FINAL REPORT

WILKINSON MURRAY

GILEAD

STAGE 2 REZONING

NOISE IMPACT ASSESSMENT
RWDI # 2103458
13 April 2022

SUBMITTED TO

Lauren Connors
Associate
lauren.connors@enspiresolutions.com.au

Enspire Solutions
205/275 Alfred Street N,
North Sydney, NSW 2060
T: (02) 9922 6135

SUBMITTED BY

Justin Leong
Acoustical Consultant
justin.leong@rwdi.com

RWDI Australia Pty Ltd (RWDI)
Suite 602, 80 William Street
Woolloomooloo NSW 2011
T: +61.2.9437.4611
E-mail: solutions@rwdi.com
ABN: 86 641 303 871

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Draft	14 March 2022	Justin Leong	John Wassermann
B	Final	13 April 2022	Justin Leong	John Wassermann
C	Final	20 April 2022	Justin Leong	John Wassermann

NOTE

WILKINSON MURRAY

In October 2020, Wilkinson Murray Pty Ltd merged with RWDI Group, a leading international consulting firm. Wilkinson Murrays core practice areas of noise, acoustics, vibration and air quality consulting built since 1962 servicing Australia and Asia-Pacific region will complement RWDI practice areas. Combined, RWDI+Wilkinson Murray is one of the largest teams globally specialising in the area of noise, acoustics, vibration and air quality.

RWDI

RWDI is a team of highly-specialised consulting engineers and scientists working to improve the built environment through three core areas of practice: building performance, climate engineering and environmental engineering. More information is available at www.rwdi.com.

QUALITY ASSURANCE

RWDI Australia Pty Ltd operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified by SAI Global and Licence No. QEC 13457 has been issued for the following scope: The provision of consultancy services in acoustic engineering and air quality; and the sale, service, support and installation of acoustic monitoring and related systems and technologies.

TABLE OF CONTENTS

LIST OF CHARTS

LIST OF TABLES

LIST OF APPENDICES

1 INTRODUCTION

RWDI was retained on behalf of Lendlease Communities (Figtree Hill) Pty Ltd to conduct an acoustic assessment for the proposed rezoning of the Gilead Stage 2 subdivision development in Gilead, NSW. This report presents the project objectives, background, approach, and provides a discussion of the results and recommendations from RWDI's assessment.

This report presents a noise assessment of the rezoning. The aspects covered are:

- Noise impact of existing industrial noise on the proposed development;
- Noise impact of future traffic noise on the proposed development; and
- Noise impact from future traffic noise generated by the development on existing residential areas.

A glossary of acoustic terminology is presented in Appendix A.

1.1 Project Description

The Gilead property is located between the Hume Motorway (to the immediate west of the property) and Appin Road (to the immediate east) and is located immediately south of the existing suburb of Rosemeadow.

The Gilead property comprises of the three following main land parcels:

- **Gilead Stage 2 ("Site")** – 522ha parcel located within the Greater Macarthur Growth Area and the subject of this acoustic assessment. The proposed urban development project is expected to yield approximately 4,500 lots and will consist of low and medium density residential development, retail & educational facilities and public open space and conservation areas.
- **Figtree Hill** – a 215ha parcel which has received planning approval for 1,700 lots in 2017; and
- **The Homestead Lot** – A 150ha agricultural parcel, the State Heritage listed Mount Gilead Homestead contains historically significant buildings and a dam that will be retained by the landowner.

A quarry and a coal seam gas plant are located towards the north-western boundary of the site, and the South Coast Line rail corridor is located approximately 870m west of the site.

Existing residential development around the site have been grouped into the following Noise Catchment Areas (NCAs):

- NCA01: Residential dwellings to the north of the site;
- NCA02: Residential development approximately 1.5km to the north-east of the site in the suburb of Rosemeadow
- NCA03: Dwellings to the north-west of the site across the Hume Motorway, with the nearest dwelling located approximately 170m from the site;
- NCA04: Dwellings located approximately 700m east of the site across Appin Road;
- NCA05: Dwellings to the immediate south-east of the site; and
- NCA06: Dwellings located approximately 850m west of the site across the Hume Motorway.

An aerial photograph of the site is presented in Figure 1-1. In addition, a concept plan of the proposed development is presented in Figure 1-2.

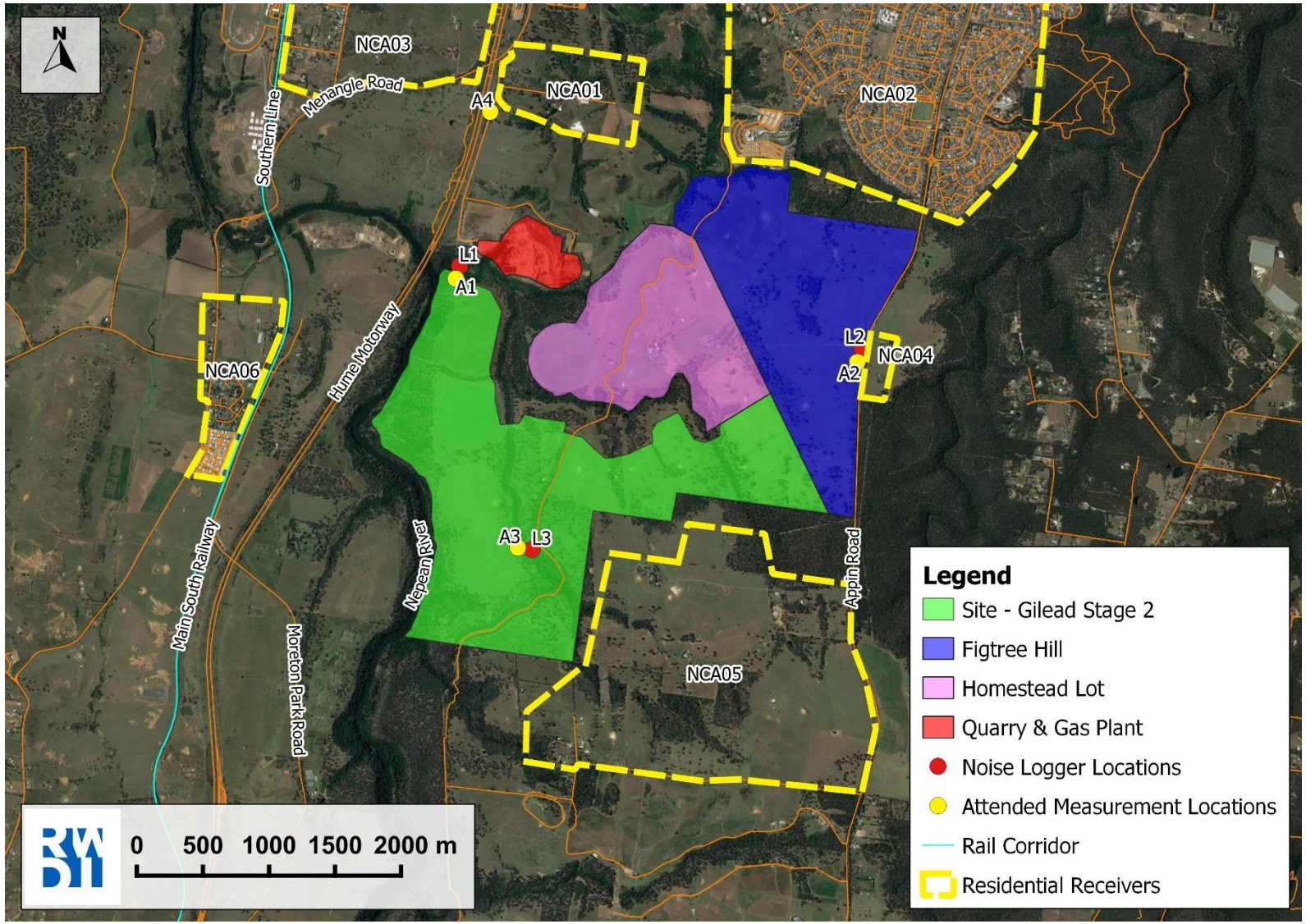


Figure 1-1 Aerial Photograph of Site and Surroundings (Image Courtesy of Google Maps)

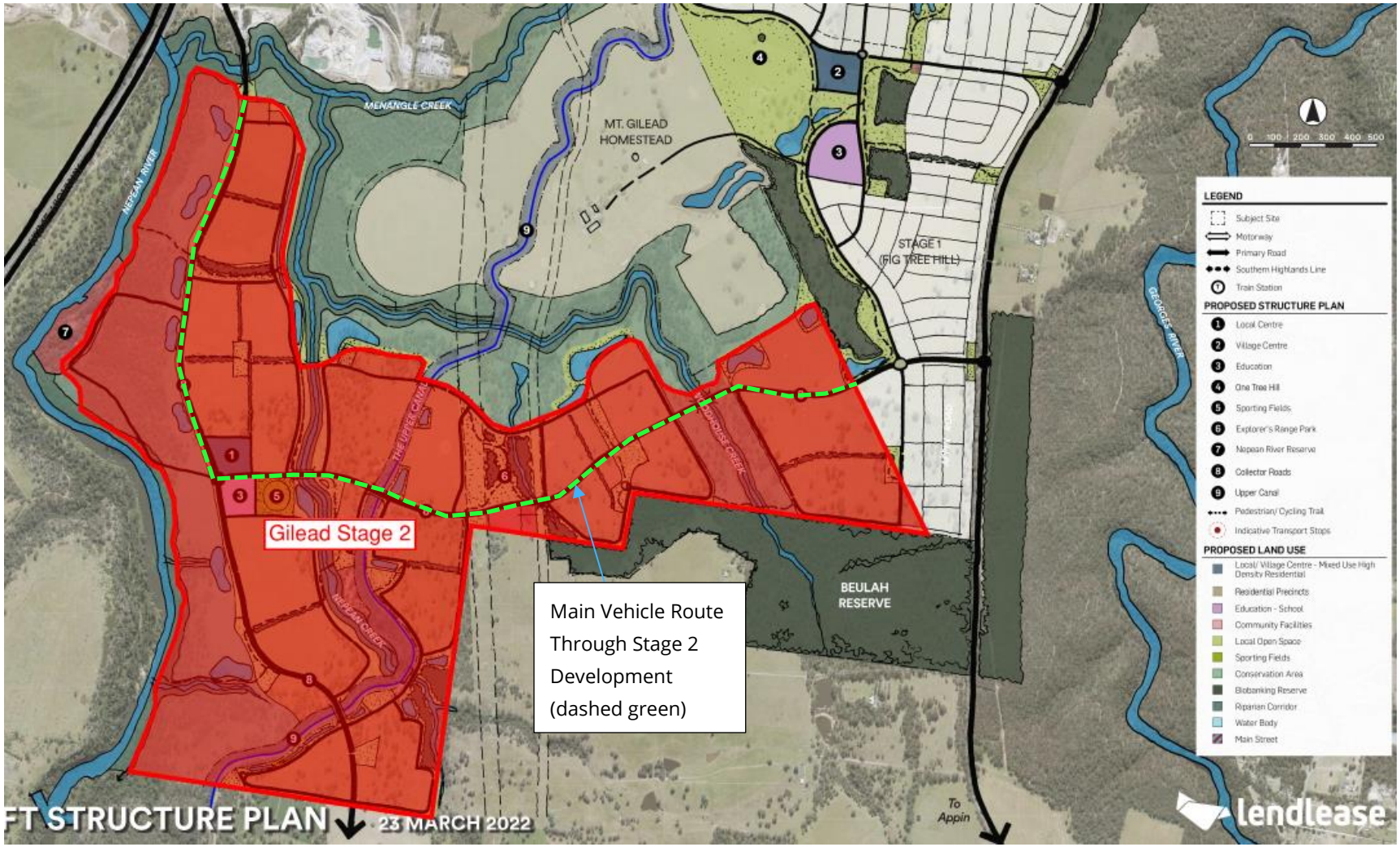


Figure 1-2 Lendlease Design Structure Plan

2 EXISTING NOISE ENVIRONMENT

2.1 Site Survey

2.1.1 Unattended Noise Measurements

A site noise survey was undertaken between March 31 and April 16, 2021 using three unattended noise loggers that were installed around the site (indicated in red circles in Figure 1-1). The locations of the noise loggers are as follows:

- Logger Location 1 (L1): Located near the quarry and coal seam gas land uses. The logger was approximately 200m from the Hume Motorway. The noise environment at this location was dominated by traffic noise from the Hume Motorway, with marginal contributions from wildlife noise. Activity noise from the quarry and the coal seam gas plant was inaudible.
- Logger Location 2 (L2): Located approximately 25m west of Appin Road. The noise environment was dominated by traffic noise from Appin Road.
- Logger Location 3 (L3): Located towards the middle of the site to measure background noise levels primarily. The noise environment was characterised by wildlife noise and very faint, distant traffic noise.

The noise monitoring equipment used for these measurements consisted of Acoustic Research Laboratories environmental noise loggers set to A-weighted, fast response continuously monitoring over 15-minute sampling periods. This equipment is capable of storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the existing noise environment. The L_{A1}, L_{A10} and L_{A90} levels are the levels exceeded for 1%, 10% and 90% of the sample time respectively. The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional pass-by of a heavy vehicle. The L_{A90} level is normally taken as the background noise level. The L_{Aeq} level is the Equivalent Continuous Sound Level and has the same sound energy over the sampling period as the actual noise environment with its fluctuating sound levels. Whilst the L_{A10} has in the past been used as a descriptor for traffic noise, the LAeq is now the standard descriptor for traffic noise.

Table 2-1 presents the existing overall representative L_{Aeq} ambient noise level and the background L_{A90} noise levels for the day, evening and night-time periods, in accordance with the NSW EPA Noise Policy for Industry (NPfI). The overall representative L_{Aeq} noise levels were determined by logarithmically averaging each assessment period for the entire monitoring period. We note that the noise logging included the period of the Easter long weekend (April 2 to 6 inclusive). Given that ambient noise conditions during this period would not be representative of typical conditions, the noise logging data measured during this period has been excluded in calculating the ambient and rated background noise levels for the site.

Table 2-1 Unattended Noise Monitoring Results (Day/Evening/Night Descriptors) – dBA

Logger Location (refer to Figure 1-1)	Period[1]	Ambient Noise Level $L_{Aeq,period}$	Rated Background Level $L_{A90,period}$
L1: Near Hume Motorway	Day	60	52
	Evening	59	52 [2]
	Night	58	46
L2: Near Appin Road	Day	69	43
	Evening	67	42
	Night	64	35
L3: Middle of Site	Day	47	35
	Evening	44	34
	Night	44	34 [3]

Note 1: Periods are defined in accordance with the NSW EPA Noise Policy for Industry; Day (7.00am – 6.00pm or 8.00am – 6.00pm Sundays and public holidays), evening (6.00pm – 10.00pm) and (10.00pm-7.00am or 10.00pm – 8.00am Sundays and public holidays).

Note 2: The measured background noise level during the evening period was 53dBA, however in accordance with the NPfI, the lower daytime background noise level (52dBA) has been adopted for the evening period.

Note 3: The measured background noise level during the night period was 35dBA, however in accordance with the NPfI, the lower evening background noise level (34dBA) has been adopted for the night period.

In addition, the measured L_{Aeq} noise levels based on the Day (7am-10pm) / Night (10pm-7am) time descriptors have been presented in Table 2-2.

Table 2-2 Unattended Noise Monitoring Results (Day/Night Descriptors) – dBA

Logger Location (refer to Figure 1-1)	Period	Ambient Noise Level, $L_{Aeq,period}$
L1: Near Hume Motorway	Day (7am-10pm)	60
	Night (10pm-7am)	58
L2: Near Appin Road	Day (7am-10pm)	69
	Night (10pm-7am)	64
L3: Middle of Site	Day (7am-10pm)	46
	Night (10pm-7am)	44

The results for each day and the graphical noise logging results are presented in Appendix B.

2.1.2 Attended Noise Measurements

Attended noise measurements were conducted around the site on March 31, 2021 to supplement the unattended noise measurements. The measurement locations are indicated in yellow circles in Figure 1-1.

All attended noise measurements were conducted using an NTI XL2 Sound Level Meter. This sound level meter conforms to Australian Standard 1259 Acoustics - Sound Level Meters as a Type 1 Precision Sound Level Meter which has an accuracy suitable for field and laboratory use. The A-Weighting filter of the meter was selected and the time weighting was set to "Fast". The calibration of the meter was checked before and after the measurements and no significant drift was noted.

Weather conditions during the attended measurements were clear with little to no wind. The results of the attended measurements are summarised in Table 2-3.

Table 2-3 Attended Noise Measurement Results

Measurement Location (Refer to Figure 1-1)	Measurement Time	Measured Ambient Noise Level dB(A) L_{EQ}	Measured Background Noise Level dB(A) L_{90}	Noted Noise Source(s)
A1: Near Quarry and Coal Seam Gas Plant	2:15pm – 2:30pm	55	51	Traffic Noise from Hume Motorway. Noise from Quarry and Coal Seam Gas Plant Inaudible
A2: Near Appin Road	12:20pm – 12:35pm	70	46	Traffic Noise from Appin Road
A3: Middle of Site	1:05pm – 1:20pm	39	30	Wildlife Noise
A4: Near Hume Motorway	1:50pm – 2:05pm	61	52	Traffic from Hume Motorway. Occasional traffic accessing Quarry/Coal Seam Gas Plant

As noted in the table above, operational noise from the neighbouring quarry and coal seam gas plant was inaudible at the site location and so existing uses are not expected to present a noise nuisance for the proposed development.

3 EXTERNAL NOISE INTRUSION ASSESSMENT

3.1 Acoustic Criteria

The following sub-sections detail the external noise intrusion criteria that are applicable to the proposed development.

3.1.1 Campbelltown City Council Development Control Plan (DCP)

Section 3.4.3 of Part 3 of the Campbelltown City Council DCP (which applies to low and medium density residential development and ancillary residential structures) provides the following acoustic requirements:

*"**3.4.3.1 Acoustic Privacy***

Design Requirements

a) Development that adjoins significant noise sources, (such as main roads, commercial/industrial development, public transport interchanges and railways) shall be designed to achieve acceptable internal noise levels, based on recognised Australian Standards and any criteria and standards regulated by a relevant State Government Authority.

d) Multi dwelling housing and attached dwellings near railway corridors and major roads shall demonstrate to Council's satisfaction compliance with the requirements under the Guidelines entitled Development Near Rail Corridors and Busy Roads – Interim Guideline, 2008)."

3.1.2 State Environmental Planning Policy (Infrastructure) 2007 ["ISEPP"]

The acoustic requirements of Clause 102 of the ISEPP applies to developments that are located on land in or adjacent to a road corridor with an annual average daily traffic (AADT) volume of more than 20,000 vehicles.

The proposed development is located in the vicinity of Hume Motorway, which has an annual average daily traffic volume in excess of 20,000 vehicles based on the Roads and Maritime Services (RMS) traffic volume maps. However, given that the nearest residential lot of the proposed rezoning will be approximately 100m from the Hume Motorway, this would not be considered land adjacent to the road corridor. In addition, the proposed development is located in the vicinity of a section of Appin Road that has an AADT volume less of 20,000 vehicles based on the RMS traffic volume maps.

As a result, there is no mandatory requirement to apply the acoustic criteria of the ISEPP to the proposed site. For the purposed of this assessment however, the acoustic requirements of the ISEPP will be adopted. Clause 102 of the ISEPP provides the following internal noise criteria for residential development:

"(3) If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:

(a) in any bedroom in the residential accommodation—35 dB(A) at any time between 10 pm and 7 am,
(b) anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time."

3.1.3 NSW DoP's "Development Near Rail Corridors & Busy Roads – Interim Guideline" 2008

Section 3.6.1 of the NSW DoP's "Development Near Rail Corridors & Busy Roads – Interim Guideline" references the internal requirements of the ISEPP for developments that are located along roadways with an AADT of 20,000 vehicles or more, or development located adjacent to a rail corridor. Refer to section 3.1.2 above for the ISEPP internal noise requirements.

3.1.4 Summary of Internal Noise Criteria

Based on the sub-sections above, a summary of the internal noise criteria for the residential components of the development are presented in Table 3-1.

Table 3-1 Summary of Internal Noise Level Criteria

Type of Occupancy	Time of Day	Internal Noise Criteria
Residential Sleeping Areas	Night (10 pm – 7 am)	35 $L_{Aeq, 9hr}$
Residential Living Areas	Day (7 am – 10 pm)	40 $L_{Aeq, 15hr}$

3.2 Traffic Noise Levels

To assess traffic noise impacts on the proposed development, a 3D model of the site and the surrounding roadways was developed using Cadna/A, which is a commercially available software implementation of the ISO 9613 (ISO, 1994 and ISO, 1996) algorithms.

In addition, traffic noise impacts on the proposed development were assessed based on predicted future traffic data supplied by VIAE Consulting and using the Calculation of Road Traffic Noise (CoRTN) algorithms. The traffic data used for this assessment is presented in Table 3-3 and represents the predicted future 2036 traffic volumes on the surrounding roadways assuming that the development is constructed.

Table 3-2 Traffic Volume Forecasts for Surrounding Roadways

Roadway	2036 Build			
	Day (7am-10pm)		Night (10pm-7am)	
	LV	HV	LV	HV
Hume Motorway	121,700	5,781	12,093	1,953
Medhurst Road	18,209	0	1,240	0
Appin Road	43,381	235	2,771	22

For the purposes of this assessment, it has been assumed that the majority of the vehicle traffic along Medhurst Road will travel along the main vehicle route through the Stage 2 development (as indicated by the dashed green line in Figure 1-2).

The predicted noise levels at the façades of the western-most and eastern-most residential buildings in the site are presented in Table 3-3.

Table 3-3 Predicted Noise Levels at the Façades of Residential Buildings with the Development

Location	Time of Day	Predicted Traffic Noise Level $L_{Aeq, period}$ - dBA
Western Façade of Western-Most Building along Medhurst Road (approx. 100m from Hume Motorway)	Day (7 am – 10 pm)	67
	Night (10 pm – 7 am)	61
Eastern Façade of Eastern-Most Buildings (approx. 220m from Appin Road)	Day (7 am – 10 pm)	57
	Night (10 pm – 7 am)	51

Using the predicted façade noise levels determined by the Cadna/A modelling, façade noise intrusion analysis was conducted to determine the internal noise levels within the development as a result of noise transmission through the building façade elements. This modelling considered the transmission loss performance of the façade elements, the typical surface area of each façade element exposed to external noise, and the absorption characteristics of the internal spaces due to room finishes.

3.3 Recommendations

Based on our external noise intrusion analysis, the indicative recommended weighted sound reduction index (R_w) performance for the building façade elements to meet the internal noise requirements are presented in the sub-sections below. **It is recommended that the façade treatments be reviewed at construction certificate stage once the design and layout of internal spaces has sufficiently progressed.**

3.3.1 Glazing

The indicative glazing performance requirements for the development are presented in Table 3-4 and should be read in conjunction with the marked-up concept plan presented in Figure 3-1 below.

Glazing suppliers should provide acoustic laboratory test reports confirming that the acoustic performance of their window systems (combined performance of the glass and window/door frame) meet the recommended R_w requirements.

Table 3-4 Recommended Minimum Acoustic Performance for Glazing (Indicative)

Region (Refer to Figure 3-1)	Space Type	Minimum Glazing Performance
Residential Buildings in Red Region	Bedrooms and Living Rooms	R_w 34
Residential Buildings in Blue Region	Bedrooms and Living Rooms	R_w 31
All Remaining Residential Buildings	Bedrooms and Living Rooms	R_w 28

Sample glazing assemblies for each of the R_w ratings are noted below.

Glazing, R_w 28

- 6 mm float glazing with rubber acoustic seals (similar to Schlegel Q-lon seals)

Glazing, R_w 31

- 6.38 mm laminated glazing with rubber acoustic seals (similar to Schlegel Q-lon seals)

Glazing, R_w 34

- 10.38 mm laminated glazing with rubber acoustic seals (similar to Schlegel Q-lon seals)

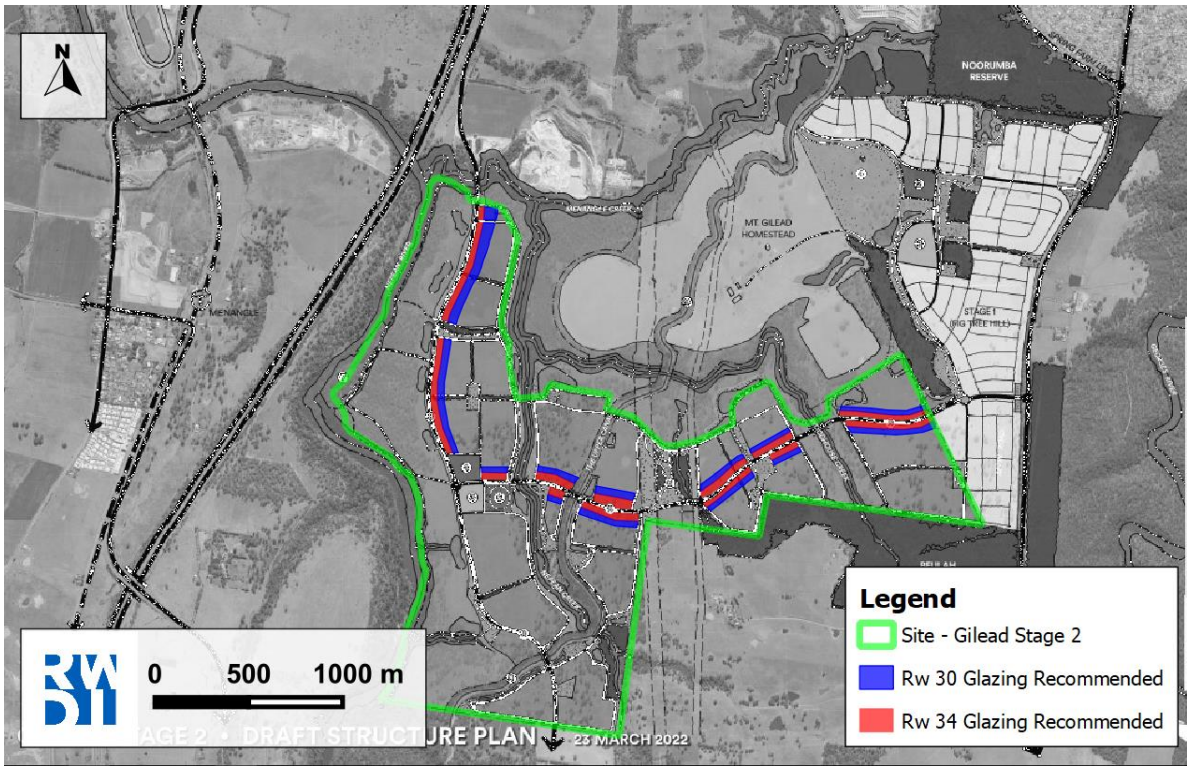


Figure 3-1 Indicative Recommended Glazing Requirements (Refer Also to Table 3-4)

3.3.2 External Walls

Any external walls constructed of concrete or masonry (including brick) elements will provide adequate acoustic isolation and will not require any additional acoustic treatment to meet the internal noise requirements.

Should lightweight external wall constructions be proposed for residential lots highlighted in red or blue in Figure 3-1, the external walls should be reviewed at detailed design stage to confirm that the internal noise requirements will be met. Lightweight external constructions for all other residential buildings within the development should be acoustically acceptable.

Any penetrations of the external walls should be acoustically sealed and treated to maintain the acoustic performance of the wall.

3.3.3 Roof/Ceiling

Concrete tile or metal deck roofs with a large airgap (minimum 300mm cavity), glasswool insulation to the ceiling void and plasterboard ceiling will provide adequate acoustic isolation to mitigate traffic noise ingress through the roof.

3.3.4 External Entry Doors

Hinged external entry doors to habitable spaces (i.e. bedrooms or living rooms) of dwellings fronting the main vehicle route through the Stage 2 development (as indicated by the dashed green line in Figure 1-2) should have full perimeter rubber acoustic seals to the head and jamb of the doors as well as a drop seal to the underside of the doors. Suitable door seals are supplied by Raven and Lorient.

Timber doors should be constructed using minimum 40 mm thick solid core timber. Glazed doors are to have sound insulation performance to equal to or greater than those recommended in Table 3-4.

3.3.5 Ventilation

Section 3.6.1 of the DoP's *Development Near Rail Corridors and Busy Roads - Interim Guideline* states the following with respect to internal noise requirements for residential development and natural ventilation:

"If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."

For residential buildings highlighted in red and blue in Figure 3-1, it is anticipated that windows and doors will need to remain closed to achieve the internal noise requirements. Therefore, ventilation for these rooms should be such that occupants can leave windows closed, if they so desire and also to meet the ventilation requirements of the Building Code of Australia.

All other residential buildings within the development will be able to meet these internal noise guidelines with windows open.

The need for supplementary ventilation requirements for the residential developments (as described above) should be reviewed once the building layouts for the precinct have progressed sufficiently.

3.3.6 Findings of External Noise Intrusion Assessment

Our external noise intrusion assessment indicates that it will be possible to achieve the internal noise requirements for the development through the use of standard building façade constructions. We can confirm that the site will be suitable for residential development via rezoning with respect to external noise intrusion. Façade constructions for the development should be reviewed post-rezoning during the construction certificate stage.

4 NOISE EMISSION ASSESSMENT

4.1 Acoustic Criteria

The following sub-sections present the noise emission criteria that are applicable to the proposed development.

4.1.1 Campbelltown City Council DCP

Section 3.4.3.1 of the Campbelltown City Council DCP (which relates to low and medium density residential development) provides the following acoustic requirements:

*"**3.4.3.1 Acoustic Privacy***

b) On-site noise generating sources including, but not limited to, plant rooms and equipment, air conditioning units, pool pumps, and recreation areas shall be designed and located to ensure that the noise levels generated by such facilities do not exceed 5 dBA above background levels at the property boundary."

4.1.2 NSW EPA Noise Policy for Industry 2017

The EPA's Noise Policy for Industry (NPfI) 2017 provides guidance for the assessment and control of noise emissions from industrial sources and activities. The policy nominates two noise emission criteria that should be satisfied, namely the project intrusiveness noise level and project amenity noise level. These are described in detail in the following sub-sections.

4.1.2.1 Project Intrusiveness Noise Level

The project intrusiveness noise criterion aims to protect residential receivers against significant changes in the noise environment due to new development. The project intrusiveness noise criterion states that noise emissions from new development should be no more than 5 dB(A) above the rated background noise level. Based on the rated background noise levels measured on site (presented in section 2), the project intrusiveness noise levels are summarised in Table 4-1 below.

Table 4-1 NPfI Project Intrusiveness Noise Level Criteria

Receiver Location	Time of Day	Rating Background Noise Level $L_{A90(period)}$, dBA	Project Intrusiveness Noise Level Criteria $L_{Aeq(15min)}$, dBA
Residential Receivers in NCA01, NCA03 and NCA06	Day (7 am – 6 pm)	52	57
	Evening (6 pm – 10 pm)	52	57
	Night (10 pm – 7 am)	46	51
Residential Receivers in NCA02 and NCA04	Day (7 am – 6 pm)	43	48
	Evening (6 pm – 10 pm)	42	47
	Night (10 pm – 7 am)	35	40
Residential Receivers in NCA05	Day (7 am – 6 pm)	35	40
	Evening (6 pm – 10 pm)	34	39
	Night (10 pm – 7 am)	34	39

4.1.2.2 Project Amenity Noise Level

The project amenity noise criterion is intended to protect receivers against continuing increases in cumulative noise levels from all "industrial" noise sources. The project amenity criterion for any specific receiver is dependant on the land use of the receiver (e.g. residential, commercial, industrial etc.). Residential receivers also need to be classified as rural, suburban or urban depending on the existing noise environment of the residences, with guidance for determining the residential classification provided in table 2.3 of the policy.

The neighbouring residential receivers along and in close proximity to Hume Motorway and Appin Road have been classified as suburban residential, while neighbouring residential receivers located towards the middle of the site are classified as rural residential. In addition, based on our unattended noise monitoring results (refer to section 2) we note that the "high traffic project amenity noise level" criterion applies to these residential receivers along Appin Road at all times of the day, and at the residential receivers along Hume Motorway during the evening and night time periods based on section 2.4.1 of the Noise Policy for Industry.

The project amenity noise level criteria, determined in accordance with the procedure outlined in section 2.2 and 2.4 of the NPfI, are summarised in Table 4-2 below.

Table 4-2 NPfI Project Amenity Noise Level Criteria

Receiver Type	Time of Day	Measured Ambient Noise Level $L_{Aeq(period)}$, dBA	Project Amenity Noise Level Criteria $L_{Aeq(15min)}$, dBA
Residential Receivers in NCA01, NCA03 and NCA06 (Suburban)	Day (7 am – 6 pm)	60	53
	Evening (6 pm – 10 pm)	59	47 [1]
	Night (10 pm – 7 am)	58	46 [1]
Residential Receivers in NCA02 and NCA04 (Suburban)	Day (7 am – 6 pm)	69	57 [1]
	Evening (6 pm – 10 pm)	67	55 [1]
	Night (10 pm – 7 am)	64	52 [1]
Residential Receivers in NCA05 (Rural)	Day (7 am – 6 pm)	47	48
	Evening (6 pm – 10 pm)	44	43
	Night (10 pm – 7 am)	44	38
Commercial Receivers	When in use	-	63

Note 1: High traffic project amenity noise level.

4.1.2.3 Project Noise Trigger Level

The project noise trigger levels are defined as the lower of the project intrusiveness and the project amenity noise levels. These are summarised in Table 4-3 below.

Table 4-3 NPfI Project Trigger Noise Level Criteria

Receiver Location	Time of Day	Project Intrusiveness Noise Level Criteria $L_{Aeq(15min)}$	Project Amenity Noise Level Criteria $L_{Aeq(15min)}$	Project Trigger Noise Level Criteria $L_{Aeq(15min)}$
Residential Receivers in NCA01, NCA03 and NCA06	Day (7 am – 6 pm)	57	53	**53**
	Evening (6 pm – 10 pm)	57	47	**47**
	Night (10 pm – 7 am)	51	46	**46**
Residential Receivers in NCA02 and NCA04	Day (7 am – 6 pm)	48	57	**48**
	Evening (6 pm – 10 pm)	47	55	**47**
	Night (10 pm – 7 am)	40	52	**40**
Residential Receivers in NCA05	Day (7 am – 6 pm)	40	48	**40**
	Evening (6 pm – 10 pm)	39	43	**39**
	Night (10 pm – 7 am)	39	38	**38**
Commercial Receivers	When in use	-	63	**63**

4.2 Recommendations

4.2.1 Air-Conditioning Noise

It is not possible to carry out an assessment of noise emissions of mechanical plant at this stage. However, our preliminary review indicates that noise emissions from the air-conditioner units should be able to comply with the noise emission requirements at all receivers external to the development with typical outdoor air conditioning units (sound power level of units less than or equal to 68dBA).

4.2.2 School and Sporting Fields

The concept design for the Stage 2 rezoning indicates school facilities and sporting fields and in close proximity to residential areas within the Stage 2 precinct.

It is anticipated that noise impacts from the use of the school facility and sporting fields would be reviewed as part of separate development applications once the operational details (e.g. hours of operation, capacity) for these facilities have been confirmed.

5 INCREASED TRAFFIC NOISE ON PUBLIC ROADS

This section of the report addresses noise impacts on the neighbouring residential development due to increased traffic generated from the proposed development on the surrounding public roads.

5.1 Acoustic Criteria

The NSW EPA Road Noise Policy (RNP) provides base line criteria for noise impacts on residences affected by additional traffic on existing local roads generated by land use developments. Hume Motorway and Appin Road are considered arterial roads, and Medhurst Road will be considered a sub-arterial road and so the relevant criteria applicable to the proposed development are summarised in Table 5-1.

Table 5-1 *RNP* Base Line Criteria for Road Traffic Noise – dBA

Type of Development	Assessment Criteria	
	Day (7am–10pm)	**Night** (10pm–7am)
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,15\ hour}$ 60 (external)	$L_{Aeq,9\ hour}$ 55 (external)

Note: The identified criteria does not apply to vehicle movements within the Project Site.

Where the existing traffic noise levels exceed the base line criteria stipulated in Table 5-1, additional analysis should be conducted to evaluate whether traffic noise levels at residences would increase by more than 2dBA (referred hereafter as the "allowance" criteria). If the increase in overall traffic noise levels is less than 2dBA, this would typically be considered as an imperceptible increase in noise level and, as such, will not result in any adverse impacts on residential receivers.

5.2 Noise Predictions

5.2.1 Noise Modelling Assumptions

Modelling of increased traffic noise on the surrounding public roads as a result of the proposed development have been undertaken using the Calculation of Road Traffic Noise (CoRTN) algorithm. The modelling has been based on traffic forecasts for 2036 provided by VIAE Consulting. Future traffic volumes on the surrounding roadways have been provided for two scenarios:

- No Build Scenario: Traffic volumes if the development was not to be constructed.
- Build Scenario: Traffic volumes if the development was to be constructed

The traffic volume forecasts used for this assessment are summarised in Table .

Table 5-2 Traffic Volume Forecasts for Surrounding Roadways

Roadway	2036 No Build				2036 Build			
	Day (7am-10pm)		Night (10pm-7am)		Day (7am-10pm)		Night (10pm-7am)	
	LV [1]	HV [1]	LV	HV	LV	HV	LV	HV
Hume Motorway	117,796	5,610	11,497	1,894	121,700	5,781	12,093	1,953
Medhurst Road	222	4	17	0	18,209	0	1,240	0
Appin Road	31,884	290	1,992	28	43,381	235	2,771	22

Note 1: LV = Light Vehicles, HV = Heavy Vehicles

5.2.2 Predicted Noise Levels

Based on the traffic data provided (refer to Table 5-2) the predicted traffic noise levels at the potentially most-affected residences in each of the NCAs are presented in Table 5-3.

Predicted noise levels will be assessed against the criteria of the NSW EPA RNP (see section 5.1).

Table 5-3 Predicted Noise Levels – Increased Traffic Noise on Public Roads

Receiver Location	Time Period	Predicted Noise Level Traffic Noise Level, $L_{Aeq, period}$		Increase in Traffic Noise Level $L_{Aeq, period}$	Allowance Criteria $L_{Aeq, period}$	Complies
		2036 No Build Scenario	2036 Build Scenario			
NCA01	Day	65.8	66.1	0.3	2	Yes
	Night	60.1	60.3	0.2		Yes
NCA02	Day	65.4	66	0.6		Yes
	Night	55.6	56.3	0.7		Yes
NCA03	Day	67.2	67.3	0.1		Yes
	Night	61.6	61.6	0		Yes
NCA04	Day	60.6	61.6	1		Yes
	Night	50.8	51.8	1		Yes
NCA05	Day	51.4	52.4	1		Yes
	Night	41.6	42.7	1.1		Yes
NCA06	Day	64	64.3	0.3		Yes
	Night	58.1	58.3	0.2		Yes

The predicted increase in traffic noise on the surrounding roadways as a result of the proposed development are predicted to comply with the allowance criteria of the RNP. Based on the noise predictions, it is expected that there will generally be an imperceptible increase in road traffic noise due to the proposed development and no further analysis is required.

6 CONCLUSION

This report has presented an assessment of noise impacts associated with the proposed rezoning of the Gilead Stage 2 residential development in Gilead, NSW.

External noise intrusion (primarily from traffic) into the development has been assessed against the requirements of the Campbelltown City Council DCP, the ISEPP and the DoP's "Development Near Rail Corridors & Busy Roads – Interim Guideline". Indicative recommendations for building façade construction have been presented in section 3.3 to achieve the internal noise requirements. These recommendations for the building envelope construction should be reviewed at construction certificate stage once the design and layout of internal spaces has sufficiently progressed.

Noise emission criteria for the development have been developed with reference to the Campbelltown City Council DCP and the NSW EPA Noise Policy for Industry as outlined in section 4.1. Noise from the sporting fields, school facilities, and air-conditioning units are expected to be addressed as part of separate development applications once the operational details (e.g. hours of operation, capacity) for these facilities have been confirmed.

An assessment of traffic noise generation from the proposed development has been presented in section 5. Predicted noise impacts are expected to comply with the requirements of the NSW EPA RNP.

Based on the findings of this noise impact assessment, the site will be suitable for residential development via rezoning.

Please do not hesitate to contact us if you have any questions regarding this report.

APPENDIX A

APPENDIX A: GLOSSARY OF ACOUSTIC TERMINOLOGY

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 are here defined.

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

dB(A) – A-weighted decibels. The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.

Frequency – Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.

Impulsive Noise – Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.

Intermittent Noise – The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.

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.

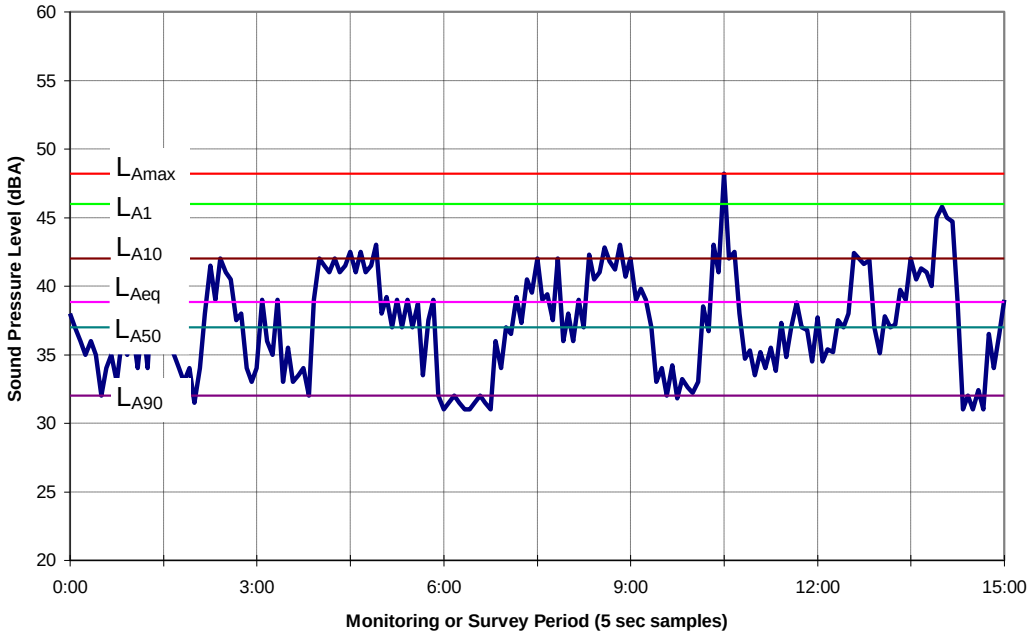
RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Sound Absorption – The ability of a material to absorb sound energy through its conversion into thermal energy.

Sound Level Meter – An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure level.

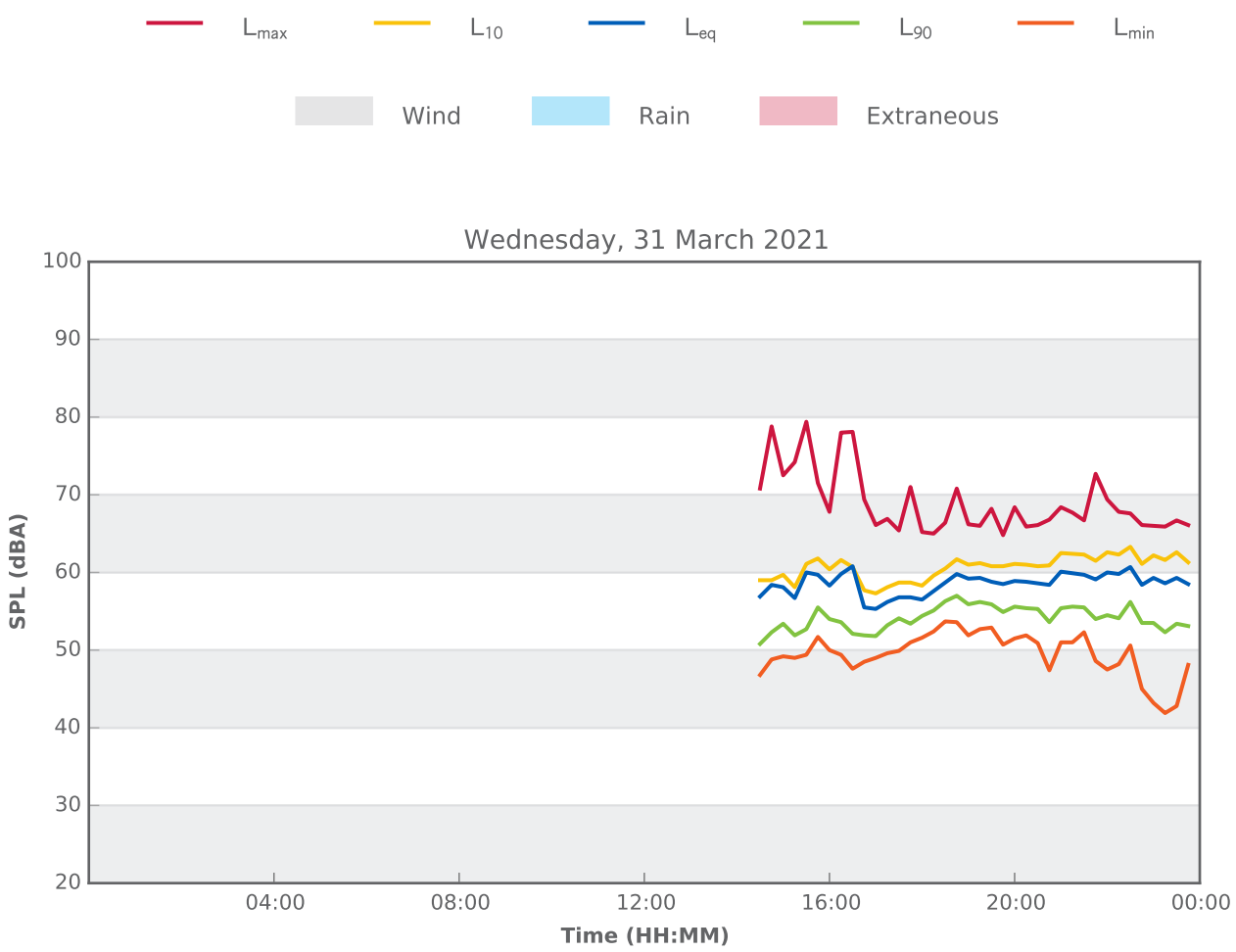
Sound Pressure Level – The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.

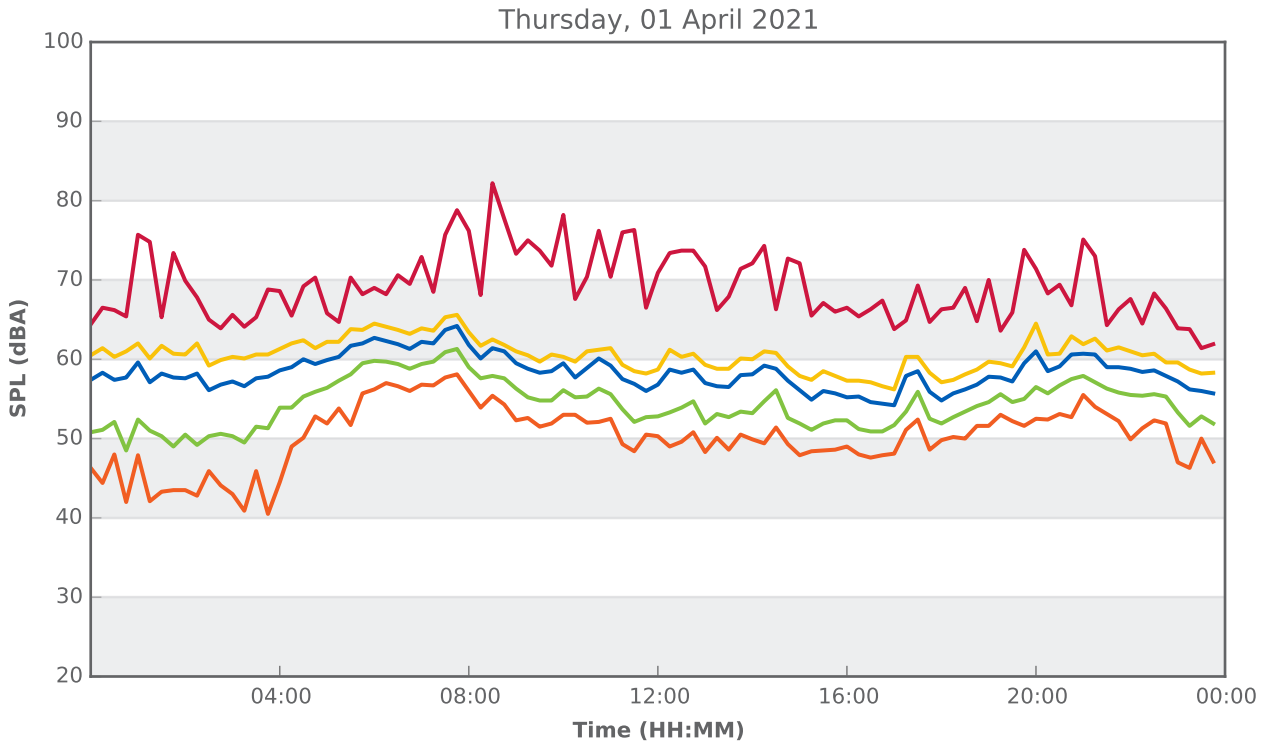
Tonal Noise – Containing a prominent frequency and characterised by a definite pitch.



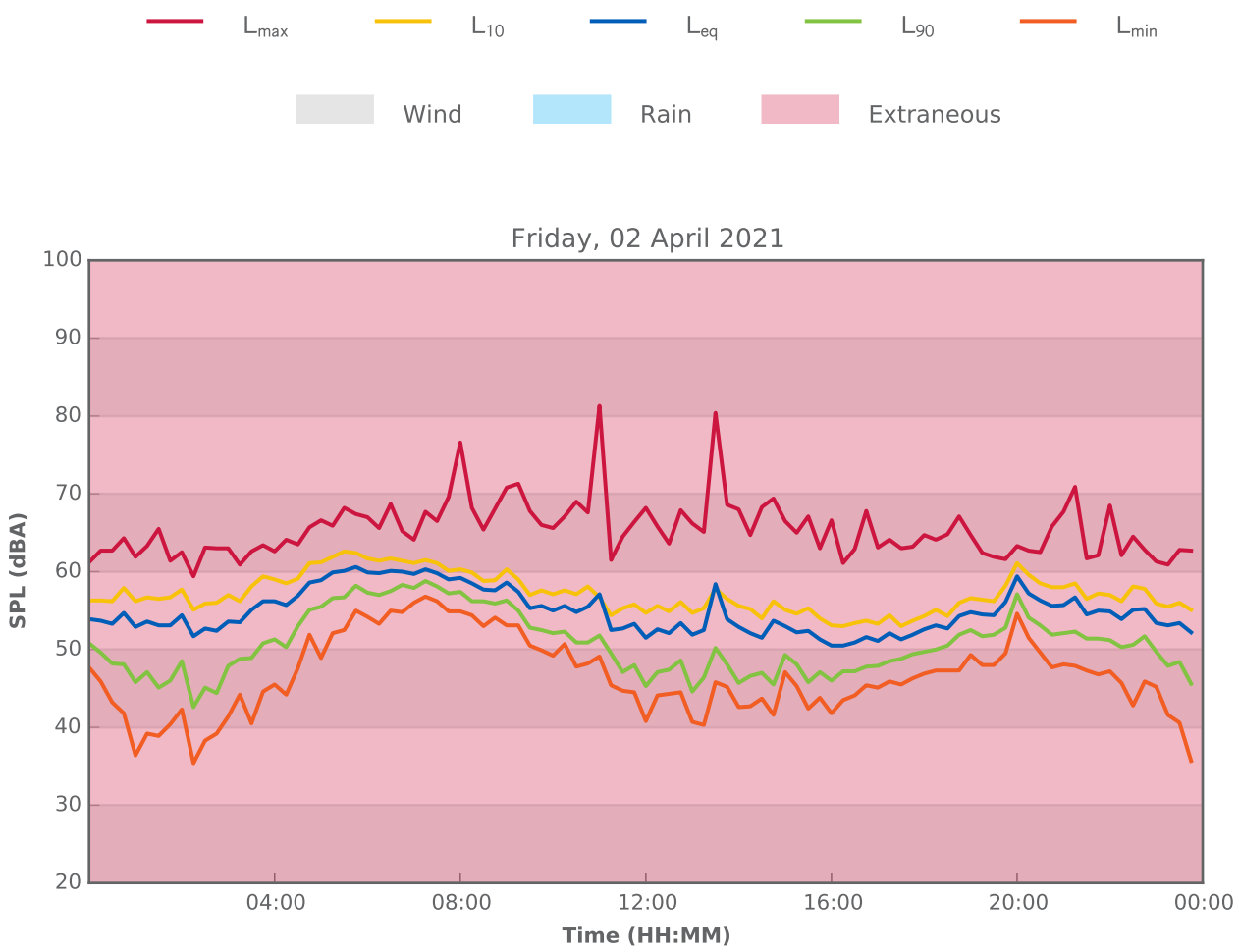
APPENDIX B

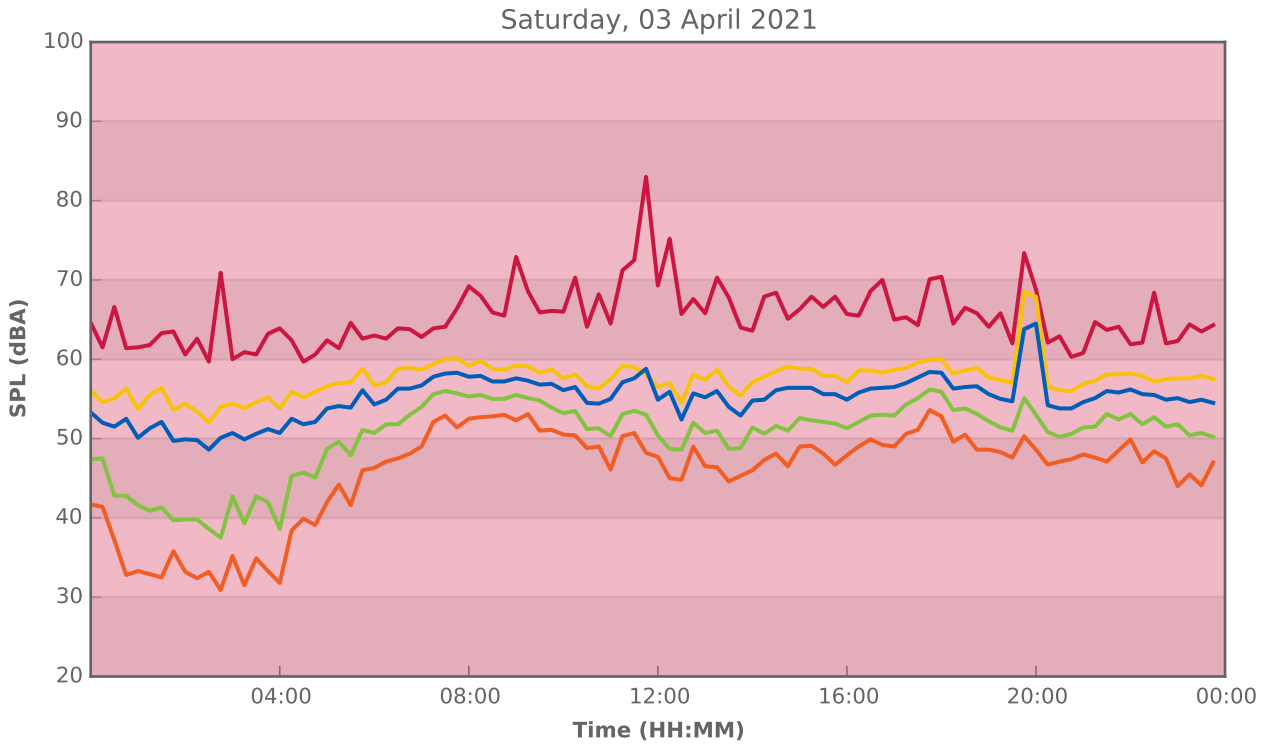
Logger Location 1 - Near Hume Motorway



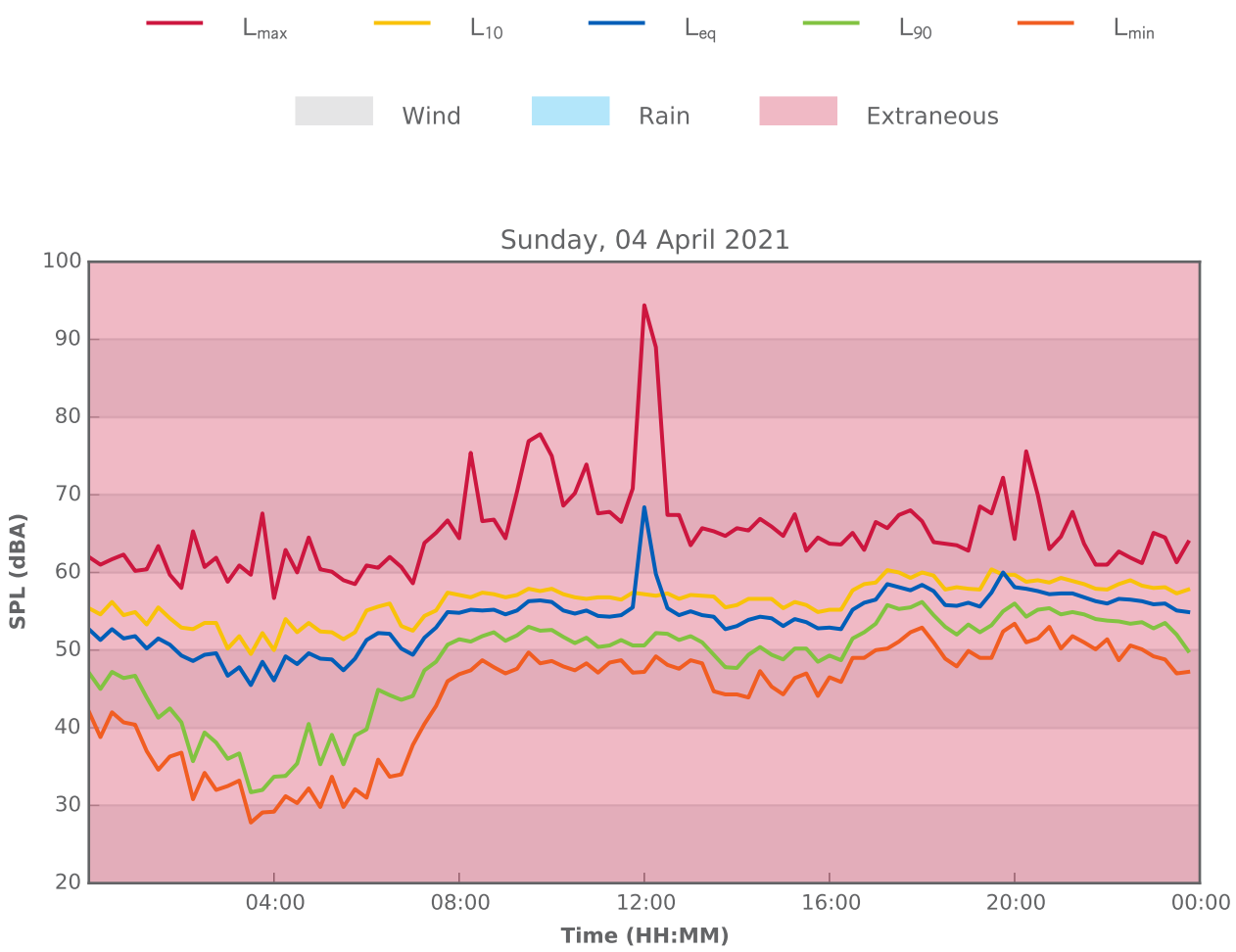


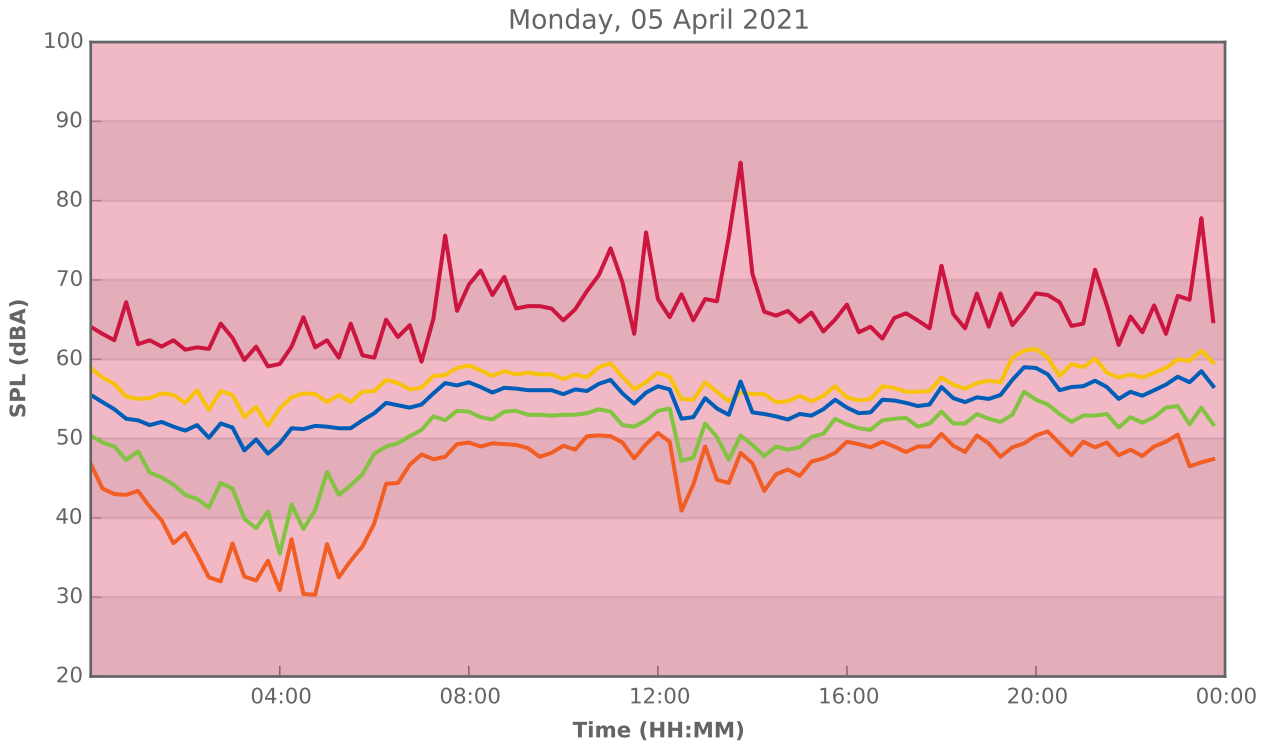
Logger Location 1 - Near Hume Motorway



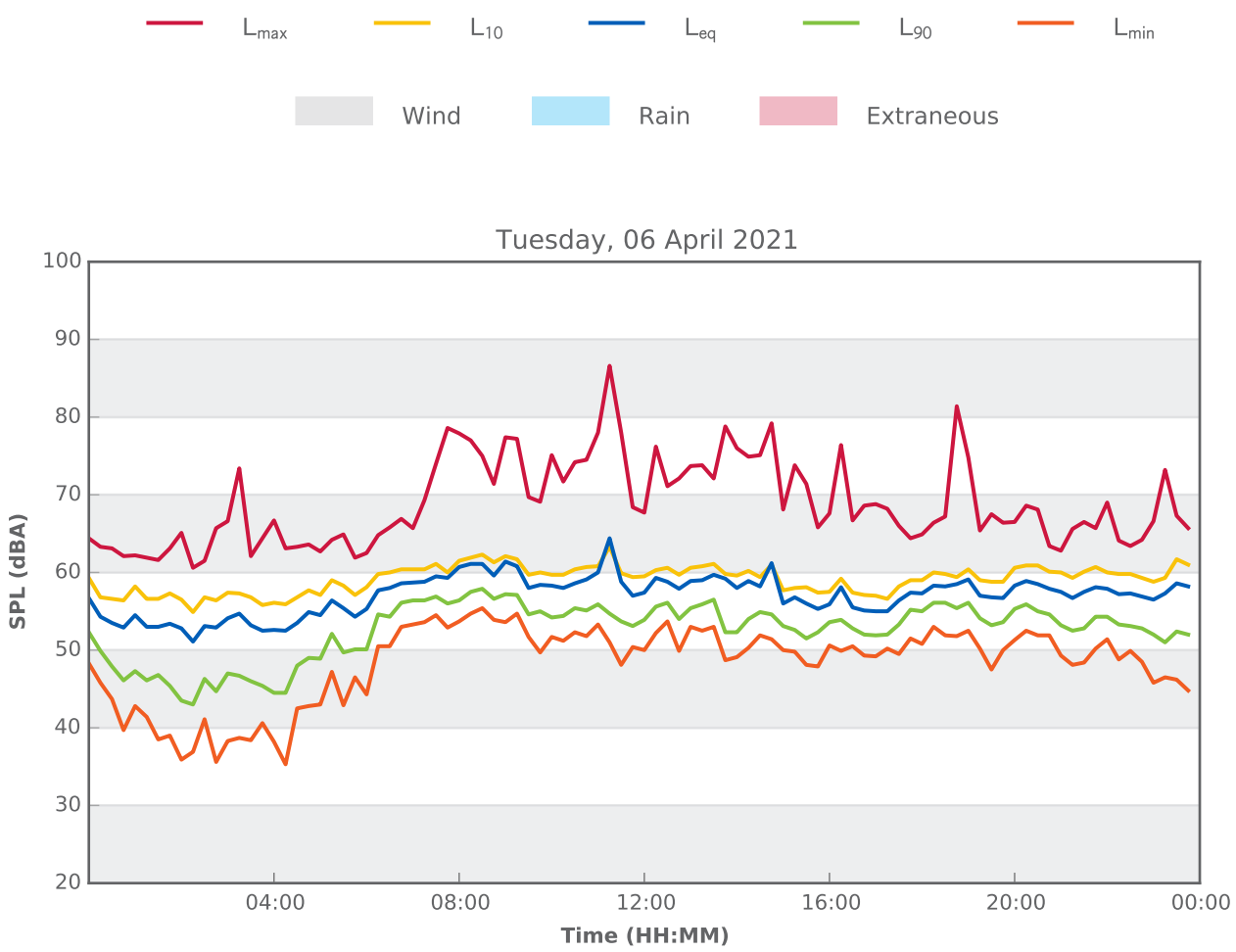


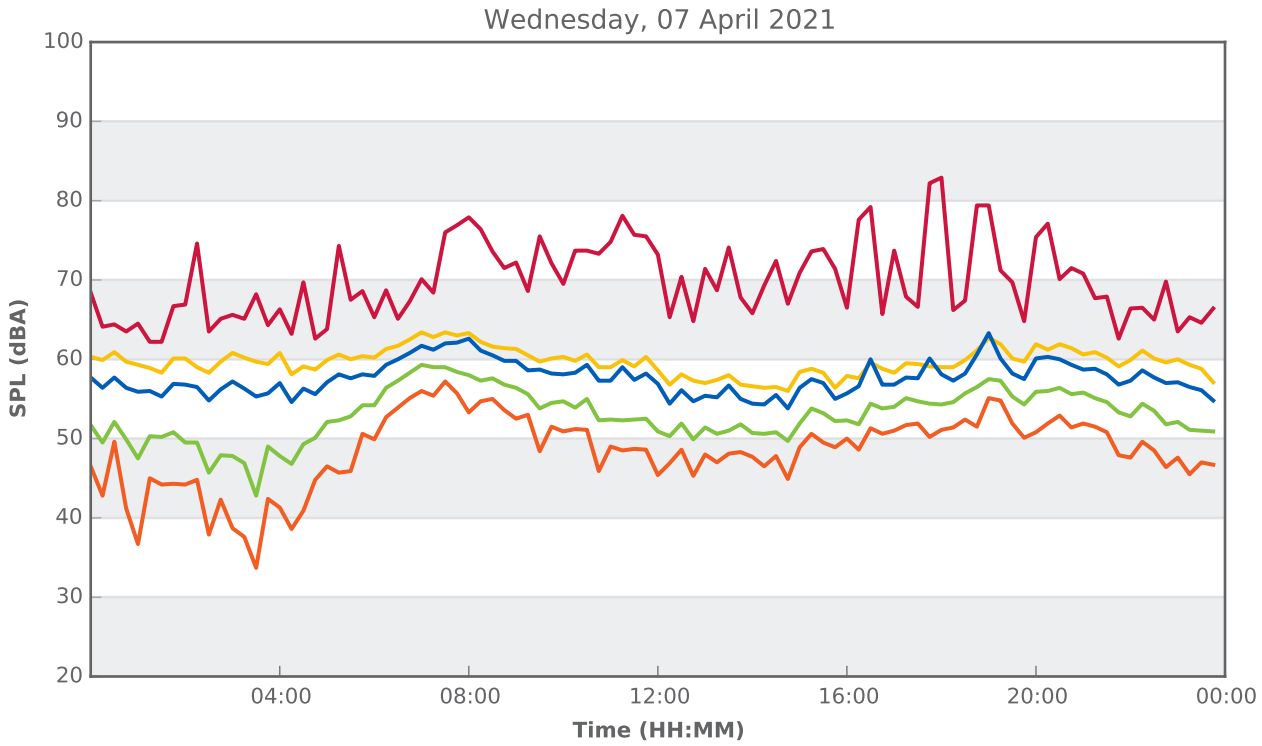
Logger Location 1 - Near Hume Motorway



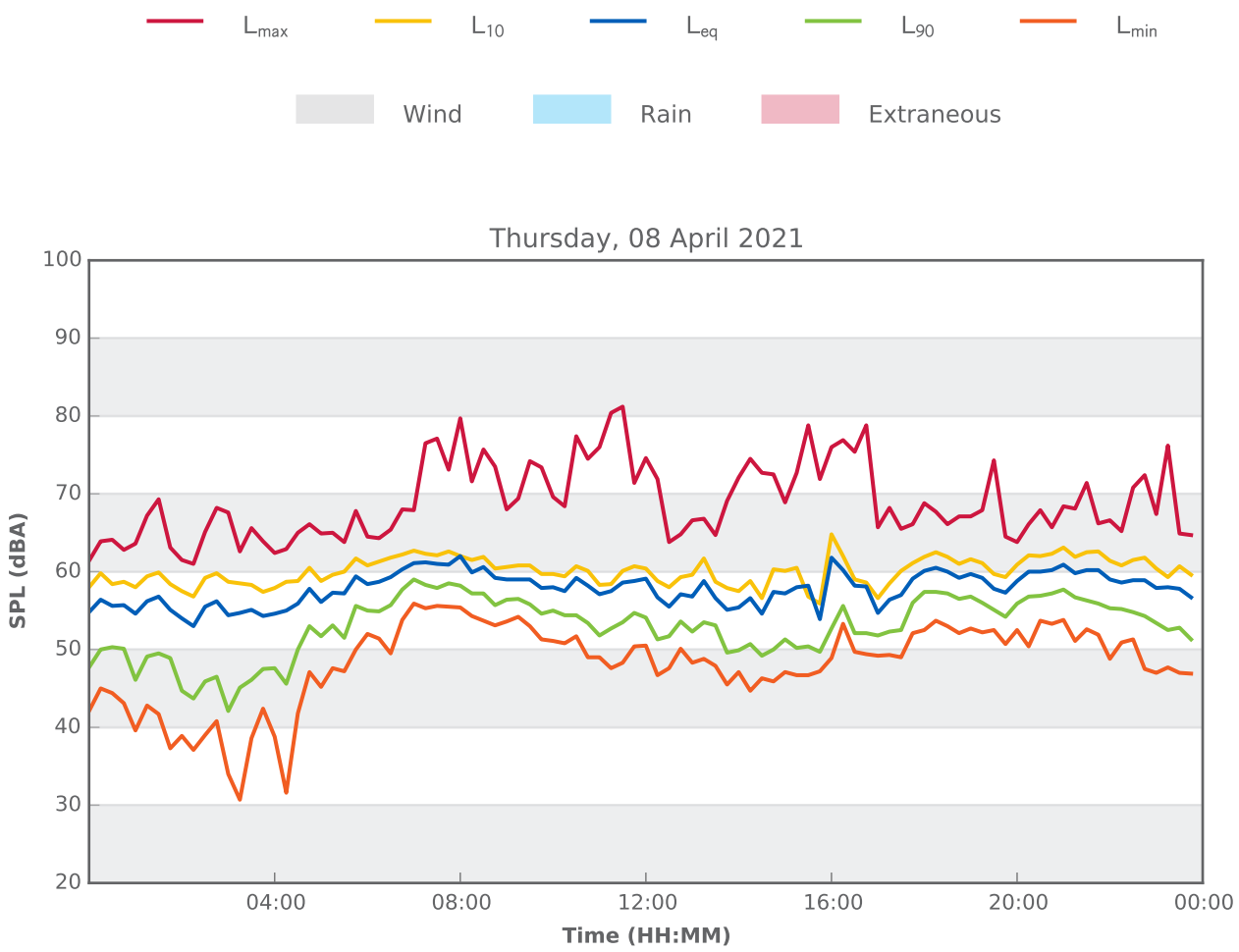


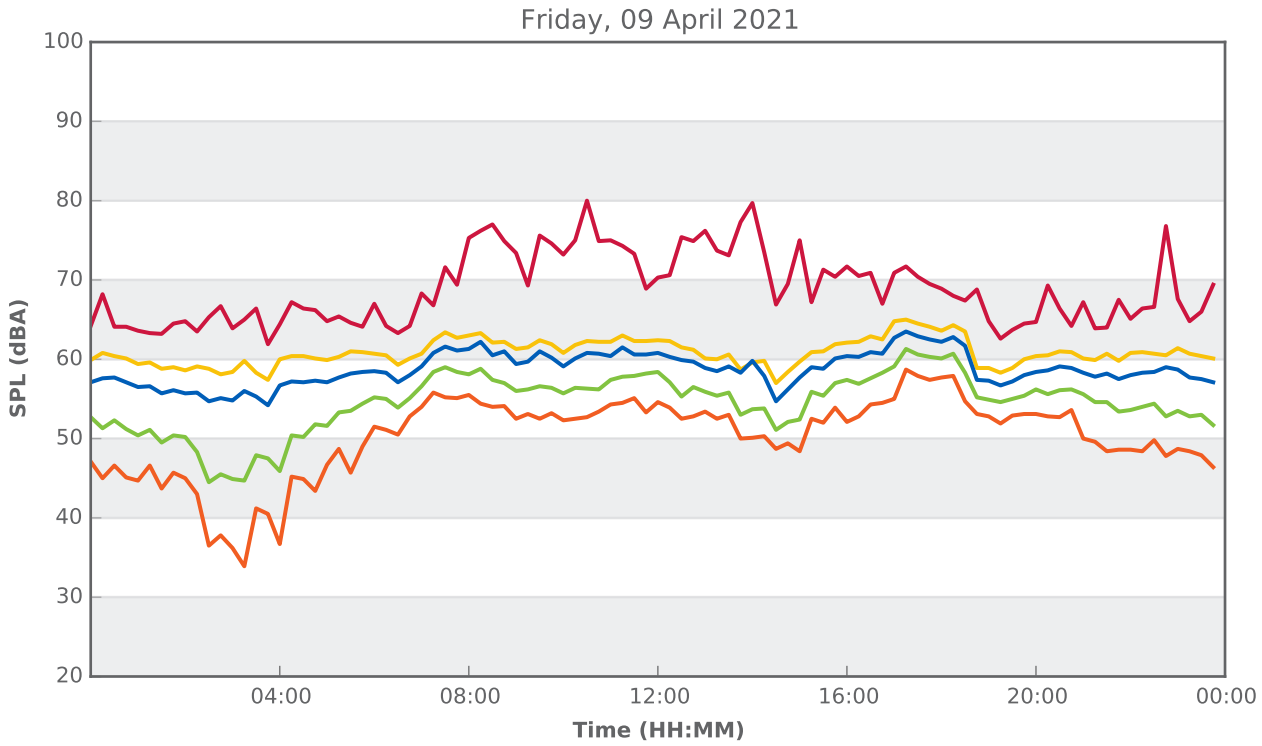
Logger Location 1 - Near Hume Motorway



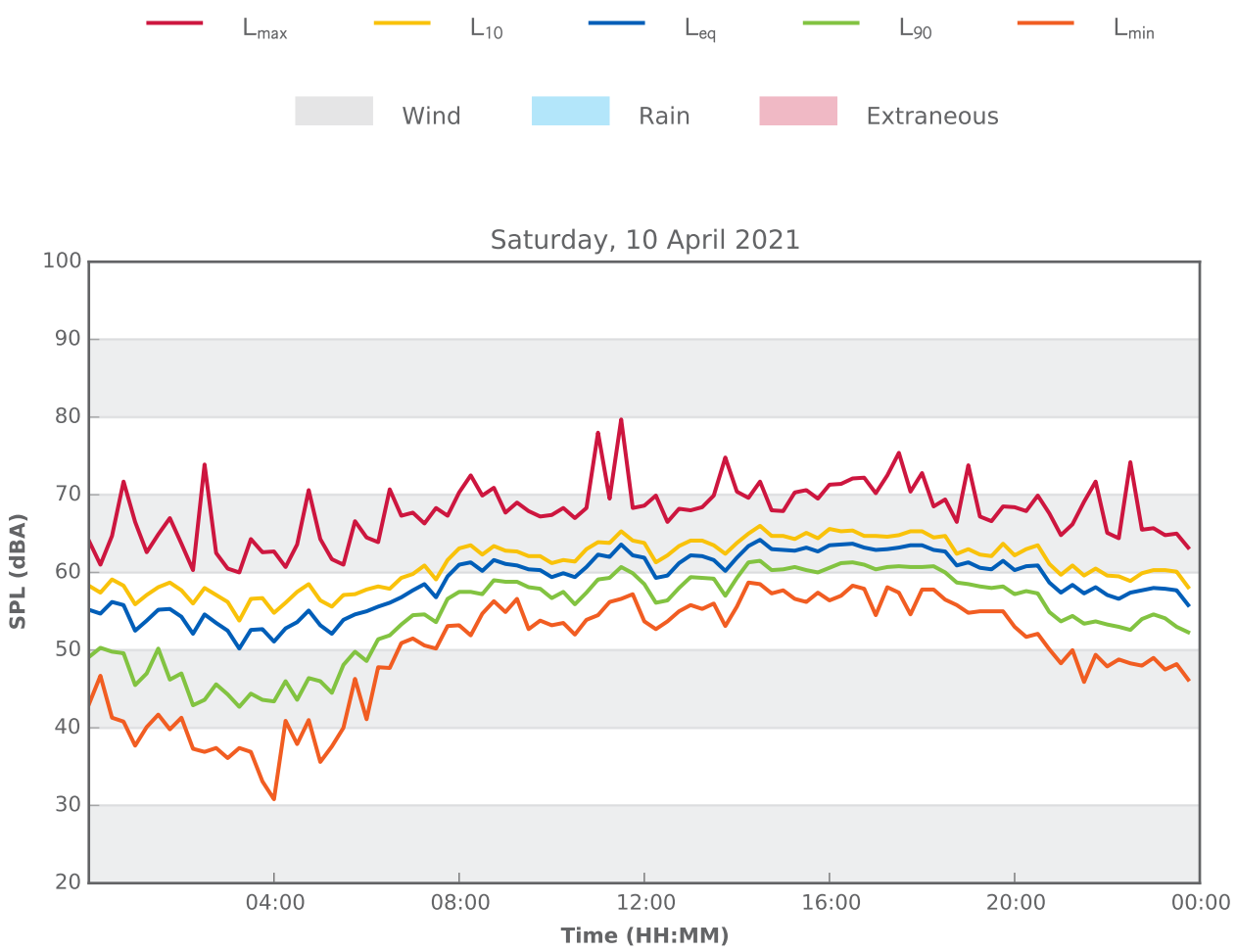


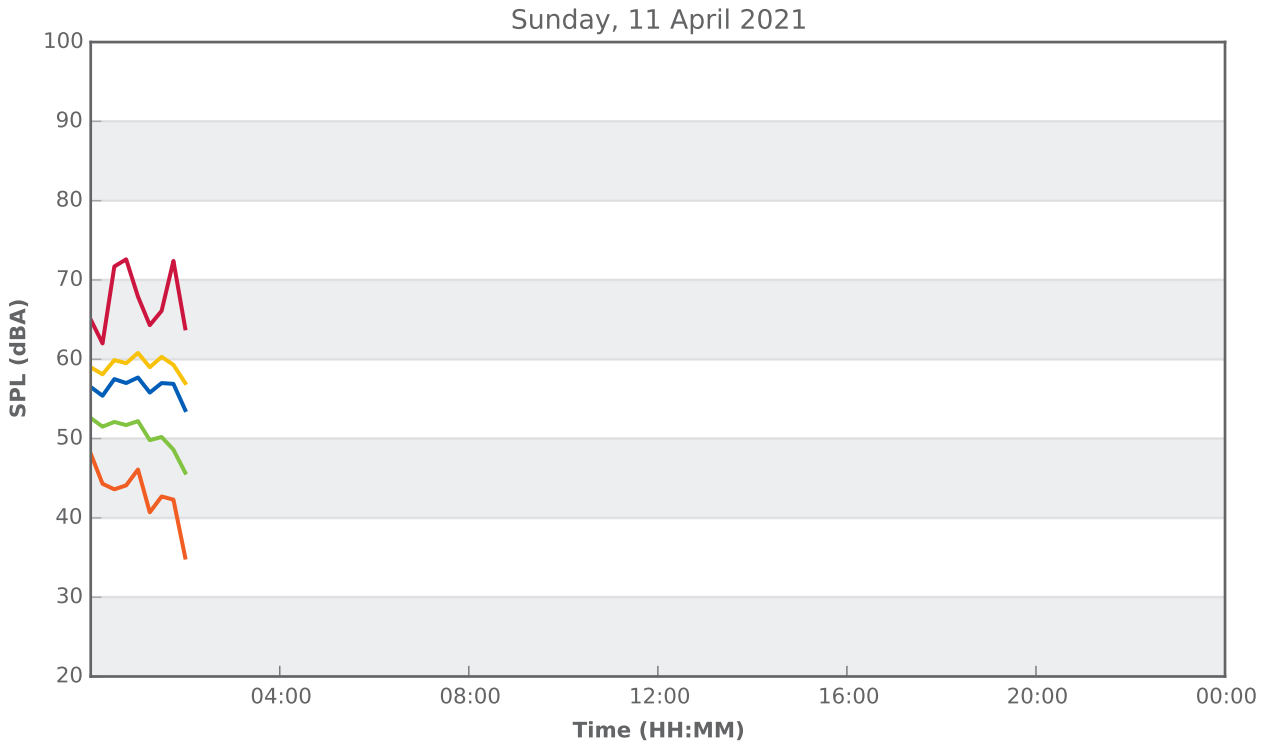
Logger Location 1 - Near Hume Motorway



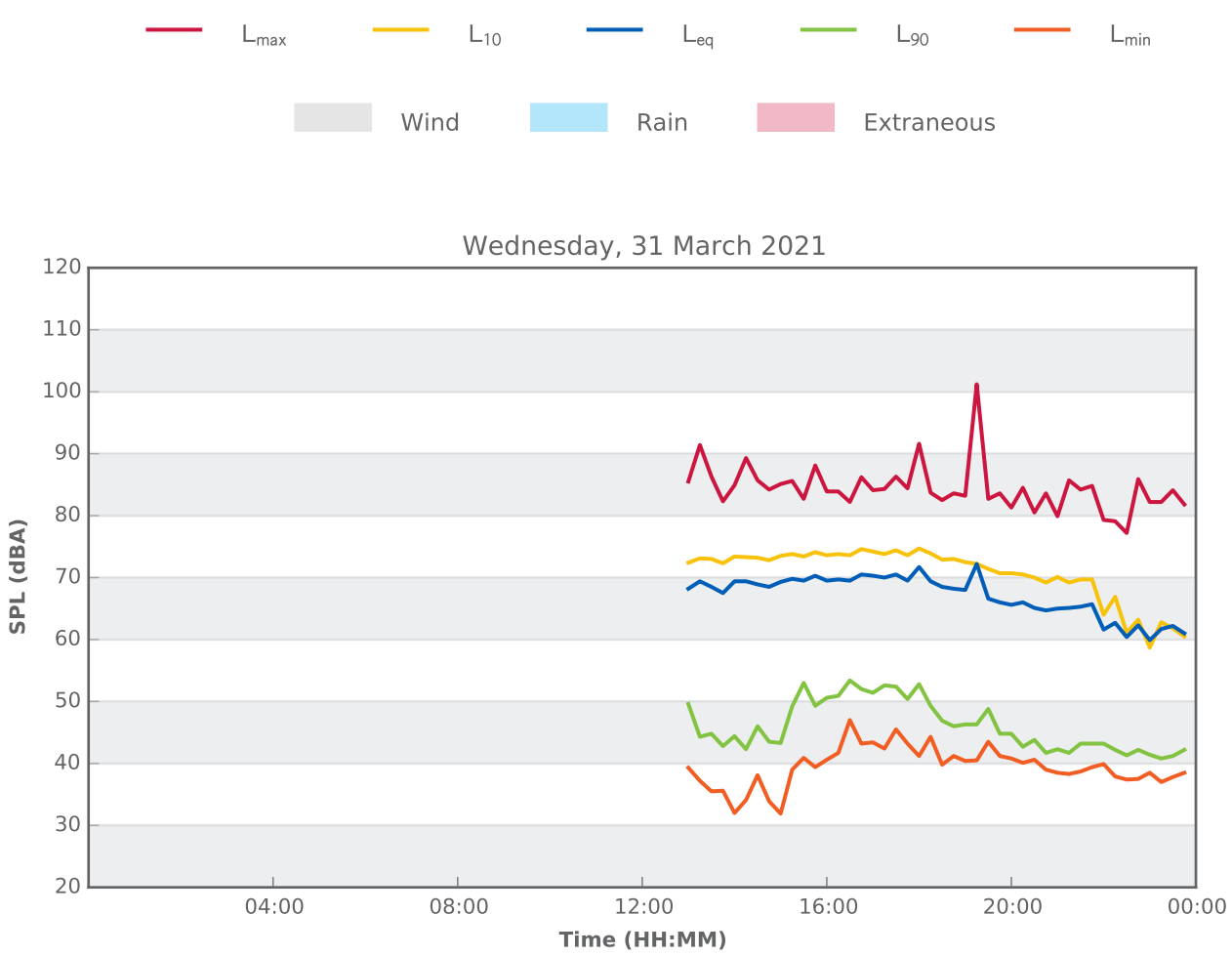


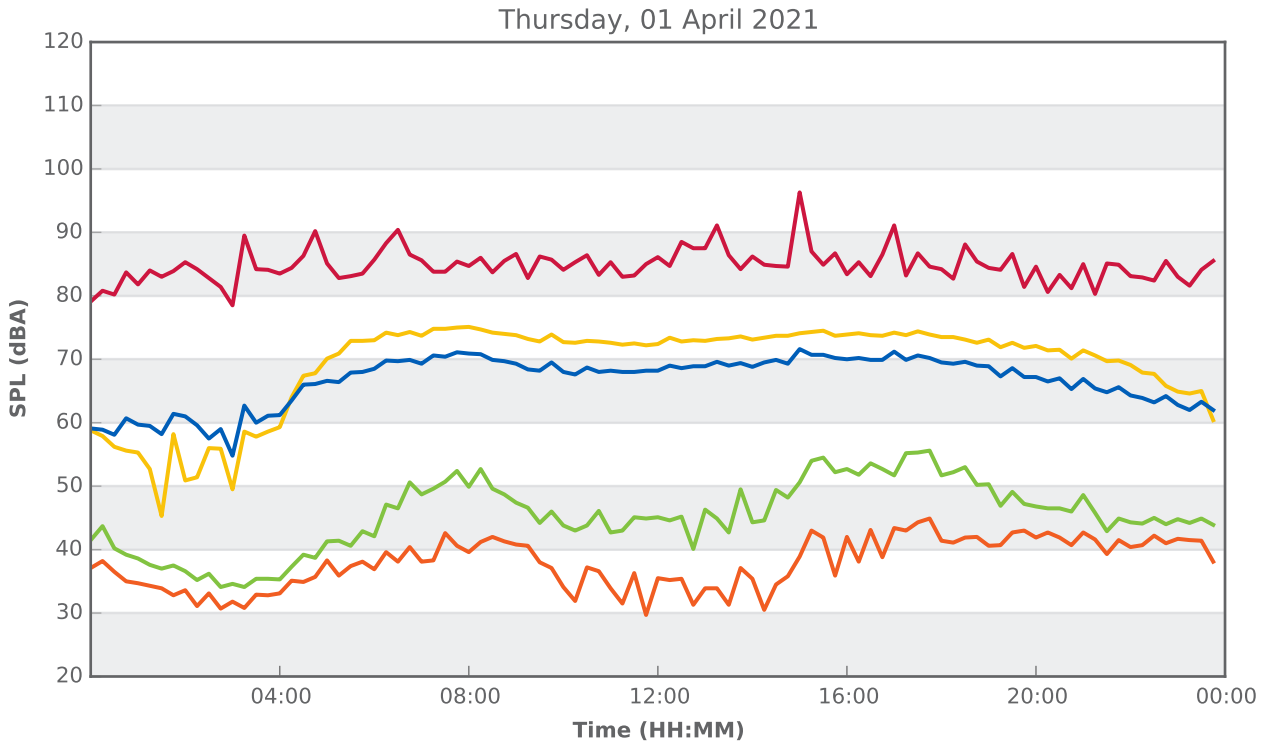
Logger Location 1 - Near Hume Motorway



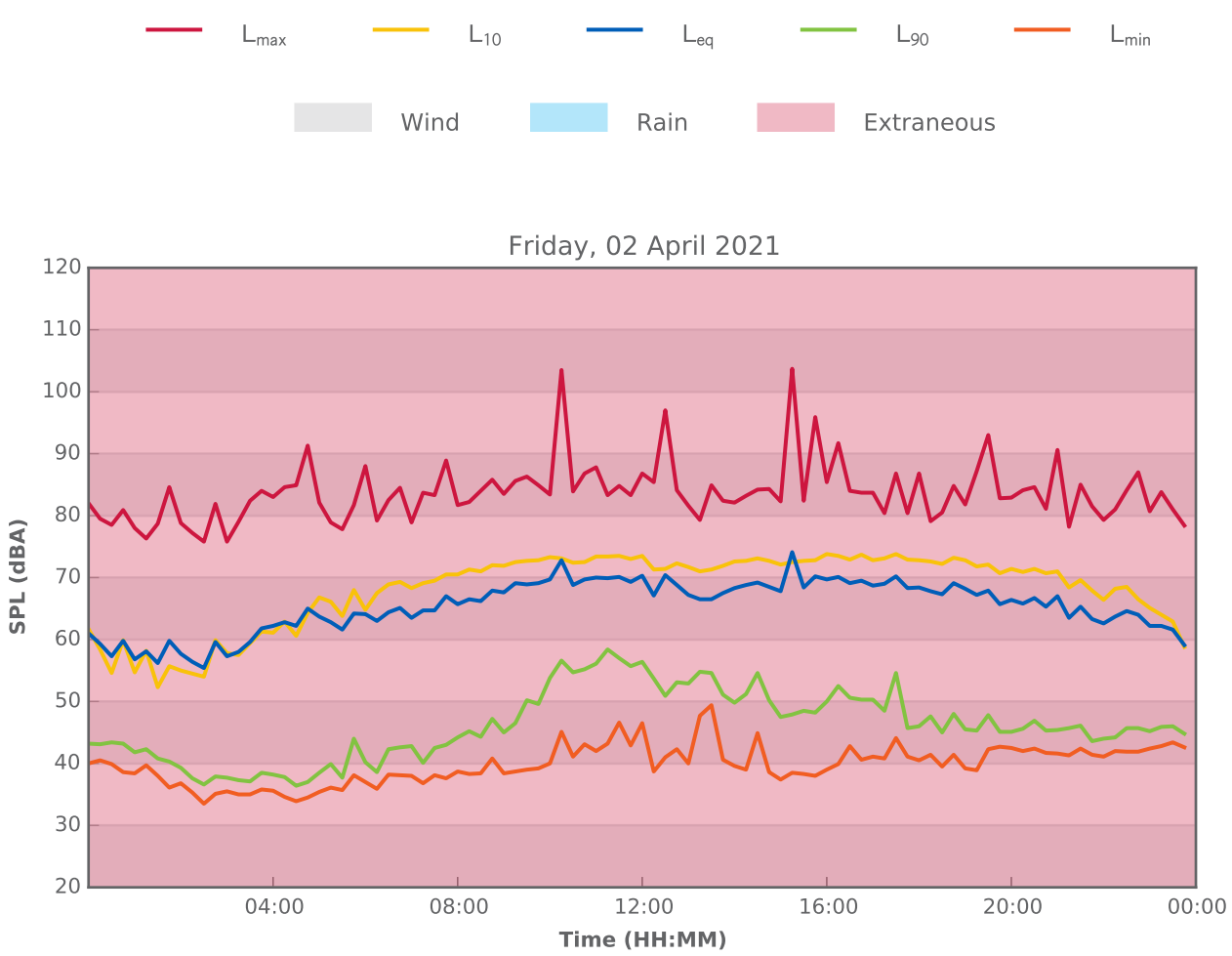


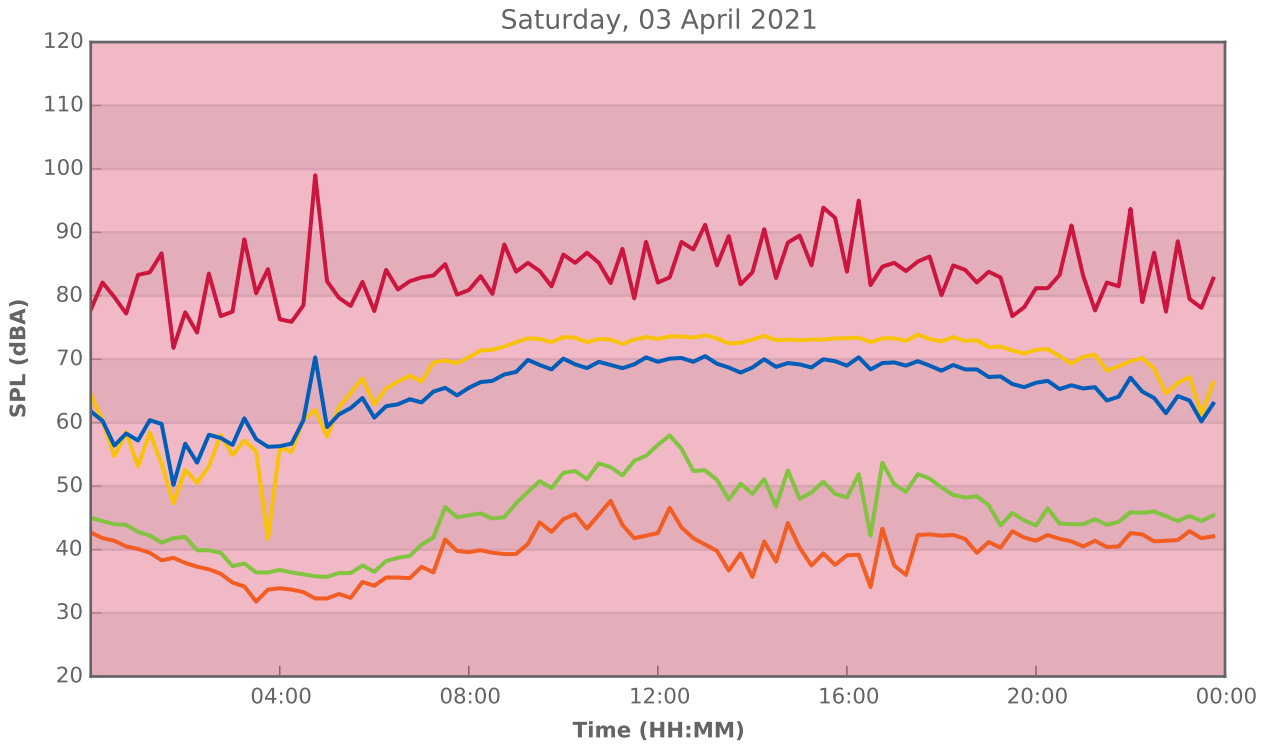
Logger Location 2 - Near Appin Road



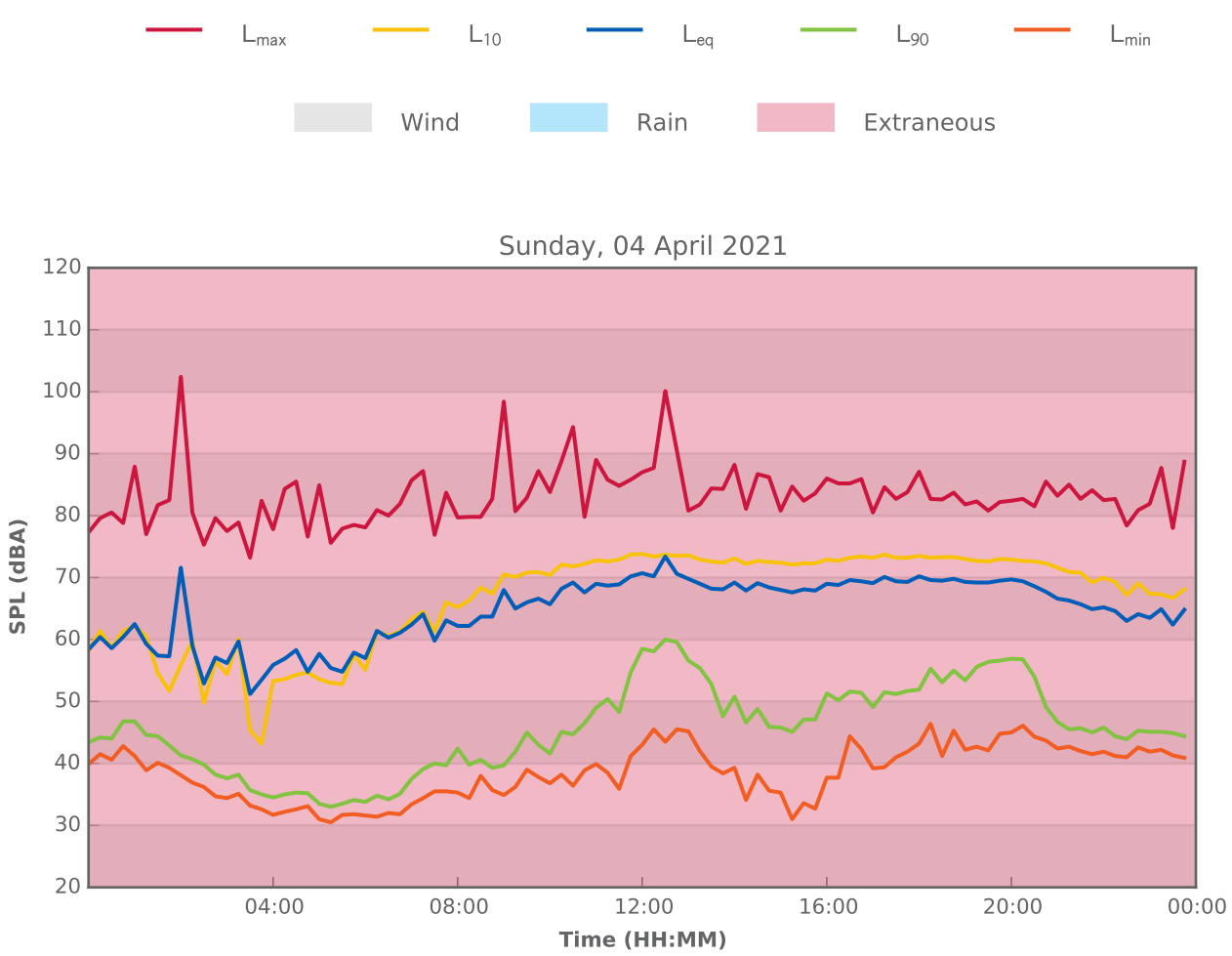


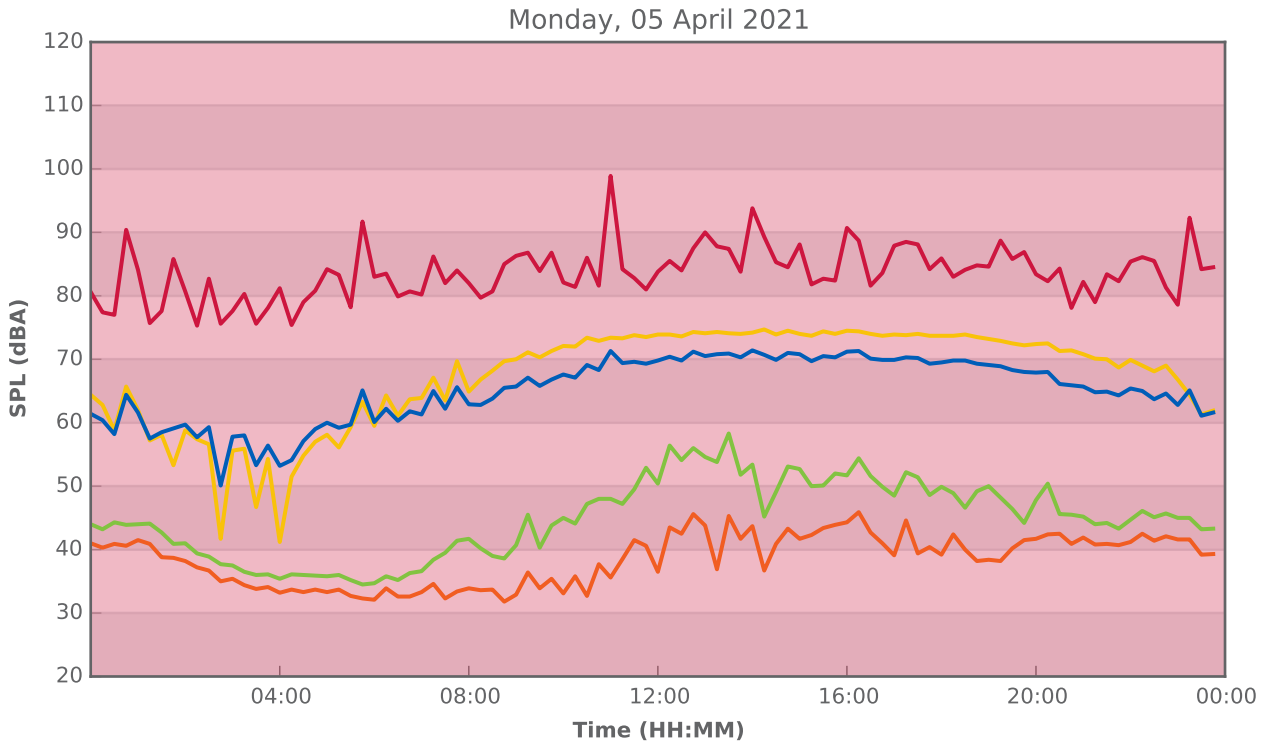
Logger Location 2 - Near Appin Road



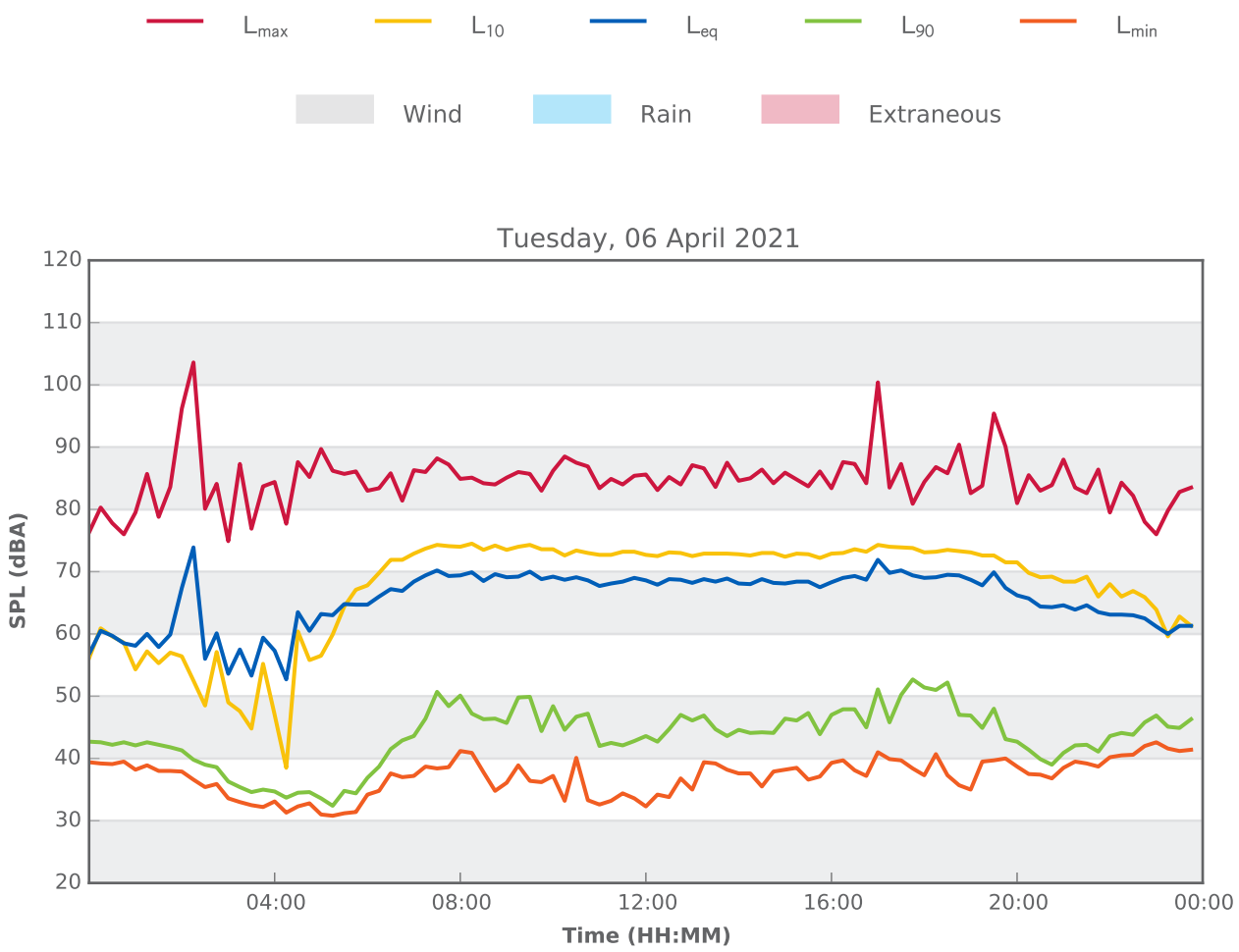


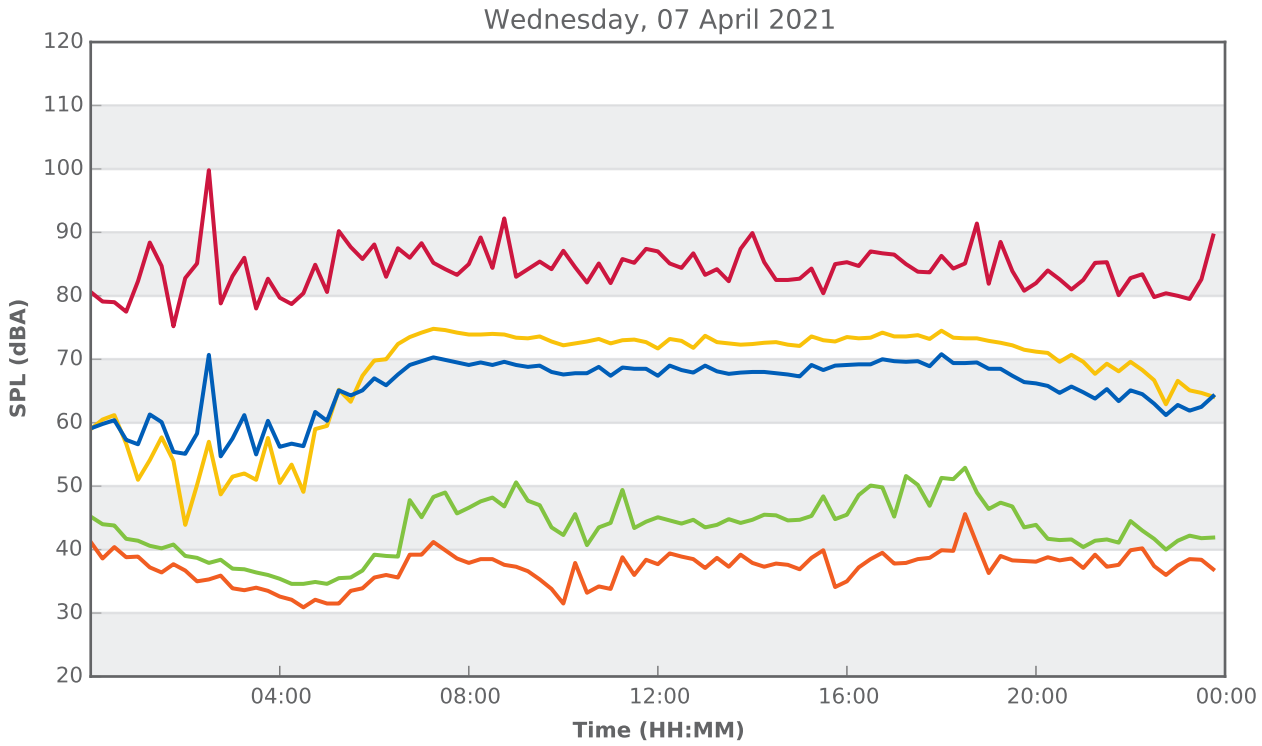
Logger Location 2 - Near Appin Road



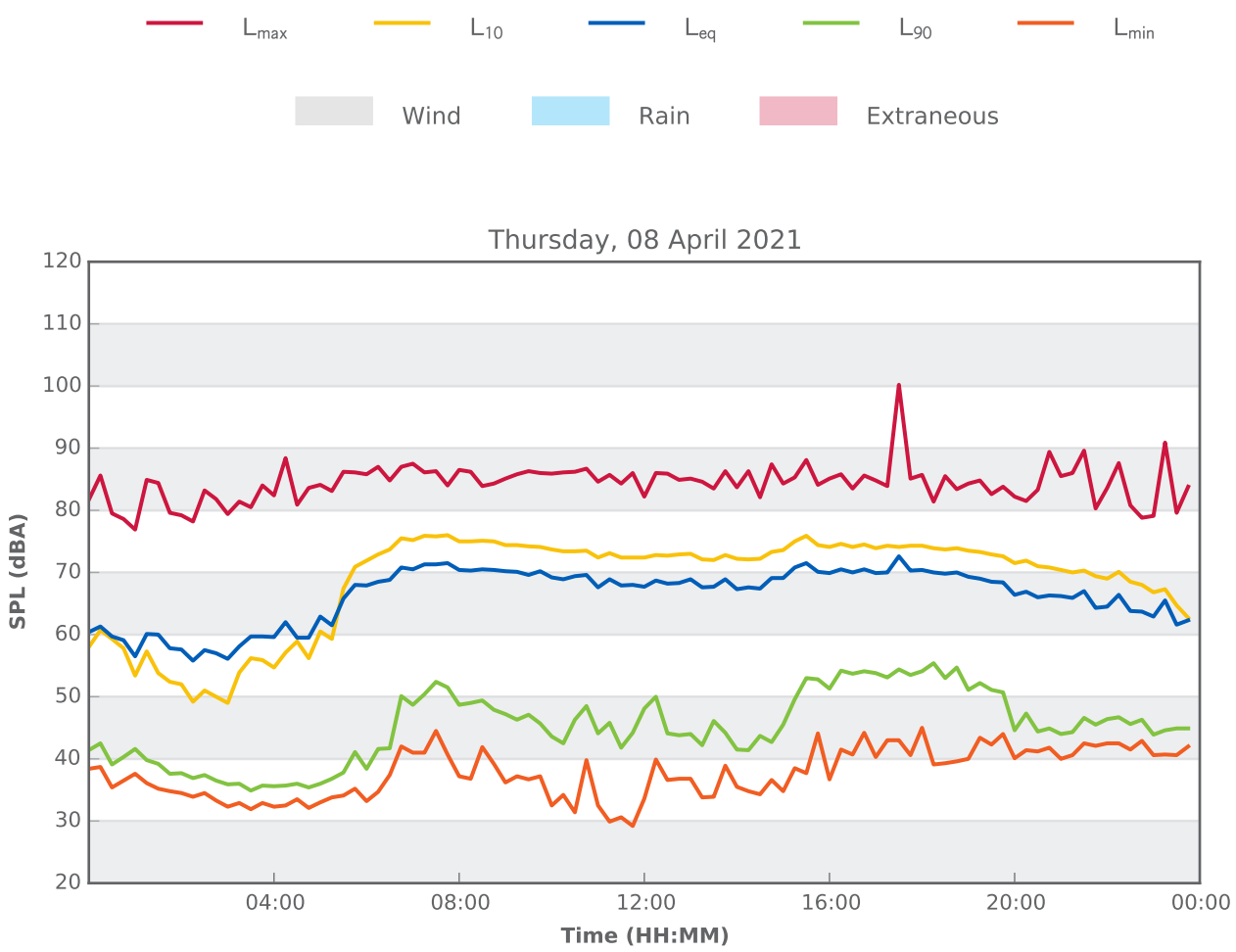


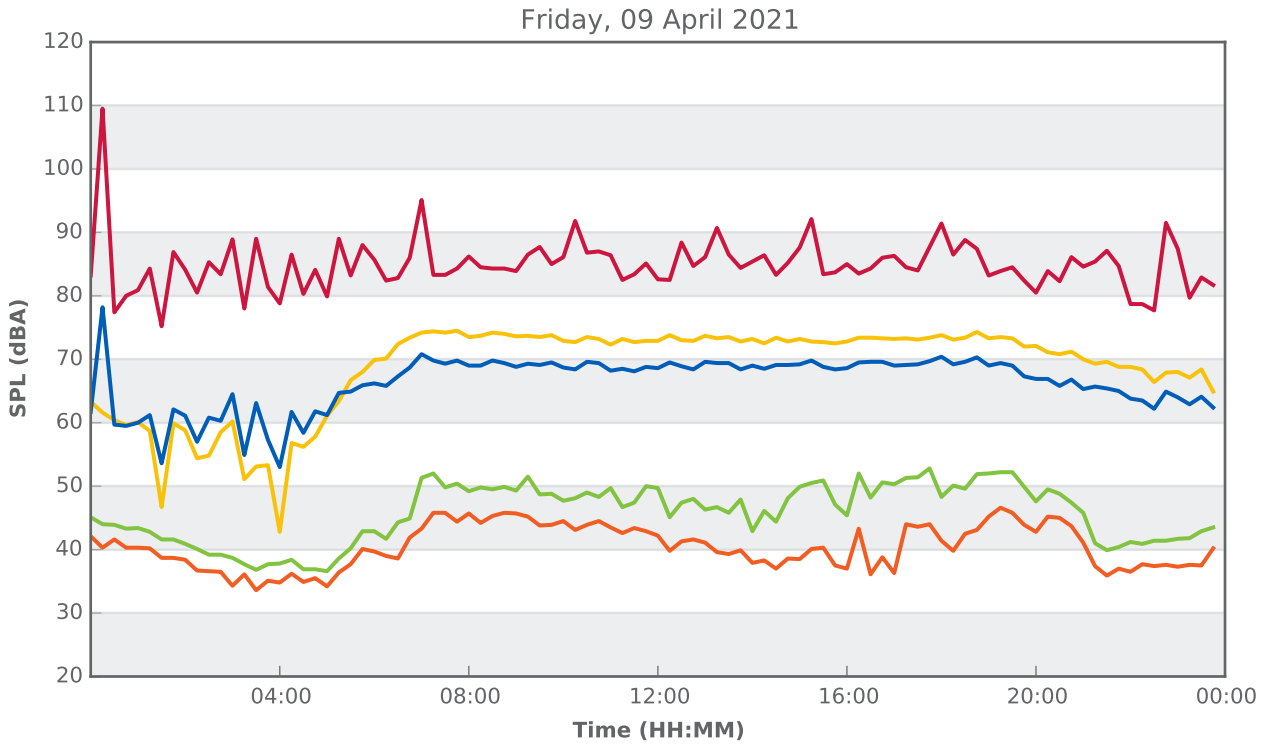
Logger Location 2 - Near Appin Road



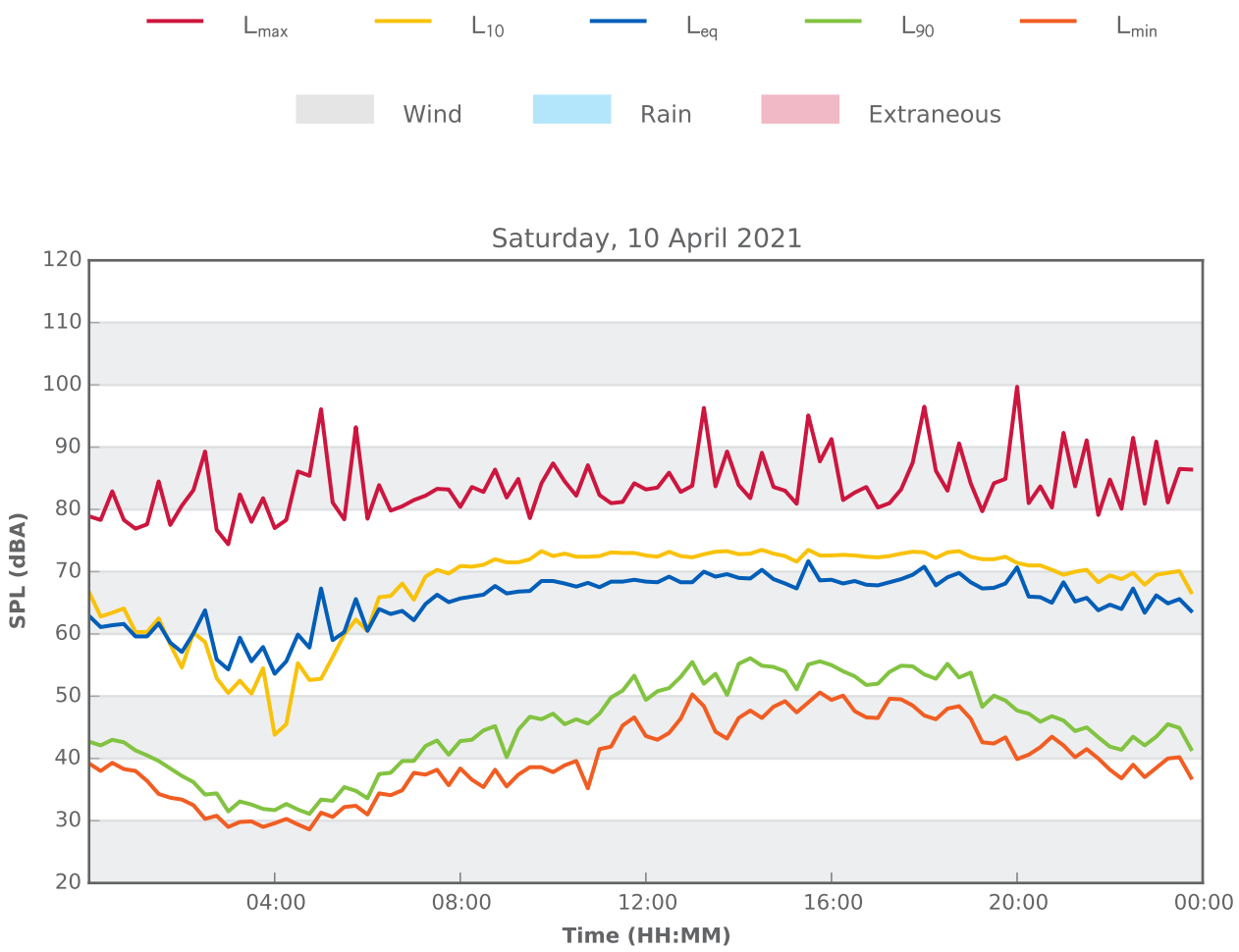


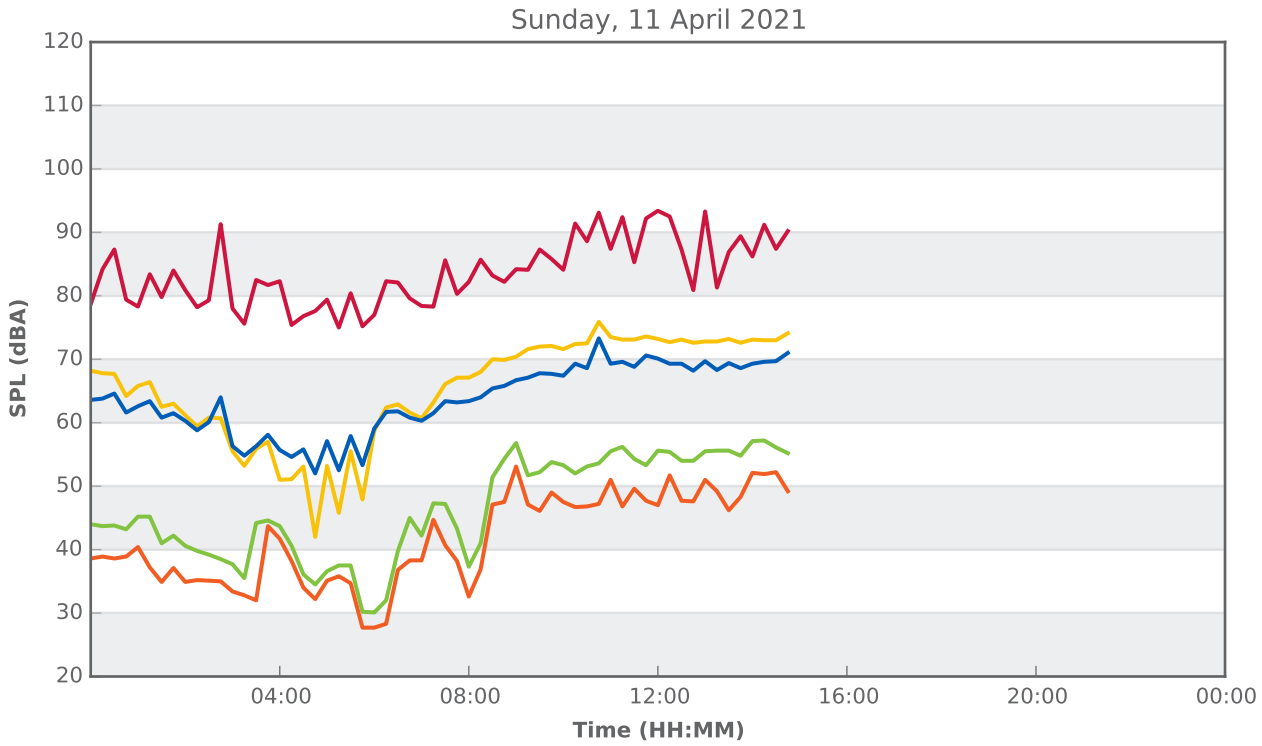
Logger Location 2 - Near Appin Road



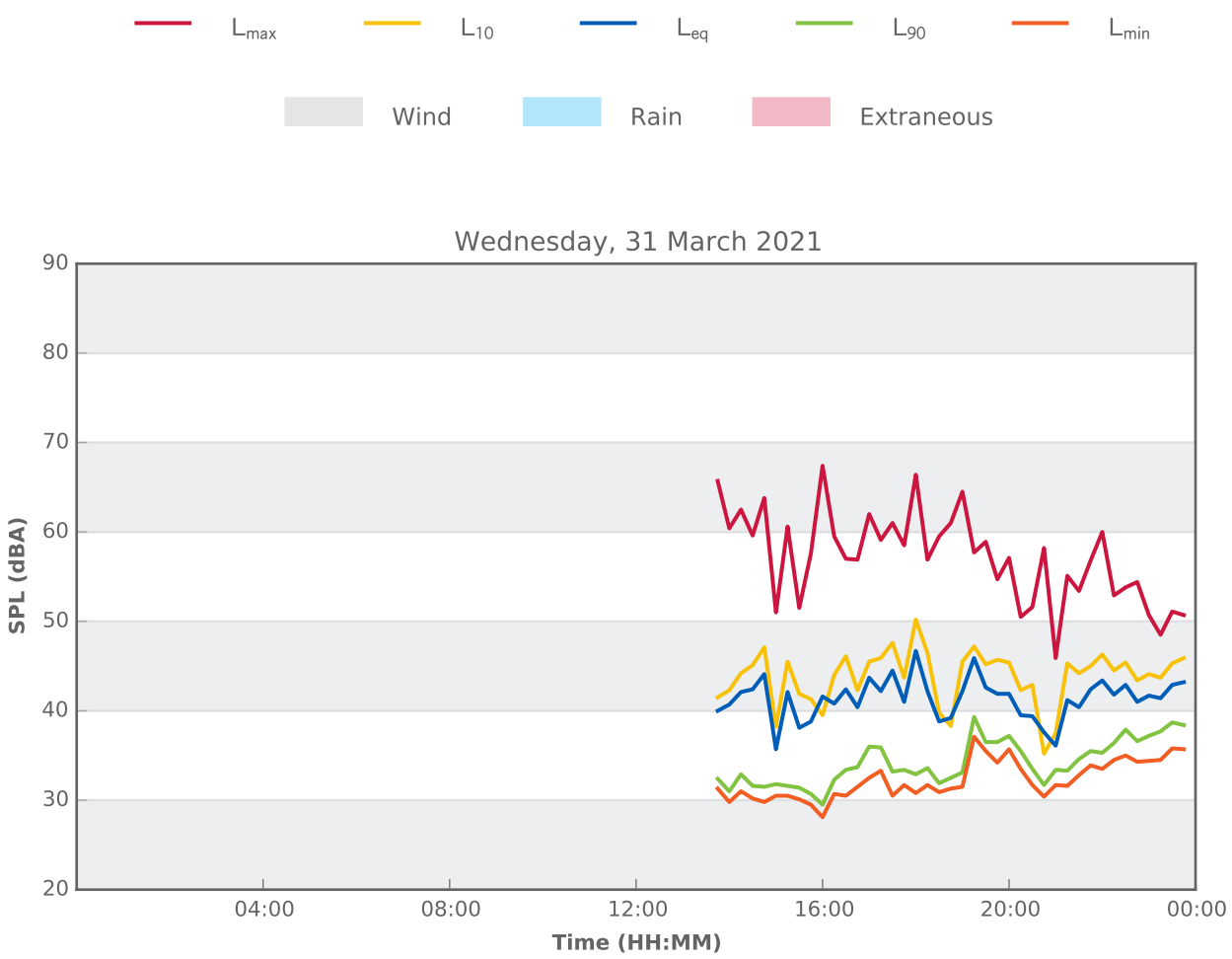


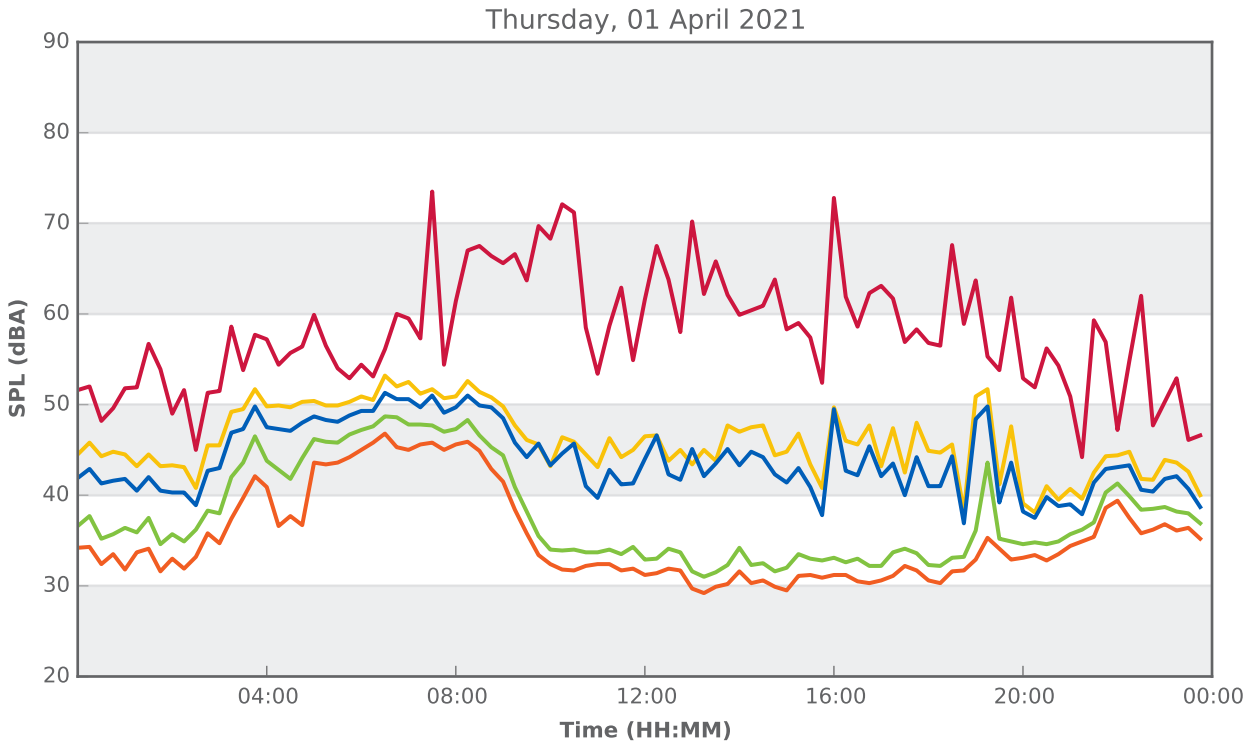
Logger Location 2 - Near Appin Road



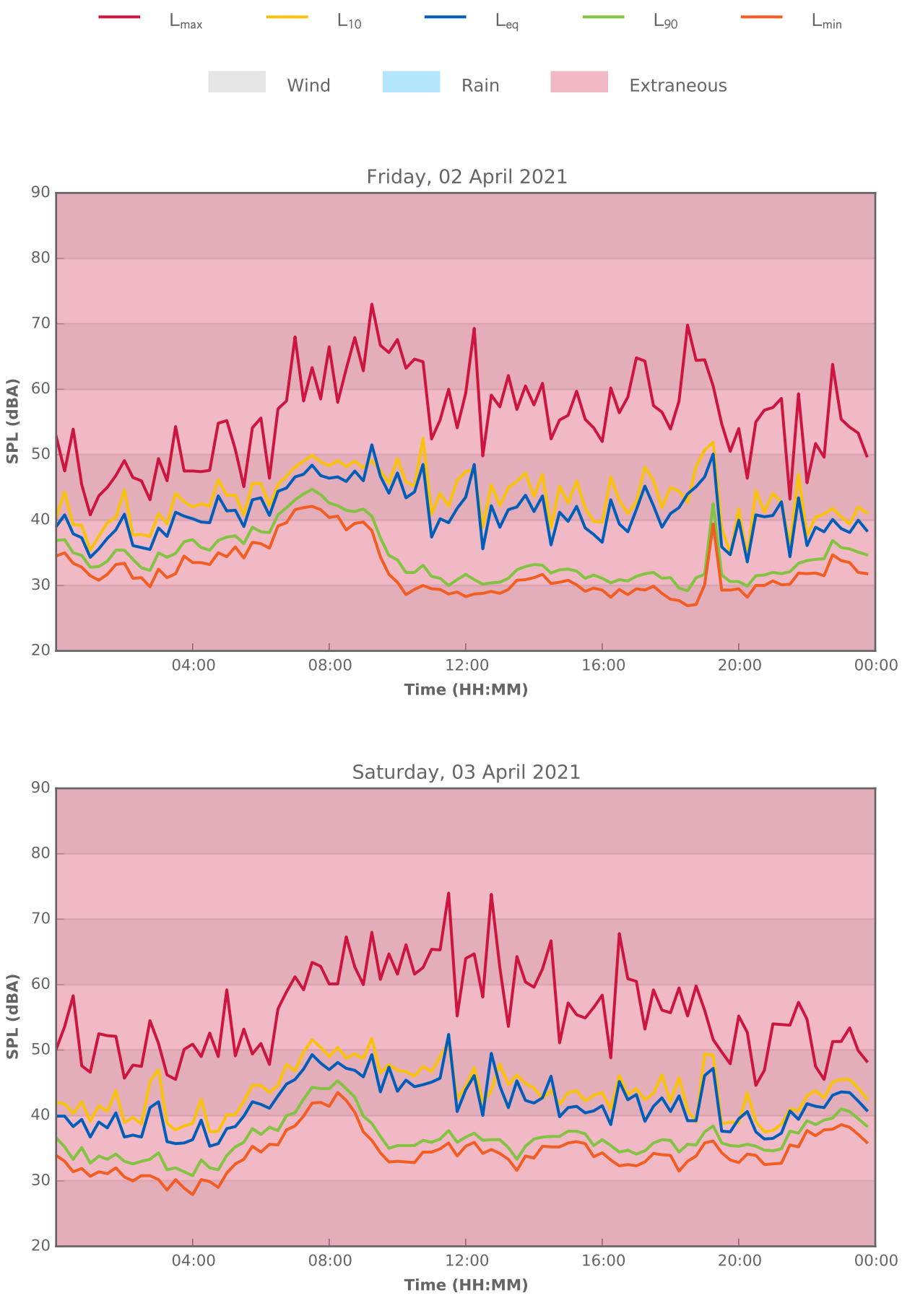


Logger Location 3 - Middle of Site

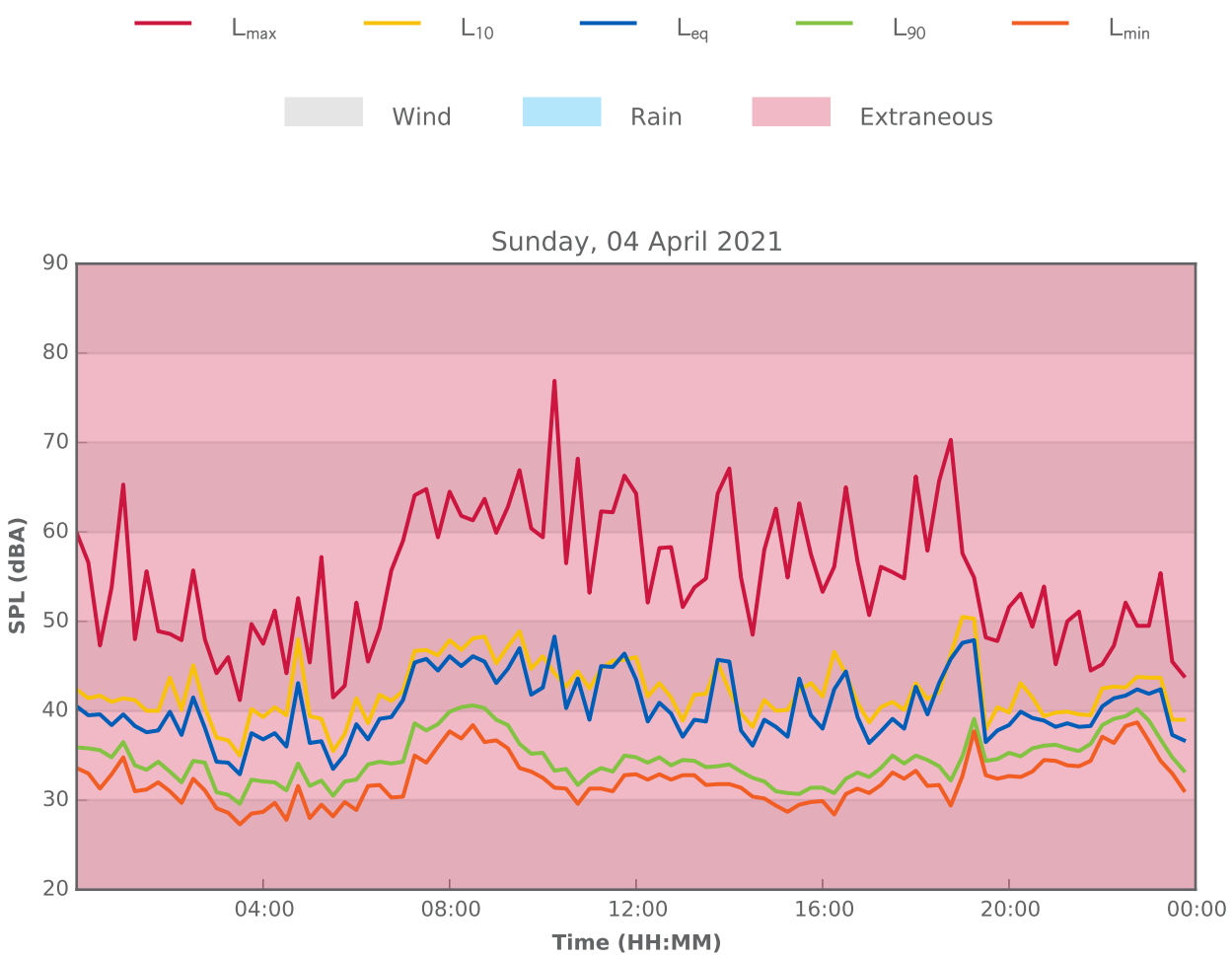


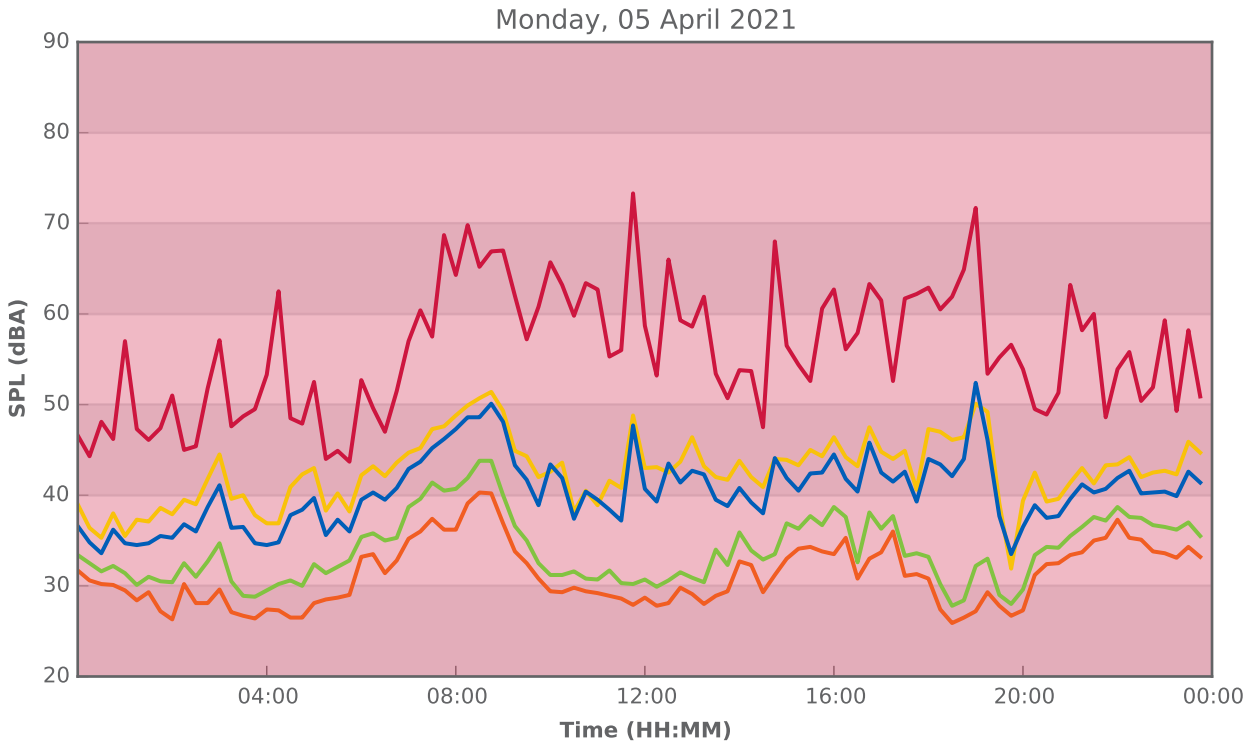


Logger Location 3 - Middle of Site

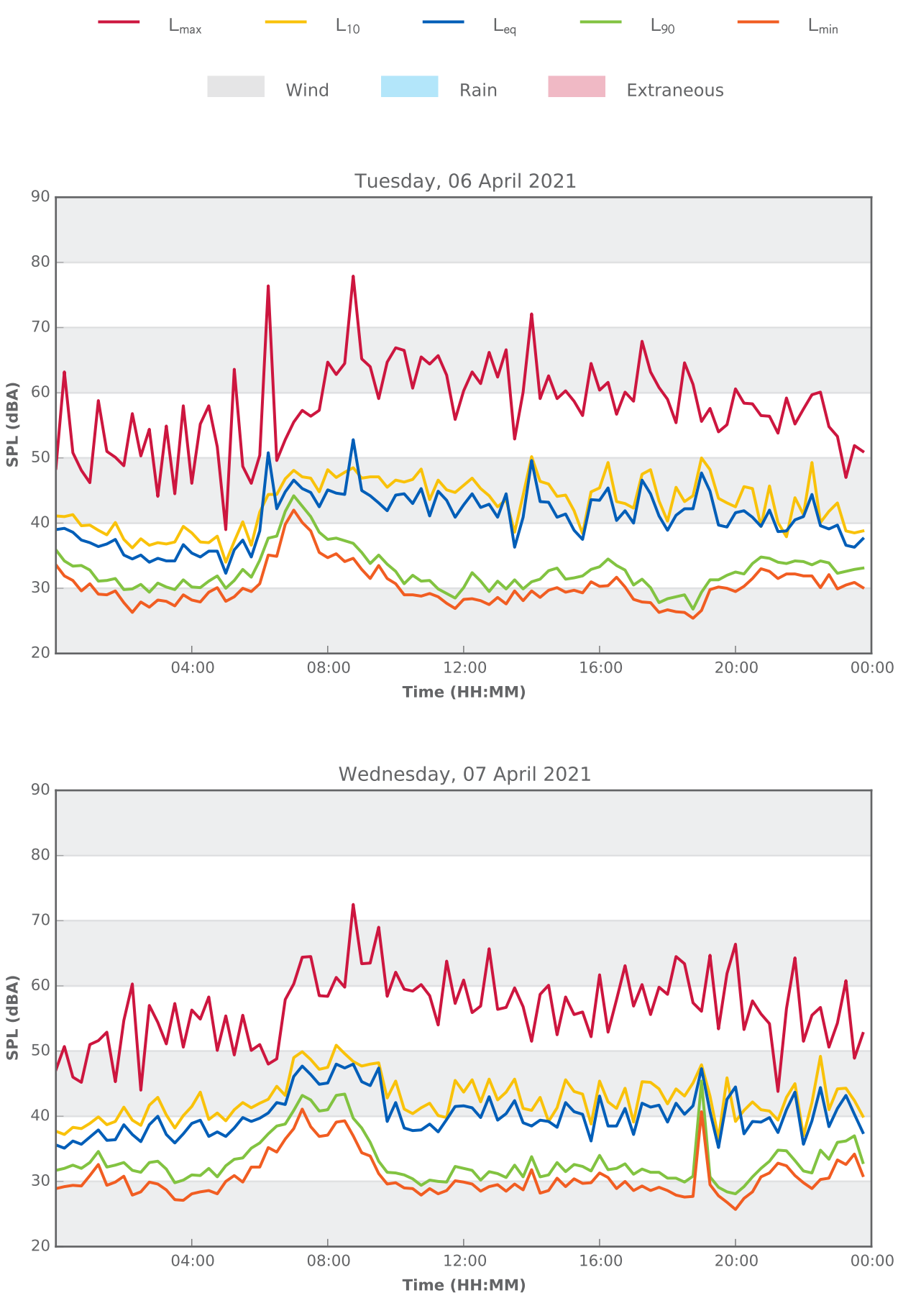


Logger Location 3 - Middle of Site

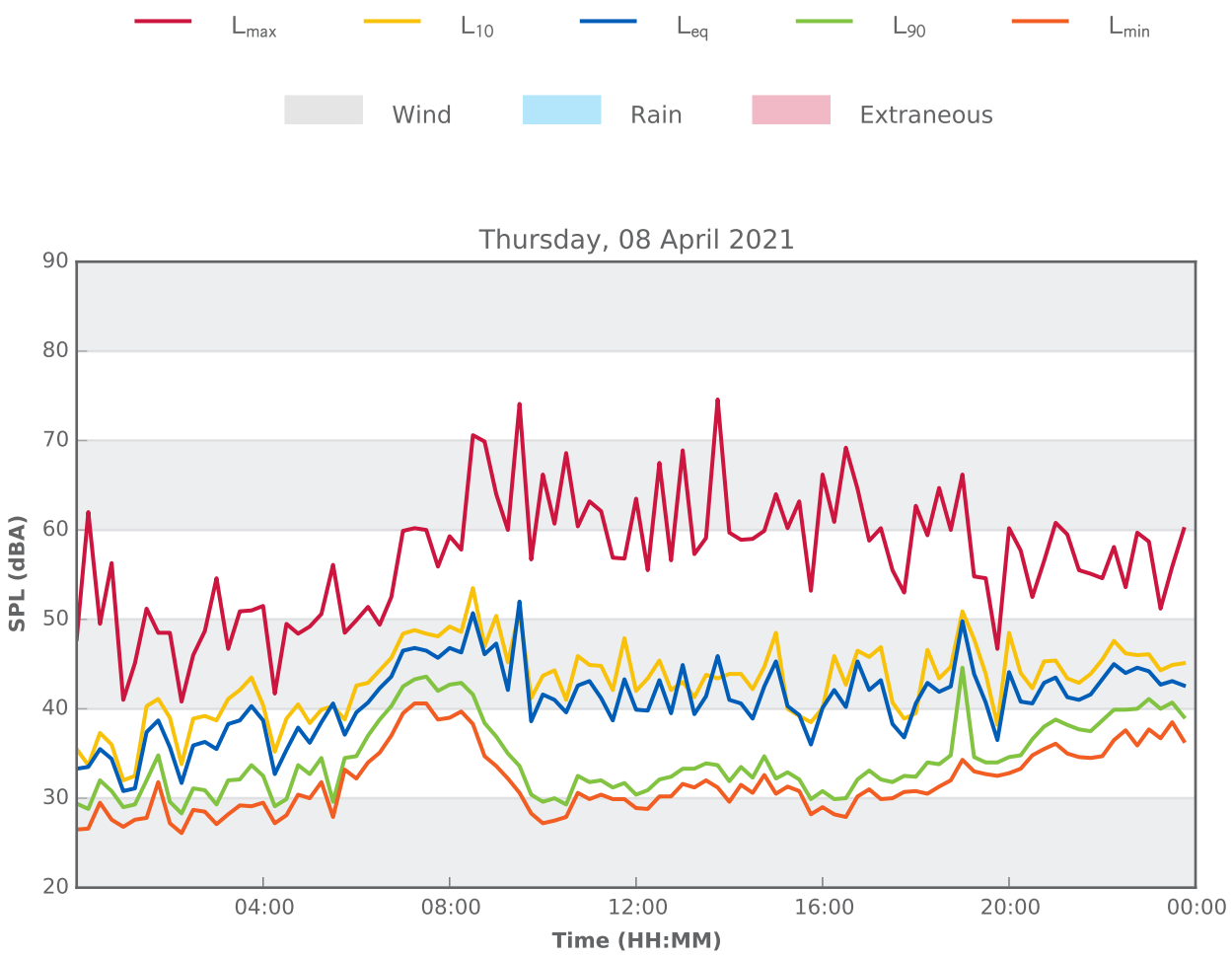


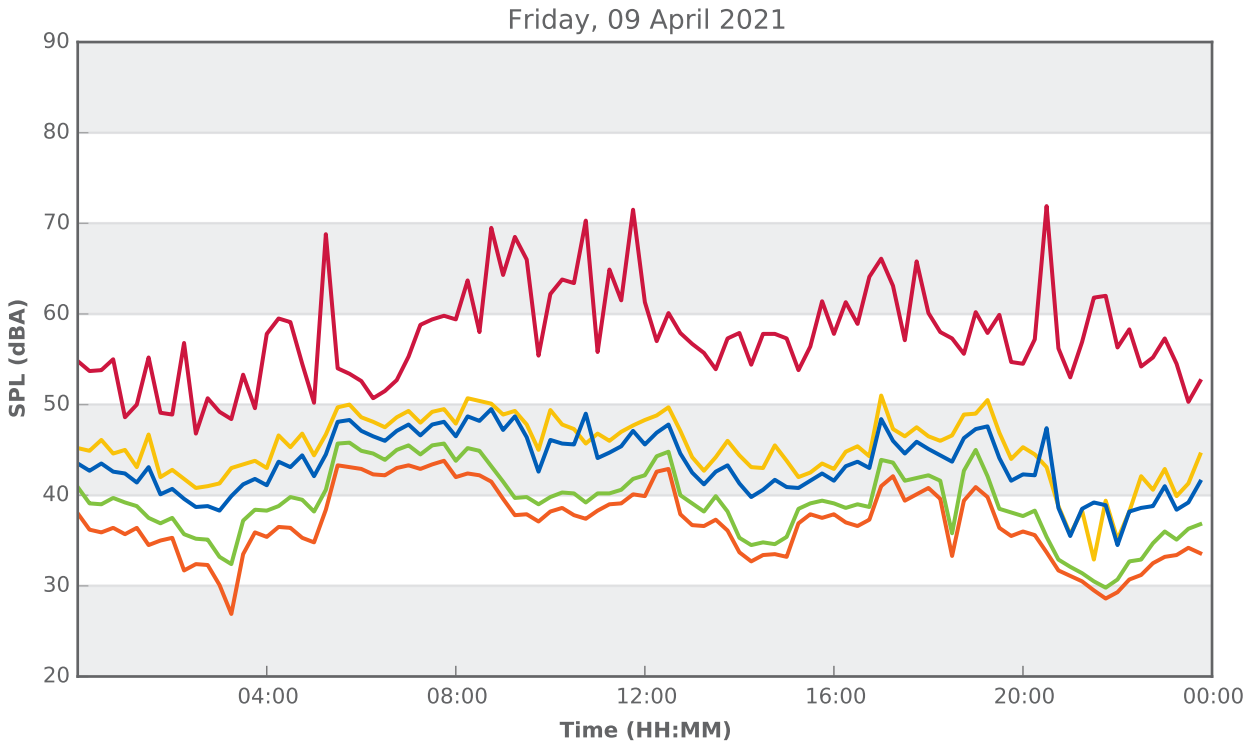


Logger Location 3 - Middle of Site

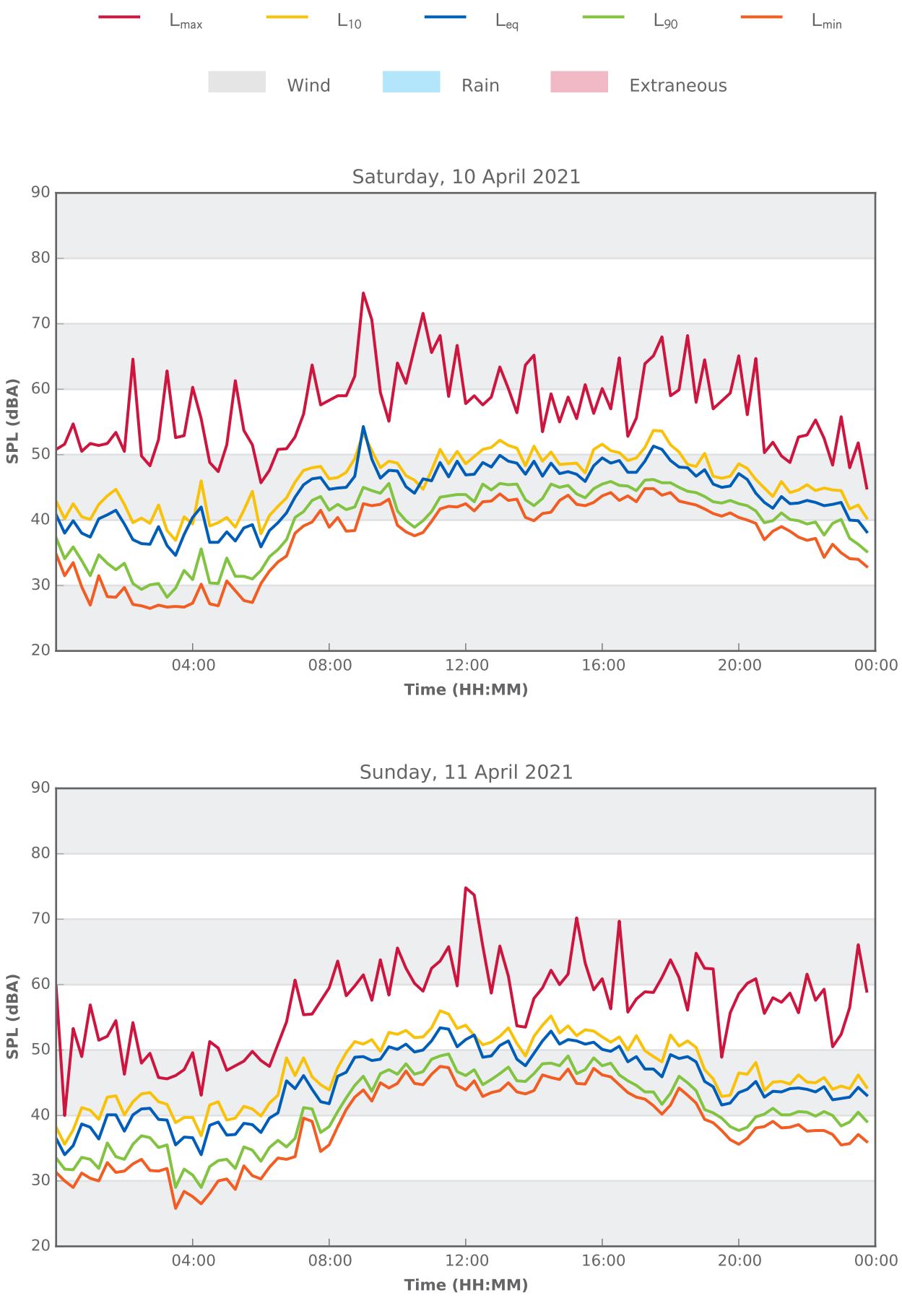


Logger Location 3 - Middle of Site

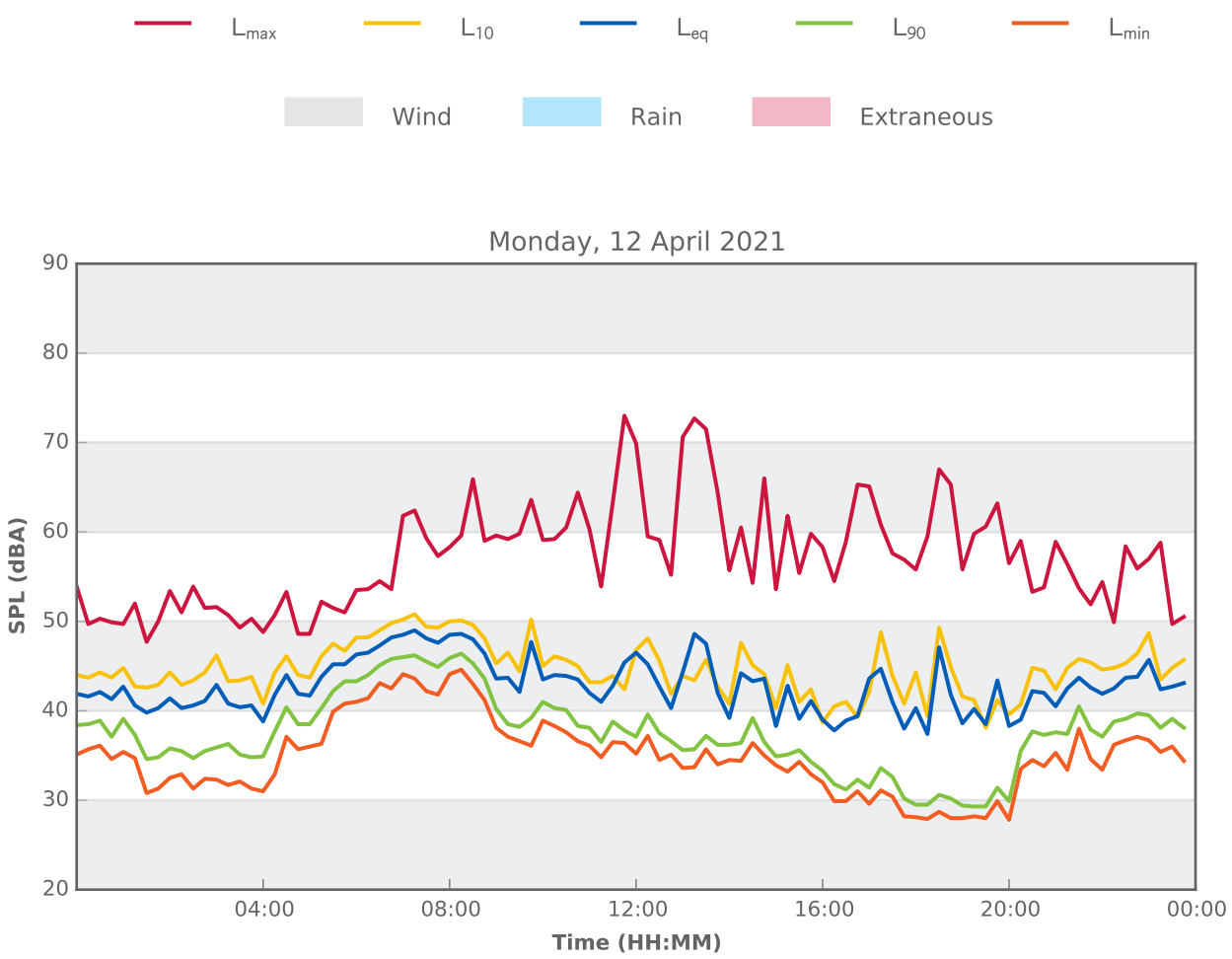


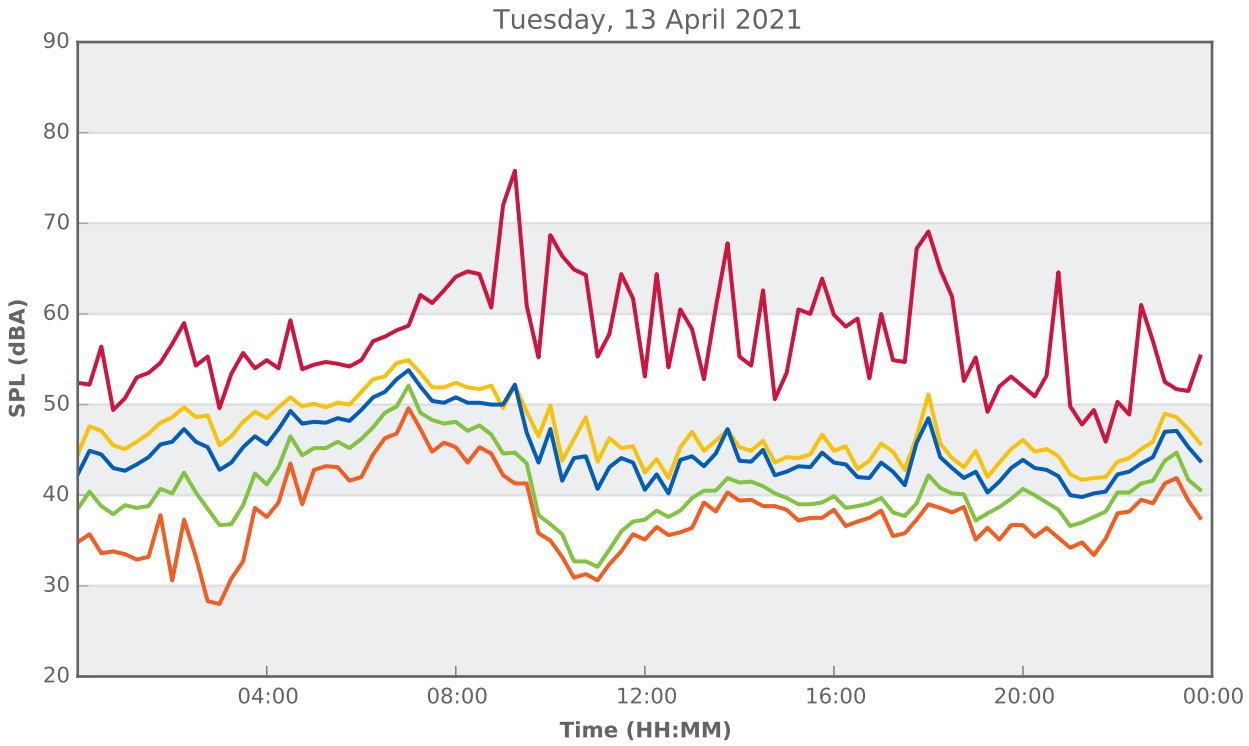


Logger Location 3 - Middle of Site

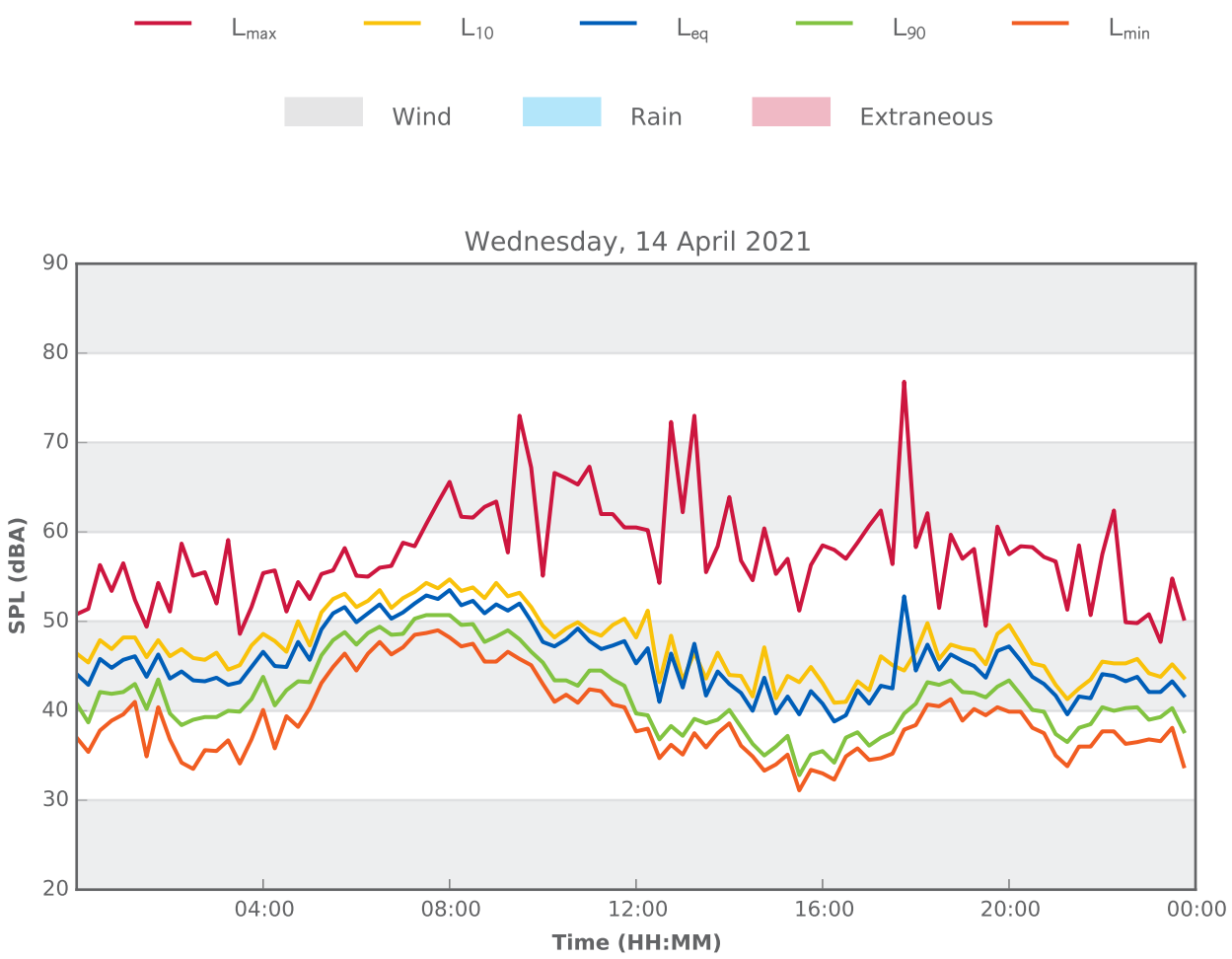


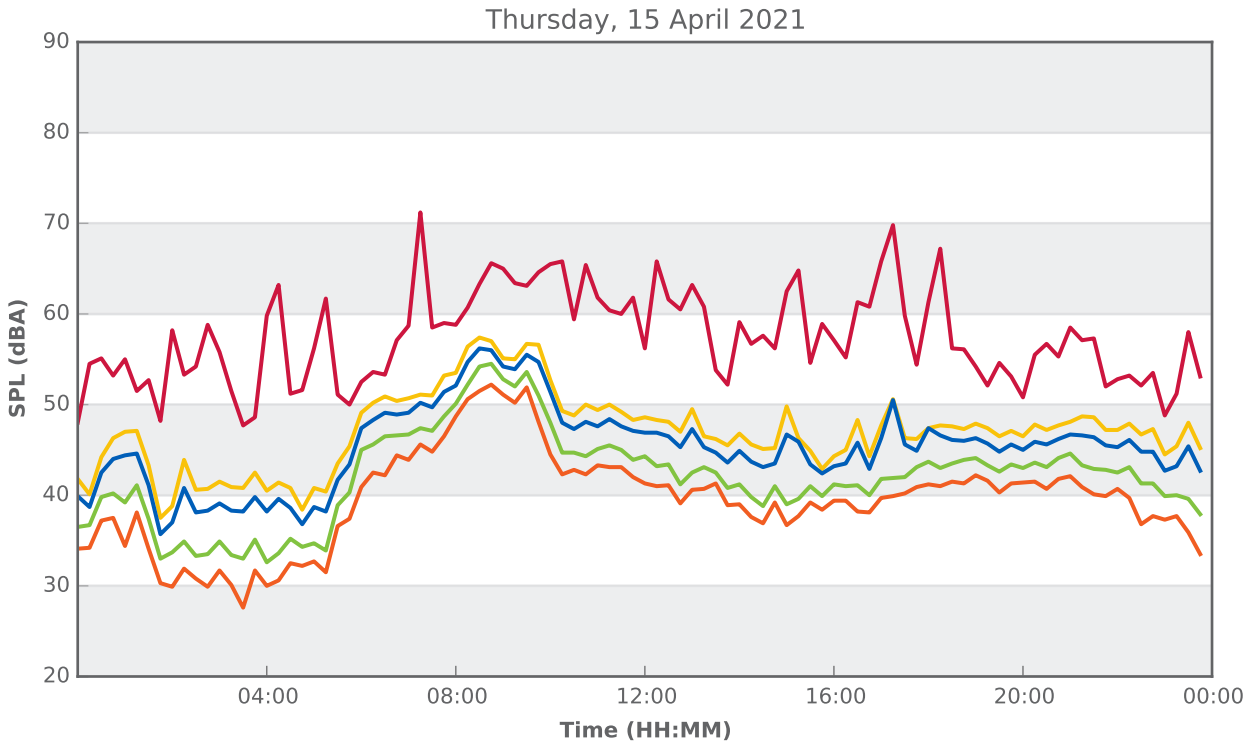
Logger Location 3 - Middle of Site





Logger Location 3 - Middle of Site





Logger Location 3 - Middle of Site