

CHILD CARE CENTRE - 16 BANGAROO STREET,
NORTH BALGOWLAH
DA NOISE ASSESSMENT

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PREPARED FOR

KELLIE GIELIS
16 BANGAROO STREET
NORTH BALGOWLAH NSW 2093

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AAAC

This firm is a member firm of the Association of Australasian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.



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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

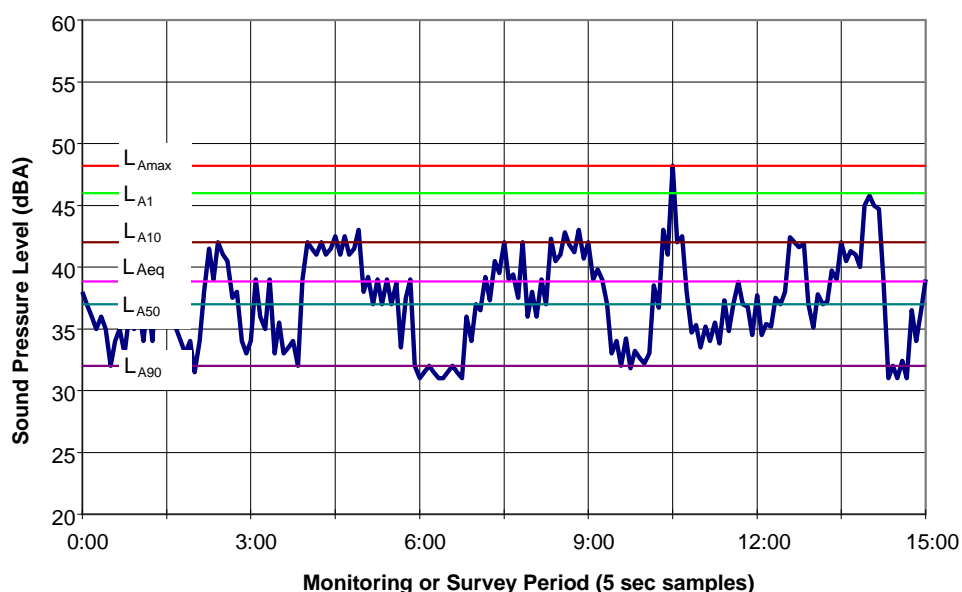
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1 INTRODUCTION

Wilkinson Murray Pty Limited has been commissioned by Kellie Gielis to undertake a noise impact assessment for the Development Application of a proposed child care centre located at 16 Bangaroo Street, North Balgowlah (the site). The site is currently occupied by a double storey residential dwelling and is surrounded by residential properties.

This report presents the noise assessment of children playing indoors and outdoors, mechanical plant and vehicle noise associated with the centre and road traffic noise impacting on the site. This report includes details of the identified nearby receivers and their relevant noise criteria, the noise impact calculation and assumptions used in the assessment, and recommendations to minimise the noise impact on the affected receivers, if required.

The Association of Australasian Acoustical Consultants (AAAC) *Guideline for Child Care Centre Acoustic Assessment*, and other appropriate NSW guidelines are used to assess noise issues.

2 SITE DESCRIPTION

The proposed development is a two-storey structure comprised of two separate indoor playrooms, a library, staff/meeting rooms and kitchen, and an outdoor play area in the backyard.

The proposed child care centre will accommodate a total of 20 children between the ages of 3 and 6 years old. The centre will operate from 8.30am-4.00pm, Monday to Friday. The client has advised the outdoor play time will be divided amongst the children and have proposed to permit a maximum of 8 children outside at one time.

According to the Northern Beaches Council, the site and the nearby surrounding receivers are located within a low-density residential area. The southern receivers are on a lower elevation compared to the site and the northern receivers are on a higher elevation. The southern area of the western receiver is on a lower elevation and the northern part is on a higher elevation compared to the site.

Table 2-1 presents the nearest identified residential receivers from the site. Figure 2-1 presents an aerial map of the existing site (outlined in red), the surrounding receivers and the locations of three noise loggers used to monitor background noise. The first two noise loggers were installed on the ground level of the front (L01) and backyard (L02), and the third noise logger was installed on the first-floor rear balcony (L03) of the property.

Table 2-1 Nearest noise-sensitive receivers

Receiver ID	Receiver Type	Address
R01	Single storey residential	14A Bangaroo St, North Balgowlah
R02	Double storey residential	14B Bangaroo St, North Balgowlah
R03	Three storey apartment building	2 Worrobyl St, North Balgowlah
R04	Double storey residential	18 Bangaroo St, North Balgowlah
R05	Double storey residential	23 Bangaroo St, North Balgowlah

Figure 2-1 Existing site and surrounding receivers



Figure 2-2 Ground floor layout

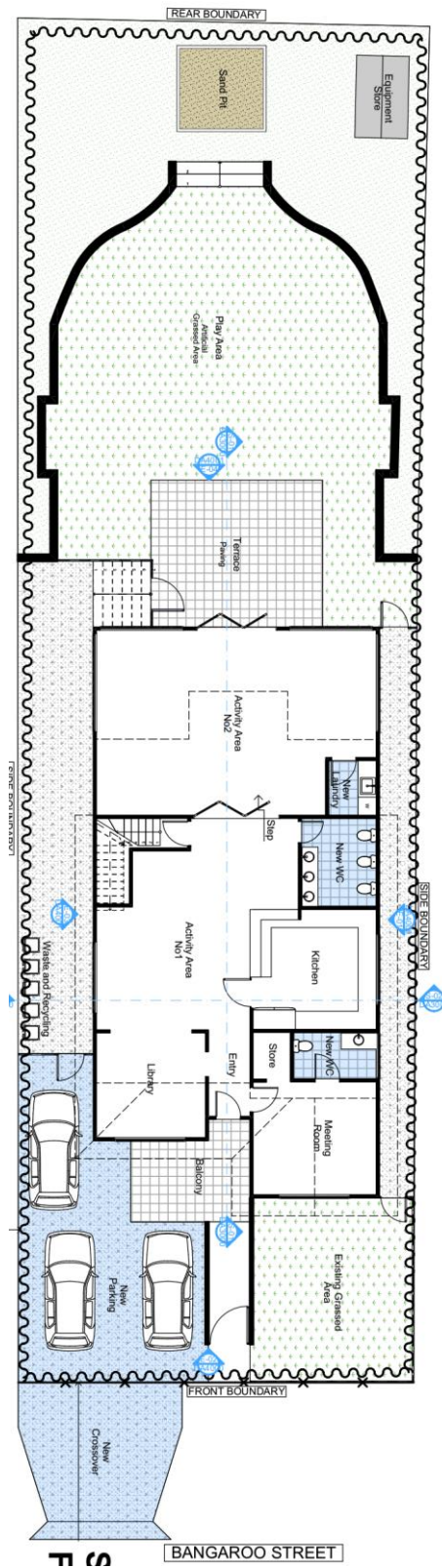
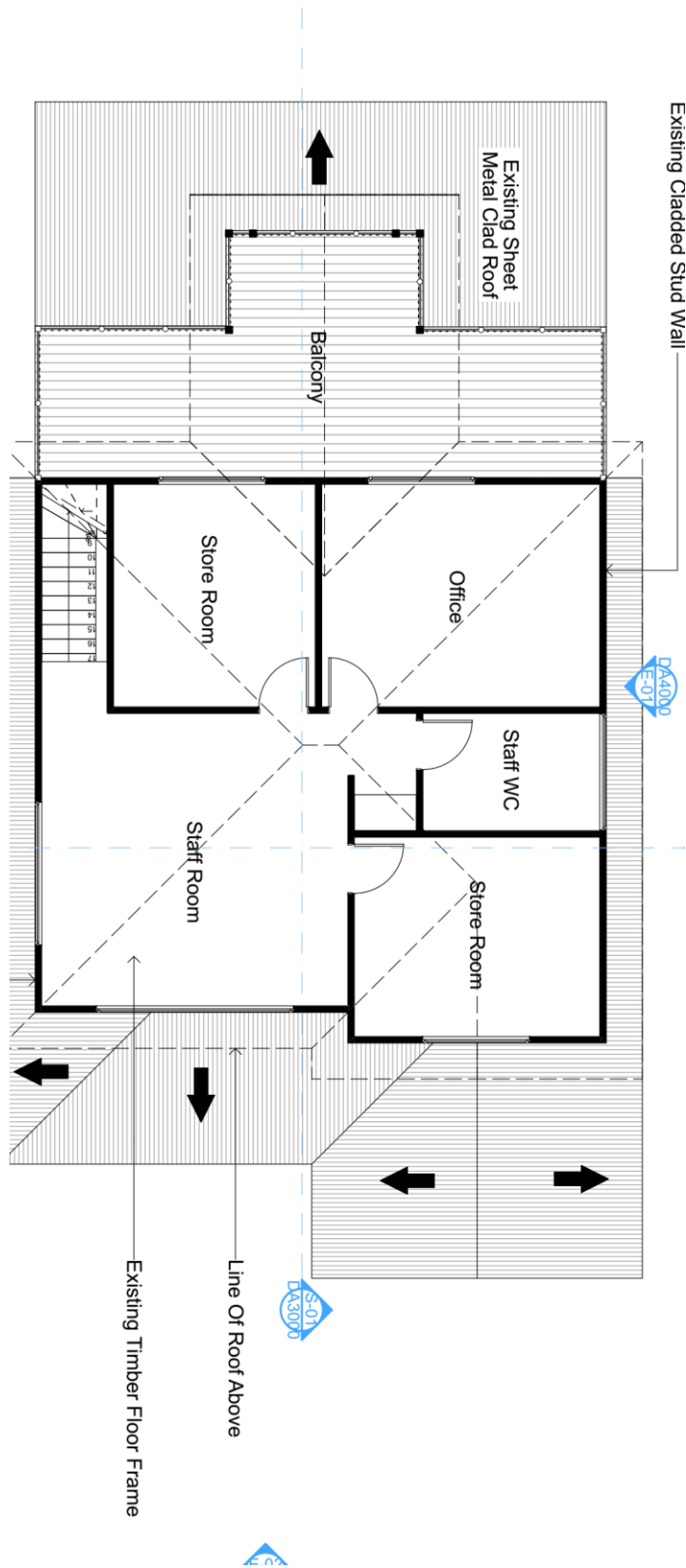


Figure 2-3 First floor layout



3 EXISTING AMBIENT NOISE LEVELS

3.1 Background Noise Levels

Long-term unattended noise monitoring was conducted between 15 – 24 June 2020, using two ARL 316 and a NGARA noise logger. The noise monitoring equipment were set to A-weighted, fast response, continuously monitoring over 15-minute sampling periods.

Technical issues from the rear balcony noise logger (L03) occurred during monitoring on site. Monitoring was undertaken again between the 26 and 29 June 2020 on the ground floor of the backyard and the upper level balcony of the residential property. The equipment calibration was checked before and after the survey and no significant drift was noted.

The loggers determine L_{A1} , L_{A10} , L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1} , L_{A10} and L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Glossary of Acoustic Terms for definitions). The noise loggers were configured to measure instantaneous noise levels with a 'Fast' time weighting and 'A' frequency weighting.

Table 3-1 presents a summary of the relevant noise descriptors, in particular the Rating Background Level (RBL) which is considered appropriate to establish the relevant noise criteria. The RBL is based on the weekday average background noise level as the childcare centre will not operate over the weekend. The noise results exclude any noise data affected by significant weather conditions (i.e. strong winds and rain).

Table 3-1 Daytime (7am-6pm) ambient noise levels

Logger	Noise Level (dBA)	
	RBL (L_{A90})	L_{Aeq}
L01 – front yard	41	56
L02 – backyard ground floor	39	46
L03 – Rear Balcony	44	52

The ground floor front (L01) and backyard (L02) noise results presented above were taken from measurement between 15-24 June 2020. The RBL during for the second background noise measurement was 39dBA for the backyard on the ground floor and 44dBA for the upper level (L03). The difference in noise level between the ground floor and upper level was 5dB.

The 5dB correction was added to the initial ground floor backyard background noise measurement to establish the upper level RBL.

Background noise on the first floor of the balcony is likely to be influenced by the traffic noise along Bangaroo Street and distant ambient and road traffic noise along Frenchs Forest Road. The surrounding buildings are at least two storeys high and would provide noise shielding from distant traffic and ambient noise at ground level.

4 OPERATIONAL NOISE ASSESSMENT

The following issues are considered for noise generated by the child care centre:

- Noise produced by children primarily from outdoor the play areas;
- Mechanical plant;
- Vehicle drop-off/pick-up/parking noise; and
- Additional traffic noise on nearby local/arterial roads.

4.1 AAAC Guidelines

A guideline for the assessment of noise from child care centres has been prepared by the Association of Australian Acoustical Consultants (AAAC) as a result of a NSW Australian Acoustical Society (AAS) Technical Meeting held in September 2007 on Child Care Noise. The document, *AAAC Guideline for Child Care Centre Acoustic Assessment, October 2020*, provides criteria for the assessment of noise intrusion into and noise emissions from child-care centres and also provides recommendations for treatment to minimise acoustical impacts upon neighbouring premises.

4.1.1 Indoor Activities, Mechanical Plant & On-Site Traffic

The AAAC recommended criterion is that the $L_{Aeq,15min}$ noise level emitted from the cumulative operation of indoor activities, mechanical plant and traffic on the site should not exceed the background noise level by more than 5dB at the assessment location.

The assessment location is defined as the most affected point on or within any residential receiver property boundary.

4.1.2 Outdoor Play – Residential Receptors

The client has advised there will be more than 2 hours of outdoor playtime. For outdoor play occurring for more than two hours per day, the AAAC considers that the $L_{Aeq,15min}$ noise level from the outdoor play shall not exceed the background noise level by more than 5dB at the residential assessment location. The adopted criteria for operational noise are presented in Table 4-1.

Table 4-1 Operational noise criteria

Receivers	More than 2 hours of play
	$L_{Aeq,15min}$
Ground Floor of Receivers R01-R04 – 14A & 14B Bangaroo St, 2 Worrobyl St and 18 Bangaroo St	44
Upper Floor of Receivers R01-R04 – 14A & 14B Bangaroo St, 2 Worrobyl St and 18 Bangaroo St	49
Frontyard 14A & 16 Bangaroo St (R01 & R04), and Receiver R05 – 23 Bangaroo St	46

4.2 Operational Noise Modelling

4.2.1 Noise Modelling

Site related noise emissions were modelled using the SoundPLAN 8 noise prediction software. Factors that are addressed in the modelling include sound level emissions, screening from building and barriers, topography, receiver locations and ground and atmospheric absorption. Continuous cumulative operational noise levels have been predicted at the nearest receivers surrounding the site, using the ISO 9613-2 prediction algorithm.

4.2.2 Noise Modelling Scenarios

Table 4-2 presents the worst-case prediction scenarios.

Table 4-2 Worst-Case Noise Prediction Scenarios

No.	Scenario	Noise Sources	Criterion
1	Cumulative Operational Noise	Mechanical plant (i.e. AC unit & Exhaust fan). All 20 children playing inside. Onsite carpark noise.	Daytime RBL +5
2	Children Outdoors	8 children playing outside	Daytime RBL +5

4.2.3 Sound Power Level of Children Playing

Based on Wilkinson Murray's Sound Power Level measurement of previous child care noise assessment, a typical Sound Power Levels (L_w) of children playing is established. Resulting Sound Power Levels for children between 3 – 5 years old are shown in Table 4-3. The noise measurement is consistent with the children Sound Power Level range outlined in Section 6 of the AAAC's *Guideline for Child Care Centre Acoustic Assessment, October 2020*.

Table 4-3 Children playing sound power level

Age Group	Number of Children in Group		
	10	20	30
3 – 5 years old	86	90	94

4.2.4 Parking

The site will consist of three parking spaces at the front, one space for staff parking and the two spaces for drop off and pick up.

Staff Parking

The predicted noise level from use of the staff parking (i.e. 1 car entering the site) is 31dBA at nearest receiver location, 14A Bangaroo Street. This prediction complies with the relevant noise criterion of 46dBA.

Pick-Up/Drop-Off

It is assumed within a 15-minute assessment period that there will be two drop-offs/pick up in each of the two remaining parking spaces.

4.2.5 Mechanical Plant Noise

The client has advised there will be no additional condenser units installed on site. The existing condenser unit is located within the cavity space underneath the house.

At this stage, the design and selection of the exhaust fan required to service the kitchen has not been finalised. The exhaust fan is to be placed on the north side of the roof. This is shown by a red dot in Figure 4-1. When selecting a unit, the Sound Power Level of the fan should not exceed 60dBA.

If the exhaust fan cannot meet the prescribed Sound Power Level, then alternative mitigation measures should be considered. Alternative mitigation measures include moving the location of the exhaust to provide shielding and/or increasing distance between exhaust fan and receiver R04 or, if possible, using internal duct lining between fan and the outlet.

Figure 4-1 Proposed Exhaust Fan Location



4.2.6 Children Playing Indoor/Outdoor Scenarios

A preliminary noise impact prediction of children playing inside and outside the centre was undertaken. It was assumed the playrooms' window and door were open while children were engaged in active play inside the centre. The second scenario assesses a total of eight children playing outside, five children in the open area and three within the sandpit, adjacent to the western fence. In addition to this, the prediction assumes a 1.8m high boundary fence surrounding the play area.

Preliminary impact noise prediction from children engaged in active play inside the centre playrooms was predicted to exceed the criterion at receivers R01 and R02. These receivers are located nearest to the playroom and have line of sight of the window and doors of the playrooms.

Noise emissions of children playing outside is predicted to exceed the daytime criterion at receivers R02, R03 and R04, particularly the upper level.

Section 7 of the report provides detailed noise control measures to comply with the relevant noise standard. Noise prediction of the operation of the site inclusive of these measure were undertaken and results are presented in Section 4.2.7. The model includes the following mitigation measures:

- Windows are closed during active intensive noisy activities.
- The proposed noise barrier outlined in Section 7.1. In summary this consist of a 2.4m barrier on the north and partially on the south side, a 3m high barrier to the west, and 1.8m high barrier along the south boundary.

4.2.7 Noise Modelling Results

Table 4-4 and Table 4-5 present the predicted noise levels of each scenarios as presented in Section 4.2.2.

Table 4-4 Scenario 1 – All 20 children playing indoors (windows and sliding door closed) + mechanical plant operating + onsite parking

ID	Address	Noise Prediction $L_{Aeq,15min}$	Noise Criteria	Compliance
R01	14A Bangaroo St, North Balgowlah - backyard	42	44	Compliant
	14A Bangaroo St, North Balgowlah – Front yard	41	46	Compliant
R02	14B Bangaroo St – Ground Floor	38	44	Compliant
	14B Bangaroo St – First Floor	39	49	Compliant
R03	2 Worrobil St – Ground Floor	28	44	Compliant
	2 Worrobil St – Upper Floor	29	49	Compliant
R04	18 Bangaroo St – Ground Floor	33	44	Compliant
	18 Bangaroo St – First Floor	35	49	Compliant
	18 Bangaroo St – Front yard	43	46	Compliant
R05	23 Bangaroo St, North Balgowlah	38	46	Compliant

Table 4-5 Operational Scenario 2 – Eight children outside

ID	Address	Noise Prediction L_{Aeq,15min}	Noise Criteria	Compliance
R01	14A Bangaroo St, North Balgowlah	38	44	Compliant
	14A Bangaroo St, North Balgowlah – Front yard	32	46	Compliant
R02	14B Bangaroo St – Ground Floor	44	44	Compliant
	14B Bangaroo St – First Floor	49	49	Compliant
R03	2 Worrobil St – Ground Floor	40	44	Compliant
	2 Worrobil St – Upper Floor	48	49	Compliant
R04	18 Bangaroo St – Ground Floor	43	44	Compliant
	18 Bangaroo St – First Floor	49	49	Compliant
	18 Bangaroo St – Front yard	43	46	Compliant
R05	23 Bangaroo St, North Balgowlah	27	46	Compliant

5 ROAD TRAFFIC NOISE ASSESSMENT

5.1 Criteria

5.1.1 Road Noise Policy NSW

Additional road traffic movements generated by the proposed centre may result in increased traffic noise that may potentially impact residential receivers along Bangaroo Street. The assessment should be based on the road traffic noise assessment criteria for residential land uses contained within Table 3 of the NSW EPA *Road Noise Policy (RNP)*.

Anyone using a vehicle to travel to and from the proposed centre will pass residential receivers along Bangaroo Street. From a noise perspective, Bangaroo Street is a collector road and is identified as a sub-arterial road according to the *RNP*.

The applicable *RNP* criteria during the daytime (when vehicular movements associated with the proposed centre will occur) is presented in Table 5-1.

Table 5-1 Road noise criteria

Road Category	Type of Project / Land Use	Assessment Criteria – dB(A)
		Day (7am–10pm)
Freeway/Arterial /Sub-arterial roads	Existing residences affected by additional traffic on existing sub-arterial roads generated by land use developments	$L_{Aeq,15hr}$ 60 (external)

Note 1: These criteria are for assessment against façade-corrected noise levels when measured in front of a building façade.

When existing traffic noise levels are above the noise criteria (as outlined above), the noise objective is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria. An increase of up to 2dB represents a minor impact that is considered barely perceptible to the average person.

5.2 Road Traffic Data

A traffic impact assessment report (ref: 20035, Version C) was prepared by Transport and Traffic Planning Associates (TTPA). The report provides an indication of the traffic generation of the proposed child care along Bangaroo Street. The traffic generation prediction are as follows:

- AM Peak: 0.8 peak vehicle trips per child.
- PM Peak: 0.7 peak vehicle trips per child.

The traffic generation rates for the 20 children will produce a traffic generation potential of approximately 16 vehicles trips during the weekday peak period (i.e. 8 vehicles movements TO and 8 vehicle movements FROM).

Traffic volume data of morning (AM) and afternoon (PM) peak traffic periods along Bangaroo Street was provided by TTPA. Table 5-2 presents the traffic volume during peak periods (8.00am-9.00am and 4.00pm-5.00pm) along Bangaroo Street.

Table 5-2 Bangaroo Street traffic volume count during AM and PM Peak period

Period	Vehicle Volume weekday peak periods
AM Peak Period	767
PM Peak Period	667

5.3 Predicted Road Traffic Noise

The *Calculation of Road Traffic Noise (CoRTN)* algorithm was used to predict the existing and new traffic noise generated from the proposed development.

The morning period experiences a greater traffic volume and so calculations were completed based on this period. Calculations were completed for 18 Bangaroo Street, which would be the worst affected receiver regarding traffic noise.

As traffic volume data was only provided for peak periods of the day, prediction could only be made for the 1-hour period of peak traffic. Given that during other hours of the day there would be minimal movements from the proposed development and lower existing traffic movements the $L_{Aeq,1hr}$ for these periods would be lower. Therefore, the expected $L_{Aeq,15hr}$ will be lower than the calculated $L_{Aeq,1hr}$.

It was calculated that the existing traffic noise is $L_{Aeq,1hr}$ 56.3dBA and with the additional vehicles from the child care centre the hourly traffic noise level increase is predicted to be less than 0.1dB. The additional traffic noise is predicted to have minimal impact on the surrounding receivers and therefore complies with the *RNP*.

6 ROAD TRAFFIC NOISE INGRESS

6.1 Criteria

6.1.1 Road Traffic Noise Ingress

According to the AAAC guideline, the noise level from road, rail traffic or industry into the proposed child care centre shall adhere to the following requirements:

- *The noise level $L_{Aeq, 1 \text{ hour}}$ from road, rail traffic or industry at any location within the outdoor play or activity during the hours when the centre is operating shall not exceeding 55dB(A)*
- *The noise level $L_{Aeq, 1 \text{ hour}}$ from road, rail traffic or industry at any location within the indoor play or sleeping areas of the centre during the hours when the centre is operating shall not exceed 40dB(A).*

6.2 Road Traffic Noise Ingress

A review of the noise monitoring data for the backyard was conducted. The maximum hourly average road traffic noise level was 47.2dBA between 4.00pm – 5.00pm. This complies with 55dBA $L_{Aeq, 1hr}$ outdoor play area criterion as established by the AAAC.

Road traffic noise impact on the two activity rooms within the proposed child care centre was predicted using the *CoRTN* algorithm. The road traffic impact prediction was based on the hourly peak road traffic volume data outlined in Section 5.1 and the proposed child care centre layout.

In order to comply with the indoor playroom noise requirement, the recommendations outlined in Section 7.3 should be implemented. Playrooms may open windows/doors for ventilation during this period without exceeding the AAAC's internal noise level requirement.

7 NOISE CONTROL RECOMMENDATIONS

The following recommendations should be implemented to ensure the proposed child care centre satisfy the relevant noise criteria.

7.1 Noise Barrier

The barrier surrounding the outdoor play area should have the following properties:

- Figure 7-1 presents the layout of all the noise barriers and the proposed new heights. The barrier outlined in red should be no less than 2.4m high, the western and north-western barrier (purple) should be no less than 3m high and southern barrier outlined in blue should be no less than 1.8m high. The 3m high barrier on the north-western side should extend 6m long from the western boundary. Alternatively, the assigned 2.4m or 3m high barrier could be 0.6m lower in height and be provided with an angled cantilever on top of the barrier to achieve the assigned total height.
- All joints between noise barrier panels should have no air gap between the screens. If a gap is required underneath the barrier, we recommend that the gap be kept to a minimum so that it is installed close to the ground as much as possible.
- The construction of the proposed noise barrier may be constructed with solid material with a surface density of greater than 20kg/m².

7.2 Mechanical Plant

The following noise control for the proposed exhaust fan should be considered:

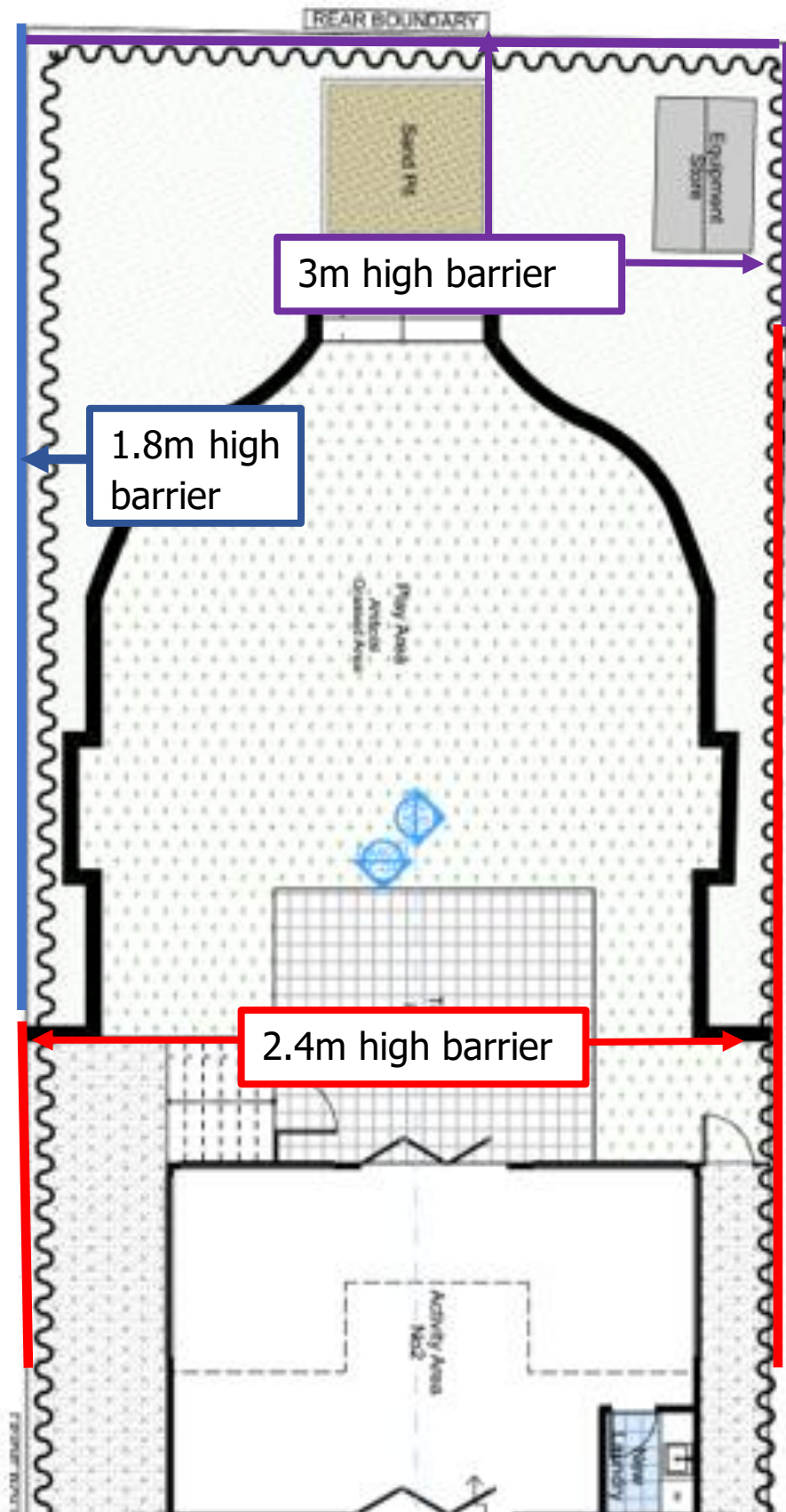
- Ensure the Sound Power Level of the exhaust fan does not exceed 60dBA.
- If exhaust fan cannot meet the prescribed Sound Power Level, then relocate of the exhaust to increase the distance between exhaust fan and receiver R04 and possibly provide noise shielding.
- If possible, using internal duct lining between fan and outlet.

7.3 Indoor Playrooms Requirement

The indoor playrooms should have the following items:

- Playrooms 1 and 2 door/windows should be fitted with a glazing system with an acoustic performance rating of 26 Rw or (4mm window).
- Windows and doors of indoor play areas should be kept closed during active high intensive noise activities such as music or singing.

Figure 7-1 Noise barrier



7.4 Noise Management Plan

During the operation of the child care centre, we recommend the following noise management plan to be implemented to ensure the noise amenity of the surrounding receivers. This includes:

- Allow a maximum of eight children to play outside in the play area.
- Parents and guardians should be informed of the importance of noise minimisation when entering the site, dropping off or picking up children. This includes:
 - no door slamming
 - do not raise voices at the front of the centre
- Contact phone number of the centre's director should be made available to neighbours to facilitate communication and to resolve any neighbourhood issues that may arise due to the operation of the centre.
- Crying children should be taken inside the centre and be comforted.

8 CONCLUSION

Wilkinson Murray has assessed potential noise impacts from the operation of the proposed child care centre at 16 Bangaroo Street, North Balgowlah with respect to the requirements from the AAAC Guidelines and the relevant noise standards.

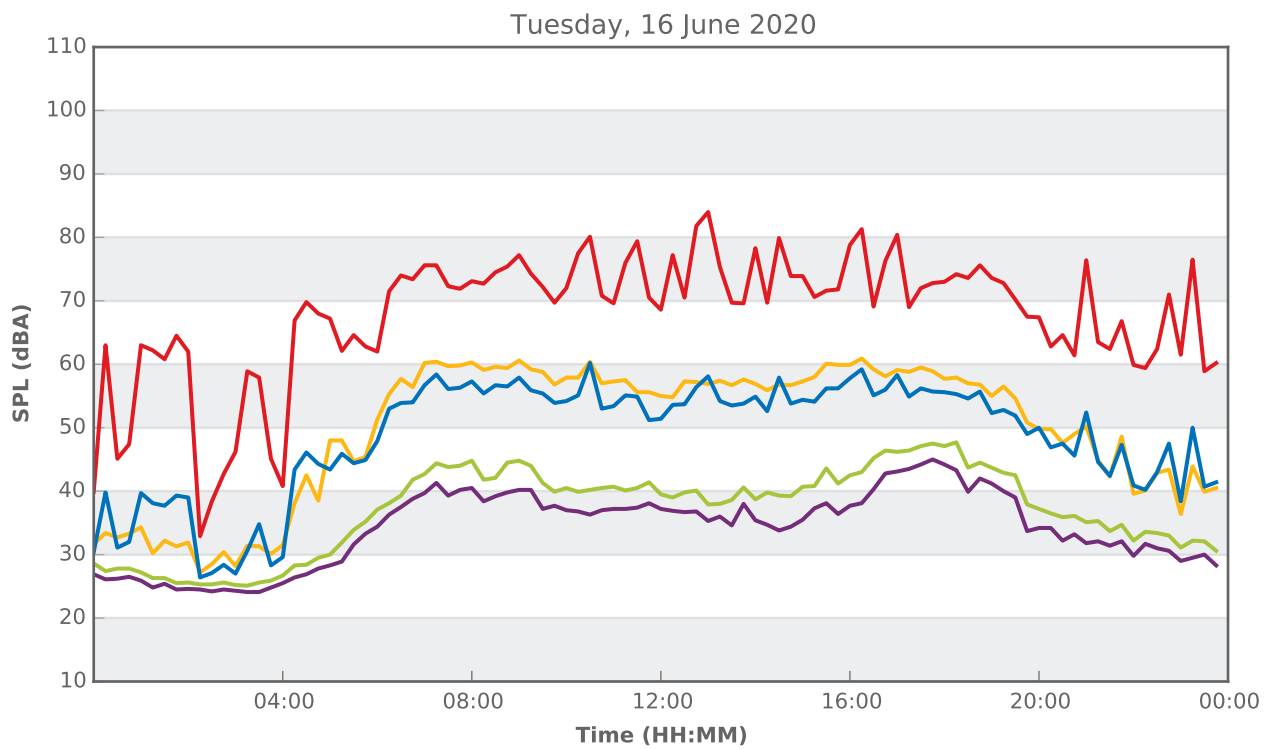
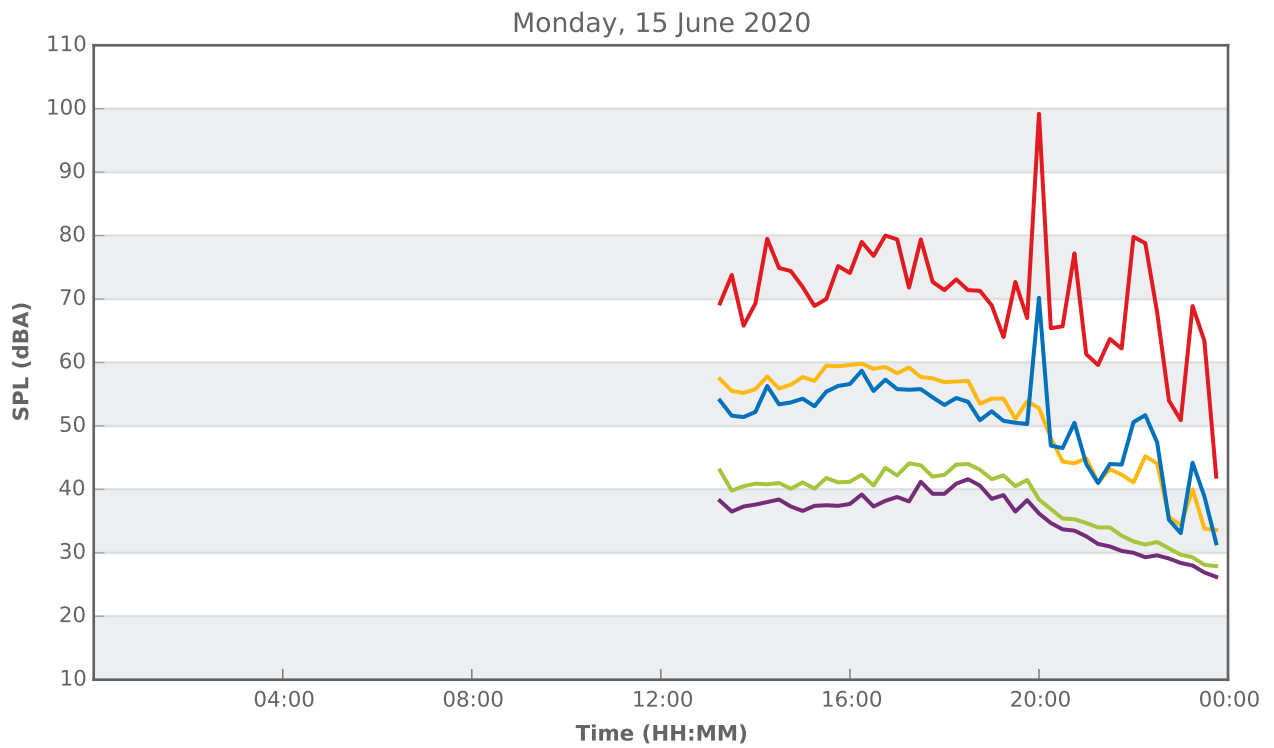
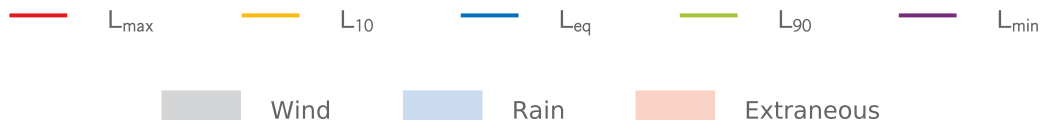
The operation of a child care centre is able to meet the requirements of relevant noise standards, provided that the mitigation measures as recommended in Section 7 of this report are fully implemented.

APPENDIX A

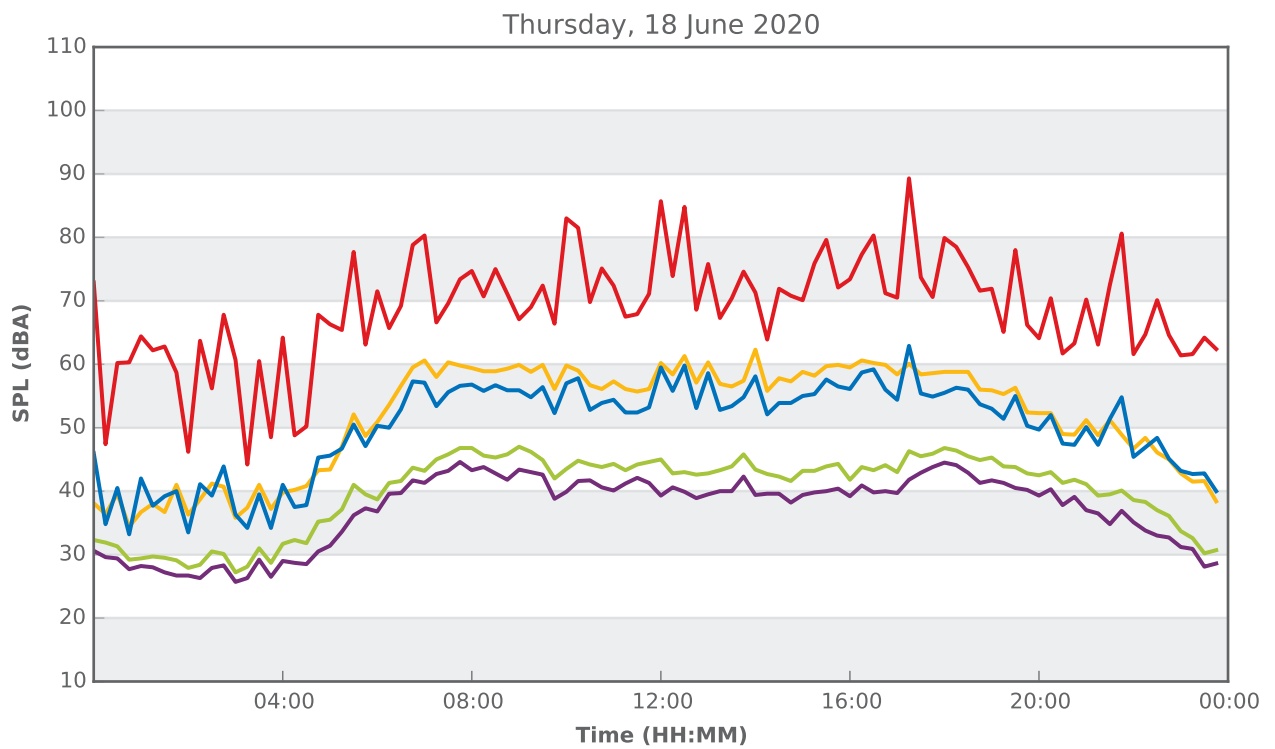
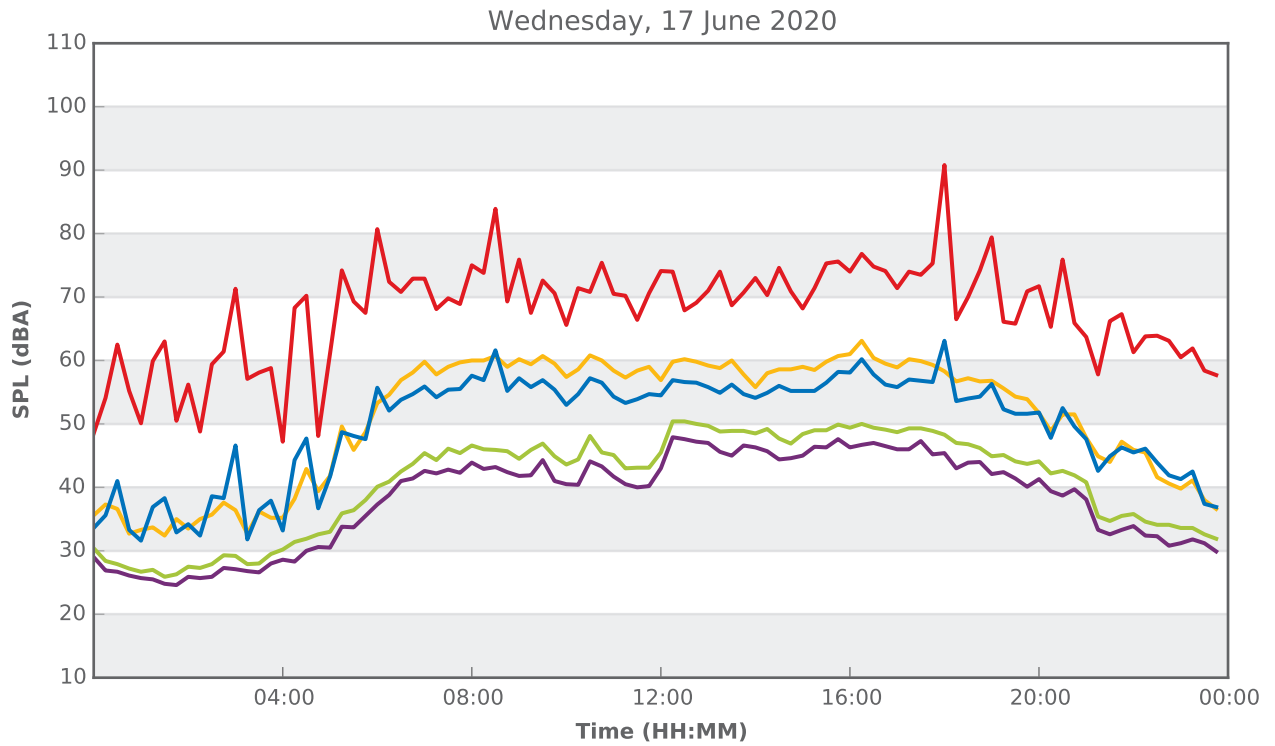
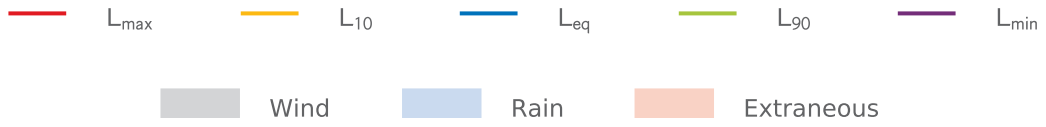
NOISE MEASUREMENT RESULTS

NOISE LOGGER L01 - FRONT YARD

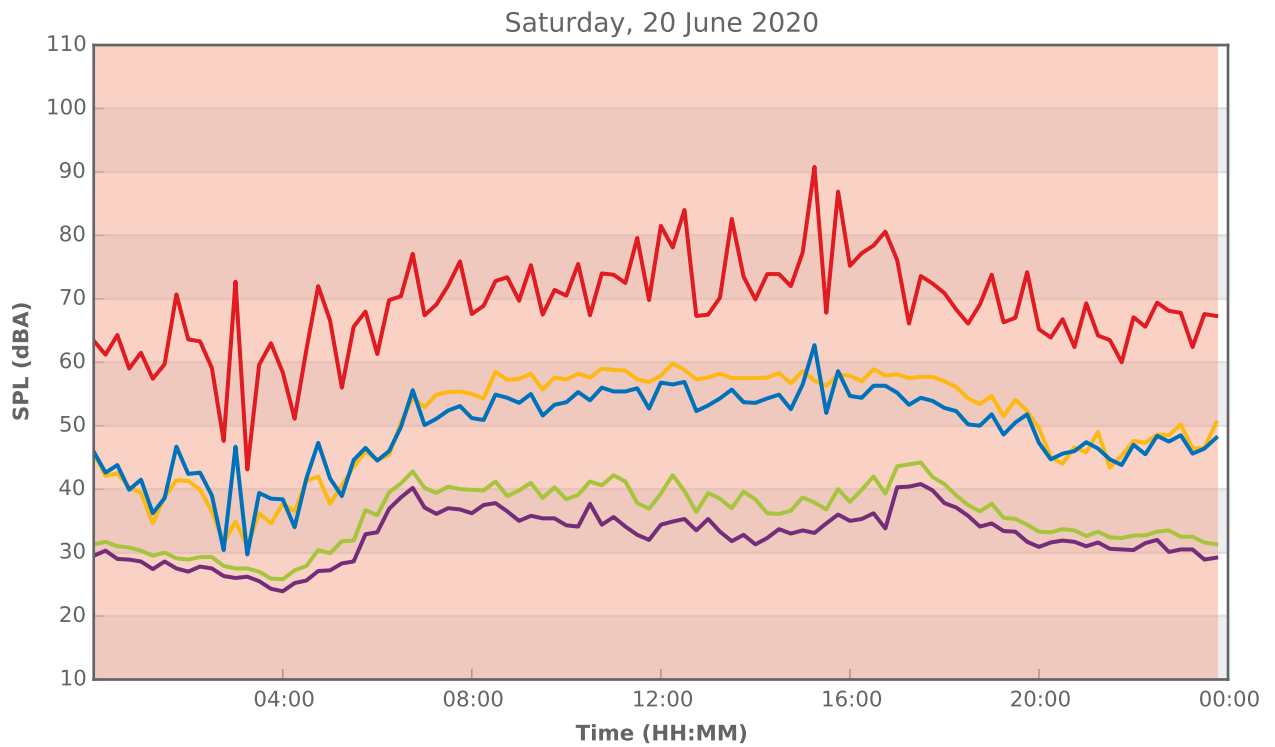
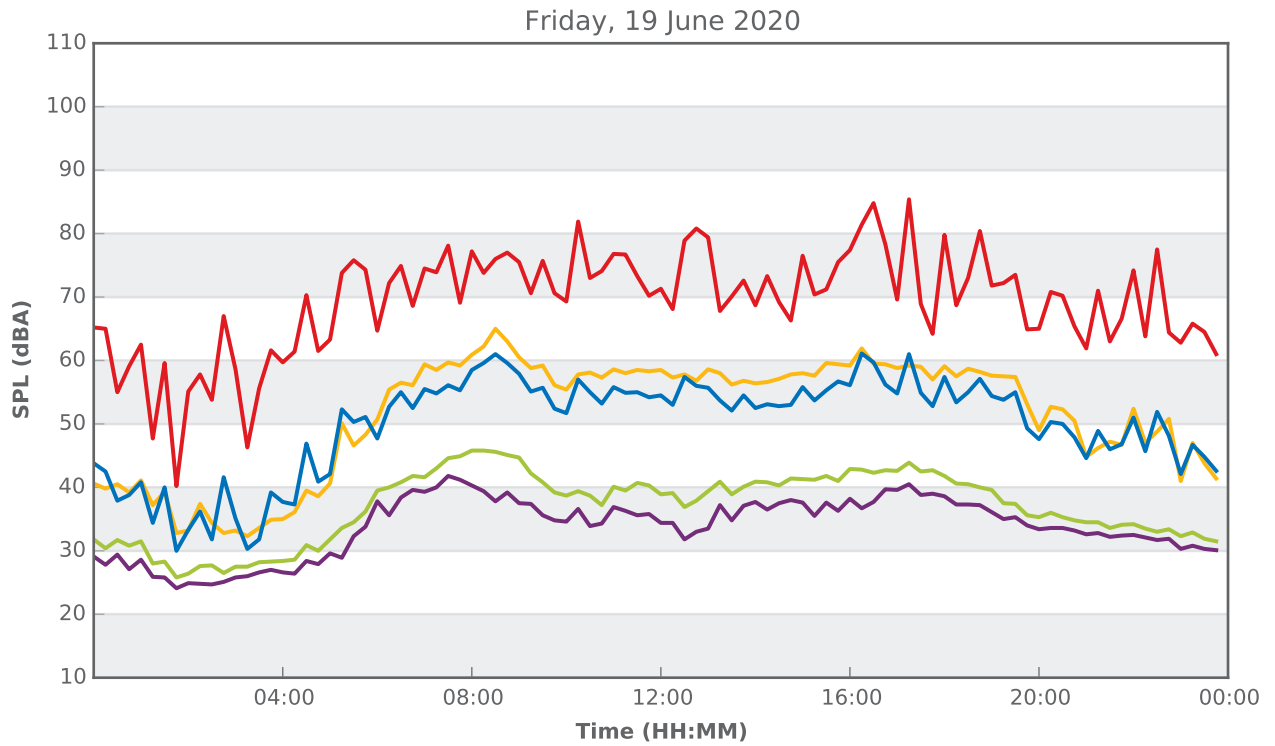
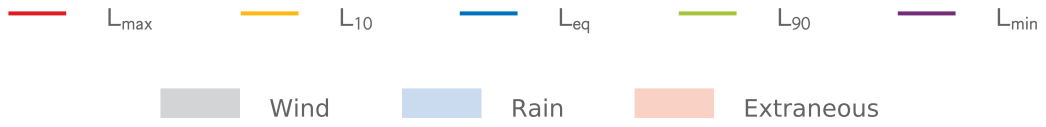
16 Bangaroo Street North Balgowlah



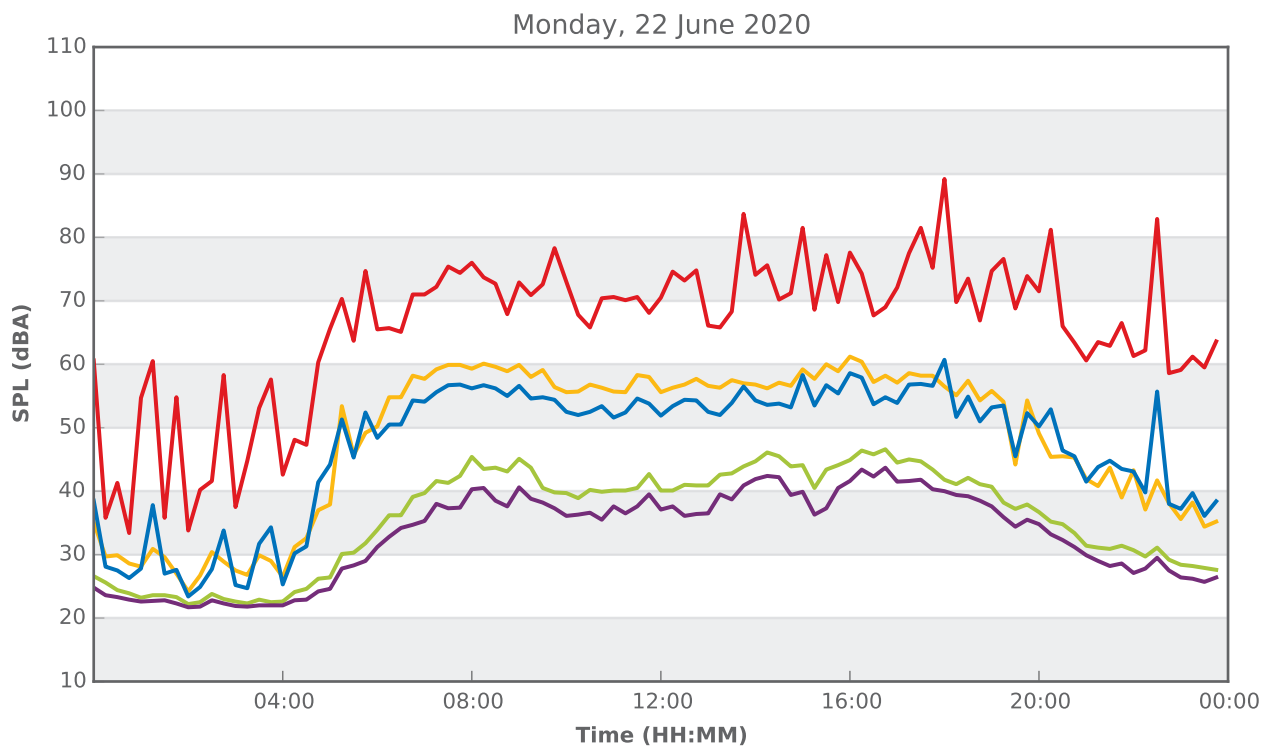
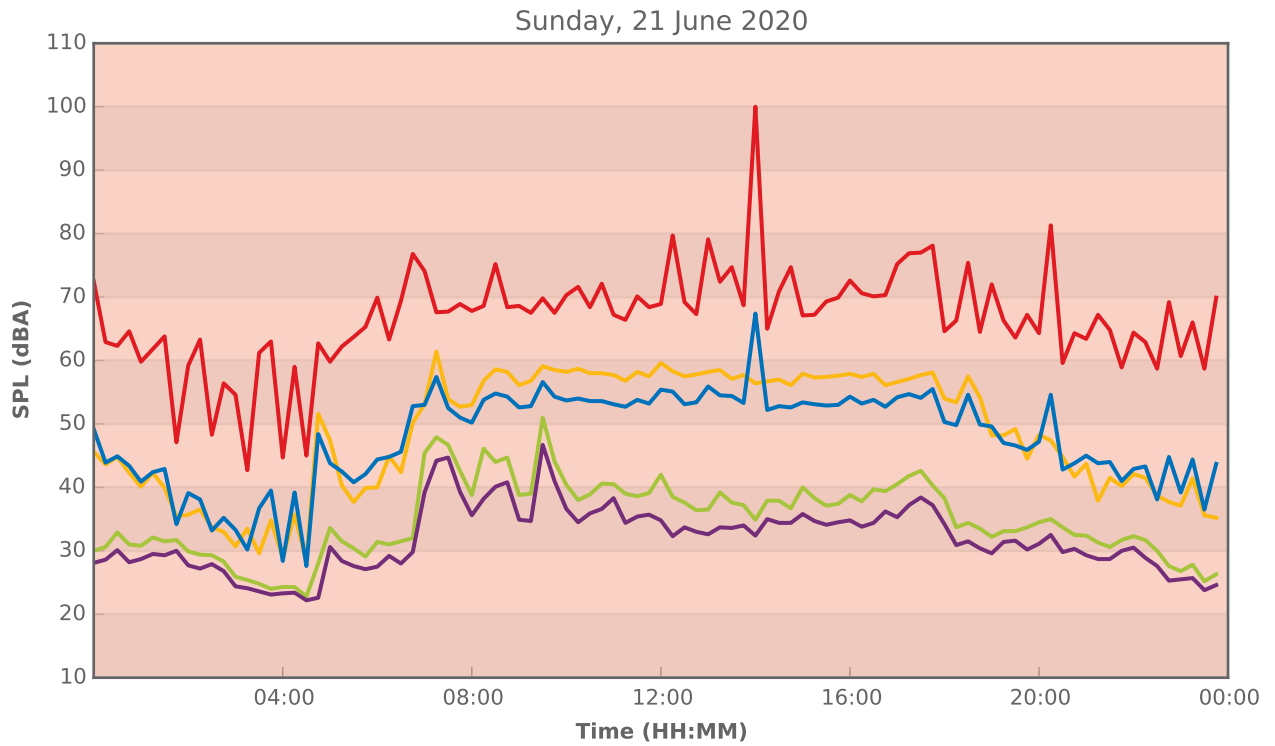
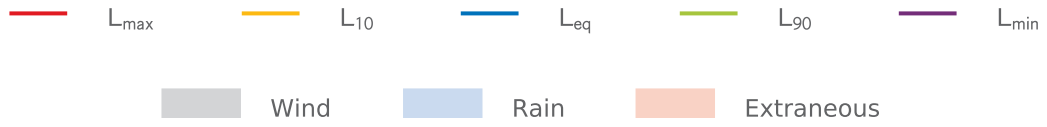
16 Bangaroo Street North Balgowlah



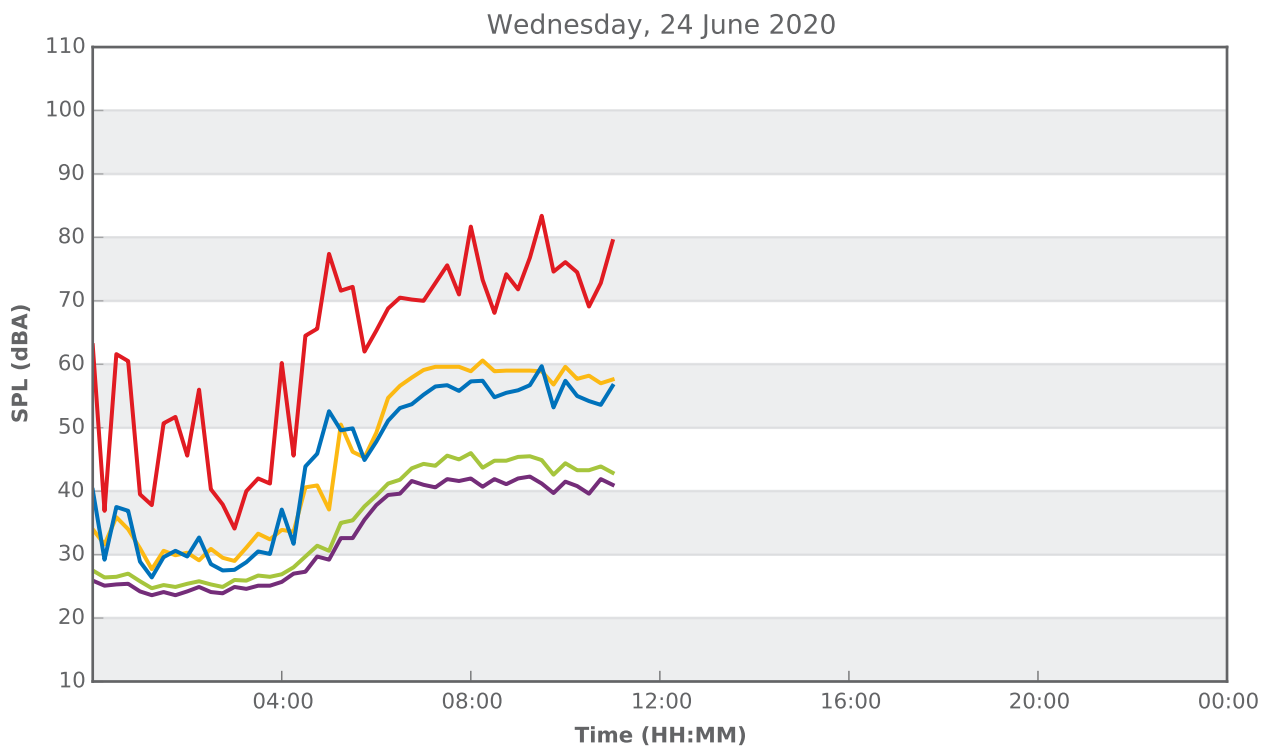
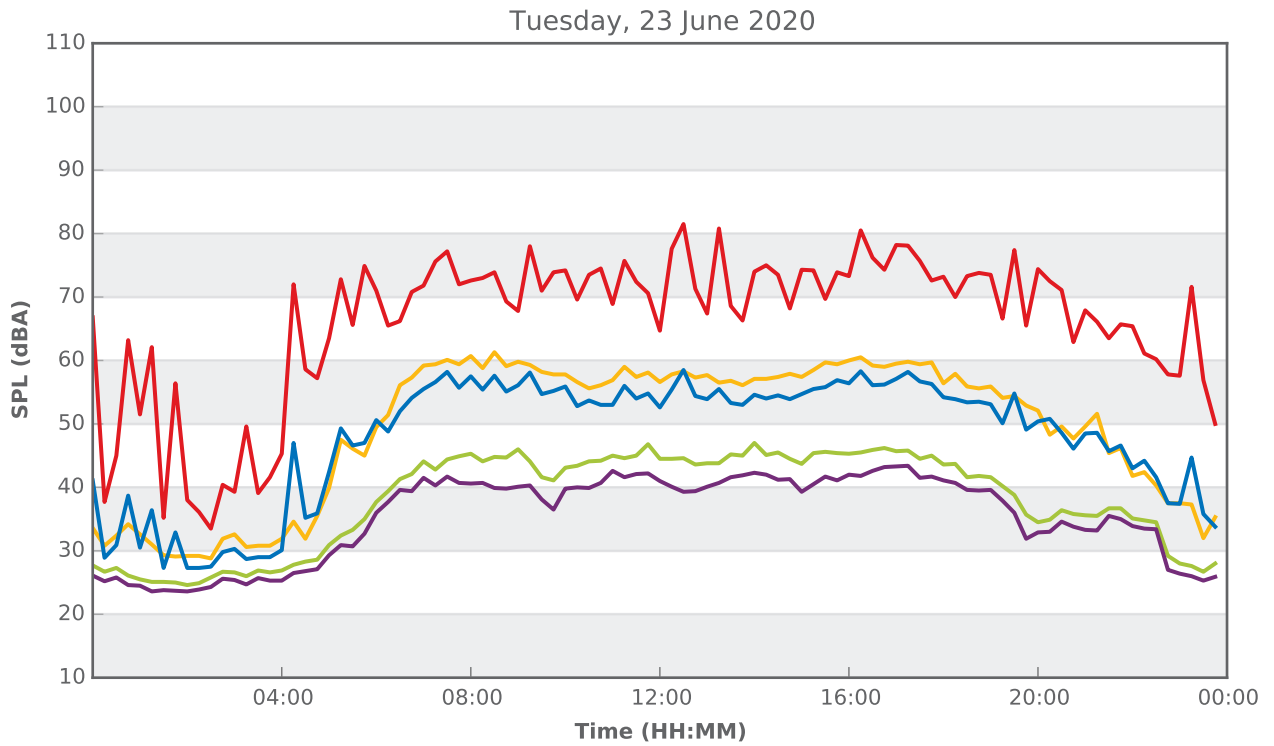
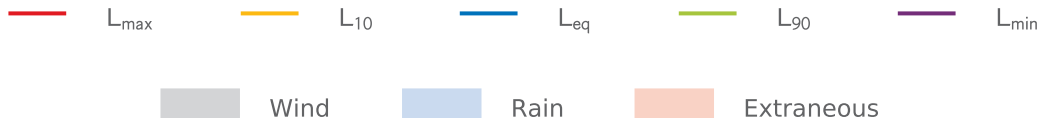
16 Bangaroo Street North Balgowlah



16 Bangaroo Street North Balgowlah

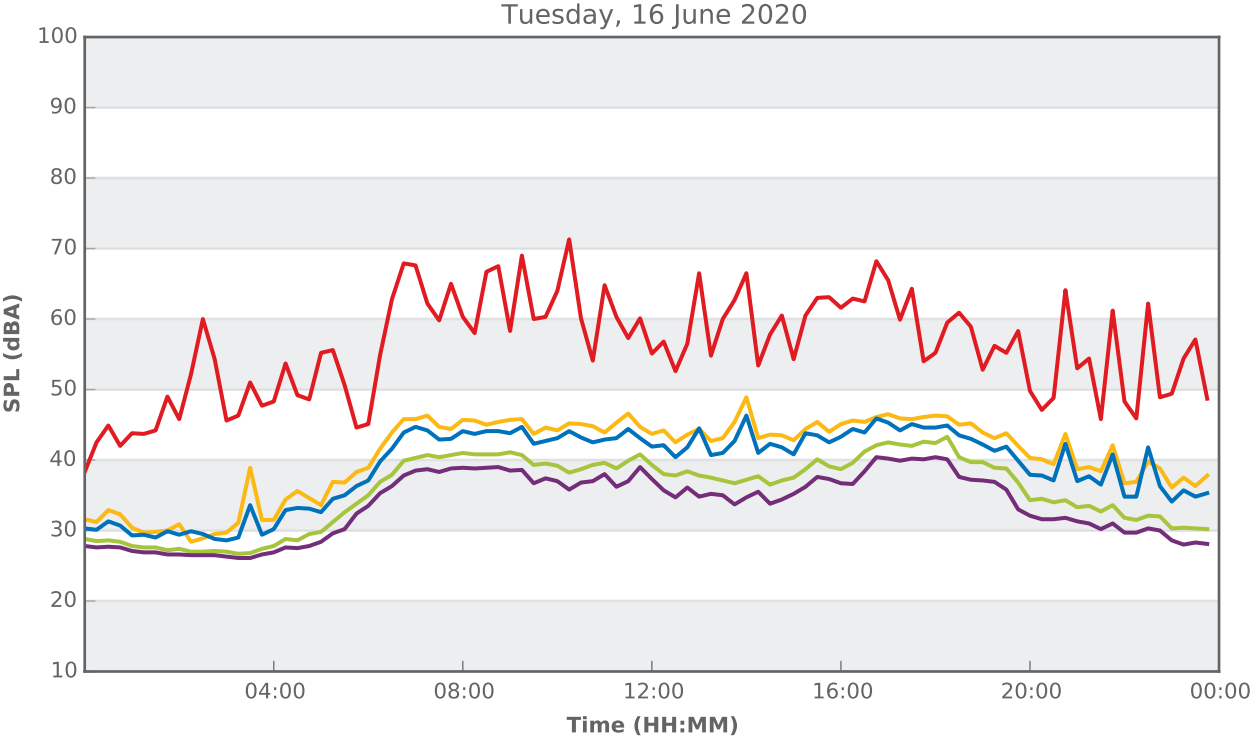
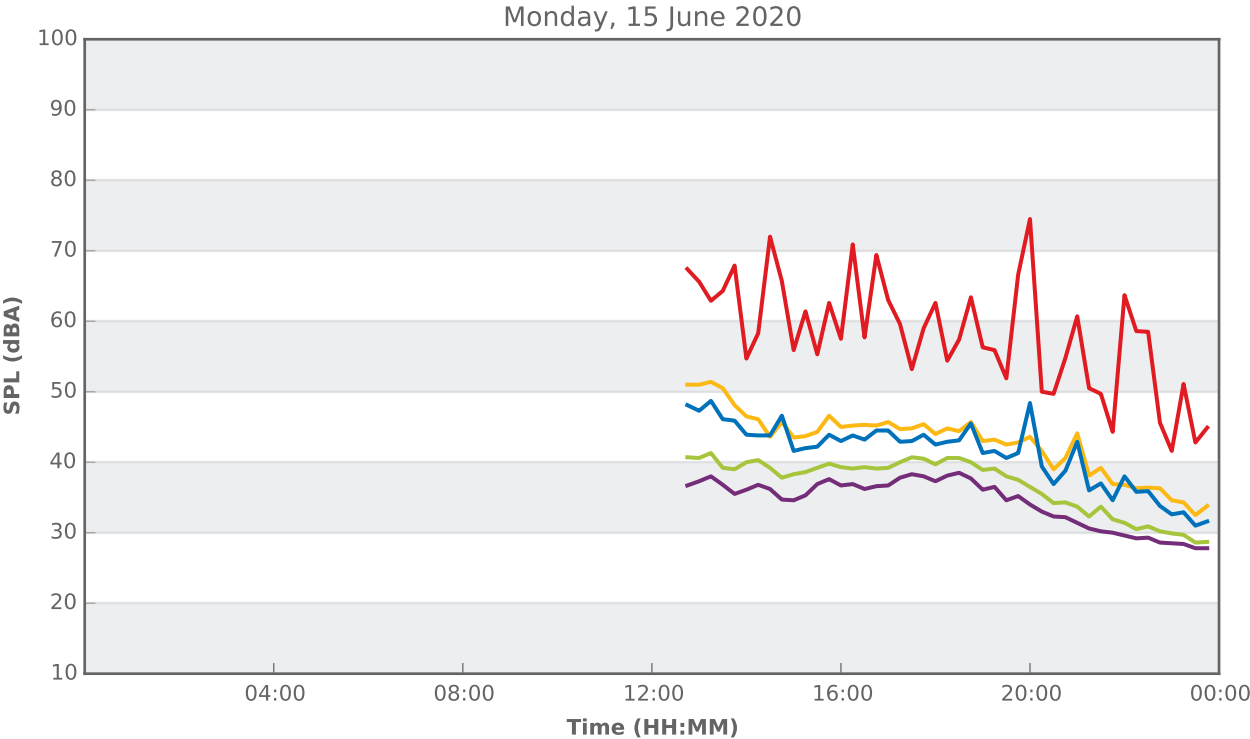
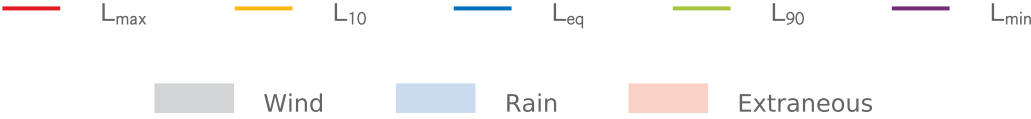


16 Bangaroo Street North Balgowlah

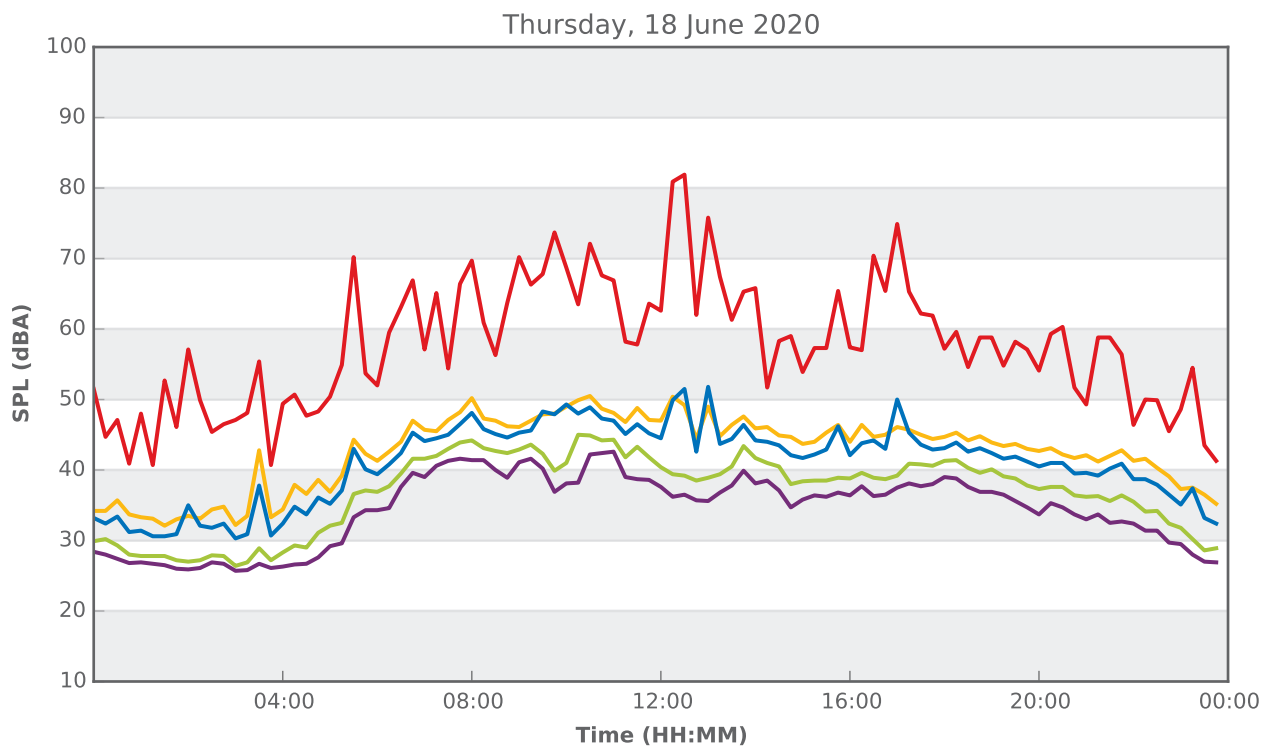
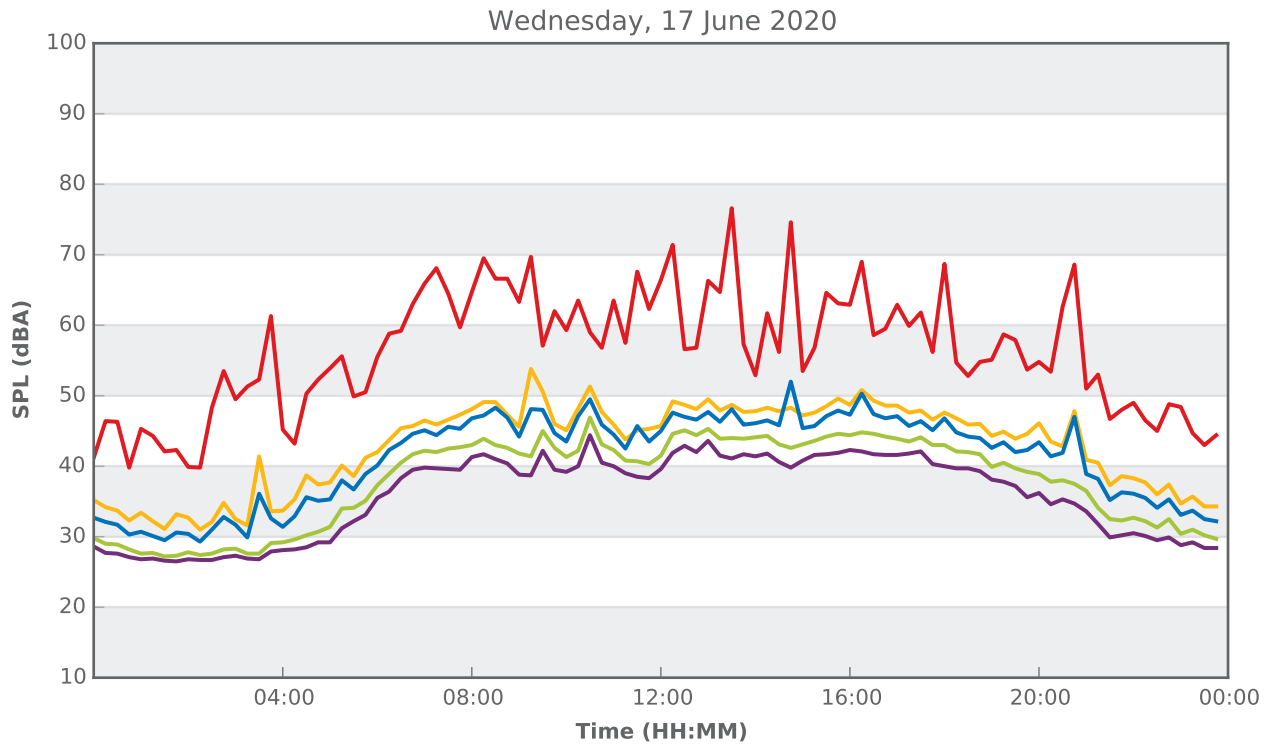
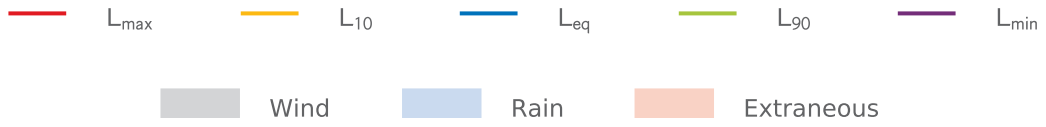


NOISE LOGGER L02 - GROUND FLOOR BACKYARD

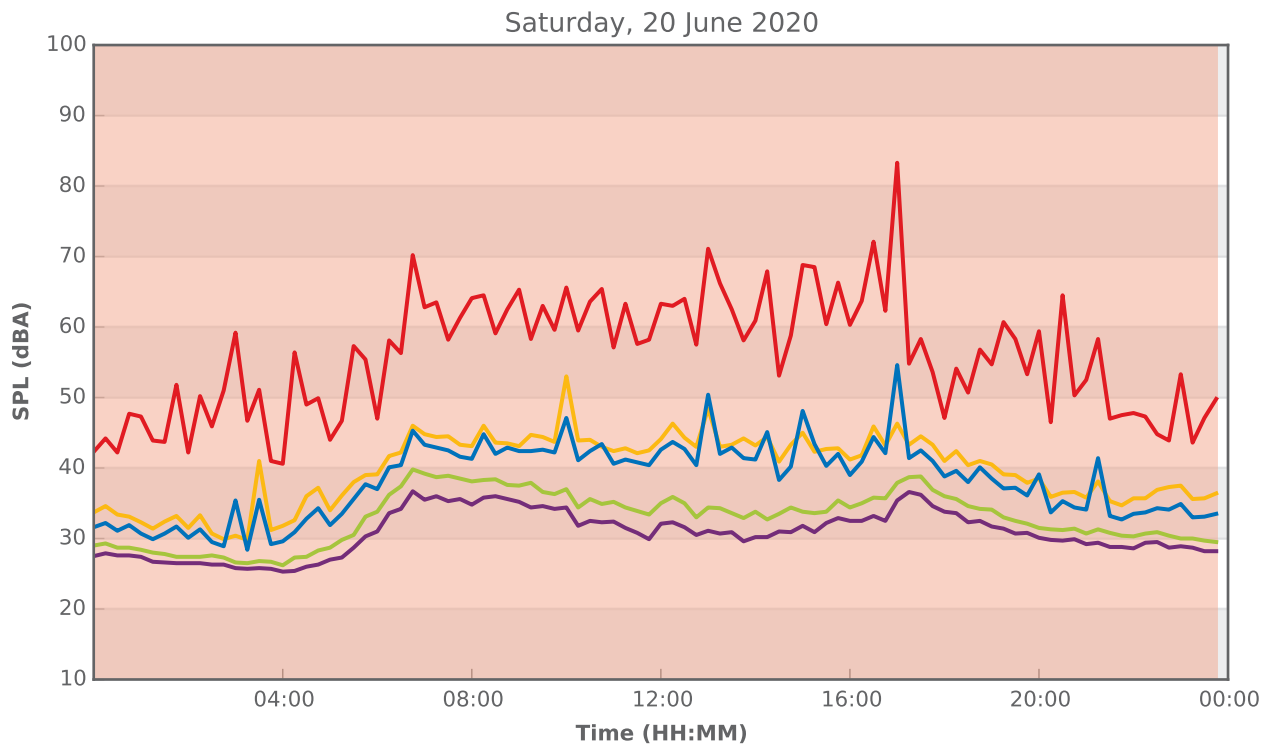
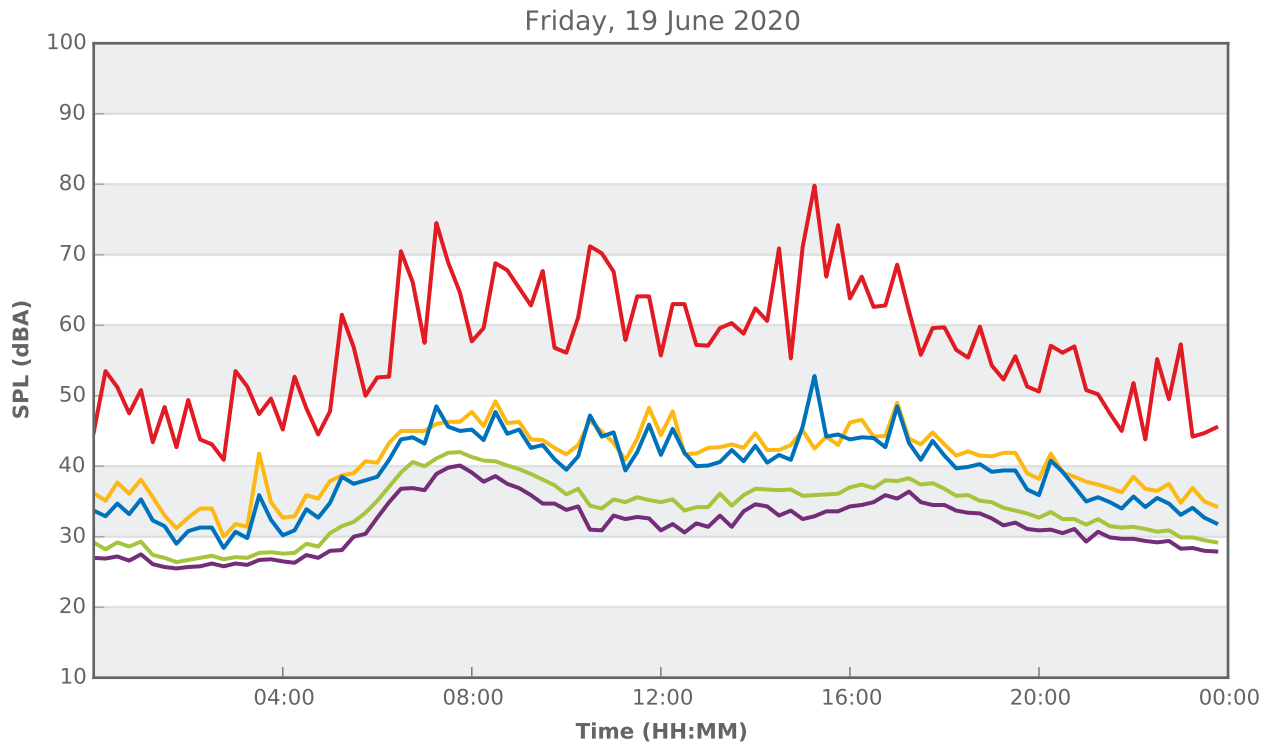
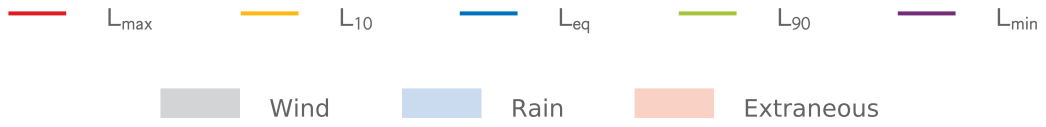
16 Bangaroo Street North Balgowlah



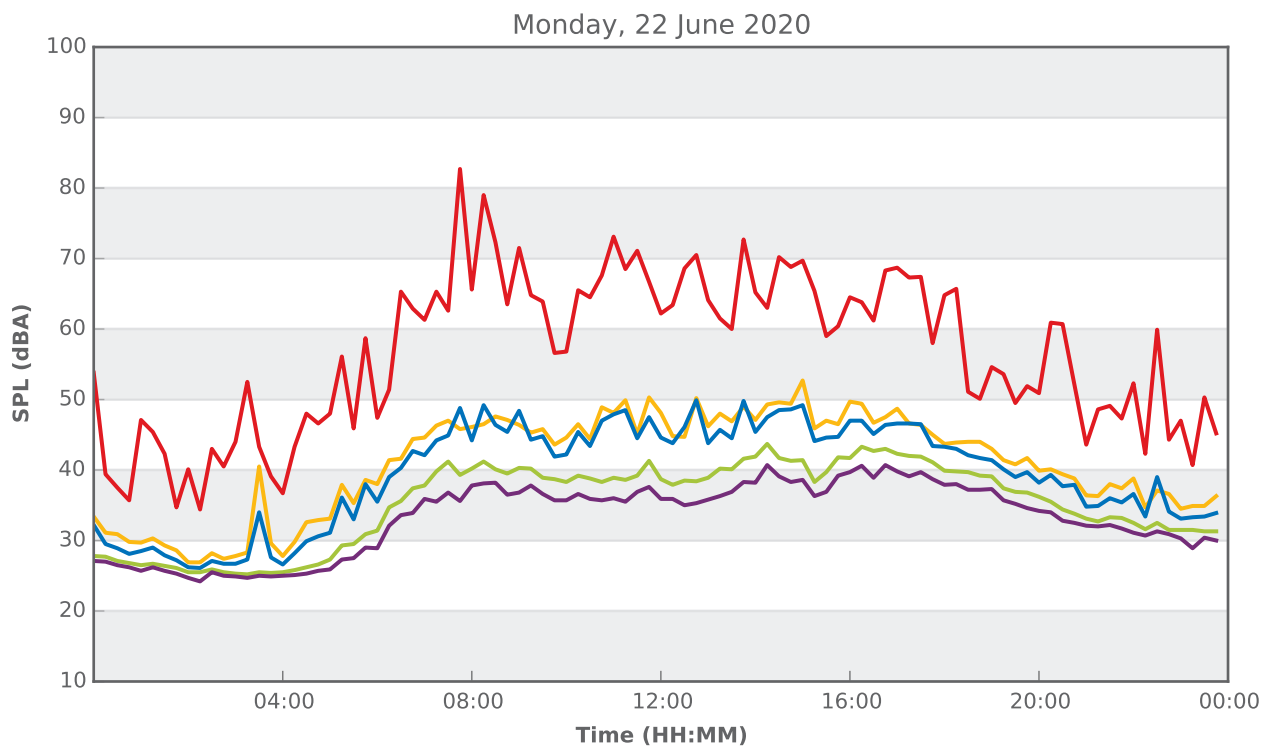
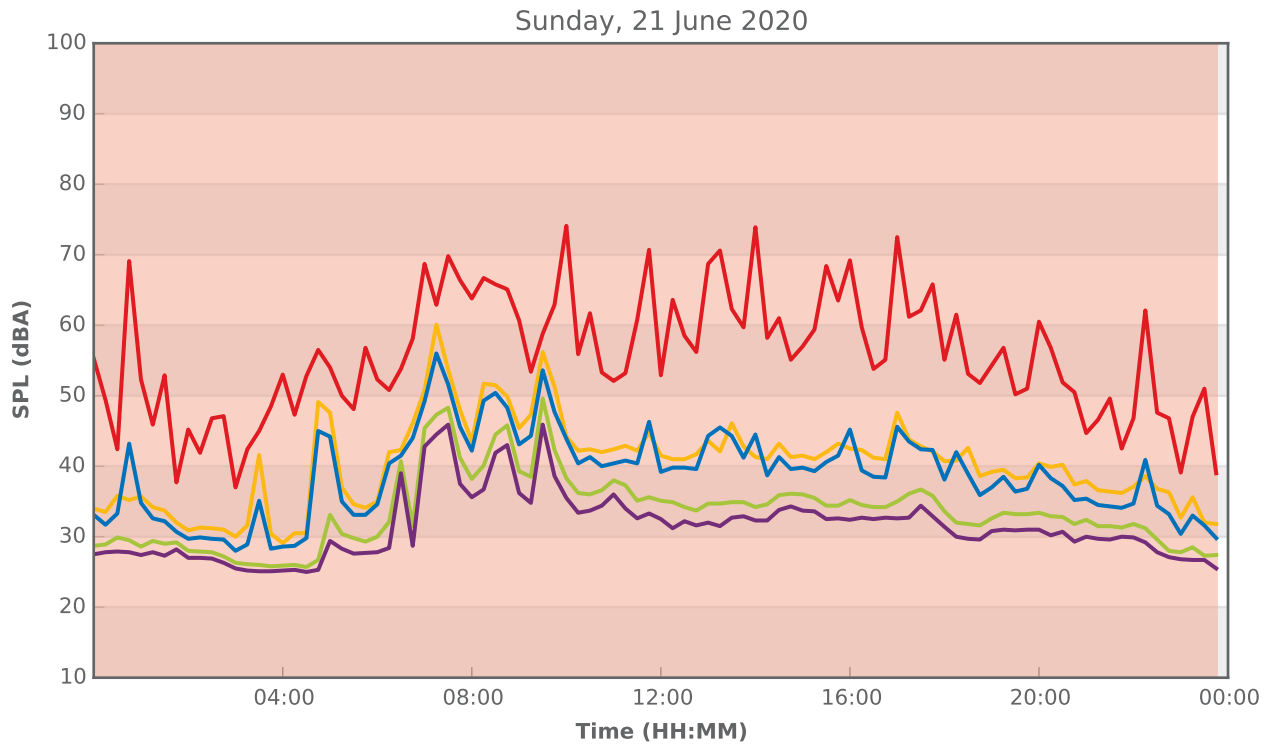
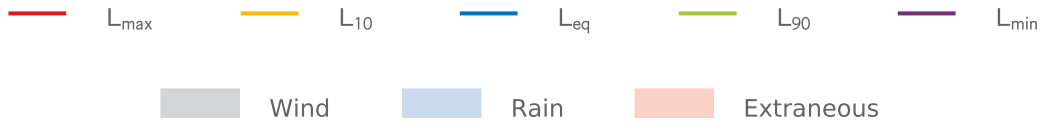
16 Bangaroo Street North Balgowlah



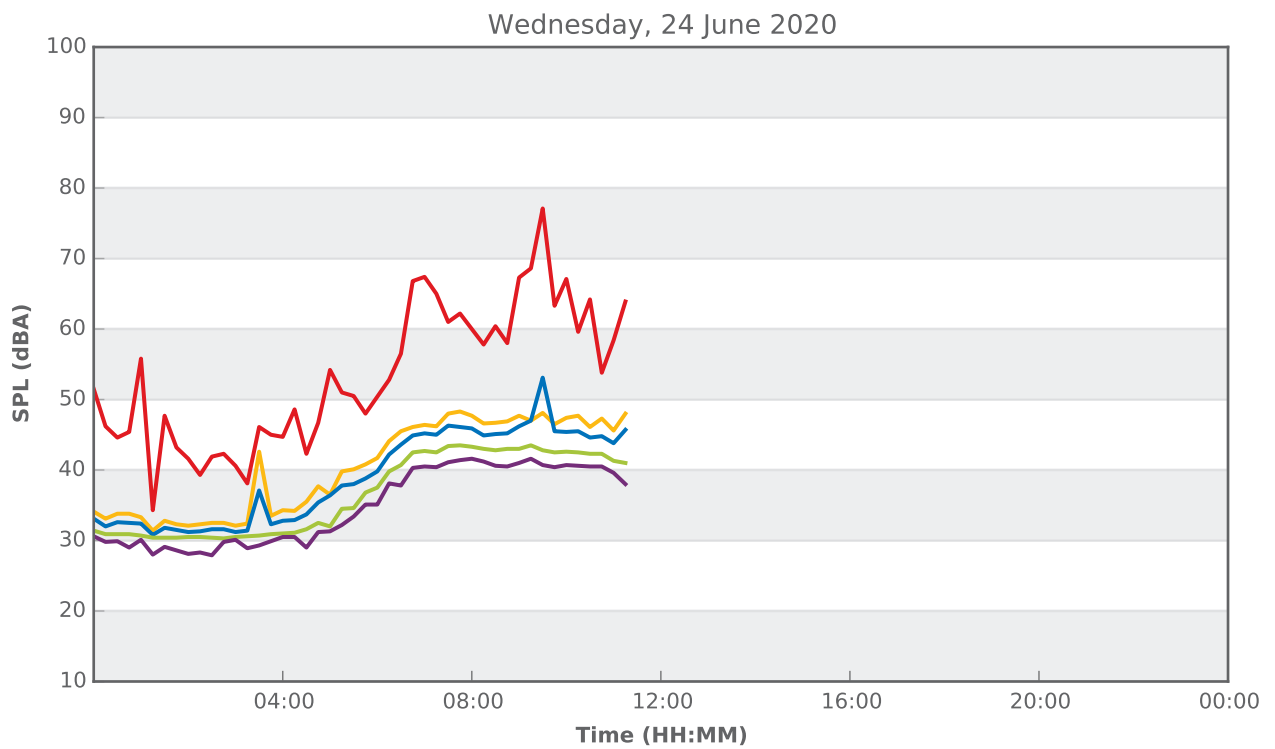
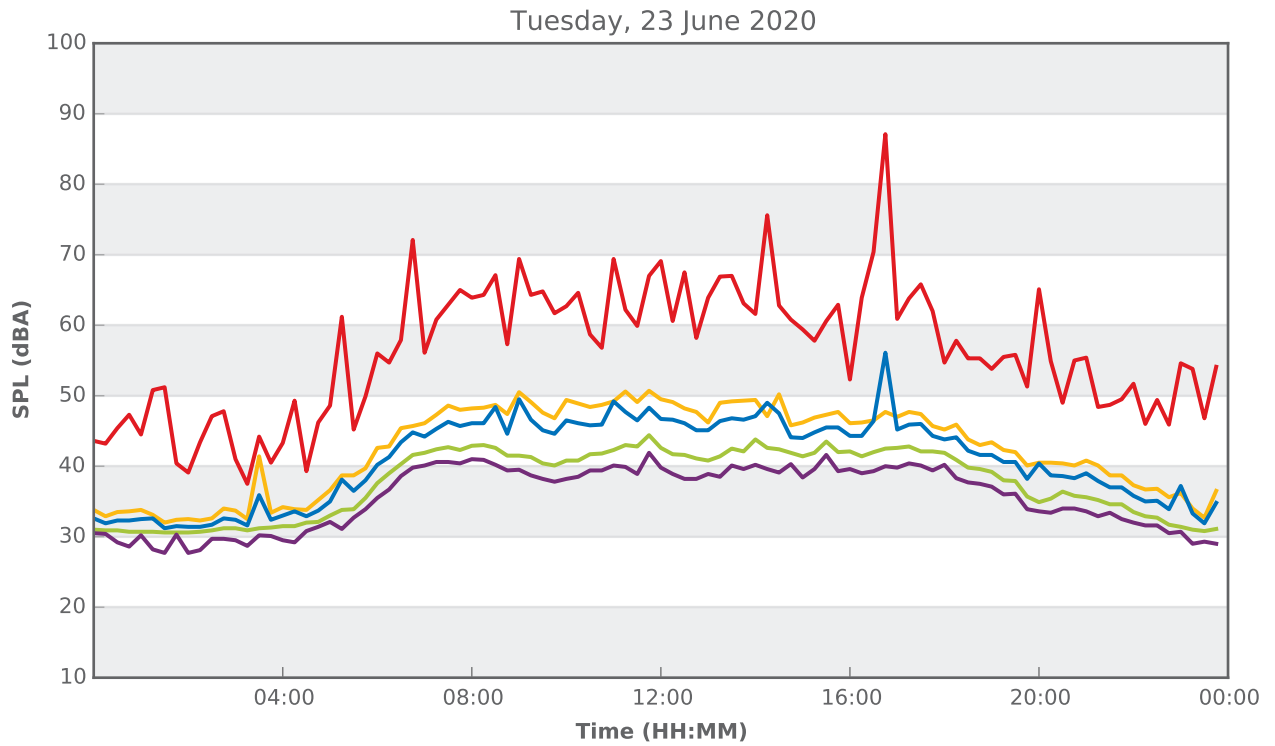
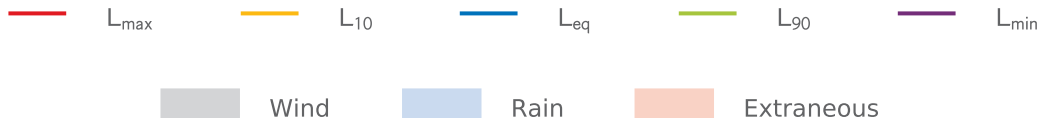
16 Bangaroo Street North Balgowlah



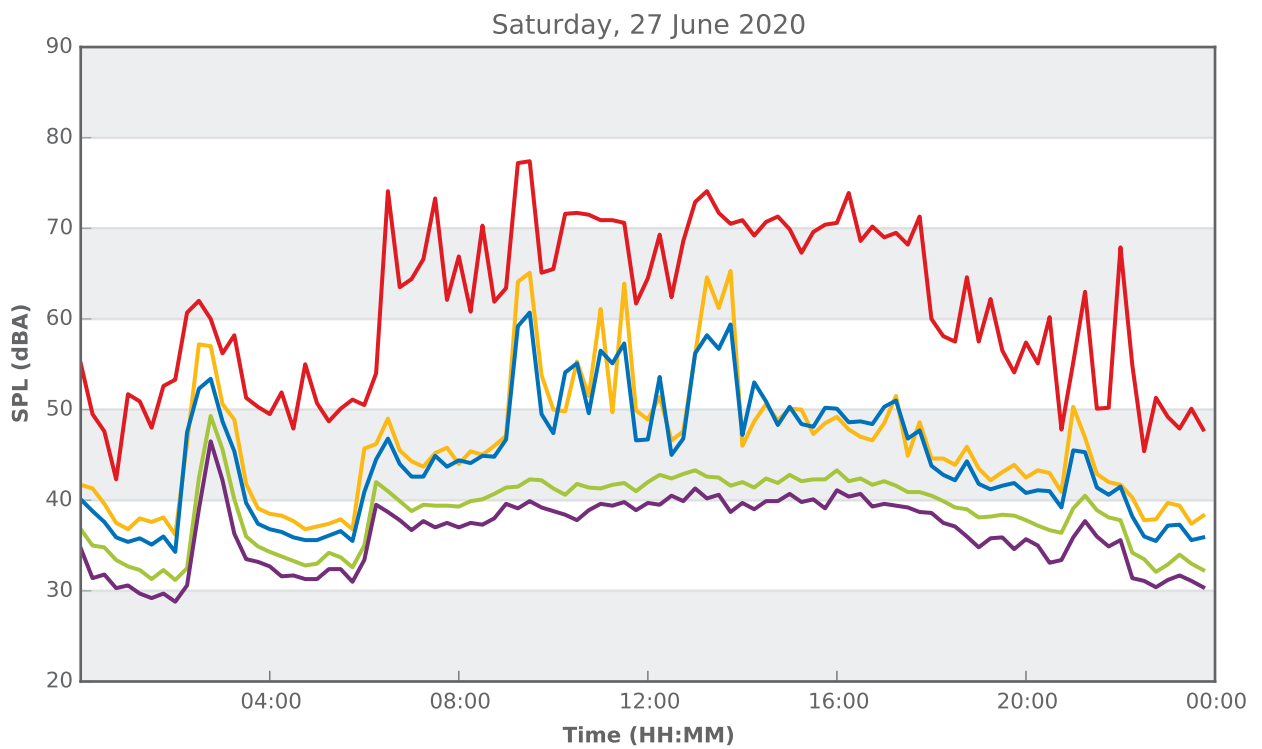
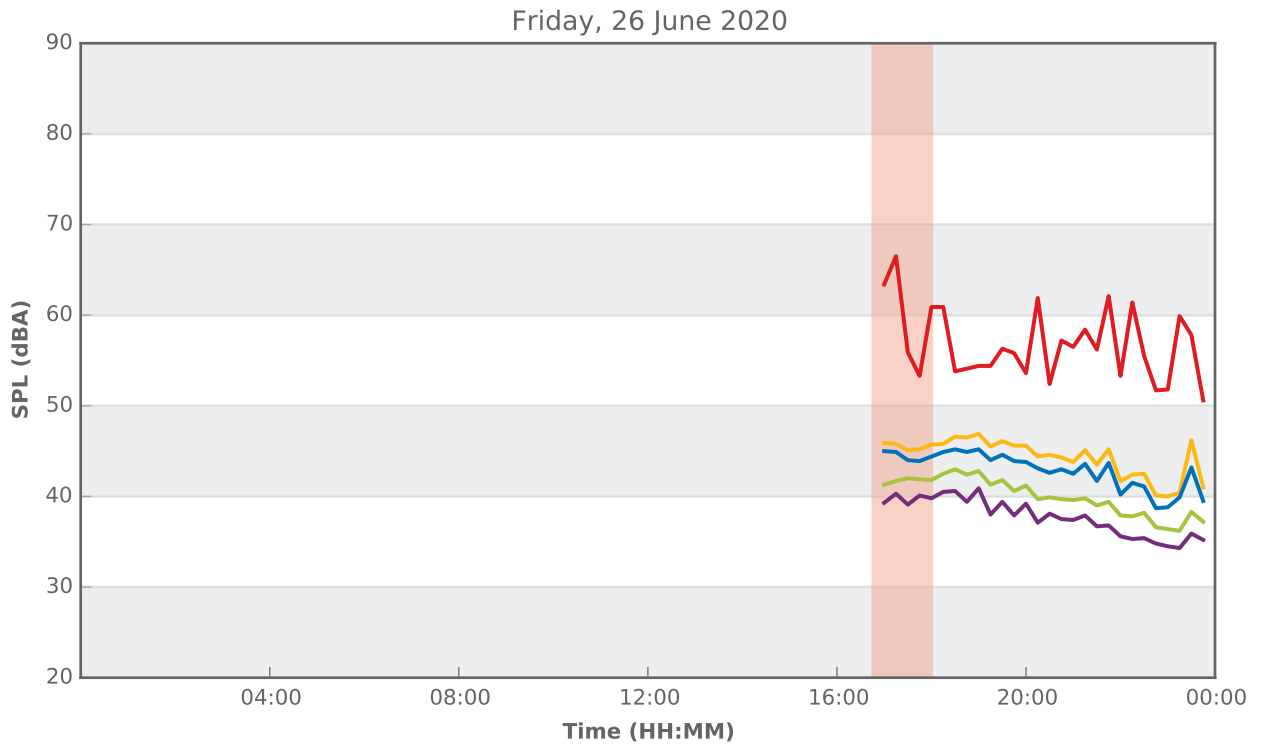
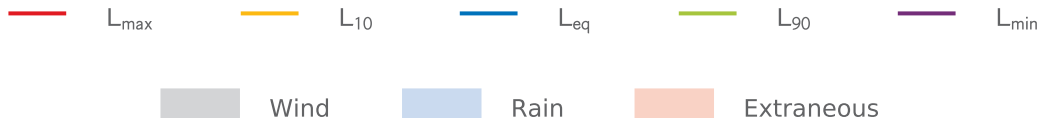
16 Bangaroo Street North Balgowlah



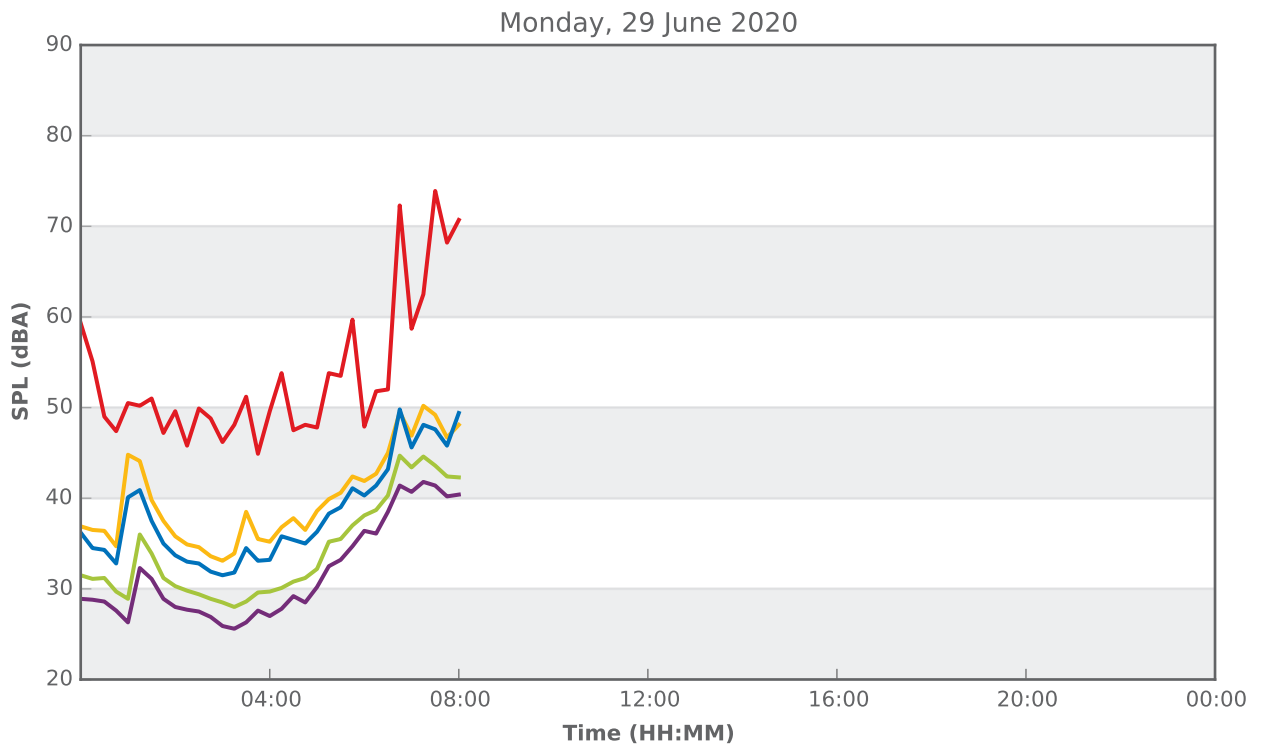
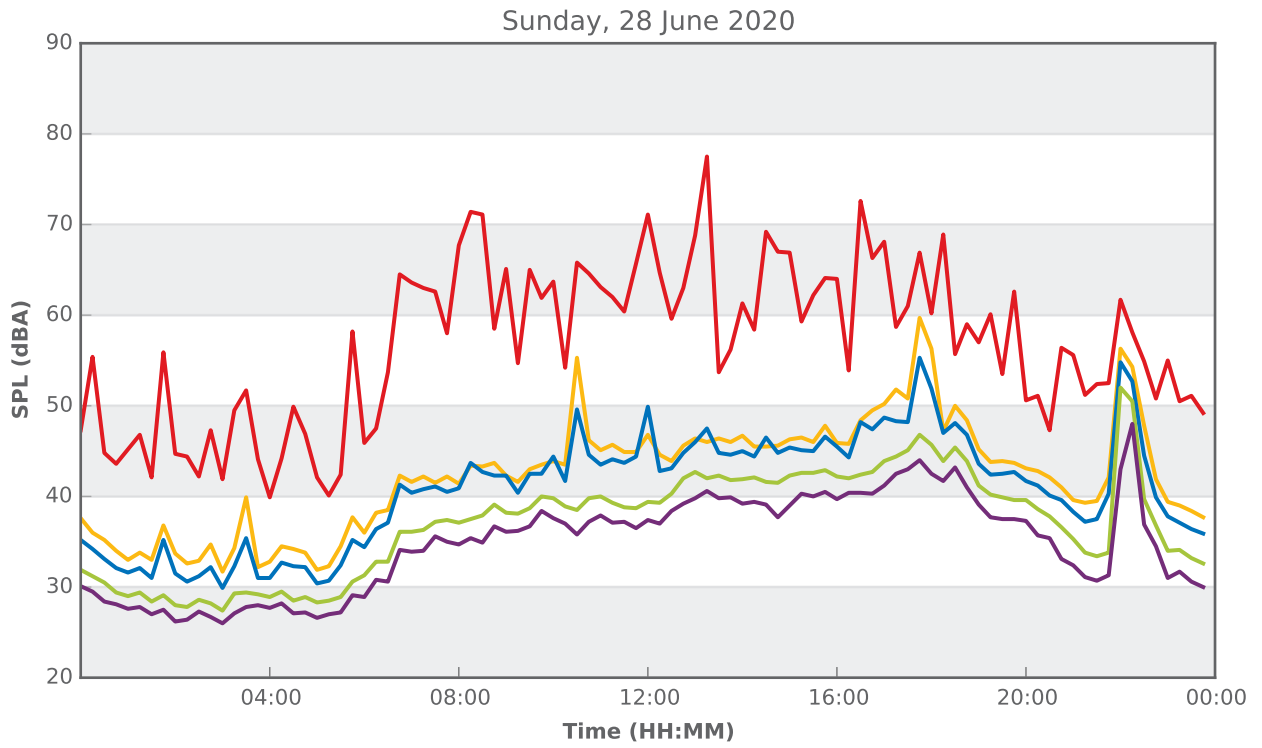
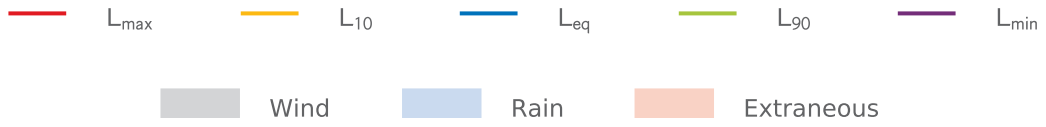
16 Bangaroo Street North Balgowlah



16 Bangaroo Street, North Balgowlah

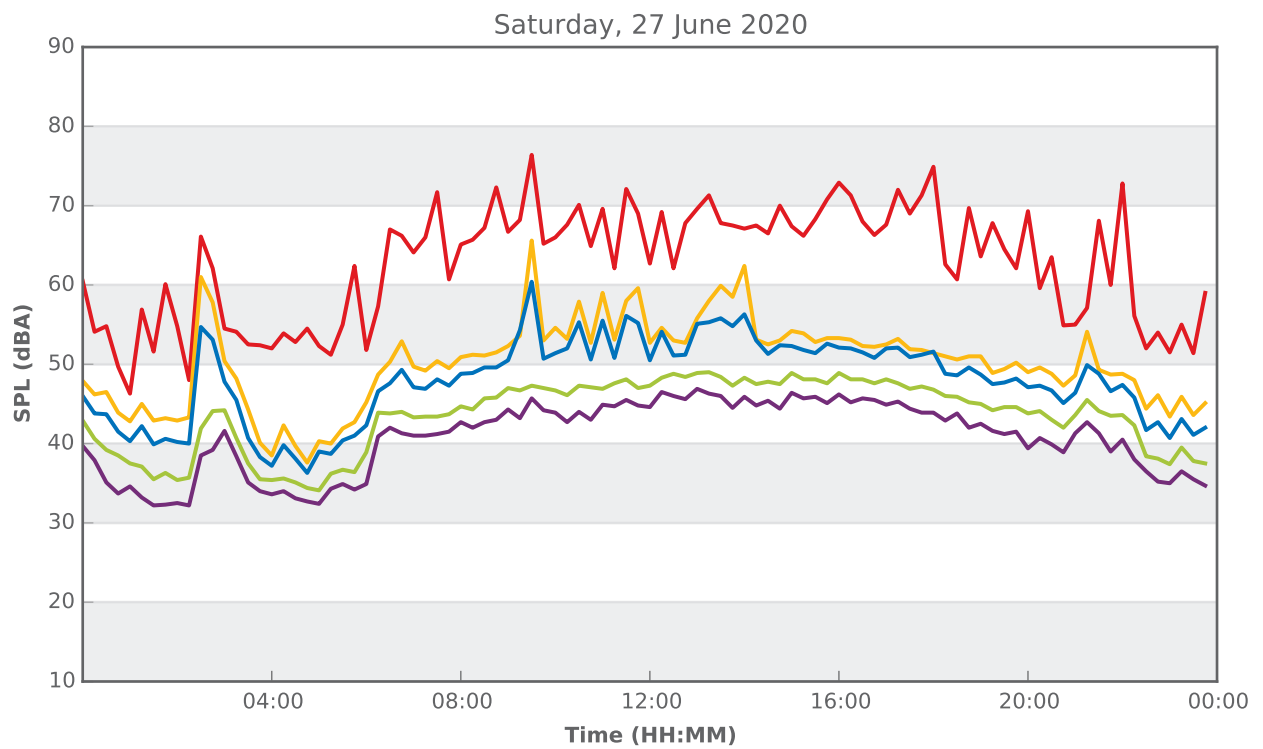
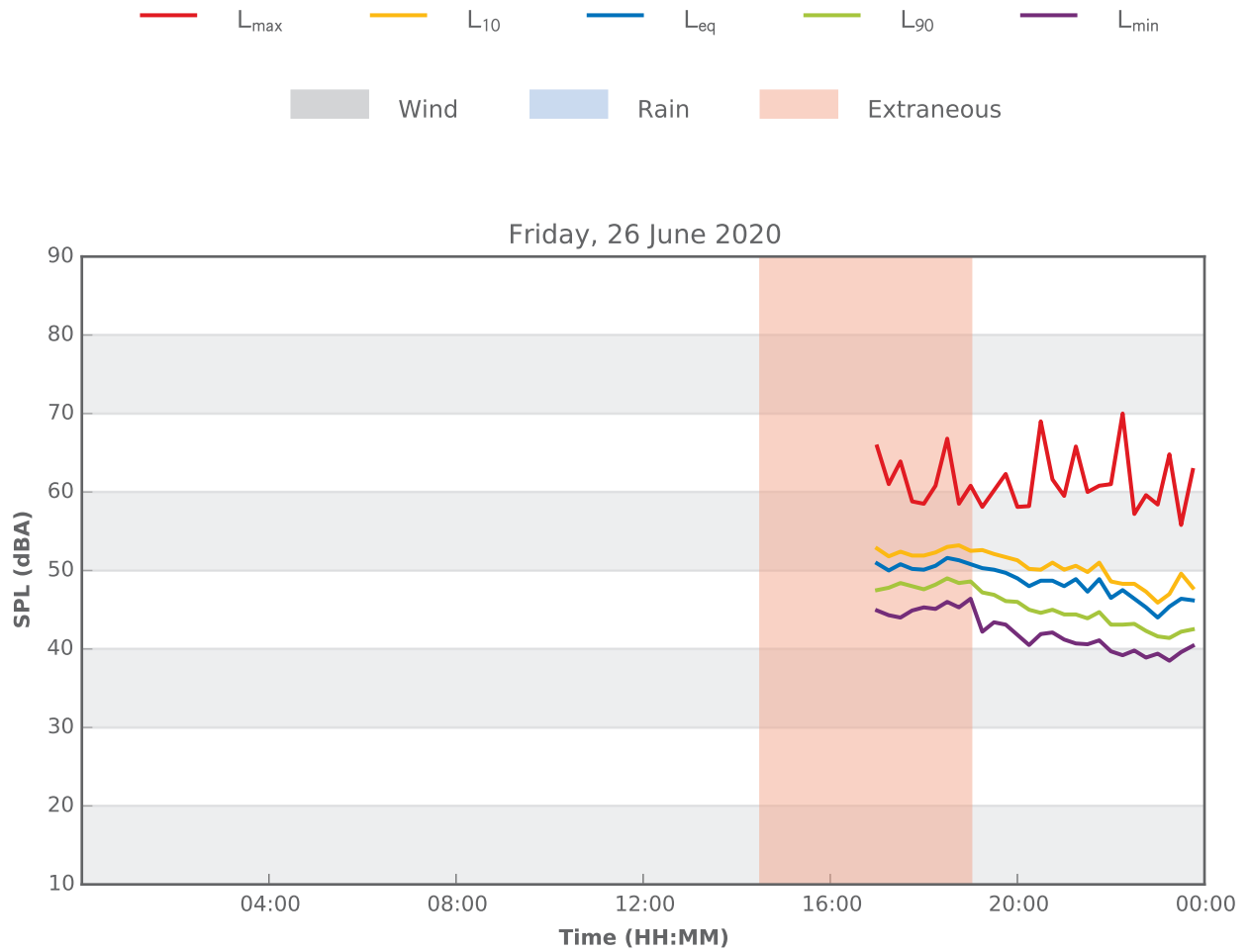


16 Bangaroo Street, North Balgowlah



NOISE LOGGER L03 - REAR UPPER BALCONY

16 Bangaroo Street, North Balgowlah



16 Bangaroo Street, North Balgowlah

