

ACOUSTIC ASSESSMENT FOR A PROPOSED CHILDCARE CENTRE
16 - 18 Upper Street, North Tamworth

Prepared for [REDACTED]

Prepared by RCA Australia

RCA ref 15728a-401/1

June 2023



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RCA ref 15728a-401/1

28 June 2023

16 - 18 Upper Street, North Tamworth
NSW 2340

Attention: [REDACTED]

Geotechnical Engineering

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ACOUSTIC ASSESSMENT OF PROPOSED CHILDCARE CENTRE 16 - 18 UPPER STREET, NORTH TAMWORTH

1 INTRODUCTION

RCA Australia (RCA) was engaged by [REDACTED] to prepare an acoustic assessment for the proposed development of a childcare centre located at 16 - 18 Upper Street, North Tamworth NSW. This report assesses the noise impact of the proposed development to nearby residences in accordance with the *Association of Australasian Acoustical Consultants (AAAC) - Guideline for Child Care Centre Acoustic Assessment (Version 3.0)* and the *Road Noise Policy (RNP) (DECCW, 2011)*.

1.1 PROPOSAL DESCRIPTION

The architectural plans of the proposed Childcare centre are shown in **Appendix A**. The proposal is adjacent to a number of residential dwellings. The proposed childcare facility has the potential to create noise impacts to residential receivers as a result of sound emissions from the outside playing area, the mechanical plant, the carpark and traffic generated from the development.

The proposed operating hours of the Childcare centre are Monday to Friday between 7 AM and 6 PM. Peak traffic generating times would be between 7:30 AM to 9 AM and 3:30 PM to 5 PM. There would be a maximum of 120 children within the following categories:

- 0 – 2 years: 20 children on the ground floor
- 2 – 3 years: 40 children on the ground floor
- 3 – 5 years: 60 children on the attic (first) floor

2 EXISTING ACOUSTIC ENVIRONMENT

2.1 NOISE SENSITIVE RECEIVERS

The subject site is surrounded by residential receivers. There are no commercial premises around the site. An aerial showing the subject site shaded red and surrounding noise receivers labelled R01 through to R19 is provided in **Figure 1**. The location of the noise logger is also shown as a light blue cross. Google Maps shows two properties at 12 Upper Street. For distinction, RCA have labelled receiver R08 as 12a Upper Street and receiver R06 as 12b Upper Street.

Table 1 *Identified receivers*

Receiver address	Receiver ID	Receiver type
3 Dowell Ave	R01	Residential
1 Dowell Ave	R02	Residential
5 Dowell Ave	R03	Residential
7 Dowell Ave	R04	Residential
10 Upper St	R05	Residential
12b Upper St	R06	Residential
9 Dowell Ave	R07	Residential
12a Upper St	R08	Residential
19 Upper St	R09	Residential
21 Upper St	R10	Residential
11 Dowell Ave	R11	Residential
23 Upper St	R12	Residential
23A Upper St	R13	Residential
20-22 Upper St	R14	Residential
25 Upper St	R15	Residential
27 Upper St	R16	Residential
24 Upper St	R17	Residential
29 Upper St	R18	Residential
33 Upper St	R19	Residential

2.2 NOISE MONITORING EQUIPMENT

RCA have undertaken unattended noise monitoring in preparing this assessment using class 1 instruments which comply with IEC61672-1:2019 *Electroacoustics – Sound level meters – Specifications* and were in current NATA calibration at the time of the monitoring. Additional equipment details are provided in **Table 2**. The sound level meter was set to “A-weighted” and “Fast” time response.

Table 2 *Logging equipment*

Make / model	Serial number	Previously calibrated
Sound level meters		
Svan / 971	61419	May 2021
Acoustic calibrators		
RION / NC 73	10196883	December 2021

2.4 UNATTENDED NOISE MONITORING

While on site, RCA observed that the local acoustic environment was typical of a suburban residential environment, mainly dominated by residential noise sources and intermittent bird calls. An unattended monitor was left on site to determine existing background levels. Deployment dates are shown in **Table 3**.

Table 3 *Unattended monitoring periods*

Deployed	Retrieved
17/6/2022	27/06/2022

Overall L_{eq} ambient levels and Rating Background Levels (RBL) measured for day periods are shown in **Table 4**. The RBLs were calculated in accordance with the *Noise Policy for Industry (NPfI)*. Weather data was sourced from the Bureau of Meteorology' automatic weather station at Tamworth Airport and periods of rain or wind above 5 m/s were excluded prior to determining the RBL and overall LAeq levels.

Table 4 *Overall L_{eq} and Rating Background Levels (RBL)*

Period	RBL Day, dBA	LAeq Day, dBA
Day	33	50



Figure 1 Site location shown in red. Noise monitoring location shown as blue cross

3 ASSESSMENT CRITERIA

The proposed development is surrounded by residential dwellings and has the potential to create noise impacts as a result of sound emissions primarily from the outdoor child centre play areas, the car park for the facilities, any mechanical plant associated with the facilities and road traffic generated by the facilities.

This assessment presents a typical worst-case scenario when a majority of children are playing outside. Noise from internal activities is expected to be far less significant.

Assessment criteria have been determined for this project in accordance with the AAAC *guideline* and the RNP.

Criteria derived in accordance with each guideline is presented in the following sections.

3.2 AAAC- GUIDELINE FOR CHILD CARE CENTRE ACOUSTIC ASSESSMENT

The AAAC *guideline* has the objective to protect the acoustic privacy of nearby residents and to provide noise goals and noise control recommendations to ensure that a child care centre does not generate unacceptable noise levels to adversely impact on nearby properties. This guideline is the most relevant to this proposal.

For residential receivers the base criterion of a contributed $L_{eq,15 \text{ min}}$ of 45 dBA for the assessment of an outdoor play area is recommended when the background noise level is less than 40 dBA. When the background level is more than 40 dBA and if the outdoor play is in use for more than 4 hrs per day, the contributed $L_{eq,15 \text{ min}}$ noise level emitted from the outdoor play area should not exceed the background level by more than 5 dB at the assessment locations.

The background noise level was measured to be less than 40 dBA (see **Table 4**) and so the AAAC guideline base criteria are adopted and is shown in **Table 5**.

The AAAC guideline also provides recommended noise criteria for “all other noise sources” excluding outdoor play, related to the operation of the child care centre. The criterion for all other sources is $L_{eq,15 \text{ min}}$ of background plus 5 dB. These criteria are summarised in **Table 5**.

Table 5 Assessment noise criteria

Time of Day	Contributed $L_{eq,15 \text{ min}}$ noise level from outdoor playground	Cumulative $L_{eq,15 \text{ min}}$ noise level from all other child care noise sources
	Residential receivers	
Day	45 dBA	38 dBA (background + 5 dB)

Day time is defined to be between 7 am and 6 pm

3.1 ROAD NOISE POLICY

The RNP provides a 1-hour target of $LA_{eq,1hr}$ 55 dBA for residents on local roads impacted by additional road noise due to a development, with the contribution of the development not adding any more than 2 dB to the total road noise level. If the increase in total road noise due to a development is no greater than 2 dB, then the objectives of the RNP have been met.

4 METHODOLOGY

Noise impacts from site were assessed using computer software *CadnaA (version 2020)*. The *ISO 9613-2* algorithm was implemented, which incorporates the equivalent of a 2 m/s source to receiver wind in all directions or a moderate temperature inversion. The result is that the modelled predictions are made under 'noise enhancing' meteorological conditions. This provides some conservatism in the predictions made.

Sound power data for the children and external mechanical plant have been taken from the AAA guideline. Sound power inputs for groups of children playing is shown below in **Table 6**.

Table 6 *Effective Sound Power Levels (LAeq, 15min) for Groups of 10 Children Playing*

Number and Age of Children	SWL dB(A)
10 Children - 0 to 2 years	78
10 Children - 2 to 3 years	85
10 Children - 3 to 5 years	87
Correction for children engaged in passive play	- 6 dB (RCA have applied this correction to 20% of outdoor children between 3 – 5 years old)

Noise model inputs are shown in **Table 7** and are considered to represent a reasonable worst-case 15-minute scenario.

Table 7 *Noise model inputs*

Model parameter	Value	Notes / assumptions
Calculation algorithm	<i>ISO 9613-2</i>	First order reflections included.
Ground absorption coefficient	0.75	Mostly soft ground type between noise source and adjacent neighbours.
Kids at play	15 children 0 to 2 years old outside on ground floor (based on floor area) 35 children 2 to 3 years old outside on ground floor (based on floor area). 51 children 3 to 5 years old outside on attic level (~85% of total). Shown as blue hatched areas.	Sound power input provided in Table 6 . All children heights modelled at 1 m based on advice from AAAC guideline. RCA have assumed 20% of outdoor play is passive play and have applied a -6 dB correction for these children. This can be any quiet activity.
Mechanical plant	3 medium external AC units on the ground floor. SWL of 70 dBA.	Represents medium double fan condenser units on ground level.
Mechanical plant	3 toilet exhausts (SWL 60 dBA) and 1 kitchen exhaust (SWL 70 dBA)	Note: These sources were found to be negligible.

Model parameter	Value	Notes / assumptions
	Carpark exhaust (SWL 85 dBA) housed inside outdoor store area. Enclosure modelled to provide 10 dB reduction. Shown as blue cross.	Carpark exhaust is enclosed except for flue opening in the roof of the outdoor store.
Vehicles	Moving point noise source. SWL 81 dBA (provided by AAAC). Shown as blue line.	Assumed 24 light vehicle movements in childcare carpark during a 15-minute period (equivalent of 96 per peak hour).
Fences	Fence design heights labelled in figures.	Fence must be solid without gaps, from floor level to the design height. The fence may include an angled design provided the final vertical height meets the acoustic specifications labelled in this report.

This configuration indicated that several minor exceedances would result due to 51 children aged between 3 – 5 years old playing outside simultaneously (see **Table 8**). Mitigation measures were explored and are reported below.

5 MITIGATION STRATEGIES

1. Plan of management

The management plan adopted by the child care centre will need to limit the number of 3 – 5 year old children playing outside at any given time to no more than 30 children. This is half of the maximum capacity for this age group, and means that children in this age group may need rostered outdoor play time.

2. Mix of active and passive play options outside

The outdoor attic level should have a mix of active and passive play options for the children. This will reduce overall noise levels of children playing.

3. Hard reflective ground surfaces to be minimised

The landscape plan shows that the ground type is mostly synthetic grass with a small area of concrete for a bike track. Having mostly acoustically soft ground cover will reduce noise reflections.

4. Fences

All boundary fences separating the child care centre from next door neighbours are to be 2.1 m tall with the exception of the fence that separates the child care centre driveway from 20 Upper Street, which may be 1.8 m. Internal fences on the attic level are to be 1.8 m on the north, north-east and south east sides. The fences on the south-west side of the attic play area (facing the main building) can be 1.5 m. All fences must be solid without gaps from floor level to the design height.

6 RESULTS

After adopting the mitigation strategies outlined above, RCA present the predicted received worst case 15-minute noise levels for two scenarios: 51 children (3 – 5 years old) playing outside and 30 children (3 – 5 years old) playing outside. RCA have assumed 20% of these children are engaged in passive play in both scenarios and have applied the -6 dB correction for these children. Both scenarios include 15 children 0 - 2 years old and 35 children 2 – 3 years old playing outside on the ground floor. These children were found to be not as acoustically significant as the 3 – 5 year old children on the attic level. It is shown that the AAAC guideline is satisfied at all assessed receivers if the centre implements a management plan that limits the number of three to five year old children playing outside at any time to 30. If 51 three to five year old children were to play outside at any given time, the noise model predicts a 1 dB and 2 dB exceedance at both 12 Upper Street properties. This is considered a very minor exceedance as it is generally accepted that most people will not perceive a difference between noise levels of 2 dB or less. It is also noted that the noise model represents a typical worst-case 15-minute scenario. Noise levels throughout the day will often be lower than what is assessed in this report. A summary of the noise model results for outside play are shown in **Table 8**.

Table 8 Outdoor play noise model results

Receiver ID	criteria	Predicted LAeq,15 min, 51 children 3-5	Exceedance, dBA	Predicted LAeq,15 min, 30 children 3-5	Exceedance, dBA
R1	45 dBA	40	nil	39	Nil
R2	45 dBA	41	nil	40	Nil
R3	45 dBA	41	nil	40	Nil
R4	45 dBA	41	nil	40	Nil
R5	45 dBA	43	nil	42	Nil
R6	45 dBA	47	2	45	Nil
R7	45 dBA	44	nil	42	Nil
R8	45 dBA	46	1	44	Nil
R9	45 dBA	35	nil	33	Nil
R10	45 dBA	35	nil	33	Nil
R11	45 dBA	43	nil	41	Nil
R12	45 dBA	35	nil	33	Nil
R13	45 dBA	35	nil	33	Nil
R14	45 dBA	41	nil	40	Nil
R15	45 dBA	34	nil	32	Nil
R16	45 dBA	34	nil	33	Nil
R17	45 dBA	38	nil	36	Nil
R18	45 dBA	34	nil	33	Nil
R19	45 dBA	33	nil	32	Nil

A separate noise model was run to predict noise from mechanical ventilation and car movements in the driveway. These are presented in **Table 9**.

Table 9 *Predicted noise levels from MV and car movements*

Receiver ID	criteria (background + 5 dB)	Predicted LAeq,15 min, dBA	Exceedance, dBA
R1	38 dBA	28	nil
R2	38 dBA	28	nil
R3	38 dBA	30	nil
R4	38 dBA	30	nil
R5	38 dBA	30	nil
R6	38 dBA	36	nil
R7	38 dBA	32	nil
R8	38 dBA	37	nil
R9	38 dBA	24	nil
R10	38 dBA	25	nil
R11	38 dBA	31	nil
R12	38 dBA	26	nil
R13	38 dBA	27	nil
R14	38 dBA	37	nil
R15	38 dBA	28	nil
R16	38 dBA	27	nil
R17	38 dBA	30	nil
R18	38 dBA	26	nil
R19	38 dBA	25	nil

Noise from mechanical ventilation and car movements are predicted to comply with the AAAC criteria for all identified receivers. Again, note that this model presents a worst case 15-minute scenario based on peak traffic movements into the car park.

Noise contour figures are presented in **Figure 2** and **Figure 3**. For reference, the yellow contour line is LAeq,15 minute 45 dBA and the dark green contour line is LAeq,15 minute 40 dBA.

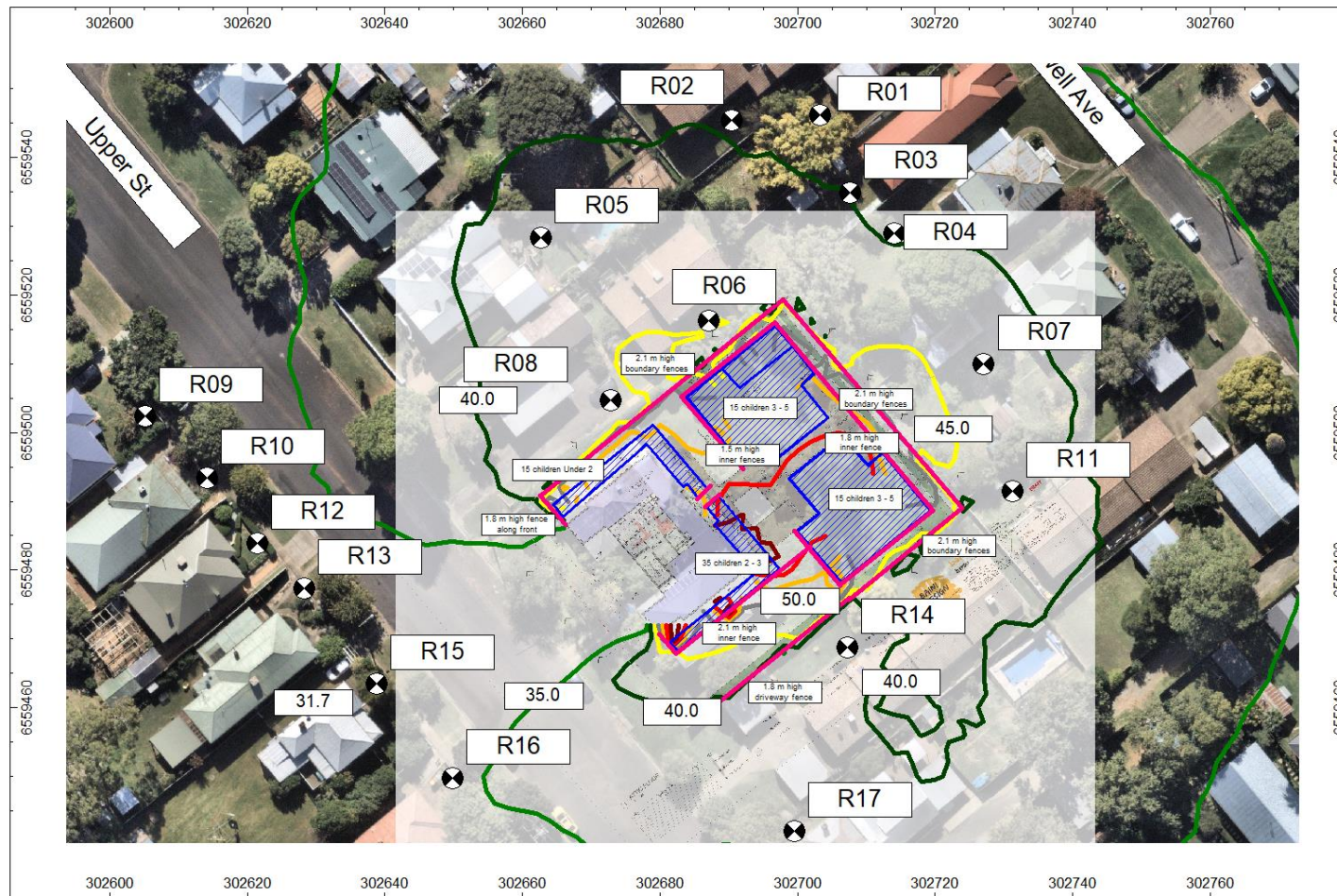


Figure 2 *LAeq,15 min noise contour figure: Outdoor play (30 children 3 – 5 years old scenario)*

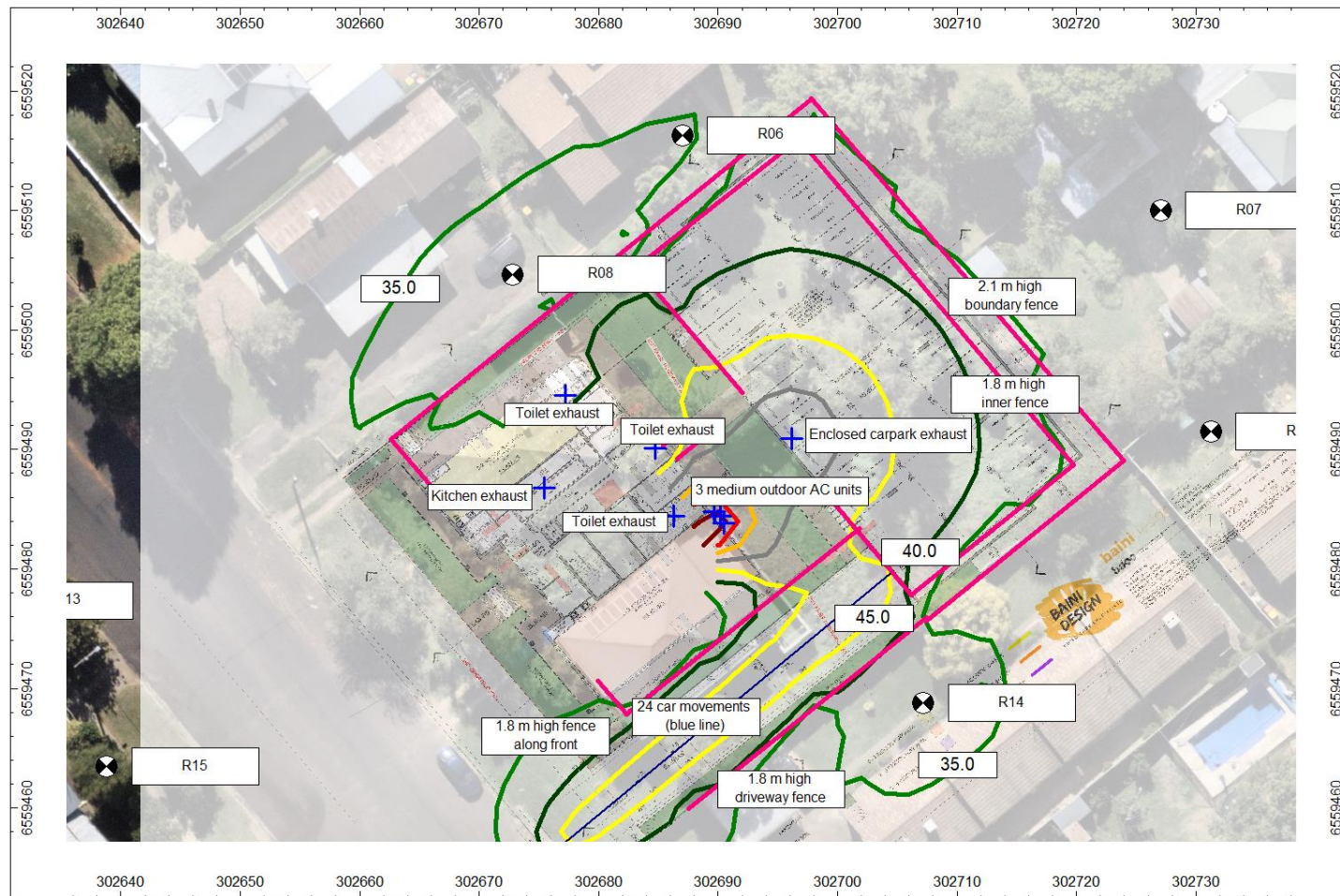


Figure 3 *LAeq,15 min noise contour figure: MV and car movements*

7 ROAD NOISE IMPACTS

The Traffic & Parking Impact Assessment prepared by Hemanote Consultants Pty Ltd (dated April 2023) reports recent traffic counts taken on Upper Street. The most relevant counts are reproduced below.

Table 10 Existing traffic counts

Direction	Morning peak (7:45 am – 8:45 am) vehicles per hour	Evening peak (3:30 pm – 4:30 pm) vehicles per hour
Upper Street (South of Macquarie Street)		
Northbound	104	159
Southbound	152	111
Upper Street (North of Darling Street)		
Northbound	107	123
Southbound	161	114

The traffic report also indicates that there may be 96 additional vehicle movements during the peak AM period between 7 am and 9 am and 84 vehicle movements during the peak PM period between 4 pm and 6 pm due to the child care proposal.

RCA have first modelled a worst case “existing” peak morning scenario based on the traffic counts taken on Upper Street, South of Macquarie Street (107 northbound and 161 southbound). Intermittent traffic was modelled as a moving point source in each direction with a sound power level of 90 dBA. A 2.5 dB façade correction has also been added to the predicted levels. **Figure 4** below shows that the existing am peak hour provides no more than LAeq,1 hr 55 dBA at the front facade of any nearby houses.

The total increase in road noise due to an additional 96 vehicle movements during the AM peak hour can be estimated using the following formula:

$$\text{Increase (dB)} = 10 * \log_{10} \left(\frac{\text{new total traffic}}{\text{existing total traffic}} \right)$$

Using this formula and the traffic data provided, RCA estimate the increase in road noise below.

Table 11 Increase in LAeq,1 hr road noise

Existing total traffic (both directions)	New total traffic (with additional 96 movements)	Increase (dB)
268	364	1.3

96 vehicle movements along Upper Street would potentially increase the worst case LAeq,1hr by 1.3 dBA at the front façade of nearby houses in Upper Street. Since the total increase in road noise is no more than 2 dB, the objectives of the RNP are met.



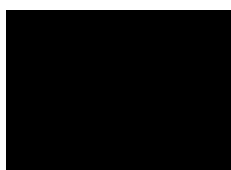
Figure 4 Existing Upper Street am peak hour LAeq,1 hr dBA

8 CONCLUSION

This report has assessed the potential noise impacts for the proposed Childcare centre at the nearest receivers against the *AAAC Guideline for Childcare Centre Acoustic Assessment* and the Road Noise Policy. RCA predicts that the centre will meet all relevant noise guidelines if the mitigation strategies outlined in **Section 5** are implemented and considers that the Childcare centre proposal is acoustically suitable for development.

Yours faithfully

RCA AUSTRALIA



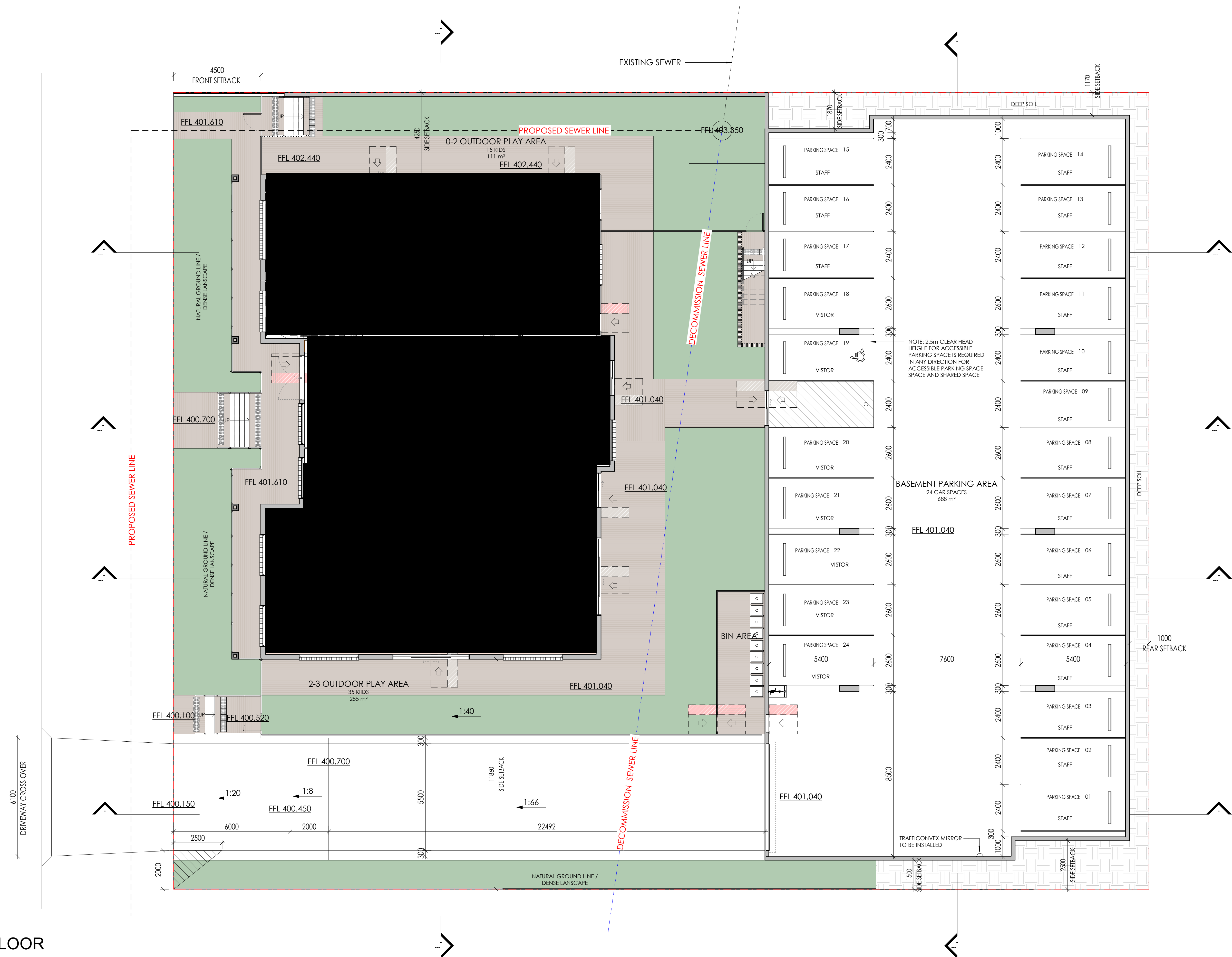
Senior Acoustic Consultant

GLOSSARY

dB (A)	Unit of sound pressure level, modified by the A-weighting network to represent the sensitivity of the human ear.
L _{Aeq}	Equivalent continuous noise level averaged over time on an equivalent energy basis.
SWL	Sound Power Level.

Appendix A

Architectural plans



1 GROUND FLOOR
1 : 100

REV	DESCRIPTION	DATE
A	DRAFT ISSUE	20/05/22

KEY

SITE BOUNDARY



LANDSCAPE



0 - 2 INDOOR PLAY AREA



2.4m ACOUSTIC BARRIER



DEMOLISHED



DEEP SOIL



2 - 3 INDOOR PLAY AREA



2m ACOUSTIC BARRIER



BUILDING FOOTPRINT



AREA CALC.



3 - 5 INDOOR PLAY AREA

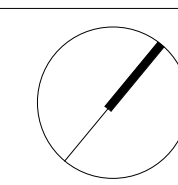


1.8m ACOUSTIC BARRIER



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DRAFT PLANS
16-18 UPPER STREET NORTH TAMWORTH
DRAWING TITLE
GROUND FLOOR PLAN



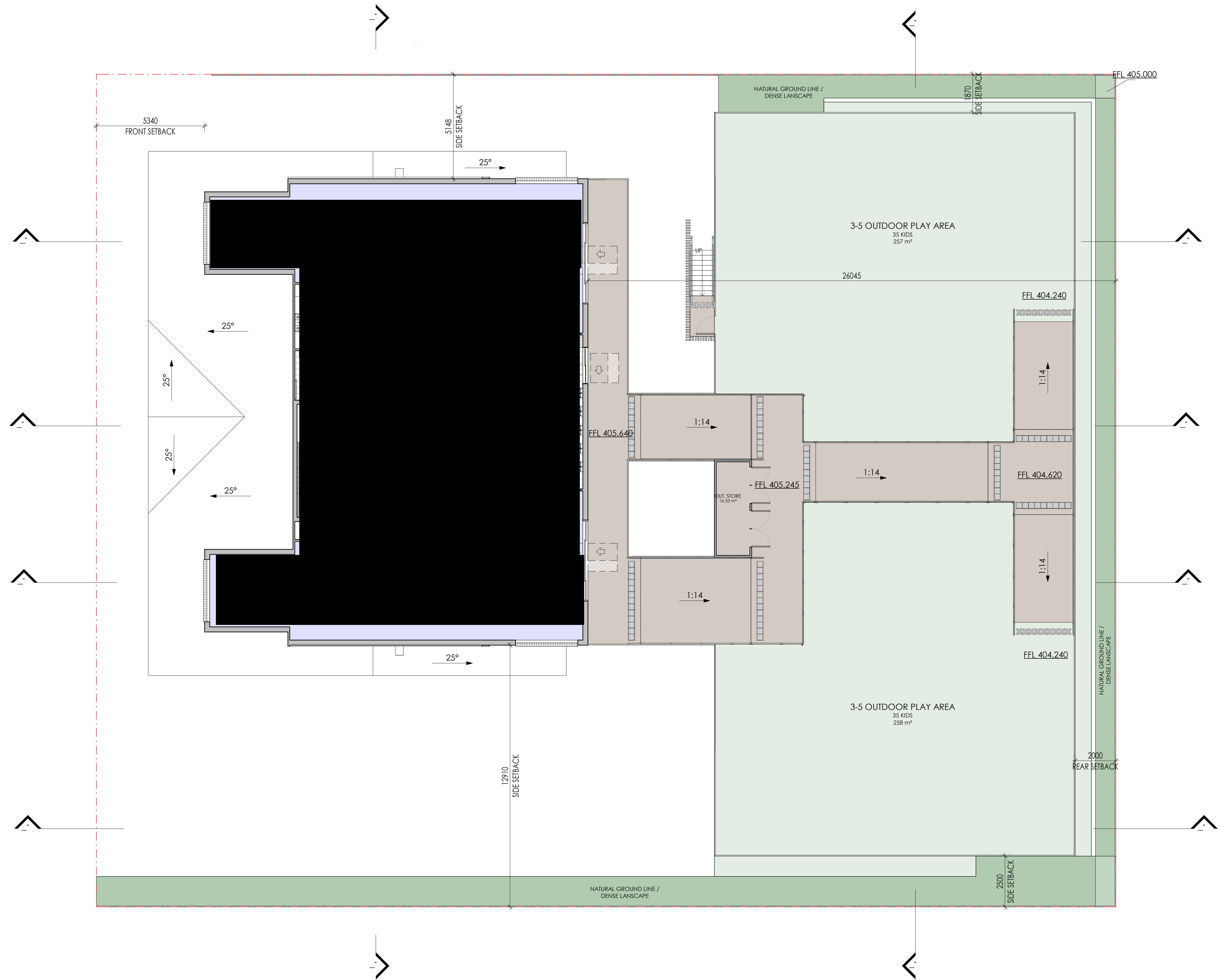
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1 ATTIC FLOOR
1 : 100

REV	DESCRIPTION	DATE
A	DRAFT ISSUE	20/05/22

KEY	
SITE BOUNDARY	LANDSCAPE
DEMOLISHED	DEEP SOIL
BUILDING FOOTPRINT	AREA CALC.
0 - 2 INDOOR PLAY AREA	2 - 3 INDOOR PLAY AREA
2.4m ACOUSTIC BARRIER	2m ACOUSTIC BARRIER
1.8m ACOUSTIC BARRIER	



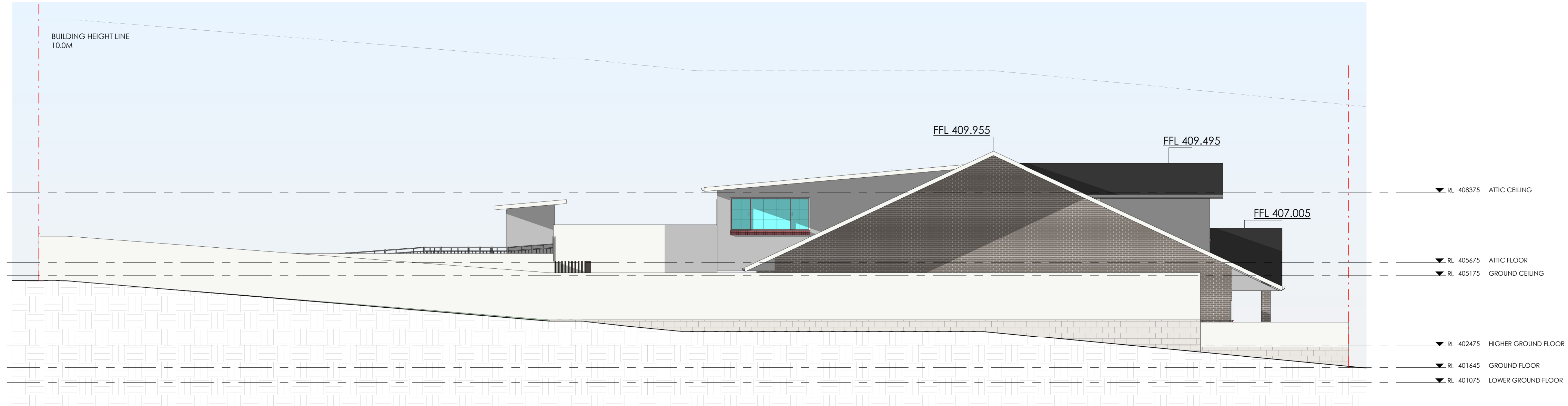
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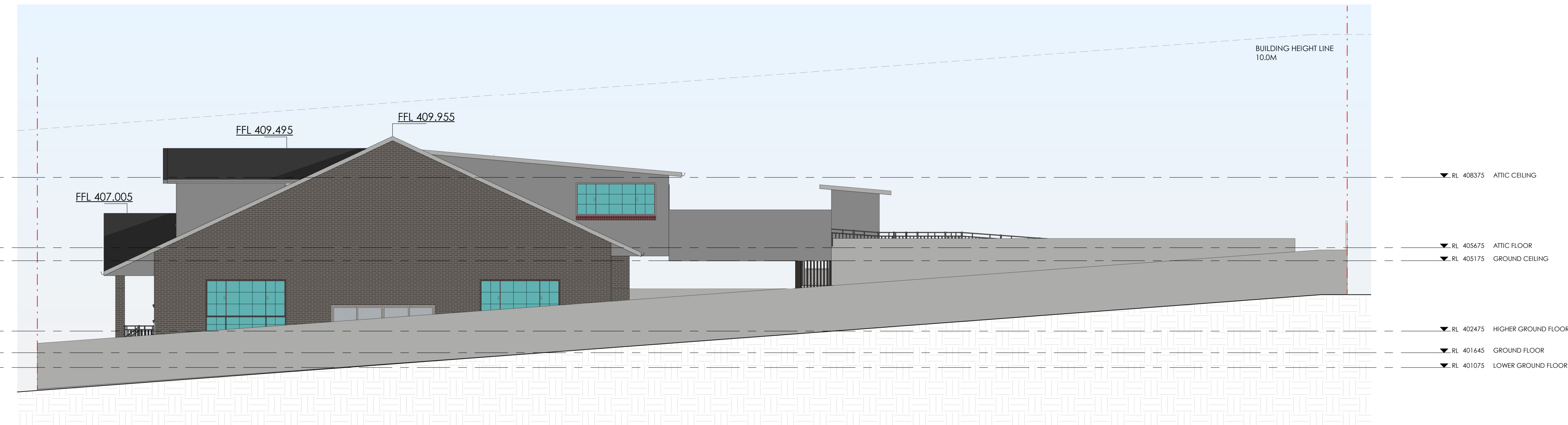
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1 NORTHERN ELEVATION
1 : 100



2 SOUTHERN ELEVATION
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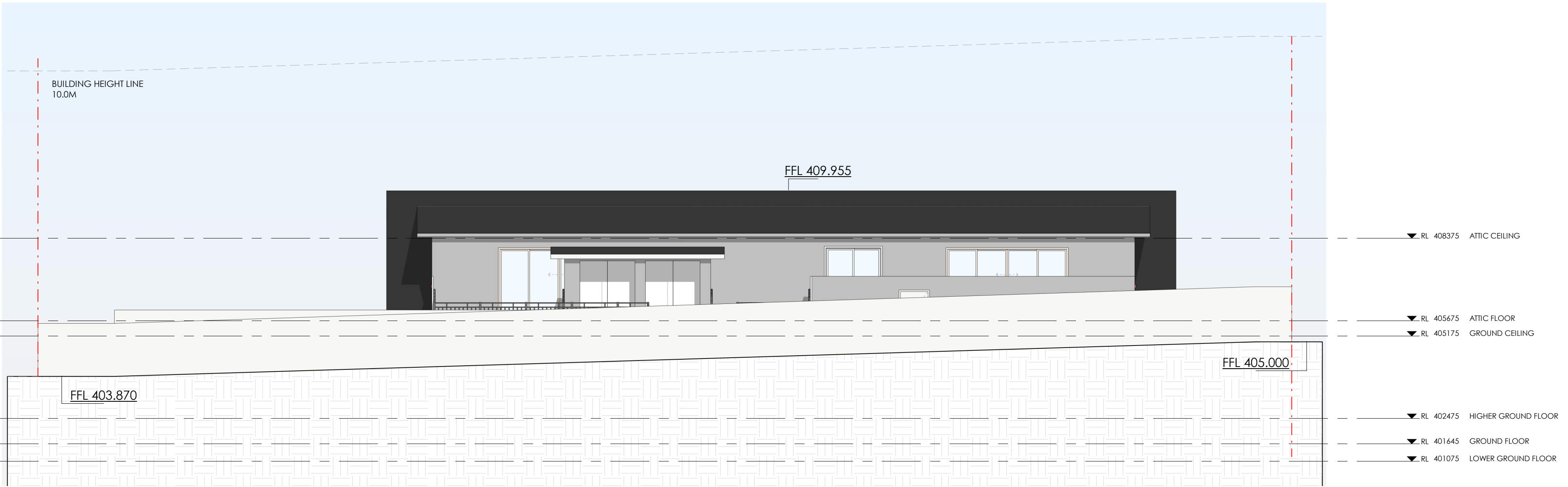


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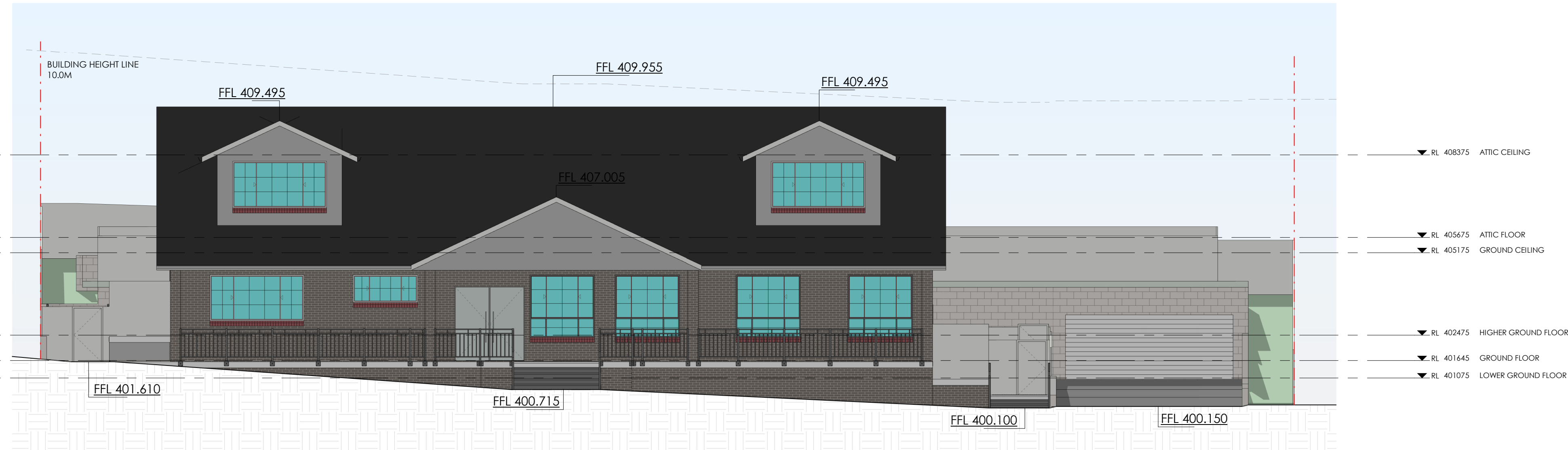
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1 EASTERN ELEVATION
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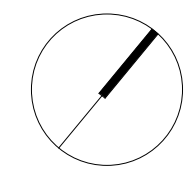


2 WESTERN ELEVATION
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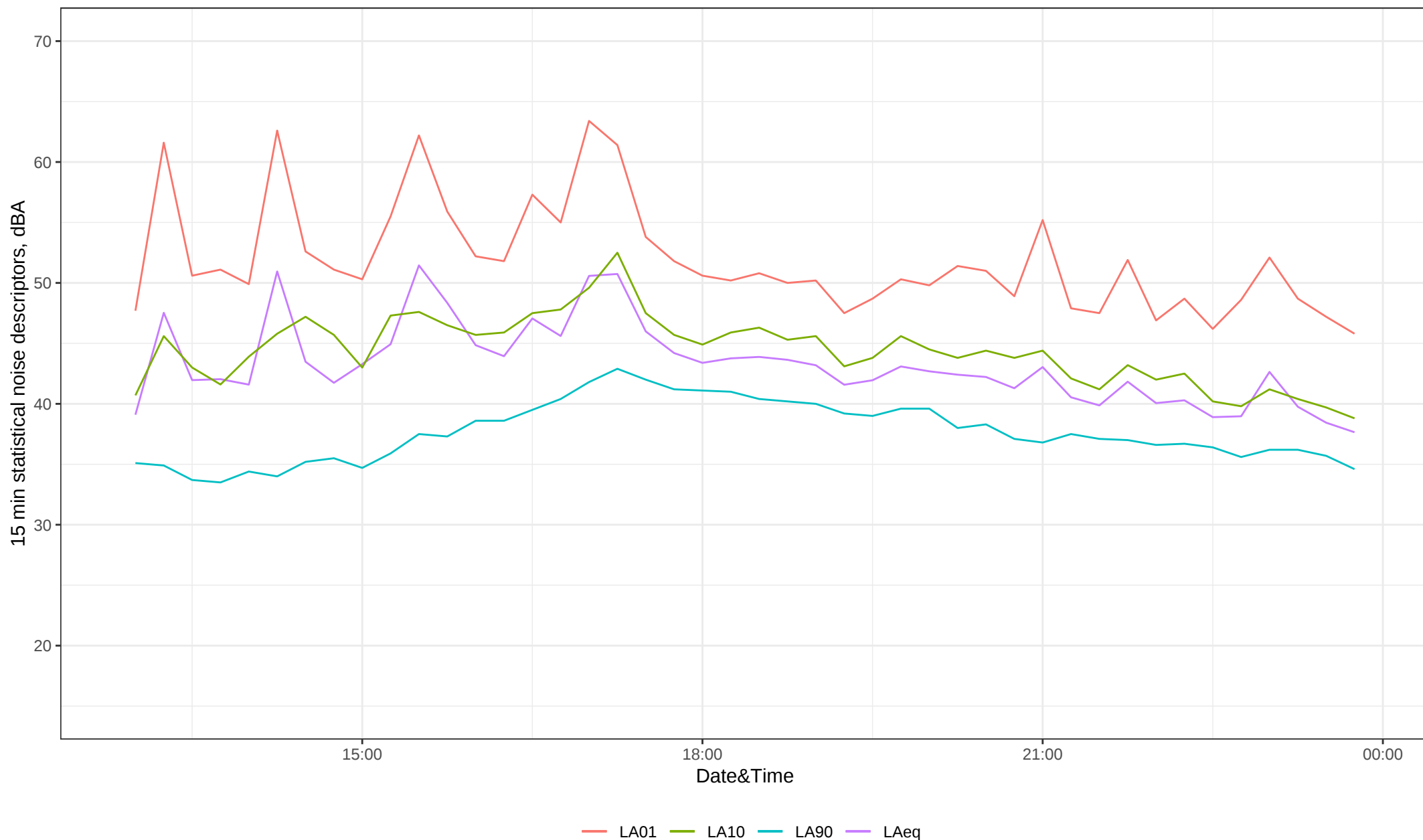
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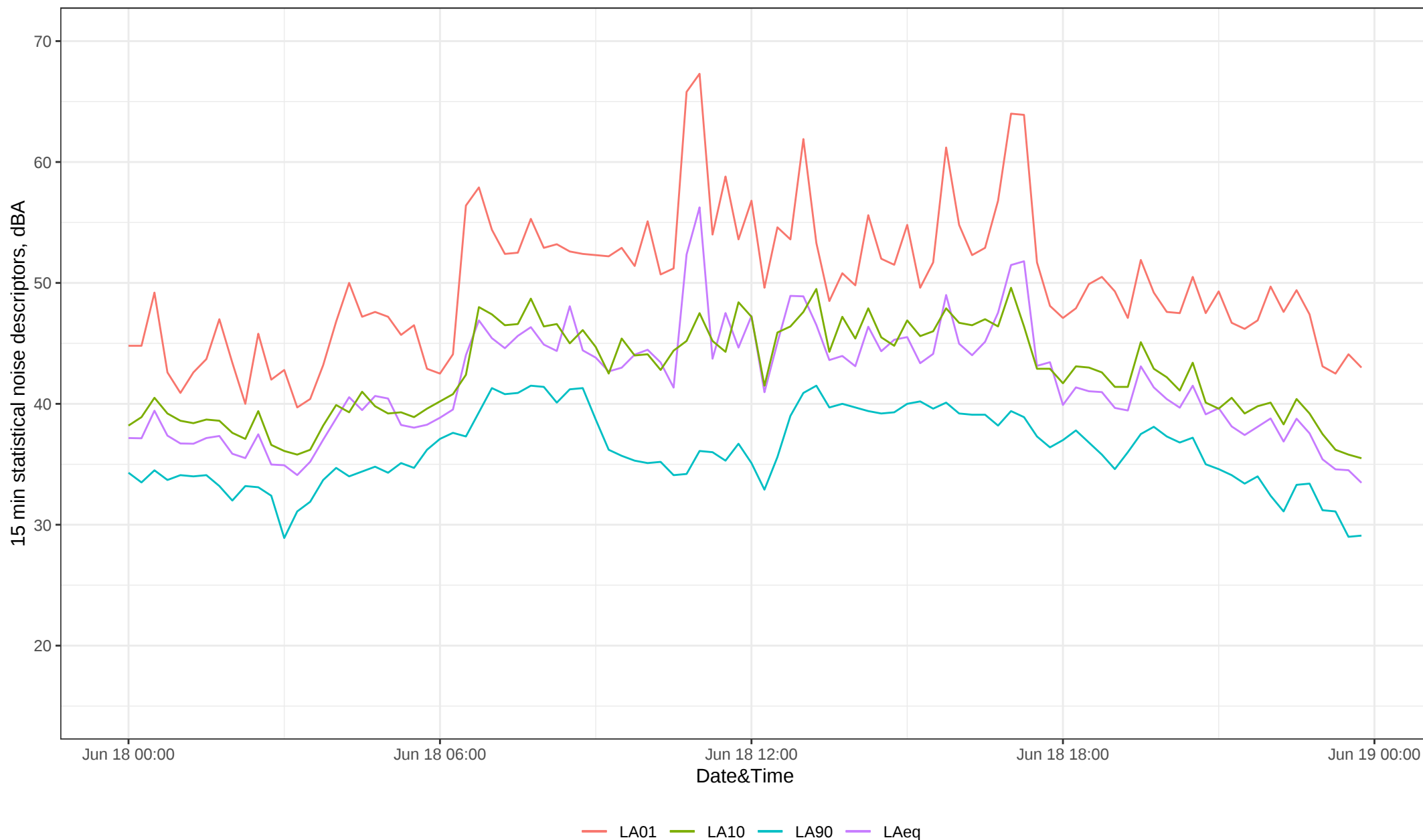
Appendix B

Noise monitoring charts

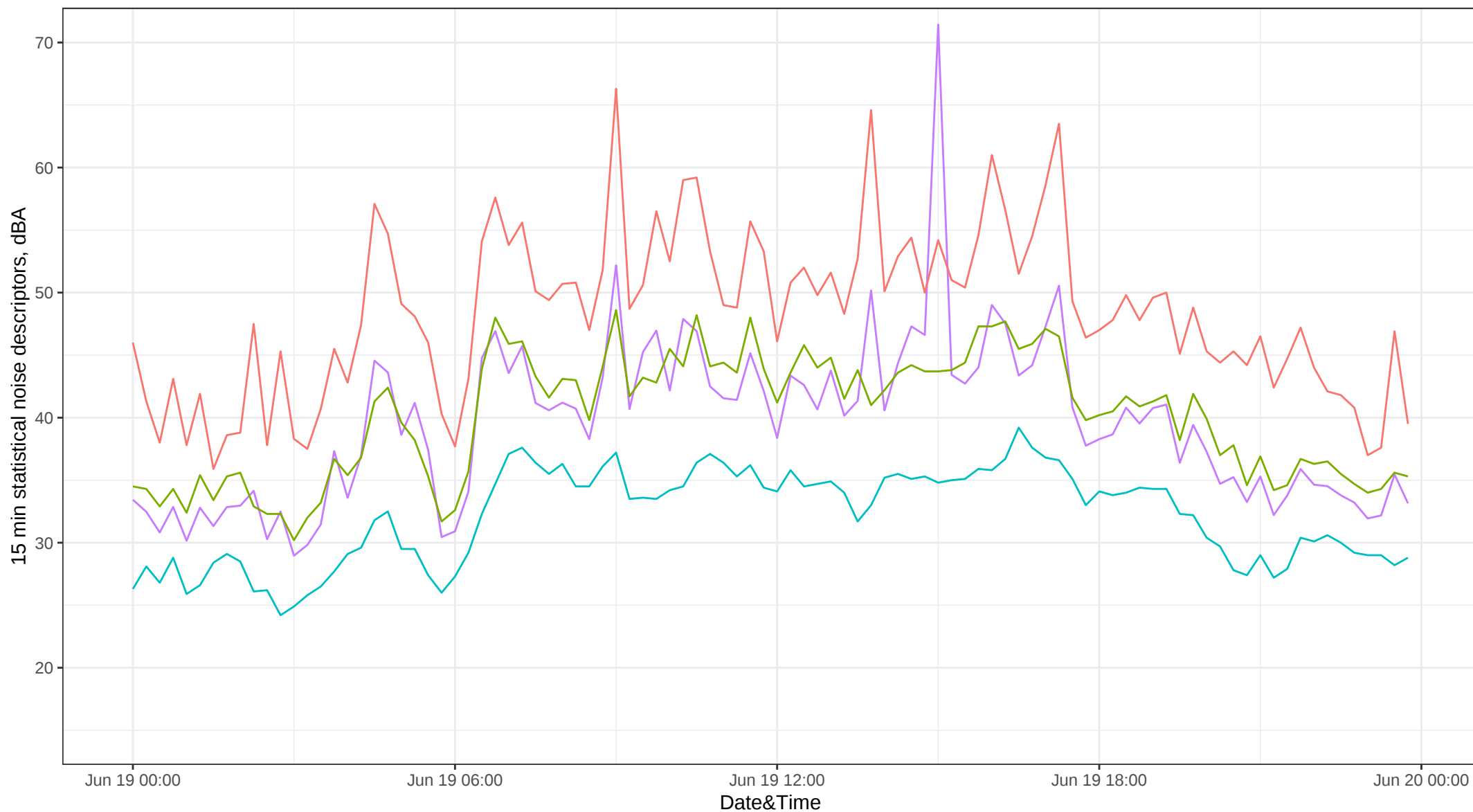
17-Jun-2022 daily 15 minute statistical descriptors 16-18 Upper Street, North Tamworth



18-Jun-2022 daily 15 minute statistical descriptors 16-18 Upper Street, North Tamworth



19-Jun-2022 daily 15 minute statistical descriptors 16-18 Upper Street, North Tamworth

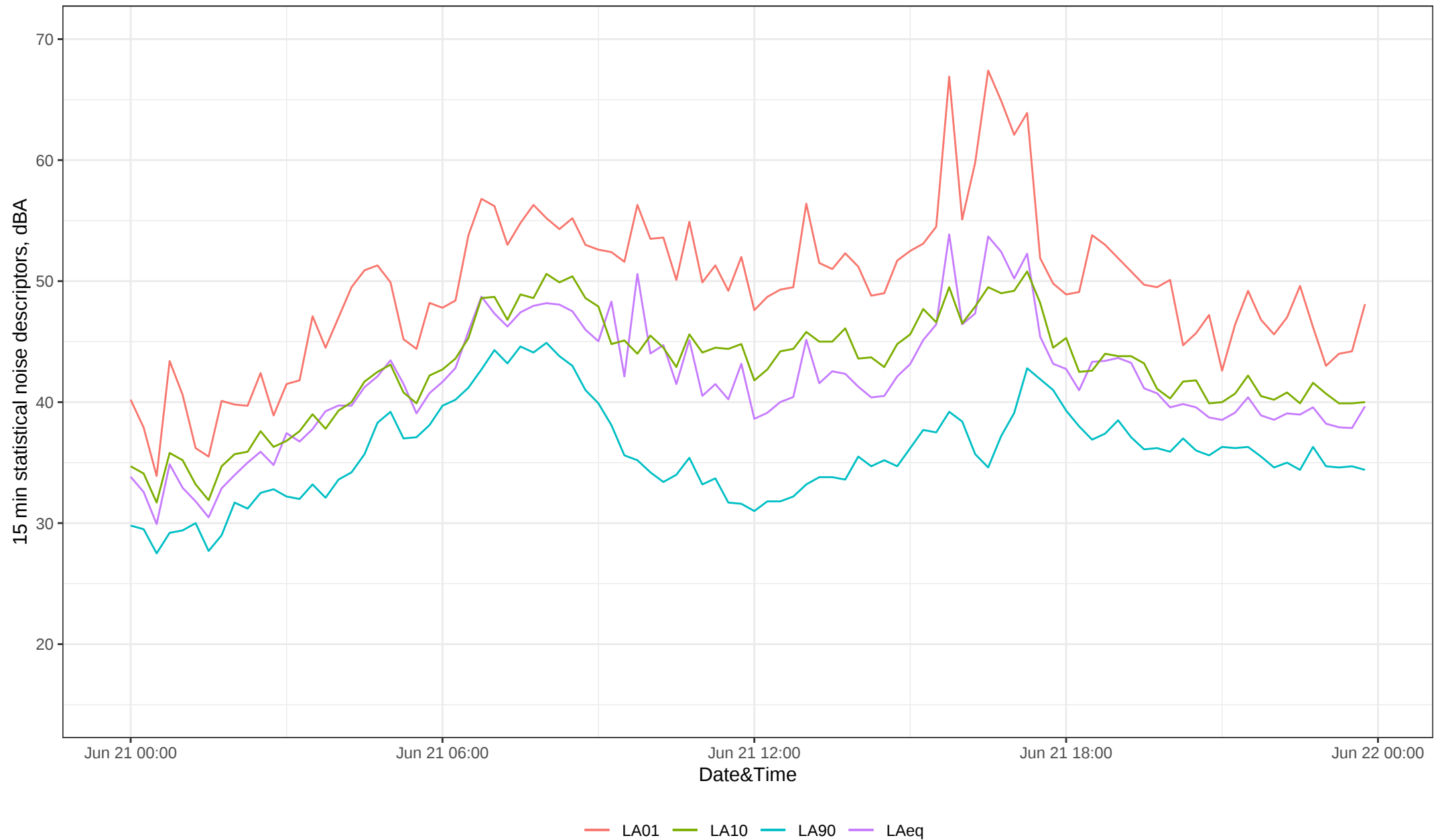


LA01 LA10 LA90 LAeq

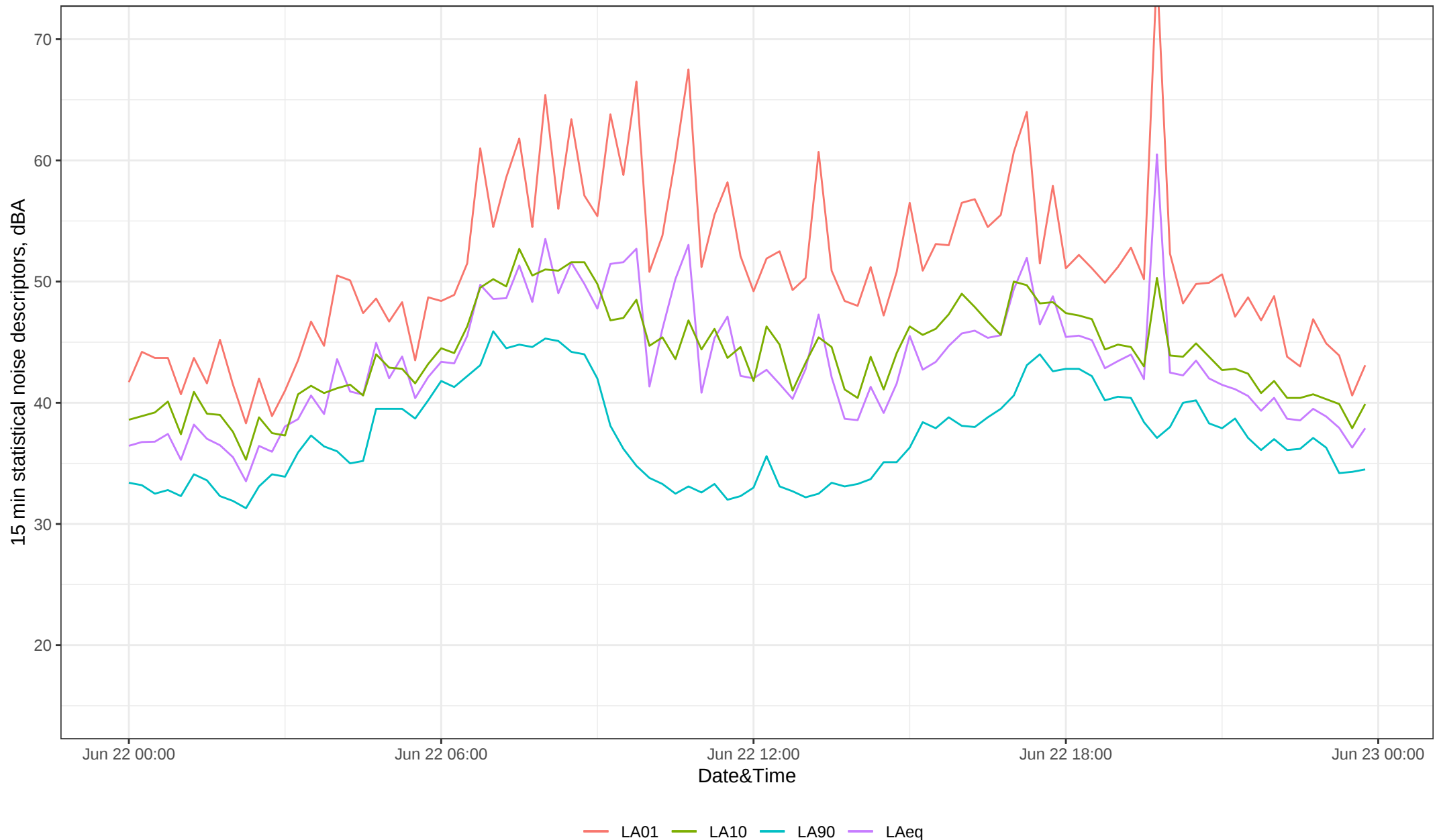
20-Jun-2022 daily 15 minute statistical descriptors 16-18 Upper Street, North Tamworth



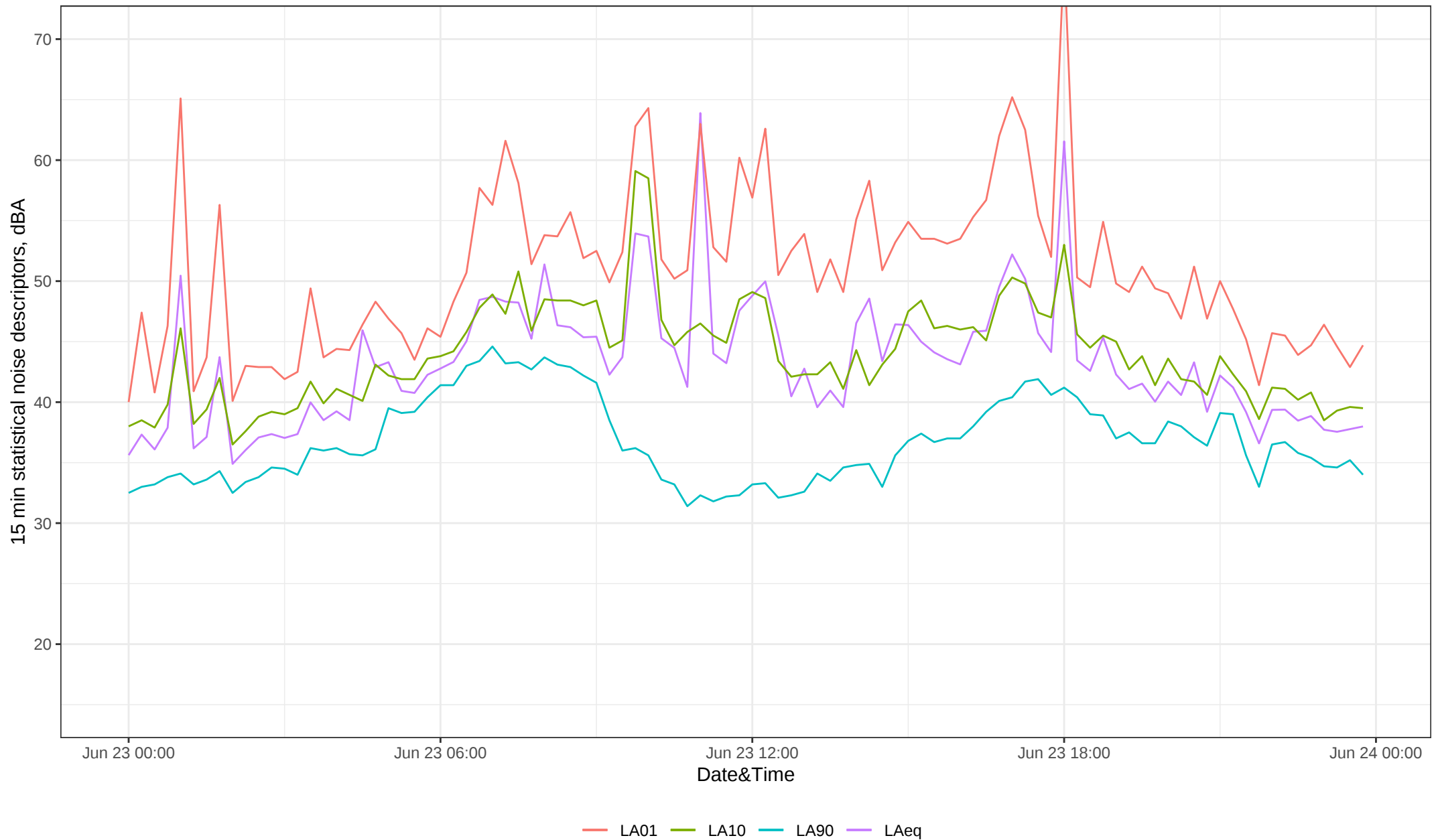
21-Jun-2022 daily 15 minute statistical descriptors 16-18 Upper Street, North Tamworth



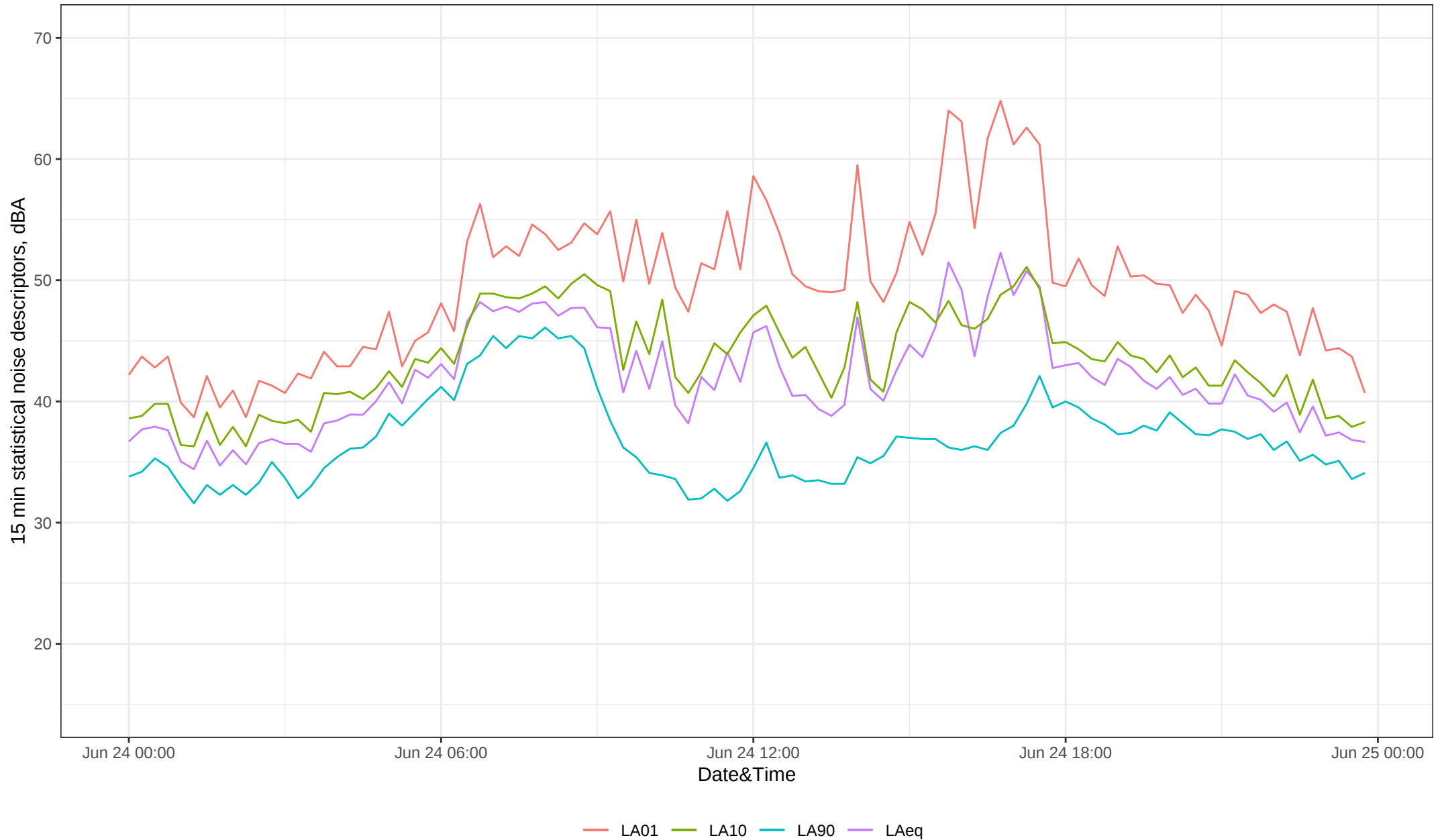
22-Jun-2022 daily 15 minute statistical descriptors 16-18 Upper Street, North Tamworth



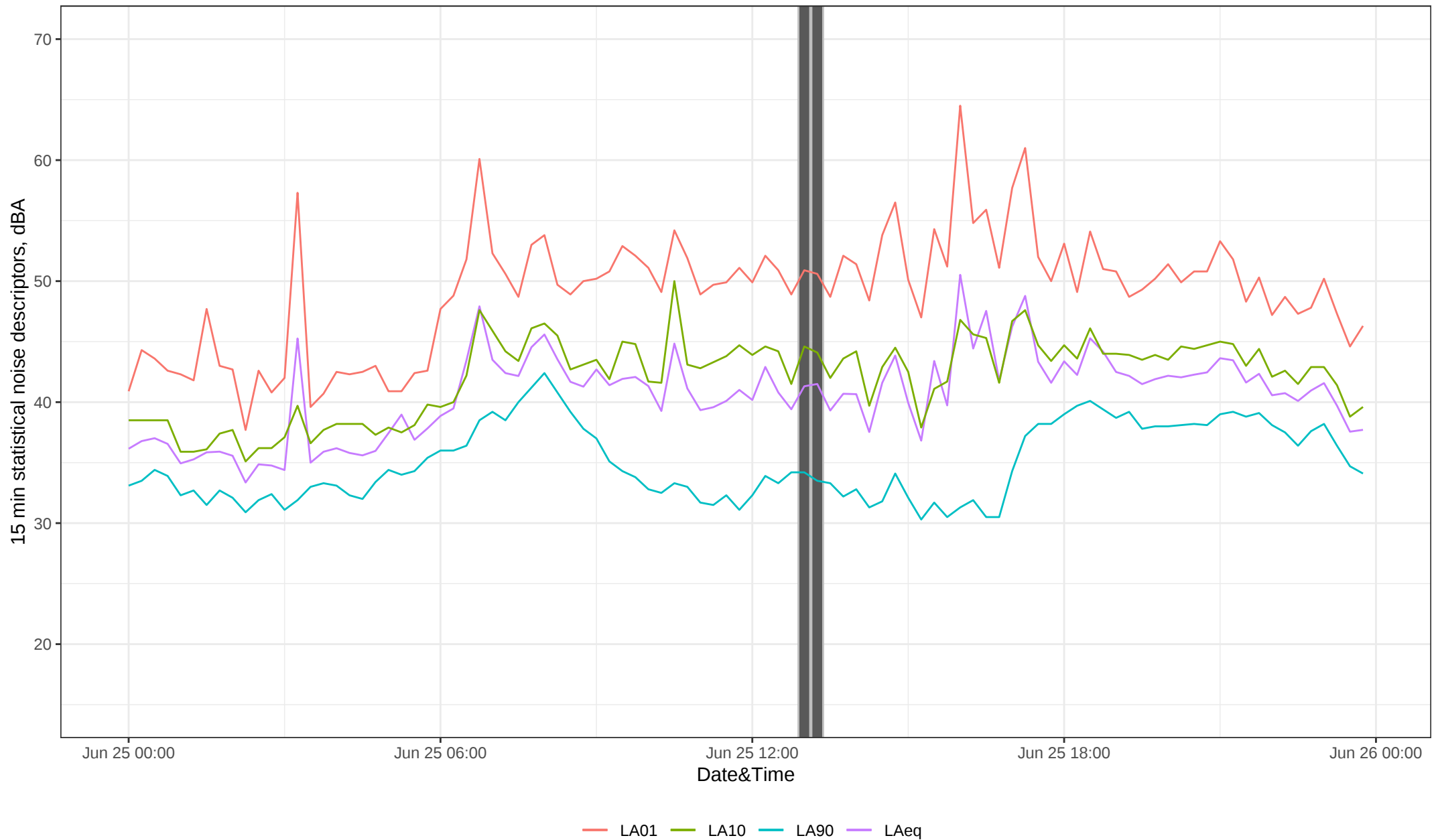
23-Jun-2022 daily 15 minute statistical descriptors 16-18 Upper Street, North Tamworth



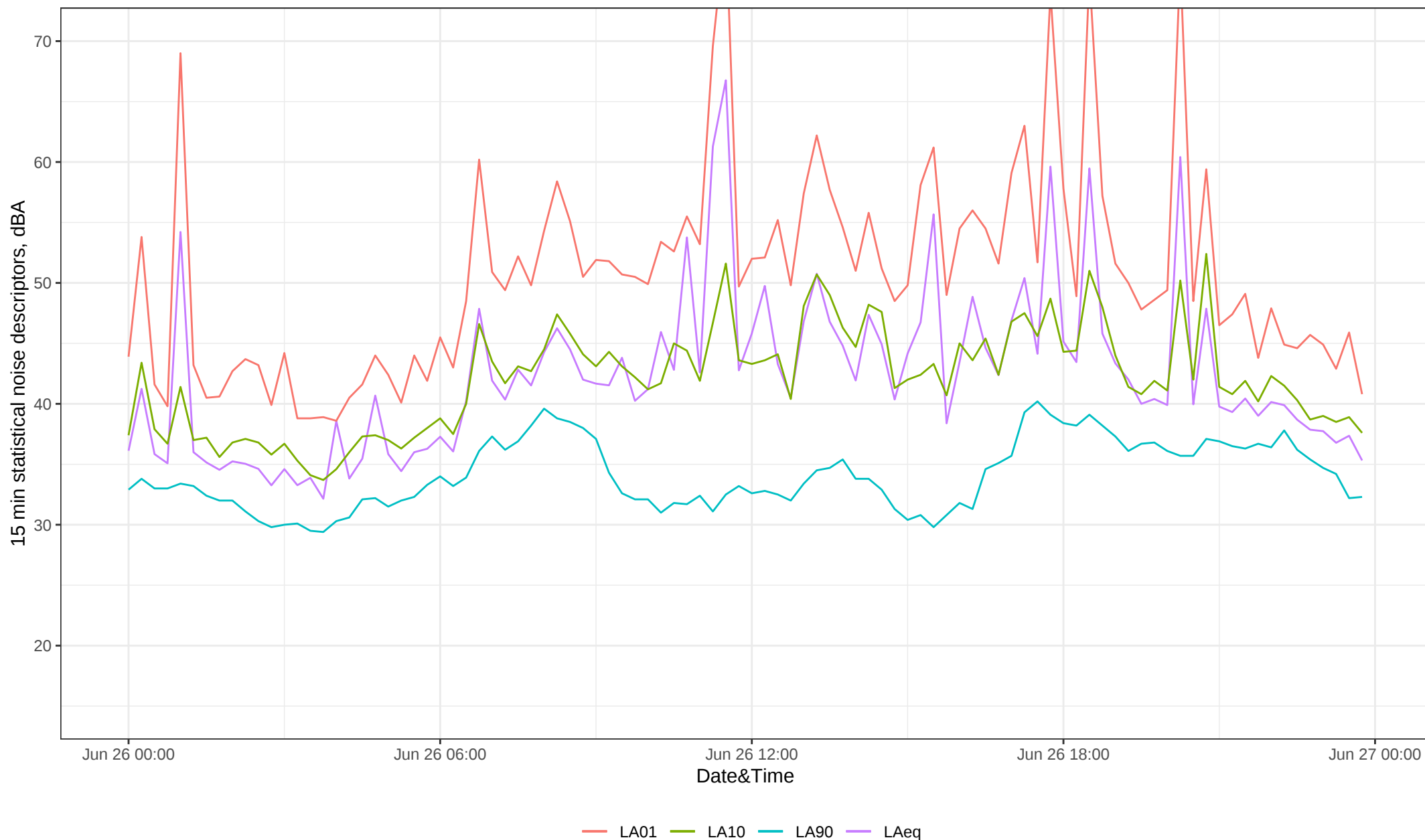
24-Jun-2022 daily 15 minute statistical descriptors 16-18 Upper Street, North Tamworth



25-Jun-2022 daily 15 minute statistical descriptors 16-18 Upper Street, North Tamworth



26-Jun-2022 daily 15 minute statistical descriptors 16-18 Upper Street, North Tamworth



27-Jun-2022 daily 15 minute statistical descriptors 16-18 Upper Street, North Tamworth

