

## **Construction noise and vibration Monthly Report – December 2017**

### **London Borough of Camden**

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# Non-technical summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise and vibration monitoring carried out within the London Borough of Camden (LBC) during the month of December 2017.

A number of worksites were active during the reporting month in the LBC area. Removal of spoil, investigative surveys, construction of walkway, lighting works, laying of new cables and under track crossing (UTX) works were underway at Network Rail worksites B. Investigative surveys, movement of plant and deliveries, UTX preparatory works, laying of new cables and positioning of signalling and telecom equipment were underway at Network Rail worksite C, D and E. Laying of new cables, piling and removal of spoil were underway at Network Rail worksite F. Pre-demolition surveys, removal of fixtures and fittings from buildings and asbestos removal were undertaken at the DB Cargo and former Addison Lee worksite (ref. S001-WS01). Site establishment and archaeological surveys were underway at St James's Gardens worksite (ref. S003-WS01). Pre-demolition surveys were underway at the former National Temperance Hospital, 110 Insull Wing worksite (ref. S003-WS02). Details of works undertaken at each worksite is presented in the report.

Noise monitoring was undertaken in the vicinity of Network Rail worksites B, D, E and F and the DB Cargo worksite (ref.: S001-WS01). Further noise monitoring installation in the LBC area will follow in advance of significant demolition or construction activities.

Exceedances of the SOAELs due to HS2 works were measured at some monitoring positions surrounding worksites B, D, E and F, which were caused by activities at Network Rail HS2 construction sites mainly outside core working hours. No exceedance of S61 trigger levels was measured during the monitoring period. Three noise complaints were received during the monitoring period. Description of the complaints, results of investigations and any actions taken are detailed in the report.

# Abbreviations and descriptions

The abbreviations, descriptions and project terminology used within this report can be found in the Project Dictionary (HS2-HS2-PM-GDE-000-000002).

Table 1: Table of abbreviations

Terminology	Meaning
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +2.5 to +3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
Equivalent continuous sound pressure level, or $L_{pAeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Peak particle velocity, or PPV	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.
Sound pressure level	The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.
Vibration dose value, or VDV	An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in $m/s^{1.75}$ .

# 1 Introduction

1.1.1 The nominated undertaker is required to undertake noise (and vibration) monitoring as necessary to comply with the requirements of the High Speed Rail (London-West Midlands) Environmental Minimum Requirements, including specifically Annex 1: Code of Construction Practice, in addition to any monitoring requirements arising from conditions imposed through consents under section 61 of the Control of Pollution Act, 1974 or through Undertakings & Assurances given to third parties. Such monitoring may be undertaken for the following purposes:

- monitoring the impact of construction works;
- to investigate complaints, incidents and exceedance of trigger levels; or
- monitoring the effectiveness of noise and vibration control measures.

Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the London Borough of Camden (LBC) for the period 1<sup>st</sup> to 31<sup>st</sup> December 2017.

1.1.2 Active construction sites in the local authority area during this period include:

- Network Rail on-networks HS2 preparatory works: worksite ref. B (see plan 1 in Appendix A)
  - Works activities include removal of spoil, deliveries, surveys (including trial holes, ground investigations and drainage surveys), installation of walkway and lighting bases, removal of ballast, under track crossing (UTX) works (including ground preparation, monitoring and compaction), laying of new cables and installation of lighting bollard along Line E.
- Network Rail on-networks HS2 preparatory works: worksite ref. C, D and E (see plan 2 in Appendix A)
  - Works activities include material deliveries and movement of plant, surveys (including cone penetration testing, cable percussive boreholes and rotary boreholes), trial pitting, UTX ground preparation works, sample drilling, laying of new cables and positioning of signalling and telecom equipment.
- Network Rail on-networks HS2 preparatory works: worksite ref. F (see plan 2 in Appendix A)
  - Works activities include laying of new cables, piling and removal of spoil.

- DB Cargo shed and former Addison Lee, worksite ref. S001-WS01 (see plan 2 in Appendix A)
  - Works activities include pre-demolition surveys, removal of fixtures and fittings from buildings and asbestos removal.
- St James’s Gardens, worksite ref. S003-WS01 (see plan 3 in Appendix A)
  - Works activities include site establishment and archaeological surveys.
- Former National Temperance Hospital, Insull Wing, worksite ref. S003-WS02 (see 3 in Appendix A)
  - Works activities include pre-demolition surveys.

The applicable standards, guidance, and monitoring methodology is outlined in the construction noise and vibration monitoring methodology report which can be found at the following location <https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2>. Noise and vibration monitoring reports for 2018 can also be found at this location. Noise and vibration reports prior to 2018 can be found at the following location [www.gov.uk/government/publications/monitoring-noise-and-vibration-on-the-hs2-phase-one-route](http://www.gov.uk/government/publications/monitoring-noise-and-vibration-on-the-hs2-phase-one-route).

## 1.2 Measurement locations

1.2.1 Table 2 summarises the position of noise and vibration monitoring installations within the LBC area in December 2017.

1.2.2 Maps showing the position of noise monitoring installations are presented in Appendix B.

Table 2: Monitoring locations.

Worksite Reference	Measurement Reference	Address
B	JC	Juniper Crescent, London, NW1 8HA
D	MT	13 Mornington Terrace, Kings Cross, London, NW1 7RR
	N004	Mornington Terrace lamppost #7 (junction of Mornington Terrace, Mornington Place and Clarkson Row)
E	GT	5A Granby Terrace, Kings Cross, London, NW1 3SA
F	BS	Roof of Stockbeck House, Barnby Street, Kings Cross, London, NW1 2RS
S001-WS01	N001	Park Village East lamppost #1 (external to Cubitt Court, 100 Park Village East)
	N002	Park Village East lamppost #2 (external to Richmond Court)
	N003	Park Village East lamppost #9 (external to Silsoe House)

## 2 Summary of results

### 2.1 Exceedances of SOAEL

- 2.1.1 The significant observed adverse effect levels (SOAEL) is defined in the Planning Practice Guidance – Noise as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."
- 2.1.2 Where construction noise levels exceed the SOAEL, relevant periods will be identified and summary statistics provided in order to evaluate ongoing qualification for noise insulation and temporary rehousing.
- 2.1.3 Table 3 presents a summary of recorded exceedances of the SOAEL due to HS2 related construction noise at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 3: Summary of exceedances of LOAEL and SOAEL.

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
B	JC <sup>(1)</sup>	Juniper Crescent	Saturday	1400-2200	1
			Night	2200-0700	5
D	MT	Mornington Terrace	Night	2200-0700	1
	N004	Mornington Terrace lamppost #7	Weekday	1900-2200	1
			Saturday	0700-2200	1
			Night	2200-0700	7
E	GT	Granby Terrace	Night	2200-0700	4
	N001	DB Cargo shed and adjacent land on Granby Terrace	Night	2200-0700	6
			Weekday	1900-2200	1
	N002	DB Cargo shed and adjacent land on Granby Terrace	Night	2200-0700	2
N003	DB Cargo shed and adjacent land on Granby Terrace	Night	2200-0700	4	
F	BS	Barnby Street	Night	2200-0700	3
S001-WS01	N001	DB Cargo shed and adjacent land on Granby Terrace	All days	All periods	No exceedance
	N002	DB Cargo shed and adjacent land on Granby Terrace	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	N003	DB Cargo shed and adjacent land on Granby Terrace	All days	All periods	No exceedance

<sup>(1)</sup> This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL are not representative of noise at the surrounding residential properties. Alternative locations for repositioning of this monitor are being considered in discussion with the Local Council.

2.1.4 Over the reporting period the SOAEL was exceeded at a number of measurement locations in the vicinity of worksites B, D, E and F. These were caused by activities at Network Rail HS2 construction sites during night-time periods and during weekend days. Outside of these times any exceedances of the SOAEL were caused by the underlying ambient noise levels or other construction activities not related to HS2, rather than being attributable to HS2 construction noise.

2.1.5 For the purpose of assessing eligibility for noise insulation or temporary rehousing, multiple exceedances of the SOAEL in a 24-hour period would be counted as a single exceedance during that day. Over the reporting period, the overall number of SOAEL exceedances at each measurement location is shown in Table 4 and may be lower than the total sum of individual exceedances reported in Table 3 for each location.

Table 4: Summary of total exceedances of SOAEL.

Worksite Reference	Measurement Reference	Site Address	Total of SOAEL exceedances in the month
B	JC <sup>(1)</sup>	Juniper Crescent	5
D	MT	Mornington Terrace	1
	N004	Mornington Terrace lamppost #7	7
E	GT	Granby Terrace	4
	N001	DB Cargo shed and adjacent land on Granby Terrace	6
	N002	DB Cargo shed and adjacent land on Granby Terrace	3
	N003	DB Cargo shed and adjacent land on Granby Terrace	4
F	BS	Barnby Street	3

<sup>(1)</sup> This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL are not representative of noise at the surrounding residential properties. Alternative locations for repositioning of this monitor are being considered in discussion with the Local Council.



## 2.2 Summary of measured noise levels

2.2.1 Table 5 presents a summary of the measured noise levels at each monitoring location over the reporting period. The  $L_{Aeq,T}$  is presented for each of the relevant time periods averaged over the calendar month, along with the highest single period  $L_{Aeq,T}$  that was found to occur within the month.

2.2.2 Other than during periods of out-of-hours works at HS2 on-network worksites, the measured noise levels at all locations were largely dominated by the underlying ambient noise levels, rather than being attributable to HS2 construction activities, acknowledging that intermittent HS2 works may on occasion be taking place within the area.

Table 5: Summary of measured dB L<sub>Aeq</sub> data over the monitoring period.

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekly Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )					Saturday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )					Sunday / Public Holiday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
B	JC <sup>(1)</sup>	Juniper Crescent, London, NW1 8HA	Free-field	65.6 (70.0)	67.7 (74.5)	67.6 (70.2)	66.6 (70.7)	62.3 (69.4)	65.9 (67.2)	70.4 (74.3)	67.8 (68.4)	67.5 (78.1)	63.4 (71.9)	64.6 (68.5)	60.9 (66.2)
D	MT	13 Mornington Terrace, Kings Cross, London, NW1 7RR	Free-field	55.0 (57.3)	58.3 (61.0)	58.0 (60.1)	57.2 (65.6)	52.3 (57.5)	54.7 (56.1)	56.1 (56.6)	56.3 (56.6)	56.2 (57.2)	53.0 (57.6)	55.6 (57.7)	50.7 (54.4)
	N004	Mornington Terrace lamppost #7	Free-field	61.7 (64.8)	64.1 (66.6)	63.9 (66.0)	64.4 (72.9)	59.9 (69.0)	62.9 (64.4)	64.3 (66.7)	64.5 (67.1)	64.2 (71.9)	59.2 (71.9)	61.9 (65.4)	57.6 (63.0)
E	GT	5A Granby Terrace, Kings Cross, London, NW1 3SA	Free-field	66.9 (70.8)	68.9 (79.2)	68.0 (75.6)	67.4 (71.8)	63.4 (71.5)	65.6 (67.4)	72.7 (83.1)	68.4 (72.5)	66.9 (70.5)	63.2 (69.2)	65.3 (67.8)	62.5 (66.3)
F	BS	Roof of Stockbeck House, Barnby Street	Free-field	56.6 (60.5)	61.2 (65.7)	58.3 (62.0)	57.6 (61.1)	53.7 (62.5)	56.3 (58.0)	60.3 (62.8)	60.2 (62.9)	57.7 (61.2)	52.8 (57.9)	55.6 (58.0)	52.8 (57.0)
S001-WS01	N001	External to Cubitt Court, 100 Park Village East	Free-field	60.8 (63.8)	64.7 (73.1)	61.8 (64.2)	60.7 (71.5)	56.6 (63.9)	57.9 (59.8)	59.9 (62.0)	61.3 (63.0)	60.7 (65.5)	56.0 (60.1)	60.5 (65.4)	56.3 (60.3)
	N002	Richmond Court, Park Village East	Free-field	61.5 (64.0)	63.7 (69.2)	63.1 (64.8)	61.7 (69.3)	57.3 (63.6)	58.8 (60.6)	60.7 (62.1)	62.6 (64.0)	62.0 (64.7)	56.9 (60.8)	61.4 (64.5)	57.4 (62.2)
	N003	Silsoe House, Park Village East	Free-field	61.8 (64.7)	63.4 (66.5)	63.3 (65.1)	62.0 (70.0)	57.8 (66.0)	58.8 (60.3)	61.1 (62.1)	62.8 (64.4)	62.2 (65.1)	57.5 (61.6)	61.9 (65.0)	57.7 (62.8)

<sup>(1)</sup> This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL are not representative of noise at the surrounding residential properties. Alternative locations for repositioning of this monitor are being considered in discussion with the Local Council.

2.2.3 Appendix C presents graphs of noise monitoring data over the month for each of the measurement locations. Noise data presented consist of the hourly  $L_{Aeq}$  values and, where relevant, the  $L_{Aeq,T}$  values (where the time period T has been taken to be the averaging period as specified in Table 1 of HS2 Information Paper E23). The full data set for the monitoring equipment can be found at the following location:  
<https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data>.

## 2.3 Exceedances of trigger level

2.3.1 Table 6 provides a summary of exceedances of the S61 trigger noise levels determined to be due to HS2 related construction measured during the reporting period, along with the findings of any investigation.

Table 6: Summary of exceedances of trigger levels.

Complaint reference number (if applicable)	Worksite reference	Date and time period	Identified Source	Results of investigation (including noise monitoring results)	Actions taken
-	-	-	-	-	-

2.3.2 There were no exceedances of trigger levels as defined in section 61 consents during the reporting period at any monitoring position.

## 2.4 Complaints

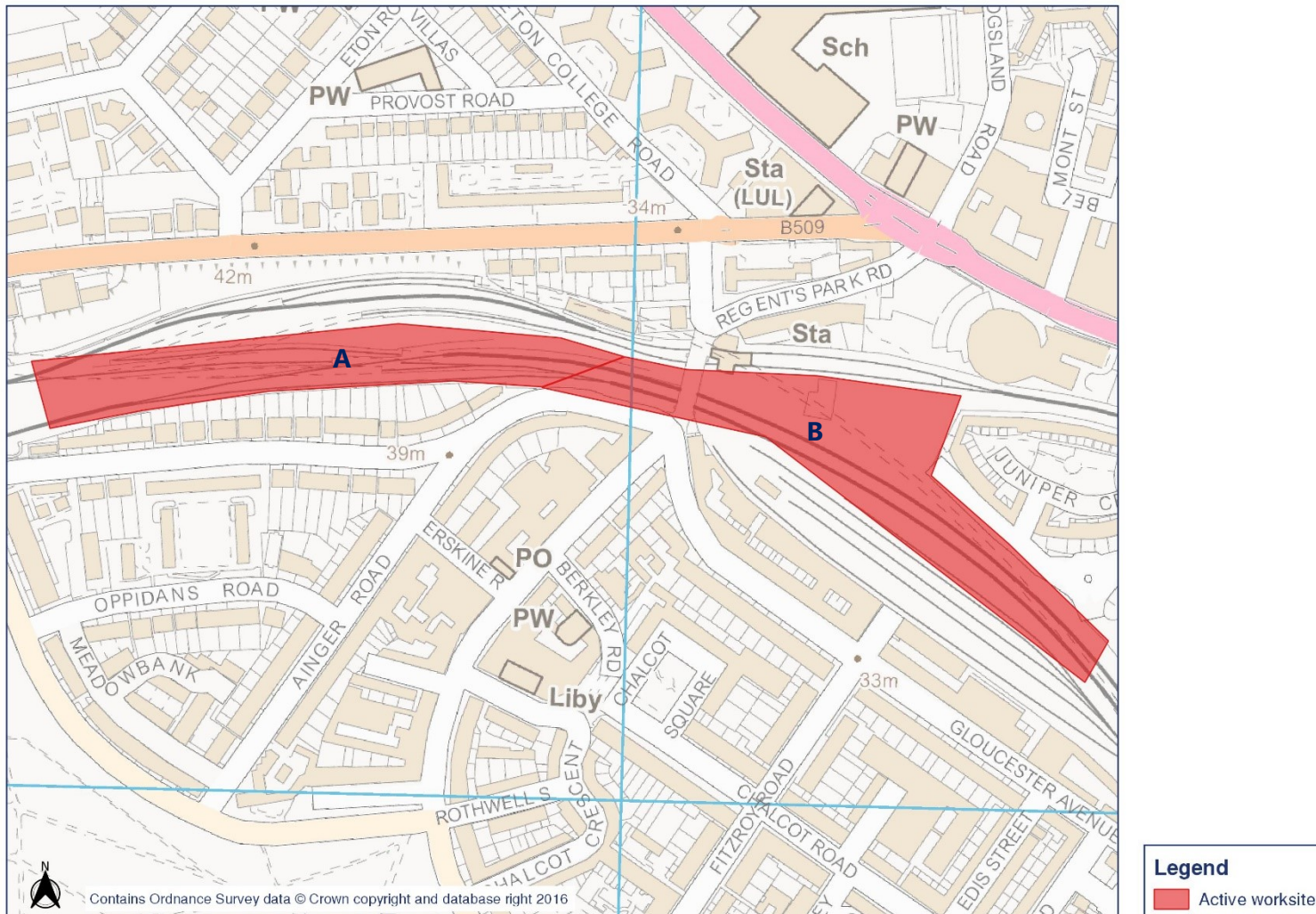
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 7: Summary of complaints.

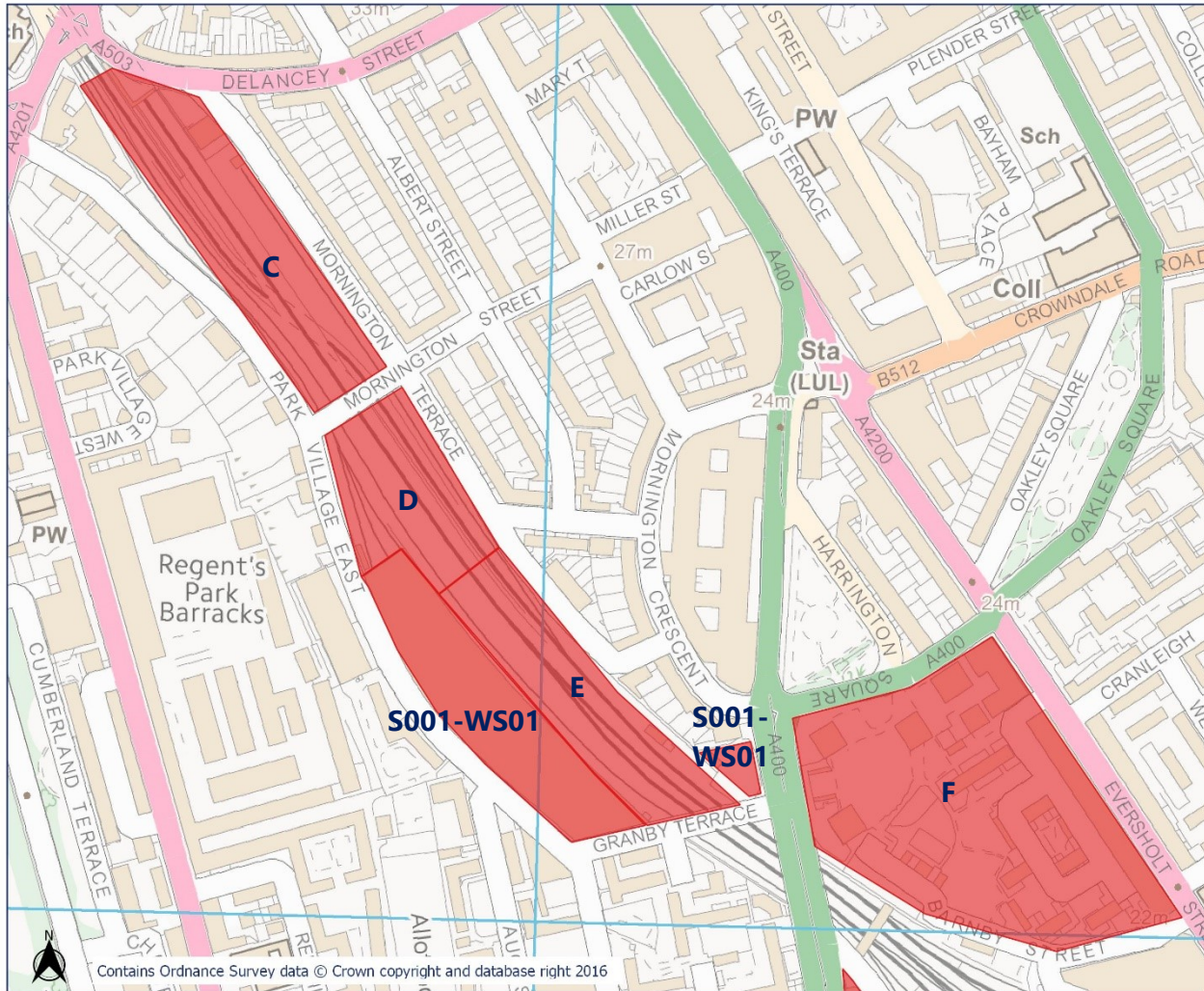
Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
CPA-000183	S001-WS01	Noise complaint regarding works at the former Addison Lee site.	A late change in methodology was required due to unforeseen ground conditions that required additional breaking out of concrete, which gave rise to increased noise and vibration levels.	Working methods and mitigation reviewed and agreed with the Local Authority prior to recommencement of works. Response sent to resident to advise on investigation outcome.
N/A	E	Complaint from a resident on Granby Terrace	The plate design requires contact with	Resident advised on works taking place and date that

Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
		regarding clattering noise from vehicle passing over the metal covers protecting a trench dug in the road.	road surface and any changes to setup were deemed unsafe as this could potentially cause plates to move exposing the trench.	the trench would be backfilled.
N/A	S001-WS01	Noise complaint regarding works at the former Addison Lee site.	A late change in methodology was required due to unforeseen ground conditions that required additional breaking out of concrete which gave rise to increased noise and vibration levels.	Working methods and mitigation reviewed and agreed with the Local Authority prior to recommencement of works. Response sent to resident to advise investigation outcome.

# Appendix A Site Locations

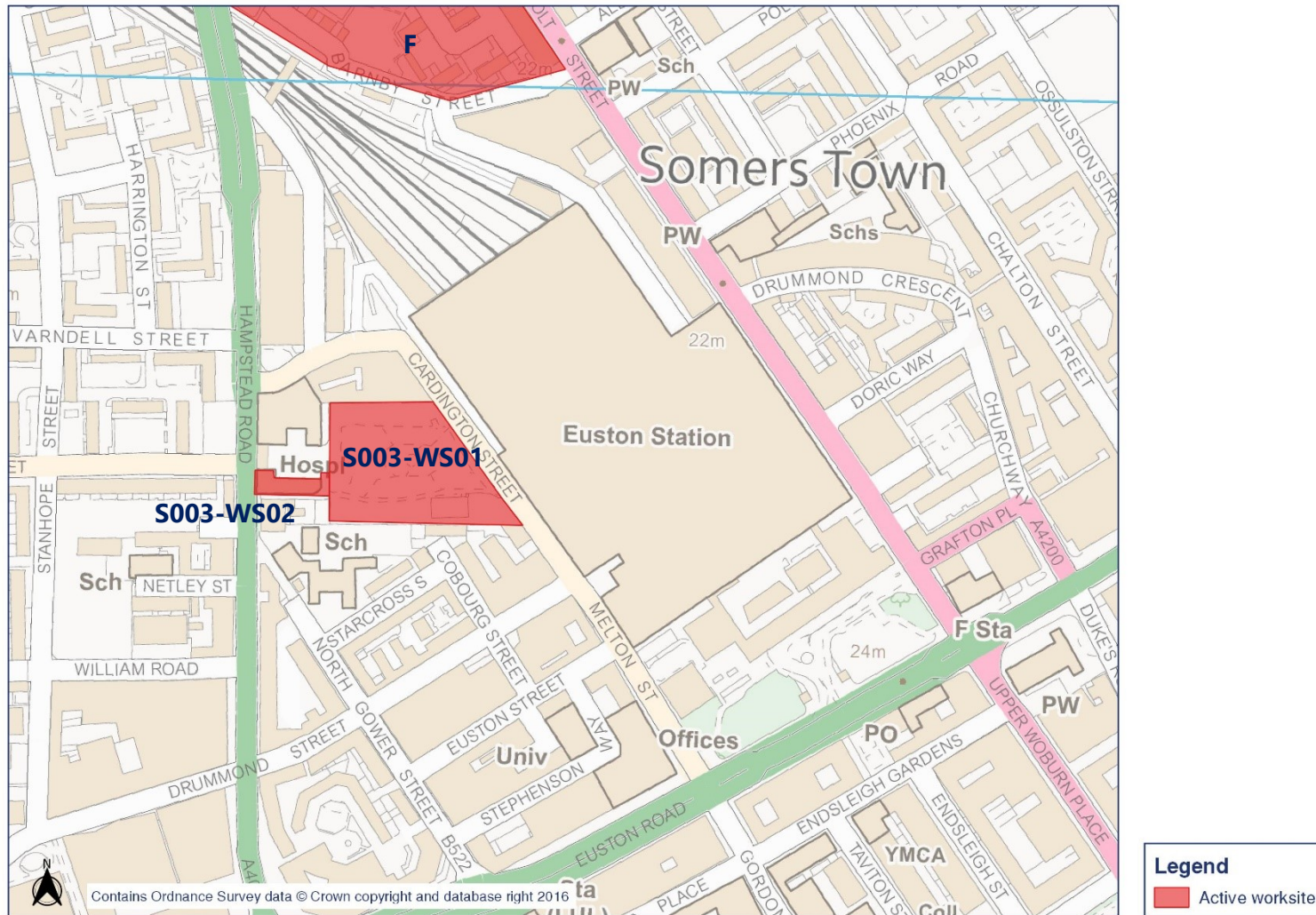






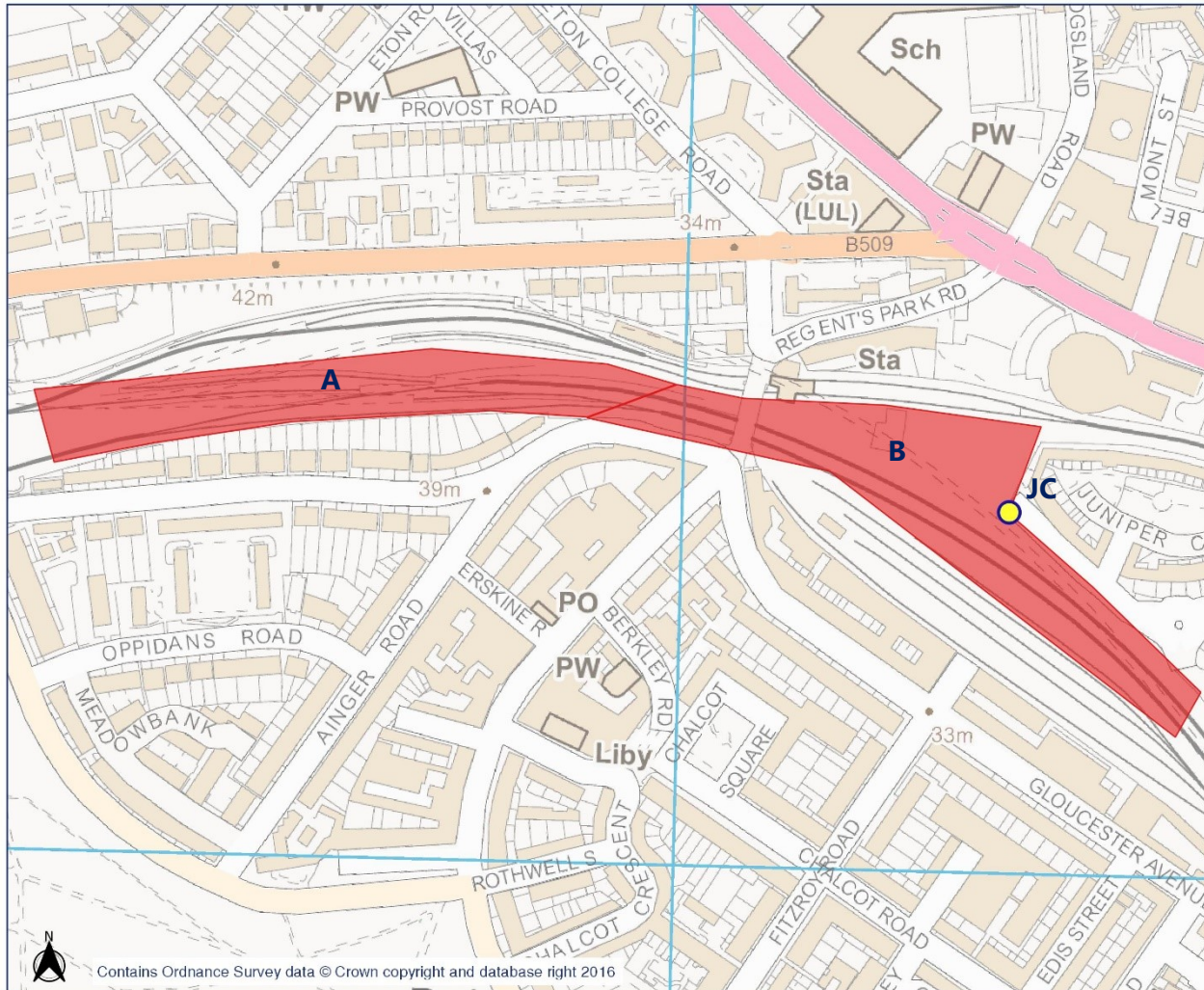
**Legend**

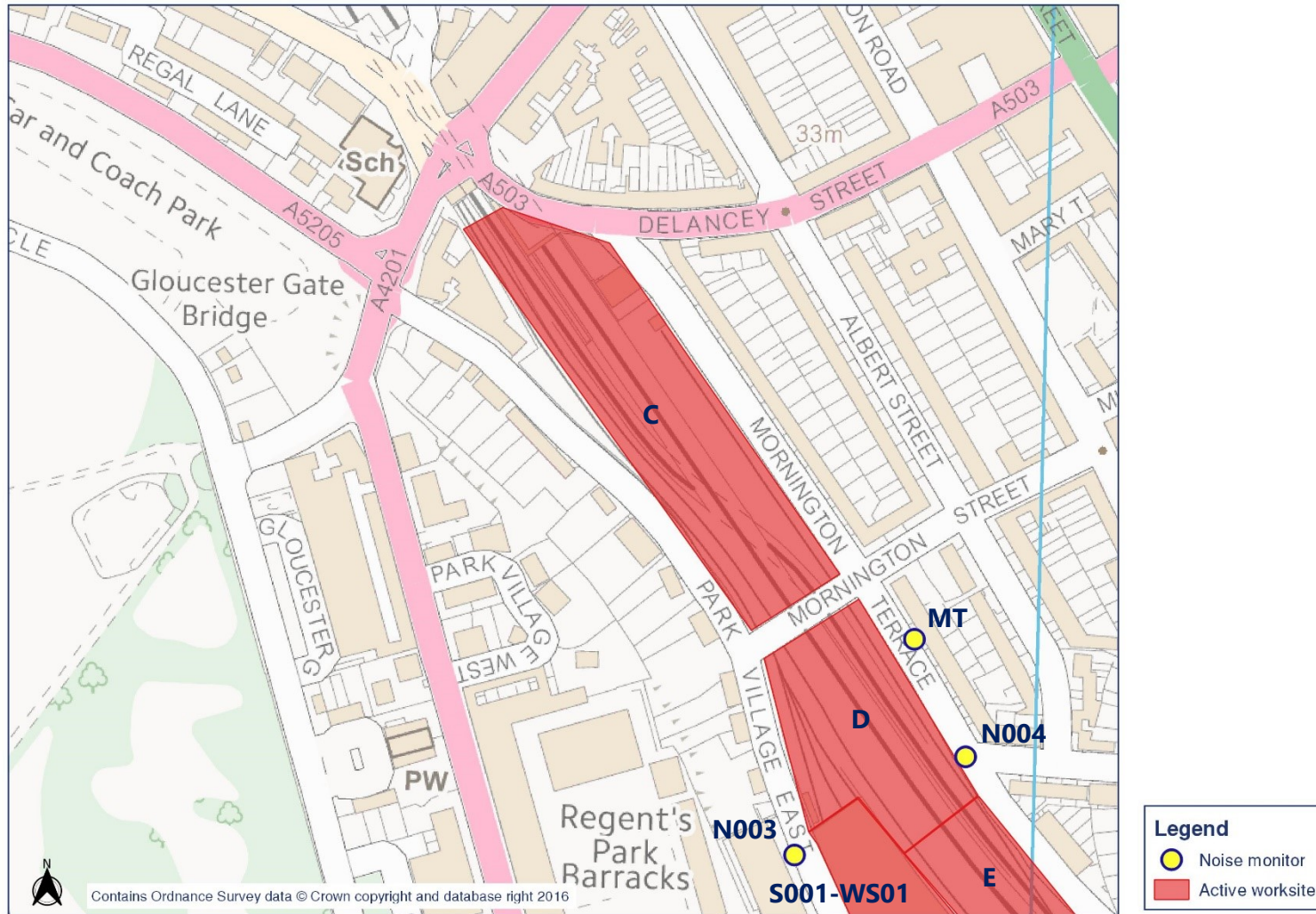
- Active worksites



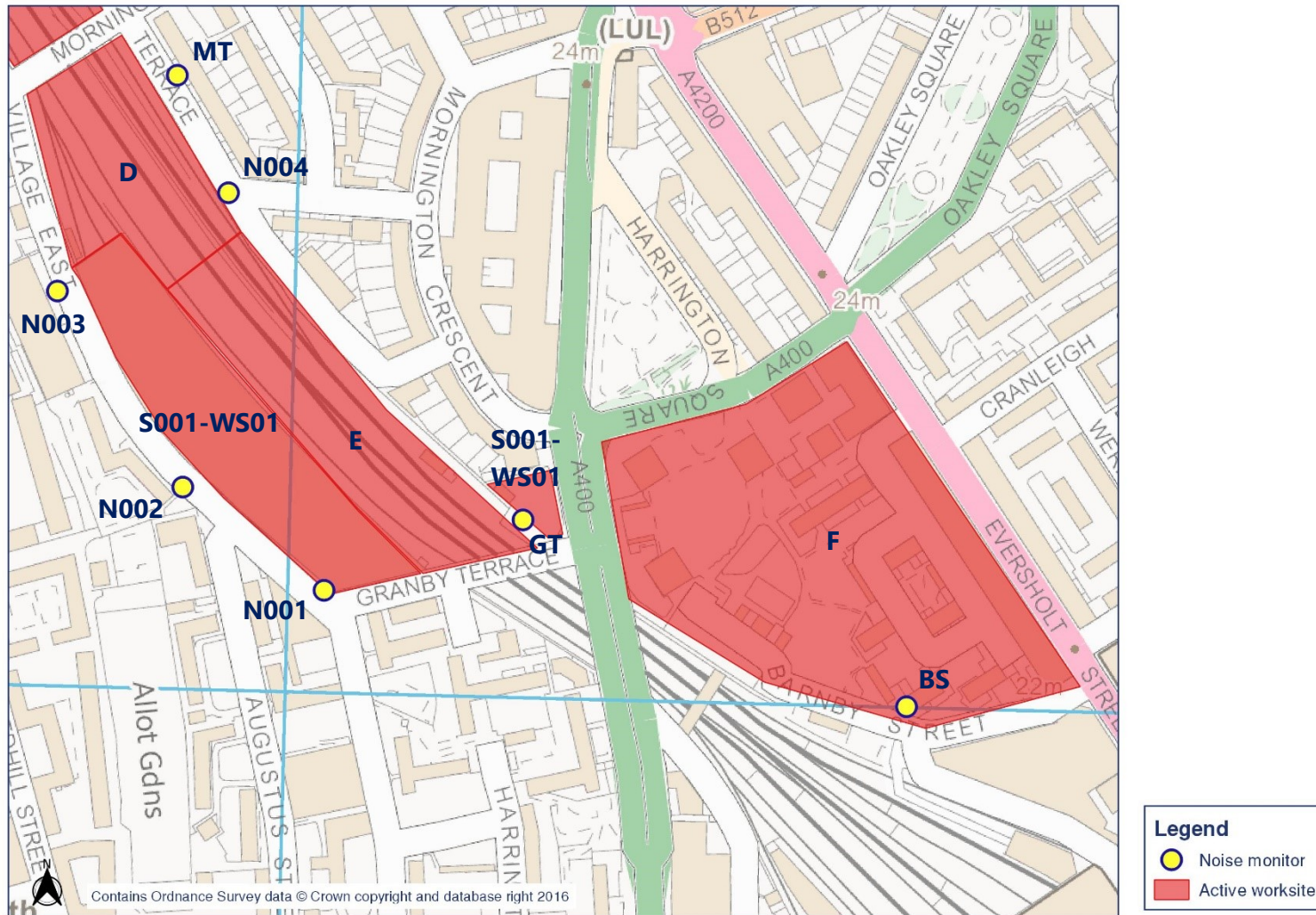


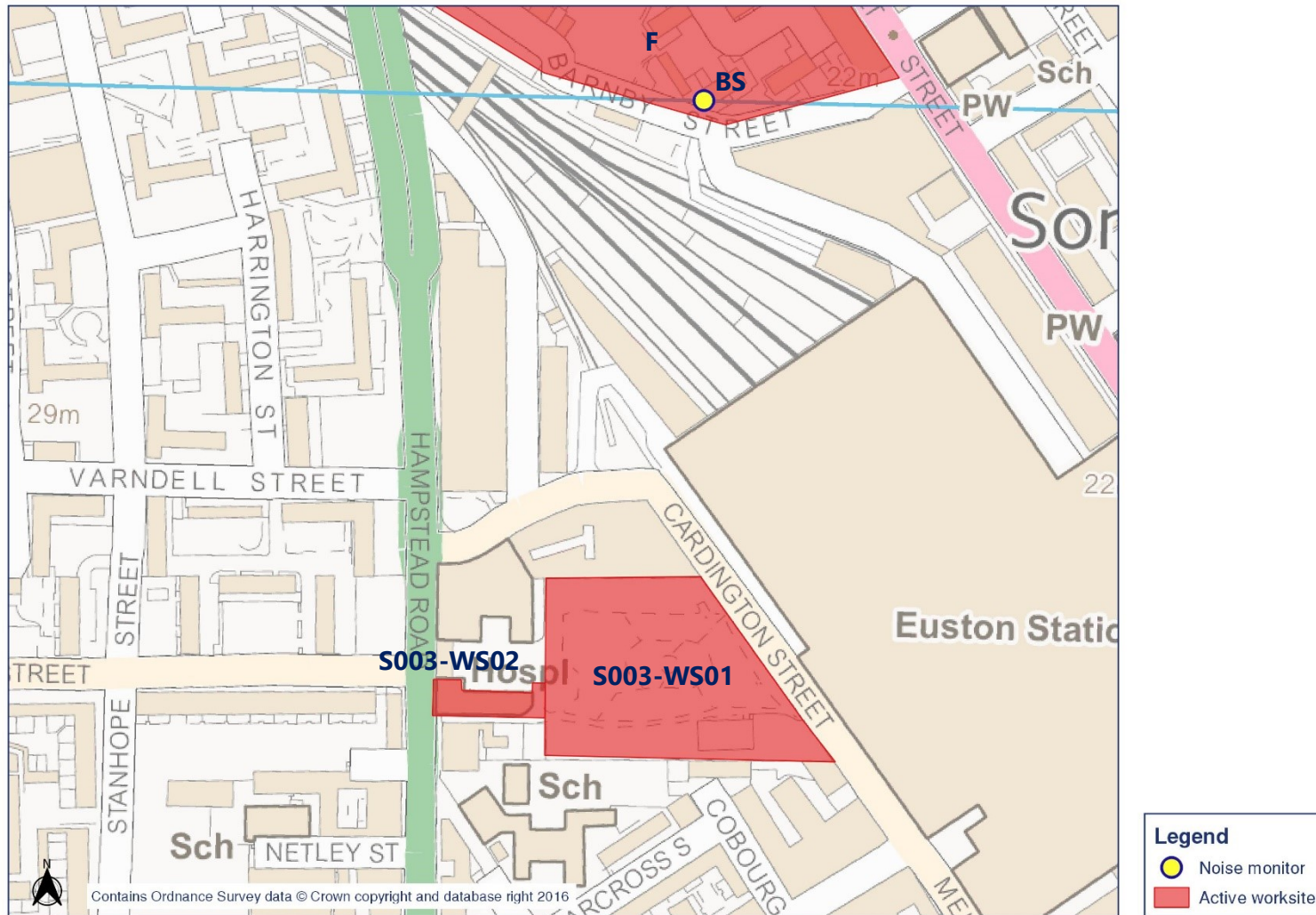
# Appendix B Monitoring Locations









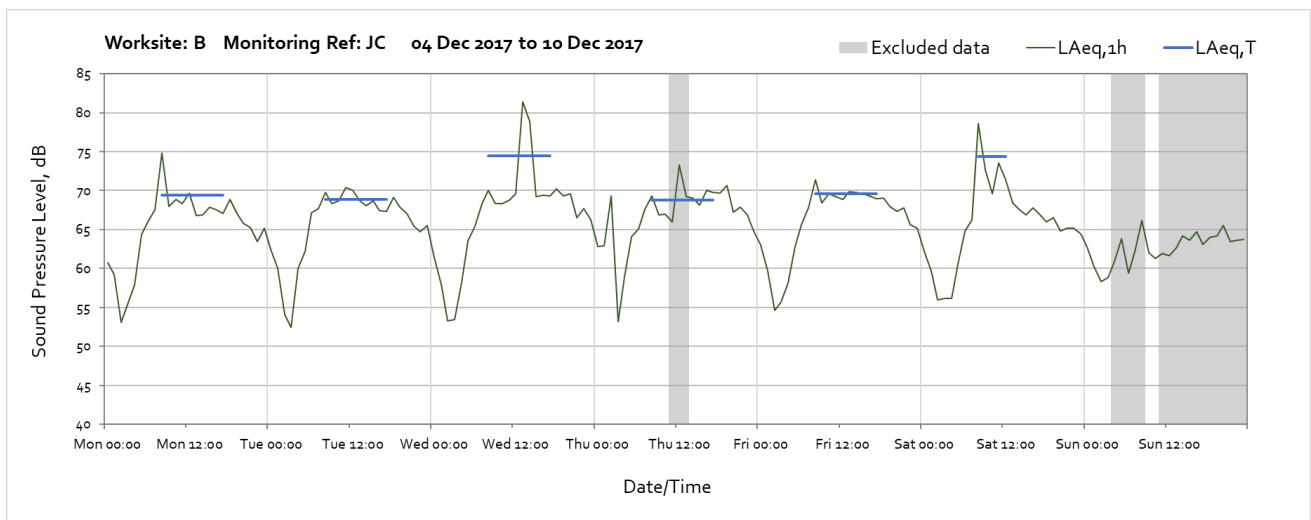
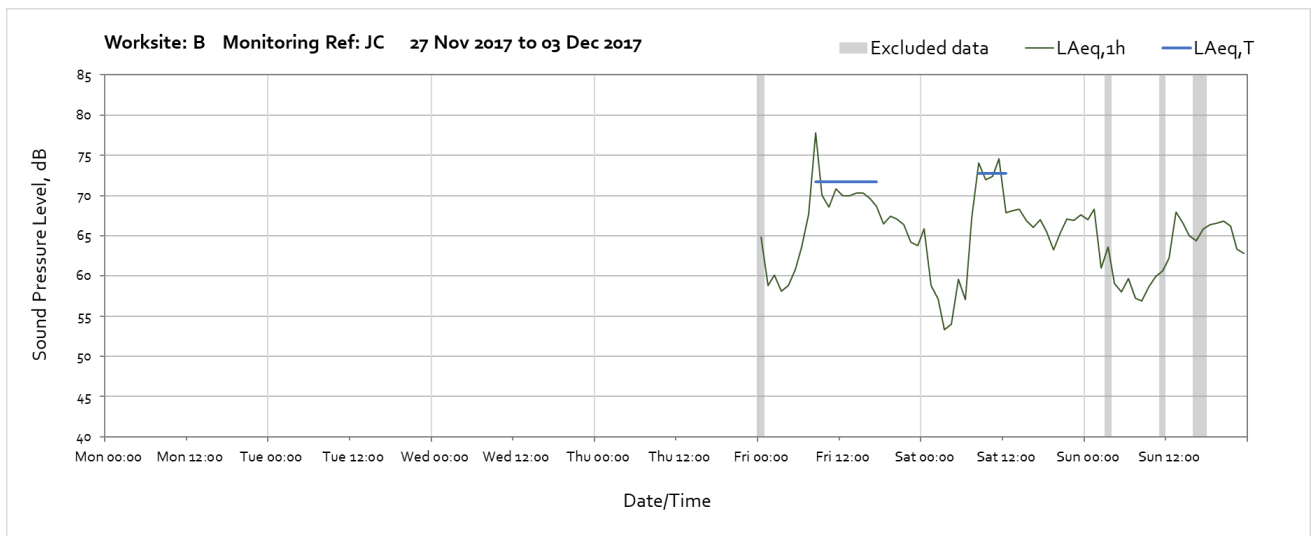


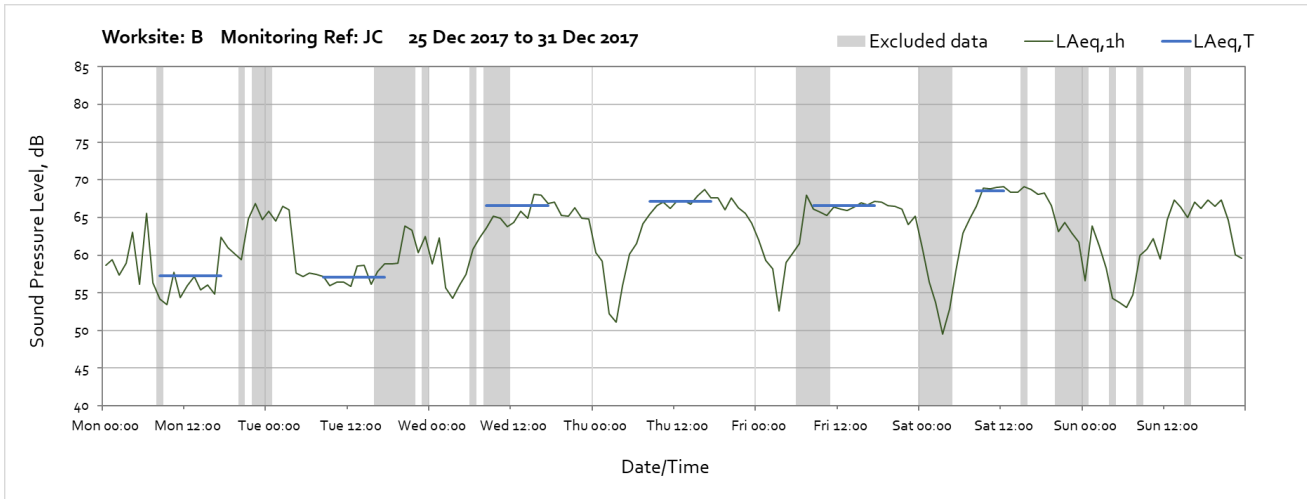
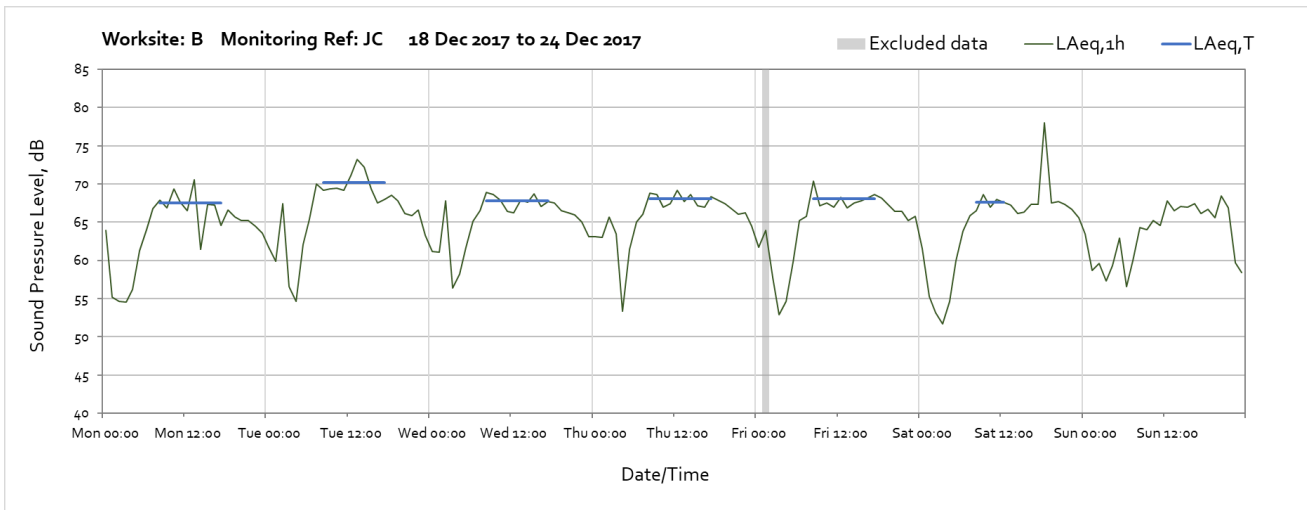
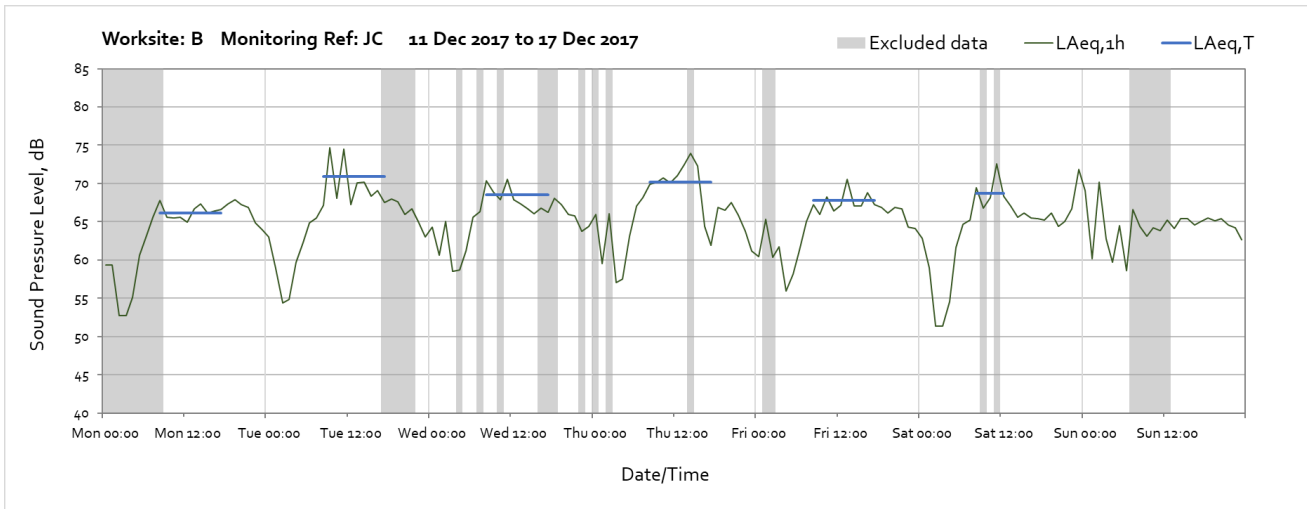
# Appendix C Data

## Noise

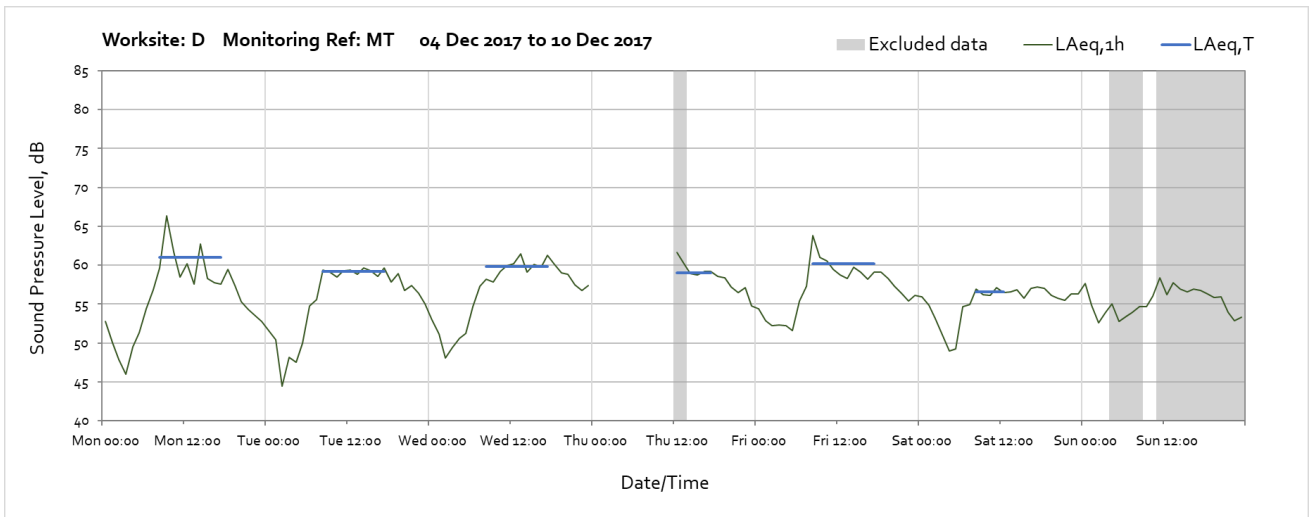
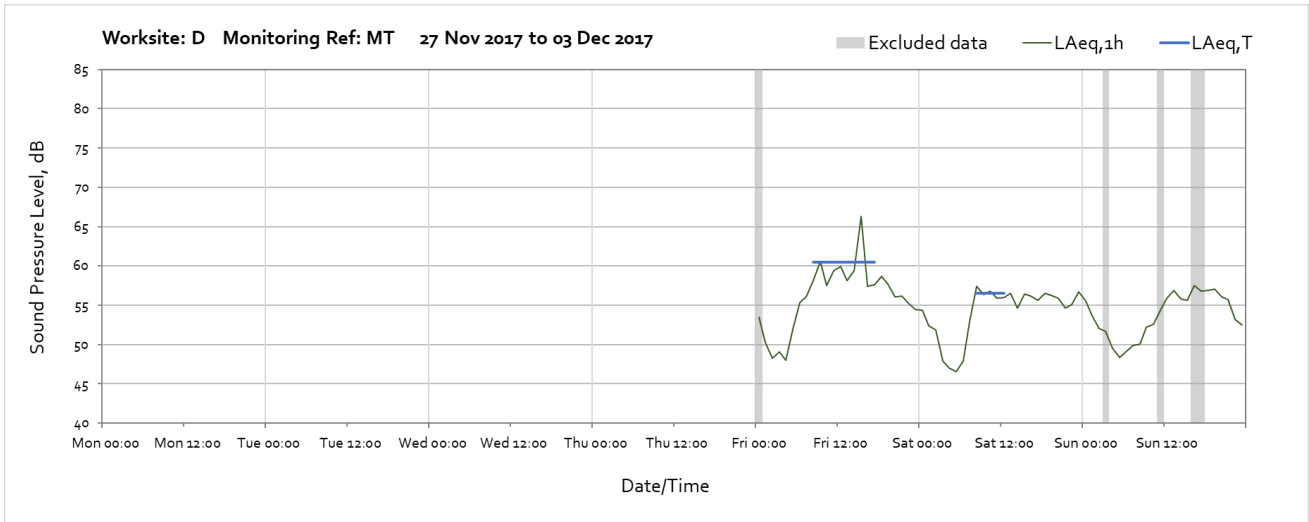
The following graphs show the hourly measured ambient noise level  $L_{Aeq,1h}$  and, where relevant, the averaged noise level  $L_{Aeq,T}$  values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have been excluded from the calculation of the  $L_{Aeq,T}$  values in Table 5.

### Worksite: B – Monitoring Ref: JC

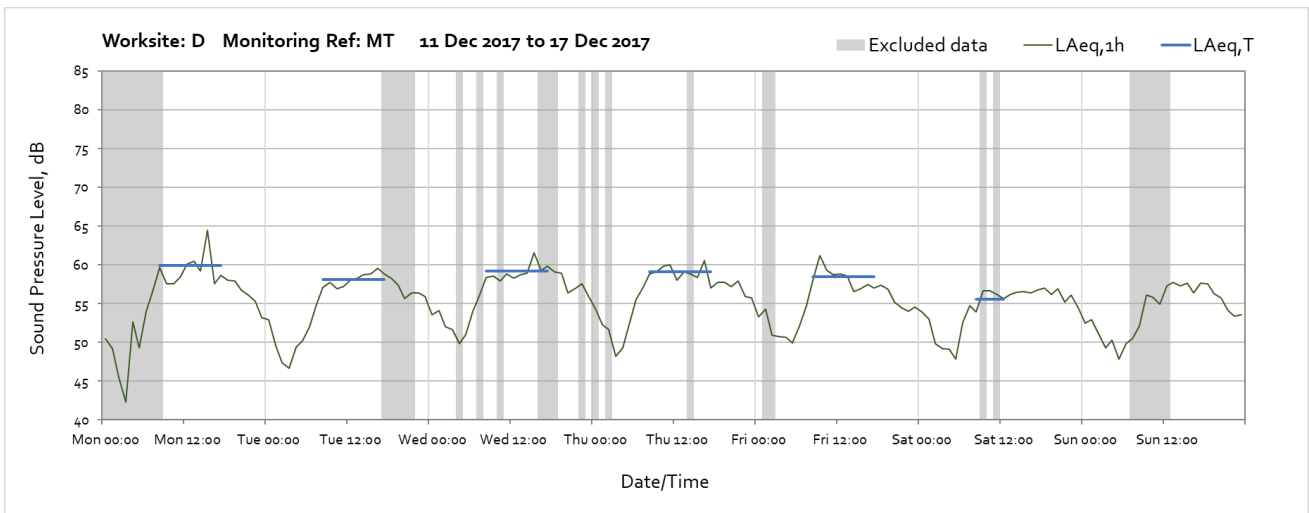




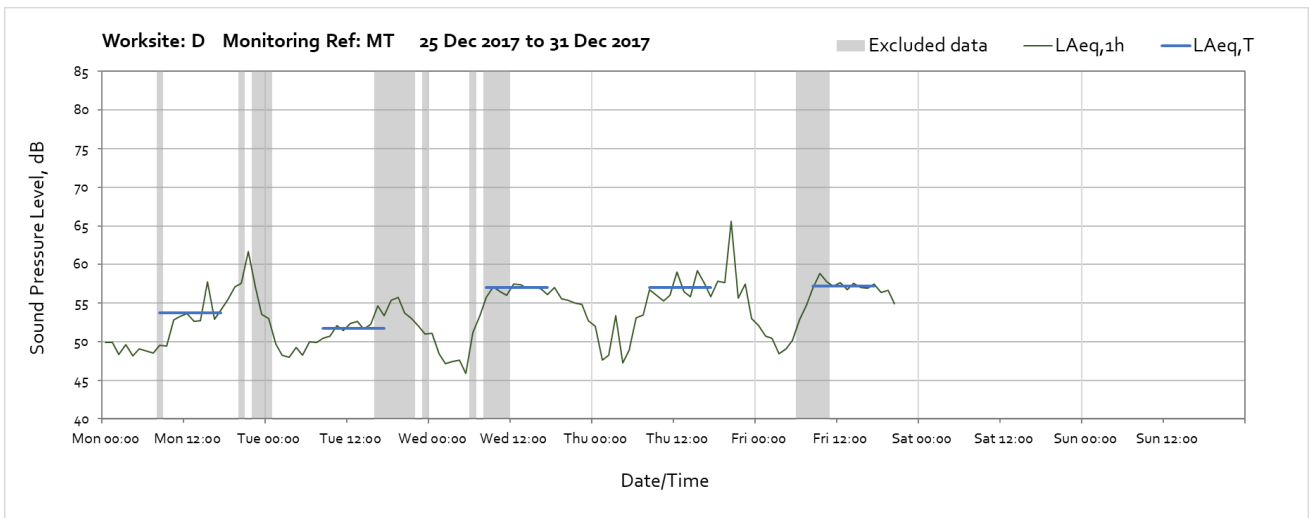
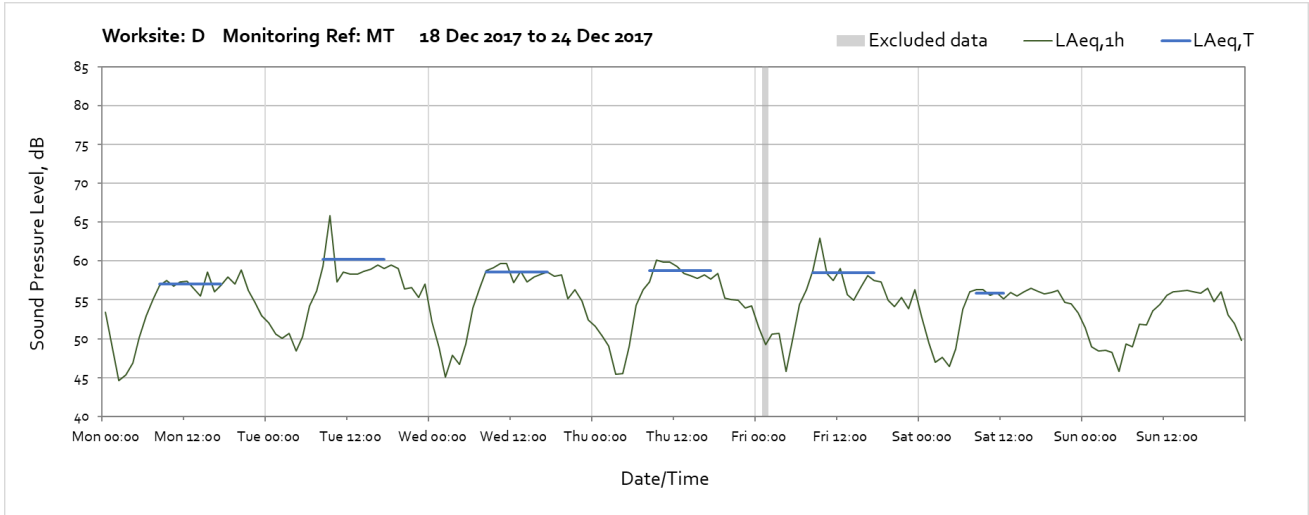
## Worksite: D – Monitoring Ref: MT



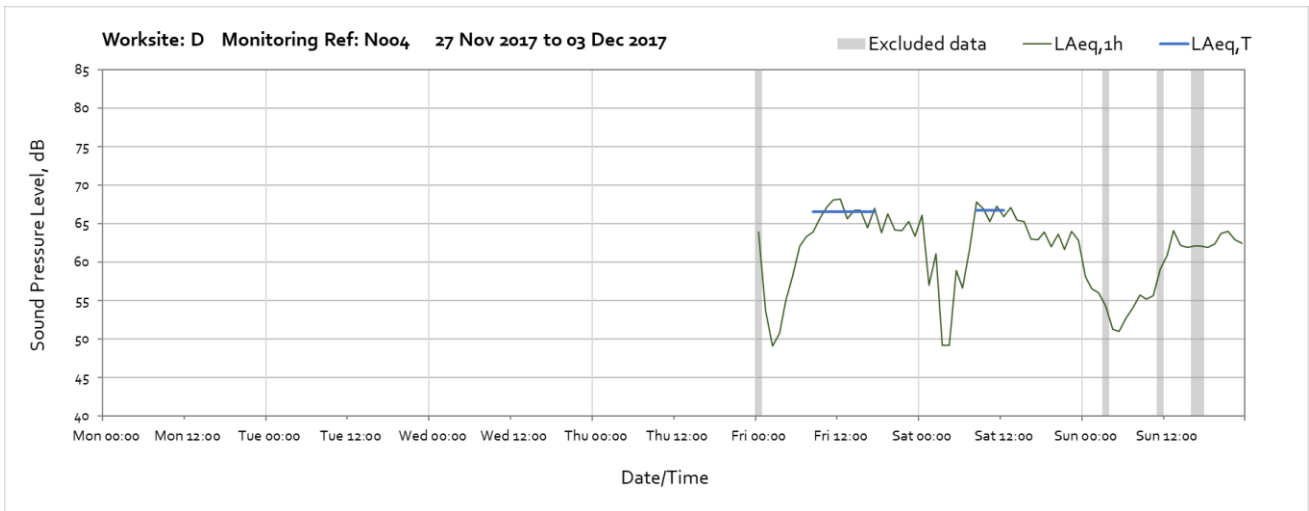
Note – Missing data between 23:00 on Wednesday 6<sup>th</sup> and 12:00 on Thursday 7<sup>th</sup> due to a loss of power at the noise monitor.

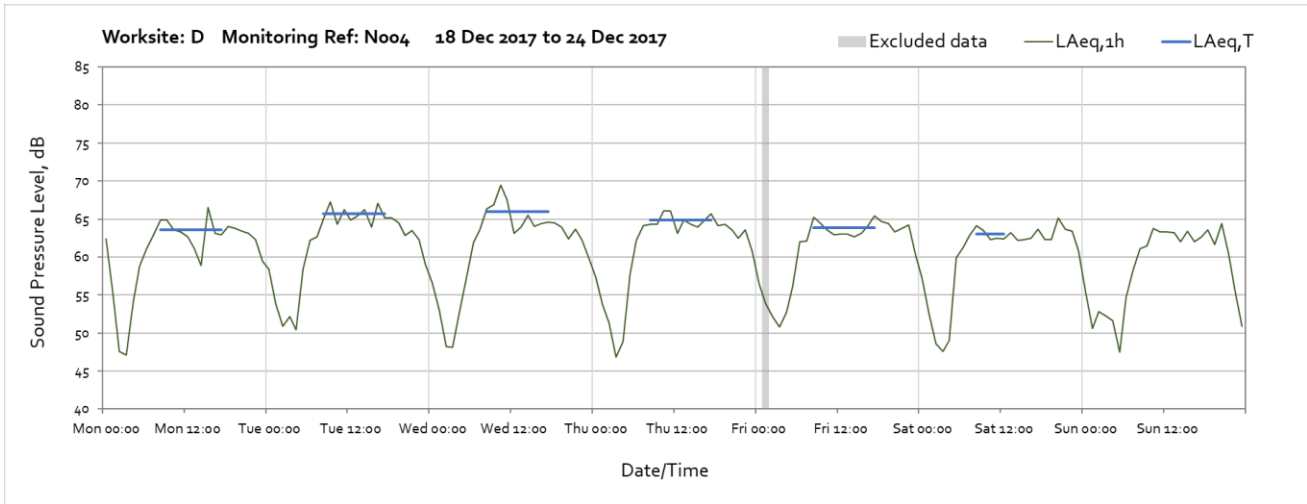
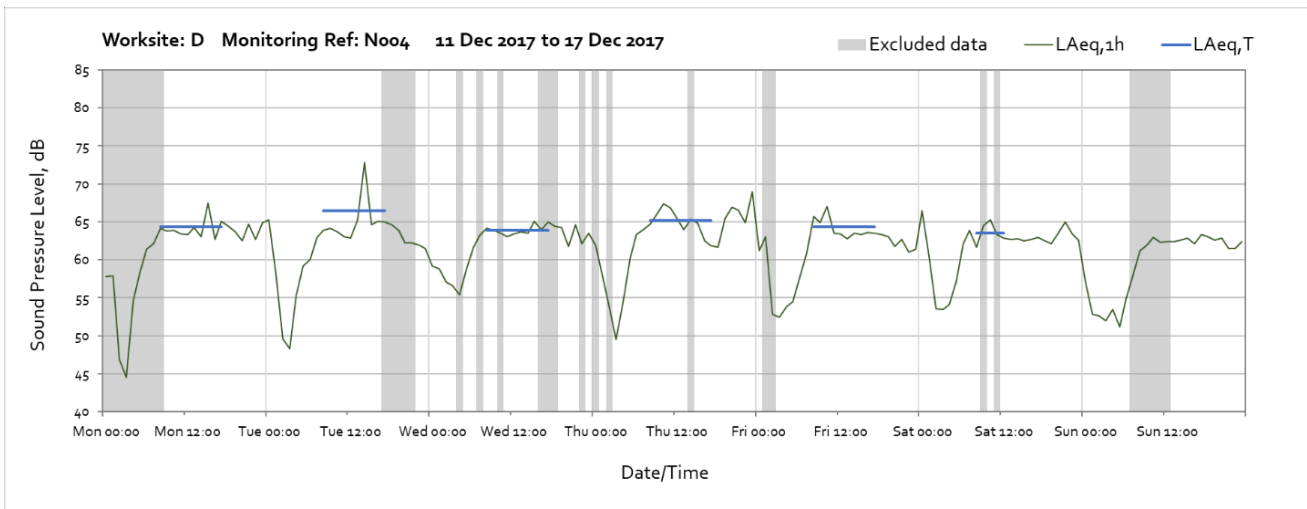
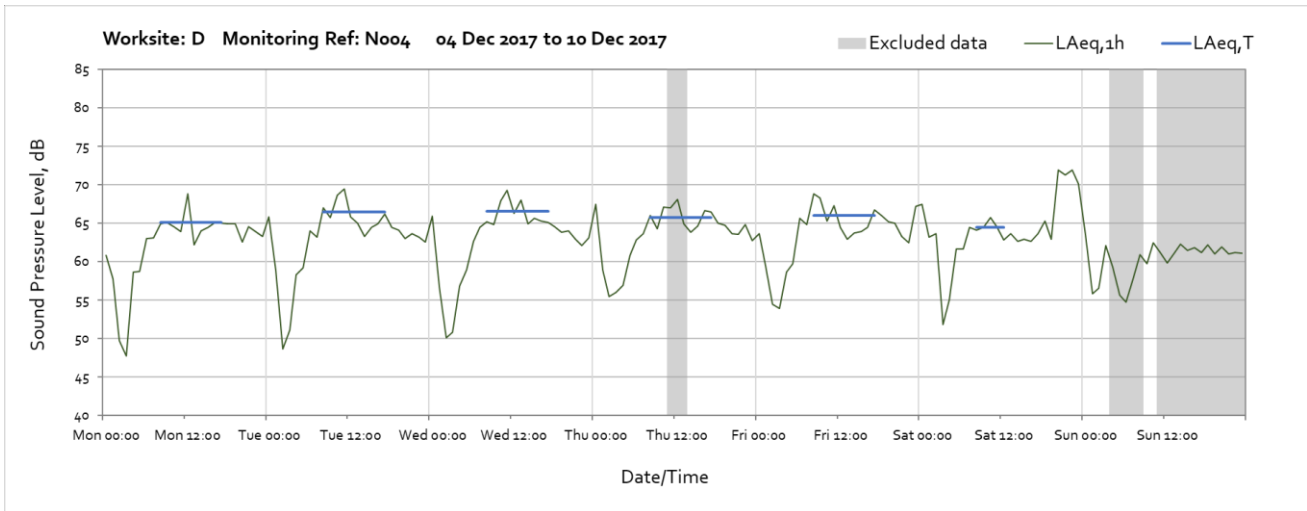


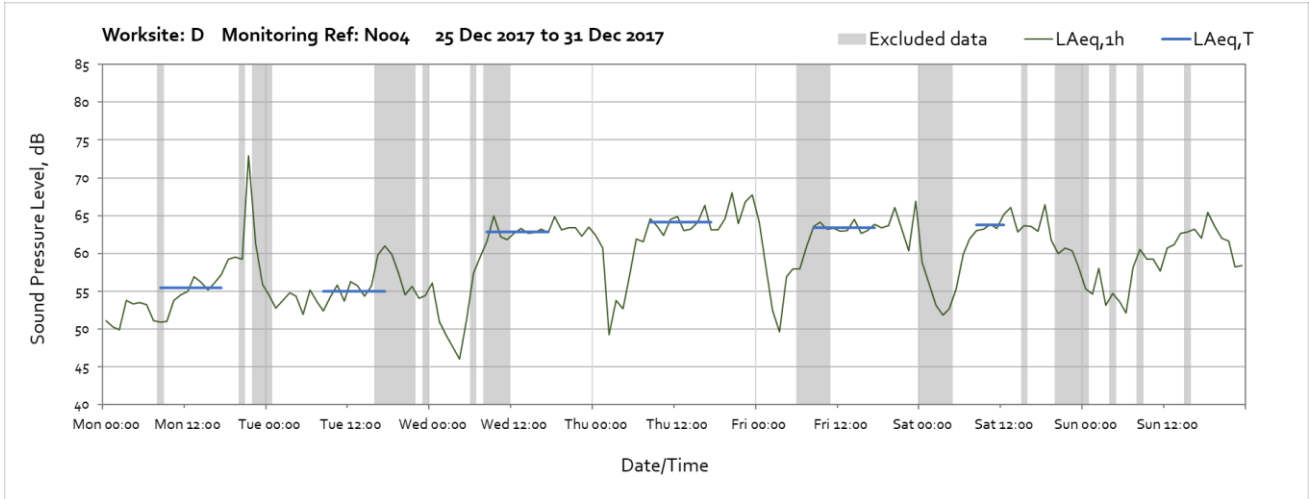




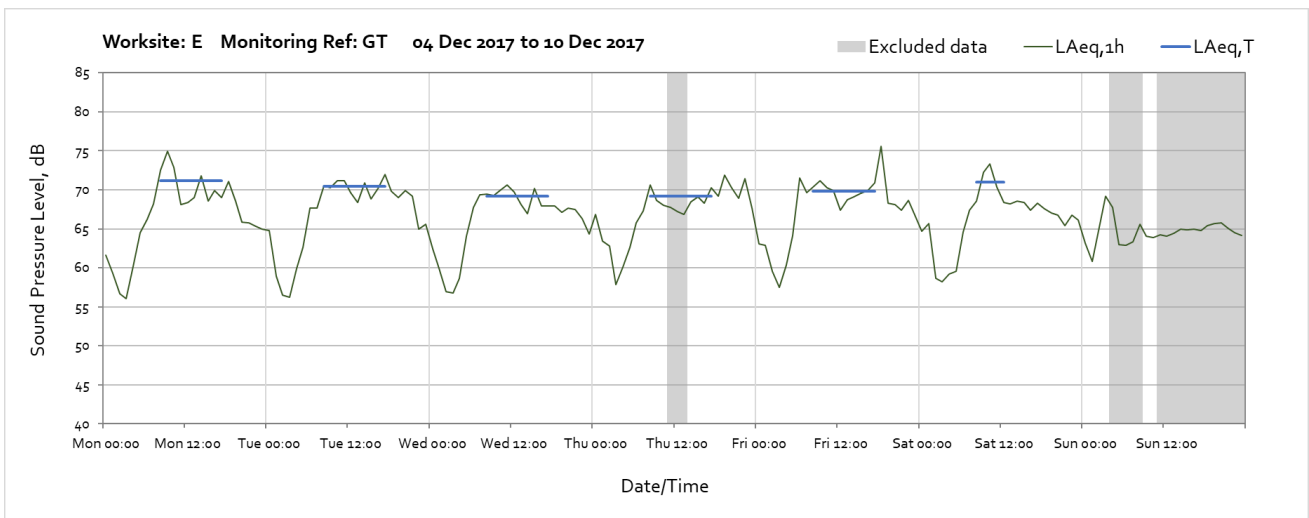
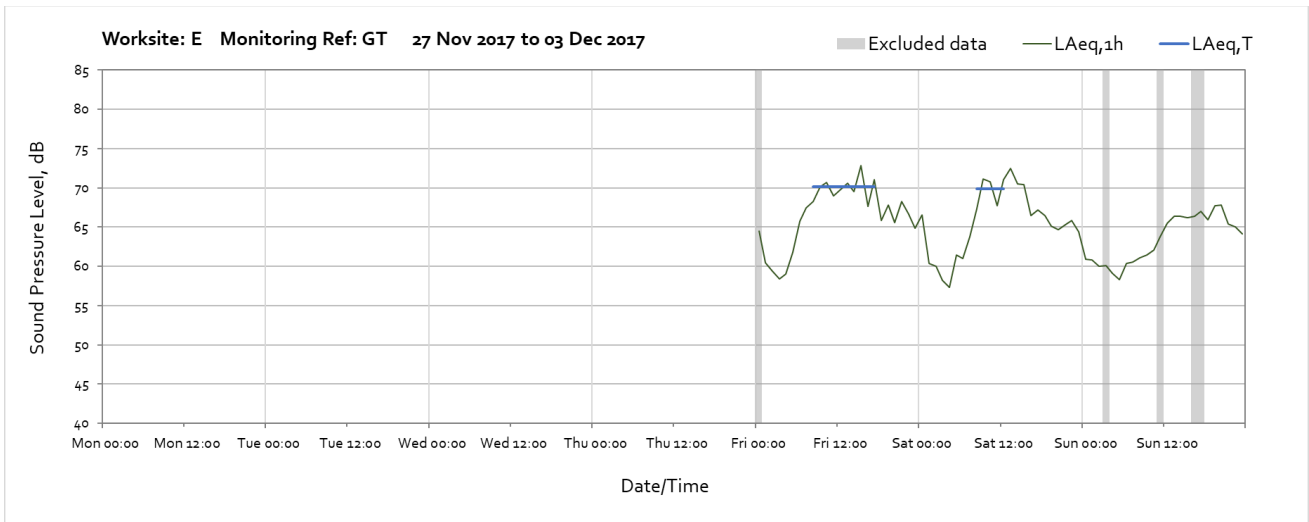
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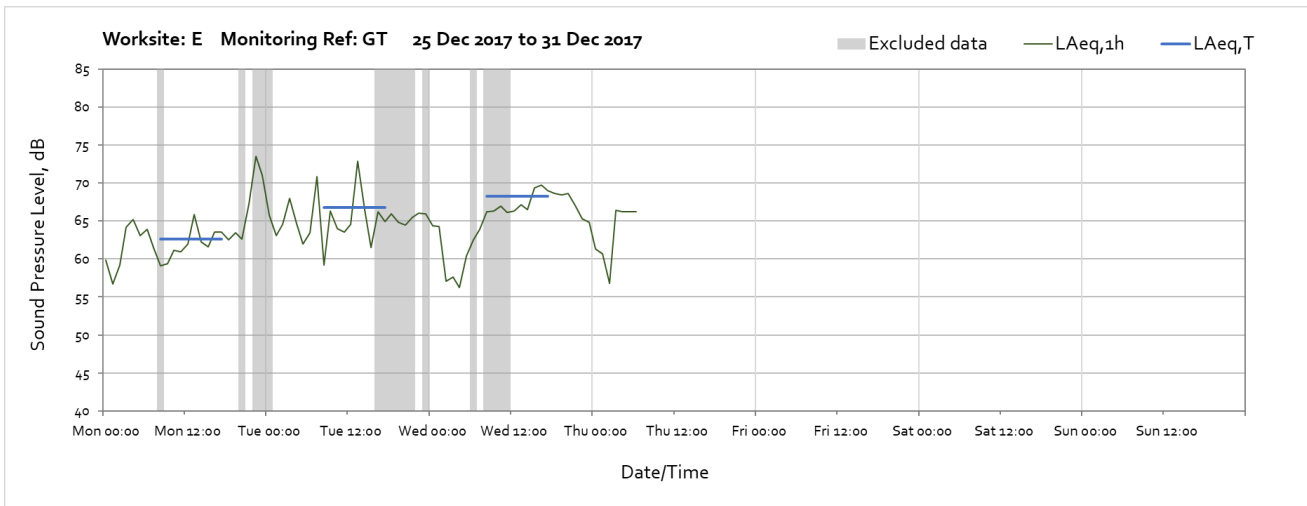
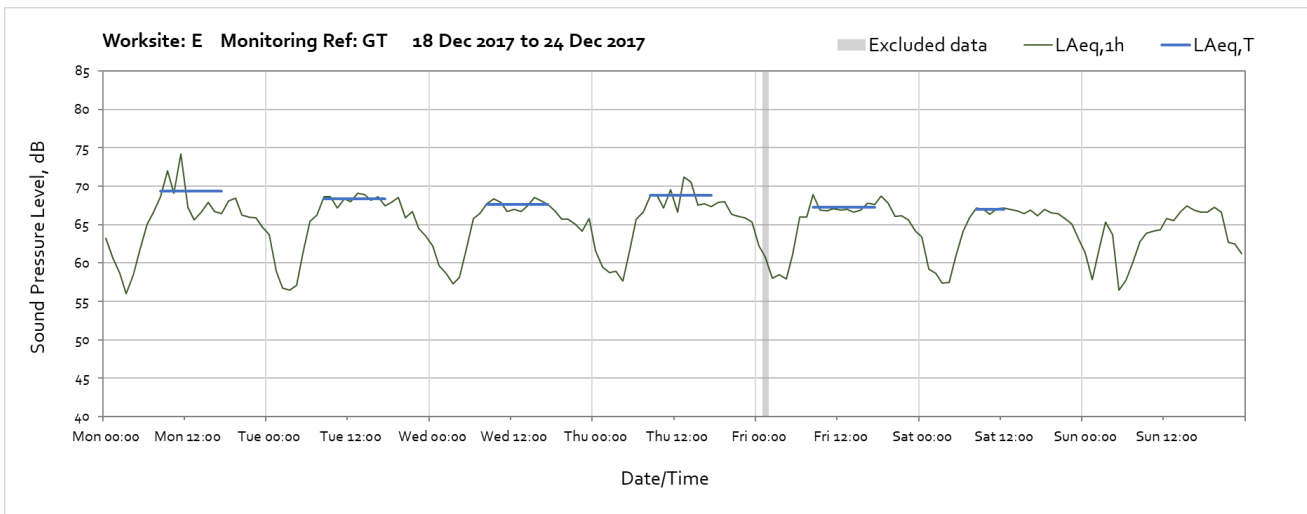
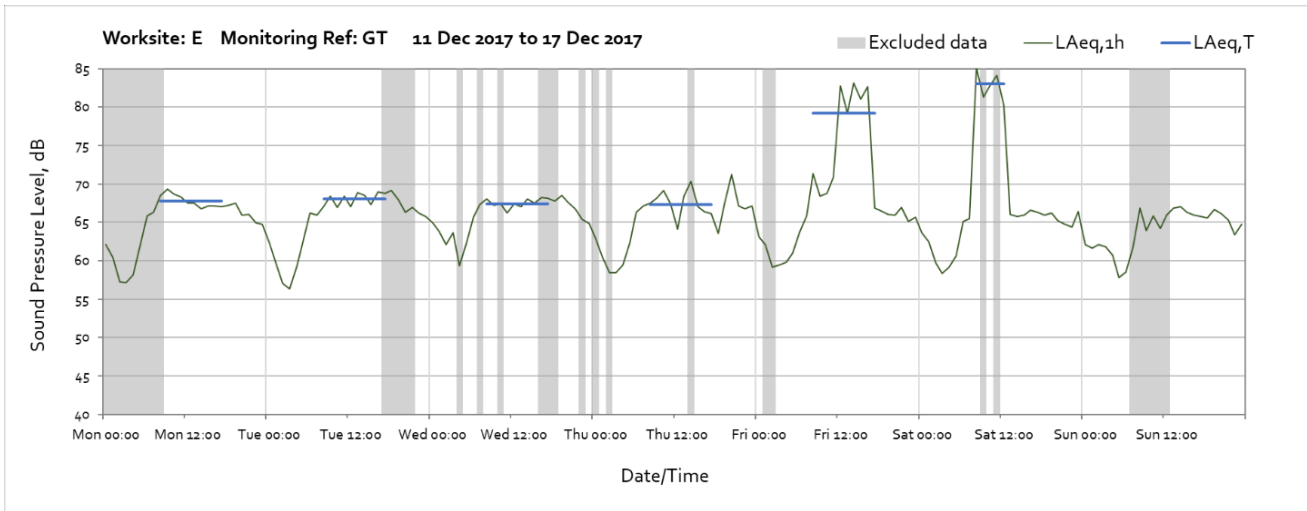




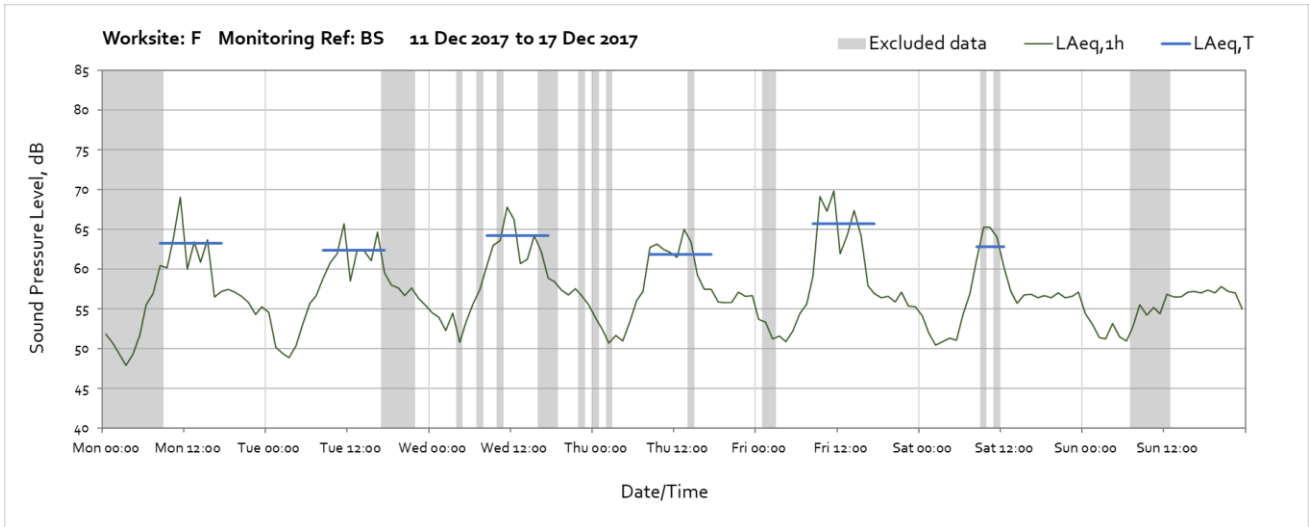
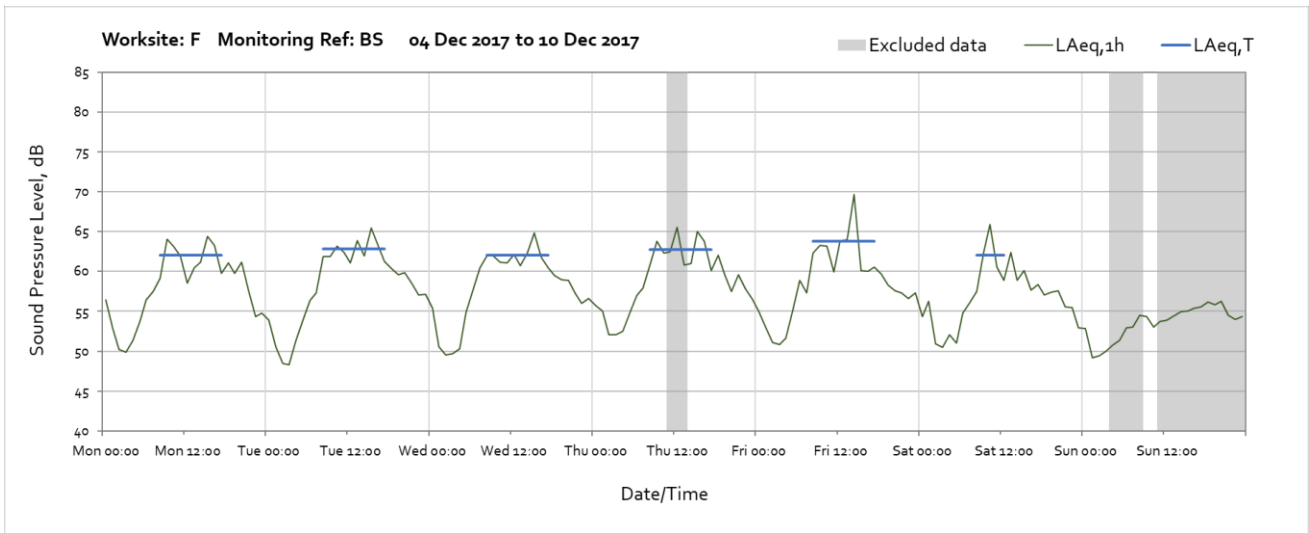
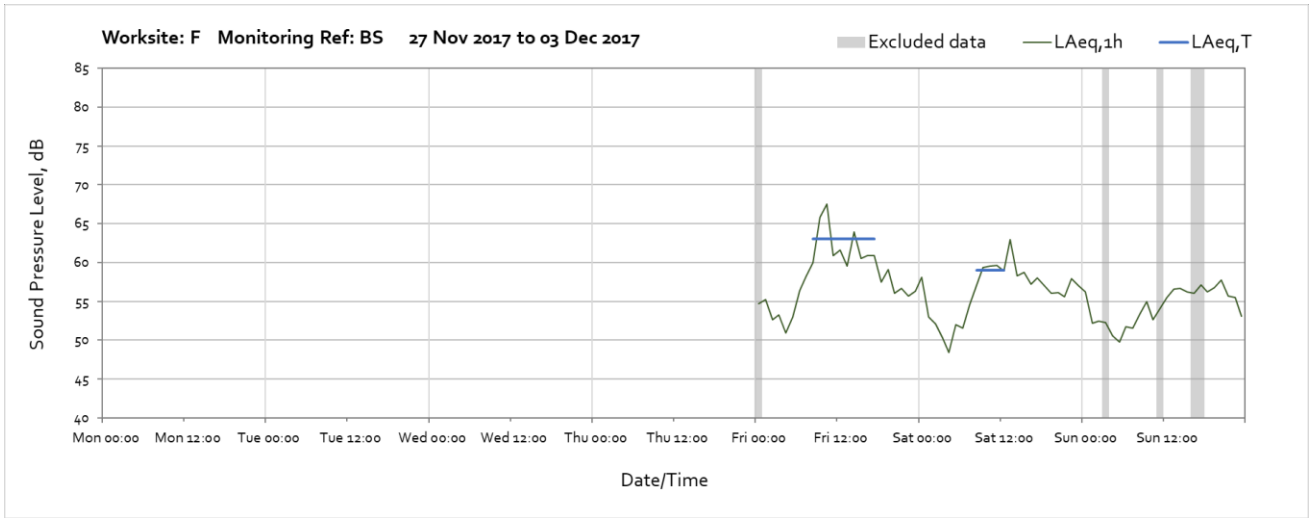


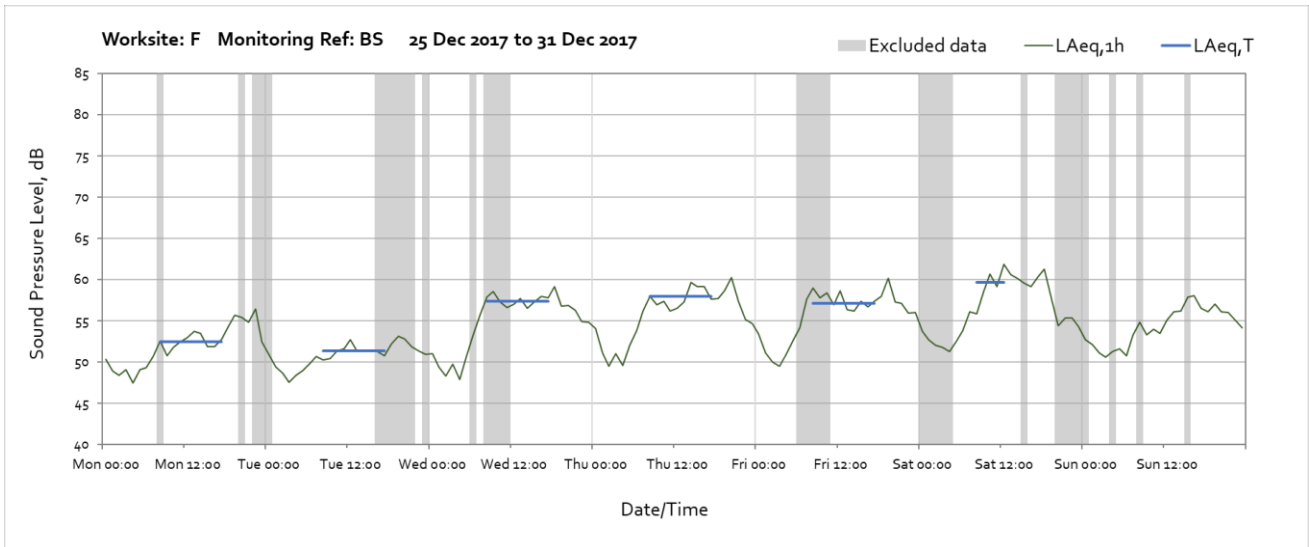
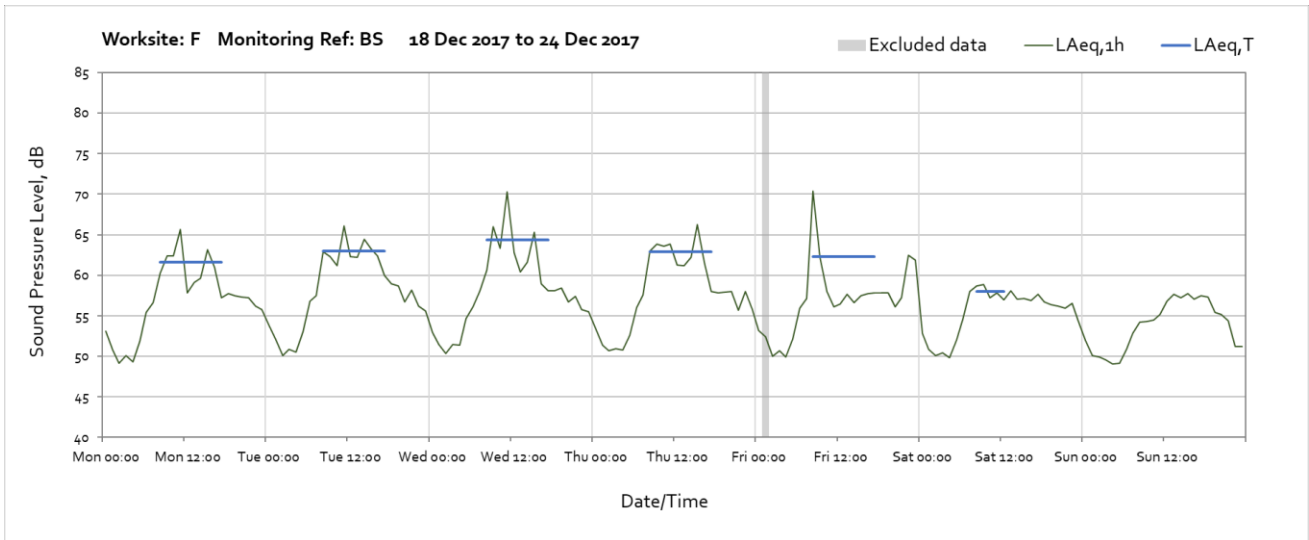
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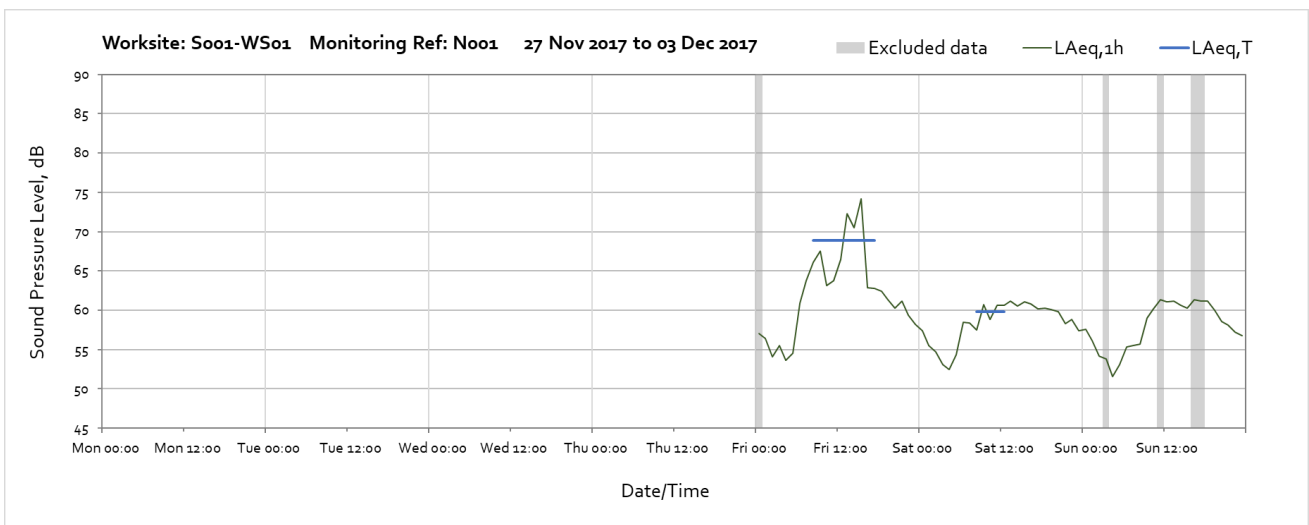


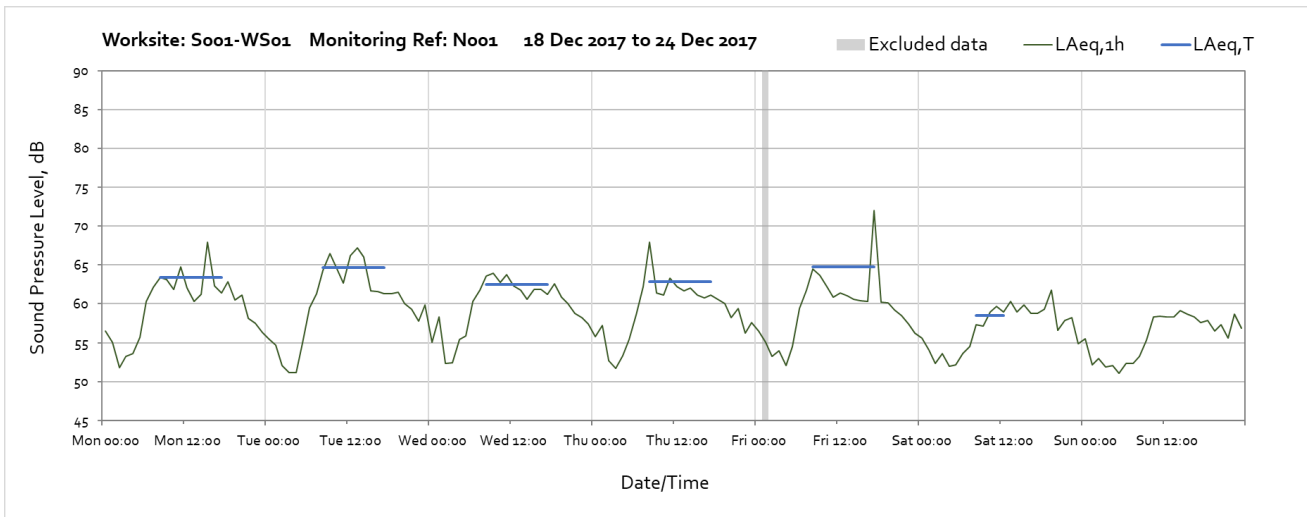
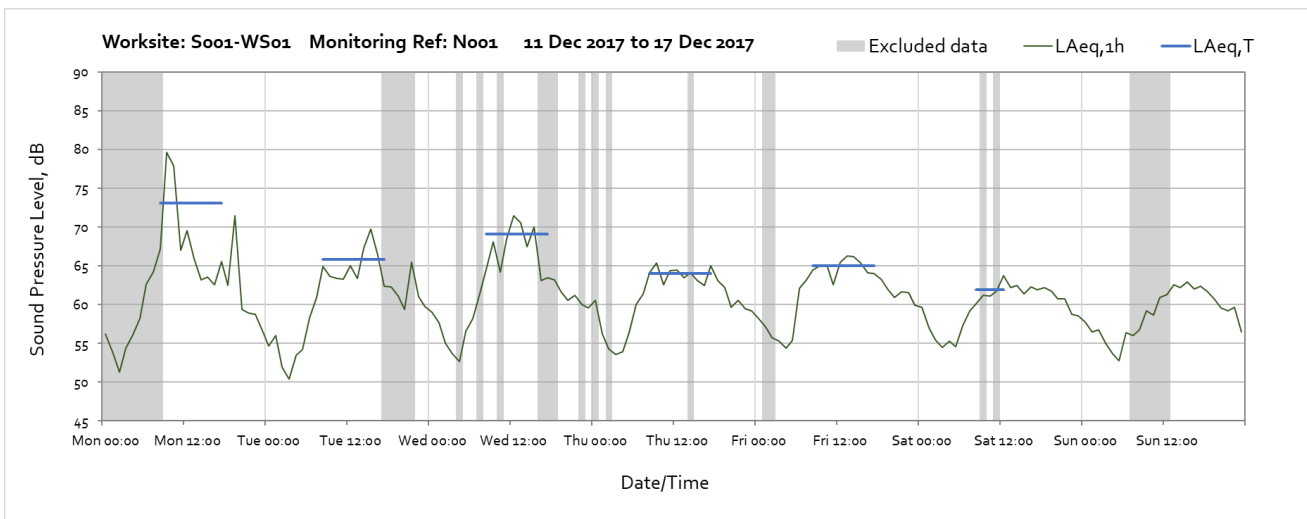
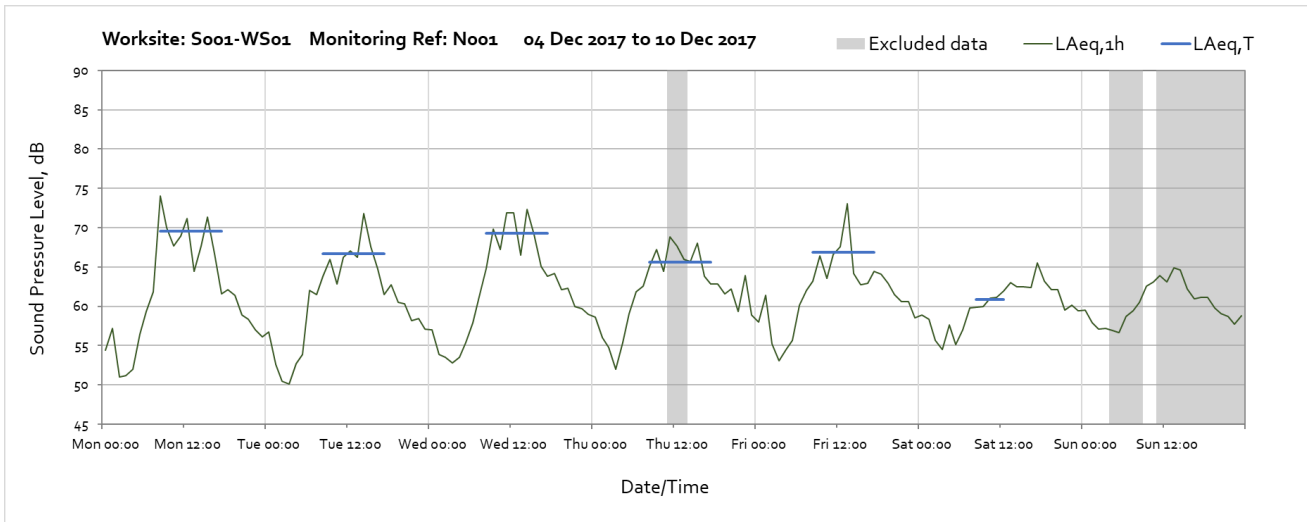
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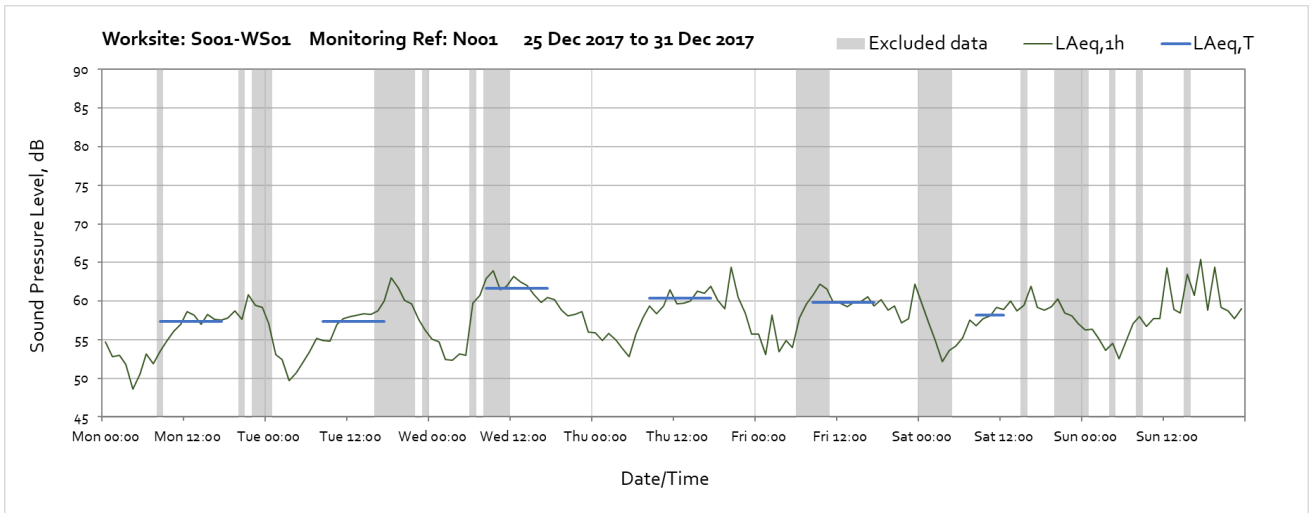




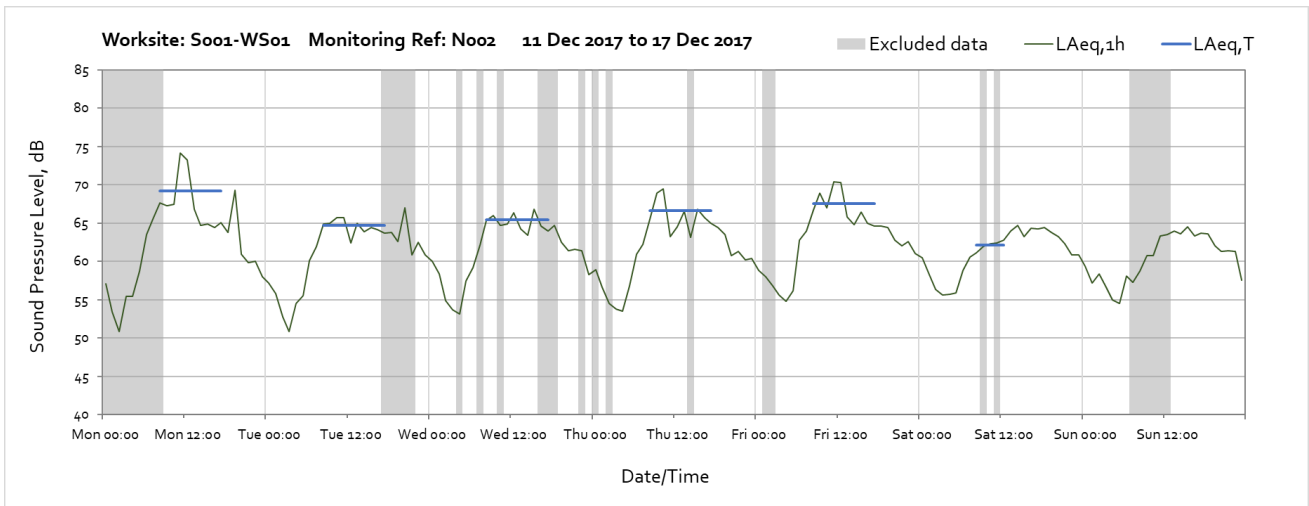
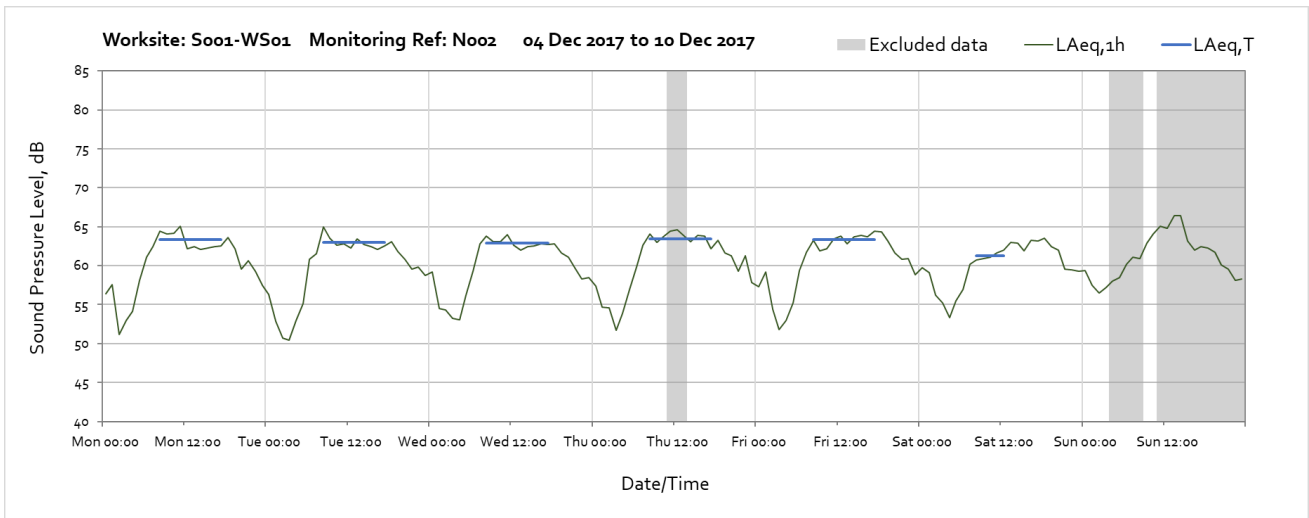
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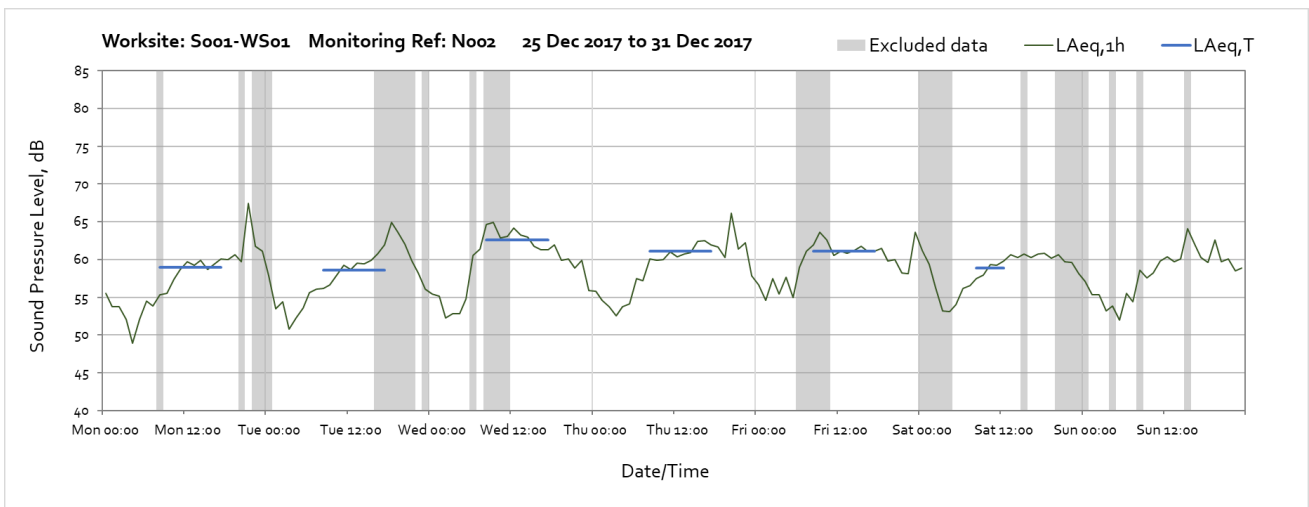
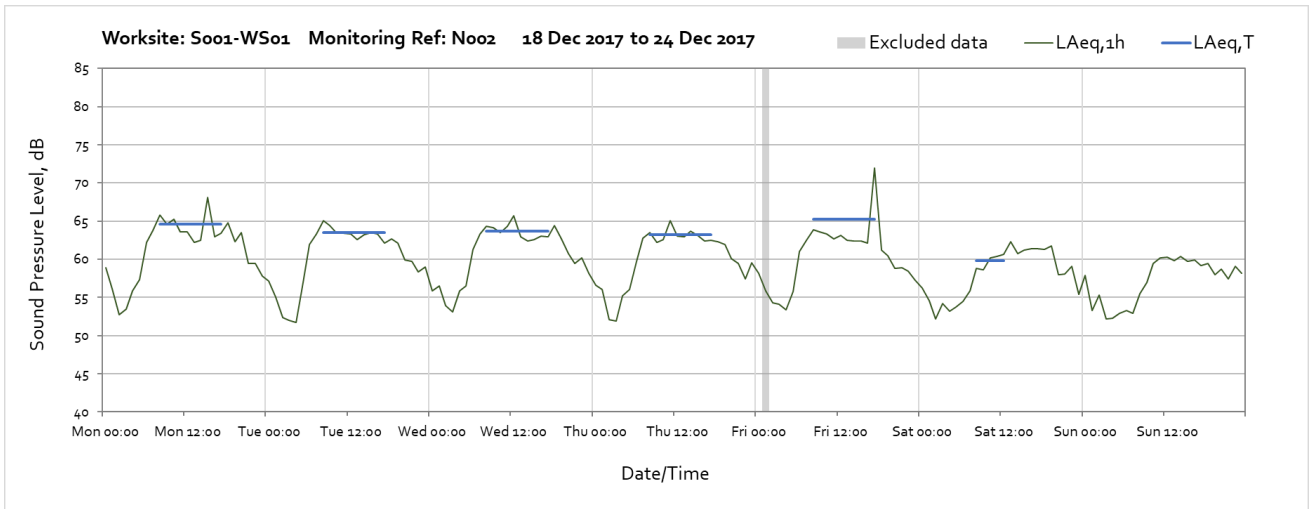




## Worksite: S001-WS01 – Monitoring Ref: N002







## Worksite: S001-WS01 – Monitoring Ref: N003

