

CHILD CARE CENTRE
49 GIBBES STREET, REGENTVILLE
DA ACOUSTIC ASSESSMENT

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PREPARED FOR

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Quality
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Celebrating 50 Years in 2012

Wilkinson Murray is an independent firm established in 1962, originally as Carr & Wilkinson. In 1976 Barry Murray joined founding partner Roger Wilkinson and the firm adopted the name which remains today. From a successful operation in Australia, Wilkinson Murray expanded its reach into Asia by opening a Hong Kong office early in 2006. Today, with offices in Sydney, Newcastle, Wollongong, Orange, Queensland and Hong Kong, Wilkinson Murray services the entire Asia-Pacific region.



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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.

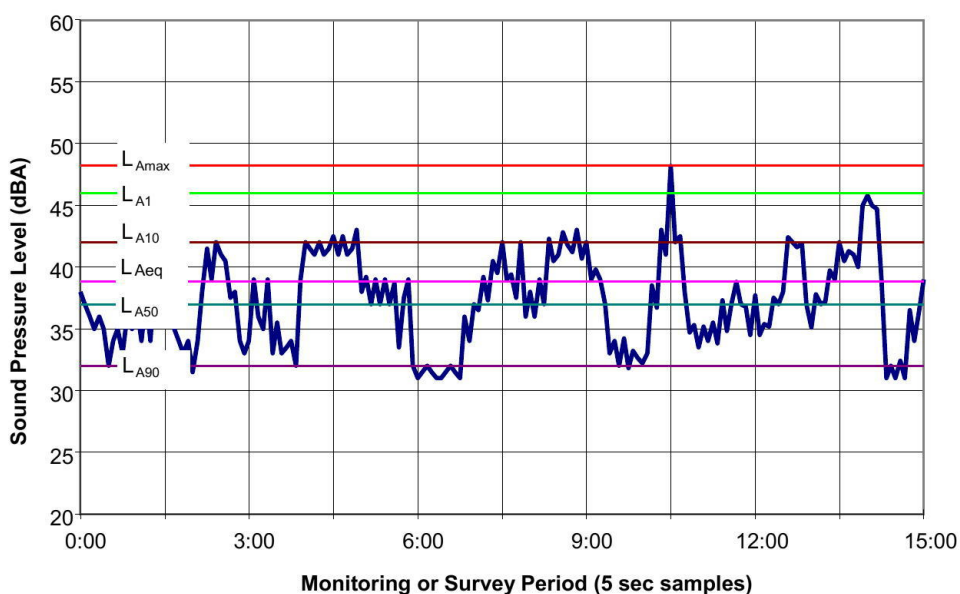
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

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 Grace Early Learning to undertake a noise impact assessment for the Development Application of a proposed child care centre located at 49 Gibbes Street, Regentville (the site). The site is currently occupied by a single storey residential dwelling, surrounded by residential properties.

This report presents the noise assessment of children playing indoors and outdoors, mechanical plant, vehicle noise associated with the centre and road traffic noise impacting on the site. This assessment report provides 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. This guideline is consistent with the Penrith Council's Development Control Plan noise requirement for a child care centre.

2 SITE DESCRIPTION

According to the Penrith City Council, the site and the nearby surrounding receivers are located within a low-density residential area. Mulgoa Road is the nearest arterial road from the site and is located 80m south of the site. The M4 highways is located approximately 600m north-east from the site. Table 2-1 presents the nearest identified residential receivers from the site. A site map of the existing site (outlined in red) and the surrounding receivers are shown in Figure 2-1.

Table 2-1 Closest Noise Sensitive Receivers

Receiver ID	Receiver Type	Address
R01	Double storey Residential	50A Loftus Street, Regentville
R02	Single storey Residential	46 Loftus Street, Regentville
R03	Single storey Residential	42 Loftus Street, Regentville
R04	Single & Double storey Townhouses	47 Gibbes Street, Regentville
R05	Single storey Residential	48 Gibbes Street, Regentville
R06	Single storey Residential	50 Gibbes Street, Regentville
R07	Single storey Residential	52 Gibbes Street, Regentville
R08	Single storey Residential	51 Gibbes Street, Regentville

Figure 2-1 Existing Site & Surrounding Receivers

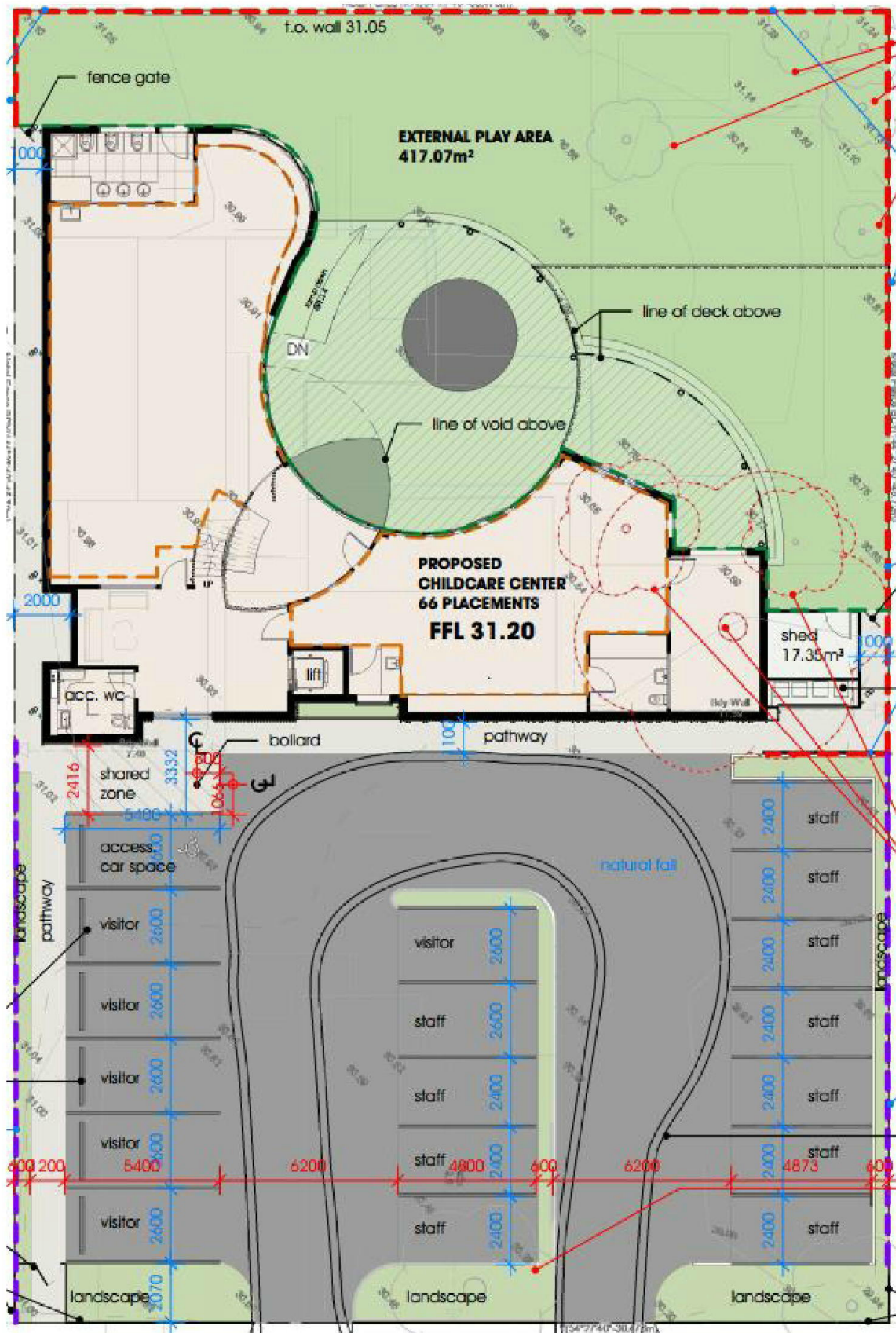


The proposed development is a double storey structure which comprises of 3 separate playrooms, an office/staff space, outdoor play area in the backyard (located north) and a carpark at the front with 19 car spaces. An additional outdoor play area is located on the first floor, outside of playroom 3, approximately 79m².

The proposed child care centre will accommodate up to 10 children between the ages of 0 and 2 years old, 20 children between the ages of 2 and 3 years old and 30 children between the ages of 3 and 5 years old. The centre will operate from 7.00am-6.00pm, Monday to Friday.

The proposed layout is presented in Figure 2-2.

Figure 2-2 Proposed Site Layout



3 EXISTING AMBIENT NOISE LEVELS

3.1 Existing Noise Levels

Long-term unattended noise monitoring was conducted between 16 and 25 April 2019, using two ARL 215 noise loggers. The noise monitoring equipment were set to A-weighted, fast response, continuously monitoring over 15-minute sampling periods. 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.

The noise loggers were installed on front and backyard of the existing residential property located at 49 Gibbes Street, Regentville.

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. Logger 1 represents the backyard noise logger and Logger 2 represents the logger in the front yard. The noise results exclude noise measurements taken on a public holiday.

Table 3-1 Daytime (7am-6pm) Ambient Noise Levels

Logger	Noise Level (dBA)		Comment
	RBL (L_{A90})	L_{Aeq}	
1 Rear	40	62	Ambient noise was affected by traffic noise along Mulgoa Road and barking dogs
2 Front	41	51	Ambient noise was mainly influenced by distant traffic noise from Mulgoa Road

4 NOISE CRITERIA

The following noise issues should be considered for the child care centre:

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

4.1 AAAC Guidelines

4.1.1 Child at Play, Onsite Vehicles and Mechanical Plant

The AAAC Guidelines state that cumulative noise $L_{Aeq,15min}$ generated by mechanical plant and traffic on site should not exceed the background level by more than 5dBA at the assessment location for residential receivers.

For noise generated by outdoor play, the AAAC Guidelines provide different criteria depending on the amount of time that outdoor play occurs. For surrounding residential receivers, the criteria are as follows:

- Up to 2 hours (total) per day – $L_{eq,15 min}$ must not exceed Background Level + 10dBA
- More than 2 hours per day – $L_{eq,15min}$ must not exceed Background Level + 5dBA

The adopted criteria for operational noise are presented in Table 4-1.

Table 4-1 Operational Noise Criteria

Receivers	Operational Noise Criteria	
	$L_{Aeq,15min}$	Up to 2 Hours Play $L_{Aeq,15min}$
R01 – R03	45	50
R04 – R08	46	51

4.2 Additional Traffic Generated by the Site

Additional road traffic movements generated by the proposed centre will result in increased traffic noise that may potentially impact residential receivers along Gibbes Street. We note that there will also be additional traffic on Mulgoa Road. However, given the existing traffic volumes on Mulgoa Road, the impact of the additional traffic generated by the child care centre will be negligible.

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 Gibbes Street. As required by the *RNP*, the functional category of these roads is to be confirmed so that noise criteria can be determined.

The applicable *RNP* criteria during the daytime (when vehicular movements associated with this proposed Centre will occur) is presented in Table 4-2.

Table 4-2 Road Noise Criteria

Road Category	Type of Project/Land Use	Assessment Criteria, dBA Daytime 7am-10pm ⁽¹⁾
Local Roads (Gibbes Road)	Existing residences affected by noise from new local road corridors	L _{Aeq,1hr} 55 (external)

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

5 NOISE ASSESSMENT

5.1 Noise Modelling

Site related noise emissions were modelled using the SoundPLAN 8 noise prediction software. Factors that are addressed in the modelling are:

- Equipment sound level emissions and locations;
- Screening effects from buildings;
- Receiver locations;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; 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.

5.2 Sound Power Level of Children Playing

Based on the AAAC document, *Guideline for Child Care Centre Acoustic Assessment (2010)* and 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 each age group are shown in Table 5-1.

Table 5-1 Children Playing Sound Power Level

Age Group	Number of Children in Group		
	10	20	30
0-2 years old	80	83	86
2-3 years old	84	88	92
3-5 years old	86	90	94

5.3 Operational Scenario

Two noise prediction scenarios are modelled to assess the worst-case scenario. The first scenario assesses all children engaged in active play inside the centre with the centre windows open. The second scenario assesses 30 children playing outside (20 in the outdoor play area and 10 on the first level play deck) and the remaining 30 children playing indoors with the centre windows open. The second scenario assumes children between 3-5 years old are outdoor, as they have the highest sound power level.

Table 5-2 summarises the layout of the two noise prediction scenarios. The table provides the location of the children and the number of children in each area.

Table 5-2 Modelled Scenarios

Scenario	Children	Location	Quantity
Scenario 1 – Children playing indoors with windows open	0-2 years	Playroom 1 – Ground Floor	10
	2-3 years	Playroom 3 – First Floor	20
	3-5 years	Playroom 2 – Ground Floor	30
Scenario 2 – 31 Children playing outdoors and 44 playing indoors	0-2 years	Playroom 1 – Ground Floor	10
	2-3 years	Playroom 3 – First Floor	20
	3-5 years	Outdoor Play space	20
	3-5 years	Outdoor play area deck – First Floor	10

The worst-case operational noise prediction scenarios also assume the following items:

- The fence surrounding the outdoor play area to be 1.8m high;
- The child care centre playrooms in both scenarios have window/doors open;
- The play area deck on the first floor has a 1m high barrier surrounding the deck; and
- The playground area consists of either grass or soft ground.

5.4 Noise Modelling Results

Table 5-3 and Table 5-4 present the predicted noise levels of each scenarios as presented in Table 5-2.

Table 5-3 Operational Scenario 1 – All Children Playing Indoors

ID	Address	Noise Prediction	Noise Criteria	Compliance
		$L_{Aeq,15min}$		
R01	50A Loftus Street – Ground	42	45	Compliant
	50A Loftus Street – 1 st Floor	44	45	Compliant
R02	46 Loftus Street	46	45	Non-Compliant
R03	42 Loftus Street	46	45	Non-Compliant
R04	47 Gibbes Street	52	46	Non-Compliant
R05	48 Gibbes Street	28	46	Compliant
R06	50 Gibbes Street	32	46	Compliant
R07	52 Gibbes Street	34	46	Compliant
R08	51 Gibbes Street	36	46	Compliant

It was noted that open windows/doors nearest to residential receivers are the cause of the non-compliance at receivers R01 to R04. Noise control recommendation including extension of noise barrier and a window to be closed when children are playing inside are provided in Section 6.

Table 5-4 Operational Scenario 2 – 30 Children Playing Outdoors & 30 Playing Indoors

ID	Address	Noise Prediction $L_{Aeq,15min}$	Noise Criteria		Compliance
			Criteria More than 2 hours Play	Criteria Up to 2 hours Play	
R01	50A Loftus Street – Ground	47	45	50	No/Yes
	50A Loftus Street – 1 st Floor	49	45	50	No/Yes
R02	46 Loftus Street	48	45	50	No/Yes
R03	42 Loftus Street	48	45	50	No/Yes
R04	47 Gibbes Street	53	46	51	No/No
R05	48 Gibbes Street	39	46	51	Yes/Yes
R06	50 Gibbes Street	37	46	51	Yes/Yes
R07	52 Gibbes Street	36	46	51	Yes/Yes
R08	51 Gibbes Street	36	46	51	Yes/Yes

Noise exceedance is predicted at receiver locations R01 to R04. Noise control recommendations to satisfy the more than 2 hours play noise criteria (background level + 5dB) are provided in Section 6.

5.5 Noise from Onsite Vehicles

At this stage, a traffic impact assessment report has been not been prepared. Therefore, the following onsite vehicle noise assessment are based on the design plans and the proposed number of children within the centre. It is assumed peak drop-offs at the centre will be made between 7.00am and 9.00am and peak pick-ups will be made between 4.00pm and 6.00pm.

To assess the noise impact on surrounding receivers, SoundPLAN noise modelling software has been used. The onsite vehicle noise impact prediction assumes the following items:

- 38 parking events per hour/9.5 parking events per 15 minutes;
- Parking lot consists of an asphalt road surface;
- 1.2m high barrier on the east and west boundary of the parking lot;
- Parking Lot type: visitors and staff; and
- Typical car starting Sound Power Level of 95dBA.

The predicted noise levels from vehicles on site are presented in Table 5-5.

Table 5-5 Predicted Noise Levels from Vehicles Onsite

ID	Address	Noise Prediction	Noise Criteria	Compliance
		L _{Aeq,15min}		
R01	50A Loftus Street	34	45	Compliant
R02	46 Loftus Street	39	45	Compliant
R03	42 Loftus Street	39	45	Compliant
R04	47 Gibbes Street	44	46	Compliant
R05	48 Gibbes Street	42	46	Compliant
R06	50 Gibbes Street	39	46	Compliant
R07	52 Gibbes Street	41	46	Compliant
R08	51 Gibbes Street	45	46	Compliant

5.6 Mechanical Plant Noise

At this stage, the design and selection of the mechanical equipment required to service the centre has not been finalised. However, the following noise control should be considered:

- Install the external condenser units on the east wall of Playroom 2 or at the front of the child care centre to ensure sufficient shielding and distance between the units and surrounding receivers is made.
- Ensure the Sound Power Level of the condenser units do not exceed 70dBA.

When the mechanical plant has been selected, the units should be checked prior to their installation to ensure noise emissions do not exceed the relevant noise standard.

5.7 Road Traffic Noise on Public Roadways

It should be noted at this stage, a road traffic impact assessment report has not been provided to Wilkinson Murray. Therefore, the following assessment of vehicle noise on public roadways are based on the proposed number of children within the centre.

It is assumed peak drop-offs at the centre will be made between 7.00am and 9.00am and peak pickups will be made between 4.00pm and 6.00pm. The centre is likely to generate 38 vehicles entering and 38 vehicles departing the childcare centre per hour. Therefore, a total of 76 vehicle movements along Gibbes Street within an hour period is assumed.

Receiver R06 is the nearest property to Gibbes Street. If the road traffic noise complies at this location, then compliance is achieved at all receiver locations along Gibbes Street. The road traffic noise assessment is calculated in accordance with the *Calculation of Road Traffic Noise* methodology.

Table 5-6 presents the façade-reflected noise level prediction at 50 Gibbes Street from road traffic noise from Gibbes Street.

Table 5-6 Predicted Noise Levels from Vehicles Movement along Gibbes Street

ID	Address	Noise Prediction $L_{Aeq,1hr}$	Noise Criteria	Compliance
R06	50 Gibbes Street	55	55	Compliant

6 NOISE CONTROL RECOMMENDATIONS

The worst-case daytime operational scenarios presented in Section 5.4 are predicted to exceed the relevant noise standards at four receiver locations. The following recommendations in this section is to achieve the noise criteria for children to play outdoors throughout the whole day, background level + 5dB noise criterion.

6.1 Noise Barrier

The proposed noise barrier should consist of the following properties:

- All joints between noise barrier panels should be sealed airtight and should not have an 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 formed solid material with a density of greater than 20kg/m²;
- The surrounding playground barrier height should be no less than 1.8m high and is to be fitted with a 45 ° angled cantilevered top, approximately 0.9m long. The internal walls of the playground noise barrier should be fitted with sound absorbers with a Noise Reduction Coefficient (NRC) of 0.8;
- The east and west boundary barrier adjacent to the parking lot should be no less than 1.5m high;
- Figure 6-1 presents the layout of the playground (red) and parking lot (purple) noise barrier.
- The balustrade on the first-floor playroom deck should also have the barrier qualities as outline above and should be no less than 1.5m high.

6.2 Assigned Windows/Sliding Doors to be Closed

The following windows should remain closed while all children are actively playing inside:

- North-East side of sliding door Playroom 2;
- Playroom 3 window facing east.

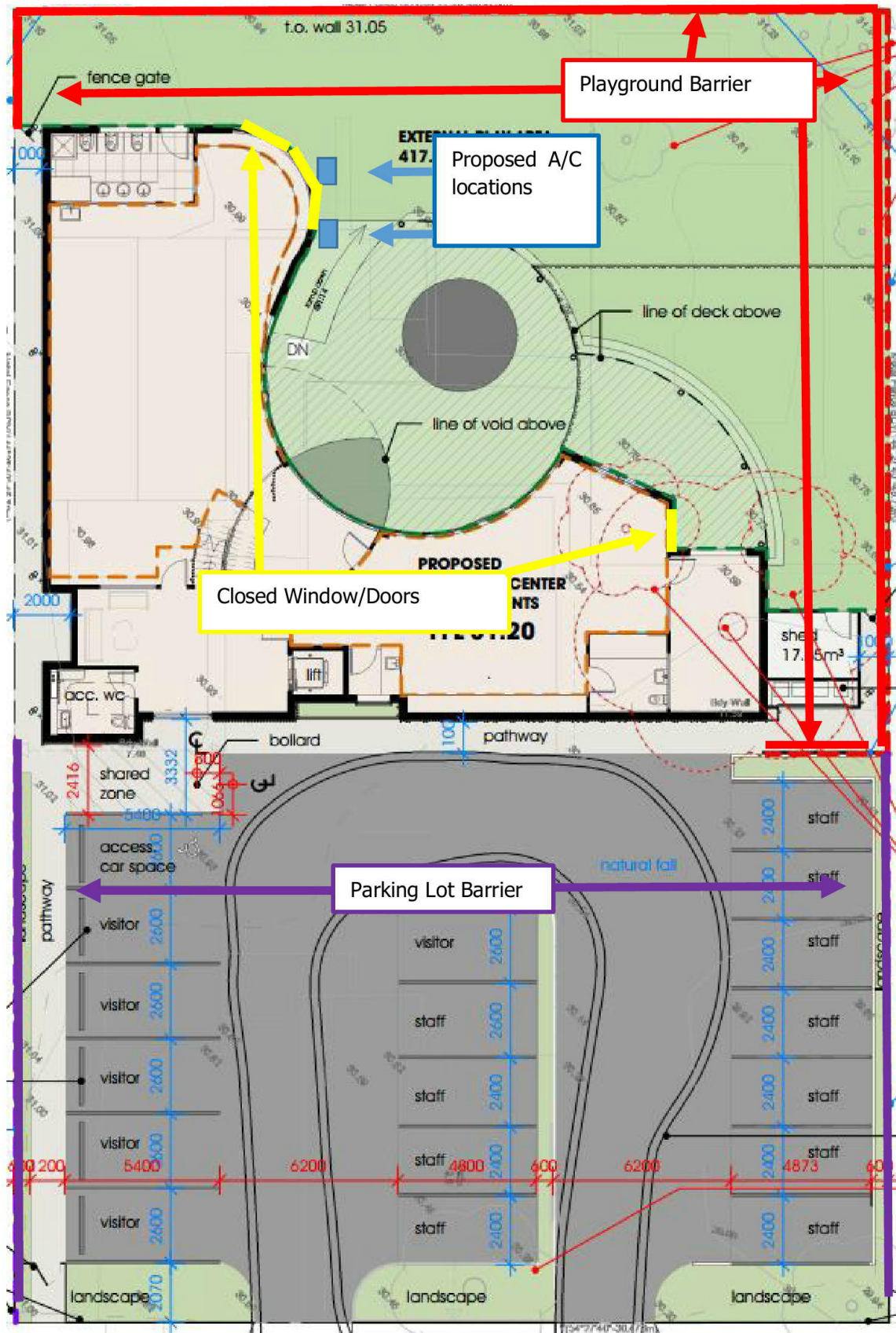
6.3 Mechanical Plant

The following noise control for mechanical units should be considered:

- Install the condenser unit on the east wall of Playroom 2 or at the front of the child care centre site as shown in Figure 6-1.
- Ensure the Sound Power Level of the condenser units do not exceed 70dBA.

Figure 6-1 presents the recommended noise control plan as outlined in Sections 6.1, 6.2 and 6.3 on the proposed site plan.

Figure 6-1 Proposed Noise Control Plan



Reducing the Number of Children Outside

Site personnel should ensure a maximum of **20** children to play outdoors at one time to satisfy noise amenity.

6.4 Noise Management Plan

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

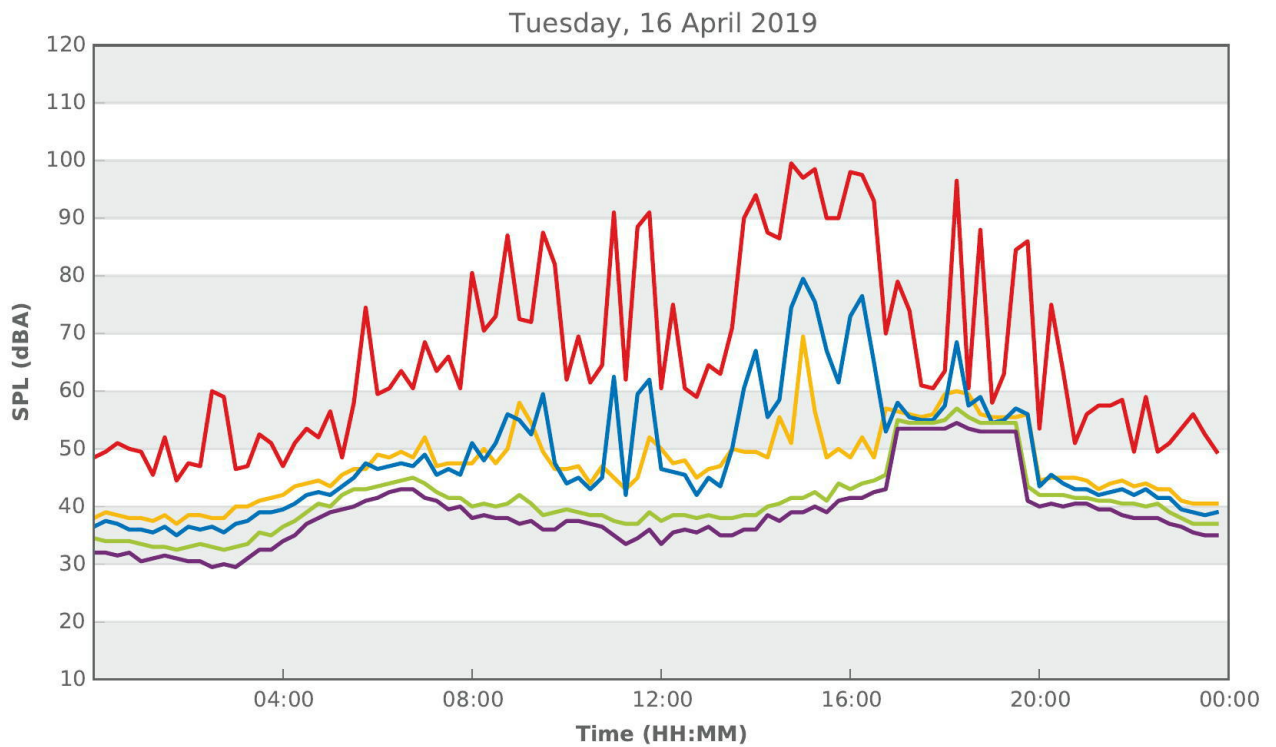
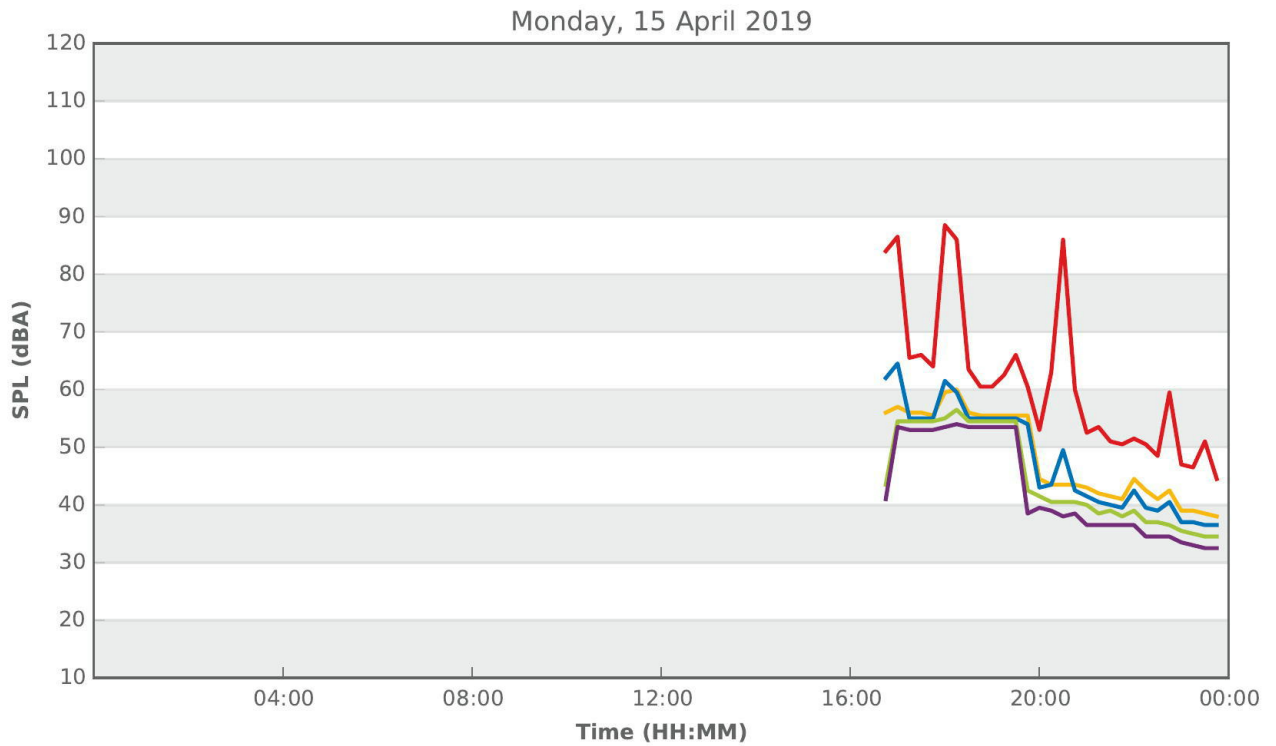
- Only allow a maximum of 20 children in the outdoor play area. Additionally, if children are playing on the first level deck then only 10 children playing outside is permitted;
- Programs should be made available to parents and neighbours;
- Proposed external condenser units should be organised, as outlined in Section 5.6;
- 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;
 - vehicles should not be left idling on site.
- 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; and
- Doors and windows of indoor playroom should remain closed during high/intense noise level activities.

7 CONCLUSION

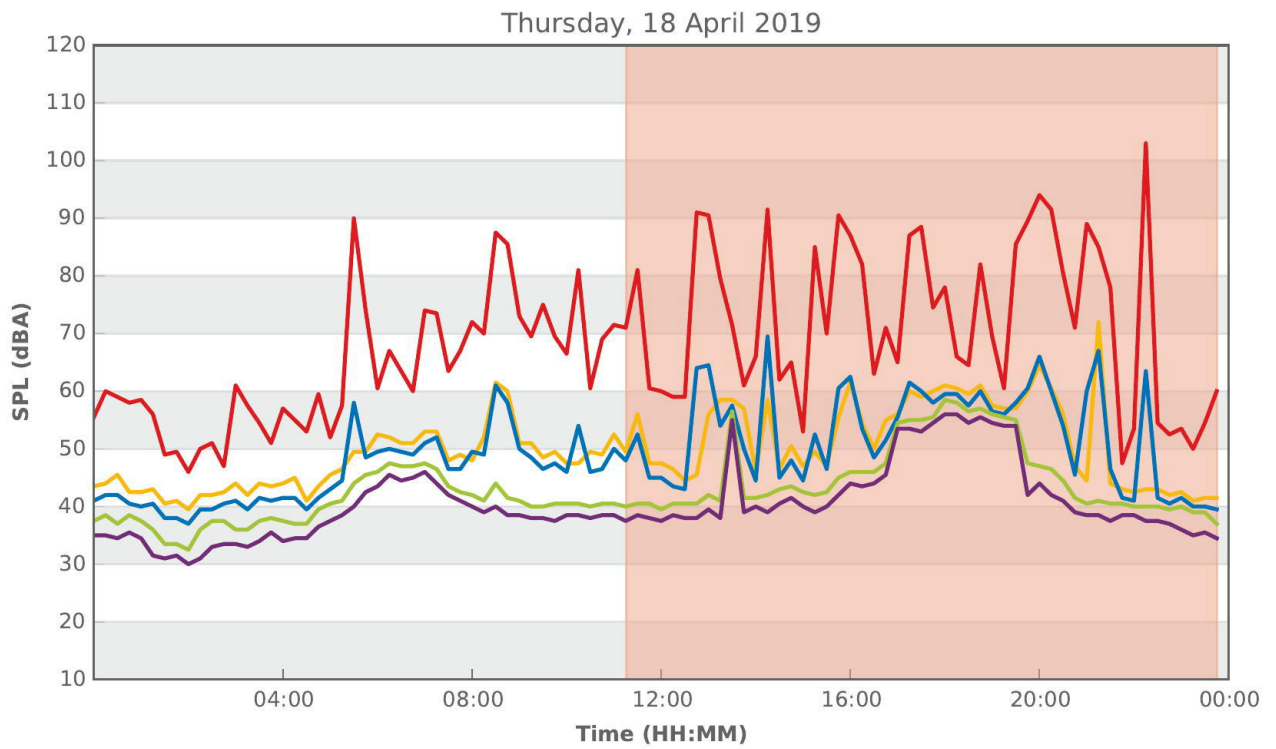
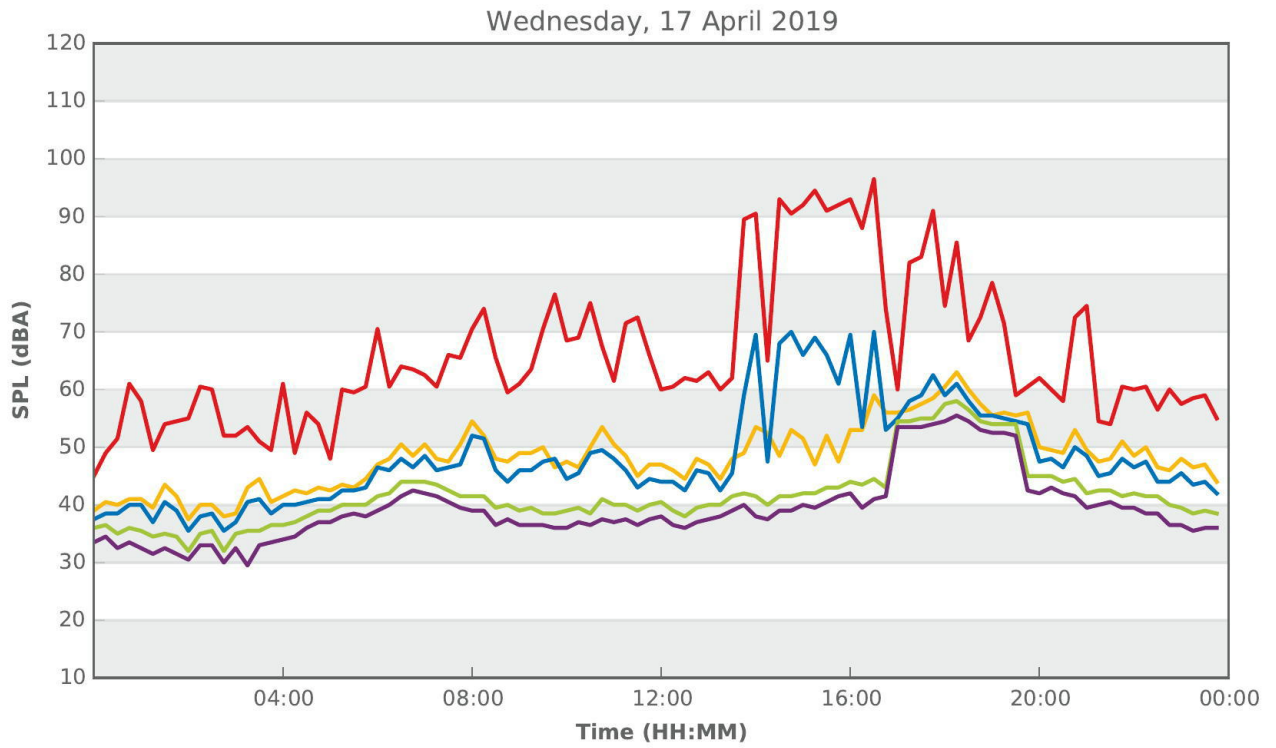
Wilkinson Murray has assessed potential noise impacts from the operation of the proposed child care centre at 49 Gibbes Street, Regentville with respect to the requirements from the AAAC Guidelines and the NSW noise standard.

The operation of a childcare centre is able to meet the requirements of Council, provided that the mitigations as recommended in Section 6 of this report are correctly implemented.

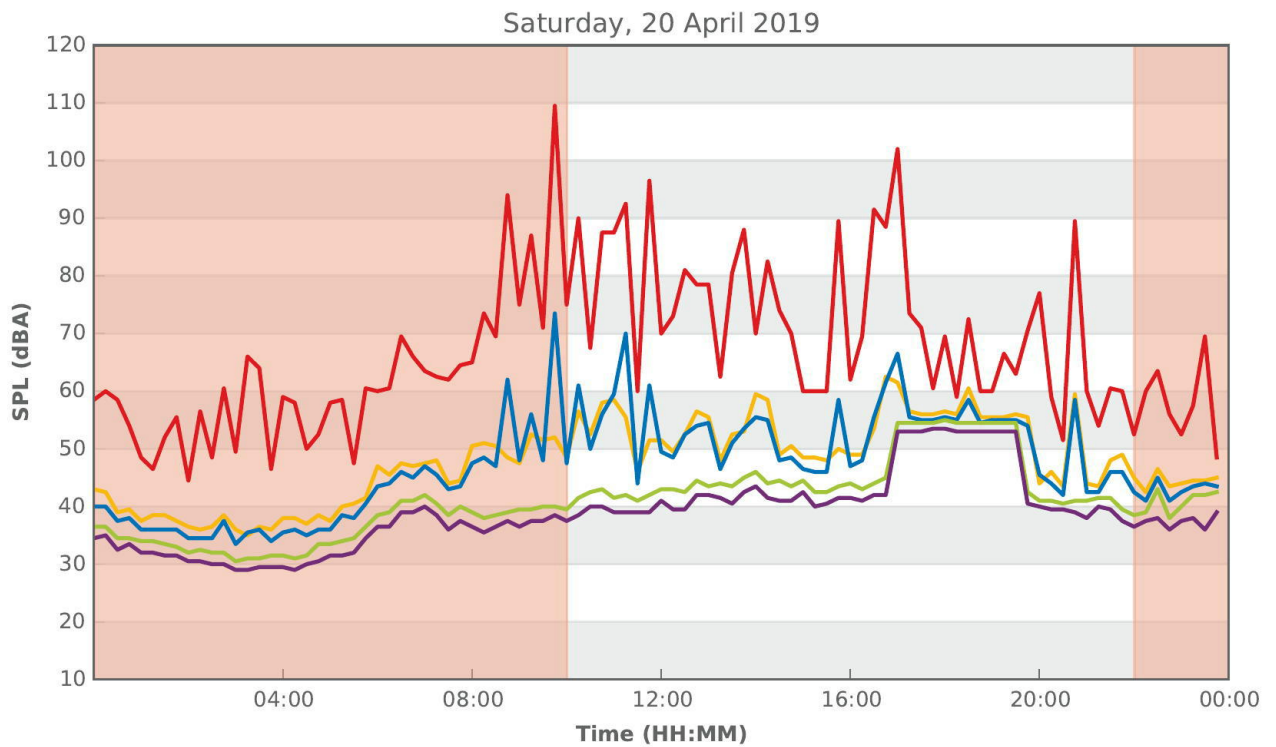
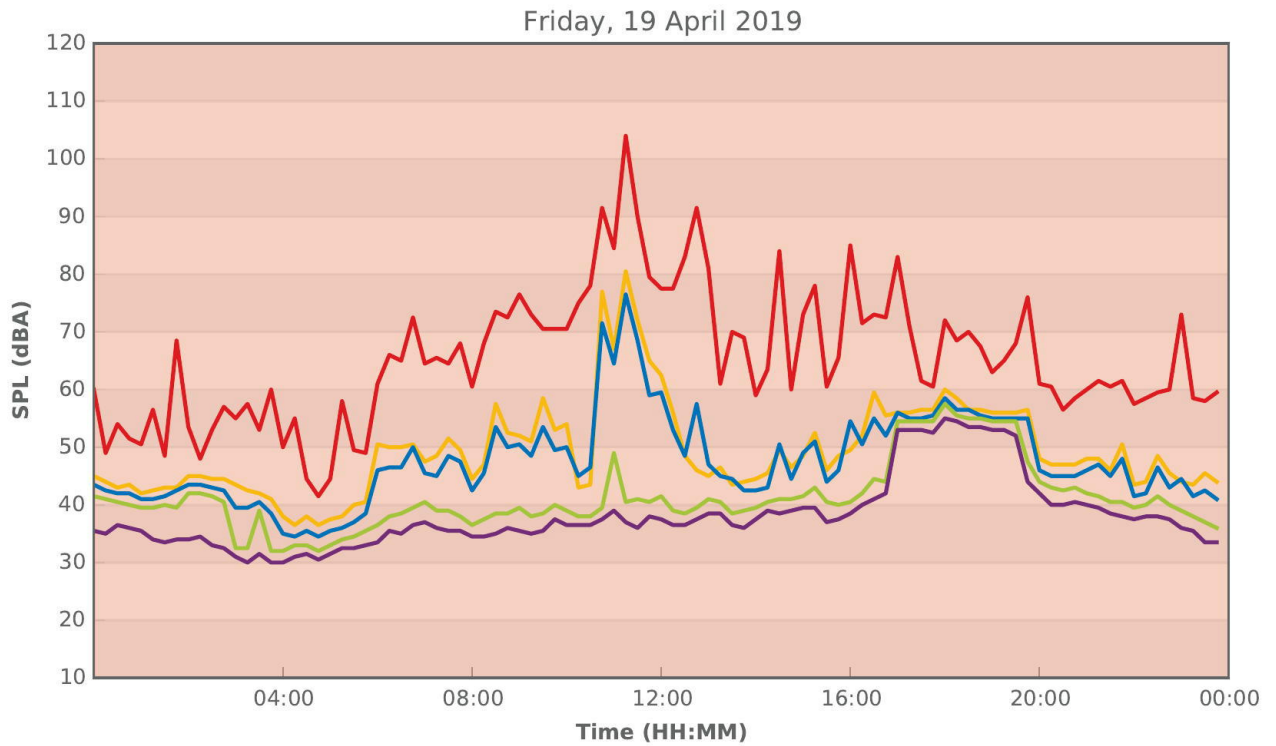
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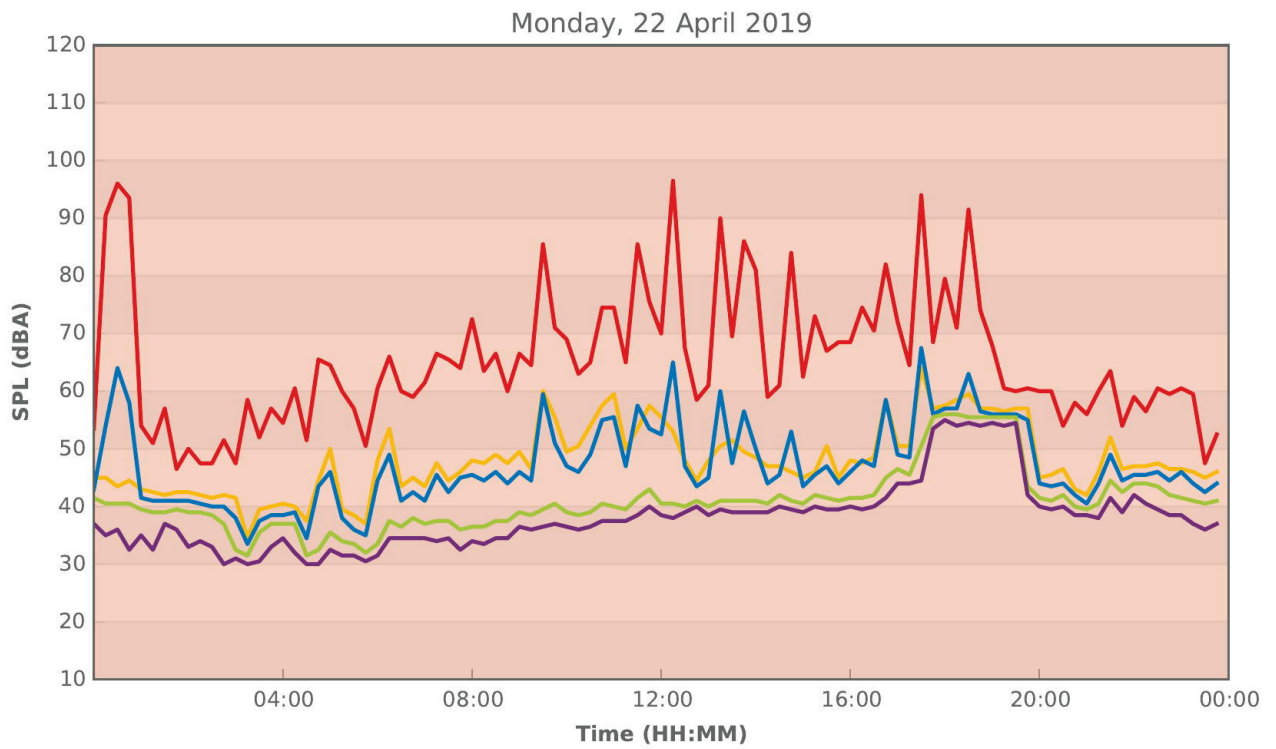
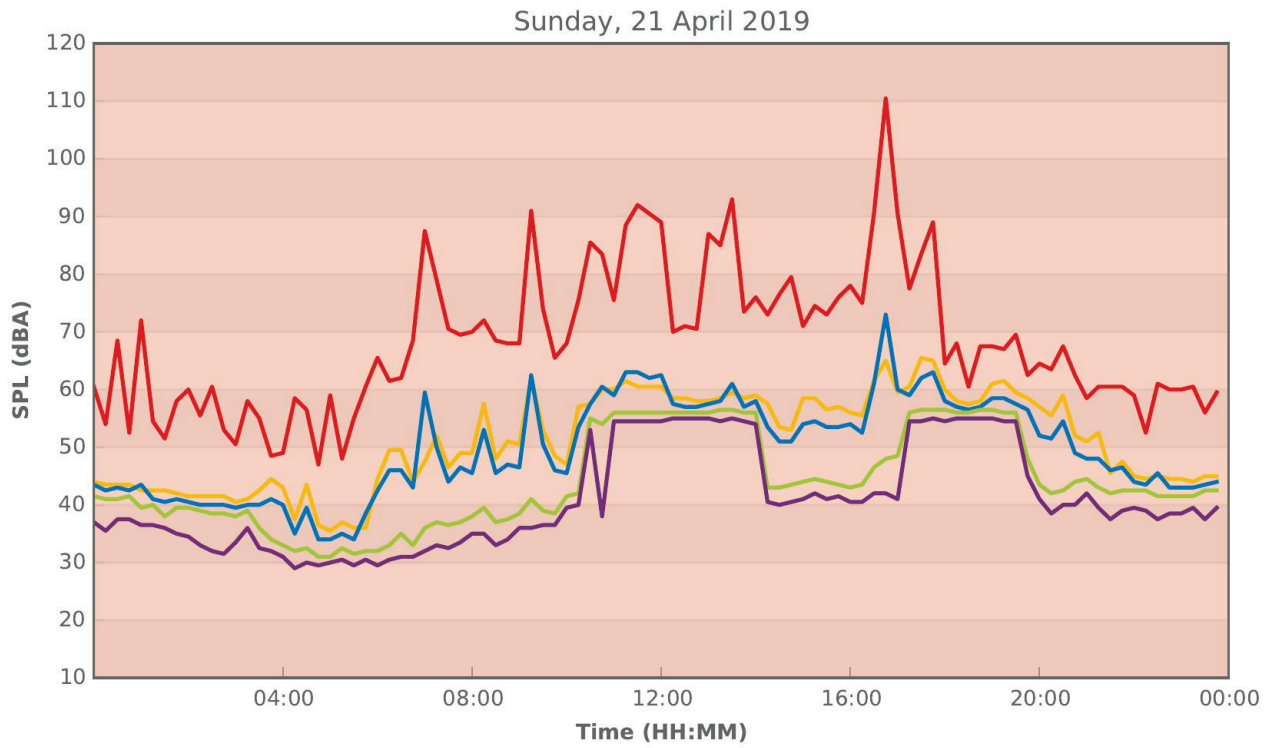
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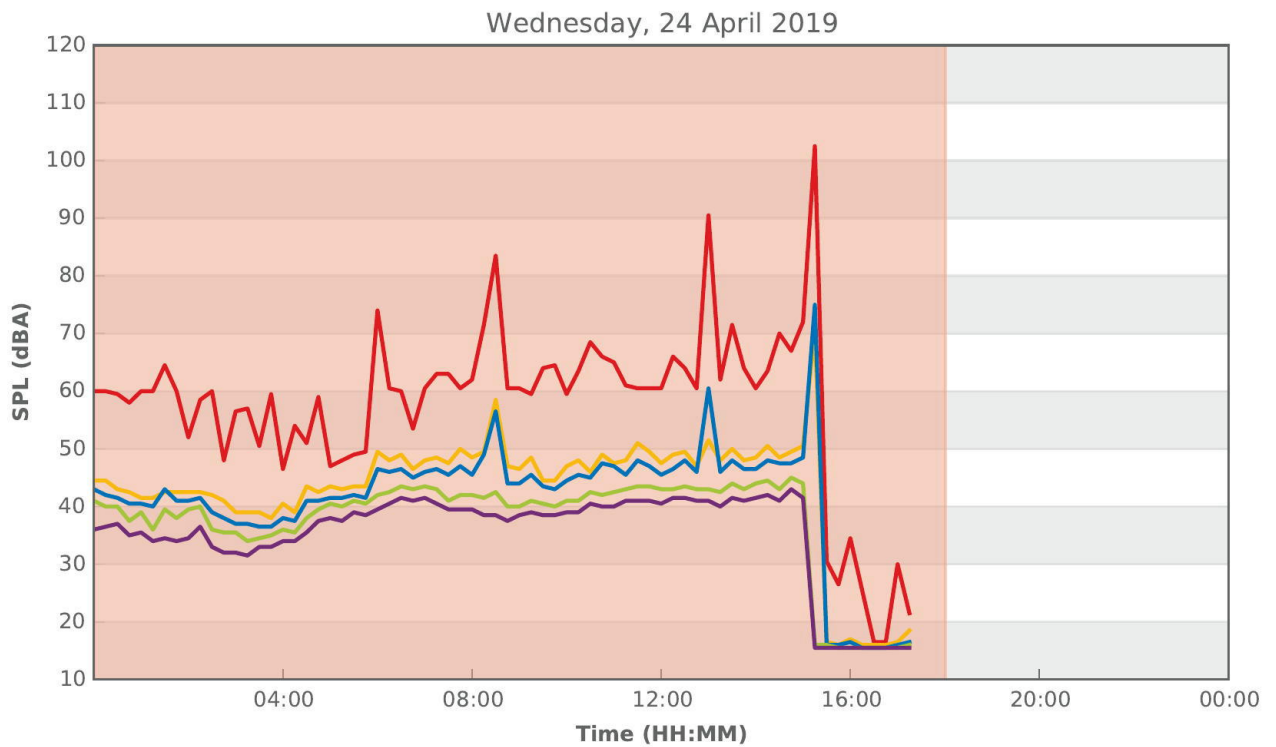
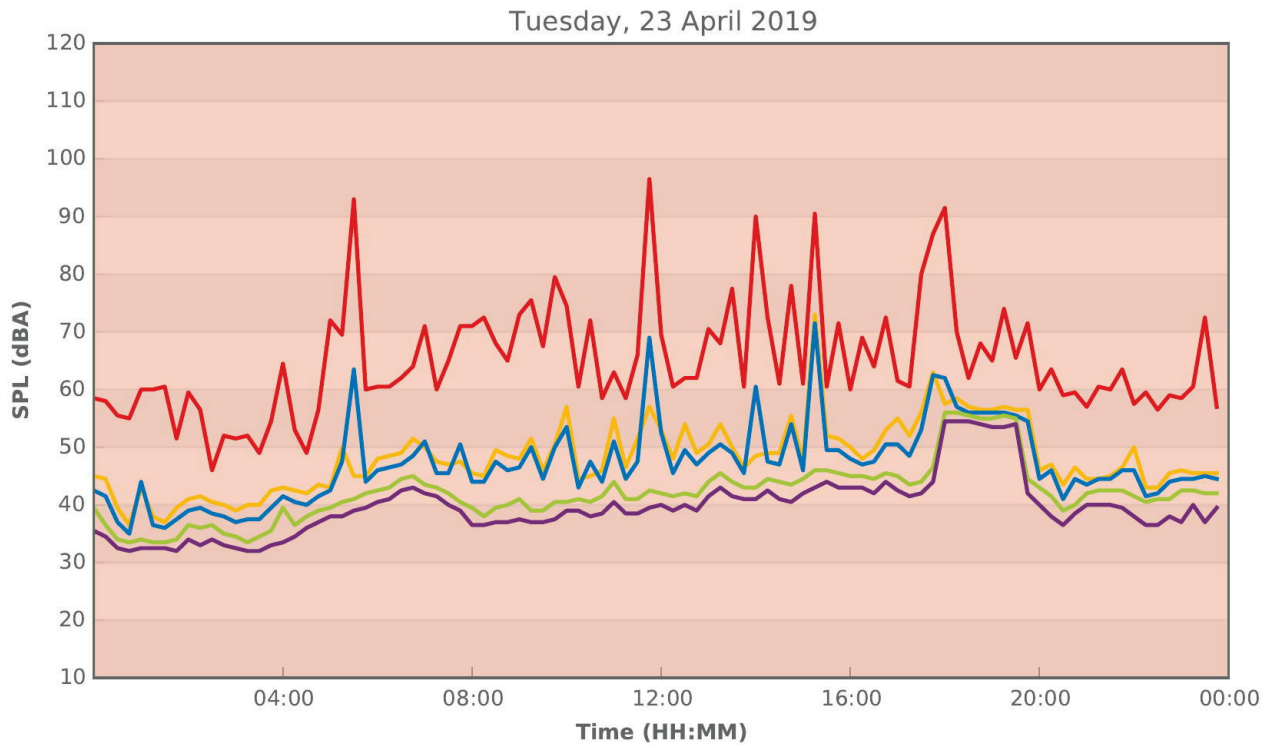
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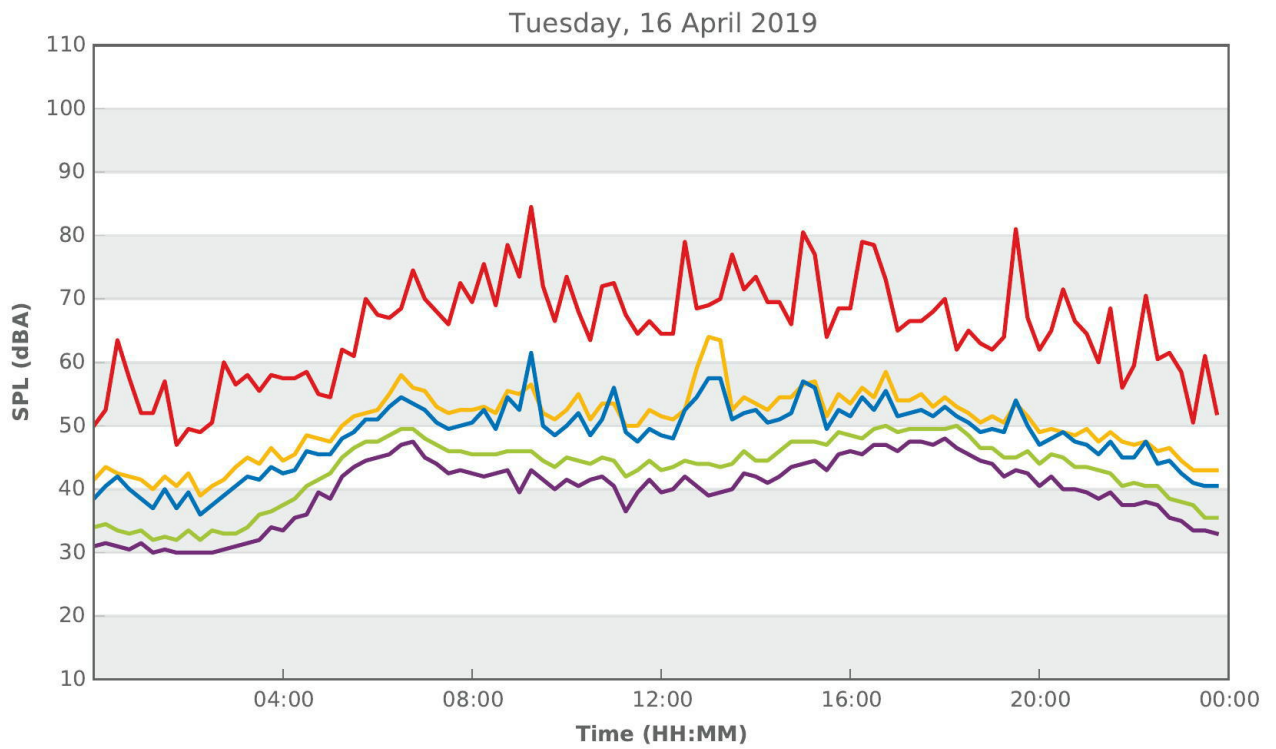
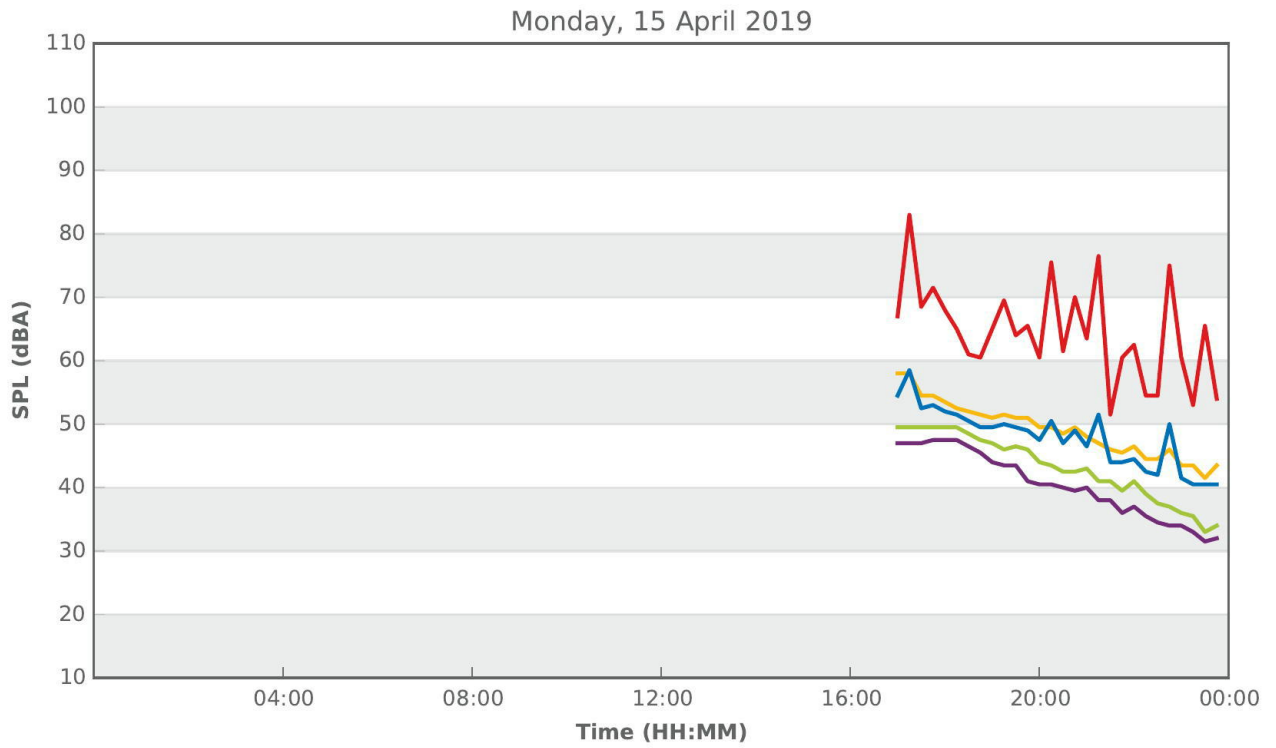
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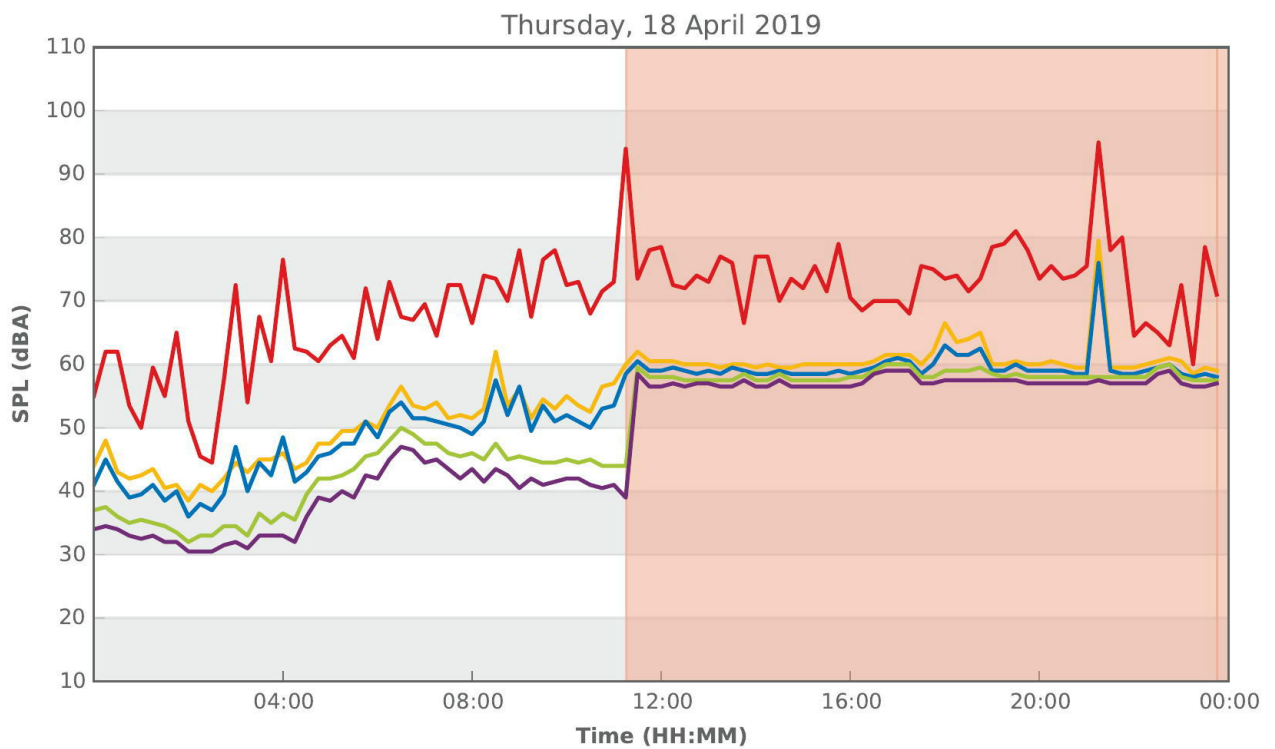
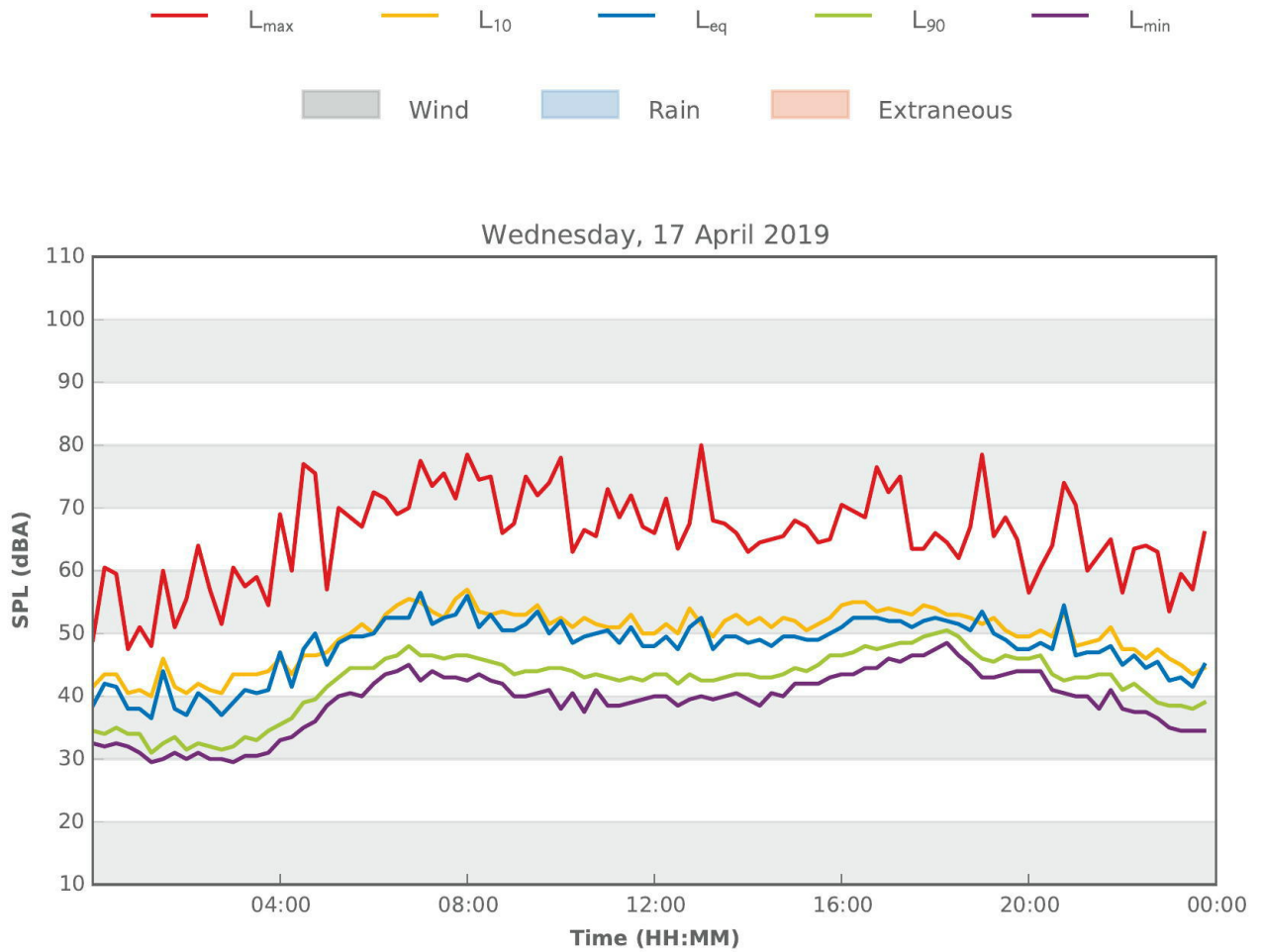
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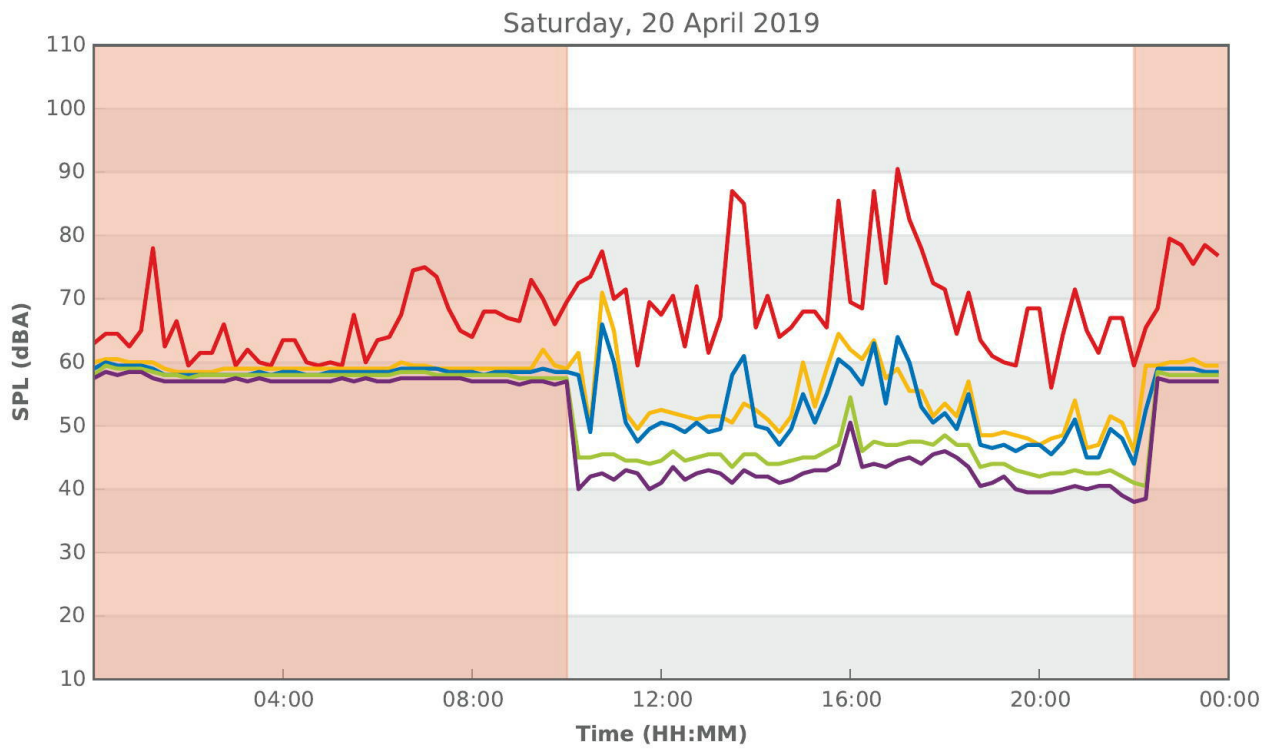
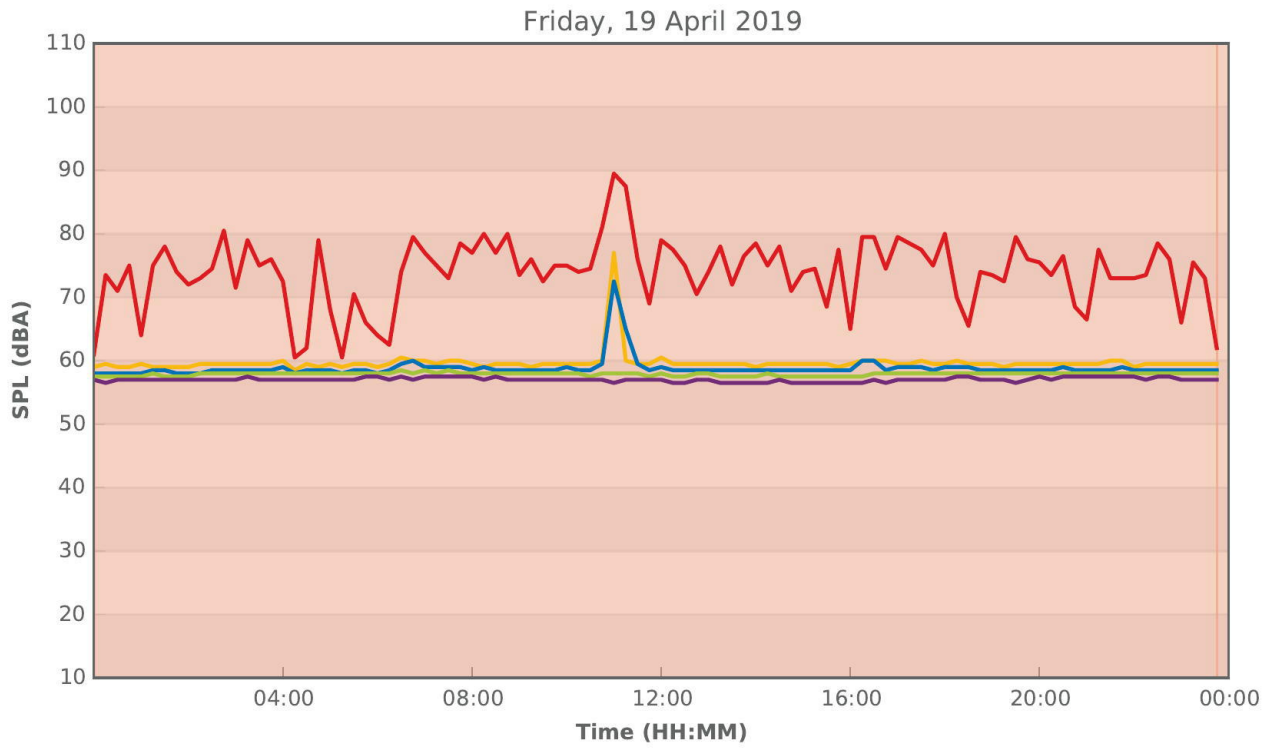
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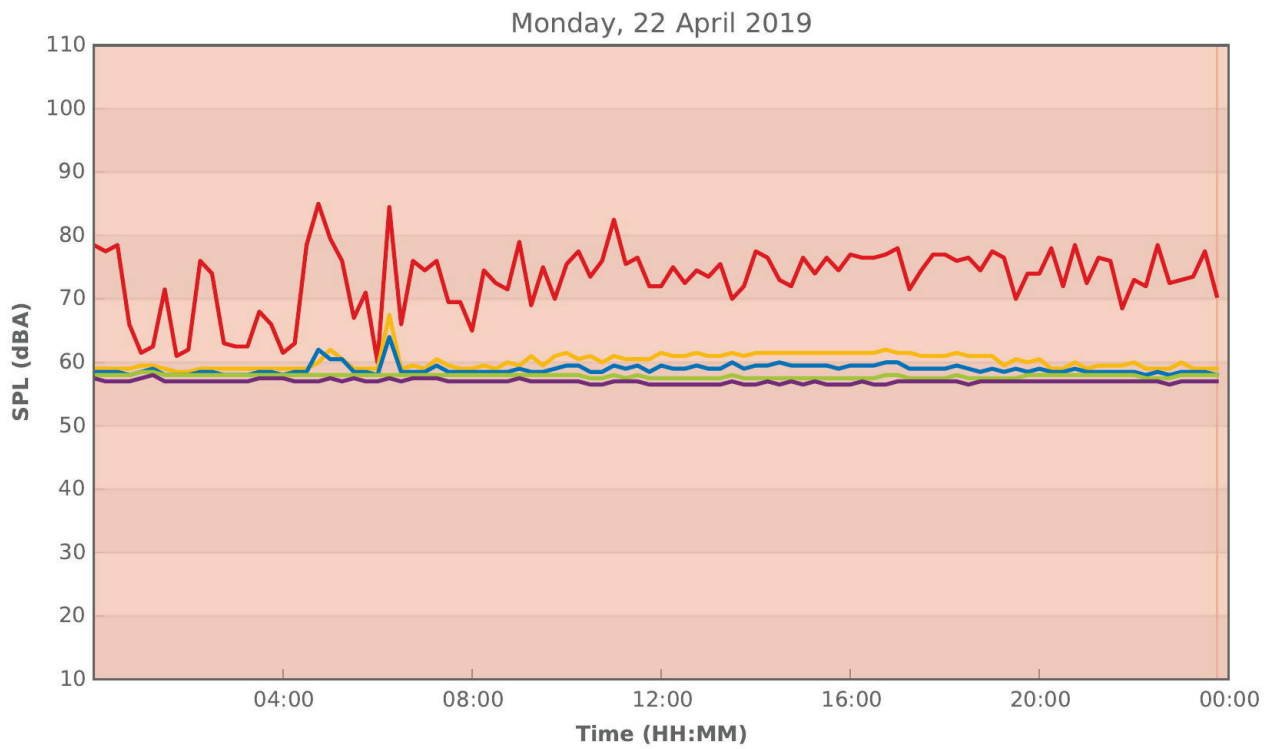
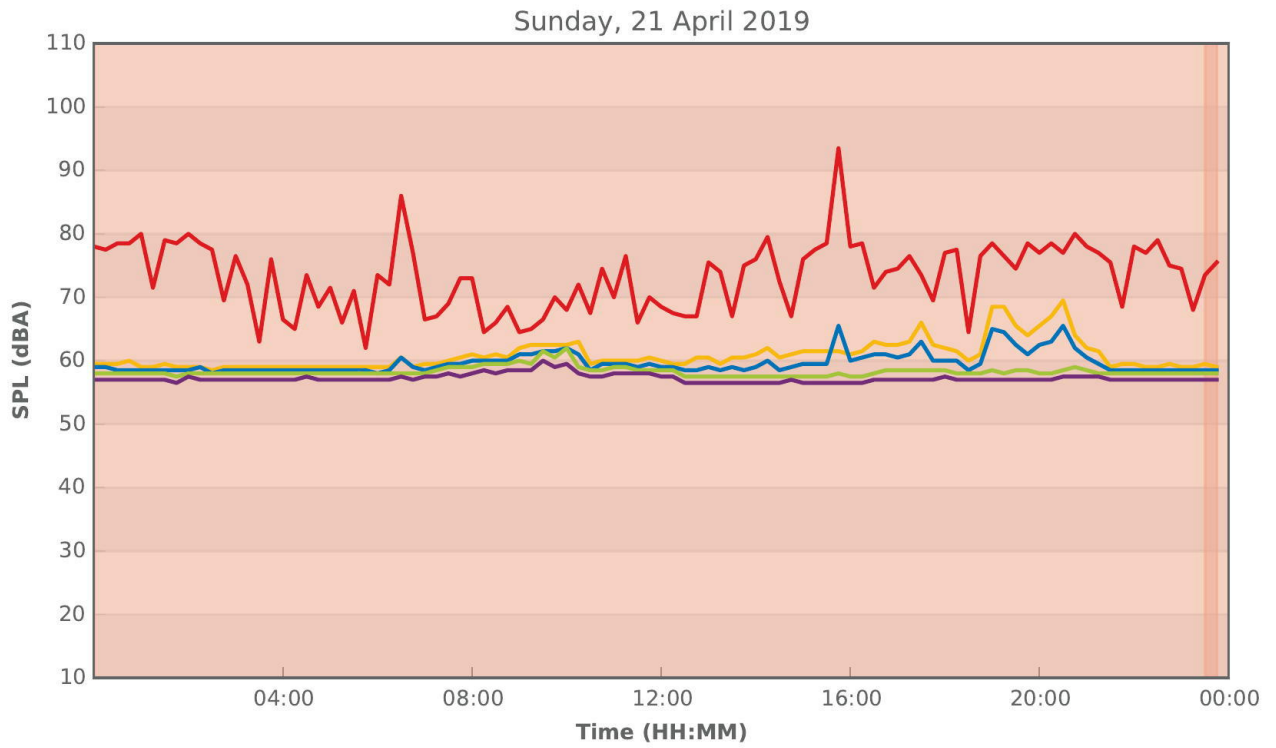
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