 June 2024
Noise Logger
dB(A)
90
80
70
60
50
40
30
20
25
20
15
10
5
0
Wind Speed m/s
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time


Sentry 1 - Location L2
Monday 24 June 2024
Noise Logger
dB(A)
90
80
70
60
50
40
30
20
25
20
15
10
5
0
Wind Speed m/s
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time

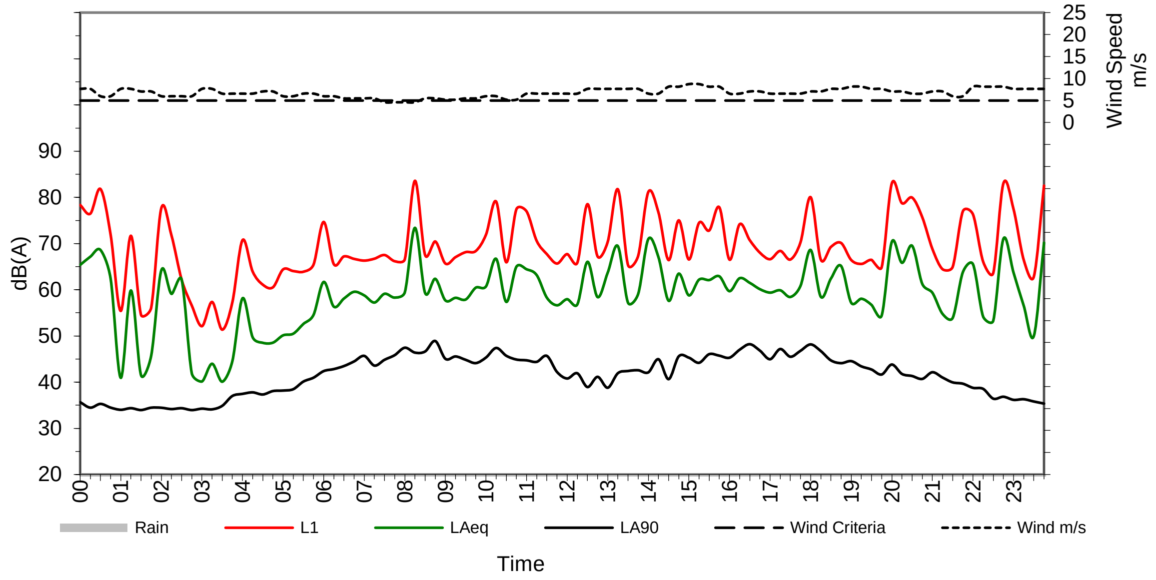

Sentry 7 - Location L3
Noise Logger
Monday 17 June 2024
dB(A)
Wind Speed m/s
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time


Sentry 7 - Location L3
Noise Logger
Tuesday 18 June 2024
dB(A)
Wind Speed m/s
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time

Sentry 7 - Location L3

Noise Logger

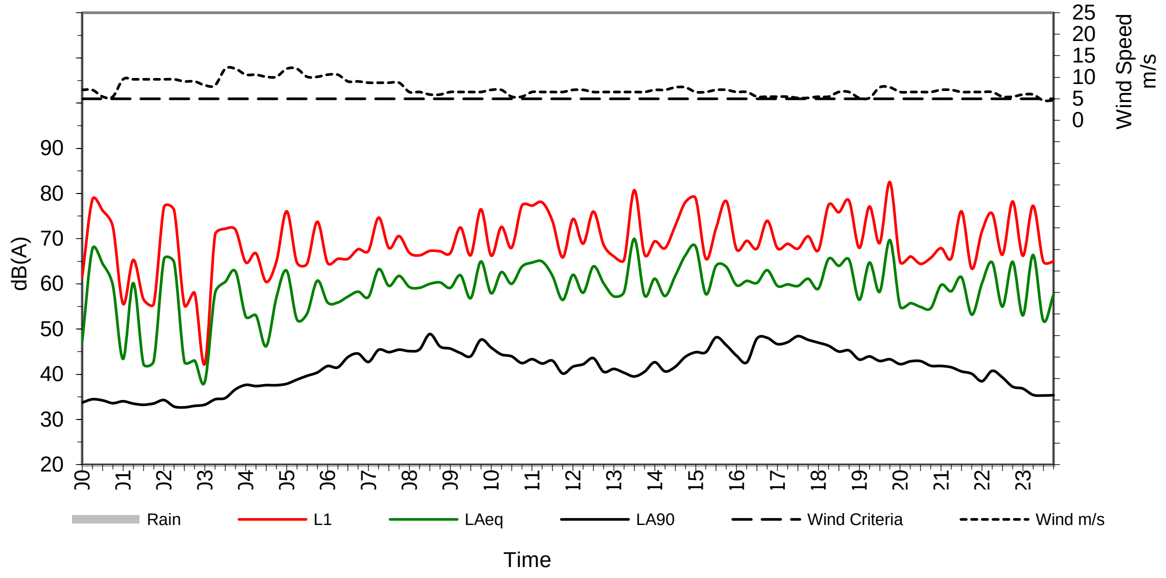
Wednesday 19 June 2024



Sentry 7 - Location L3

Noise Logger

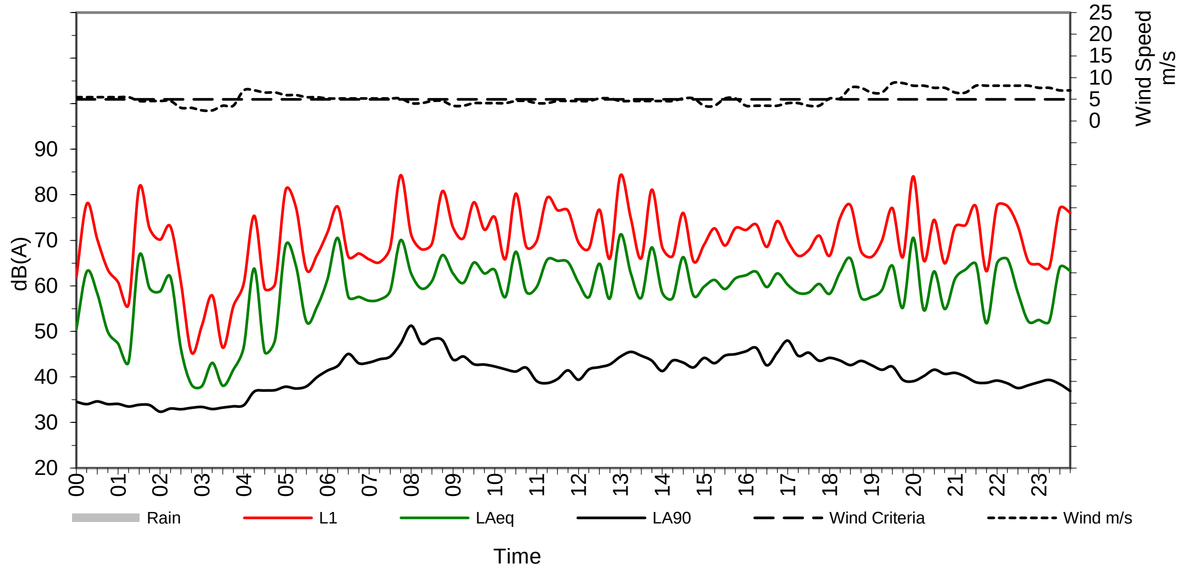
Thursday 20 June 2024



Sentry 7 - Location L3

Noise Logger

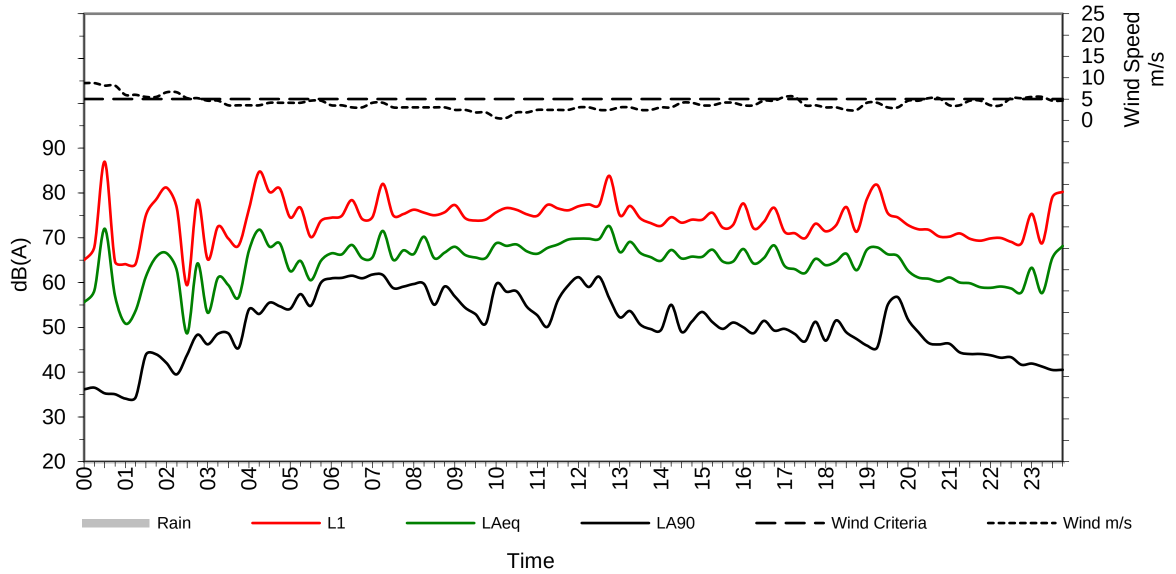
Friday 21 June 2024

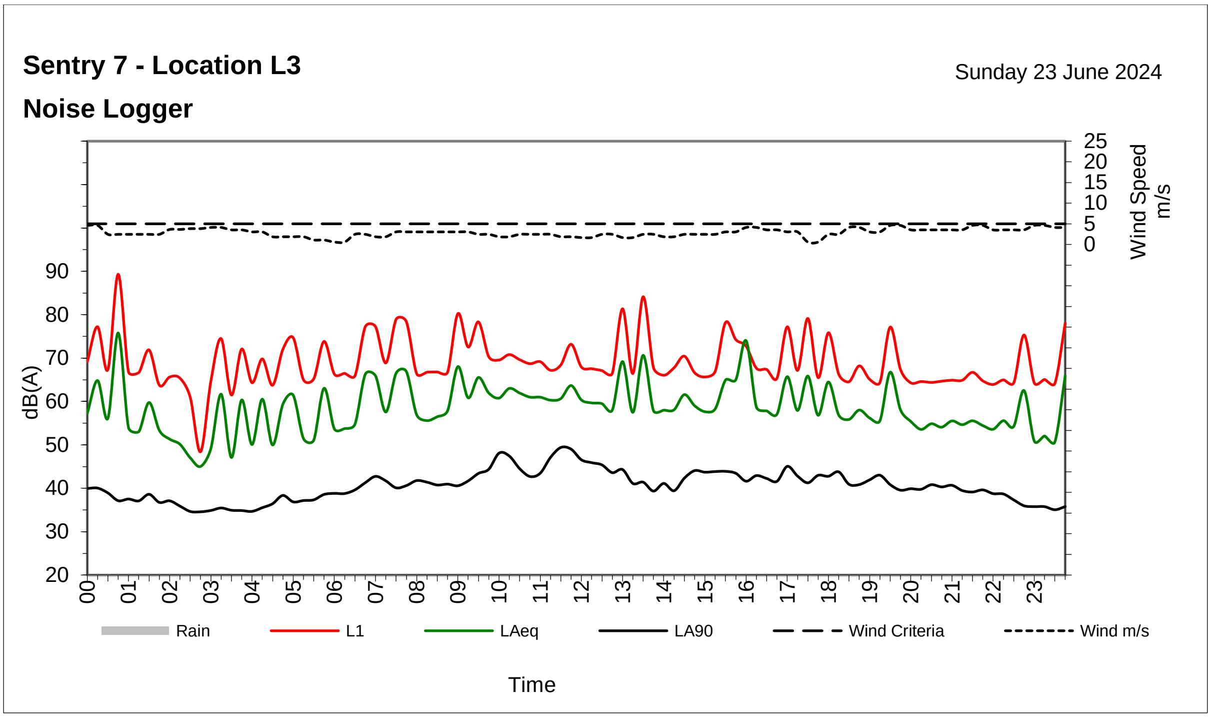


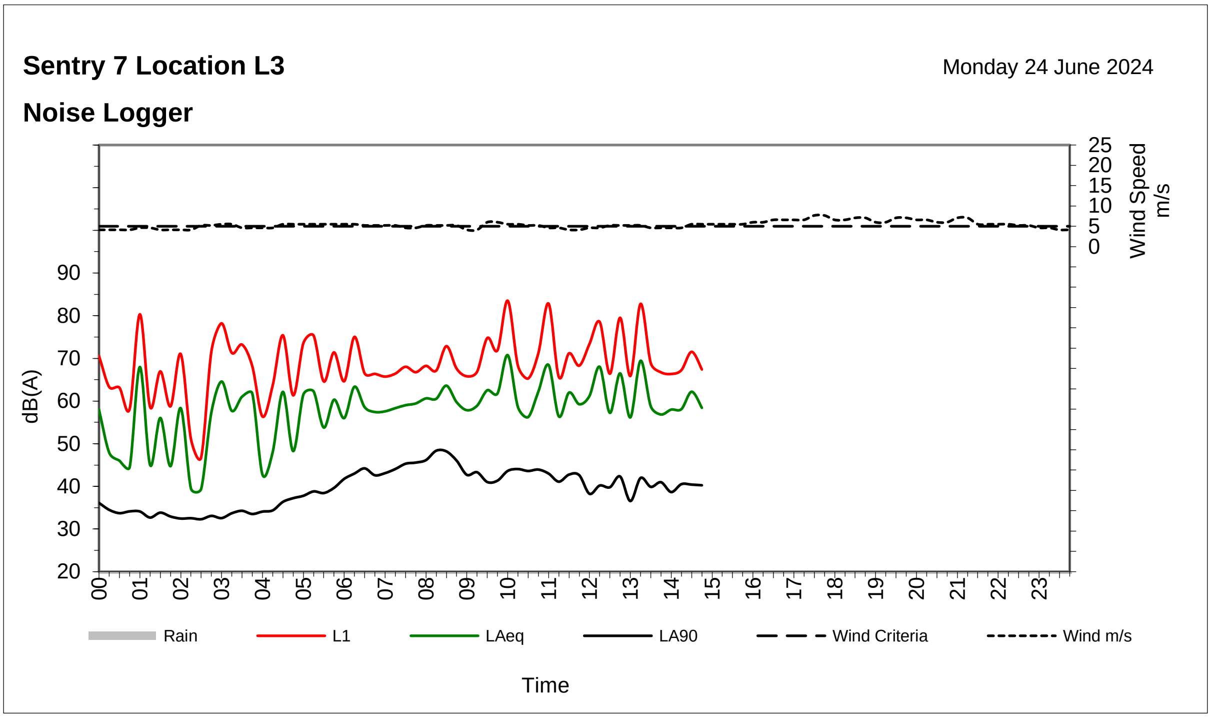
Sentry 7 - Location 3

Noise Logger

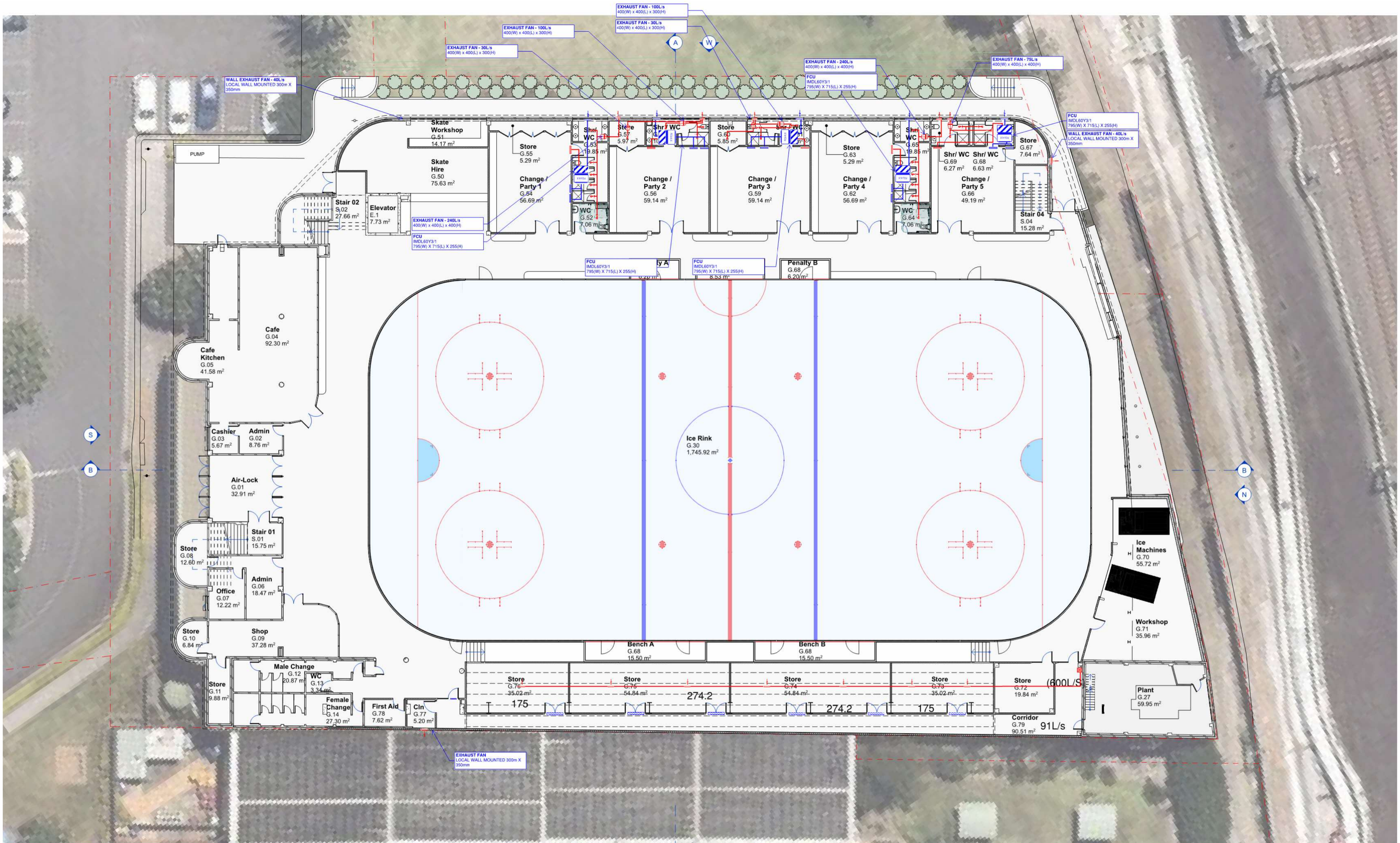
Saturday 22 June 2024




Sentry 7 - Location L3
Sunday 23 June 2024
Noise Logger
dB(A)
Wind Speed m/s
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time


Sentry 7 Location L3
Monday 24 June 2024
Noise Logger
dB(A)
Wind Speed m/s
Rain
L1
LAeq
LA90
Wind Criteria
Wind m/s
Time

Appendix C
External Inlet/Outlet Locations



Date	05.07.24	Drawn by	SC
Scale	1:200	Checked by	VB
Sheet Size	A2	Approved by	SW

Building Services Engineers

ADP CONSULTING PTY LTD

MELBOURNE	SYDNEY	BRISBANE	GOLD COAST
Level 13	Level 6	Level 16	Level 13
55 Collins St	33 Erskine St	15 Adelaide St	50 Cavill Ave
Melbourne	Sydney	Brisbane	Surfers Paradise
VIC 3000	NSW 2000	QLD 4000	QLD 4022
+61 39521 1195	+61 28203 5447	+61 73088 4022	+61 73088 4022

www.adpconsulting.com.au contact@adpconsulting.com.au

Project Name:
CANTERBURY OLYMPIC ICE RINK

Title:
MECHANICAL SERVICES - SPATIAL

Client:
COIR

Job No.	Drawing / Sketch No.	Rev.
SYD2599	MEFP SK	03

1:200 @ A2

P3 Preliminary Schematic Design 23/5/2024 source file: 2221 - SD Master_v26.pln

kennedy associates architects

Level 3, 1 Booth Street Annandale NSW 2038
E mail@kennedyassociates.com.au
W www.kennedyassociates.com.au
P +61 2 9557 6466
F +61 2 9557 6477

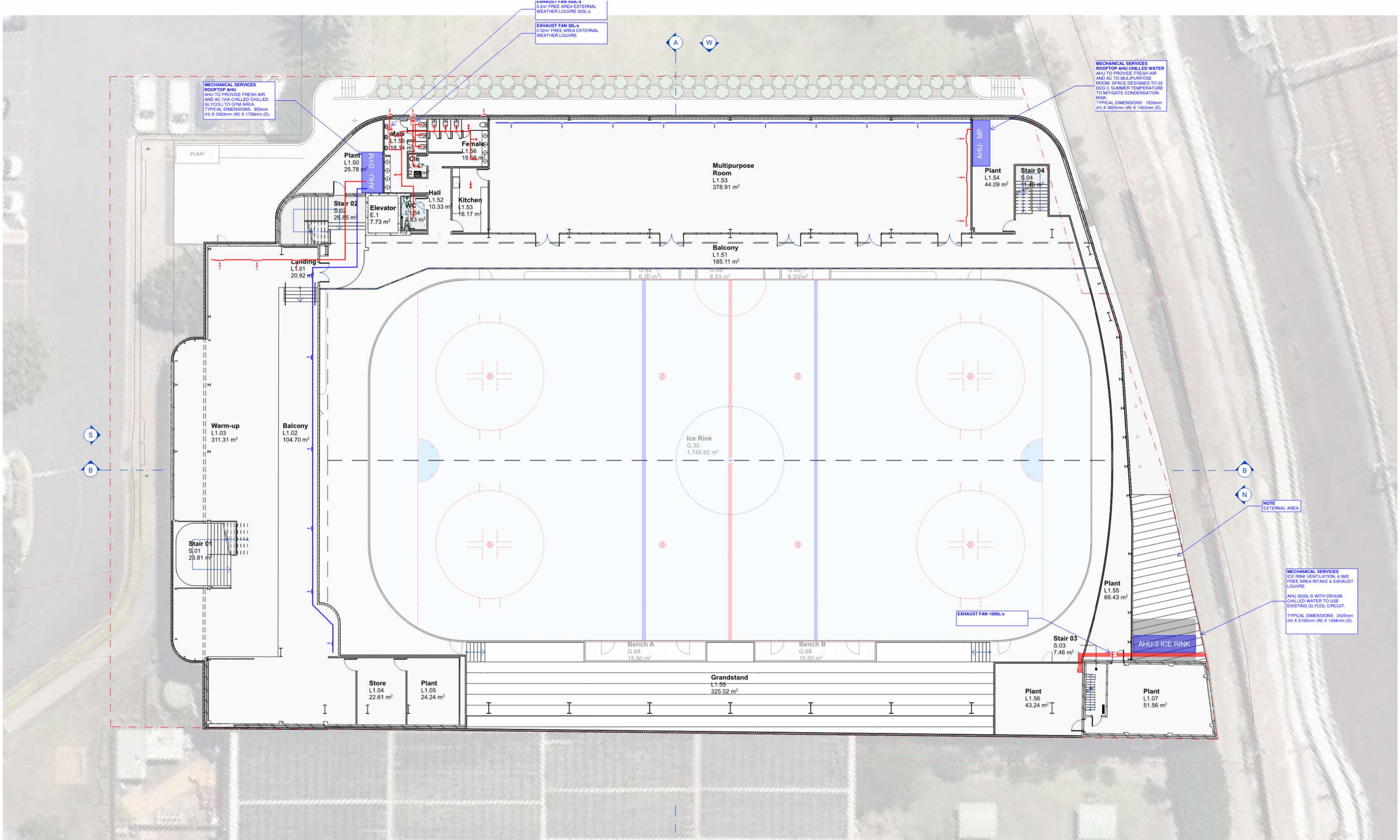
nominated architects: Steve Kennedy NSW ARB 5828; Anthony Nolan NSW ARB 6773

project
Canterbury Olympic Ice Rink Redevelopment
17A Phillips Ave,
Canterbury NSW 2193

drawing name
Ground Floor - Proposed Plan

project no.	drawn by	checked by	date
2221	DR	SK	23/05/24

drawing number - **2221-SD100** rev no. **P3**



Date	05.07.24	Drawn by	SC
Scale	1:200	Checked by	VB
Sheet Size	A2	Approved by	SW

Building Services Engineers

ADP CONSULTING PTY LTD

ADP Consulting · Engineering

MELBOURNE	SYDNEY	BRISBANE	GOLD COAST
Level 13	Level 6	Level 16	Level 13
55 Collins St	33 Erskine St	15 Adelaide St	50 Cavill Ave
Melbourne	Sydney	Brisbane	Surfers Paradise
VIC 3000	NSW 2000	QLD 4000	QLD 4022
+61 39521 1195	+61 28203 5447	+61 73088 4022	+61 73088 4022

www.adpconsulting.com.au contact@adpconsulting.com.au

Project Name:
CANTERBURY OLYMPIC ICE RINK

Title:
MECHANICAL SERVICES - SPATIALS

Client:
COIR

Job No.	Drawing / Sketch No.	Rev.
SYD2599	MEFP SK	03

1:200 @ A2

P3 Preliminary Schematic Design 23/5/2024

source file: 2221 - SD Master_v26.pln

kennedy associates architects

Level 3, 1 Booth Street E mail@kennedyassociates.com.au P +61 2 9557 6466
Annandale NSW 2038 W www.kennedyassociates.com.au F +61 2 9557 6477

nominated architects Steve Kennedy NSW ARB 5828 Anthony Nolan NSW ARB 6773

project
Canterbury Olympic Ice Rink Redevelopment
17A Phillips Ave,
Canterbury NSW 2193

drawing name
First Floor - Proposed Plan

project no.	drawn by	checked by	date
2221	DR	SK	23/05/24

drawing number - rev no.
2221-SD101 P3

ADP
Consulting : Engineering

Appendix D
Plant Noise Data

Represented by:
Fantech Pty. Ltd.
A.B.N. 11 005 434 024
63 Vision Street
Dandenong South VIC 3175
Telephone: +61 (03) 9554 7845
Facsimile: +61 (03) 9554 7833
E-mail: info@fantech.com.au

FANTECH

Fan: TD-1300/250 (Hi speed) Duty: 0.24 m³/s @ 250 Pa Date: 2/07/2024
Project:
Location: Designation:

		Octave band centre frequency,HZ 63	125	250	500	1K	2K	4K	8K
Sound Power Level (Inlet)		63	68	73	70	75	74	67	60
Sound Power Leaving System		63	68	73	70	75	74	67	60
Direct Sound Corrections									
Direct Sound to Terminal	100 %	0	0	0	0	0	0	0	0
Distance Listener to Terminal	3 m	-21	-21	-21	-21	-21	-21	-21	-21
Directivity(Terminal Area)	<= 0.01 m	9	9	9	9	9	9	9	9
Grille Position:	Corner (3 surfaces)								
Direct Sound Pressure at 3m		51	56	61	58	63	62	55	48
Reverberant Sound Corrections									
Reverberant Sound to Area	0 %	-50	-50	-50	-50	-50	-50	-50	-50
Absorption	Dead Room	-1	-4	-9	-13	-15	-16	-16	-16
Room Volume	Small(20 -99 m³)								
Reverberant Sound Pressure in Area		12	14	14	7	10	8	1	-6
Total Sound Pressure at 3m		51	56	61	58	63	62	55	48
Required dBA	0 dBA	17	7	0	-6	-9	-10	-10	-8
Attenuation Required		34	49	61	64	72	72	65	56
Silencer Selection		0	0	0	0	0	0	0	0
Resultant Sound Pressure at 3m		51	56	61	58	63	62	55	48

Criteria Achieved	**NR 65**	**dBA 67**	**PNC 66**

Represented by:
Fantech Pty. Ltd.
A.B.N. 11 005 434 024
63 Vision Street
Dandenong South VIC 3175
Telephone: +61 (03) 9554 7845
Facsimile: +61 (03) 9554 7833
E-mail: info@fantech.com.au

Fan: TD-1300/250 (Hi speed) Duty: 0.24 m³/s @ 250 Pa Date: 2/07/2024
Project:
Location: Designation:

		Octave band centre frequency,HZ 63	125	250	500	1K	2K	4K	8K
Sound Power Level (Inlet)		63	68	73	70	75	74	67	60
Sound Power Leaving System		63	68	73	70	75	74	67	60
Direct Sound Corrections									
Direct Sound to Terminal	100 %	0	0	0	0	0	0	0	0
Distance Listener to Terminal	3 m	-21	-21	-21	-21	-21	-21	-21	-21
Directivity(Terminal Area)	<= 0.01 m	9	9	9	9	9	9	9	9
Grille Position:	Corner (3 surfaces)								
Direct Sound Pressure at 3m		51	56	61	58	63	62	55	48
Reverberant Sound Corrections									
Reverberant Sound to Area	0 %	-50	-50	-50	-50	-50	-50	-50	-50
Absorption	Dead Room	-1	-4	-9	-13	-15	-16	-16	-16
Room Volume	Small(20 -99 m³)								
Reverberant Sound Pressure in Area		12	14	14	7	10	8	1	-6
Total Sound Pressure at 3m		51	56	61	58	63	62	55	48
Required dBA	0 dBA	17	7	0	-6	-9	-10	-10	-8
Attenuation Required		34	49	61	64	72	72	65	56
Silencer Selection		0	0	0	0	0	0	0	0
Resultant Sound Pressure at 3m		51	56	61	58	63	62	55	48

Criteria Achieved	**NR 65**	**dBA 67**	**PNC 66**

All FCU's IMDL60Y 3/1 (5 No.)

IMDL 60Y 3/1

FCU-GF-Change1 G.54
FCU-GF-Change4 G.62

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Temperzone Ltd.          *** Rifled Tube Only ***      21/06/2024  10:34:51
                            COIL CALCULATION

    SELECTION 11:  3/8 TUBE CHILLED GLYCOL - WATER
 1: ENTRY AIR DRY.B (degC):      30.3         *** CALCULATION ***
 2: ENTRY AIR WET.B (degC):      22.0    Face Area              :   0.151 sq.m
 3: ENTRY CHILLED GLYCOL  :       6.0    Face Velocity          :   1.876 m/s
 4: LEAVING CHILLED GLYCOL:      12.0    Leaving Dry Bulb       :  17.55  degC
 5: AIR FLOW       (m^3/s) :      0.284  Leaving Wet Bulb       :  15.94  degC
 6: FIN HEIGHT      8  (mm):             Glycol Flow            :   0.265 l/s
 7: FINNED LENGTH      (mm):             Glycol Velocity        :   1.322 m/s
 8: No. COIL ROWS         :       3      Equivalent Water Vel.  :   0.384 m/s
 9: FINS PER METER        :              Number of Circuits     :   3
10: No. CIRCUITS          :              Sensible Cooling       :   4.38  kw
11: GLYCOL % VOLUME       :      40      Sensible Heat Ratio    :   0.657
                                         Total Cooling          :   6.67  kw
13: Re-enter all                         Air Side Friction Loss:  45.3   pa
14: Calculate & Display                  Pressure Drop          :   0.00  kpa
 0: Menu                               CONNECTIONS : Same Ends
```

FCU-GF-Change2 G.56
FCU-GF-Change3 G.59

```
Temperzone Ltd.          *** Rifled Tube Only ***      21/06/2024  10:38:39
                            COIL CALCULATION

    SELECTION 11:  3/8 TUBE CHILLED GLYCOL - WATER
 1: ENTRY AIR DRY.B (degC):      30.3         *** CALCULATION ***
 2: ENTRY AIR WET.B (degC):      22.0    Face Area              :   0.151 sq.m
 3: ENTRY CHILLED GLYCOL  :       6.0    Face Velocity          :   1.955 m/s
 4: LEAVING CHILLED GLYCOL:      12.0    Leaving Dry Bulb       :  17.69  degC
 5: AIR FLOW       (m^3/s) :      0.296  Leaving Wet Bulb       :  16.03  degC
 6: FIN HEIGHT      8  (mm):             Glycol Flow            :   0.273 l/s
 7: FINNED LENGTH      (mm):             Glycol Velocity        :   1.358 m/s
 8: No. COIL ROWS         :       3      Equivalent Water Vel.  :   0.397 m/s
 9: FINS PER METER        :              Number of Circuits     :   3
10: No. CIRCUITS          :              Sensible Cooling       :   4.52  kw
11: GLYCOL % VOLUME       :      40      Sensible Heat Ratio    :   0.659
                                         Total Cooling          :   6.85  kw
13: Re-enter all                         Air Side Friction Loss:  48.6   pa
14: Calculate & Display                  Pressure Drop          :   0.00  kpa
 0: Menu                               CONNECTIONS : Same Ends
```

FCU-GF-Change5 G.66

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Temperzone Ltd.          *** Rifled Tube Only ***        21/06/2024   10:40:49
                              COIL CALCULATION

      SELECTION 11:   3/8 TUBE CHILLED GLYCOL / WATER
 1: ENTRY AIR DRY.B (degC):        30.3          *** CALCULATION ***
 2: ENTRY AIR WET.B (degC):        22.0    Face Area              :    0.151 sq.m
 3: ENTRY CHILLED GLYCOL   :        6.0    Face Velocity          :    1.625 m/s   0
 4: LEAVING CHILLED GLYCOL:        12.0    Leaving Dry Bulb       :   17.05  degC
 5: AIR FLOW       (m^3/s) :        0.246  Leaving Wet Bulb       :   15.61  degC
 6: FIN HEIGHT      8   (mm):          .   Glycol Flow            :    0.241 l/s
 7: FINNED LENGTH       (mm):              Glycol Velocity        :    1.202 m/s
 8: No. COIL ROWS          :         3     Equivalent Water Vel.  :    0.342 m/s
 9: FINS PER METER         :      .        Number of Circuits     :    3
10: No. CIRCUITS           :               Sensible Cooling       :    3.94  kw
11: GLYCOL % VOLUME        :        40     Sensible Heat Ratio    :    0.650
                                           Total Cooling          :    6.06  kw
13: Re-enter all                           Air Side Friction Loss:   35.5   pa
14: Calculate & Display                    Pressure Drop          :    0.00  kpa
 0: Menu                                 CONNECTIONS : Same Ends
```
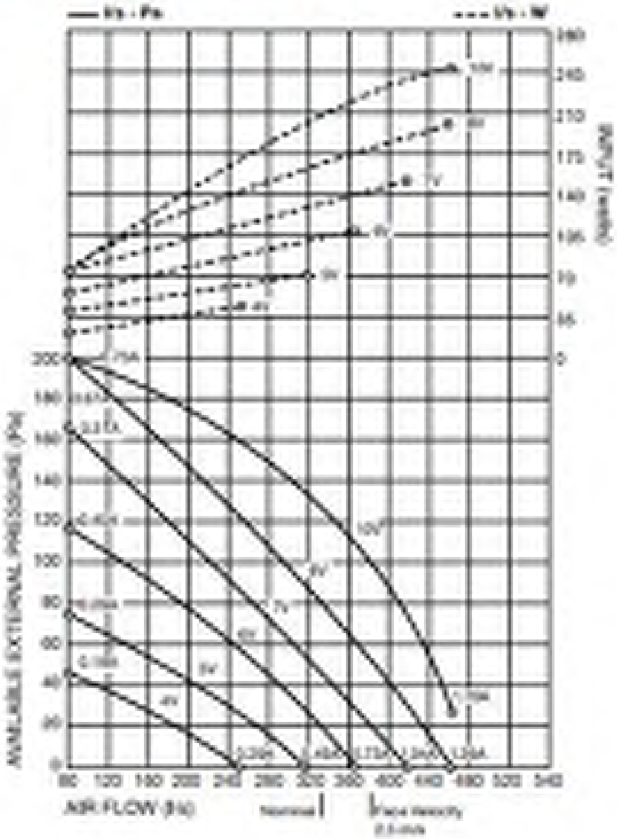

Air Handling



MX² 80 Plus system

Unit Submittal Data

System name	Canterbury Ice Rink June 2024
Genesys no	G364815-1
Labels	
Prepared by	Ian Air
Print date	28/06/2024 03:29:33
Program version	2024.6.19.23559+97d9925a3e3f2dd7f42344b08f9cb2156a4a01be

Munters

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Technical datasheet

Specification Munters dehumidifier

System

- The MX² combines traditional Munters strengths like efficiency and robustness with modern state of the art technology like modulating RH control and communication. Low energy consumption and reliability are important in todays processes. Our modern control system together with the high efficient fans with frequency converters and the Energy Recovery Purge (ERP) or Energy Efficiency Purge (EEP), ensure optimal energy savings. Features include:
- Efficient dehumidification between -20°C and 40°C
- Modulating humidity control including wet air temp sensor
- Communication and external control options
- Filter and rotor stop alarm as standard
- Energy saving options
- Service and running indicator alarm as external indicators
- Munters Connected Climate® (MCC)
- Plenum fan for public areas

Cooling coil

- Cooling coil fitted out with an inclined stainless steel collection pan. Condensing cooler with drip-catcher and loose syphon tube.

Technical data Munters dehumidifier

General information

DH Model	MX²80
Controller type	Munters control system
Grid Voltage/Phase/Frequency	400/3/50
Water Removed	67.5 kg/h
Max water removed	67.5 kg/h

Process side

Air flow in	10800 Sm³/h
Outlet temperature	28.3 °C
Outlet moisture	2 g/kg
Air out relative pressure	299 Pa
Bag filter grade (EN 779)	Without
Panel filter grade (EN 779)	G4

Regeneration side

Air flow in	2520 Sm³/h
Panel filter grade (EN 779)	G4
Bag filter grade (EN 779)	Without
React heater type	Electric
Reactivation heater rated power	84.00 kW
Reactivation heater reqd. power	84.01 kW
Outlet temperature	44.4 °C
Outlet moisture	38.62 g/kg
Air out relative pressure	300 Pa

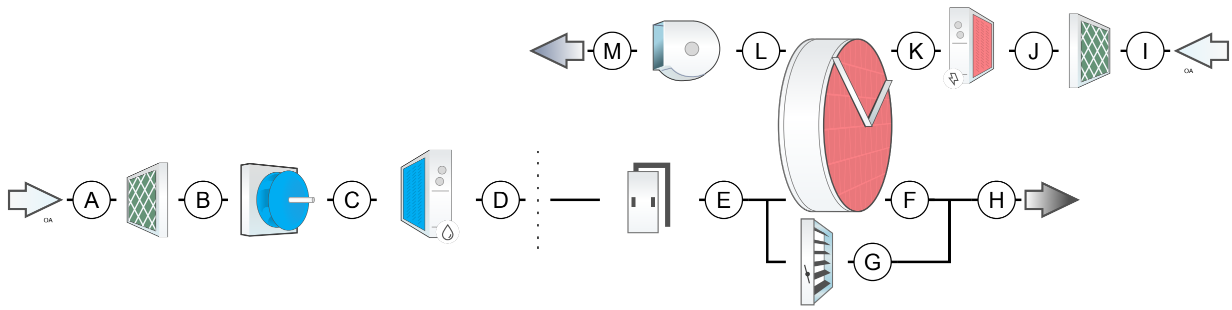
Dimension / weight / others

System total reqd. elect. power	91.73 kW
System total rated elect. power	97.72 kW
System total reqd. elect. current	136.80 A
System total rated elect. current	139.05 A
System weight	1708 kg

Munters

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Flow diagram



Climate data location: Australia, SYDNEY CANTERBURY 3 m / 1012.9 mbar

Summer

	A	B	C	D	E	F	G	H	I	J	K	L
Sl/s	3000	3000	3000	3000	3000	2579	421	3000	700	700	700	700
°C	25.2	25.2	26.8	9.0	9.0	31.4	9.0	28.3	25.2	25.2	124.4	42.8
dp°C	21.70	21.68	21.88	8.85	8.85	-15.22	8.78	-8.41	21.70	21.68	21.68	35.70
% r.H.	81	81	74	99	99	4	98	8	81	81	1	68
Pa	0	-154	1095	818	818	329	299	299	0	-135	-160	-760

	M
Sl/s	700
°C	44.4
dp°C	35.89
% r.H.	64
Pa	300

Winter

	A	B	C	D	E	F	G	H	I	J	K	L
Sl/s	3000	3000	3000	3000	3000	2579	421	3000	700	700	700	700
°C	3.7	3.7	5.2	5.2	5.2	14.1	5.2	12.8	3.7	3.7	62.7	30.0
dp°C	-5.08	-5.10	-4.96	-4.99	-4.99	-26.11	-5.05	-19.83	-5.08	-5.10	-5.10	14.09
% r.H.	50	50	46	46	46	4	45	7	50	50	2	38
Pa	0	-151	1042	818	818	360	299	299	0	-132	-157	-658

	M
Sl/s	700
°C	31.4
dp°C	14.24
% r.H.	35
Pa	300

System capacities

Total Dehumidification	188.9 kg/h
Dehumidifier	67.5 kg/h
Cooling Coil	121.4 kg/h

Dehumidification @ maximum capacity

System utilities

System total rated power	97.7 kW
System rated current	139.1 A
Chilled Water	6.52 l/s

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Summary

Number of systems	1
System configurations	1 x Canterbury Ice Rink June 2024 (G364815-1)

System

System arrangement	MX² Plus
DH Model	MX²80
React heater type	Electric
Airflow direction	Left to right
Grid Voltage/Phase/Frequency	400/3/50
Case number	AUSTRALIA
System connection side	Back
Controller type	Munters control system
System weight	1708 kg

Operating conditions

Operating temperature, minimum	-20.0 °C
Operating temperature, maximum	40.0 °C
Installation altitude, maximum	2000 m

Transport and Storage

Minimum temperature for transport and storage	-20.0 °C
Temperature range for transport and storage, Maximum	70.0 °C
Packaging	Standard pallet

Control system

Process fan mode	On demand

Totals

Water Removed	67.46 kg/h
System total rated elect. power	98 kW
Air flow	10800 Sm³/h

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Technical data - Pretreatment filter

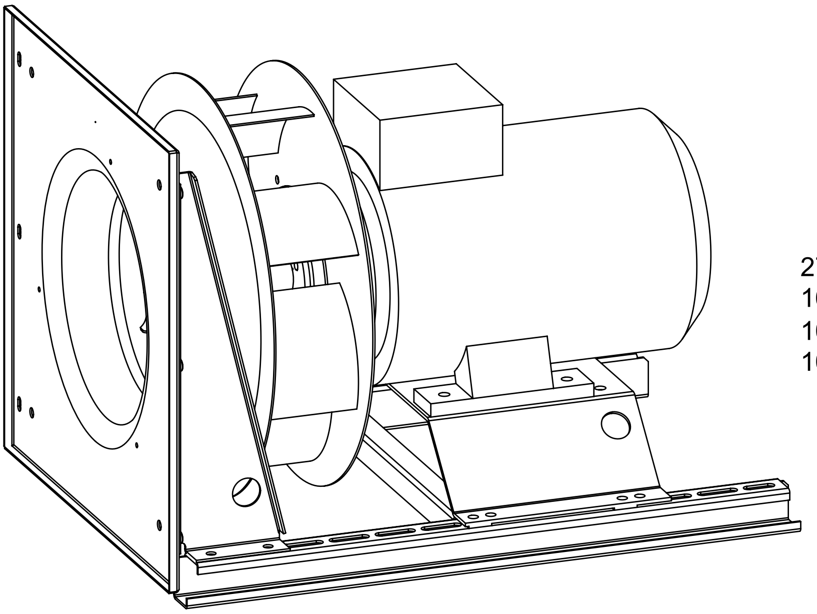
Assembly	
Inspection side	Right
Door	Removable panel
Panel filter	
Panel filter grade (EN 779)	G4
Panel filter quantity	4
Panel filter size 1	595x595x95
Panel filter part no.1	150-023855-001 (2pcs)
Panel filter size 2	595x495x95
Panel filter part no. 2	150-023856-001 (2pcs)
Design	
Dirtiness % for design	50 %
Options	
Pressure indicator	Pressure Switch 50-500Pa QBM9903-5
Pressure indicator quantity	1

Panel filter	
Panel filter pressure drop design	154 Pa
Panel filter pressure drop clean	58 Pa
Panel filter pressure drop dirty	250 Pa

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

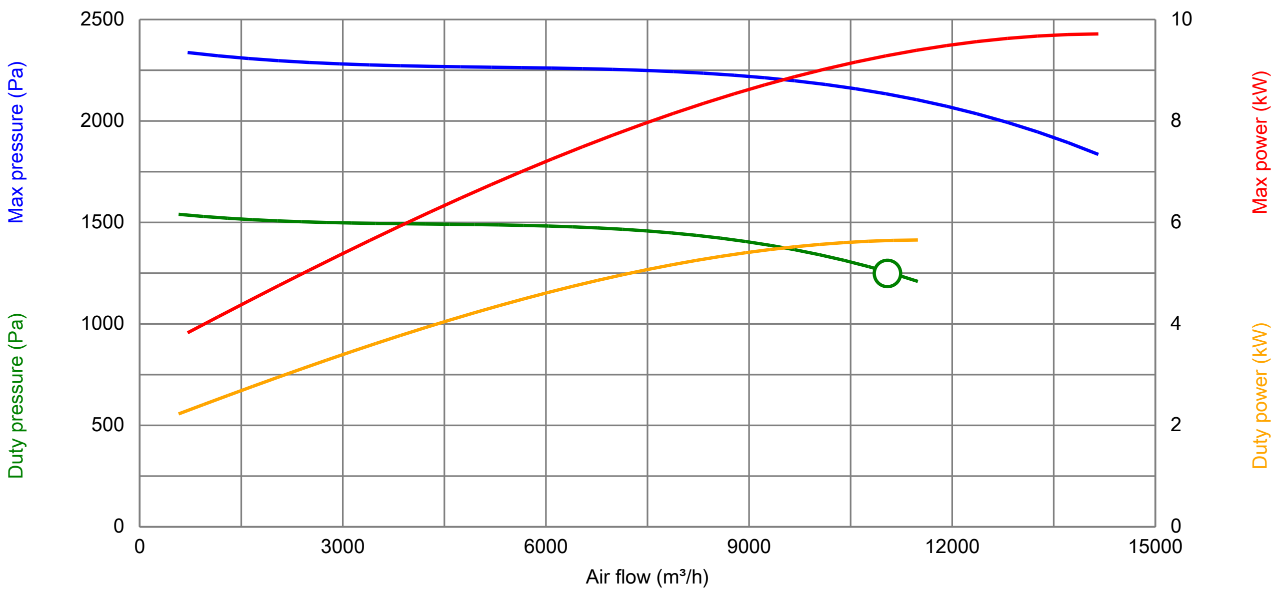
Technical data - Supply fan, pushing

25 °C
16.4 g/kg
10800 Sm³/h
-154 Pa



27 °C
16.4 g/kg
10800 Sm³/h
1095 Pa

ER56C-4DN.I7.CR, 11kW



Munters

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Main selections

Door	Left hinged
Pressure indicator	PRESSURE, DIFF TRANSM. 0-7000
Inspection side	Right
Fan Model	ER56C-4DN.I7.CR, 11kW
Frequency control	Yes

Results

Component total rated electric current	12.3 A
Component total rated electric power	11.0 kW

Sound

		63	125	250	500	1k	2k	4k	8k	dBA
Sound power levels at suction side	dB	71.2	70.7	82.7	72.3	74.8	74.4	71.3	69.4	80.8
Sound power levels at pressure side	dB	80.3	78.2	86.0	83.3	83.9	79.9	76.2	72.1	87.7

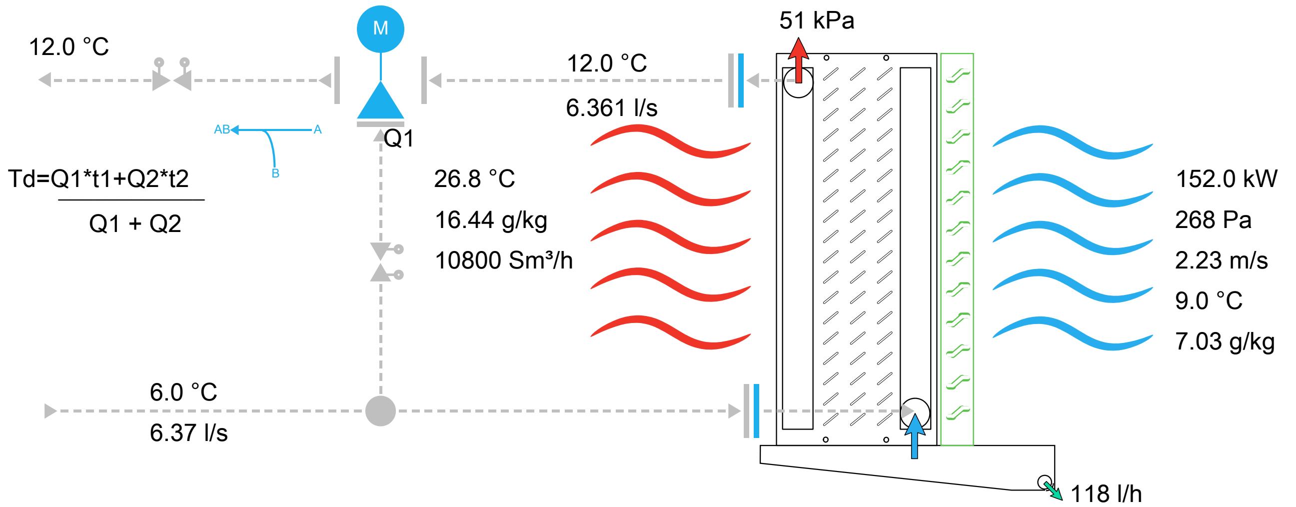
1 x

Main selections

Frequency inverter	INVERTER,FREQUENCY,FC101 IP54 15KW

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Technical data - Precooler, ethylene glycol



Design	
Fluid temperature in	6.0 °C
Fluid temperature out	12.0 °C
Coil casing	
Connection side	Left
Coil frame material	FeZn 2.0 mm
Coil dimensions	1335x1290
Cooling coil fluid drainage	Sloped tray, Inox 304
Tubes	
Tube material	Copper
Tube diameter	9.9 mm (3/8")
Tube thickness	0.30 mm
Number of tube rows	12
Number of circuits	72
Fins	
Fin material	Aluminium
Fin thickness	0.2 mm
Fin spacing	2 mm
Fluid	
Fluid	Ethylene glycol
Fluid antifreeze by weight	20.00 %
Coil fluid inlet connection size	2 x DN 80
Fluid volume	64 L
Accessories	
Coil Flanges	Threaded flanges PN16
Frost Protection	None
Droplet eliminator	Removable polypropylene HT 33mm pitch
Mist eliminator frame	Separate frame, FeZn
Coil Data	
PED design pressure (barg)	15 bar
PED CAT.	Art. 4 Par. 3 seen as Piping
PED Class	Art 4.3

1 x Valve, precooler, ethylene glycol

Coil

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Coil fluid inlet connection size	2 x DN 80
Valve	
Fluid valve type	3-Way, Kvs=40, VXG41.50
Valve DN connection size	DN 50
Valve material	None
Valve connection, valve side	G 2¾ "
Valve fittings	Brass
Valve, pipe side	Rp 2 "
Actuator	
Actuator	SAX61.03
Actuator voltage	24 V AC/DC
Actuator positioning voltage	0-10V DC
Actuator positioning time	30 s
Fluid temperature in	6.0 °C
Valve options	
Valve stem heater	No

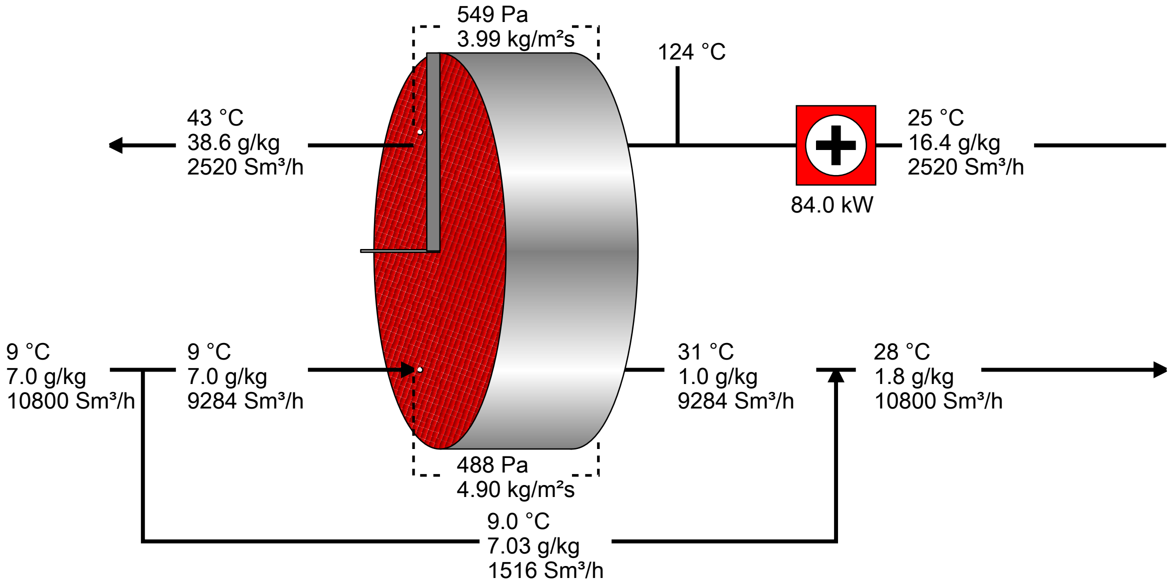
1 x Siphon drainage, non-return valve

Main selections	
Drainage valve	Water trap, non-return, overpressure

Munters

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Technical data - Dehumidifier



Main selections	
DH Model	MX²80
Desiccant rotor type	HPS
Material	Aluzink
Grid Voltage/Phase/Frequency	400/3/50
Airflow direction	Left to right
Insulated process inlet	Yes
Purge	None
DH Bypass	Yes, internal
Weight	
Estimated weight	564 kg
Options	
Humidity transmitter	RH+T (Duct mounted)
User Manual	GB
React Heater	
Reactivation heater reqd. power	84.0 kW
Reactivation heater max. power	102.0 kW
Air flow out	2520 Sm³/h
Outlet temperature	124 °C
Outlet moisture	16.4 g/kg
Process	
Outlet temperature	28 °C
Outlet moisture	1.8 g/kg
React	
Air flow out	2520 Sm³/h
Outlet temperature	43 °C
Outlet moisture	38.6 g/kg
Air pressure drop	624 Pa
Drive motor	
Drive motor rated power	0.02 kW
Rotor	
Air flow out	9284 Sm³/h

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Outlet temperature	31	°C
Outlet moisture	1.0	g/kg
Air pressure drop	488	Pa
Bypass		
Outlet temperature	9.0	°C
Outlet moisture	7.03	g/kg
Dehumidifier		
Component total electric power	84.0	kW
Component total rated electric power	84.02	kW
Component total electric current	121.37	A
Component total rated electric current	121.37	A

Munters

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

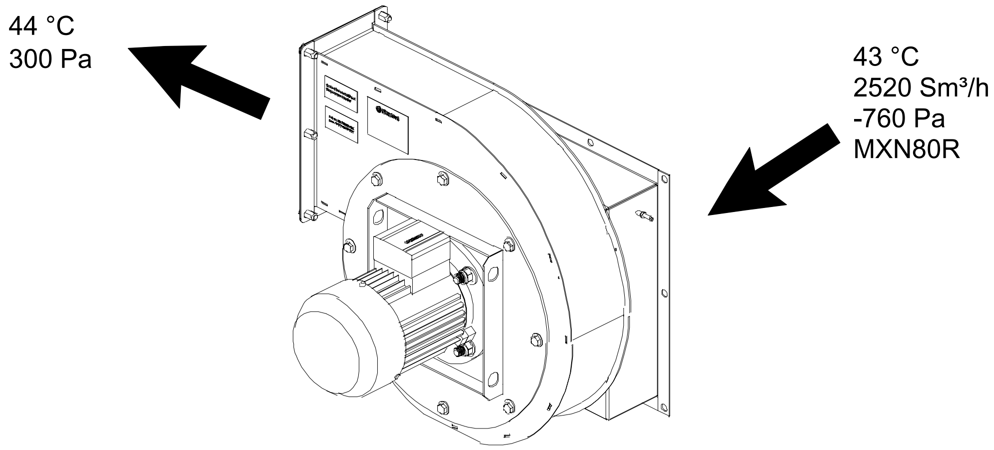
Technical data - Filter bank, React

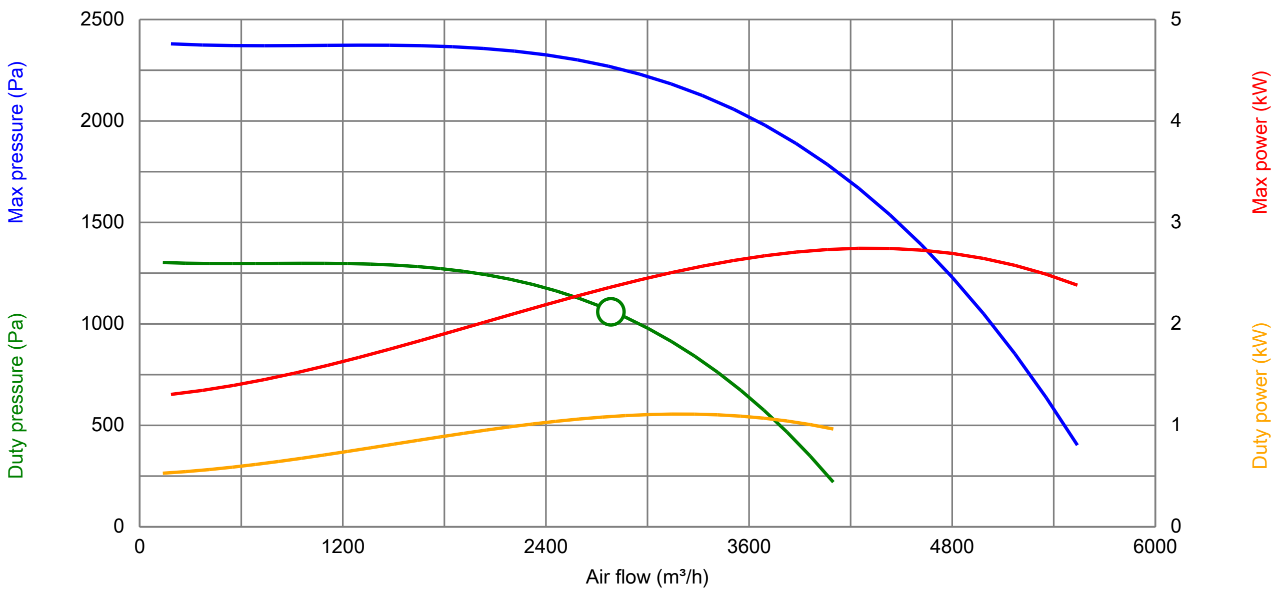
Panel filter		
Panel filter grade (EN 779)	G4	
Panel filter quantity	1	
Panel filter size 1	592x392x95	
Panel filter part no.1	190112300-7 (1pcs)	
Options		
Pressure indicator	Pressure Switch 50-500Pa QBM9903-5	
Pressure indicator quantity	1	
Filter		
Filter pressure drop design	135	Pa
Filter pressure drop dirty	200	Pa
Face velocity	3.10	m/s

Munters

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Technical data - Reactivation fan





System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Main selections

DH Model	MX²80
React fan outlet	Back
Frequency control, react	Yes
Fan outlet connection size	502x291 (450x231)

Frequency

Fan set point frequency	50Hz

Results

Fan speed	2641	rpm
Fan pressure rise	1060	Pa
Component total rated electric current	4.66	A
Component total rated electric power	2.20	kW

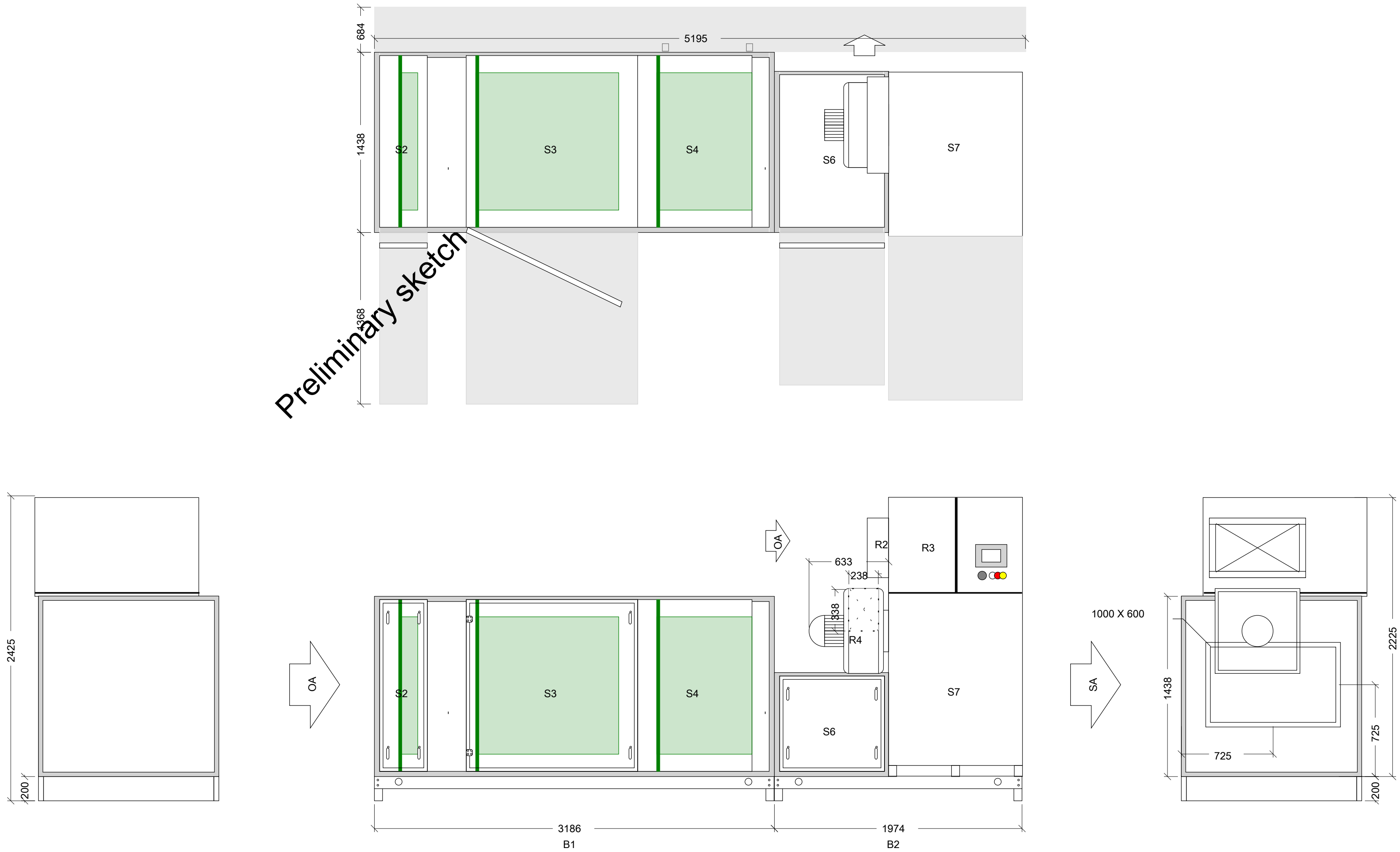
System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Technical data - Control system

Control system	
Controller type	Munters control system
HMI	Text display
Communications protocols	No
Munters Connected Climate®	No
Humidity control	
Humidity transmitter	RH+T (Duct mounted)
Sensor control	Relative Humidity
Sensor 2	None
Sensor 3	No
Sensor 4	No
Temperature sensor	None
Frost protection pre react heater	None
Temperature sensor	None
Options	
External humidity control	No
External temperature setpoint	No
CO2 Sensor	No
CO2 damper output	No
Floating dew point control	No
Re-transmission control	No
Re-transmission signal	No
Re-transmission control nr.2	No
Re-transmission signal nr.2	No
System	
Process pretreatment temp sensor	PT1000
Limitation temp sensor	None
Pre reactactivation heater control	None

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Technical data - Spare parts

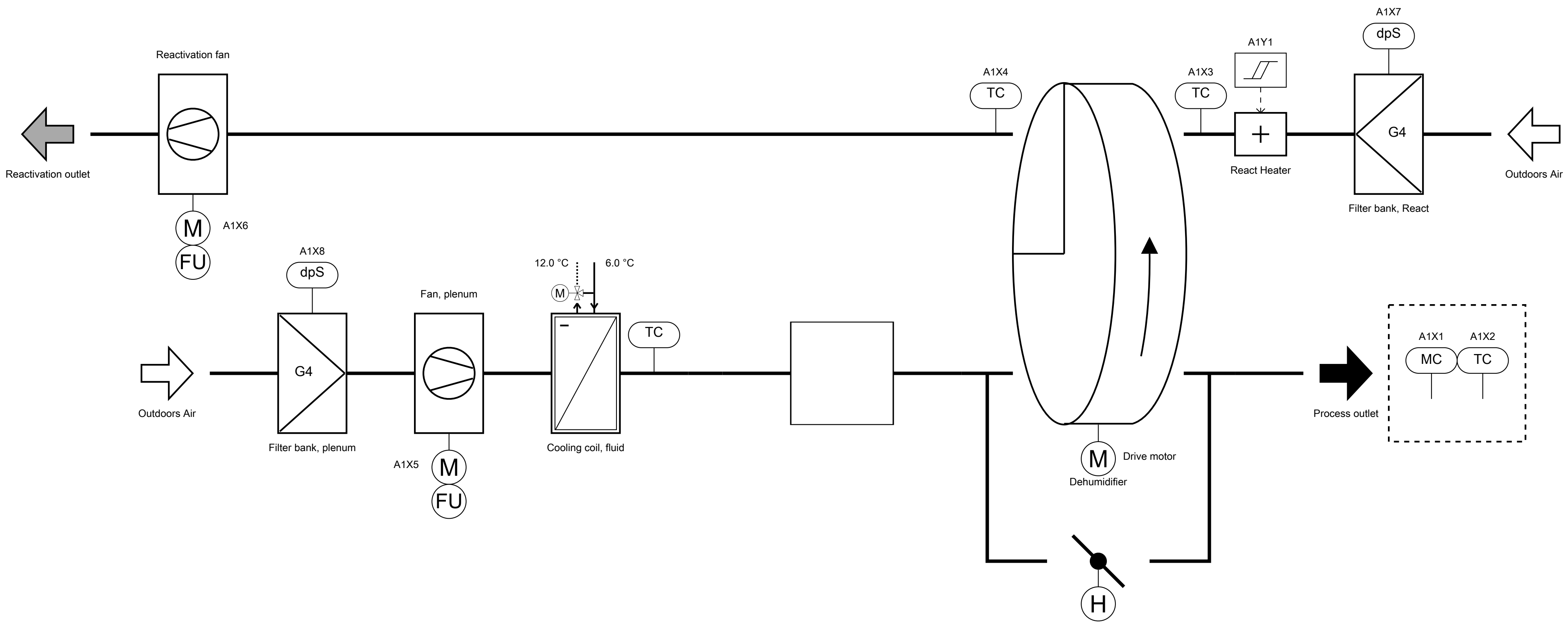


S1 - Process inlet
S2 - Pretreatment filter
S3 - Supply fan, pushing
S4 - Precooler, ethylene glycol
S5 - Box split
S6 - Section, Empty/Access
S7 - Dehumidifier
S8 - Process outlet

R1 - Reactivation inlet
R2 - Filter bank, React
R3 - Dehumidifier
R4 - Reactivation fan
R5 - Reactivation outlet

System weight 1708 kg

System name Canterbury Ice Rink June 2024		
Tolerances, if not indicated, according to 160-010266-001	Preliminary sketch (not to scale)	
Munters	Design by Ian Air	Genesys no G364815-1



System

System arrangement	MX^2 Plus
Pre/post treatment	Pre
Process pretreatment temp sensor	PT1000
Limitation temp sensor	None
Frost protection pre react heater	None
Precooler	Yes
Post-treatment is present	No
Humidifier present	No
Post cooler or heater present	no

Unit

DH Model	$MX^2$80

Control system

Controller type	Munters control system
HMI	Text display
Communications protocols	No

Humidity sensor

Humidity transmitter	RH+T (Duct mounted)
Sensor control	Relative Humidity

Main selections

Remote start/stop	Yes

External control

External humidity control	No
External temperature setpoint	No

Sensor

CO2 Sensor	No
Floating dew point control	No

System name
Canterbury Ice Rink June 2024

Tolerances, if not indicated, according to
160-010266-001
P&ID

Munters

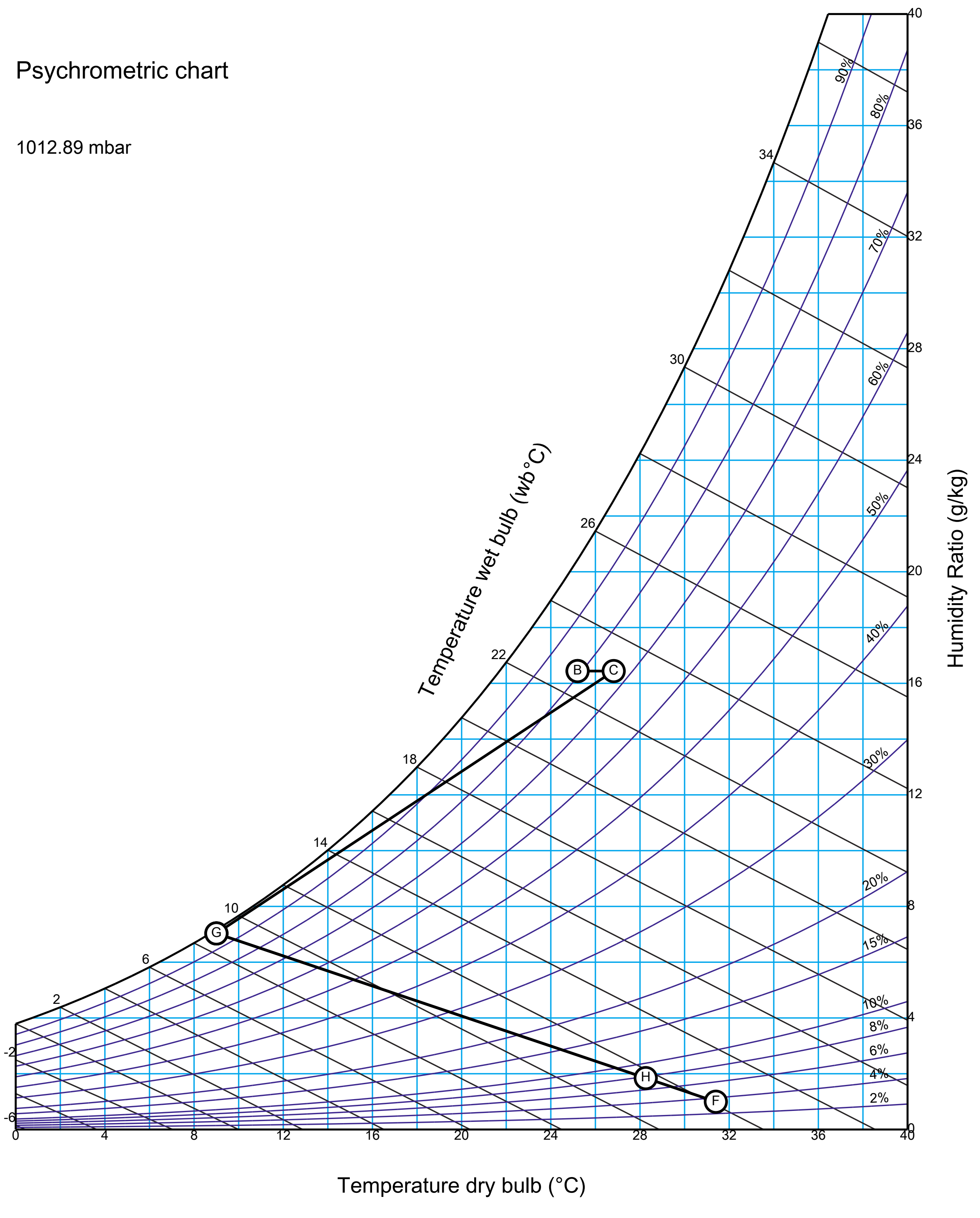
Design by
Ian Air

Genesys no
G364815-1

Munters

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

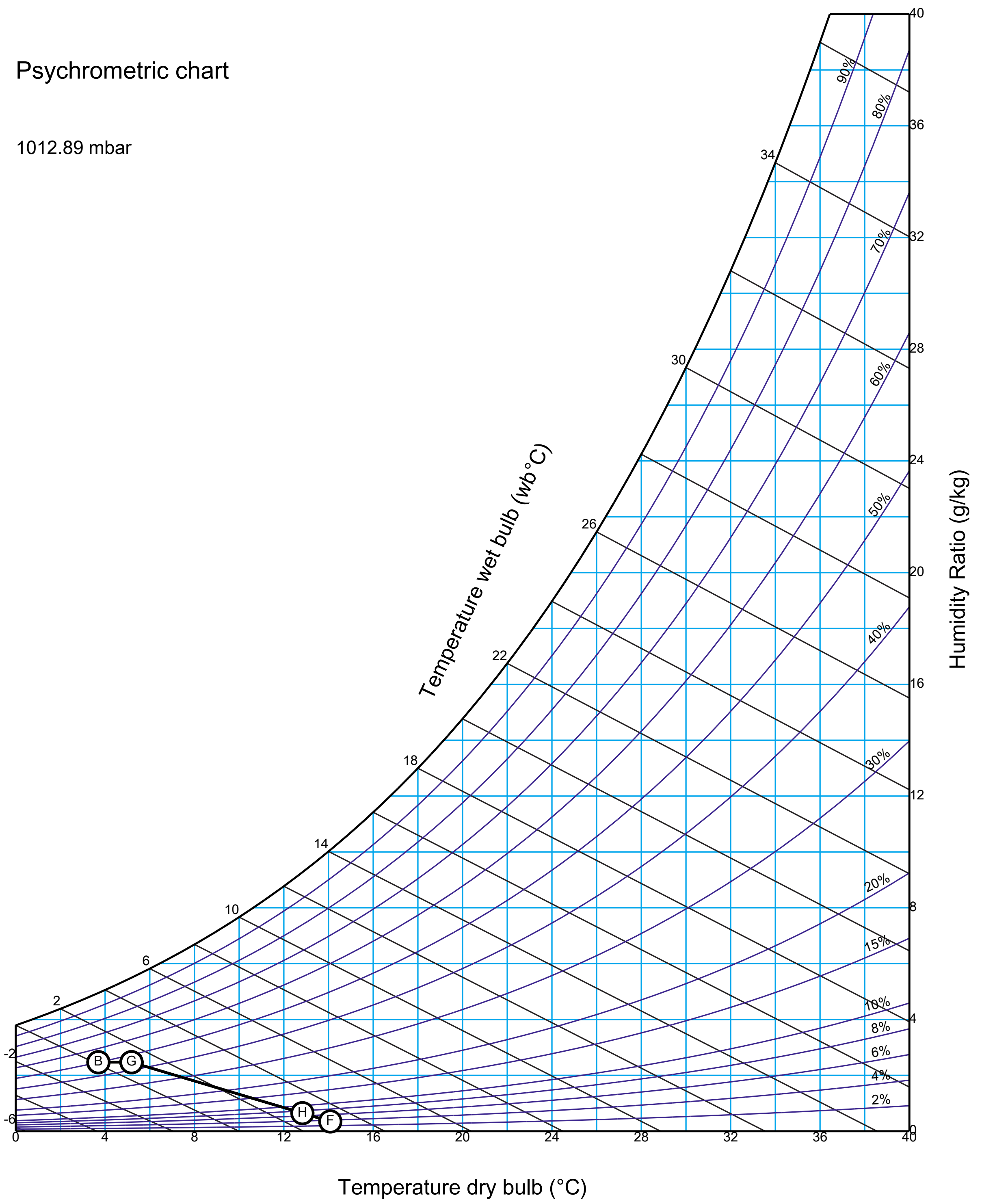
Psychrometric chart - Summer



Munters

System Type	MX² 80 Plus system	Prepared by	Ian Air
Size	1818	Print date	28/06/2024
Genesys no	G364815-1	Labels	
Name	Canterbury Ice Rink June 2024		

Psychrometric chart - Winter



Represented by:
Fantech Pty. Ltd.
A.B.N. 11 005 434 024
63 Vision Street
Dandenong South VIC 3175
Telephone: +61 (03) 9554 7845
Facsimile: +61 (03) 9554 7833
E-mail: info@fantech.com.au

Fan: TD-1300/250 (Hi speed) Duty: 0.24 m³/s @ 250 Pa Date: 2/07/2024
Project:
Location: Designation:

		Octave band centre frequency,HZ 63	125	250	500	1K	2K	4K	8K
Sound Power Level (Inlet)		63	68	73	70	75	74	67	60
Sound Power Leaving System		63	68	73	70	75	74	67	60
Direct Sound Corrections									
Direct Sound to Terminal	100 %	0	0	0	0	0	0	0	0
Distance Listener to Terminal	3 m	-21	-21	-21	-21	-21	-21	-21	-21
Directivity(Terminal Area)	<= 0.01 m	9	9	9	9	9	9	9	9
Grille Position:	Corner (3 surfaces)								
Direct Sound Pressure at 3m		51	56	61	58	63	62	55	48
Reverberant Sound Corrections									
Reverberant Sound to Area	0 %	-50	-50	-50	-50	-50	-50	-50	-50
Absorption	Dead Room	-1	-4	-9	-13	-15	-16	-16	-16
Room Volume	Small(20 -99 m³)								
Reverberant Sound Pressure in Area		12	14	14	7	10	8	1	-6
Total Sound Pressure at 3m		51	56	61	58	63	62	55	48
Required dBA	0 dBA	17	7	0	-6	-9	-10	-10	-8
Attenuation Required		34	49	61	64	72	72	65	56
Silencer Selection		0	0	0	0	0	0	0	0
Resultant Sound Pressure at 3m		51	56	61	58	63	62	55	48

Criteria Achieved	**NR 65**	**dBA 67**	**PNC 66**

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Telephone: +61 (03) 9554 7845
Facsimile: +61 (03) 9554 7833
E-mail: info@fantech.com.au

Fan: TD-1300/250 (Hi speed) Duty: 0.24 m³/s @ 250 Pa Date: 2/07/2024
Project:
Location: Designation:

		Octave band centre frequency,HZ 63	125	250	500	1K	2K	4K	8K
Sound Power Level (Inlet)		63	68	73	70	75	74	67	60
Sound Power Leaving System		63	68	73	70	75	74	67	60
Direct Sound Corrections									
Direct Sound to Terminal	100 %	0	0	0	0	0	0	0	0
Distance Listener to Terminal	3 m	-21	-21	-21	-21	-21	-21	-21	-21
Directivity(Terminal Area)	<= 0.01 m	9	9	9	9	9	9	9	9
Grille Position:	Corner (3 surfaces)								
Direct Sound Pressure at 3m		51	56	61	58	63	62	55	48
Reverberant Sound Corrections									
Reverberant Sound to Area	0 %	-50	-50	-50	-50	-50	-50	-50	-50
Absorption	Dead Room	-1	-4	-9	-13	-15	-16	-16	-16
Room Volume	Small(20 -99 m³)								
Reverberant Sound Pressure in Area		12	14	14	7	10	8	1	-6
Total Sound Pressure at 3m		51	56	61	58	63	62	55	48
Required dBA	0 dBA	17	7	0	-6	-9	-10	-10	-8
Attenuation Required		34	49	61	64	72	72	65	56
Silencer Selection		0	0	0	0	0	0	0	0
Resultant Sound Pressure at 3m		51	56	61	58	63	62	55	48

Criteria Achieved	**NR 65**	**dBA 67**	**PNC 66**

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Telephone: +61 (03) 9554 7845
Facsimile: +61 (03) 9554 7833
E-mail: info@fantech.com.au

Fan: TD-1300/250 (Hi speed) Duty: 0.24 m³/s @ 250 Pa Date: 2/07/2024
Project:
Location: Designation:

		Octave band centre frequency,HZ 63	125	250	500	1K	2K	4K	8K
Sound Power Level (Inlet)		63	68	73	70	75	74	67	60
Sound Power Leaving System		63	68	73	70	75	74	67	60
Direct Sound Corrections									
Direct Sound to Terminal	100 %	0	0	0	0	0	0	0	0
Distance Listener to Terminal	3 m	-21	-21	-21	-21	-21	-21	-21	-21
Directivity(Terminal Area)	<= 0.01 m	9	9	9	9	9	9	9	9
Grille Position:	Corner (3 surfaces)								
Direct Sound Pressure at 3m		51	56	61	58	63	62	55	48
Reverberant Sound Corrections									
Reverberant Sound to Area	0 %	-50	-50	-50	-50	-50	-50	-50	-50
Absorption	Dead Room	-1	-4	-9	-13	-15	-16	-16	-16
Room Volume	Small(20 -99 m³)								
Reverberant Sound Pressure in Area		12	14	14	7	10	8	1	-6
Total Sound Pressure at 3m		51	56	61	58	63	62	55	48
Required dBA	0 dBA	17	7	0	-6	-9	-10	-10	-8
Attenuation Required		34	49	61	64	72	72	65	56
Silencer Selection		0	0	0	0	0	0	0	0
Resultant Sound Pressure at 3m		51	56	61	58	63	62	55	48

Criteria Achieved	**NR 65**	**dBA 67**	**PNC 66**

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Dandenong South VIC 3175
Telephone: +61 (03) 9554 7845
Facsimile: +61 (03) 9554 7833
E-mail: info@fantech.com.au

Fan:	TD-1300/250 (Hi speed)	Duty:	0.24 m³/s @ 250 Pa	Date:	2/07/2024
Project:					
Location:			Designation:		

		Octave band centre frequency,HZ 63	125	250	500	1K	2K	4K	8K
Sound Power Level (Inlet)		63	68	73	70	75	74	67	60
Sound Power Leaving System		63	68	73	70	75	74	67	60
Direct Sound Corrections									
Direct Sound to Terminal	100 %	0	0	0	0	0	0	0	0
Distance Listener to Terminal	3 m	-21	-21	-21	-21	-21	-21	-21	-21
Directivity(Terminal Area)	<= 0.01 m	9	9	9	9	9	9	9	9
Grille Position:	Corner (3 surfaces)								
Direct Sound Pressure at 3m		51	56	61	58	63	62	55	48
Reverberant Sound Corrections									
Reverberant Sound to Area	0 %	-50	-50	-50	-50	-50	-50	-50	-50
Absorption	Dead Room	-1	-4	-9	-13	-15	-16	-16	-16
Room Volume	Small(20 -99 m³)								
Reverberant Sound Pressure in Area		12	14	14	7	10	8	1	-6
Total Sound Pressure at 3m		51	56	61	58	63	62	55	48
Required dBA	0 dBA	17	7	0	-6	-9	-10	-10	-8
Attenuation Required		34	49	61	64	72	72	65	56
Silencer Selection		0	0	0	0	0	0	0	0
Resultant Sound Pressure at 3m		51	56	61	58	63	62	55	48

Criteria Achieved	**NR 65**	**dBA 67**	**PNC 66**

Represented by:
Fantech Pty. Ltd.
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Dandenong South VIC 3175
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Facsimile: +61 (03) 9554 7833
E-mail: info@fantech.com.au

Fan: TD-1300/250 (Hi speed) Duty: 0.24 m³/s @ 250 Pa Date: 2/07/2024

Project:

Location: Designation:

		Octave band centre frequency,HZ 63	125	250	500	1K	2K	4K	8K
Sound Power Level (Inlet)		63	68	73	70	75	74	67	60
Sound Power Leaving System		63	68	73	70	75	74	67	60
Direct Sound Corrections									
Direct Sound to Terminal	100 %	0	0	0	0	0	0	0	0
Distance Listener to Terminal	3 m	-21	-21	-21	-21	-21	-21	-21	-21
Directivity(Terminal Area)	<= 0.01 m	9	9	9	9	9	9	9	9
Grille Position:	Corner (3 surfaces)								
Direct Sound Pressure at 3m		51	56	61	58	63	62	55	48
Reverberant Sound Corrections									
Reverberant Sound to Area	0 %	-50	-50	-50	-50	-50	-50	-50	-50
Absorption	Dead Room	-1	-4	-9	-13	-15	-16	-16	-16
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Version 5.7.0

Fan: TD-1300/250 (Hi speed) Duty: 0.24 m³/s @ 250 Pa Date: 2/07/2024
Project:
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Criteria Achieved	**NR 65**	**dBA 67**	**PNC 66**

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