JOHN HOLLAND

SYDNEY FOOTBALL STADIUM REDEVELOPMENT
Roof Installation
Out of Hours Work Request

08/04/21

Author: James Lowe / Henry Tran/ Holly Hofland - JHG
Date: 08/04/2021

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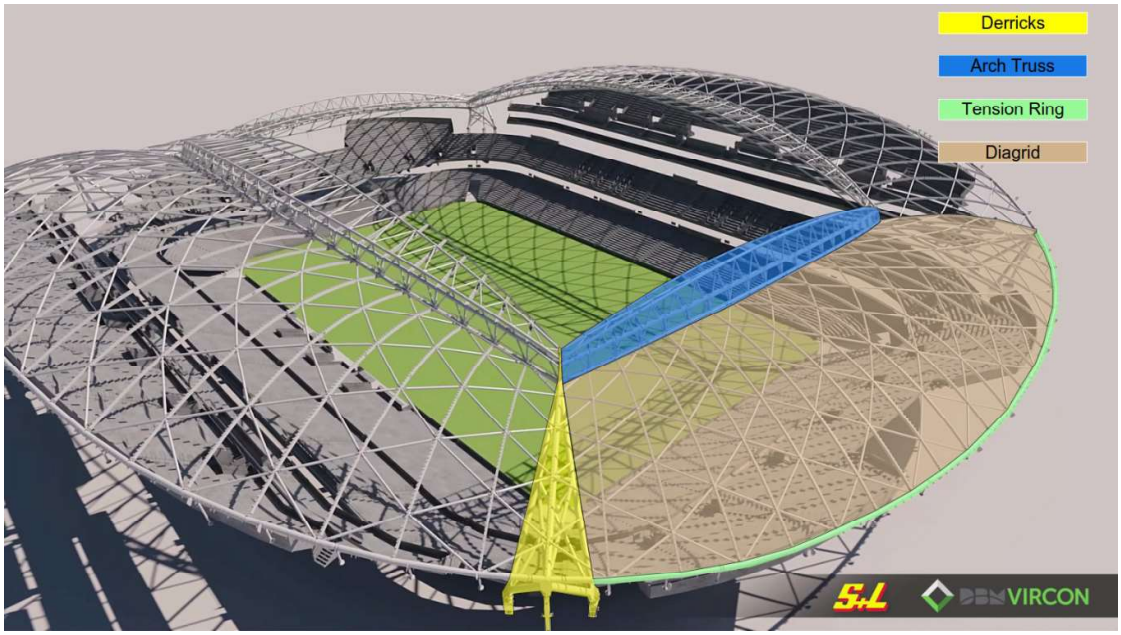
1. Overview

Sydney Football Stadium is designed with a long arch span steel structure roof, composing a steel tension ring, compression arched truss system with a latticed curved diagrid shell. There are four main structural elements to the roof, that must be lifted and installed in the following order; Derricks, tension ring, arch truss and diagrid (fig1. Below).

Figure 1. Structural Elements of Roof Structure



Definitions

Derricks: These are the truss structures annotated in yellow responsible for supporting the main trusses and transferring their loads onto the concrete structure below.

Tension Ring: The external outer ring of the stadium annotated in green and has been sectioned into 16m-35m lengths. The tension ring is vertically supported on the roof columns and supported in-plane above the derricks, which provide global stability under horizontal loads.

Arch Trusses: The main arch structure annotated in blue in the drawing above are responsible for holding up the diagrid shells and transferring force to the derricks.

Diagrid: The rafters are assembled from two parts and form together with diagonal struts the diagrid structure. This section provides the overall arch off the roof where fabric is installed to protect patrons from the weather.

Staged Erection Process

A detailed Staged Erection Analysis (SEA) has been carried out by Aurecon and Schlaich Bergermann Partner (SBP), to determine the construction methodology and erection sequence. Both parties are international and have a strong reputation and background in stadium design and erection studies. Table 1 details previous stadiums each party has worked on.

Table 1. Previous stadiums

Aurecon	Schlaich Bergermann Partner
• Bankwest Stadium • Marvel Stadium • Margaret Court Arena • Wembley Stadium • Forsyth Barr Stadium	• Tottenham Hotspur Stadium • Mercedes Stuttgart Stadium • Nelson Mandela Bay Stadium • Olympic Stadium Berlin • Pudong Stadium

Due to the unique architectural roof, the SEA has determined that installation must occur within very strict tolerances (1mm over 20m span for arch truss) to maintain the structural integrity and prevent locked in stresses. Given the span on the structure, and that the steel is subject to external temperatures, there will be a noticeable expansion and contraction of the structure as its pre-assembled on the ground. To avoid locked in stresses, and to ensure sections fit , it is essential that the steel is at an even ambient temperature. Small deviations in length or curvature due to inconsistent temperature can result in deflections and stability issues, potentially leading to catastrophic failure of the roof structure.

Locked in stress, also known as residual stress, remain in an object and may cause significant plastic deformation, leading to warping or distortion of an object or cause premature fracture or fatigue. For such a critical structure, it is essential that this structure is installed within the necessary parameters for minimal locked in stress to be introduced to the structure, and ensure that the members can be utilised to full capacity for different loading conditions.

As the structure is installed, how force is distributed and how the structure deflects is sensitive to geometry, as such erection tolerances must be maintained within the limits stipulated in the specifications. This ranges from 2mm-5mm only.

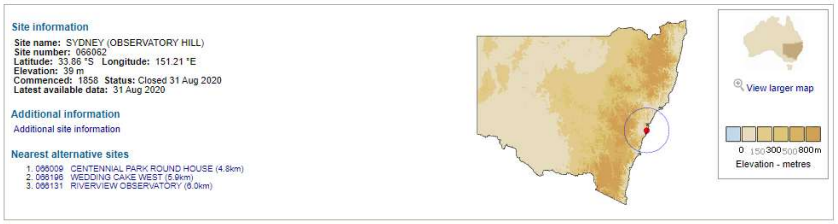
Each segment has different lifting requirements, weights, tolerances and restrictions included in the erection analysis. For instance, each of the four derricks must be lifted individually and can take 12 hours from the point of lift commence to installation, with final position having a 5mm tolerance in any direction.

As per the construction methodology erection analysis, installation of trusses will occur in the protection of sun radiation in early morning hours so that the entire truss is at an even ambient temperature. Each truss will be lifted in tandem by two crawler cranes, taking up to two hours to position. To ensure each segment fits, the cranes slowly reduce loading off the cranes onto the temporary towers and derricks over the next 12 hours, monitoring geometry against temperature constantly.

2. Effect of Temperature and Wind on Long Span Structures

Typically, early mornings have cooler, more stable temperatures and weather patterns required for safe installation (refer to appendix 3). Looking at the 20 year temperature average (Fig2. And Fig3.) the temperature fluctuates quite considerably throughout the day.

Figure 2. Sydney Observatory Weather averages



Site information

Site name: SYDNEY (OBSERVATORY HILL)
Site number: 066062
Latitude: 33.86 °S **Longitude:** 151.21 °E
Elevation: 39 m
Commenced: 1858 **Status:** Closed 31 Aug 2020
Latest available data: 31 Aug 2020

Additional information

Additional site information

Nearest alternative sites

1. 066009 CENTENNIAL PARK ROUND HOUSE (4.8km)
2. 066196 WEDDING CAKE WEST (5.9km)
3. 066131 RIVERVIEW OBSERVATORY (6.0km)

View larger map

0 150 300 500 600m
Elevation - metres

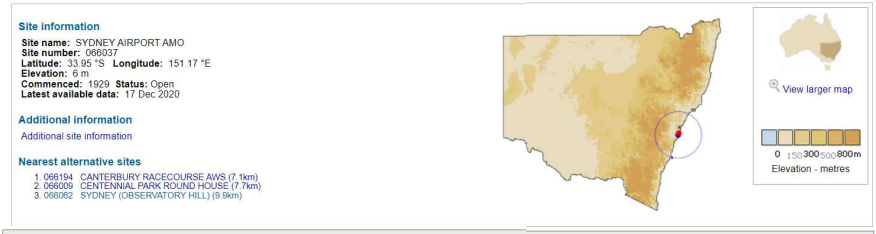
View: Main statistics All available | Period: 1991-2020 | Text size: Normal Large

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years		Plot	Map
Temperature																	
Mean maximum temperature (°C)	27.0	26.8	25.7	23.6	20.9	18.3	17.9	19.3	21.6	23.2	24.2	25.7	22.8	30	1991 2020		
Mean minimum temperature (°C)	20.0	19.9	18.4	15.3	12.3	10.0	8.9	9.7	12.3	14.6	16.6	18.4	14.7	30	1991 2020		
Rainfall																	
Mean rainfall (mm)	91.1	131.5	117.5	114.1	100.8	142.0	80.3	75.1	63.4	67.7	90.6	73.0	1149.7	30	1991 2020		
Decile 5 (median) rainfall (mm)	67.0	108.3	99.1	75.5	62.8	110.6	60.5	46.1	42.2	44.9	91.4	66.8	1148.6	30	1991 2020		
Mean number of days of rain ≥ 1 mm	8.2	9.0	10.1	7.9	7.9	9.3	7.2	5.6	5.8	7.6	8.7	7.9	95.2	30	1991 2020		
Other daily elements																	
Mean daily sunshine (hours)														1	1991 1992		
Mean number of clear days	7.2	5.5	8.0	9.2	10.2	9.2	12.0	15.0	11.8	9.3	5.5	6.6	109.5	20	1991 2010		
Mean number of cloudy days	12.5	13.2	11.6	9.8	10.8	10.3	8.9	6.5	7.3	9.5	13.9	12.9	127.2	20	1991 2010		
9 am conditions																	
Mean 9am temperature (°C)	22.4	22.1	20.7	18.0	14.5	11.9	10.9	12.7	16.2	18.7	19.4	21.2	17.4	20	1991 2010		
Mean 9am relative humidity (%)	71	76	74	72	75	74	72	64	60	61	67	69	70	20	1991 2010		
Mean 9am wind speed (km/h)														1	1991 1992		
9am wind speed vs direction plot	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
3 pm conditions																	
Mean 3pm temperature (°C)	25.2	25.3	24.2	22.0	19.5	17.2	16.7	18.0	19.8	21.1	22.2	23.9	21.3	20	1991 2010		
Mean 3pm relative humidity (%)	60	62	59	58	58	56	52	47	49	53	57	58	56	20	1991 2010		
Mean 3pm wind speed (km/h)														1	1991 1991		
3pm wind speed vs direction plot	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				

red = highest value blue = lowest value

Product IDCJCM0028 Prepared at Tue 15 Dec 2020 17:28:03 PM AEDT

Figure 3. Sydney Airport Weather Averages



Site information

Site name: SYDNEY AIRPORT AMO
Site number: 066037
Latitude: 33.95 °S **Longitude:** 151.17 °E
Elevation: 6 m
Commenced: 1929 **Status:** Open
Latest available data: 17 Dec 2020

Additional information

Additional site information

Nearest alternative sites

1. 066194 CANTERBURY RACECOURSE AWS (7.1km)
2. 066009 CENTENNIAL PARK ROUND HOUSE (7.7km)
3. 066062 SYDNEY (OBSERVATORY HILL) (9.9km)

View larger map

0 150 300 500 800 m
Elevation - metres

View: Main statistics / All available | Period: Use all years of data | Text size: Normal / Large

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years		Plot	Map
Temperature																	
Mean maximum temperature (°C)	26.7	26.5	25.4	23.0	20.2	17.7	17.2	18.4	20.7	22.7	24.2	25.9	22.4	82	1939 2020		
Mean minimum temperature (°C)	19.0	19.1	17.6	14.3	11.0	8.8	7.3	8.2	10.6	13.4	15.6	17.6	13.5	82	1939 2020		
Rainfall																	
Mean rainfall (mm)	94.1	114.2	118.1	106.0	95.3	124.8	69.2	75.6	59.7	70.1	79.5	72.8	1077.4	89	1929 2020		
Decile 5 (median) rainfall (mm)	71.7	82.5	86.3	81.0	76.4	100.6	51.6	44.6	46.9	47.5	66.3	59.8	1045.3	91	1929 2020		
Mean number of days of rain ≥ 1 mm	8.1	8.6	9.4	8.4	8.3	8.9	6.6	6.7	6.8	7.8	8.3	7.8	95.7	91	1929 2020		
Other daily elements																	
Mean daily sunshine (hours)	7.5	7.2	6.9	6.9	6.4	5.9	6.7	7.9	8.0	7.9	7.7	7.9	7.2	42	1976 2020		
Mean number of clear days	6.8	5.5	7.7	8.8	9.3	9.1	12.0	13.2	11.0	8.2	6.4	6.5	104.5	71	1939 2010		
Mean number of cloudy days	13.0	12.2	12.0	10.6	10.8	10.7	8.5	7.7	8.4	11.1	11.9	12.3	129.2	71	1939 2010		
9 am conditions																	
Mean 9am temperature (°C)	22.4	22.3	21.1	18.2	14.6	11.9	10.8	12.5	15.7	18.4	19.9	21.6	17.4	71	1939 2010		
Mean 9am relative humidity (%)	70	73	73	71	73	74	71	65	62	61	64	66	69	60	1939 2010		
Mean 9am wind speed (km/h)	14.4	13.8	12.9	12.9	12.6	13.4	13.3	14.4	15.5	16.3	16.0	14.8	14.2	70	1939 2010		
9am wind speed vs direction plot																	
3 pm conditions																	
Mean 3pm temperature (°C)	24.8	24.8	23.9	21.7	19.0	16.6	16.1	17.2	19.0	20.7	22.1	23.9	20.8	71	1939 2010		
Mean 3pm relative humidity (%)	60	63	61	59	58	57	52	49	51	54	56	58	57	60	1939 2010		
Mean 3pm wind speed (km/h)	24.1	23.0	21.0	19.3	17.1	17.8	18.2	20.8	23.1	24.6	25.3	25.2	21.6	70	1939 2010		
3pm wind speed vs direction plot																	

red = highest value blue = lowest value

Product IDCJCM0028 Prepared at Thu 17 Dec 2020 03:41:09 AM EST

Changes in temperature can adversely affect the survey results for long span structures such as the trusses and tension ring which expand and contract with temperature. As figure 4 and figure 5 depict, a 20C increase from reference temperature of 20C can result in as much as a 19mm overlap for the longest span, as such the segment will not fit and cannot be installed without risk of warping the roof and undermining the integrity of the overall structure, introducing a significant safety risk to workers and eventual end users.

Figure 4. Expansion of structure due to Temperature

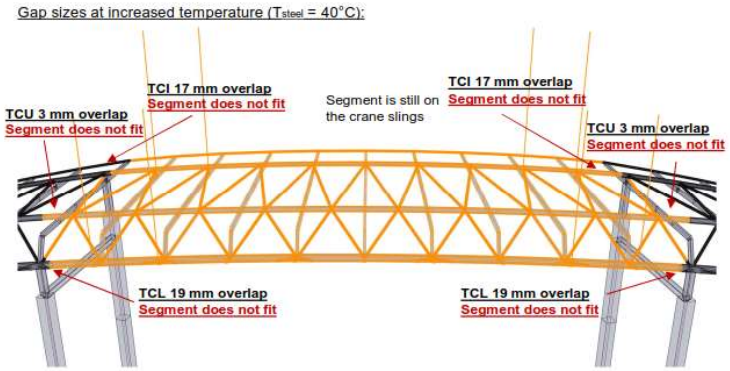
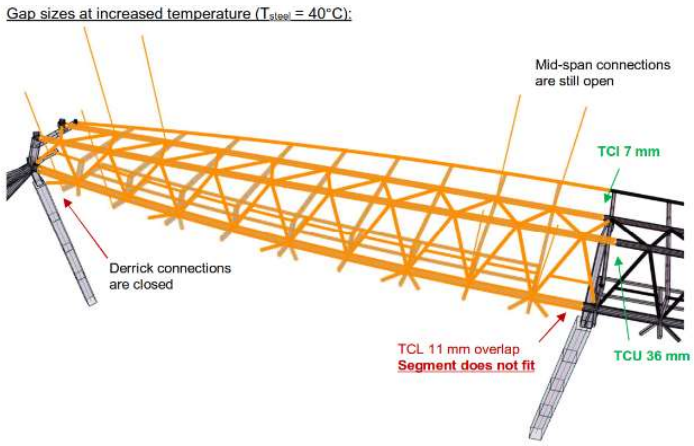


Figure 5. Expansion of structure due to Temperature



The roof is partially assembled on the ground and then lifted into place; the segments are highly susceptible to wind. Considering the tonnage and surface area of each of the relevant components, the maximum wind speeds for installation apply:

- Tension Ring – 6mm/s
- Trusses – 3mm/s
- Diagrid – 3mm/s

Lifting segments in wind speeds greater than this can cause significant damage to the cranes, and poses an unacceptable risk to the operators, any personnel onsite and residents. Based on the SEA and lift studies conducted by a Heavy Lift Specialist, lifts of this size in wind speeds greater than above can cause structural damage to the tower cranes potentially resulting in critical failure, worst case being a dropped load.

A more in-depth analysis of weather trends has been provided in Appendix 3, detailing how few days per month these works are allowable.

The heaviest lifts are the derricks at 120 tonnes. Each derrick requires an exclusion zone of 40m either side, severely limiting other works that can occur on the site.

Based on the significant safety risk posed by these works in ideal conditions there will be significant exclusion zones in place across site. For the largest of the lifts it will not be possible for any other works to occur on nearly the entire site. To mitigate the risk to personnel onsite, members of the public and any passing traffic, the most favourable condition is for the work to occur during periods of lower foot and road traffic. Impacts to the community and John Holland's mitigation techniques will be outlined further in Section 4.

JHG are requesting approval to undertake Out of Hours works from 1am to 7am as per below proposed activities. Works will only be conducted Monday to Friday and will not involve out of hours works on weekends.

JHG are requesting approval for OOHW to facilitate large structural segment lifts that cannot be completed during a standard 11 hour day due to the following:

1) Engineering constraints – large lifts are constrained by wind and temperature. Once lifted the segments cannot be lowered out of position and cannot be fixed in final position unless ambient temperature is constant. Installation of large steel segments outside of temperature ranges can lead to failure of the final structure due to unaccounted expansion and contraction
2) Safety factors – Cranes cannot be left unattended under load. Unpredicted weather events or failure of equipment can lead to a significant failure of the crane. This can result in a dropped load, structural damage to segment and to crane, and an unacceptable risk to workers and residents.

3. Precedence

For the Sydney Football Stadium, out of hours works will only be required for instances where sections have been fully assembled and are ready for lift. The intent is for the connection to be finalised out of direct sun exposure within an even ambient environment and reduces locked in stresses into the structure. This ensures that the roof has been delivered within

specifications and to a standard that ensures it is a world class stadium. Below are examples where extended early hours have been utilised for stadiums with a similar architecture and long span steel structures.

- Bankwest Stadium, Australia

Closing connection of the North-West and South-West connections of the roof on Bankwest Stadium were attempted during the day but were unable to be achieved due to the extended length of the structure. As such, the connection was worked upon and completed in the early hours of the morning (3-4am).

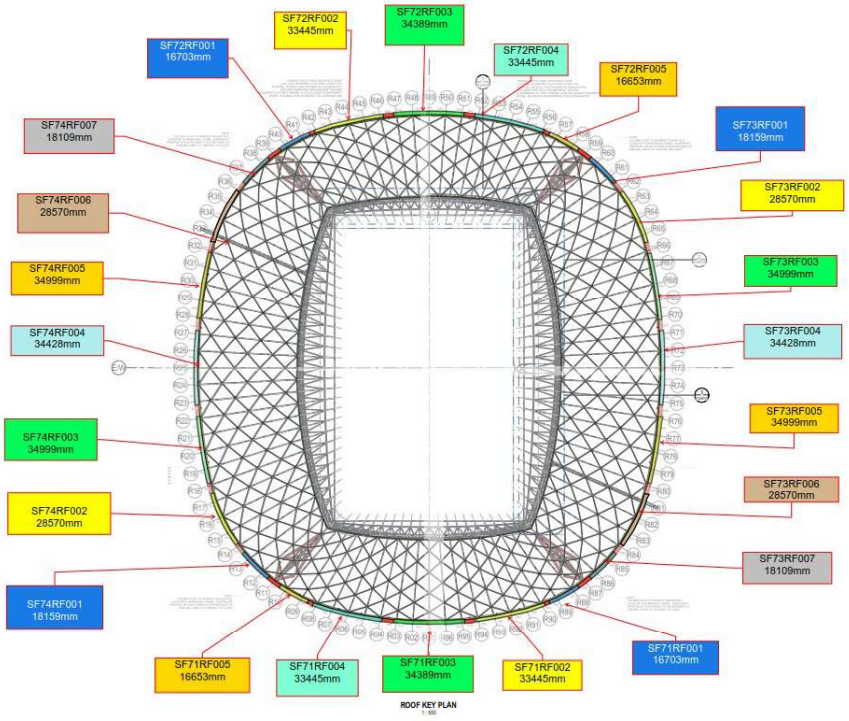
4. Proposed Activities

Preparation of key elements will occur within the several days before the critical lift. Weather permitting, the following scenarios (with exception of the derricks) outline the activities that will be conducted on the day of install and relevant noise modelling. All out of hours works have been annotated as blue within the schedules below.

4.0. Tension Ring Installation

The tension ring is broken into long span sections ranging up to 35m in length. Given the long span of the steel; it will be vulnerable to temperature and in the case where it is exposed to the direct sunlight's radiation, will be subject to extensive expansion. It has been broken up into the following 24 sections as seen below:

- North & South – will each have 5 separate tension ring segments respectively
- East & West – will each have 7 separate tension ring segments respectively



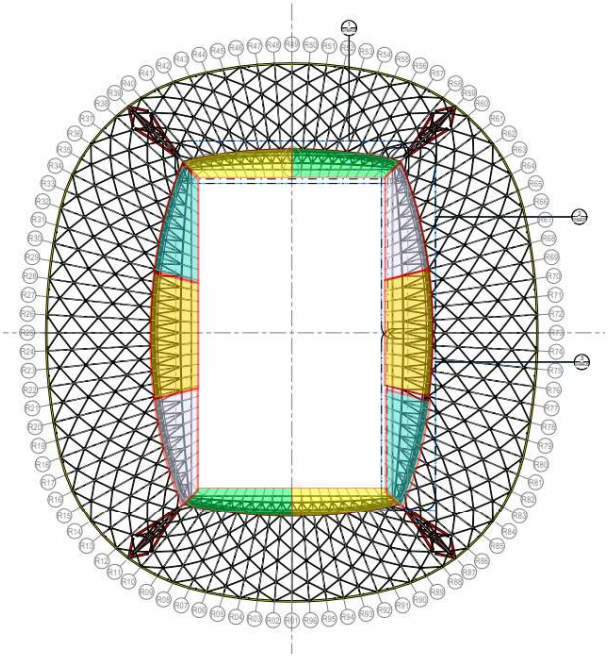
Consequently, there will be a total of 24 separate instances when tension ring install will need to occur which will not follow consecutively. The intended schedule is as per below:

Time	Activity	Equipment	Predicted Noise Level (North)
3:00am – 5:00am	- Pre-start for all involved	**4 x Solar lighting towers** **Radios as required**	**63**

	- Truck arrives at Gate 2A/1A on Driver Avenue on external haul road of structure		
5:00am – 6:00am	- Trucks to mobilise to required positions, - Tension ring segments are slightly suspended for fitment its columns; this involves the use of liquid nitrogen to shrink the spherical bearing into its intended position	**Hydra Torque** **1 x Mobile Elevated Work Platform** **Chain blocks** **Tower crane in relevant area** **4 x lighting towers** **Radios as required**	**63**
6:00am - 2:00pm	- Trucks demobilised off site		**63**
7:00am – 2:00pm	- Conduct connections of tension ring segments and props, - Derig cranes as required	**3 x Mobile Escalated Work Platforms** **Rattle Guns** **Hammers** **Hand Tools** **Radios** **Tower crane in relevant area** **Chain blocks**	**63**
3:00pm – 5:00pm	- Remove lifting points off tension ring for other connections to be made. - Finish onsite		**63**

4.1. Truss Installation

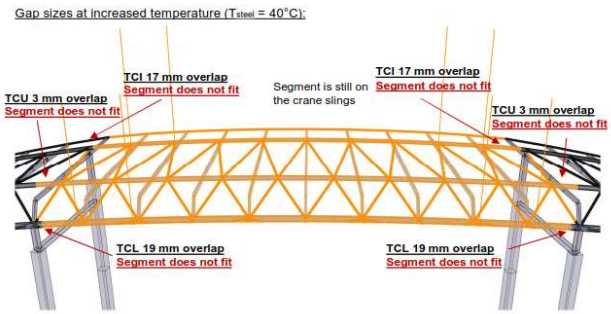
The arch trusses are broken into long span sections greater than 30 metres and has been broken up to 10 main sections as per the markup below.

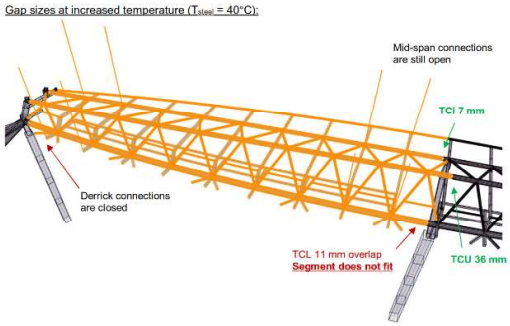


As per the construction methodology erection analysis:

'*Installation of trusses shall happen in the protection of sun radiation in early morning hours so that the entire truss is at an even ambient temperature*'

A fit up investigation has been conducted to assess the effects of temperature during install. An increase in temperature can result in sections not fitting as per the examples below





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Air temperature and steel temperature is to be recorded – as the steel temperature will vary to that of the air temperature. . Temperature variation during the survey process must be avoided. Outdoors surveying should preferably take place at late evening or early morning to avoid to avoid minimal variation in temperature.

Truss Segments (excluding 2nd truss of North & South, 8 instances)

Time	Activity	Equipment	Predicted Noise Level
4:00am – 4:30am	Pre-start for all involved		64
4:30am – 5:00am	Final check of rigging, taglines and temporary works	1 x Mobile Escalated Work Platform 2 x M16000 Crawler Crane (on pitch) 4 x Lighting Towers Radios	**64**
5:00am – 9:00am	Commence lifting and removal of final jigs, load being lowered into positions between the derrick tip and temporary towers	2 x M16000 Crawler Crane (on pitch) 4 x Lighting Towers Rattle guns Radios 1 x Mobile Escalated Work Platform 1 x Telehandlers Hydraulic Jacking Equipment	**64**
9:00am - 8:00pm	Slowly reduce loading off the cranes to the temporary towers and derrick tip. Constantly monitor geometry against temperature effects	2 x M16000 Crawler Crane (on pitch Rattle guns Hydratorque equipment Chain blocks Hand tools	**64**

4.3 Diagrid

The diagrid will be pre-assembled on site prior to install (4 assembled at any one time, 2 on the north and 2 on the south).

On the day OOHW is required, the intent is to tail out the diagrid out of the jigs with 100T crane and use of 400T to remove it completely from the jigs. The following activities will be undertaken for the day:

Time	Activity	Equipment	Predicted Noise Level

5:00am – 5:30am	Toolbox for all involved		
5:30am – 6:00am	Final check of rigging, taglines and temporary works	4 x Lighting Towers Radios 1 x Mobile Elevated Work Platform 1 x Telehandlers	63
6:00am – 6:30am	Connect cranes to rigging	1 x M16000 Crawler Crane (on pitch) Hydraulic Jacking Equipment 4 x Lighting Towers Radios 1 x Mobile Elevated Work Platform 1 x Telehandlers Rattle gun Hand tools 1 x 100 Crawler Crane	63
6:30am – 8:00am	Commence tailing out of diagrid jigs and lift into position		
8:00am – 5:00pm	Conduct final connections to tension ring and truss	1 x M16000 Crawler Crane (on pitch) Hydraulic Jacking Equipment Radios 1 x Mobile Elevated Work Platform 1 x Telehandlers Hydratorque Hand tools	63
5:00pm – 6:00pm	Derig crane from diagrid sections		63
6:00pm – 7:00pm	Derig crane from diagrid sections		63

For diagrid closing, a temperature variation by +/- 20 degrees shows a force range of up to 20%.

5. Alternate Methodologies

Once a lift has commenced it cannot be halted unless a significant safety risk occurs, as each segment, temporary tower and lifting equipment has been designed to withstand the stress of a single lift. Under the current approval some jacking operations will take over one working day to complete, exposing the workers and residents to unnecessary and unacceptable risk as the segments jacked into position will be left unattended for a significant duration.

Alternate methodologies have been considered at length to reduce both risk to workers and residents, and to reduce overall duration of works minimising impact to residents.

5.0. Jacking Alternatives

Jacking the structure up and down enables us to open and close gaps to force fit bolts for the final connection. Considering that the temporary works (i.e. temporary towers and headstocks) have been briefed upon the permanent works, we cannot increase the jacking movement any further as it will induce stress into the permanent structure (roof) that it is not designed to withstand. Over jacking/ under jacking outside of the given parameters will cause significant roof deflection leading to potential roof failure.

Several components have been strengthened for construction loading; however, the system has been optimised; strengthening further results in an increased weight to the final segment. This would then require the temporary structures

that have already been built, to be removed and further strengthened to accommodate the increased loading, significantly increasing the timeline of works.

5.1. Packer Plates

Packer plates can be used to bridge gaps between segments and were introduced to account for the variation in length as a result of temperature. However, this would have resulted in a large permutation of geometries depending on whether a packer plate was introduced or not. With the increased permutations in geometries, the force distribution throughout the structure will also differ, and the final roof structure will be out of tolerance to original design.

Another large concern with using packing plates during install is that, as it is not a permanent part of the steel structure and has a different composition, it may rub against the steel members causing paint to wear off. This creates a durability concern as without the paint, the packer plate will leach rust potentially weakening the overall structure and not achieving the design aesthetic.

5.2. Cooling Steel

Some parts of the overall structure will need to be cooled with liquid nitrogen to ensure correct fit. It was proposed to use a similar approach to cool the larger steel structure to prevent expansion from heat. However, due to the size of the structures (up to 30m long) there is no way to cool the structure uniformly to prevent warping. Having such a large quantity of liquid nitrogen onsite will also increase the safety requirements, exclusion zones and cost of the works.

5.3. Alternative equipment

Throughout the installation, various high impact equipment will be required including but not limited to; impact wrenches and hammers. To reduce the overall noise impact to residents, plant and equipment has been selected to have a lower sound power level i.e., using a hydraulic gun rather than an impact wrench where possible and out of hours to reduce total noise impact and potential for sleep disturbance.

6. Further Implications and Mitigation Measures

Approximately 30 relevant personnel will be conducting works out of standard construction hours including; supervisors, engineers, operators and riggers. Crew numbers have been minimised to essential staff only, reducing overall site noise and potential for disturbance to residents at shift start and end. Parking will be available to all required staff onsite to eliminate

all relevant personnel working on the roof prior to install will attend toolbox presentation and will include the following:

- Intended sequence of install to ensure all personnel understand their intended tasks and allow activities to be conducted efficiently.
- Restricted tools/plant will be reiterated - to ensure that personnel understand the requirements on mitigating all unnecessary noise and minimising disruptions to the local community.
- Drivers have been advised of approved routes – this will also apply to the workforce working on this task.
- Use of hardwired power or solar power for lighting towers to mitigate the need for loud generators.
- All plant to have non tonal reverse alarms installed – no beepers
- Personal communication radios to be kept on low volume, no vehicle radios/ music radios. No shouting, only radios or mobiles for communication over distance.
- All vehicles/ plant to be turned off when not in use

In addition to the alternative methodologies considered above, all plant and equipment to be used have been reviewed and assessed for alternatives with a lower sound power level. John Holland will manage complaints in accordance with the process in the CCS. Monitoring will be conducted at the commencement of each construction phase and monthly thereafter. Monthly reports will be provided to DPIE detailing the results

Should disputes be lodged, John Holland are prepared to offer alternative accommodation to affected residents.

7. Discussion

A Construction Noise Impact Assessment has been created by a Senior Acoustician from ARUP. This has been provided in Appendix 1.

Results shown in Appendix 1 indicates that noise levels of up to 56dBA are predicted, which is an exceedance of 9dBA of night time NMLs during the tension ring North installation. However, it is noted that existing ambient noise levels at the closest affected residence is lAeq 62dBA due to road traffic on Moore Park Rd. It is unlikely that the worst-case scenarios predicted and modelled will occur. Table 8 in the CNIS includes the highest predicted Laeq(15min) for the closest affected residential receiver in each time period.

Appendix 1 Steel Roof Installation Noise Impact Assessment

File Note

ARUP

Level 5
151 Clarence Street
Sydney NSW 2000
Australia
www.arup.com

t +61 2 9320 9320
f +61 2 9320 9321
d +61 2 9320 9736

Project title	Sydney Football Stadium Redevelopment	Job number	267489
cc		File reference	AC02 v3
Prepared by	Cynthia Nguyen Mathew Simon	Date	7 April 2021
Subject	Noise and Vibration Impact Assessment - Out of Hours Works for Steel Installation		

Contents

File Note

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1 Introduction

On 6 December 2018, the then Minister for Planning approved a concept development application and concurrent early works package (SSD 9249) to facilitate redevelopment of the Sydney Football Stadium. These early works facilitated the demolition of the former SFS and associated buildings.

Stage 2 of the Sydney Football Stadium (SFS) Redevelopment (SSD 9835) was approved by the Minister for Planning and Public Spaces on 6 December 2019. Construction of the new SFS was assessed and approved as part of the Stage 2 SSD DA.

Construction Noise and Vibration Management Plans have been approved for both applications and works have been undertaken in accordingly.

Construction works associated with the installation of the steel roof are proposed to take place outside of currently approved hours. This report addresses the noise and vibration impacts of the proposed steel work.

2 Assessment locations

The reasonably most-affected residences have been identified and grouped into Noise Catchment Areas (NCAs), with Rating Background Levels measured at representative locations as part of the SFSR Stage 2 SSDA Noise and Vibration Impact Assessment [1].

Representative most-affected residential and non-residential receivers are presented in Table 1 and Table 2 respectively and displayed in Figure 1.

Table 1: Reasonably most-affected residential receivers

Receiver ID	Address	No. of floors	NCA
R1	749 South Dowling Street, Redfern	2	1
R2	635 South Dowling Street, Surry Hills	3	1
R3	553 South Dowling Street, Surry Hills	3	1
R4	111 Greens Rd, Paddington	2	2
R5	479 South Dowling Street, Surry Hills	3	2
R6	252 Moore Park Road, Paddington	2	3
R7	314 Moore Park Road, Paddington	2	3
R8	45 Oatley Road. Paddington	2	4
R9	5 Poate Road, Paddington	2	5
R10	107 Cook Road, Centennial Park	2	5
R11	2 Martin Road, Moore Park	3	6

Table 2: Non-residential receivers

Receiver ID	Name	Address	No. of floors
Active Recreation Area			
AR1	Centennial Parklands Equestrian Centre	114-120 Lang Road, Moore Park	2
AR2	Moore Park Golf Course	Cleveland Street, Moore Park	0
Commercial			
C1	Fox Studios	38 Driver Avenue, Moore Park	2
C2	Sydney Cricket Ground	Driver Avenue, Moore Park	3
C3	Entertainment Quarter	122 Lang Road, Moore Park	3
C4	NRL building	Moore Park Road and Driver Avenue, Moore Park	3
Child Care			
CC1	Gumnut Gardens Early Learning and Long Day Care Ce	61 Moore Park Road, Centennial Park	1
CC2	Kira Child Care Centre	230 Moore Park Road, Paddington	1
CC3	Bambini's Child Care Centre	157/159 Cook Road, Centennial Park	2

Receiver ID	Name	Address	No. of floors
Educational Facilities			
E1	Sydney Boys High School	556 Cleveland Street, Moore Park	3
E2	Sydney Girls High School	Corner of Anzac Parade and Cleveland Street, Surry Hills	2
E3	Paddington Public School	399-435 Oxford Street, Paddington	2
E4	Bourke Street Public School	590 Bourke Street, Surry Hills	2
E5	University of Technology Sydney Rugby Australia	Moore Park Road and Driver Avenue, Moore Park	5
Passive Recreation Area			
PR2	Moore Park	Moore Park	0
Town Hall			
T1	Paddington Town Hall	249 Oxford Street, Paddington	2
Place of Worship			
W1	St Francis of Assisi Catholic Church	64 Gordon Street, Paddington	3
W2	St Mattias Anglican Church	471-475 Oxford Street, Paddington	2
W3	Paddington Uniting Church	395 Oxford Street, Paddington	2
W4	St. Vladimir's Russian Orthodox Church	31 Robertson Rd, Centennial Park	2
W5	Kingdom Hall of Jehovah's Witnesses	20 Leinster St, Paddington	2

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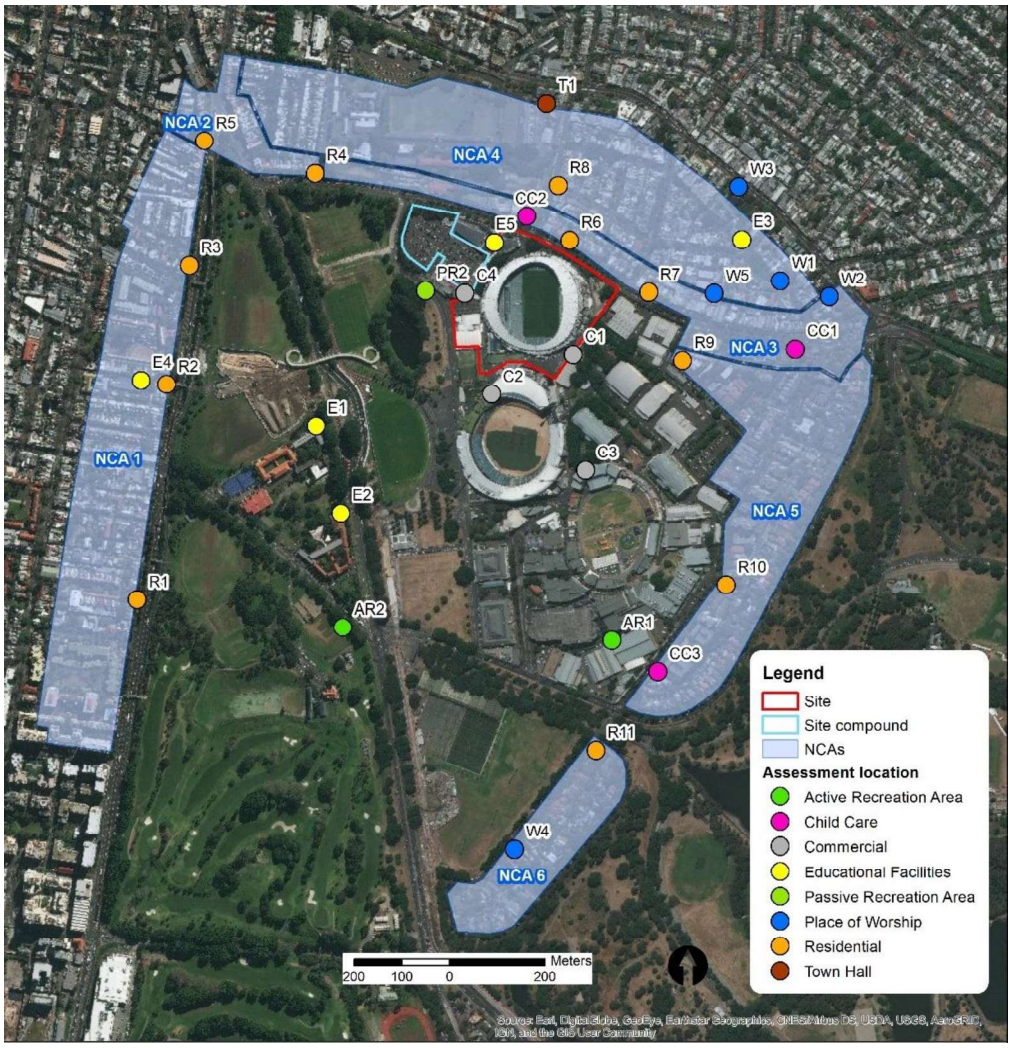


Figure 1: Assessment locations and NCAs

3 Development Consent Conditions – Approved hours

3.1 Approved hours

Current approved hours of construction are outlined in the SSD 9835 Development Consent [2] Condition C3, which states:

> *C3. Construction works, including the delivery of materials to and from the site, may only be carried out between the following hours:*
>
> *(a) between 7am and 6pm, Mondays to Fridays inclusive;*
>
> *(b) between 8am and 1pm, Saturdays; and*
>
> *(c) No construction work may be carried out on Sundays or public holidays.*

3.2 Noise management

Requirements for noise management for the construction of the SFS are outlined in Condition B28, which states:

> *B28. Prior to the commencement of construction, the Applicant must prepare a Construction Noise and Vibration Management Sub-Plan (CNVMP). The plan must address, but not be limited to, the following:*
>
> *(a) be prepared by a suitably qualified and experienced noise expert and in consultation with the EPA;*
>
> *(b) provide details of all the residential and non-residential receivers including the Kira Child Care Centre, University of Technology Sport Sciences Faculty Building (UTS) and Fox Studios, identified in Stage 2 SSDA – Noise and Vibration Assessment prepared by ARUP dated 30 August 2019;*
>
> *(c) provide details of the project specific construction noise management levels (NMLs) at all the identified receivers (B28(b)) considering the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009) (ICNG) and the relevant provisions of Australian Standard 2436 - 2010 Guide to Noise Control on Construction and Maintenance and Sites, at all identified receivers;*
>
> *(d) identify the 'High Noise Impact works' with the associated predicted construction noise levels that would exceed the NMLs and reach or exceed the Highly Affected Noise Level of 75dB(A) LAeq(15min), at the identified the residential and non-residential receivers;*
>
> *Note: High noise impact works mean:*
>
> - *jack hammering, rock breaking or hammering, pile driving, vibratory rolling, cutting of pavement, concrete or steel or other work occurring on the surface that generates noise with impulsive, intermittent, tonal or low frequency characteristics that exceed the NML; or*
> - *continuous noisy activities where 'continuous' includes any period during which there is less than a 1-hour respite between ceasing and recommencing any of the work that is the subject of this condition.*

4 Construction Noise Management Levels – Outside of approved hours

4.1 Construction noise criteria

The Interim Construction Noise Guideline [3] (ICNG) provides recommended noise levels for airborne construction noise at sensitive land uses. The ICNG provides construction management noise levels above which all 'feasible and reasonable' work practices should be applied to minimise the construction noise impact. The ICNG works on the principle of a 'screening' criterion – if predicted or measured construction noise exceeds the ICNG levels then the construction activity must implement all 'feasible and reasonable' work practices to reduce noise levels.

The ICNG sets out management levels for noise at noise sensitive receivers, and how they are to be applied. These management noise levels for residential receivers are reproduced below in Table 3.

Table 3: Construction noise management levels at residential receivers

Time of day	Management level [1] $L_{Aeq\ (15\ min)}$	How to apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15\ min)}$ 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.
	Highly noise affected 75dBA	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: 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 if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5dB	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 5dBA above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

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.

4.1.1 Maximum noise level

The ICNG [3] states:

Where construction works are planned to extend over more than two consecutive nights, and a quantitative assessment method is used, the analysis should cover the maximum noise level, and the extent and the number of times that the maximum noise level exceeds the RBL.

As the proposed works will not take place over consecutive nights (Section 5.1.1), no maximum noise level assessment is required. It is also noted no significant noise generating works are proposed 8pm and 5am (Section 5.1).

4.1.2 Project construction noise targets

Construction Noise Management Levels (NMLs) are established based on measured noise data representative of receivers. Measured noise data is detailed in SFSR Stage 2 SSDA Noise and Vibration Impact Assessment [1]. Logging results have been appended to this report for reference.

NMLs are presented in Table 4.

Table 4: Residential Noise Management Levels outside approved working hours

Location	Highly noise affected	Noise Management Level				
		Approved hours[1]	Outside approved hours - L_{eq}			
			Shoulder[2]	Day[2]	Evening[2]	Night[2]
R1	75	68	58	63	61	52
R2	75	68	58	63	61	52
R3	75	68	58	63	61	52
R4	75	66	50	61	57	44
R5	75	66	50	61	57	44
R6	75	62	48	57	54	42
R7	75	62	48	57	54	42
R8	75	53	43	48	46	42
R9	75	49	39	44	41	37
R10	75	49	39	44	41	37
R11	75	57	49	52	51	46

- Approved hours are shown in Section 3.1.
- Day, evening and night time periods are defined as:
  - Day: the period from 7 am to 6 pm Monday to Saturday; or 8 am to 6 pm on Sundays and Public Holidays;
  - Evening: the period from 6 pm to 10 pm; and
  - Night: the remaining period
  - Shoulder: the period from 5 am to 7am, a portion of the night.

Although not all non-residential receivers would be in use outside of standard construction hours,, OOHW noise impacts at these receivers have been predicted to indicate potential impacts.

NMLs for non-residential receivers are presented in Table 5.

Table 5: Non-residential Noise Management Levels during intended working hours

Usage	Rec. ID	Name	Time period	Assess. location	NML, $dBL_{Aeq\ 15minute}$
Active recreation area	AR1	Centennial Parklands Equestrian Centre	When in use	External	65
	AR2	Moore Park Golf Course	When in use	External	65
Commercial premise	C1	Fox Studios	When in use	External	70
	C2	Sydney Cricket Ground	When in use	External	70
	C3	Entertainment Quarter	When in use	External	70
	C4	NRL building	When in use	External	70
Child Care	CC1	Gumnut Gardens Early Learning and Long Day Care Ce	When in use	External	70
	CC2	Kira Child Care Centre	When in use	External	70
	CC3	Bambini's Child Care Centre	When in use	External	70
Educational institution	E1	Sydney Boys High School	When in use	Internal	45
	E2	Sydney Girls High School	When in use	Internal	45
	E3	Paddington Public School	When in use	Internal	45
	E4	Bourke Street Public School	When in use	Internal	45
	E5	University of Technology Sydney Rugby Australia	When in use	Internal	45
Passive recreation area	PR2	Moore Park	When in use	External	60
Town hall	T1	Paddington Town Hall	When in use	Internal	45
Place of worship	W1	St Francis of Assisi Catholic Church	When in use	Internal	45
	W2	St Mattias Anglican Church	When in use	Internal	45
	W3	Paddington Uniting Church	When in use	Internal	45
	W4	St. Vladimir's Russian Orthodox Church	When in use	Internal	45
	W5	Kingdom Hall of Jehovah's Witnesses	When in use	Internal	45

5 Noise assessment

5.1 Activities

The activities listed in each construction stage is shown in Table 6 as provided by John Holland.

Table 6: Construction stages and activity schedule

Time	Period	Activity
Tension Ring Segments (South & North)		
3:00am – 5:00am	Night	Toolbox for all involved, truck arrive at Gate 2A/1A on Driver Avenue on external haul road of structure
5:00am – 6:00am	**Shoulder**	**Trucks to mobilise to required positions, lift tension ring segments for fitment of other segments.**
6:00am – 2:00pm	**Shoulder / Day**	**Trucks demobilised off site, conduct connections of tension ring segments and props, derig cranes as required**
3:00pm – 5:00pm	**Day**	**Remove lifting points off tension ring for other connections to be made. Finish onsite**
Truss Segments		
4:00am – 4:30am	Night	Toolbox for all involved
4:30am – 5:00am	Night	Final check of rigging, taglines and temporary works
5:00am – 9:00am	**Shoulder / Day**	**Commence lifting and removal of final jigs, load being lowered into positions between the derrick tip and temporary towers**
9:00am – 8:00pm	**Day / Evening**	**Slowly reduce loading off the cranes to the temporary towers and derrick tip. Constantly monitor geometry against temperature effects**
Diagrid Installation		
5:00am – 5:30am	Night	Toolbox for all involved
5:30am – 6:00am	Night	Final check of rigging, taglines and temporary works
6:00am – 6:30am	**Shoulder**	**Connect cranes to rigging**
6:30am – 8:00am	**Shoulder / Day**	**Commence tailing out of diagrid jigs and lift into position**
8:00am – 5:00pm	**Day**	**Conduct final connections to tension ring and truss**
5:00am – 7:00pm	**Shoulder / Day / Evening**	**Derig crane from diagrid sections**

Note

Activities in **bold** signify activities which are anticipated to generate significant noise emissions and have been assessed.

Construction equipment to be used for these activities are provided in Table 7. Equipment sound power levels have been determined by reference to AS2436 [5], DEFRA [6], product datasheets and Arup's measurement database.

Equipment such as solar-power lighting towers and hand tools such as spanners are not anticipated to generate significant noise emissions.

Table 7: Construction equipment usage and associated sound power levels

Approx. duration	Description of works in sub-stage	Equipment	% of worst 15 minutes equipment is operational	Total number of units on site in worst 15 minutes	Sound Power, $dBL_{Aeq\ (15min)}$
Tension Ring (North & South)					
6 months	Trucks demobilised off site, conduct connections of tension ring segments and props, derig cranes as required. Remove lifting points off tension ring for other connections to be made. Finish onsite	Telescopic handler	50	1	98
		Elevated work platform	50	3	95
		Rattle gun[1]	30	1	107
		Hydraulic jacking equipment	100	1	106
		Hydra torque	50	1	102
		Crane tower	100	1	105
		Hand-held hammer	50	1	97
Truss Installation					
5 months	Slowly reduce loading off the cranes to the temporary towers and derrick tip. Constantly monitor geometry against temperature effects	Rattle gun[1]	30	2	107
		Hydra torque	50	1	102
Diagrid Installation					
6 months	Connect cranes, tailing out, lifting and connect diagrid, derig crane	Mobile crane	100	2	99
		Telescopic handler	50	1	98
		Elevated work platform	50	1	95
		Rattle gun[1]	30	1	107
		Hydraulic jacking equipment	100	1	106

Note

1 – Based on the proposed rattle gun to be used, the Hilti SIW 22T-A 1/2" Cordless Impact Wrench

5.1.1 Program

OOHW are anticipated to take place over the durations outlined in Table 7. Works will not take place over consecutive days.

5.2 Assessment methodology

Noise emissions from construction activities have been assessed to criteria outlined in Section 4.

Noise emissions have been modelled using SoundPlan 8 in accordance with ISO9613-2 algorithms. The model included:

- Construction noise sources listed in Table 7;
- SFS bowl which is anticipated to be complete by the commencement date of OOHW;
- Surrounding buildings;
- Receivers listed in Section 2; and
- Ground terrain and absorption.

Noise emissions have been modelled on the following assumptions:

- Equipment, staging, locations and durations are based on information provided by John Holland Group.
- The equipment listed in each individual stage of Table 8 have been assumed to operate concurrently over a 15-minute period.

5.2.1 Noise prediction results

Predicted residential and non- residential construction noise levels at surrounding receivers are presented in Table 8 and Table 9 respectively, along with the relevant OOHW NMLs.

Noise contour maps showing graphical representations of results are appended to this report.

Table 8: Predicted construction noise levels for residential receivers, $dBL_{Aeq\ (15\ min)}$

Receiver	NML	Construction phase			
		Tension Ring South	Tension Ring North	Truss Installation	Diagrid Installation
Day					
R1 - 749 South Dowling Street, Redfern	63	32	30	20	21
R2 - 635 South Dowling Street, Surry Hills	63	36	32	21	23
R3 - 553 South Dowling Street, Surry Hills	63	39	37	25	25
R4 - 111 Greens Rd, Paddington	61	35	29	14	17
R5 - 479 South Dowling Street, Surry Hills	61	36	32	15	17
R6 - 252 Moore Park Road, Paddington	57	51	56	42	46
R7 - 314 Moore Park Road, Paddington	57	37	55	30	32
R8 - 45 Oatley Road. Paddington	48	46	52	31	36
R9 - 5 Poate Road, Paddington	44	39	48	27	27
R10 - 107 Cook Road, Centennial Park	44	36	34	13	19
R11 - 2 Martin Road, Moore Park	52	34	31	15	17
Evening					
R1 - 749 South Dowling Street, Redfern	61	32	30	20	21

Receiver	NML	Construction phase			
		Tension Ring South	Tension Ring North	Truss Installation	Diagrid Installation
R2 - 635 South Dowling Street, Surry Hills	61	36	32	21	23
R3 - 553 South Dowling Street, Surry Hills	61	39	37	25	25
R4 - 111 Greens Rd, Paddington	57	35	29	14	17
R5 - 479 South Dowling Street, Surry Hills	57	36	32	15	17
R6 - 252 Moore Park Road, Paddington	54	51	56	42	46
R7 - 314 Moore Park Road, Paddington	54	37	55	30	32
R8 - 45 Oatley Road. Paddington	46	46	52	31	36
R9 - 5 Poate Road, Paddington	41	39	48	27	27
R10 - 107 Cook Road, Centennial Park	41	36	34	13	19
R11 - 2 Martin Road, Moore Park	51	34	31	15	17
Night – no noise generating activities proposed					
Shoulder 5am – 7am					
R1 - 749 South Dowling Street, Redfern	58	32	30	20	21
R2 - 635 South Dowling Street, Surry Hills	58	36	32	21	23
R3 - 553 South Dowling Street, Surry Hills	58	39	37	25	25
R4 - 111 Greens Rd, Paddington	50	35	29	14	17
R5 - 479 South Dowling Street, Surry Hills	50	36	32	15	17
R6 - 252 Moore Park Road, Paddington	48	51	56	42	46
R7 - 314 Moore Park Road, Paddington	48	37	55	30	32
R8 - 45 Oatley Road. Paddington	43	46	52	31	36
R9 - 5 Poate Road, Paddington	39	39	48	27	27
R10 - 107 Cook Road, Centennial Park	39	36	34	13	19
R11 - 2 Martin Road, Moore Park	49	34	31	15	17

Note:

- Levels shaded in grey indicate a notional exceedance of NMLs based on the worst-case assumptions noted above.

Results shown in Table 8 indicate that exceedances are predicted at residential receivers located along Moore Park Road, Oatley Road and Poate Road. Works to the north of the site (i.e. tension ring installation) in closer proximity to residences are predicted to generate higher impacts.

Highest predicted noise levels are during the Tension Ring North phase, where noise levels of up to 56 dBA are predicted. Exceedances of shoulder period NMLs of up to 9 dB are predicted. More minor exceedances of up to 3 dB are predicted during Tension Ring South phase. No exceedances are predicted during the Truss or Diagrid installations.

Noise impacts are predicted to be largely contained within the stadium bowl, which is anticipated to be complete by the time OOHW commence.

No ‘highly affected’ noise levels of 75dBA or above are predicted.

The use of noisier equipment such as the rattle guns and cranes are likely to be infrequent over the course of the works, therefore these levels represent infrequent periods when plant is operating. Moreover, the use of each proposed plant item concurrently is unlikely, with results representing an upper limit of expected noise impacts.

Although the nature and characteristics of construction noise are different to traffic noise with potentially more annoying intermittent, impulsive or low frequency content, it is noted that monitored traffic noise levels along Moore Park Road are generally higher than those predicted from construction works. Noise levels in quieter streets set further back from Moore Park are comparable to those predicted due to OOHW. Measured noise data is detailed in SFSR Stage 2 SSDA Noise and Vibration Impact Assessment [1] with logger results appended to this report.

Major disturbances to the community due to the OOHW are therefore not anticipated.

Works are not proposed to take place over consecutive nights, which would provide residences respite.

Table 9: Predicted construction noise levels for non-residential receivers

Receiver	NML	Construction phase			
		Tension Ring South	Tension Ring North	Truss Installation	Diagrid Installation
When in use					
AR1-Centennial Parklands Equestrian Centre	65	31	23	15	20
AR2-Moore Park Golf Course	65	36	34	26	27
C1-Fox Studios	70	44	56	33	37
C2-Sydney Cricket Ground	70	55	31	25	35
C3-Entertainment Quarter	70	34	35	22	27
C4-NRL building	70	40	37	32	39
CC1-Gumnut Gardens Early Learning and Long Day Care	70	32	43	21	25
CC2-Kira Child Care Centre	70	50	53	38	44
CC3-Bambini's Child Care Centre	70	24	27	14	19
E1-Sydney Boys High School	55[1]	45	39	28	31
E2-Sydney Girls High School	55[1]	45	44	38	38
E3-Paddington Public School	55[1]	36	36	21	22
E4-Bourke Street Public School	55[1]	34	27	12	16
E5-University of Technology Sydney Rugby Australia	67[2]	43	52	42	45
PR2-Moore Park	60	52	29	24	30
T1-Paddington Town Hall	55[1]	43	42	28	34
W1 - St Francis of Assisi Catholic Church	55[1]	35	40	17	21
W2 - St Mattias Anglican Church	55[1]	38	40	21	23
W3 - Paddington Uniting Church	55[1]	38	44	22	26
W4 - St. Vladimir's Russian Orthodox Church	55[1]	35	34	23	25
W5 - Kingdom Hall of Jehovah's Witnesses	55[1]	39	50	28	29

Note:

- Levels shaded in grey indicate a notional exceedance of NMLs based on the worst-case assumptions noted above.

1 – Levels which have been adjusted to convert internal NML levels to external, by an addition 10dB. In accordance with the ICNG.

2 - External NML has been calculated based on internal NML, University of Technology Sydney Rugby Australia building façade constructions, room and façade dimensions

Table 9 shows the results of the non-residential receivers are predicted to comply with established NMLs.

Construction noise mitigation and management measures are discussed in Section 6.

5.3 Construction vibration

No vibration intensive plant are proposed for OOHW. No significant vibration impacts are anticipated.

6 Mitigation measures

As part of SSD 9835 Development Consent [2], Condition B28 requires a Construction Noise and Vibration Management Sub-Plan (CNVMP) to be prepared. Details of this requirements are outlined in Section 3.1, and a CNVMP has been prepared with all work conducted in accordance with the plan.

In addition to the noise and vibration mitigation measures outlined in the CNVMP, the following mitigation measures are recommended to manage noise impacts resulting from proposed OOHW.

Table 10: OOHW mitigation measures

No.	Item	Detail
1	Community Communication Strategy	***Already undertaken as confirmed by INSW 25 Feb 2021*** Update the approved SFSR Community Communication Strategy (CCS) (available on the Infrastructure SFSR webpage at: http://www.infrastructure.nsw.gov.au/projects-nsw/sydney-football-stadium-redevelopment), with requirements to notify the community on proposed OOHW details, including: • Scope and location of work • Achievement of notable milestones • Hours of activity • Type of equipment used • Anticipated impacts • Mitigation measures to be implemented • Contact details Notification shall be provided a minimum of 1 week before the commencement of works. Residences to receive these notifications are indicated on the locality map appended to this report.
2	Scheduling	Where possible, avoid using other loud equipment, namely rattle guns and hydraulic jacking equipment, during the early morning period.
3	Noise monitoring	One round of attended noise monitoring is to be conducted at the commencement of each construction phase, then continue on a monthly basis: • Tension Ring South installation • Tension Ring North installation • Truss installation • Diagrid installation Monitoring is to be conducted on the first night of the works at the commencement of loudest activities as identified in Table 6. One round of monitoring shall include short term attended monitoring (15 minutes) conducted at four residential locations: 1. 252 Moore Park Road, Paddington 2. 314 Moore Park Road, Paddington 3. 45 Oatley Road. Paddington 4. 5 Poate Road, Paddington A monitoring report shall be prepared on a monthly basis outlining monitored results, the sources of any exceedances and implemented mitigation measures.

7 Conclusion

An assessment of noise generated by OOHW associated with steel roof installation has been conducted.

Activities proposed to take place outside of currently approved construction hours include:

- Tension ring installation (north and south)
- Truss installation
- Diagrid installation

Works are proposed to take place from early morning till evening. The construction program extends over the course of eleven months, and works are not proposed to take place over consecutive nights.

NMLs have been established for periods outside of currently approved hours including the shoulder period from 5am to 7am, and noise impacts have been predicted to the reasonably most-affected residences as identified in the SFSR Stage 2 SSDA Noise and Vibration Impact Assessment [1].

Noise impacts of up to 56 dBA are predicted at residences along Moore Park Road during Tension Ring installation, which represent exceedances of up to 9 dB over NMLs during the shoulder period. No exceedances are predicted during other OOHW phases.

Noise levels at non-residential receivers are predicted to comply with established NMLs.

No adverse vibration impacts are anticipated.

Although exceedances of NMLs are predicted, results are based on conservative assumptions and represent a worst case assessment scenario. Disturbances to the community are not anticipated to be major. Noise mitigation measures have been provided commensurate with the anticipated impacts to manage predicted levels outside of approved construction hours.

References

[1] Arup, "AC04-v5_SFSR Stage 2 NVIA," Arup, Sydney, 2019.

[2] Department of Planning, Industry and Environment , "Development Consent, As modified by SSD-9835-Mod-1 –03.04.2020," Department of Planning, Industry and Environment, Consent Authority: Minister for Planning and Public Spaces , Sydney, 2020.

[3] Department of Environment and Climate Change NSW, "Interim Construction Noise Guideline," Department of Environment and Climate Change NSW, Sydney, 2009.

[4] NSW Environment Protection Authority, "NSW Noise Policy for Industry," NSW Environment Protection Authority , Sydney, 2017.

[5] Standards Australia, "AS 2436-2010 - Guide to noise and vibration control on construction, demolition and maintenance sites," Standards Australia, 2010.

[6] Department for Environment Food and Rural Affairs, "Update of noise database for prediction of noise on construction and open sites," Department for Environment Food and Rural Affairs, 2006.

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name	Cynthia Nguyen	Mathew Simon	Mathew Simon
Signature			

Legend

- Site boundary
- Residential notification area

Sound Pressure Level, $L_{Aeq(15min)}$, dBA

- 39 dBA OOHW combined contour
- 43 dBA OOHW combined contour
- 48 dBA OOHW combined contour

Client
John Holland Group

Job Title
Sydney Football Stadium Redevelopment

Drawing Title
Construction noise notification area OOHW steel installation works

Metres
0 100 200

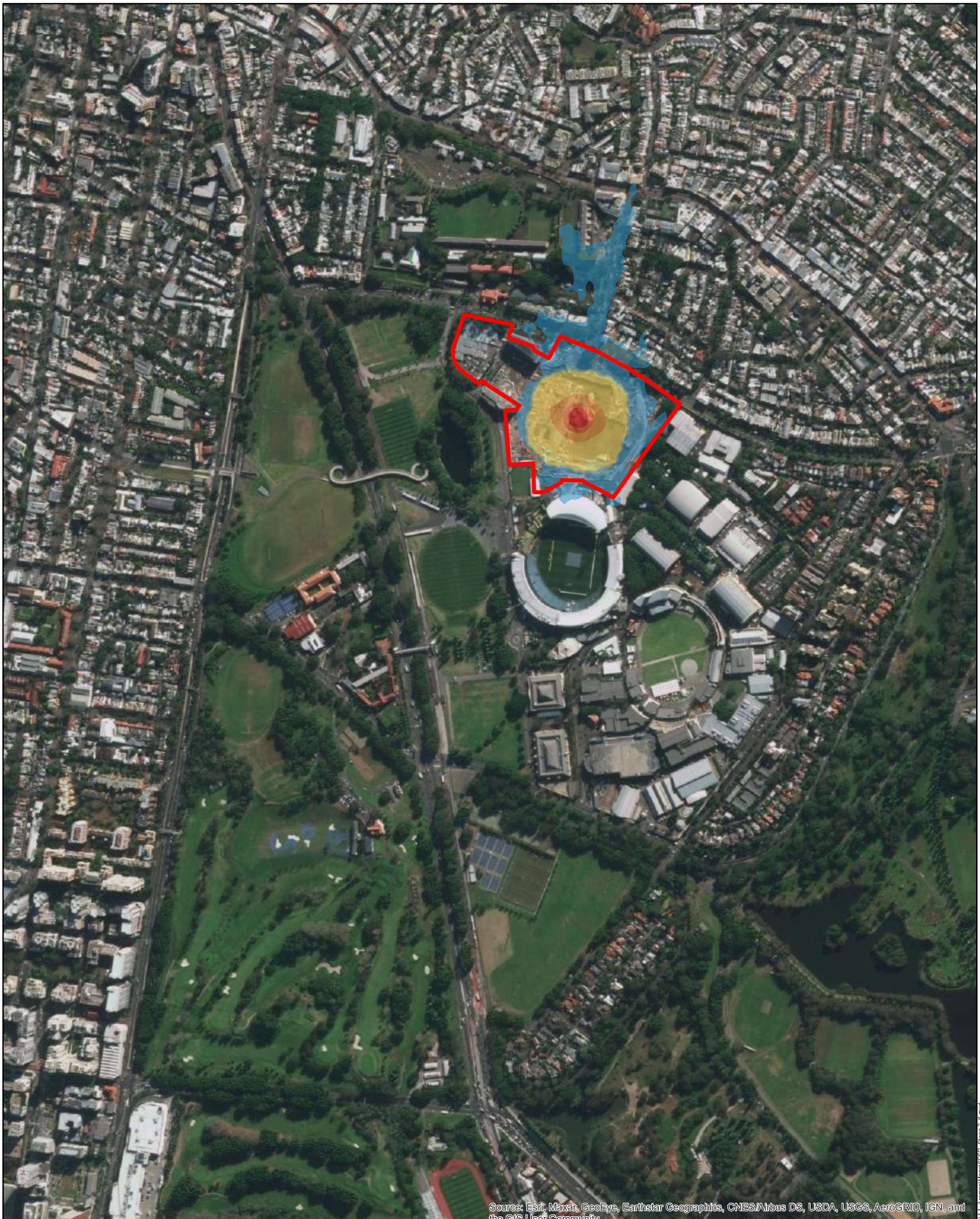
D1	24/03/2021	KJ	MS	MS
Issue	Date	By	Chkd	Appd

ARUP

Level 5, 151 Clarence Street
Sydney , NSW 2000
Tel +61 (2)9320 9320
www.arup.com

Scale at A3	Drawing Status
1:7,000	**Issue 1**
Coordinate System	
GDA 1994 MGA Zone 56	
Job No	Drawing No
267489-00	**001**

J:\259000\259997-00 Sydney Football Stadium\Work\Internal\4_Dwgs\4.1_Arcmap\Maps\SFSR_Stage 2_6.mxd



Legend

Site boundary

Sound Pressure Level, $L_{Aeq(15min)}$, dBA

39 | 44 | 49 | 54 | 59 | 64 | 69 | 74

Client
John Holland Group

Job Title
Sydney Football Stadium Redevelopment

Drawing Title
Construction noise contours Diagrid installation OOHW

Metres
0 100 200

D1	24/03/2021	KJ	MS	MS
Issue	Date	By	Chkd	Appd

ARUP

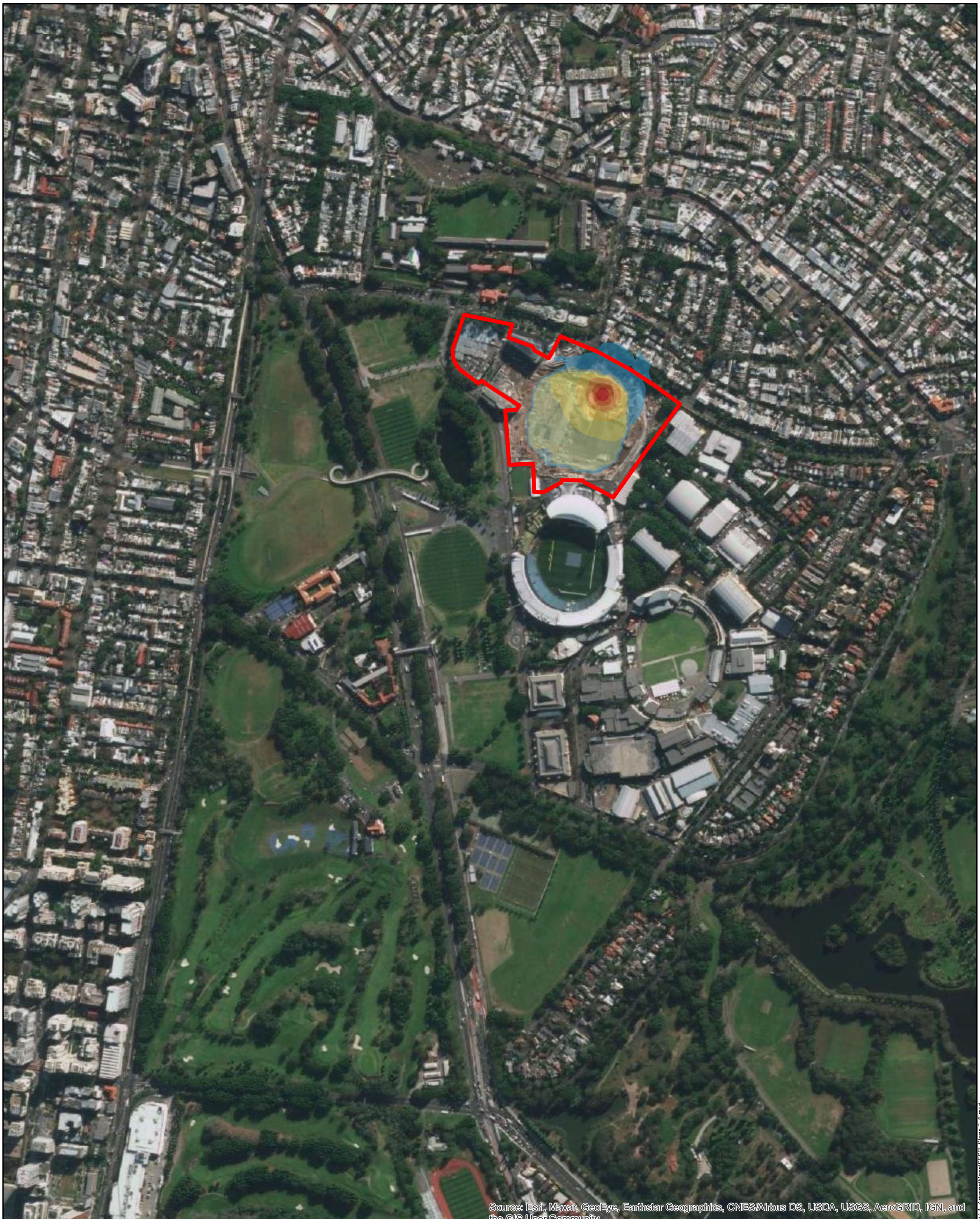
Level 5, 151 Clarence Street
Sydney , NSW 2000
Tel +61 (2)9320 9320
www.arup.com

Scale at A3	Drawing Status
1:7,000	**Issue 1**

Coordinate System
GDA 1994 MGA Zone 56

Job No	Drawing No
267489-00	**001**

J:\259000\259997-00 Sydney Football Stadium\Work\Internal\4_Dwgs\4.1_Arcmap\Maps\SFSR_Stage 2_6.mxd



Legend

Site boundary

Sound Pressure Level, $L_{Aeq(15min)}$, dBA

39 | 44 | 49 | 54 | 59 | 64 | 69 | 74

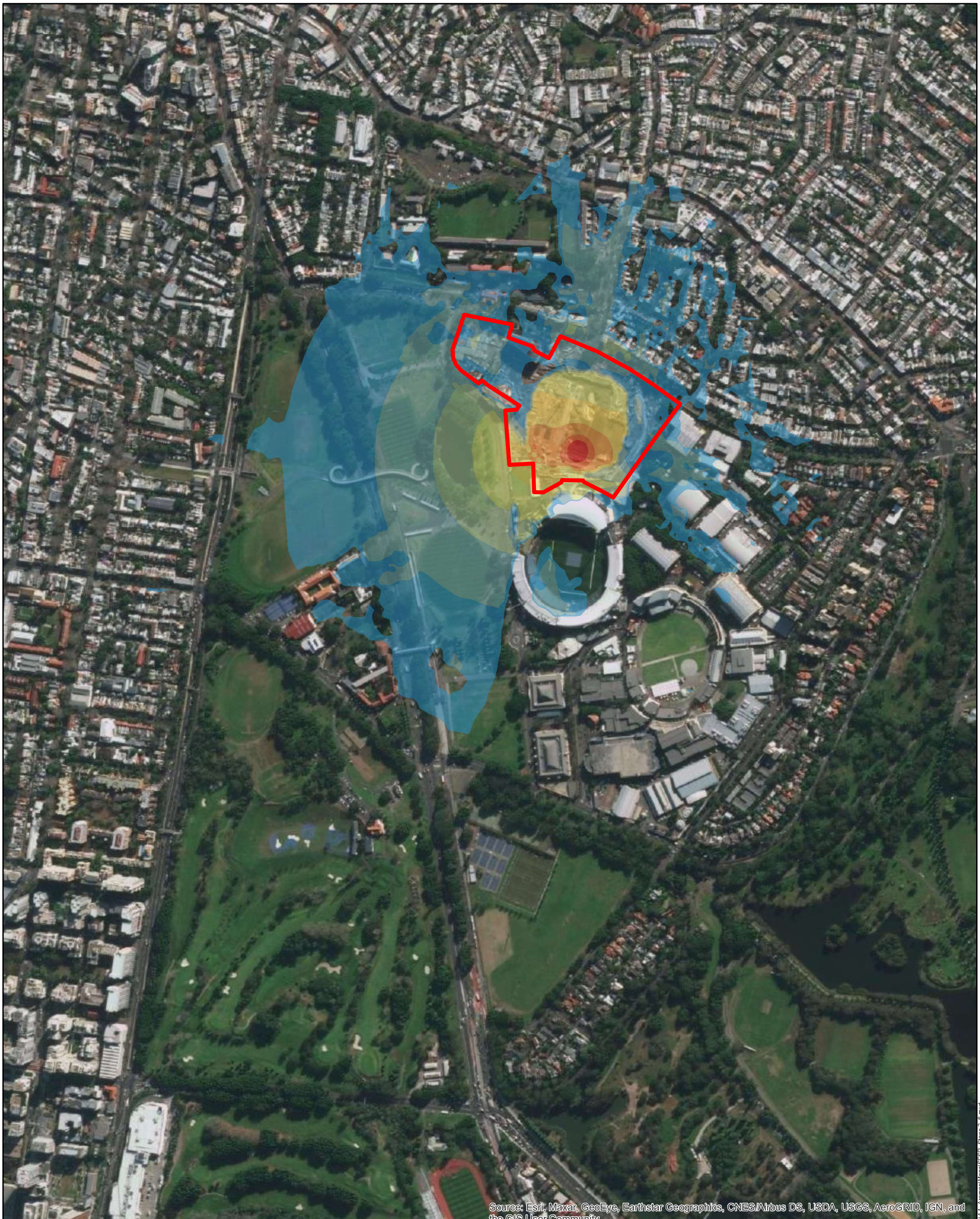
Client	John Holland Group			
Job Title	Sydney Football Stadium Redevelopment			
Drawing Title	Construction noise contours Truss installation OOHW			
Metres: 0, 100, 200				
D1	24/03/2021	KJ	MS	MS
Issue	Date	By	Chkd	Appd

ARUP

Level 5, 151 Clarence Street
Sydney , NSW 2000
Tel +61 (2)9320 9320
www.arup.com

Scale at A3: 1:7,000	Drawing Status: Issue 1
Coordinate System: GDA 1994 MGA Zone 56	
Job No: 267489-00	Drawing No: 001

J:\259000\259997-00 Sydney Football Stadium\Work\Internal\4_Dwgs\4.1_Arcmap\Maps\SFSR_Stage 2_6.mxd



Legend

Site boundary

Sound Pressure Level, $L_{Aeq(15min)}$, dBA

39 44 49 54 59 64 69 74

Client
John Holland Group

Job Title
Sydney Football Stadium Redevelopment

Drawing Title
Construction noise contours Tension grid south installation OOHW

Metres
0 100 200

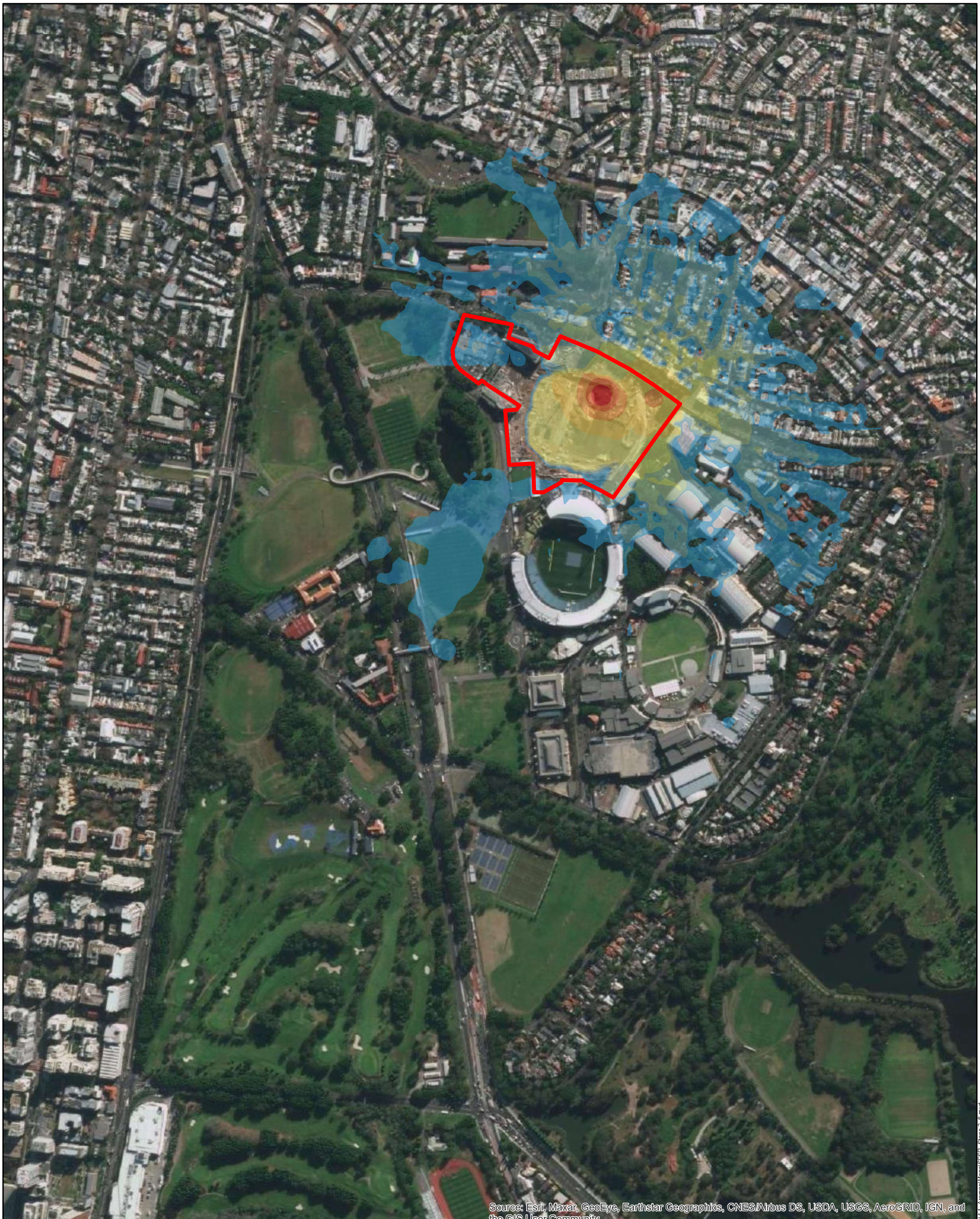
Issue	Date	By	Chkd	Appd
D1	24/03/2021	KJ	MS	MS

ARUP

Level 5, 151 Clarence Street
Sydney , NSW 2000
Tel +61 (2)9320 9320
www.arup.com

Scale at A3: **1:7,000**
Drawing Status: **Issue 1**
Coordinate System: **GDA 1994 MGA Zone 56**
Job No: **267489-00**
Drawing No: **001**

J:\259000\259997-00 Sydney Football Stadium\Work\Internal\4_Dwgs\4.1_Arcmap\Maps\SFSR_Stage 2_6.mxd



Legend

Site boundary

Sound Pressure Level, $L_{Aeq(15min)}$, dBA

39	44	49	54	59	64	69	74

Client
John Holland Group

Job Title
Sydney Football Stadium Redevelopment

Drawing Title
Construction noise contours Tension grid north installation OOHW

Metres
0 100 200

D1	24/03/2021	KJ	MS	MS
Issue	Date	By	Chkd	Appd

ARUP

Level 5, 151 Clarence Street
Sydney , NSW 2000
Tel +61 (2)9320 9320
www.arup.com

Scale at A3	Drawing Status
1:7,000	**Issue 1**

Coordinate System
GDA 1994 MGA Zone 56

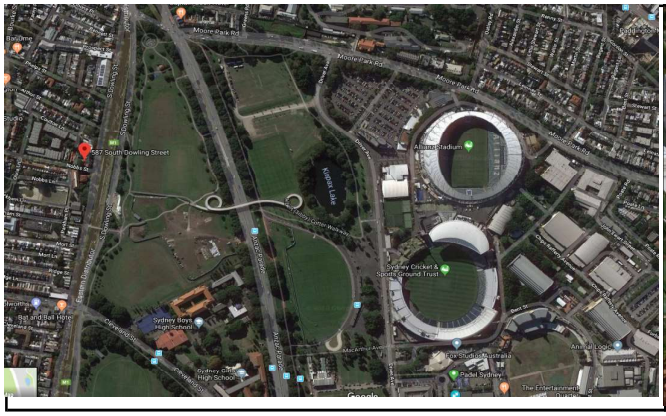
Job No	Drawing No
267489-00	**001**

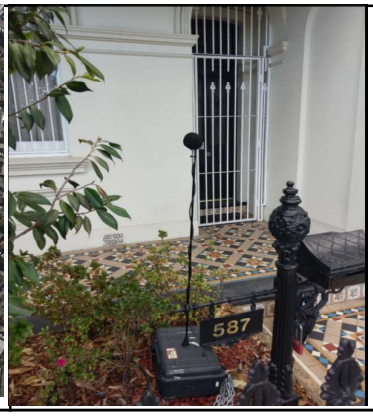
J:\259000\259997-00 Sydney Football Stadium\Work\Internal\4_Dwgs\4.1_Arcmap\Maps\SFSR_Stage 2_6.mxd

ARUP

587 South Dowling St (Free Field)

Additional detail:





Background and ambient noise monitoring results - NSW 'Industrial Noise Policy', 2000

	L_{A90} Background noise levels[4]			L_{Aeq} Ambient noise levels		
Date	**Day[1]**	**Evening[2]**	**Night[3]**	**Day[1]**	**Evening[2]**	**Night[3]**
Wednesday-21-February-2018		56	45		67	65
Thursday-22-February-2018	57	56	44	68	67	65
Friday-23-February-2018	58	57	46	68	68	66
Saturday-24-February-2018	57	56		67	67	
Sunday-25-February-2018						
Monday-26-February-2018	60	56	47	70	69	67
Tuesday-27-February-2018	58	57	49	68	70	66
Wednesday-28-February-2018	57	57	50	69	68	66
Thursday-01-March-2018	58	57	49	69	68	67
Friday-02-March-2018	57	56		70	68	
Saturday-03-March-2018						
Representative Weekday[5]	**58**	**56**	**47**	**69**	**68**	**66**
Representative Weekend[5]	**57**	**56**	**#NUM!**	**67**	**67**	**#DIV/0!**
Representative Week[5]	**58**	**56**	**47**	**69**	**68**	**66**

Notes:

1. Day is 8:00am to 6:00pm on Sunday and 7:00am to 6:00pm at other times
2. Evening is 6:00pm to 10:00pm
3. Night is the remaining periods
4. Assessment Background Level (ABL) for individual days
5. Rating Background Level (RBL) for L_{A90} and logarithmic average for L_{Aeq}

Road / Rail noise monitoring results

	L_{Aeq} Noise levels		$L_{Aeq\ 1hr}$ Noise levels (upper 10th percentile)	
Date	**Day[1]**	**Night[2]**	**Day**	**Night**
Wednesday-21-February-2018	67	65	69	69
Thursday-22-February-2018	68	65	68	69
Friday-23-February-2018	68	66	68	69
Saturday-24-February-2018	67	68	68	70
Sunday-25-February-2018	70	70	74	72
Monday-26-February-2018	70	67	71	72
Tuesday-27-February-2018	69	66	70	69

Wednesday-28-February-2018	68	66	70	69
Thursday-01-March-2018	69	67	72	70
Friday-02-March-2018	70	66	0	68
Saturday-03-March-2018				
Representative Weekday[3]	**69**	**66**	**69**	**70**
Representative Weekend[3]	**69**	**69**	**72**	**71**
Representative Week[3]	**69**	**67**	**70**	**70**

Notes:

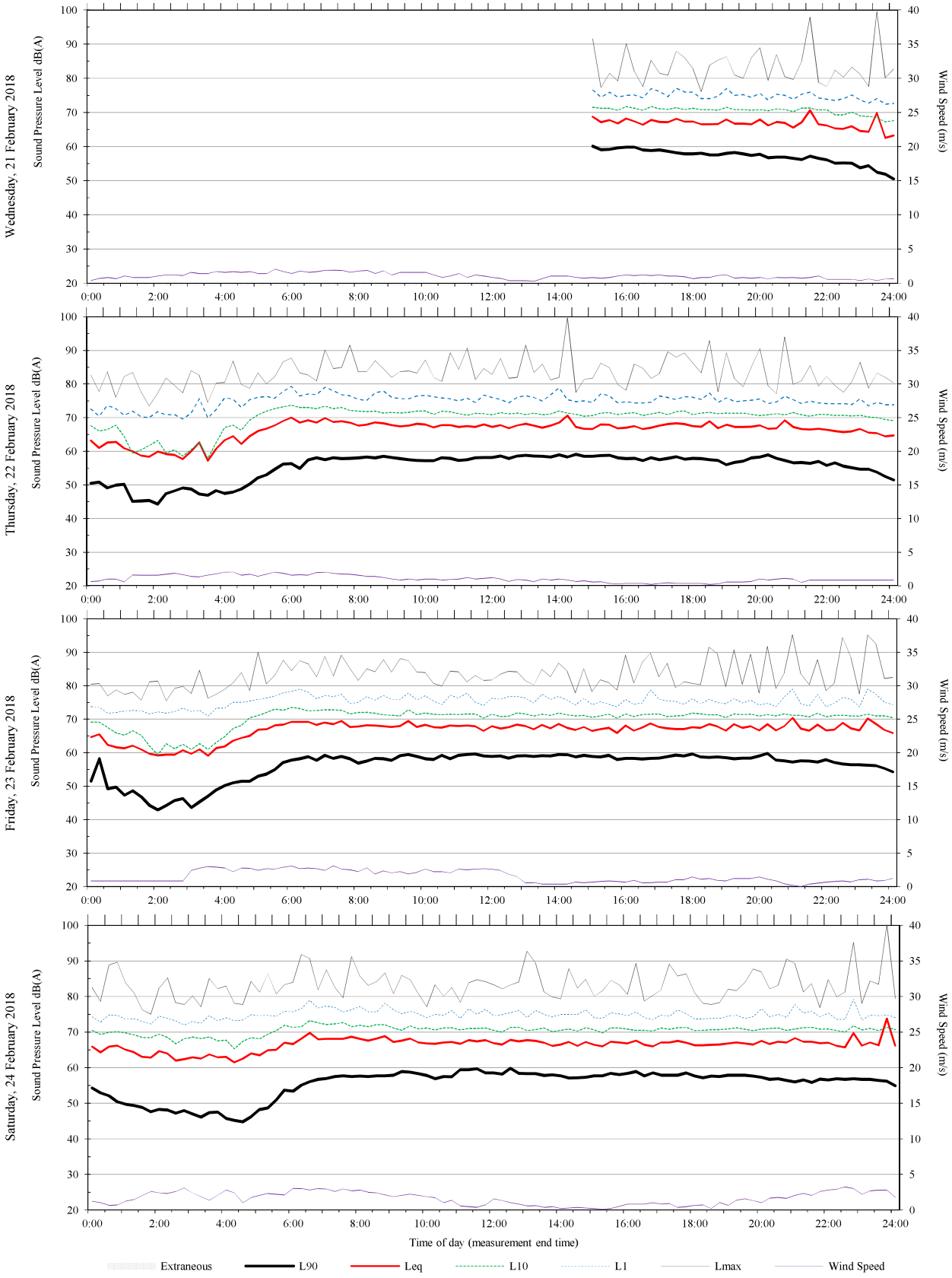
1. Day is 7:00am to 10:00pm

2. Night is 10:00pm to 7:00am

3. Logarithmic average of daily L_{Aeq}

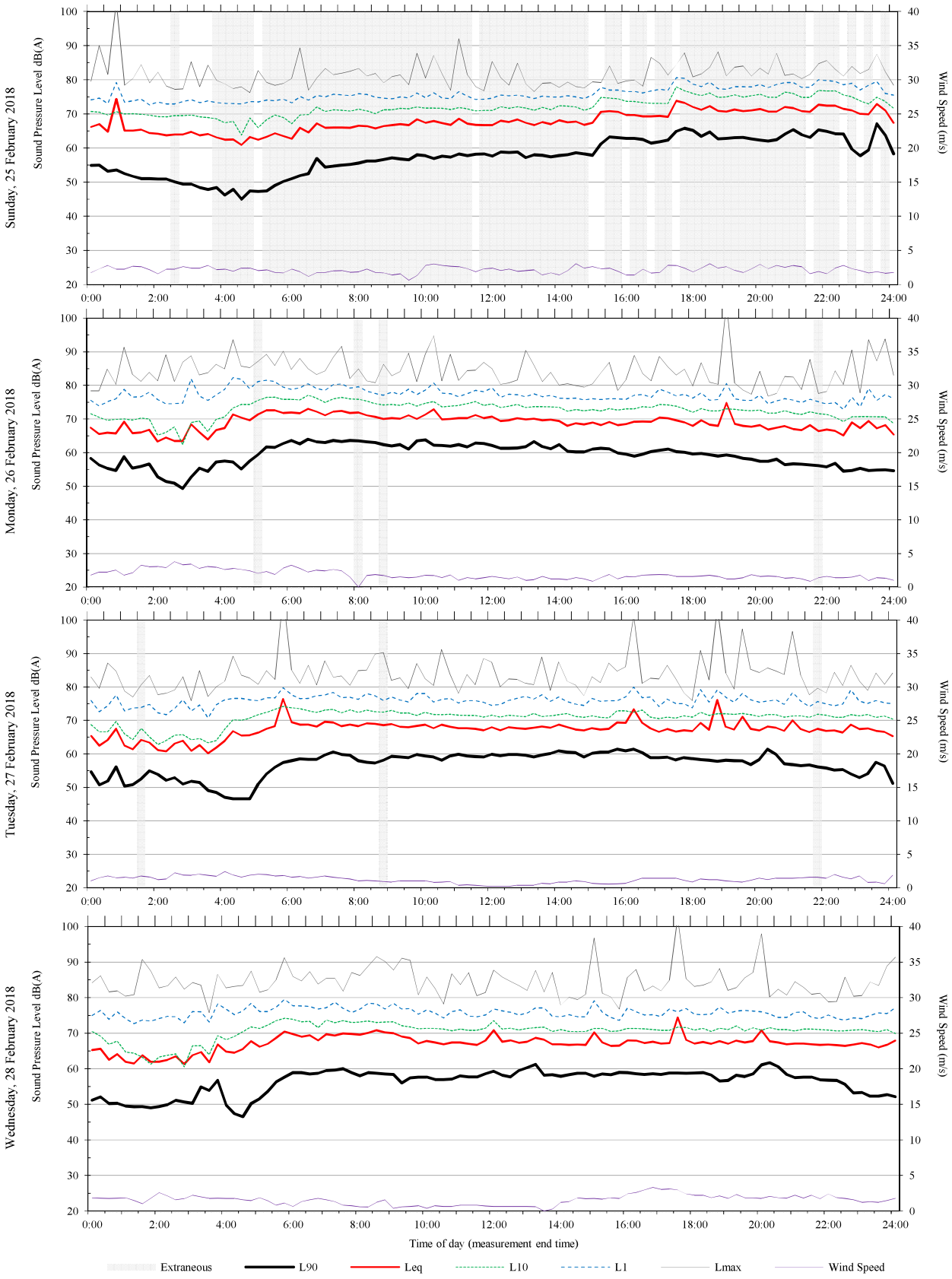
Unattended monitoring: 587 South Dowling St (Free Field)

ARUP



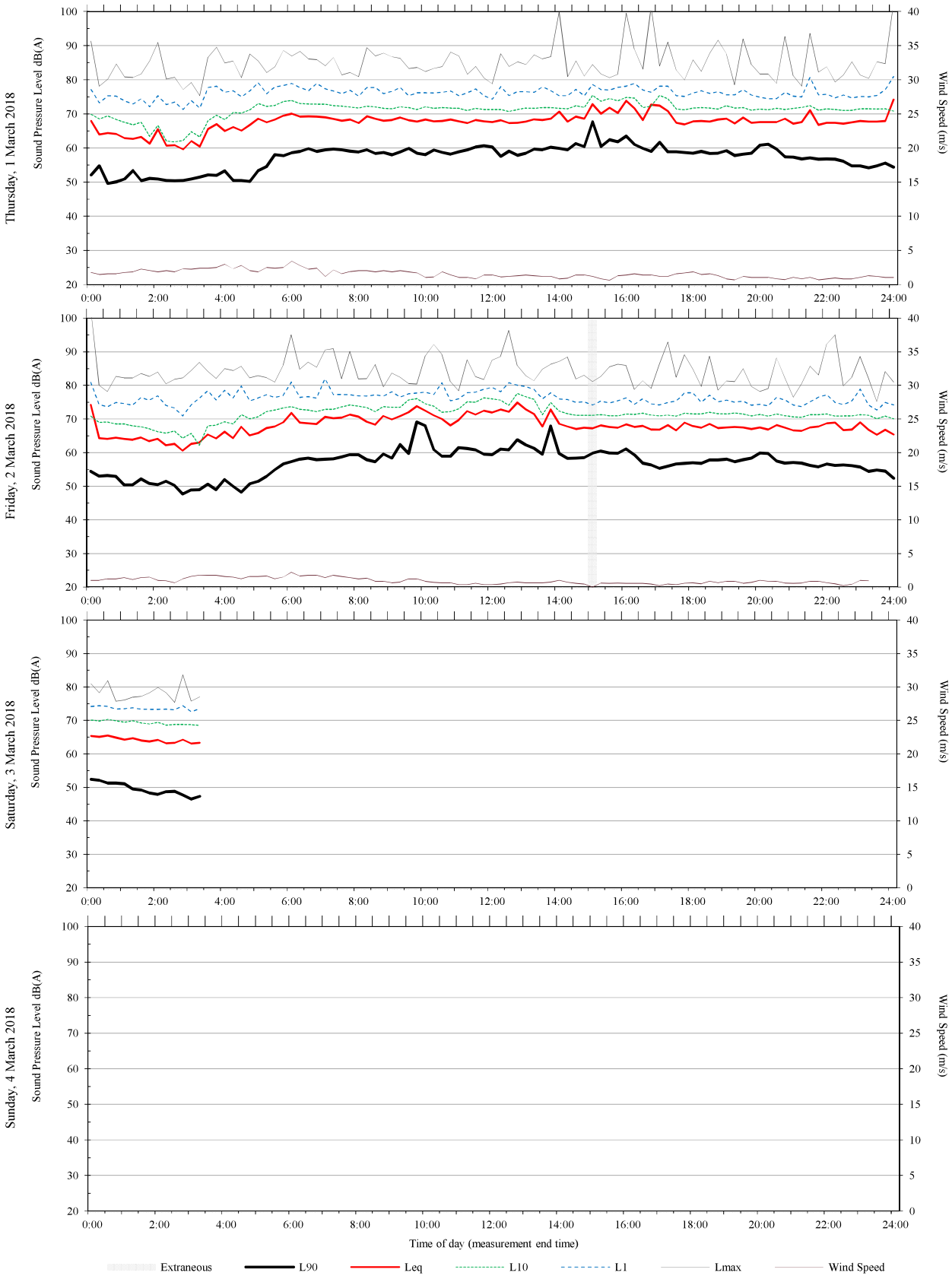
Unattended monitoring: 587 South Dowling St (Free Field)

ARUP



Unattended monitoring: 587 South Dowling St (Free Field)

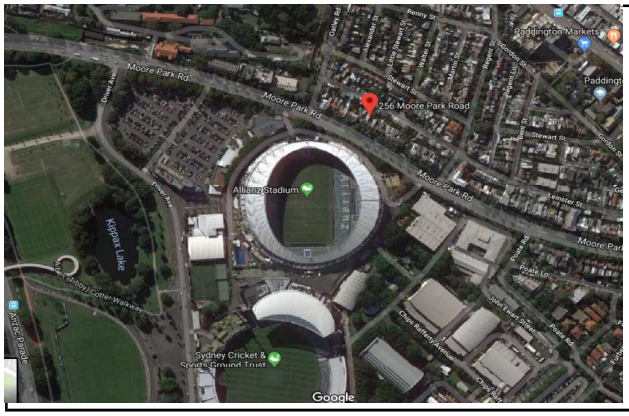
ARUP

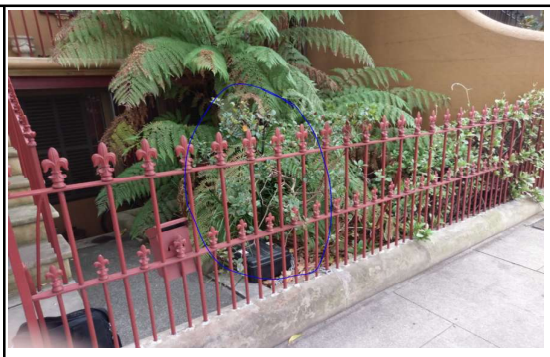


ARUP

256 Moore Park Rd (Free Field)

Additional detail:





Background and ambient noise monitoring results - NSW 'Industrial Noise Policy', 2000

	L_{A90} Background noise levels[4]			L_{Aeq} Ambient noise levels		
Date	**Day[1]**	**Evening[2]**	**Night[3]**	**Day[1]**	**Evening[2]**	**Night[3]**
Wednesday-21-February-2018		49	37		66	62
Thursday-22-February-2018	52	50	37	67	67	63
Friday-23-February-2018	53	49	38	68	66	61
Saturday-24-February-2018	52	54		66	65	
Sunday-25-February-2018						
Monday-26-February-2018	53	48	38	69	66	61
Tuesday-27-February-2018	52	50	37	67	66	62
Wednesday-28-February-2018	52	50	41	68	67	62
Thursday-01-March-2018	52	51	38	68	68	62
Friday-02-March-2018	52	49	37	68	66	63
Saturday-03-March-2018	50	49		69	65	
Sunday-04-March-2018						
Representative Weekday[5]	**52**	**49**	**37**	**68**	**67**	**62**
Representative Weekend[5]	**51**	**51**	**#NUM!**	**68**	**65**	**#DIV/0!**
Representative Week[5]	**52**	**49**	**37**	**68**	**66**	**62**

Notes:

1. Day is 8:00am to 6:00pm on Sunday and 7:00am to 6:00pm at other times
2. Evening is 6:00pm to 10:00pm
3. Night is the remaining periods
4. Assessment Background Level (ABL) for individual days
5. Rating Background Level (RBL) for L_{A90} and logarithmic average for L_{Aeq}

Road / Rail noise monitoring results

	L_{Aeq} Noise levels		$L_{Aeq\ 1hr}$ Noise levels (upper 10th percentile)	
Date	**Day[1]**	**Night[2]**	**Day**	**Night**
Wednesday-21-February-2018	67	62	68	67
Thursday-22-February-2018	67	63	70	68
Friday-23-February-2018	67	61	68	64
Saturday-24-February-2018	66	62	67	64
Sunday-25-February-2018	71	67	72	72
Monday-26-February-2018	69	61	72	68

Tuesday-27-February-2018	67	62	68	69
Wednesday-28-February-2018	68	62	69	68
Thursday-01-March-2018	68	62	69	69
Friday-02-March-2018	67	63	0	66
Saturday-03-March-2018	68	62	71	65
Sunday-04-March-2018				
Representative Weekday[3]	**68**	**62**	**69**	**68**
Representative Weekend[3]	**69**	**64**	**70**	**69**
Representative Week[3]	**68**	**63**	**69**	**68**

Notes:

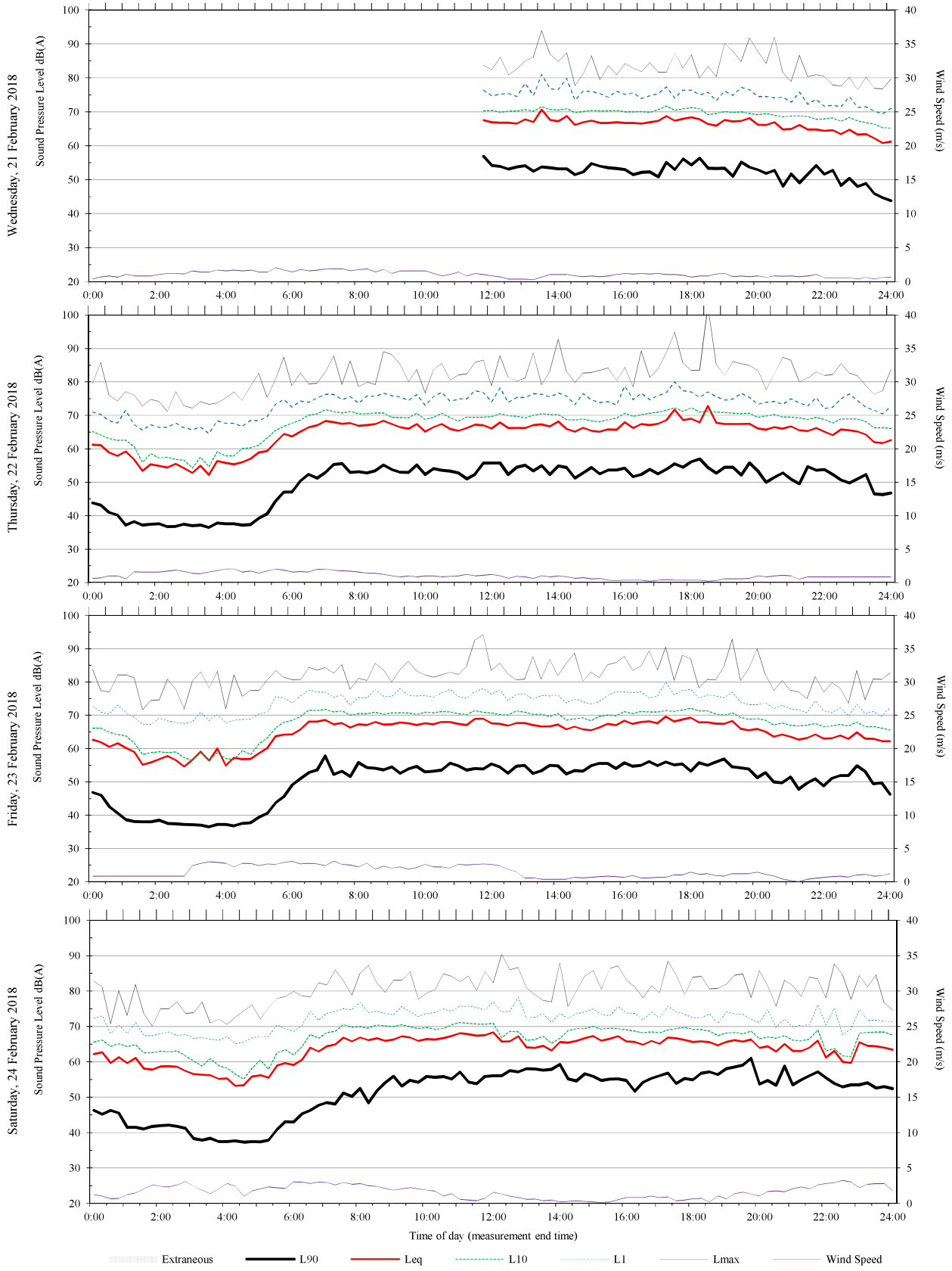
1. Day is 7:00am to 10:00pm

2. Night is 10:00pm to 7:00am

3. Logarithmic average of daily L_{Aeq}

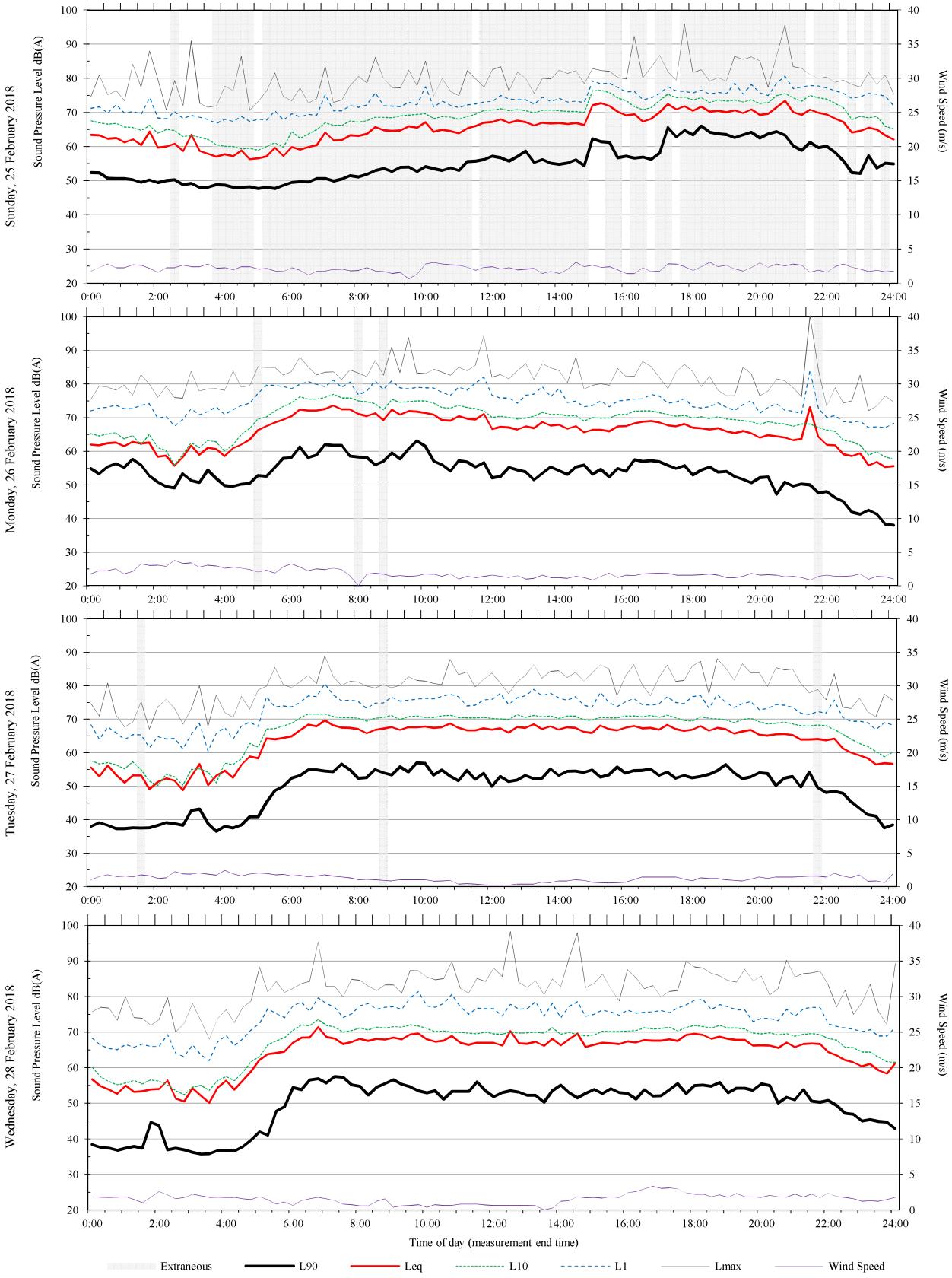
Unattended monitoring: 256 Moore Park Rd (Free Field)

ARUP



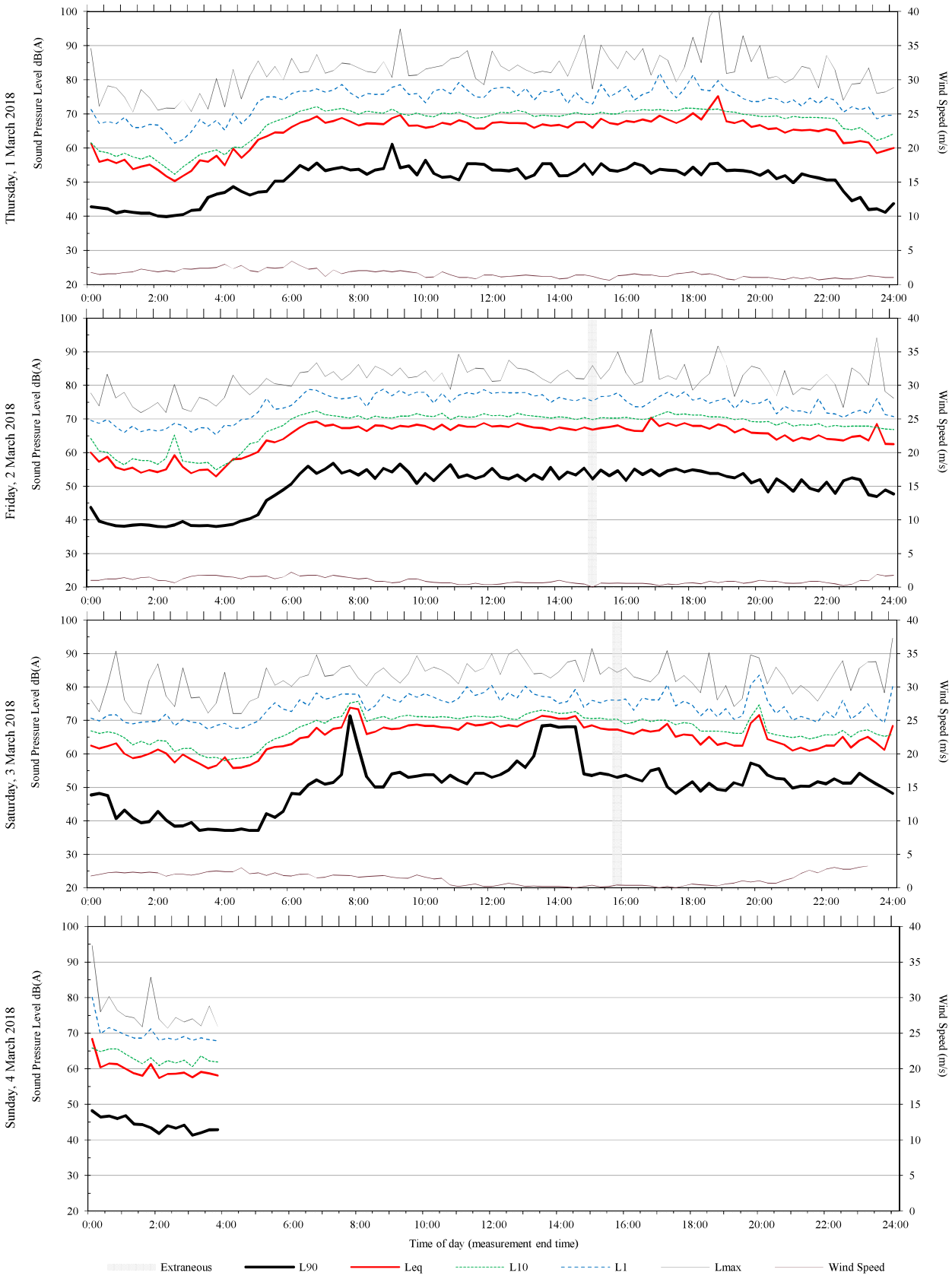
Unattended monitoring: 256 Moore Park Rd (Free Field)

ARUP



Unattended monitoring: 256 Moore Park Rd (Free Field)

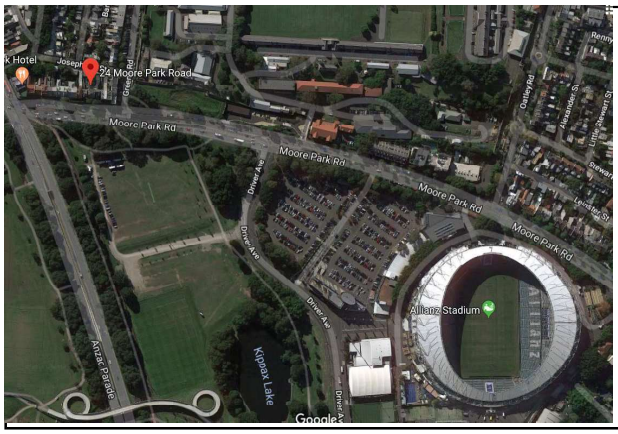
ARUP



ARUP

24 Moore Park Road, Paddington (Free Field)

Additional detail:



Background and ambient noise monitoring results - NSW 'Industrial Noise Policy', 2000

Date	L_{A90} Background noise levels[4]			L_{Aeq} Ambient noise levels		
	Day[1]	Evening[2]	Night[3]	Day[1]	Evening[2]	Night[3]
Wednesday-21-February-2018		52	38		64	61
Thursday-22-February-2018	56	51	39	66	65	61
Friday-23-February-2018	57	52	39	66	64	60
Saturday-24-February-2018	54	52		66	64	
Sunday-25-February-2018						
Monday-26-February-2018	58	52	42	69	67	61
Tuesday-27-February-2018	56			66		
Wednesday-28-February-2018						
Thursday-01-March-2018		54	44		65	63
Friday-02-March-2018	57	51	42	67	64	61
Saturday-03-March-2018	55			66		
Sunday-04-March-2018	56	51	42	66	63	60
Monday-05-March-2018						
Representative Weekday[5]	**57**	**52**	**41**	**67**	**65**	**61**
Representative Weekend[5]	**55**	**52**	**42**	**66**	**63**	**60**
Representative Week[5]	**56**	**52**	**42**	**67**	**65**	**61**

Notes:

1. Day is 8:00am to 6:00pm on Sunday and 7:00am to 6:00pm at other times
2. Evening is 6:00pm to 10:00pm
3. Night is the remaining periods
4. Assessment Background Level (ABL) for individual days
5. Rating Background Level (RBL) for L_{A90} and logarithmic average for L_{Aeq}

Road / Rail noise monitoring results

Date	L_{Aeq} Noise levels		$L_{Aeq\ 1hr}$ Noise levels (upper 10th percentile)	
	Day[1]	Night[2]	Day	Night
Wednesday-21-February-2018	65	61	66	66
Thursday-22-February-2018	66	61	67	67
Friday-23-February-2018	66	60	67	64

Saturday-24-February-2018	65	62	66	64
Sunday-25-February-2018	69	65	72	69
Monday-26-February-2018	68	61	70	66
Tuesday-27-February-2018	66		67	
Wednesday-28-February-2018				
Thursday-01-March-2018	66	63	66	67
Friday-02-March-2018	66	61	0	65
Saturday-03-March-2018	66	62	67	65
Sunday-04-March-2018	65	60	66	66
Monday-05-March-2018	66		67	
Representative Weekday[3]	**66**	**61**	**67**	**66**
Representative Weekend[3]	**67**	**62**	**69**	**66**
Representative Week[3]	**66**	**62**	**68**	**66**

Notes:

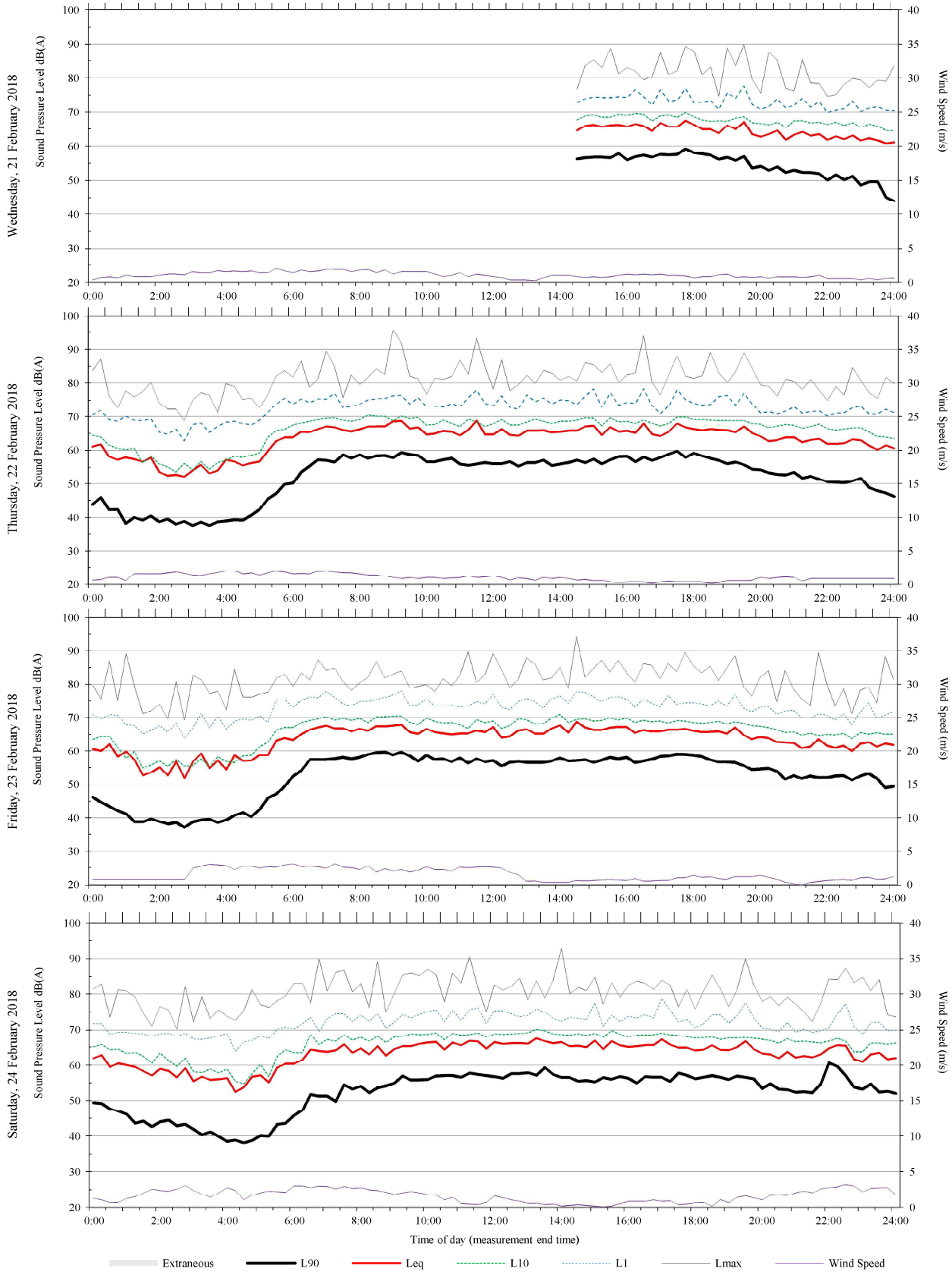
1. Day is 7:00am to 10:00pm

2. Night is 10:00pm to 7:00am

3. Logarithmic average of daily L_{Aeq}

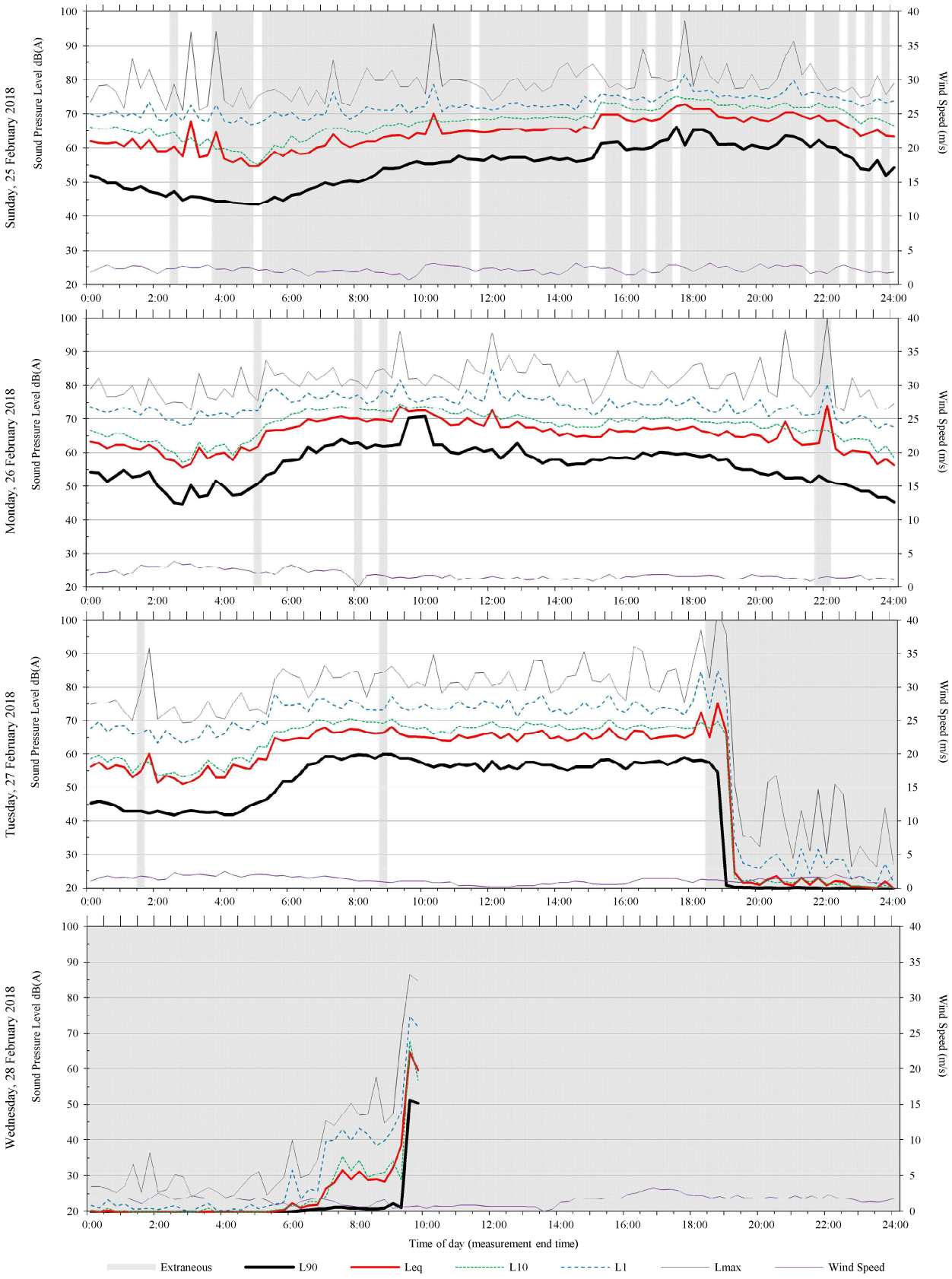
Unattended monitoring: (Free Field)

ARUP



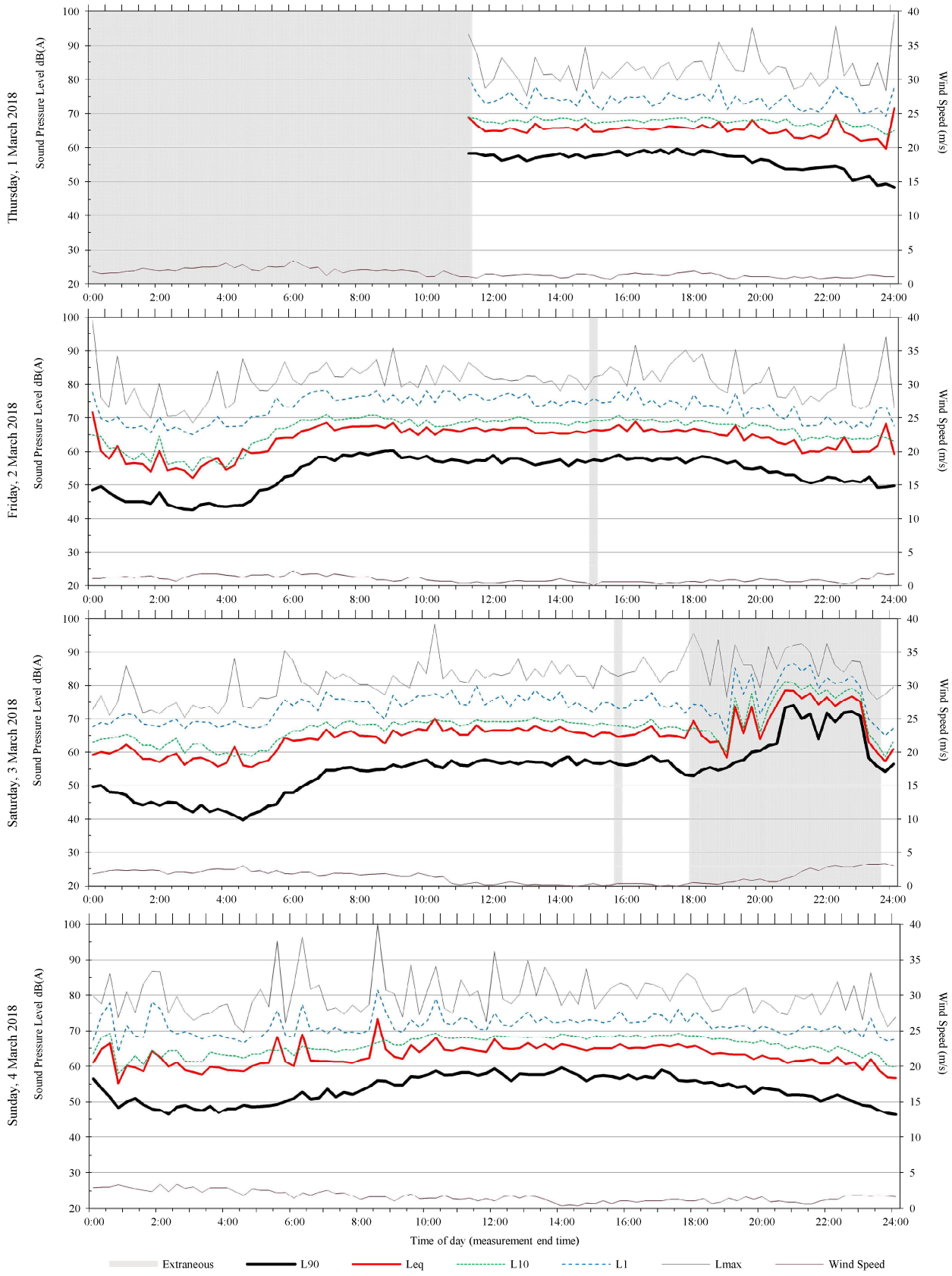
Unattended monitoring: (Free Field)

ARUP



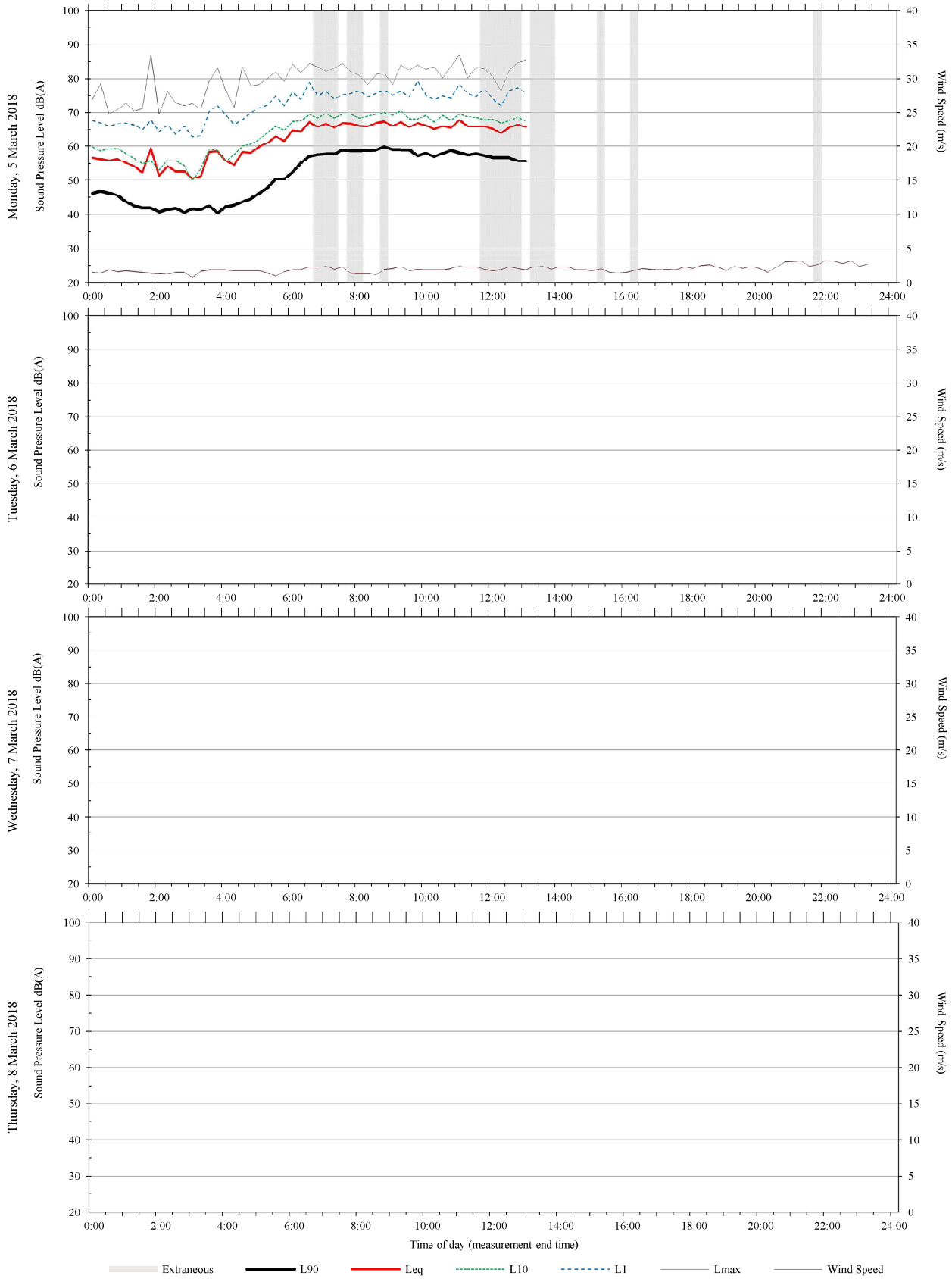
Unattended monitoring: (Free Field)

ARUP



Unattended monitoring: (Free Field)

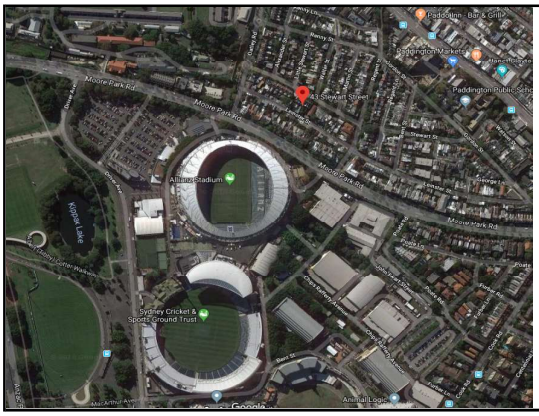
ARUP



ARUP

43 Stewart St (Free Field)

Additional detail:



Background and ambient noise monitoring results - NSW 'Industrial Noise Policy', 2000

Date	L_{A90} Background noise levels[4]			L_{Aeq} Ambient noise levels		
	Day[1]	Evening[2]	Night[3]	Day[1]	Evening[2]	Night[3]
Wednesday-21-February-2018		39	37		53	49
Thursday-22-February-2018	40	40	37	60	55	44
Friday-23-February-2018	43	44	38	58	57	49
Saturday-24-February-2018	43	46		57	56	
Sunday-25-February-2018						
Monday-26-February-2018	45	42	38	57	53	46
Tuesday-27-February-2018	41	38	37	54	56	47
Wednesday-28-February-2018	43	45	41	59	56	53
Thursday-01-March-2018	42	40	38	60	53	46
Friday-02-March-2018	40	38	37	55	50	47
Saturday-03-March-2018	40	46	38	56	57	50
Sunday-04-March-2018	45	41	37	58	51	46
Monday-05-March-2018						
Representative Weekday[5]	**42**	**40**	**37**	**58**	**54**	**49**
Representative Weekend[5]	**43**	**46**	**38**	**57**	**55**	**48**
Representative Week[5]	43	41	**37**	**57**	**55**	**49**

Notes:

1. Day is 8:00am to 6:00pm on Sunday and 7:00am to 6:00pm at other times
2. Evening is 6:00pm to 10:00pm
3. Night is the remaining periods
4. Assessment Background Level (ABL) for individual days
5. Rating Background Level (RBL) for L_{A90} and logarithmic average for L_{Aeq}

Road / Rail noise monitoring results

Date	L_{Aeq} Noise levels		$L_{Aeq\ 1hr}$ Noise levels (upper 10th percentile)	
	Day[1]	Night[2]	Day	Night
Wednesday-21-February-2018	52	49	54	58
Thursday-22-February-2018	59	44	60	50
Friday-23-February-2018	57	49	58	55
Saturday-24-February-2018	57	51	59	57
Sunday-25-February-2018	59	55	65	57

Monday-26-February-2018	56	46	58	51
Tuesday-27-February-2018	55	47	56	56
Wednesday-28-February-2018	58	53	58	58
Thursday-01-March-2018	59	46	63	51
Friday-02-March-2018	54	47	0	55
Saturday-03-March-2018	56	50	57	55
Sunday-04-March-2018	56	46	60	52
Monday-05-March-2018	55		57	
Representative Weekday[3]	**57**	**49**	**58**	**55**
Representative Weekend[3]	**57**	**51**	**61**	**56**
Representative Week[3]	**57**	**50**	**59**	**55**

Notes:

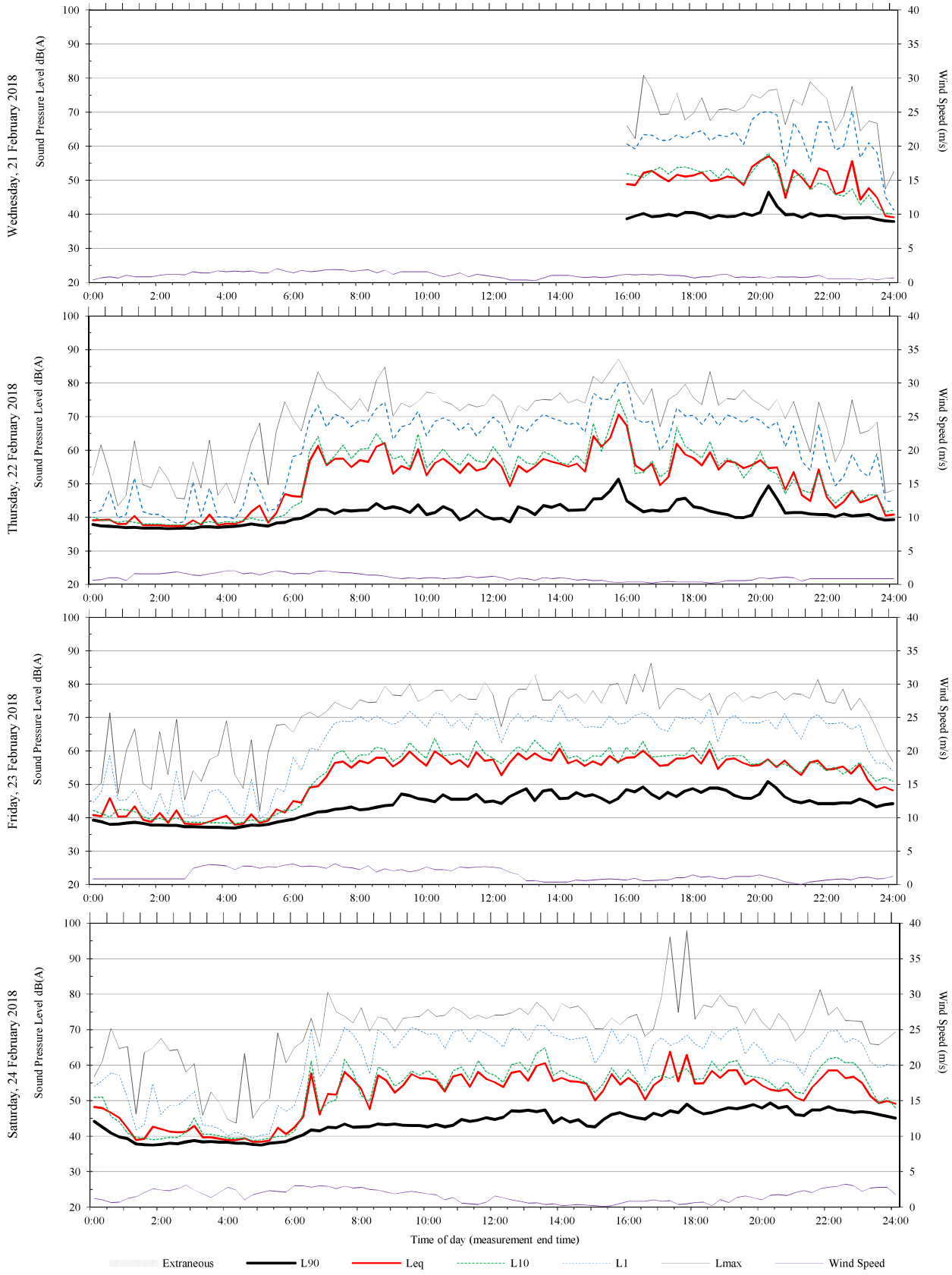
1. Day is 7:00am to 10:00pm

2. Night is 10:00pm to 7:00am

3. Logarithmic average of daily L_{Aeq}

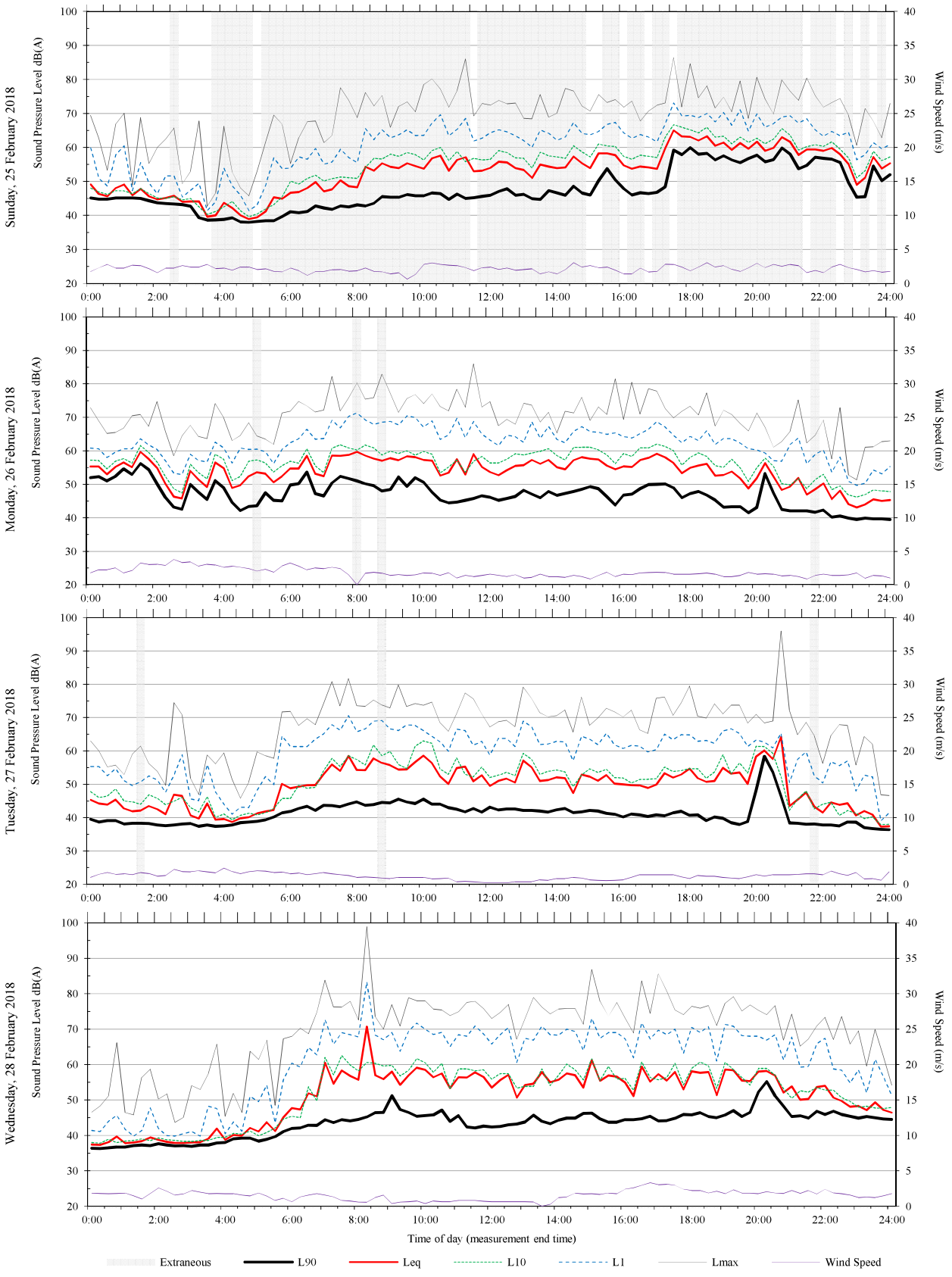
Unattended monitoring: 43 Stewart St (Free Field)

ARUP



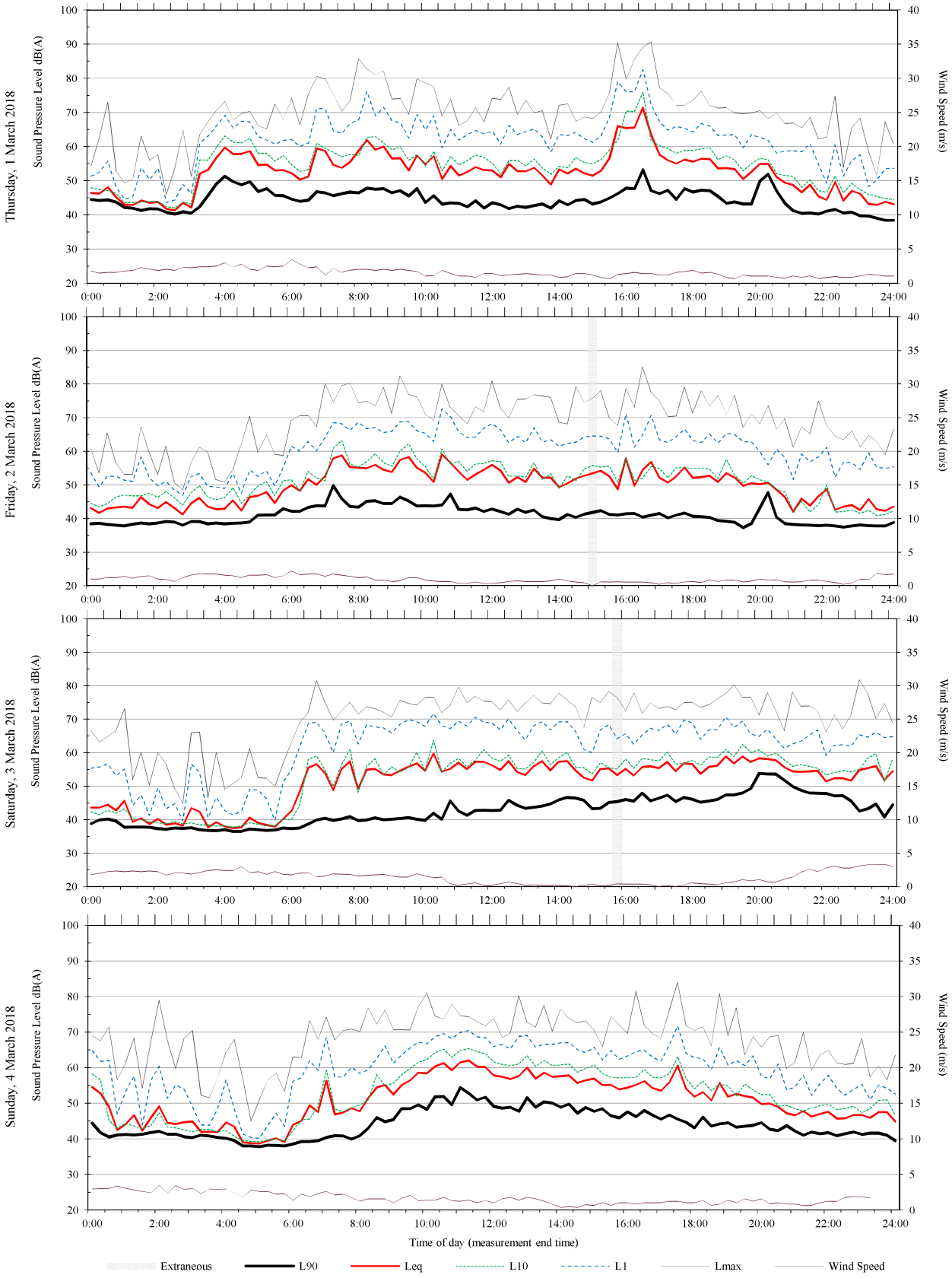
Unattended monitoring: 43 Stewart St (Free Field)

ARUP



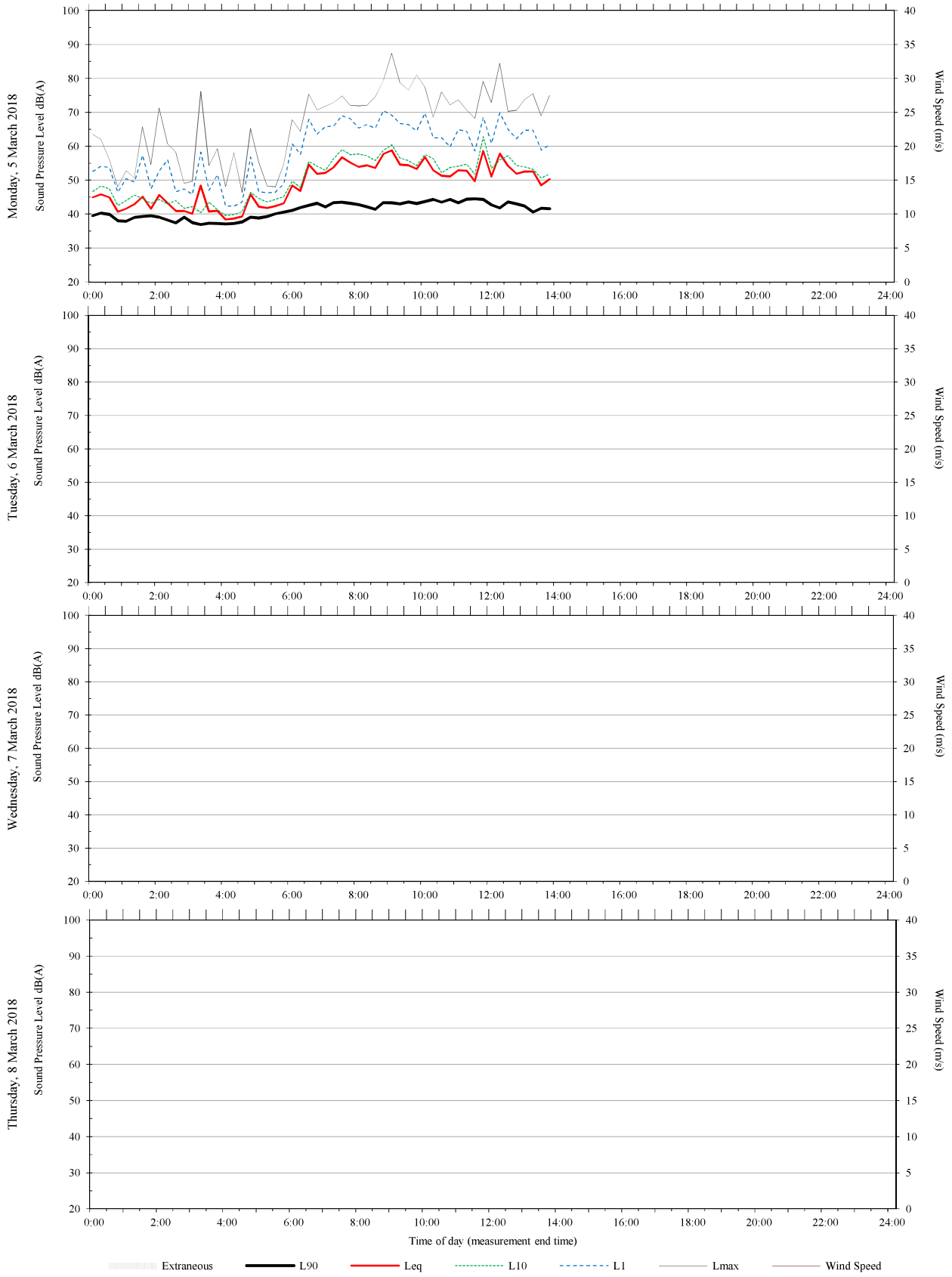
Unattended monitoring: 43 Stewart St (Free Field)

ARUP



Unattended monitoring: 43 Stewart St (Free Field)

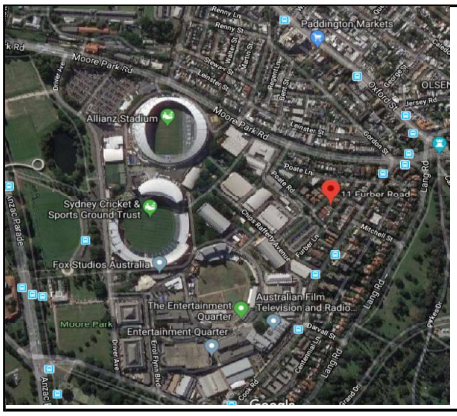
ARUP

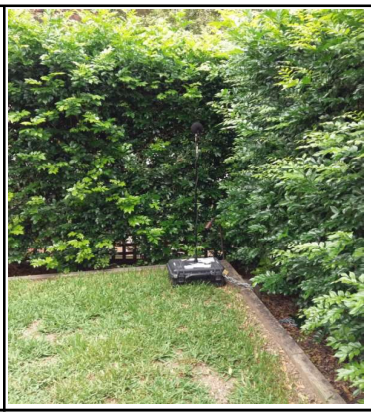


ARUP

11 Furber Rd (Free Field)

Additional detail:





Background and ambient noise monitoring results - NSW 'Industrial Noise Policy', 2000

Date	L_{A90} Background noise levels[4]			L_{Aeq} Ambient noise levels		
	Day[1]	Evening[2]	Night[3]	Day[1]	Evening[2]	Night[3]
Wednesday-21-February-2018		36	28		52	45
Thursday-22-February-2018	38	37		56	54	
Friday-23-February-2018						
Saturday-24-February-2018		43			52	
Sunday-25-February-2018						
Monday-26-February-2018	41	36	29	51	55	42
Tuesday-27-February-2018	38	35	30	54	56	40
Wednesday-28-February-2018	40	42	37	57	59	45
Thursday-01-March-2018	39	35	33	54	54	40
Friday-02-March-2018	37	32	30	49	52	44
Saturday-03-March-2018	37	43	34	68	60	47
Sunday-04-March-2018	40	36	29	51	51	39
Monday-05-March-2018						
Representative Weekday[5]	**39**	**36**	**30**	**54**	**55**	**43**
Representative Weekend[5]	**39**	**43**	**32**	**65**	**56**	**45**
Representative Week[5]	**39**	**36**	**30**	**60**	**56**	**43**

Notes:

1. Day is 8:00am to 6:00pm on Sunday and 7:00am to 6:00pm at other times
2. Evening is 6:00pm to 10:00pm
3. Night is the remaining periods
4. Assessment Background Level (ABL) for individual days
5. Rating Background Level (RBL) for L_{A90} and logarithmic average for L_{Aeq}

Road / Rail noise monitoring results

Date	L_{Aeq} Noise levels		$L_{Aeq\ 1hr}$ Noise levels (upper 10th percentile)	
	Day[1]	Night[2]	Day	Night
Wednesday-21-February-2018	52	45	53	52
Thursday-22-February-2018	55	41	57	41
Friday-23-February-2018				
Saturday-24-February-2018	53	46	59	51
Sunday-25-February-2018	56	49	61	52

Monday-26-February-2018	53	42	56	49
Tuesday-27-February-2018	55	40	59	45
Wednesday-28-February-2018	58	45	62	49
Thursday-01-March-2018	54	40	57	45
Friday-02-March-2018	50	44	0	52
Saturday-03-March-2018	67	47	72	54
Sunday-04-March-2018	51	39	54	44
Monday-05-March-2018	51		53	
Representative Weekday[3]	**54**	**43**	**57**	**49**
Representative Weekend[3]	**61**	**47**	**66**	**51**
Representative Week[3]	**58**	**45**	**63**	**50**

Notes:

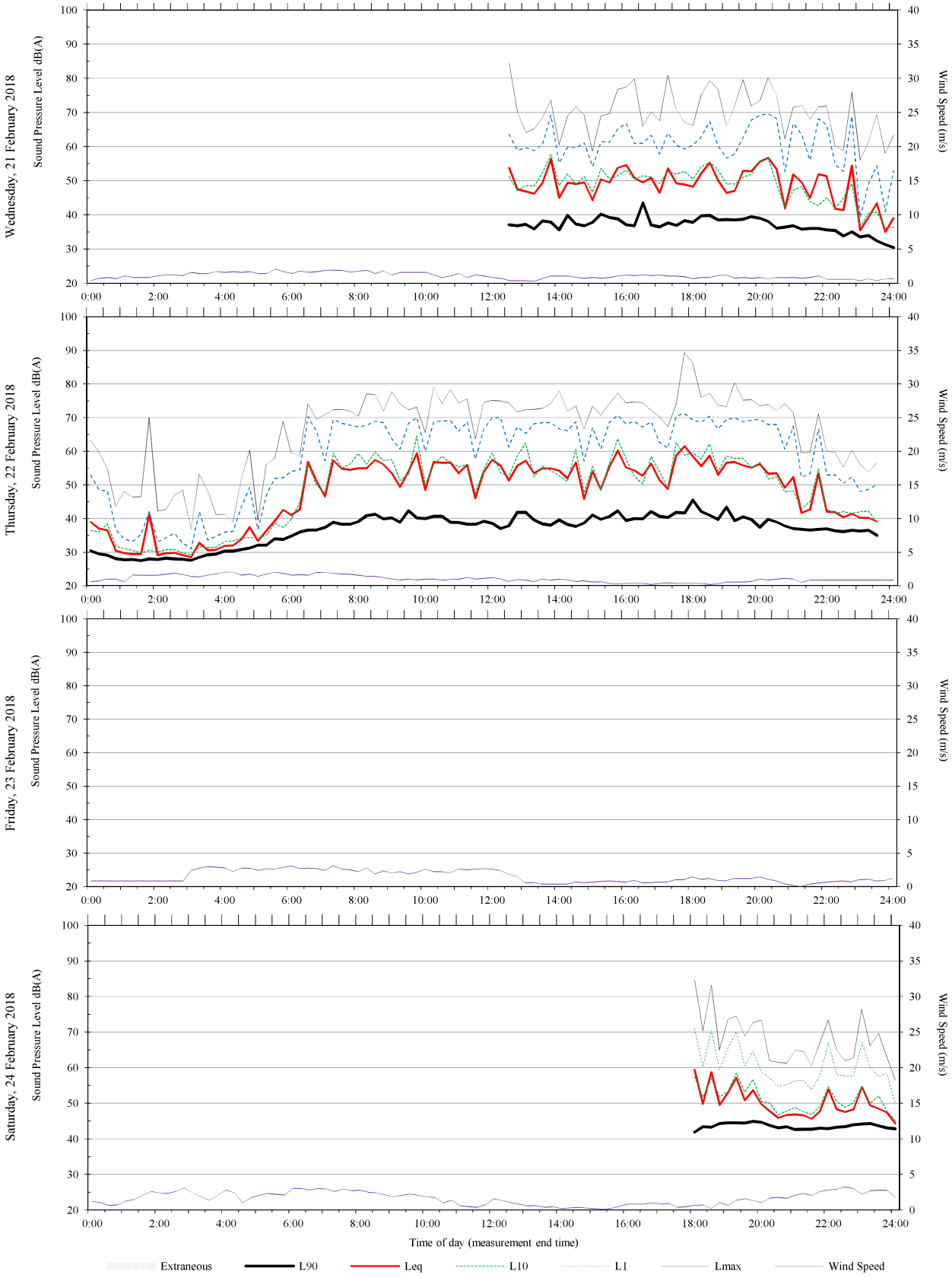
1. Day is 7:00am to 10:00pm

2. Night is 10:00pm to 7:00am

3. Logarithmic average of daily L_{Aeq}

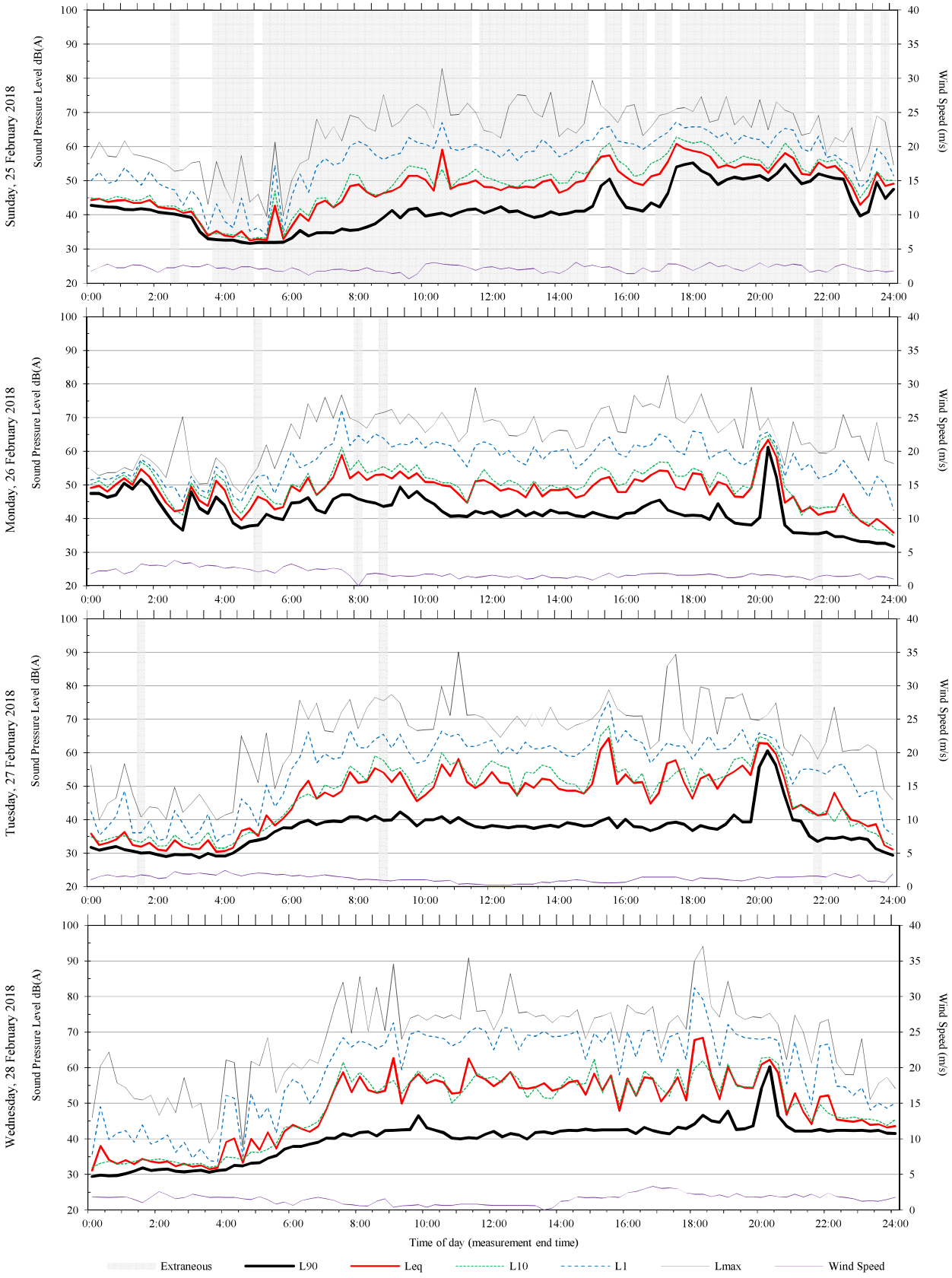
Unattended monitoring: 11 Furber Rd (Free Field)

ARUP



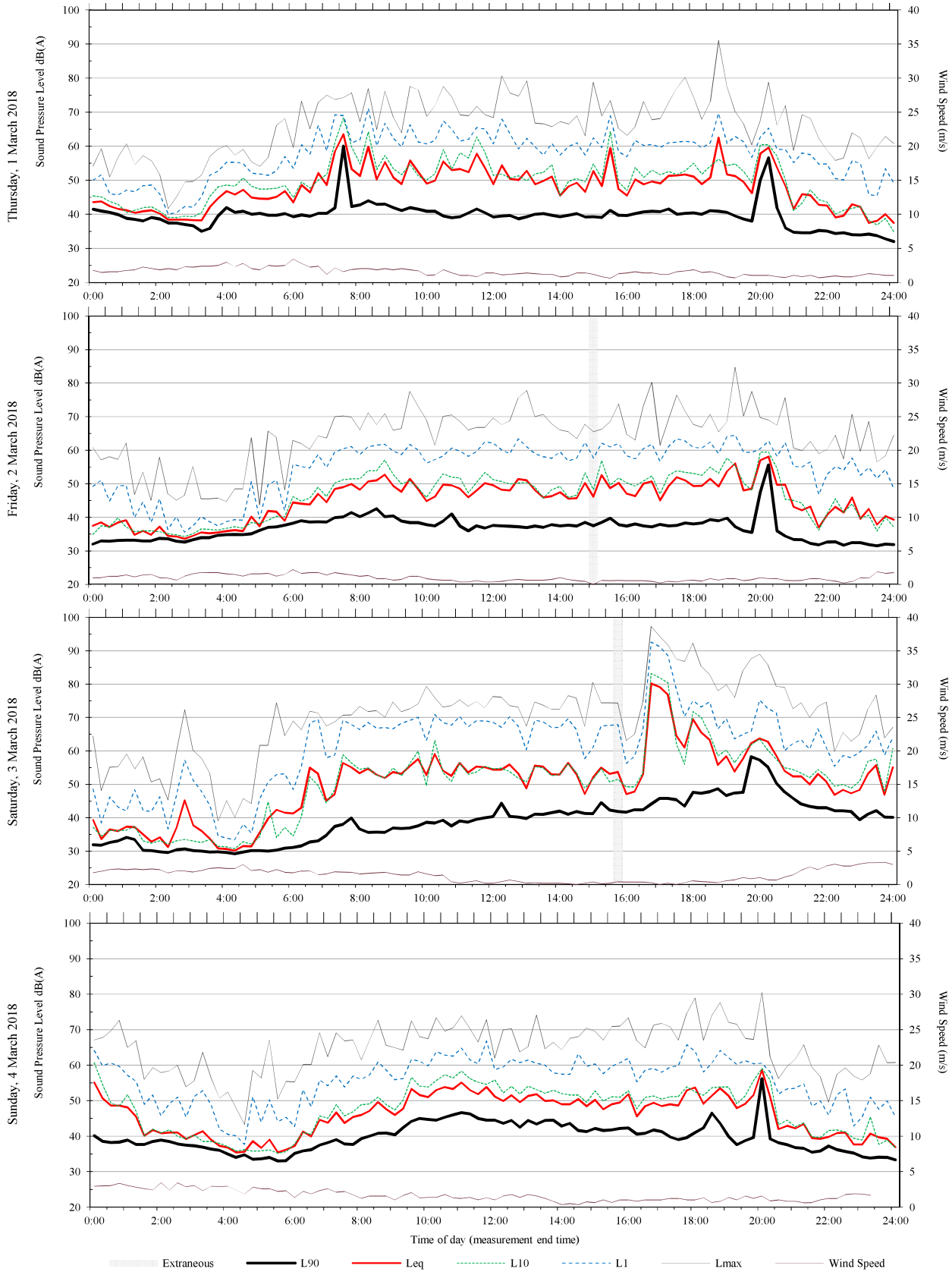
Unattended monitoring: 11 Furber Rd (Free Field)

ARUP



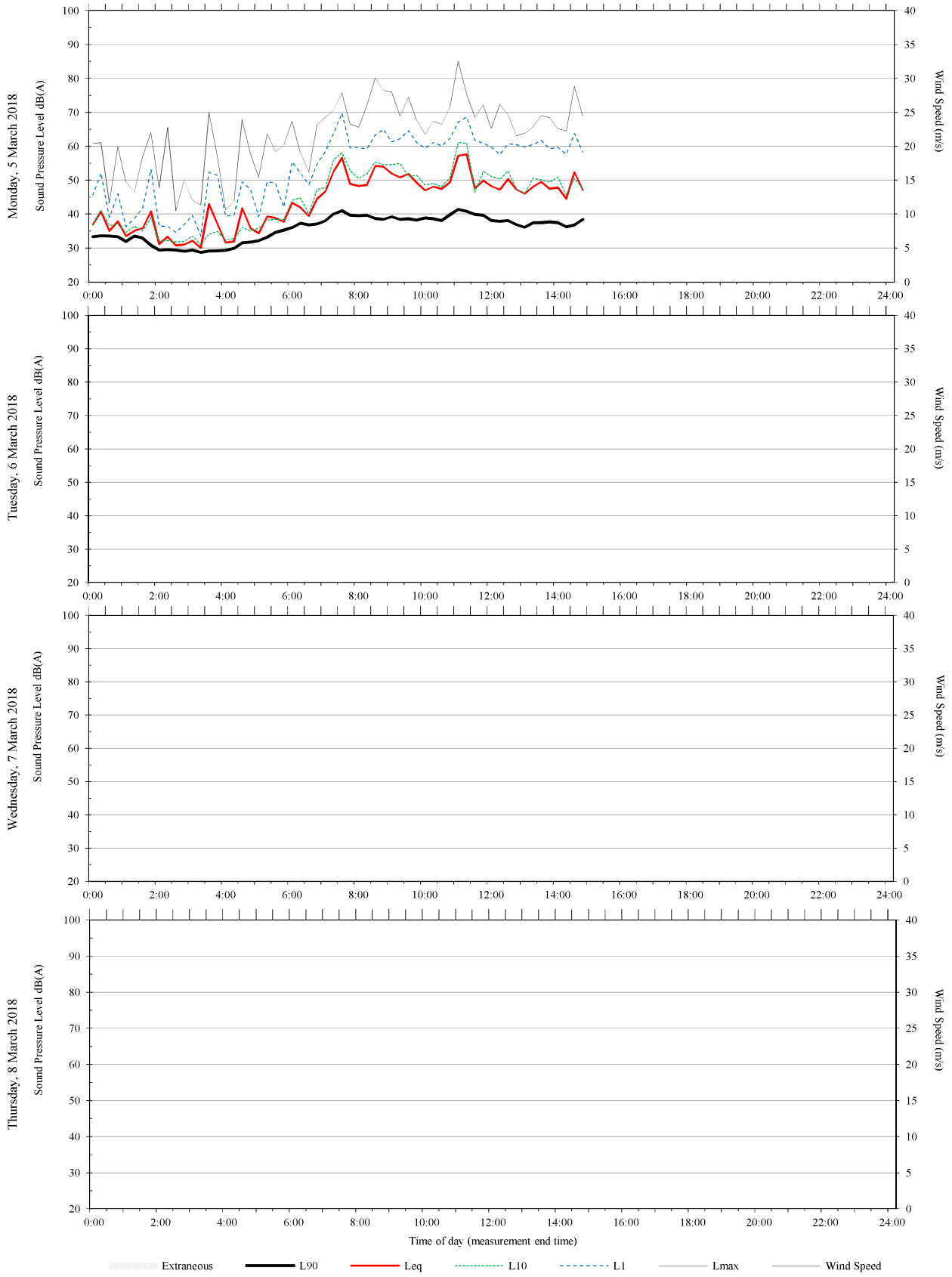
Unattended monitoring: 11 Furber Rd (Free Field)

ARUP



Unattended monitoring: 11 Furber Rd (Free Field)

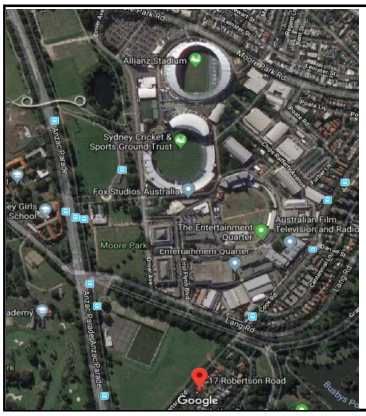
ARUP



ARUP

17 Robertson Rd (Free Field)

Additional detail:



Background and ambient noise monitoring results - NSW 'Industrial Noise Policy', 2000

	L_{A90} Background noise levels[4]			L_{Aeq} Ambient noise levels		
Date	**Day[1]**	**Evening[2]**	**Night[3]**	**Day[1]**	**Evening[2]**	**Night[3]**
Wednesday-21-February-2018		45	41		57	50
Thursday-22-February-2018	47	48	43	58	58	50
Friday-23-February-2018	50	47	40	59	57	50
Saturday-24-February-2018	48	49		57	55	
Sunday-25-February-2018						
Monday-26-February-2018	47		39	55		47
Tuesday-27-February-2018	45		42	54		51
Wednesday-28-February-2018	47	49	43	58	61	50
Thursday-01-March-2018	45		40	55		48
Friday-02-March-2018	44	43	41	55	54	49
Saturday-03-March-2018	47			57		
Representative Weekday[5]	**47**	**47**	**41**	**57**	**58**	**49**
Representative Weekend[5]	**48**	**49**	**#NUM!**	**57**	**0**	**#DIV/0!**
Representative Week[5]	**47**	**47**	**41**	**57**	**57**	**49**

Notes:

1. Day is 8:00am to 6:00pm on Sunday and 7:00am to 6:00pm at other times
2. Evening is 6:00pm to 10:00pm
3. Night is the remaining periods
4. Assessment Background Level (ABL) for individual days
5. Rating Background Level (RBL) for L_{A90} and logarithmic average for L_{Aeq}

Road / Rail noise monitoring results

	L_{Aeq} Noise levels		$L_{Aeq\ 1hr}$ Noise levels (upper 10th percentile)	
Date	**Day[1]**	**Night[2]**	**Day**	**Night**
Wednesday-21-February-2018	56	50	60	56
Thursday-22-February-2018	58	50	60	54
Friday-23-February-2018	59	50	60	55
Saturday-24-February-2018	57	50	58	52
Sunday-25-February-2018	58	52	64	56
Monday-26-February-2018	54	47	57	53
Tuesday-27-February-2018	54	51	55	56

Wednesday-28-February-2018	59	50	60	52
Thursday-01-March-2018	55	48	58	53
Friday-02-March-2018	55	49	0	55
Saturday-03-March-2018	57			
Representative Weekday[3]	**57**	**49**	**58**	**55**
Representative Weekend[3]	**0**	**51**	**62**	**54**
Representative Week[3]	**0**	**50**	**59**	**55**

Notes:

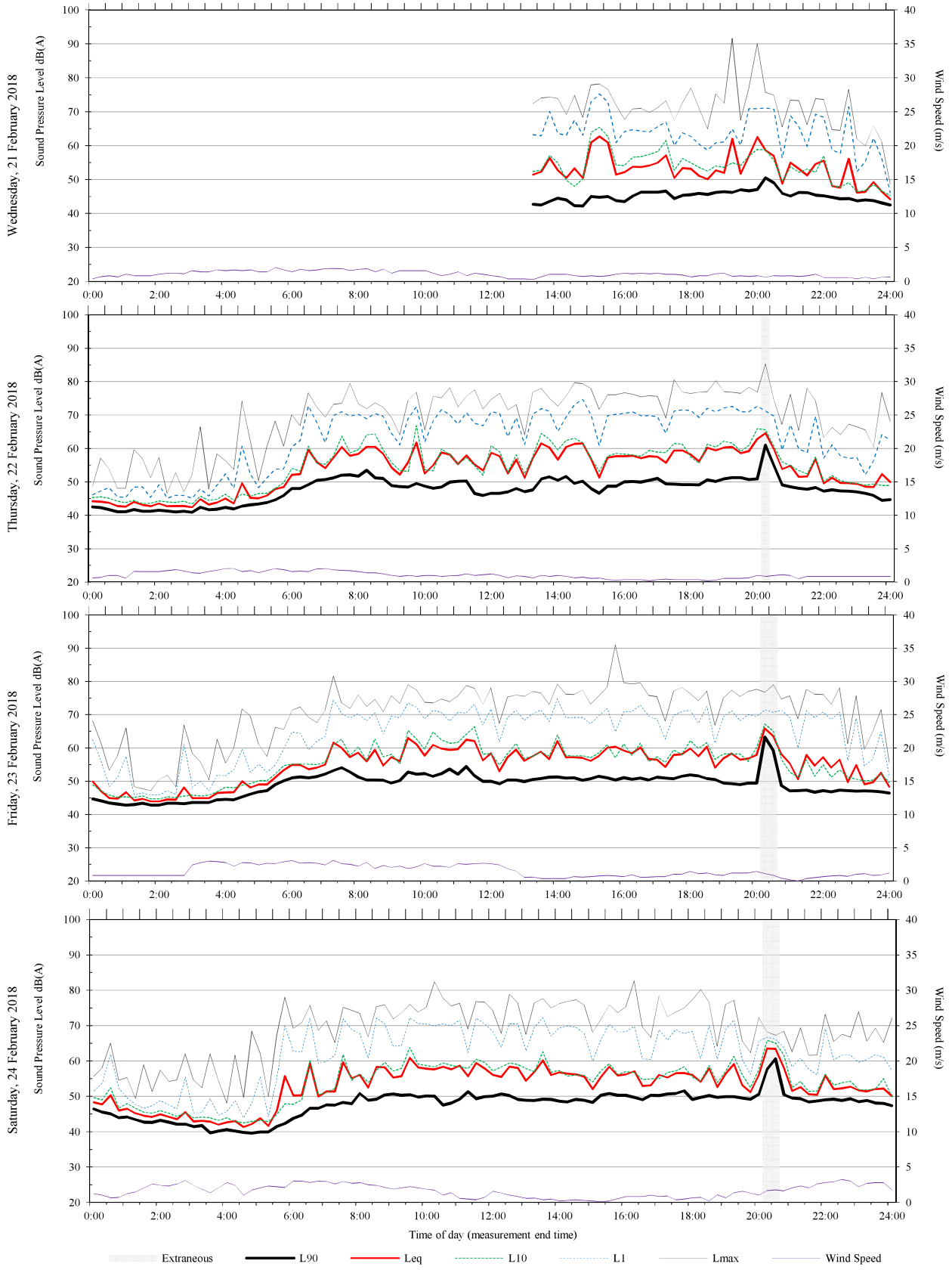
1. Day is 7:00am to 10:00pm

2. Night is 10:00pm to 7:00am

3. Logarithmic average of daily L_{Aeq}

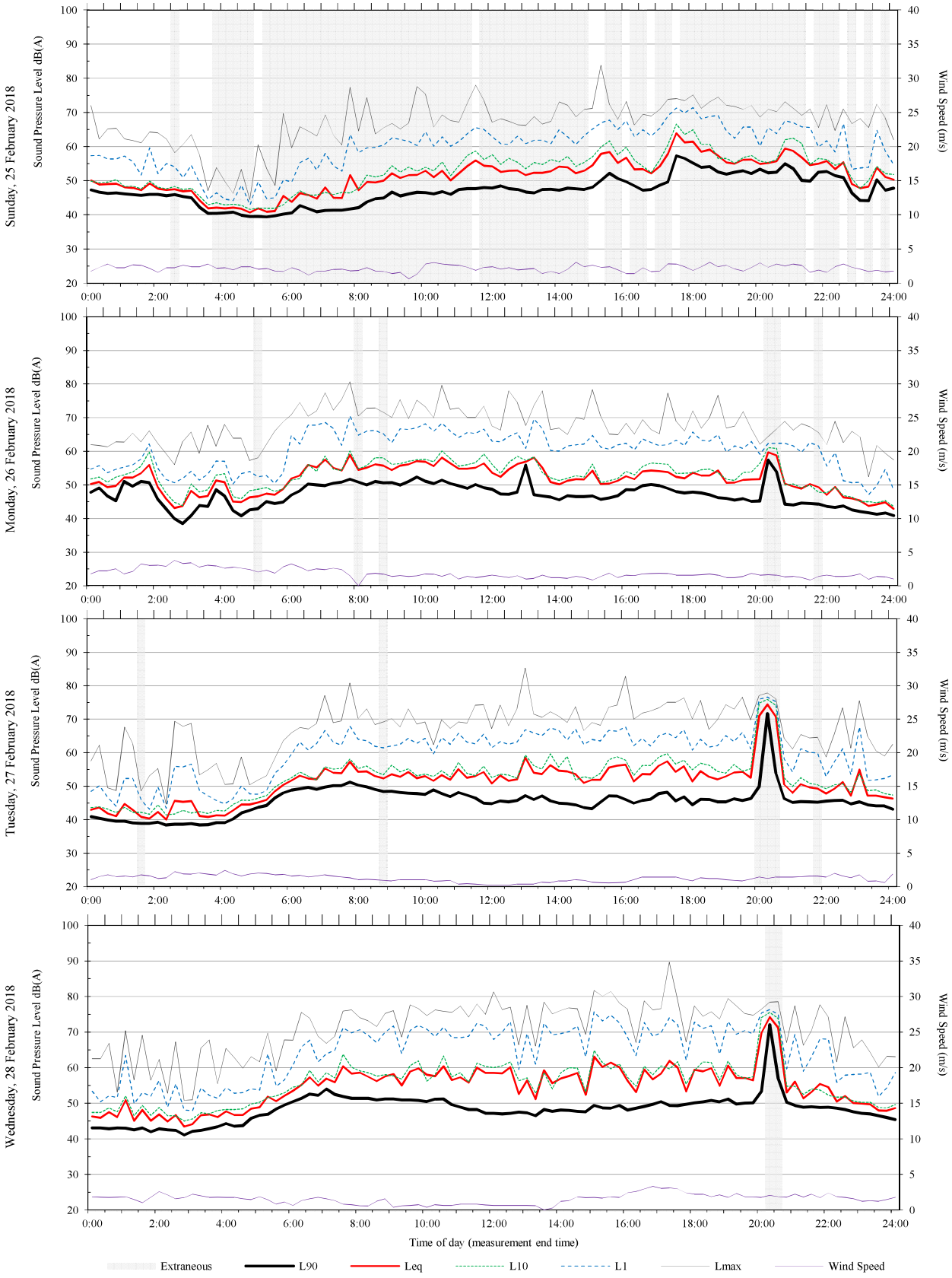
Unattended monitoring: 17 Robertson Rd (Free Field)

ARUP



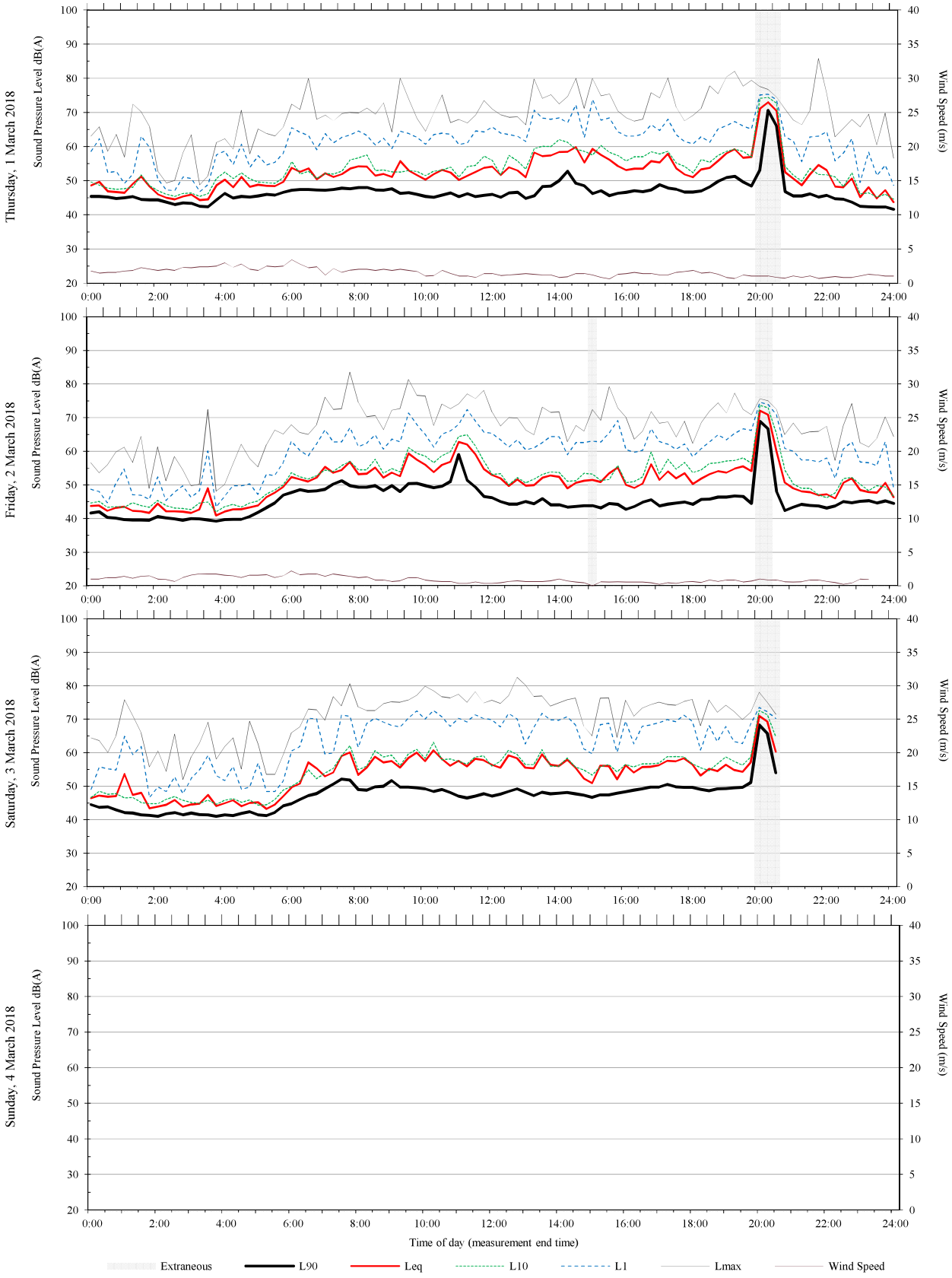
Unattended monitoring: 17 Robertson Rd (Free Field)

ARUP



Unattended monitoring: 17 Robertson Rd (Free Field)

ARUP



Appendix 2 – Program

Element	Forecast Install Date	Works Start Time	Tower Crane	Crawler Crane
Derrick (N)	15/02/21	3:00		400T x 1
Derrick (N)	20/02/21	3:00		400T x 1
Tension Ring (N)	04/03/21	4:30	TC4	
Tension Ring (N)	11/03/21	4:30	TC4	
Tension Ring (N)	18/03/21	4:30	TC4	
Derrick (S)	24/03/21	3:00		400T x 1
Tension Ring (N)	25/03/21	4:30	TC3	
Derrick (S)	30/03/21	3:00		400T x 1
Tension Ring (N)	01/04/21	4:30	TC3	
Tension Ring (S)	12/04/21	4:30	TC1	
Truss (N)	15/04/21	3:30		400T x 2
Tension Ring (S)	19/04/21	4:30	TC1	
Tension Ring (S)	26/04/21	4:30	TC1	
Tension Ring (S)	03/05/21	4:30	TC6	
Truss (N)	06/05/21	1:30		400T x 2
Tension Ring (S)	10/05/21	4:30	TC6	
Truss (S)	11/05/21	3:30		400T x 2
Diagrid (N)	21/05/21	5:30		400T x 1
Diagrid (N)	24/05/21	5:30		400T x 1
Truss (S)	26/05/21	1:30		400T x 2
Tension Ring (W)	28/05/21	4:30	TC6	
Diagrid (N)	28/05/21	5:30		400T x 1
Tension Ring (W)	01/06/21	4:30	TC6	
Diagrid (N)	02/06/21	5:30		400T x 1
Tension Ring (W)	04/06/21	4:30	TC5	
Diagrid (N)	07/06/21	5:30		400T x 1
Tension Ring (W)	08/06/21	4:30	TC5	
Diagrid (N)	09/06/21	5:30		400T x 1
Tension Ring (W)	11/06/21	4:30	TC5	
Diagrid (N)	14/06/21	5:30		400T x 1
Tension Ring (W)	15/06/21	4:30	TC4	
Diagrid (S)	21/06/21	5:30		400T x 1
Diagrid (S)	23/06/21	5:30		400T x 1
Truss (W)	26/06/21	3:30		400T x 2
Truss (W)	28/06/21	3:30		400T x 2
Diagrid (S)	28/06/21	5:30		400T x 1
Diagrid (S)	02/07/21	5:30		400T x 1
Tension Ring (E)	05/07/21	4:30	TC3	
Diagrid (S)	06/07/21	5:30		400T x 1
Tension Ring (E)	08/07/21	4:30	TC3	
Diagrid (S)	08/07/21	5:30		400T x 1
Tension Ring (E)	12/07/21	4:30	TC2	
Diagrid (S)	12/07/21	5:30		400T x 1
Tension Ring (E)	15/07/21	4:30	TC2	
Truss (W)	15/07/21	1:30		400T x 2

Truss (E)	17/07/21	3:30		400T x 2
Tension Ring (E)	19/07/21	4:30	TC2	
Tension Ring (E)	22/07/21	4:30	TC1	
Tension Ring (E)	26/07/21	4:30	TC1	
Diagrid (W)	02/08/21	5:30		400T x 1
Truss (E)	06/08/21	3:30		400T x 2
Diagrid (W)	06/08/21	5:30		400T x 1
Truss (E)	07/08/21	1:30		400T x 2
Diagrid (W)	11/08/21	5:30		400T x 1
Diagrid (W)	16/08/21	5:30		400T x 1
Diagrid (W)	20/08/21	5:30		400T x 1
Diagrid (E)	23/08/21	5:30		400T x 1
Diagrid (E)	27/08/21	5:30		400T x 1
Diagrid (W)	01/09/21	5:30		400T x 1
Diagrid (E)	06/09/21	5:30		400T x 1
Diagrid (W)	10/09/21	5:30		400T x 1
Diagrid (E)	15/09/21	5:30		400T x 1
Diagrid (W)	20/09/21	5:30		400T x 1
Diagrid (E)	24/09/21	5:30		400T x 1
Diagrid (W)	29/09/21	5:30		400T x 1
Diagrid (E)	04/10/21	5:30		400T x 1
Diagrid (E)	11/10/21	5:30		400T x 1
Diagrid (E)	15/10/21	5:30		400T x 1
Diagrid (E)	20/10/21	5:30		400T x 1

Bowl Install			
North	**South**	**West**	**East**
L1M 80%			
L1M 80%			
L1M 100%			
L1M 100%			
L1M 100%			
L1M 100%	L1M 80%		
L1M 100%	L1M 80%		
L1M 100%	L1M 80%		
L1M 100%	L1M 80%		
L1M 100%	L1M 100%		
L1M 100%	L1M 100%		
L1M 100%	L1M 100%		
L1M 100%	L1M 100%		
L1M 100%	L1M 100%		
L1M 100%	L1M 100%		
L1M 100%	L1M 100%		
L1M 100%	L1M 100%		
L1M 100%	L1M 100%		
L1M 100%	L1M 100%		
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Mid-Tier	
L1M 100%	L1M 100%	Upper-Tier	
L1M 100%	L1M 100%	Upper-Tier	
L1M 100%	L1M 100%	Upper-Tier	
L1M 100%	L1M 100%	Upper-Tier	
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier

L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Mid-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier
L1M 100%	L1M 100%	Upper-Tier	Upper-Tier

Appendix 3 – Weather Trends

Month	Rainfall	Max wind speed				9am wind speed			3pm Wind speed			Complete Loss	Partial Loss >2.5hrs	Partial Loss < 2.5hrs	Total	
		Direction	Km/h	m/s	time	Days > 10m/s	Km/h	m/s	Days > 10m/s	Km/h	m/s	Days > 10m/s					
Sep-18	2	NW	72	20.0	1223	10	15	4.2	0	21	5.8	1	2	1	8	4.5	4
Oct-18	6	SSW	70	19.4	141	13	14	3.9	0	21	5.8	0	6	0	9	8.25	8
Nov-18	3	W	85	23.6	1747	15	16	4.4	2	24	6.7	3	4	1	10	7	6
Dec-18	4	W	80	22.2	1330	15	12	3.3	0	21	5.8	1	4	1	9	6.75	6
Jan-19	1	S	83	23.1	1801	8	10	2.8	0	21	5.8	1	1	1	6	3	3
Feb-19	3	S	69	19.2	2308	10	12	3.3	0	21	5.8	0	2	0	8	4	4
Mar-19	5	W	72	20.0	1528	12	14	3.9	0	21	5.8	0	4	0	9	6.25	6
Apr-19	0	S	57	15.8	1509	6	13	3.6	0	18	5.0	0	0	0	7	1.75	2
May-19	1	S	76	21.1	1316	9	19	5.3	0	16	4.4	1	1	2	6	3.5	3
Jun-19	8	SW	74	20.6	1158	12	18	5.0	0	15	4.2	0	7	0	8	9	8
Jul-19	2	W	72	20.0	645	11	18	5.0	0	17	4.7	0	2	1	9	4.75	4
Aug-19	2	WNW	87	24.2	1018	11	19	5.3	1	22	6.1	4	3	3	6	6	5
Sep-19	3	W	91	25.3	1906	16	17	4.7	2	22	6.1	2	4	3	8	7.5	7
Oct-19	2	W	72	20.0	1631	8	13	3.6	0	22	6.1	2	0	0	0	0	0
													40	13	103		66

Daily Weather Observations for Sydney, New South Wales for September 2018
Prepared at 13:00 UTC on Sunday 13 October 2019 IDCJDW2124.201809

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/09/2018	2.2	W	48	13.3	12:01	W	13	3.6	WNW	24	6.7
02/09/2018	0.2	SSW	44	12.2	12:01	S	15	4.2	SSE	26	7.2
03/09/2018	0.2	SE	41	11.4	10:37	W	19	5.3	SSE	11	3.1
04/09/2018	11.2	SE	39	10.8	9:56	ESE	22	6.1	ESE	22	6.1
05/09/2018	0	ENE	31	8.6	11:51	WNW	9	2.5	ESE	13	3.6
06/09/2018	0.8	NNE	46	12.8	19:08	WNW	13	3.6	ENE	26	7.2
07/09/2018	4	W	59	16.4	18:01	W	13	3.6	ENE	17	4.7
08/09/2018	20	SSW	44	12.2	1:59	SSW	20	5.6	SSW	15	4.2
09/09/2018	0	W	48	13.3	11:58	W	24	6.7	WNW	13	3.6
10/09/2018	0.2	W	30	8.3	5:25	S	15	4.2	E	17	4.7
11/09/2018	0	NNE	52	14.4	18:23	W	11	3.1	NE	24	6.7
12/09/2018	0	NE	39	10.8	12:54	NNE	15	4.2	ESE	11	3.1
13/09/2018	0	SSE	41	11.4	0:08	SSW	13	3.6	SE	19	5.3
14/09/2018	0	NNE	44	12.2	17:25	N	9	2.5	NE	17	4.7
15/09/2018	0	WSW	69	19.2	21:03	ESE	13	3.6	NW	35	9.7
16/09/2018	0	W	65	18.1	3:29	W	24	6.7	SSE	31	8.6
17/09/2018	0	NE	37	10.3	19:12	WNW	17	4.7	E	24	6.7
18/09/2018	0	NE	44	12.2	15:04	SW	2	0.6	NE	30	8.3
19/09/2018	0	NW	72	20.0	12:23	W	20	5.6	NW	44	12.2
20/09/2018	5.6	SSW	35	9.7	3:14	W	19	5.3	SE	17	4.7
21/09/2018	0	ENE	30	8.3	16:17	W	13	3.6	E	22	6.1
22/09/2018	0	NNE	33	9.2	18:12	W	0	0.0	E	17	4.7
23/09/2018	0	SSE	54	15.0	22:34	SSW	20	5.6	SSE	30	8.3
24/09/2018	0.4	SSW	50	13.9	2:26	SSW	20	5.6	SSE	26	7.2
25/09/2018	0.8	ENE	30	8.3	17:06	NE	2	0.6	ENE	17	4.7
26/09/2018	3.6			0.0		N	33	9.2	SE	17	4.7
27/09/2018	1	NE	44	12.2	16:36	W	17	4.7	NE	28	7.8
28/09/2018	0			0.0		ESE	6	1.7	NE	22	6.1
29/09/2018	0.8			0.0				0.0			0.0
30/09/2018	0			0.0				0.0			0.0

Daily Weather Observations for Sydney, New South Wales for October 2018
Prepared at 13:00 UTC on Saturday 12 October 2019 IDCJDW2124.201810

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/10/2018	0			0.0				0.0			0.0
02/10/2018	0			0.0				0.0			0.0
03/10/2018	0			0.0				0.0			0.0
04/10/2018	2.2			0.0				0.0			0.0
05/10/2018	44.4			0.0				0.0			0.0
06/10/2018	29.4			0.0				0.0			0.0
07/10/2018	2.2			0.0				0.0			0.0
08/10/2018	13.8			0.0				0.0			0.0
09/10/2018	2.2			0.0				0.0			0.0
10/10/2018	0			0.0				0.0			0.0
11/10/2018	13.4			0.0				0.0			0.0
12/10/2018	7.6			0.0				0.0	SSE	24	6.7
13/10/2018	4.8	E	54	15.0	17:06	WNW	9	2.5	E	24	6.7
14/10/2018	12.6	E	59	16.4	17:07	E	30	8.3	E	24	6.7
15/10/2018	6.8	ENE	52	14.4	11:04	N	2	0.6	ENE	26	7.2
16/10/2018	4.6	NE	50	13.9	11:57	NE	19	5.3	NE	28	7.8
17/10/2018	0.4			0.0		NNE	4	1.1	NE	20	5.6
18/10/2018	5.2	NNE	44	12.2	17:24	W	9	2.5	NE	20	5.6
19/10/2018	2.2	NE	46	12.8	17:28	W	9	2.5	ENE	13	3.6
20/10/2018	0	W	57	15.8	16:55	E	13	3.6	ENE	6	1.7
21/10/2018	12.6	S	52	14.4	5:24	SSW	24	6.7	SSE	24	6.7
22/10/2018	0	ENE	37	10.3	14:25	WNW	0	0.0	ENE	26	7.2
23/10/2018	0	NE	39	10.8	16:41	ESE	9	2.5	E	17	4.7
24/10/2018	0	SSW	70	19.4	1:41	SSW	30	8.3	SSE	31	8.6
25/10/2018	0	ENE	31	8.6	15:42	W	13	3.6	E	19	5.3
26/10/2018	0	SSW	44	12.2	8:27	SSW	22	6.1	SE	24	6.7
27/10/2018	0	NNE	44	12.2	16:40	W	9	2.5	NE	22	6.1
28/10/2018	3.2	SSE	57	15.8	8:48	S	30	8.3	SSE	22	6.1
29/10/2018	0	E	24	6.7	11:58	N	9	2.5	E	19	5.3
30/10/2018	0	NE	43	11.9	14:30	N	20	5.6	NE	24	6.7
31/10/2018	0	ESE	31	8.6	15:35	SSW	7	1.9	E	19	5.3

Daily Weather Observations for Sydney, New South Wales for November 2018
Prepared at 13:00 UTC on Friday 11 October 2019 IDCJDW2124.201811

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/11/2018	0	ENE	35	9.7	16:00	ESE	7	1.9	ENE	24	6.7
02/11/2018	0	NNW	67	18.6	11:48	NW	30	8.3	NNW	24	6.7
03/11/2018	5	W	50	13.9	10:37	WNW	13	3.6	ESE	17	4.7
04/11/2018	0	NE	44	12.2	13:51	E	9	2.5	NE	30	8.3
05/11/2018	0	E	22	6.1	11:14	W	11	3.1	E	11	3.1
06/11/2018	0	W	35	9.7	7:12	SSE	4	1.1	ESE	13	3.6
07/11/2018	0.2	SW	63	17.5	19:40	SSE	13	3.6	E	4	1.1
08/11/2018	21.8	W	46	12.8	0:12	SSW	22	6.1	SE	28	7.8
09/11/2018	0	NNE	46	12.8	20:19	W	9	2.5	NE	22	6.1
10/11/2018	0	S	39	10.8	8:47	S	17	4.7	ESE	26	7.2
11/11/2018	0	E	37	10.3	15:50	W	7	1.9	E	28	7.8
12/11/2018	0	E	31	8.6	14:30	E	7	1.9	ENE	24	6.7
13/11/2018	0	NE	54	15.0	14:49	NE	17	4.7	NE	33	9.2
14/11/2018	0	NE	31	8.6	23:02	NNE	4	1.1	NE	13	3.6
15/11/2018	0.2	SSE	52	14.4	13:09	S	22	6.1	SSE	28	7.8
16/11/2018	2.2	SSW	37	10.3	6:14	SSW	17	4.7	ESE	17	4.7
17/11/2018	0	SE	48	13.3	14:33	SSW	17	4.7	SSE	26	7.2
18/11/2018	2.6	SSE	39	10.8	2:10	SE	19	5.3	ESE	24	6.7
19/11/2018	0	E	35	9.7	14:17	WNW	9	2.5	E	26	7.2
20/11/2018	0	NNE	54	15.0	17:28	ENE	9	2.5	NE	28	7.8
21/11/2018	0	W	85	23.6	17:47	N	9	2.5	N	11	3.1
22/11/2018	8	W	74	20.6	11:18	NW	0	0.0	WNW	37	10.3
23/11/2018	0	WNW	78	21.7	9:45	W	48	13.3	WNW	41	11.4
24/11/2018	0.2	WSW	63	17.5	0:02	W	28	7.8	E	17	4.7
25/11/2018	0	SSW	46	12.8	20:44	W	15	4.2	ESE	26	7.2
26/11/2018	0	SW	50	13.9	10:12	SSW	26	7.2	S	31	8.6
27/11/2018	0	ENE	39	10.8	16:44	N	6	1.7	E	26	7.2
28/11/2018	105.6	E	72	20.0	9:20	E	37	10.3	SE	41	11.4
29/11/2018	30.2	SW	61	16.9	12:22	SSW	24	6.7	S	30	8.3
30/11/2018	0.2	W	28	7.8	1:06	S	11	3.1	E	17	4.7

Daily Weather Observations for Sydney, New South Wales for December 2018
Prepared at 13:00 UTC on Thursday 10 October 2019 IDCJDW2124.201812

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust
01/12/2018	0	NNE	44	12.2	19:43
02/12/2018	0	W	80	22.2	13:30
03/12/2018	0	WSW	35	9.7	22:35
04/12/2018	0	ESE	39	10.8	14:00
05/12/2018	0	E	28	7.8	15:41
06/12/2018	1.2	ENE	46	12.8	14:23
07/12/2018	0	NE	54	15.0	16:37
08/12/2018	0	NE	57	15.8	16:24
09/12/2018	0	ENE	46	12.8	14:32
10/12/2018	0	S	43	11.9	18:06
11/12/2018	0	S	26	7.2	23:37
12/12/2018	0	NE	35	9.7	16:30
13/12/2018	0.6	WSW	59	16.4	19:10
14/12/2018	17.2	SSE	30	8.3	17:52
15/12/2018	14.2	NNW	59	16.4	16:27
16/12/2018	6.6	NNE	65	18.1	16:57
17/12/2018	0.2	SSE	37	10.3	22:56
18/12/2018	0	SSE	43	11.9	18:00
19/12/2018	0.2	ENE	39	10.8	20:03
20/12/2018	13.8	SW	54	15.0	17:08
21/12/2018	28.4	SSW	46	12.8	0:35
22/12/2018	4.6	SSW	67	18.6	3:32
23/12/2018	7.8	SW	41	11.4	0:22
24/12/2018	0.2	ENE	39	10.8	16:07
25/12/2018	0	NE	31	8.6	18:54
26/12/2018	0	ENE	37	10.3	15:08
27/12/2018	0	ENE	33	9.2	16:24
28/12/2018	0	NNE	43	11.9	16:42
29/12/2018	0	ESE	50	13.9	17:18
30/12/2018	0	E	26	7.2	12:41
31/12/2018	0	SSE	39	10.8	17:31

9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
WNW	6	1.7	ENE	22	6.1
ENE	2	0.6	WNW	37	10.3
WNW	11	3.1	ENE	24	6.7
ESE	24	6.7	ESE	28	7.8
ESE	17	4.7	ENE	15	4.2
SE	4	1.1	NE	28	7.8
NE	19	5.3	NE	30	8.3
NE	13	3.6	NE	28	7.8
ENE	13	3.6	ENE	24	6.7
SE	19	5.3	NE	7	1.9
SSE	17	4.7	ESE	13	3.6
E	9	2.5	ENE	17	4.7
NNE	17	4.7	NE	31	8.6
SE	2	0.6	S	15	4.2
N	4	1.1	E	20	5.6
ENE	7	1.9	NE	26	7.2
WNW	9	2.5	E	22	6.1
SSW	19	5.3	S	19	5.3
SSE	11	3.1	ESE	11	3.1
ENE	6	1.7	E	17	4.7
SSW	20	5.6	SSE	22	6.1
SW	0	0.0	S	24	6.7
SW	17	4.7	SE	22	6.1
WNW	13	3.6	ENE	30	8.3
ESE	7	1.9	E	20	5.6
E	13	3.6	ENE	20	5.6
E	13	3.6	E	19	5.3
ENE	13	3.6	NE	17	4.7
ENE	7	1.9	E	15	4.2
WNW	7	1.9	ESE	17	4.7
WNW	11	3.1	E	22	6.1

Daily Weather Observations for Sydney, New South Wales for January 2019
Prepared at 13:00 UTC on Wednesday 9 October 2019 IDCJDW2124.201901

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/01/2019	8.8	W	31	8.6	1:31	ENE	15	4.2	ESE	13	3.6
02/01/2019	0	E	30	8.3	13:06	S	11	3.1	ENE	24	6.7
03/01/2019	0	NNE	39	10.8	18:25	SSW	13	3.6	E	15	4.2
04/01/2019	0	E	31	8.6	11:32	ENE	7	1.9	ENE	17	4.7
05/01/2019	0	SSE	65	18.1	16:36	ESE	4	1.1	S	31	8.6
06/01/2019	26.2	SSW	44	12.2	4:07	SSW	19	5.3	S	19	5.3
07/01/2019	0	S	22	6.1	5:52	SE	13	3.6	ESE	15	4.2
08/01/2019	0.6	SSW	46	12.8	20:06	E	11	3.1	ENE	26	7.2
09/01/2019	4.8	SSE	54	15.0	14:31	WNW	17	4.7	SE	35	9.7
10/01/2019	0	SSW	39	10.8	6:51	SSW	22	6.1	SSE	22	6.1
11/01/2019	0.8	ENE	31	8.6	16:00	S	4	1.1	ENE	15	4.2
12/01/2019	3.8	ENE	28	7.8	14:19	ENE	11	3.1	NE	15	4.2
13/01/2019	0	SSW	48	13.3	8:13	S	22	6.1	SSE	26	7.2
14/01/2019	0	NE	46	12.8	17:46	W	4	1.1	NE	26	7.2
15/01/2019	0	NNE	50	13.9	18:21	NE	13	3.6	ENE	24	6.7
16/01/2019	0	E	26	7.2	16:14	ENE	4	1.1	E	19	5.3
17/01/2019	0	NE	41	11.4	18:54	N	4	1.1	ENE	24	6.7
18/01/2019	0	S	56	15.6	22:41	ENE	24	6.7	E	22	6.1
19/01/2019	0	S	54	15.0	10:47	ESE	6	1.7	SSE	31	8.6
20/01/2019	0	SSW	22	6.1	6:05	S	9	2.5	E	15	4.2
21/01/2019	0.4	NNE	31	8.6	20:58	WNW	2	0.6	ENE	9	2.5
22/01/2019	0.2	NE	37	10.3	16:47	W	0	0.0	ENE	19	5.3
23/01/2019	0.4	SSW	72	20.0	14:46	NNW	4	1.1	SSW	41	11.4
24/01/2019	0	SSW	46	12.8	0:28	SW	15	4.2	S	15	4.2
25/01/2019	0	NNE	46	12.8	17:09	NE	7	1.9	NE	19	5.3
26/01/2019	0	S	35	9.7	22:36	N	6	1.7	SE	17	4.7
27/01/2019	0			0.0		WNW	17	4.7	S	28	7.8
28/01/2019	2.8	SSW	35	9.7	5:16	S	13	3.6	SSE	24	6.7
29/01/2019	0	ENE	52	14.4	23:29	E	13	3.6	NE	19	5.3
30/01/2019	0	NE	39	10.8	20:17	ENE	2	0.6	ENE	13	3.6
31/01/2019	0	S	83	23.1	18:01	ESE	7	1.9	N	17	4.7

Daily Weather Observations for Sydney, New South Wales for February 2019
Prepared at 13:00 UTC on Tuesday 8 October 2019 IDCJDW2124.201902

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/02/2019	2.8	S	46	12.8	23:54	SSW	19	5.3	SSW	20	5.6
02/02/2019	23	ESE	31	8.6	10:53	E	13	3.6	E	19	5.3
03/02/2019	0	NE	46	12.8	16:45	ESE	7	1.9	NE	26	7.2
04/02/2019	0.2	E	26	7.2	12:37	E	6	1.7	E	22	6.1
05/02/2019	0	SSW	43	11.9	1:00	S	22	6.1	E	11	3.1
06/02/2019	1.8	ENE	33	9.2	18:01	E	11	3.1	E	20	5.6
07/02/2019	0	NNE	44	12.2	17:40	NE	13	3.6	E	31	8.6
08/02/2019	0	WSW	57	15.8	18:34	SW	2	0.6	NE	22	6.1
09/02/2019	17.2	W	65	18.1	16:30	WNW	4	1.1	E	11	3.1
10/02/2019	0.2	ESE	39	10.8	12:24	SSW	6	1.7	ESE	20	5.6
11/02/2019	0	NNE	48	13.3	19:34	WNW	11	3.1	ENE	15	4.2
12/02/2019	0	NW	61	16.9	16:12	WNW	13	3.6	WNW	24	6.7
13/02/2019	0	S	69	19.2	23:08	SSW	20	5.6	SE	28	7.8
14/02/2019	0	ENE	31	8.6	17:54	SW	13	3.6	E	13	3.6
15/02/2019	0	E	26	7.2	12:23	WNW	9	2.5	E	19	5.3
16/02/2019	0	NNE	33	9.2	22:18	WNW	9	2.5	E	24	6.7
17/02/2019	0	NNE	44	12.2	20:42	N	9	2.5	NE	22	6.1
18/02/2019	0	NNE	56	15.6	17:49	SE	4	1.1	NE	15	4.2
19/02/2019	0	SSE	61	16.9	13:28	WSW	15	4.2	S	33	9.2
20/02/2019	7.8	SSW	39	10.8	12:59	SSW	19	5.3	SSW	22	6.1
21/02/2019	5	ESE	44	12.2	1:17	SSW	19	5.3	S	20	5.6
22/02/2019	4.4	SSW	46	12.8	10:41	SSW	0	0.0	S	28	7.8
23/02/2019	6.6	SE	46	12.8	22:57	SSW	22	6.1	SSW	22	6.1
24/02/2019	16	SSE	54	15.0	23:19	SSE	20	5.6	SSE	31	8.6
25/02/2019	0.4	SE	35	9.7	23:20	ESE	2	0.6	ENE	19	5.3
26/02/2019	0	NE	37	10.3	15:41	WNW	15	4.2	NE	22	6.1
27/02/2019	0	SSW	44	12.2	12:50	SSW	17	4.7	S	24	6.7
28/02/2019	0	ENE	33	9.2	16:02	WNW	13	3.6	ENE	22	6.1

Daily Weather Observations for Sydney, New South Wales for March 2019
Prepared at 16:00 UTC on Monday 7 October 2019 IDCJDW2124.201903

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/03/2019	0	E	46	12.8	16:16	WNW	7	1.9	E	20	5.6
02/03/2019	6.8	NNE	39	10.8	23:31	WNW	4	1.1	E	24	6.7
03/03/2019	0	ENE	41	11.4	17:23	NNW	9	2.5	E	28	7.8
04/03/2019	0	NE	48	13.3	19:34	NNE	17	4.7	ENE	28	7.8
05/03/2019	0	NNE	48	13.3	16:48	NNE	6	1.7	ENE	22	6.1
06/03/2019	0	SW	59	16.4	13:26	WNW	6	1.7	S	19	5.3
07/03/2019	1.4	SSW	43	11.9	9:42	SW	20	5.6	SE	19	5.3
08/03/2019	0	NE	46	12.8	16:37	N	11	3.1	NE	28	7.8
09/03/2019	0	SSW	46	12.8	7:32	SSW	24	6.7	S	13	3.6
10/03/2019	0.8	NNE	35	9.7	16:42	W	9	2.5	ENE	22	6.1
11/03/2019	0	SSW	37	10.3	5:44	SW	22	6.1	ESE	22	6.1
12/03/2019	0	SSE	61	16.9	20:37	W	15	4.2	E	20	5.6
13/03/2019	14.6	SSE	44	12.2	23:10	SE	19	5.3	ESE	15	4.2
14/03/2019	5.8	SSE	61	16.9	19:31	NNE	19	5.3	NE	31	8.6
15/03/2019	8.6	S	54	15.0	13:23	W	17	4.7	SSW	33	9.2
16/03/2019	16	ESE	56	15.6	1:30	ESE	24	6.7	SE	22	6.1
17/03/2019	43.4			0.0		SW	20	5.6	W	20	5.6
18/03/2019	75.2	NW	33	9.2	8:23	WNW	9	2.5	E	7	1.9
19/03/2019	4.6	ESE	33	9.2	12:14	WNW	15	4.2	SSE	20	5.6
20/03/2019	5.8	S	35	9.7	11:20	W	17	4.7	SSE	17	4.7
21/03/2019	0	SSE	33	9.2	14:32	W	7	1.9	SE	20	5.6
22/03/2019	8.4	ESE	26	7.2	18:32	WNW	0	0.0	ESE	15	4.2
23/03/2019	2	ENE	28	7.8	14:22	WNW	17	4.7	NE	19	5.3
24/03/2019	0.4	SE	37	10.3	11:48	W	17	4.7	SSE	19	5.3
25/03/2019	3.8	W	48	13.3	6:00	NW	17	4.7	N	22	6.1
26/03/2019	0.6	W	52	14.4	13:18	WSW	31	8.6	W	24	6.7
27/03/2019	0	ENE	31	8.6	21:20	WNW	11	3.1	SSE	11	3.1
28/03/2019	0	E	33	9.2	15:00	WNW	17	4.7	ENE	24	6.7
29/03/2019	0	NNE	44	12.2	17:06	W	11	3.1	ENE	20	5.6
30/03/2019	30.8	W	72	20.0	15:28	N	4	1.1	WNW	35	9.7
31/03/2019	0.2	WSW	54	15.0	10:14	W	28	7.8	W	24	6.7

Daily Weather Observations for Sydney, New South Wales for April 2019
Prepared at 13:00 UTC on Sunday 20 October 2019 IDCJDW2124.201904

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/04/2019	0	SSE	43	11.9	12:37	WNW	20	5.6	SSE	26	7.2
02/04/2019	0	ESE	30	8.3	23:22	WNW	20	5.6	ESE	22	6.1
03/04/2019	2.8	ENE	30	8.3	16:24	WNW	15	4.2	E	20	5.6
04/04/2019	0	ESE	43	11.9	12:42	WNW	17	4.7	ESE	19	5.3
05/04/2019	3	SSE	39	10.8	3:10	WSW	7	1.9	SSE	9	2.5
06/04/2019	4.8	E	30	8.3	14:29	NNW	4	1.1	E	20	5.6
07/04/2019	0.2	SSW	31	8.6	0:34	NW	9	2.5	ENE	17	4.7
08/04/2019	0	W	43	11.9	15:39	WNW	15	4.2	E	19	5.3
09/04/2019	0	S	57	15.8	15:09	WNW	13	3.6	S	28	7.8
10/04/2019	0	S	43	11.9	8:29	S	24	6.7	SSE	24	6.7
11/04/2019	0	S	28	7.8	11:35	W	17	4.7	SSE	15	4.2
12/04/2019	0	W	20	5.6	2:33	WNW	11	3.1	E	9	2.5
13/04/2019	0	E	26	7.2	14:05	NW	13	3.6	E	20	5.6
14/04/2019	0	SSW	44	12.2	10:54	WNW	17	4.7	SSE	20	5.6
15/04/2019	0	SE	31	8.6	12:25	WNW	17	4.7	SSE	20	5.6
16/04/2019	0	WNW	26	7.2	8:20	WNW	15	4.2	ESE	20	5.6
17/04/2019	0	E	22	6.1	15:01	WNW	15	4.2	E	17	4.7
18/04/2019	0	NE	28	7.8	15:56	W	17	4.7	E	19	5.3
19/04/2019	0	S	24	6.7	0:17	W	9	2.5	ESE	15	4.2
20/04/2019	0	ENE	26	7.2	23:27	WNW	9	2.5	ESE	13	3.6
21/04/2019	0	ENE	31	8.6	12:02	NW	4	1.1	ENE	20	5.6
22/04/2019	0	NE	33	9.2	16:15		0	0.0	ENE	20	5.6
23/04/2019	0.2	ESE	28	7.8	10:50	SSE	4	1.1	ESE	15	4.2
24/04/2019	0	ENE	31	8.6	16:14	WNW	11	3.1	NE	19	5.3
25/04/2019	0	WNW	24	6.7	8:34	WNW	17	4.7	ESE	15	4.2
26/04/2019	0	SW	52	14.4	19:17	W	11	3.1	WNW	26	7.2
27/04/2019	0.2	S	41	11.4	8:53	SSW	20	5.6	ESE	19	5.3
28/04/2019	0	W	35	9.7	9:09	W	24	6.7	ESE	11	3.1
29/04/2019	0	W	28	7.8	6:28	WNW	19	5.3	SSE	13	3.6
30/04/2019	0	NNE	41	11.4	22:49	WNW	9	2.5	NE	19	5.3

Daily Weather Observations for Sydney, New South Wales for May 2019
Prepared at 13:00 UTC on Saturday 19 October 2019 IDCJDW2124.201905

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/05/2019	0	NE	35	9.7	18:35	W	2	0.6	ENE	11	3.1
02/05/2019	0	NNE	33	9.2	15:18	WNW	9	2.5	NE	19	5.3
03/05/2019	0	N	31	8.6	11:59	NNE	13	3.6	NNE	6	1.7
04/05/2019	10.8	SW	39	10.8	9:16	SSW	20	5.6	SSE	22	6.1
05/05/2019	0	S	76	21.1	13:16	W	24	6.7	SW	24	6.7
06/05/2019	3.8	W	41	11.4	6:33	W	24	6.7	SE	11	3.1
07/05/2019	0	W	28	7.8	7:57	W	24	6.7	WNW	6	1.7
08/05/2019	0	WSW	52	14.4	13:41	WNW	28	7.8	W	33	9.2
09/05/2019	0	NNE	35	9.7	19:59	W	17	4.7	ENE	22	6.1
10/05/2019	0	NNW	46	12.8	15:12	NE	6	1.7	NW	24	6.7
11/05/2019	0	W	59	16.4	9:54	W	31	8.6	SSW	20	5.6
12/05/2019	0	W	37	10.3	8:03	W	28	7.8	SE	11	3.1
13/05/2019	0	NNE	31	8.6	18:20	W	17	4.7	NE	17	4.7
14/05/2019	0	S	33	9.2	13:58	W	19	5.3	SSE	19	5.3
15/05/2019	0	W	26	7.2	5:51	W	19	5.3	ENE	13	3.6
16/05/2019	0	NE	28	7.8	13:14	WNW	17	4.7	ENE	17	4.7
17/05/2019	0	W	24	6.7	6:33	W	19	5.3	ENE	17	4.7
18/05/2019	0	W	26	7.2	9:19	WNW	20	5.6	ESE	13	3.6
19/05/2019	0	ENE	24	6.7	17:54	WNW	13	3.6	E	15	4.2
20/05/2019	0	W	20	5.6	3:34	WNW	15	4.2	E	9	2.5
21/05/2019	0	W	31	8.6	9:21	W	24	6.7	E	15	4.2
22/05/2019	0	W	24	6.7	2:01	WNW	0	0.0	SE	15	4.2
23/05/2019	0	WNW	24	6.7	7:34	WNW	19	5.3	E	11	3.1
24/05/2019	0	WNW	26	7.2	9:01	WNW	20	5.6	E	7	1.9
25/05/2019	0	W	26	7.2	2:32	W	17	4.7	E	7	1.9
26/05/2019	0	NNW	35	9.7	4:26	W	17	4.7	W	13	3.6
27/05/2019	0	WSW	72	20.0	13:46	NW	20	5.6	W	37	10.3
28/05/2019	0	NW	56	15.6	22:43	NW	19	5.3	NW	22	6.1
29/05/2019	0	WNW	65	18.1	13:30	NNW	30	8.3	WNW	37	10.3
30/05/2019	0	W	54	15.0	0:56	W	30	8.3	SW	13	3.6
31/05/2019	0	W	43	11.9	19:46	W	26	7.2	S	19	5.3

Daily Weather Observations for Sydney, New South Wales for June 2019
Prepared at 13:00 UTC on Friday 18 October 2019 IDCJDW2124.201906

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/06/2019	0	SSW	44	12.2	14:19	W	24	6.7	S	26	7.2
02/06/2019	0	W	30	8.3	6:36	WNW	22	6.1	SSW	6	1.7
03/06/2019	0	W	48	13.3	16:46	W	13	3.6	W	11	3.1
04/06/2019	18.2	SW	74	20.6	11:58	W	31	8.6	SW	30	8.3
05/06/2019	11.6	SW	52	14.4	7:54	W	20	5.6	SSW	15	4.2
06/06/2019	12.8	SSW	33	9.2	15:29	W	20	5.6	SSW	17	4.7
07/06/2019	0.2	W	30	8.3	5:40	NW	13	3.6	W	6	1.7
08/06/2019	4.2	W	24	6.7	6:10	W	17	4.7	W	6	1.7
09/06/2019	0			0.0		W	20	5.6	W	4	1.1
10/06/2019	0			0.0				0.0			0.0
11/06/2019	0			0.0				0.0			0.0
12/06/2019	0			0.0				0.0	NNE	11	3.1
13/06/2019	0	NNW	33	9.2	7:21	NNW	24	6.7	W	13	3.6
14/06/2019	0	W	37	10.3	8:43	W	28	7.8	NW	11	3.1
15/06/2019	0	W	31	8.6	8:53	W	22	6.1	SSE	13	3.6
16/06/2019	22.4	W	26	7.2	2:34	NNW	13	3.6	SSE	9	2.5
17/06/2019	4	SW	41	11.4	15:34	WSW	13	3.6	SW	22	6.1
18/06/2019	33.6	WSW	31	8.6	22:10	W	15	4.2	SW	6	1.7
19/06/2019	0.2	S	39	10.8	13:15	W	24	6.7	S	20	5.6
20/06/2019	0	W	30	8.3	3:28	W	22	6.1	SSE	13	3.6
21/06/2019	0	W	44	12.2	8:18	W	30	8.3	SSW	19	5.3
22/06/2019	0	SSW	48	13.3	12:44	W	0	0.0	SSW	20	5.6
23/06/2019	2	SSW	48	13.3	18:02	W	20	5.6	SSW	24	6.7
24/06/2019	34.2	SSE	46	12.8	12:15	WNW	13	3.6	SSE	13	3.6
25/06/2019	11.2	SSE	30	8.3	12:26	WNW	13	3.6	SSE	15	4.2
26/06/2019	14	SSE	33	9.2	12:09	WNW	7	1.9	SSE	19	5.3
27/06/2019	2.6	WNW	24	6.7	2:00	WNW	15	4.2	ESE	9	2.5
28/06/2019	0.2	NNE	33	9.2	12:43	W	17	4.7	ENE	17	4.7
29/06/2019	0	NE	46	12.8	15:59	WNW	17	4.7	NE	28	7.8
30/06/2019	0	WSW	46	12.8	3:16	SSW	9	2.5	WNW	20	5.6

Daily Weather Observations for Sydney, New South Wales for July 2019
Prepared at 13:00 UTC on Thursday 17 October 2019 IDCJDW2124.201907

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/07/2019	0	W	35	9.7	0:02	W	19	5.3	E	9	2.5
02/07/2019	0	WNW	28	7.8	0:00	W	19	5.3	WNW	11	3.1
03/07/2019	0	SSE	33	9.2	14:13	WNW	17	4.7	SE	20	5.6
04/07/2019	1.4	ESE	41	11.4	15:21	SSW	13	3.6	ESE	24	6.7
05/07/2019	22.8	SE	33	9.2	1:04	ESE	24	6.7	SSE	11	3.1
06/07/2019	2.6	E	30	8.3	0:26	W	17	4.7	E	13	3.6
07/07/2019	1	W	26	7.2	9:36	W	17	4.7	E	11	3.1
08/07/2019	0	NW	31	8.6	11:27	W	15	4.2	W	11	3.1
09/07/2019	0.2	W	37	10.3	2:31	W	15	4.2	NW	11	3.1
10/07/2019	0	NW	50	13.9	23:24	WNW	19	5.3	WNW	7	1.9
11/07/2019	0	WNW	56	15.6	9:17	WNW	33	9.2	WNW	28	7.8
12/07/2019	0	NW	59	16.4	14:35	NNW	35	9.7	NW	37	10.3
13/07/2019	0	W	72	20.0	6:45	W	28	7.8	W	33	9.2
14/07/2019	0	W	48	13.3	11:18	W	13	3.6	WNW	24	6.7
15/07/2019	0	W	52	14.4	10:06	W	24	6.7	WSW	20	5.6
16/07/2019	0	WSW	46	12.8	18:05	W	22	6.1	WSW	24	6.7
17/07/2019	0	WSW	61	16.9	21:04	W	22	6.1	NW	17	4.7
18/07/2019	0	W	41	11.4	10:12	WNW	13	3.6	ESE	17	4.7
19/07/2019	0	WSW	41	11.4	10:36	W	24	6.7	ESE	13	3.6
20/07/2019	0	N	28	7.8	12:51	W	15	4.2	ENE	17	4.7
21/07/2019	0	N	30	8.3	9:58	NNE	6	1.7	E	15	4.2
22/07/2019	0	N	26	7.2	14:05	W	0	0.0	N	15	4.2
23/07/2019	0	WNW	35	9.7	12:24	W	11	3.1	NNW	20	5.6
24/07/2019	0	W	39	10.8	11:02	WSW	11	3.1	W	19	5.3
25/07/2019	0	W	31	8.6	3:11	W	17	4.7	ENE	17	4.7
26/07/2019	0	SSW	26	7.2	20:35	WNW	17	4.7	WNW	9	2.5
27/07/2019	0	SW	30	8.3	11:34	WNW	20	5.6	S	15	4.2
28/07/2019	0	WNW	28	7.8	6:14	WNW	22	6.1	SSE	15	4.2
29/07/2019	0	W	28	7.8	2:51	WNW	19	5.3	NNW	4	1.1
30/07/2019	4.2	SW	48	13.3	11:32	NW	13	3.6	SSW	20	5.6
31/07/2019	11.2	SSW	41	11.4	13:18	W	24	6.7	SSW	24	6.7

Daily Weather Observations for Sydney, New South Wales for August 2019
Prepared at 16:00 UTC on Wednesday 16 October 2019 IDCJDW2124.201908

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/08/2019	2.8	WNW	28	7.8	7:53	W	20	5.6	E	11	3.1
02/08/2019	0.2	WNW	28	7.8	2:37	W	17	4.7	NE	4	1.1
03/08/2019	0	SE	30	8.3	15:54	WNW	17	4.7	ESE	20	5.6
04/08/2019	0	W	35	9.7	3:17	W	24	6.7	SE	15	4.2
05/08/2019	0	ENE	28	7.8	14:43	WNW	17	4.7	NE	19	5.3
06/08/2019	0	WNW	26	7.2	2:41	WNW	19	5.3	ENE	13	3.6
07/08/2019	0	ENE	30	8.3	15:44	ESE	4	1.1	ENE	20	5.6
08/08/2019	0	W	74	20.6	13:53	NNW	22	6.1	W	43	11.9
09/08/2019	0	WNW	87	24.2	10:18	WNW	33	9.2	WNW	37	10.3
10/08/2019	0	W	69	19.2	11:06	NW	33	9.2	W	30	8.3
11/08/2019	0	NW	56	15.6	9:12	NW	30	8.3	WSW	30	8.3
12/08/2019	0.2	W	44	12.2	1:29	W	28	7.8	SSW	20	5.6
13/08/2019	0	W	31	8.6	8:29	W	22	6.1	E	13	3.6
14/08/2019	0	W	30	8.3	8:15	WNW	20	5.6	E	15	4.2
15/08/2019	0	W	28	7.8	4:15	WNW	13	3.6	ENE	20	5.6
16/08/2019	0	W	26	7.2	3:49	W	17	4.7	E	19	5.3
17/08/2019	0	SSE	39	10.8	11:30	W	17	4.7	SSE	22	6.1
18/08/2019	0	WSW	54	15.0	22:45	WNW	9	2.5	NE	28	7.8
19/08/2019	0	W	69	19.2	12:58	WNW	20	5.6	W	48	13.3
20/08/2019	0	W	57	15.8	16:37	W	24	6.7	W	31	8.6
21/08/2019	0	W	67	18.6	17:54	WNW	11	3.1	WSW	39	10.8
22/08/2019	0	W	78	21.7	8:03	W	0	0.0	S	31	8.6
23/08/2019	0	W	35	9.7	4:45	W	26	7.2	ENE	17	4.7
24/08/2019	0	W	30	8.3	12:53	WNW	9	2.5	WNW	17	4.7
25/08/2019	0	SE	43	11.9	13:43	WNW	15	4.2	SSE	28	7.8
26/08/2019	0	ESE	35	9.7	20:29	SSW	17	4.7	SSE	13	3.6
27/08/2019	3.8	SSE	35	9.7	13:16	SSE	13	3.6	SSW	15	4.2
28/08/2019	0.4	WSW	30	8.3	23:57	WNW	15	4.2	ENE	20	5.6
29/08/2019	0.2	SSE	57	15.8	22:49	SSW	30	8.3	S	20	5.6
30/08/2019	43	SSE	56	15.6	12:07	S	22	6.1	SSE	24	6.7
31/08/2019	22.4	SSE	41	11.4	2:00	SSW	15	4.2	SSW	20	5.6

Daily Weather Observations for Sydney, New South Wales for September 2019
Prepared at 13:00 UTC on Monday 21 October 2019 IDCJDW2124.201909

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/09/2019	0	NNE	31	8.6	18:43	WNW	20	5.6	ENE	19	5.3
02/09/2019	0	SSE	48	13.3	13:36	WNW	24	6.7	S	28	7.8
03/09/2019	0	WNW	26	7.2	7:16	WNW	17	4.7	ENE	19	5.3
04/09/2019	0	W	44	12.2	18:12	W	15	4.2	E	7	1.9
05/09/2019	0	S	30	8.3	3:59	WNW	13	3.6	E	17	4.7
06/09/2019	0	W	91	25.3	19:06	NNE	24	6.7	NE	11	3.1
07/09/2019	0.2	W	74	20.6	10:17	WNW	35	9.7	W	41	11.4
08/09/2019	0.2	W	67	18.6	8:20	W	43	11.9	W	24	6.7
09/09/2019	0	W	57	15.8	11:02	W	37	10.3	S	28	7.8
10/09/2019	0.2	SSE	54	15.0	11:22	S	6	1.7	S	28	7.8
11/09/2019	0	W	28	7.8	8:02	WNW	13	3.6	E	19	5.3
12/09/2019	0	WNW	33	9.2	15:14	W	13	3.6	WNW	17	4.7
13/09/2019	0	S	35	9.7	3:10	SE	20	5.6	E	17	4.7
14/09/2019	0	SW	37	10.3	6:59	SSW	15	4.2	ESE	20	5.6
15/09/2019	0	NNE	28	7.8	16:08	WNW	17	4.7	ENE	13	3.6
16/09/2019	0	SSE	74	20.6	14:53	W	7	1.9	S	50	13.9
17/09/2019	19.2	SE	67	18.6	18:33	SSW	20	5.6	SE	28	7.8
18/09/2019	65.6	SSE	57	15.8	9:58	SSE	35	9.7	SE	13	3.6
19/09/2019	27	ENE	35	9.7	17:01	SE	2	0.6	E	22	6.1
20/09/2019	0.2	ENE	46	12.8	11:16	NE	19	5.3	NE	22	6.1
21/09/2019	0	NE	43	11.9	13:19	NNE	19	5.3	NE	26	7.2
22/09/2019	0.2			0.0		WSW	0	0.0	ESE	24	6.7
23/09/2019	0	W	44	12.2	17:58	WNW	9	2.5	ESE	17	4.7
24/09/2019	0	E	33	9.2	14:46	WNW	19	5.3	E	26	7.2
25/09/2019	0	ESE	37	10.3	14:10	WNW	13	3.6	SE	20	5.6
26/09/2019	0	ENE	37	10.3	16:22	W	2	0.6	ENE	24	6.7
27/09/2019	0	ENE	26	7.2	14:37	W	13	3.6	ENE	20	5.6
28/09/2019	0	SSW	61	16.9	4:50	SSW	17	4.7	SSE	33	9.2
29/09/2019	0	ENE	33	9.2	15:15	WNW	7	1.9	E	24	6.7
30/09/2019	0	SSE	39	10.8	11:50	ESE	9	2.5	SE	20	5.6

Daily Weather Observations for Sydney, New South Wales for October 2019
Prepared at 05:36 UTC on Tuesday 22 October 2019 IDCJDW2124.201910

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.
Sydney Airport is about 10 km to the south of Observatory Hill.
Temperature, humidity, pressure and rainfall observations are from Sydney (Observatory Hill) {station 066062}
Cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}
Wind observations are from Fort Denison {station 066022}

Date	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	m/s	Time of maximum wind gust	9am wind direction	9am wind speed (km/h)	m/s	3pm wind direction	3pm wind speed (km/h)	m/s
01/10/2019	0.4	E	33	9.2	15:31	WSW	2	0.6	NE	20	5.6
02/10/2019	0	NNE	37	10.3	16:04	W	9	2.5	ENE	22	6.1
03/10/2019	0	NNE	31	8.6	14:59	WNW	11	3.1	NE	15	4.2
04/10/2019	0	SSW	57	15.8	12:58	WNW	13	3.6	SSE	31	8.6
05/10/2019	16.6	SSE	31	8.6	7:50	SSE	11	3.1	SSE	13	3.6
06/10/2019	0.6	NNE	48	13.3	19:37	N	13	3.6	ENE	22	6.1
07/10/2019	0	SE	39	10.8	10:49	S	17	4.7	ESE	20	5.6
08/10/2019	0	S	50	13.9	13:43	WNW	13	3.6	S	28	7.8
09/10/2019	1.2	S	57	15.8	16:18	W	19	5.3	S	26	7.2
10/10/2019	0.4	SE	46	12.8	22:50	SSW	17	4.7	SSE	28	7.8
11/10/2019	0.6	ESE	37	10.3	21:11	WNW	11	3.1	ESE	19	5.3
12/10/2019	11	SE	44	12.2	14:40	SE	19	5.3	SSE	26	7.2
13/10/2019	3.4	WSW	24	6.7	0:47	WNW	17	4.7	ESE	17	4.7
14/10/2019	0	E	33	9.2	11:18	NNW	7	1.9	ENE	24	6.7
15/10/2019	0	NE	50	13.9	18:37	WNW	11	3.1	NE	22	6.1
16/10/2019	0	SSW	37	10.3	3:59	S	17	4.7	ESE	15	4.2
17/10/2019	0	W	72	20.0	16:31	WNW	13	3.6	W	37	10.3
18/10/2019	0	W	39	10.8	23:29	WSW	15	4.2	NE	17	4.7
19/10/2019	0	W	70	19.4	16:11	W	11	3.1	WNW	37	10.3
20/10/2019	0	ESE	31	8.6	10:28	W	17	4.7	E	19	5.3
21/10/2019	0	ENE	30	8.3	14:19	WNW	17	4.7	ENE	24	6.7
22/10/2019	0			0.0		W	0	0.0	ENE	20	5.6