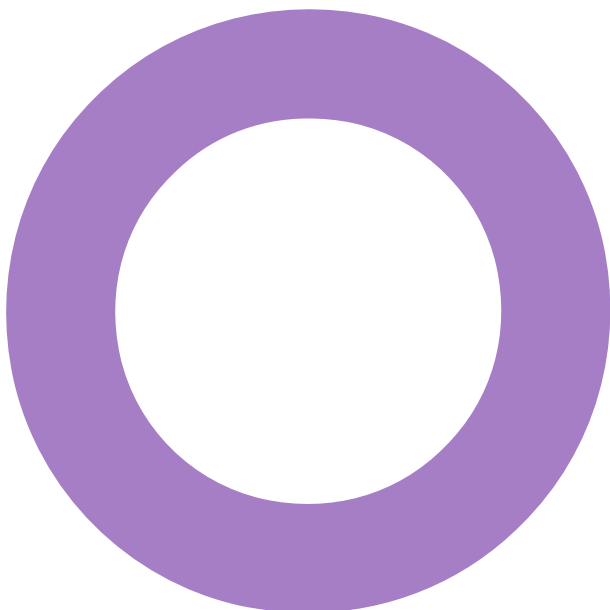


MMU John Dalton Tower. Manchester. MMU.

ACOUSTICS

ACOUSTIC PLANNING REPORT

REVISION 00 – 06 OCTOBER 2020



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	06/10/2020	Initial issue	LR	PM	PM

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Executive summary.

Hoare Lea Acoustics have been appointed by MMU to carry out an environmental noise survey and noise impact assessment in relation to the proposed new hydrogen storage tank on the roof of John Dalton Tower, within the All Saints campus in Manchester city centre.

An environmental noise survey has been carried out and a noise egress assessment undertaken in accordance with BS4142:2014/Manchester City Council requirements. The survey was carried out between 4 September and 8 September 2020.

The representative background noise levels at the nearby sensitive receptors were $L_{A90,15min}$ 60 dB during the daytime (07:00 to 23:00 hrs) and $L_{A90,15min}$ 52 dB at night-time (23:00 to 07:00 hrs).

Based on Manchester City Council criteria, all plant, equipment and machinery associated with the development shall be controlled to ensure that the overall sound pressure levels at 1 m from the façade of the nearest noise sensitive premises (Cambridge Halls) do not exceed $L_{Aeq,T}$ 55 dB during the daytime (07:00 to 23:00 hrs) and $L_{Aeq,T}$ 47 dB during the night-time (23:00 to 07:00 hrs). If the plant contains any tonal characteristics a further correction will be required.

As the hydrogen storage tank plant is proposed to only generate significant levels of noise during emergency operation, it is proposed that a 10 dB relaxation to these limits apply assuming a suitable testing regime is developed.

This approach would need to be confirmed as acceptable with Manchester City Council.

1. Introduction.

Hoare Lea Acoustics have been appointed by MMU to carry out an environmental noise survey and noise impact assessment in relation to the proposed new hydrogen storage tank on the roof of John Dalton Tower, within the All Saints campus in Manchester city centre.

An environmental noise survey has been carried out at the site over 4 days commencing on 4 September 2020. The aim of the survey was to determine the existing noise levels around the site in order to set maximum noise egress limits for plant and machinery associated with the development.

This report presents the findings of the noise survey and sets out the permissible limits for new plant in accordance with Manchester City Council criteria. A discussion on the plant operation and emergency mode plant limits are also proposed.

2. Site and development details.

2.1 Proposals.

A new hydrogen storage tank is proposed to be installed externally on the roof of John Dalton Tower. The proposed plant location is indicated in Figure 1.

2.2 Surrounding area.

The proposed site is located within the MMU All Saints Campus in Manchester City Centre. Student halls of residence and residential apartments surround the site to the north and west, with Dwell student Living considered the closest noise sensitive reception approximately 100 m to the north.

The location of the site in relation to the worst affected nearby premises is shown in Figure 1.

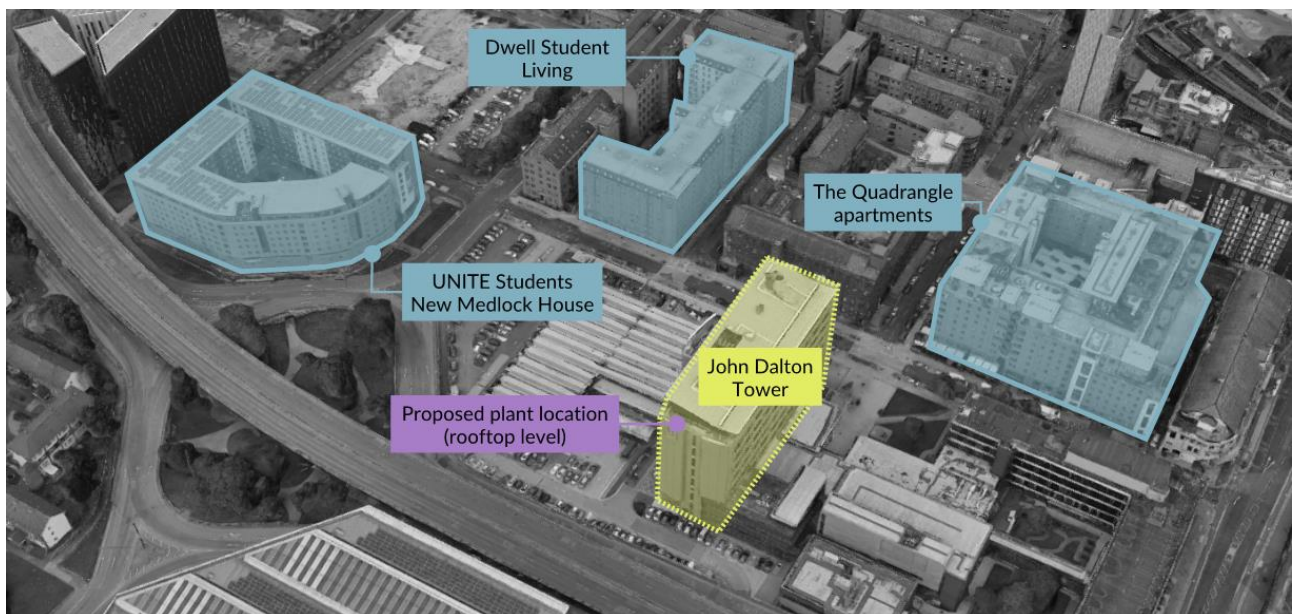


Figure 1 Annotated 3D render image indicating site location (courtesy of Google Earth)

2.3 Local noise climate.

The existing noise levels at the proposed plant location were driven by existing plant located within the MMU campus.

Road traffic along the elevated Mancunian Way carriageways and local road network at ground level were also dominant in the general vicinity of the site.

3. Assessment criteria.

3.1 Manchester City Council Planning Condition 3.

Manchester City Council have set the following condition regarding plant noise control from the proposed scheme:

3) a) Any externally mounted ancillary equipment, plant and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location.

Prior to the first operation of the equipment a scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site.

b) Notwithstanding condition 2 and the above part a, prior to first operation of the equipment (excluding testing) a verification report will be required, to be submitted to and approved in writing by the City Council as local planning authority, to validate that the work undertaken confirms to the above noise criteria. The report shall give the results of post-completion testing to confirm that the proposed noise limits are being achieved once the equipment and any mitigation measures have been installed. Any instances of non-conformity with the above criteria shall be detailed along with any measures required to ensure compliance.

3.2 BS 4142:2014 guidance.

The general principle of the BS 4142 assessment criteria is that noise nuisance can be avoided provided there is no significant change in the prevailing background noise conditions at any surrounding noise sensitive premises once the new equipment is operational.

Where the assessment indicates that the noise rating level of new plant would be 10 dB or greater above the background noise level, the standard judges that sound to be of significant adverse impact.

A difference of 5dB is considered to result in adverse impact. Where the rating noise level of the plant is equal to or below background noise, there is likely to be low impact.

Further corrections should be applied if the plant noise contains tonal, intermittent and/or impulsive characteristics. The magnitude of these corrections is dependent upon the subjective perceptibility of the tones/impulses present.

3.3 Emergency plant.

It may be acceptable to allow a relaxation for noise emissions from plant which is to operate for emergency purposes only (eg, standby generators). It is commonly accepted for a 10 dB relaxation to be applied to such plant on the basis that a testing regime is developed to ensure that the emergency plant only operates for testing purposes during typical weekday working hours (ie, 09:00 - 17:00).

4. Environmental noise survey.

The environmental noise survey was carried out on site over a period of 4 days between 4 September 2020 and 8 September 2020. During this time, long-term unattended measurements were carried out. Full details of the method and equipment used, as well as weather information are provided in Appendix A.

The survey measurement position is indicated in the annotated aerial photograph in Figure 2, indicated as Position L1.

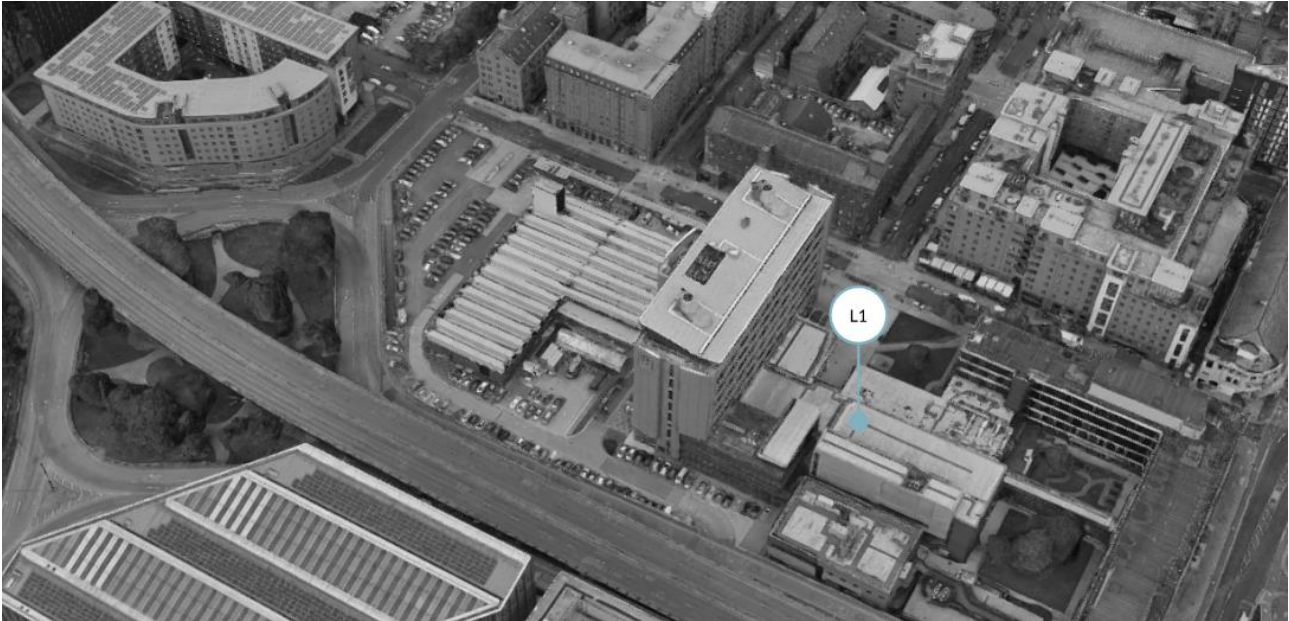


Figure 2 Aerial photograph indicating measurement position (courtesy of Google Earth)

4.1 Unattended measurement results

The results of the unattended noise measurements are presented to follow. A graph showing the results from the unattended logging survey are provided in Appendix B.

Table 1 Ambient noise levels measured during unattended measurements at Position L1

Date	Day time (07:00-23:00)	Night time (23:00 - 07:00)
	$L_{Aeq,16hr}$ (dB)	$L_{Aeq,8hr}$ (dB)
04/09/2020	63 ^[1]	59
05/09/2020	63	59
06/09/2020	62	59
07/09/2020	64	59
08/09/2020	64 ^[1]	-

[1] – Measurement not made over full period.

In line with BS 4142:2014, for the purpose of analysis and establishing representative background noise levels during the periods of interest, the background noise levels have been quantified using statistical analysis from the continuous logging measurements. These are presented in Appendix C.

From the analysis carried out, the representative background noise levels measured during the survey were as follows:

- Daytime (07:00 - 23:00) - $L_{A90,15min}$ 60 dB
- Night-time (23:00 - 07:00) - $L_{A90,15min}$ 52 dB.

These levels are based on the 20th percentile of measured background noise levels.

5. Plant noise egress.

5.1 Proposed plant scheme.

The proposed hydrogen storage tank unit is understood not to generate noise during normal operation. From correspondence with the Mechanical Engineer, it is understood that noise shall be generated only during pressure discharge, to alleviate internal pressure in an emergency.

The quoted figure at the operational pressure ratios for the proposed unit for the pressure discharge release is L_p 89 dB @ 30m from the discharge flue. Due to the operational requirement to quickly dissipate the stored hydrogen into the atmosphere, the stated level provided would rapidly decay as pressure in the tank decreases.

The Mechanical Engineer has confirmed that the pressure release mechanism would not require frequent maintenance testing, and that operation of the system as described above would only occur during emergencies.

5.2 Plant noise limits.

5.2.1 Continuous plant.

Based on the criteria set out in MCC planning condition 3 and the noise survey results, the cumulative maximum sound pressure levels for fixed plant, equipment and machinery associated with the development shall not exceed the levels presented in Table 2 at 1 m from the nearest noise sensitive premises.

Table 2 Maximum permissible sound pressure levels at 1m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1m from the nearest noise sensitive premises (L_{Aeq} , dB) *
Daytime 07:00 to 23:00	55
Night 23:00 to 07:00	47

*A further correction would be applicable if the plant contains distinguishing features.

5.2.2 Emergency plant.

In line with the comments in Section 3.3, it is proposed that a 10 dB relaxation apply for the purposes of testing the pressure release system. Based on this, a noise limit of L_{Aeq} 65 dB should apply assuming a suitable testing regime is developed to ensure that it only operates for testing purposes during typical weekday working hours (ie, 09:00 - 17:00).

5.3 Plant assessment and mitigation proposals.

From discussions with the Mechanical Engineer, it is understood that the proposed pressure release valve system can be tested under controlled conditions to provide a gradual release of internal pressure, which would be understood not to generate significant noise levels.

The expected noise levels incident upon the nearest unscreened noise sensitive premises from operation of the pressure release valve system would be in the region of L_p 78 dB, which may be in excess of the above limits depending on the duration of the impulse at full intensity.

Given the safety issues the proposed equipment is intended to address and the specific, limited use of the system in the event of a fire, the proposed plant operation would be considered acceptable on the basis of the testing restrictions set out above, subject to confirmation from Manchester City Council.

Appendix A: Survey and equipment details.

Unattended noise measurements were carried out between 12:50 on 4 September 2020 and 15:05 on 8 September 2020.

Prior to commencement of the unattended survey, a subjective assessment of the noise climate was undertaken and compared to that of the immediate vicinity of the nearby residential premises. The chosen logger position at position L1 was deemed to be representative of the noise levels at the nearest noise sensitive premises.

The microphone was fitted with a windshield. The meter was calibrated before and after the survey and no significant drift was noted.

Equipment details.

Table B1 summarises the details of the equipment used during the environmental noise survey. All equipment used was within dates of calibration and calibration certificates are available on request.

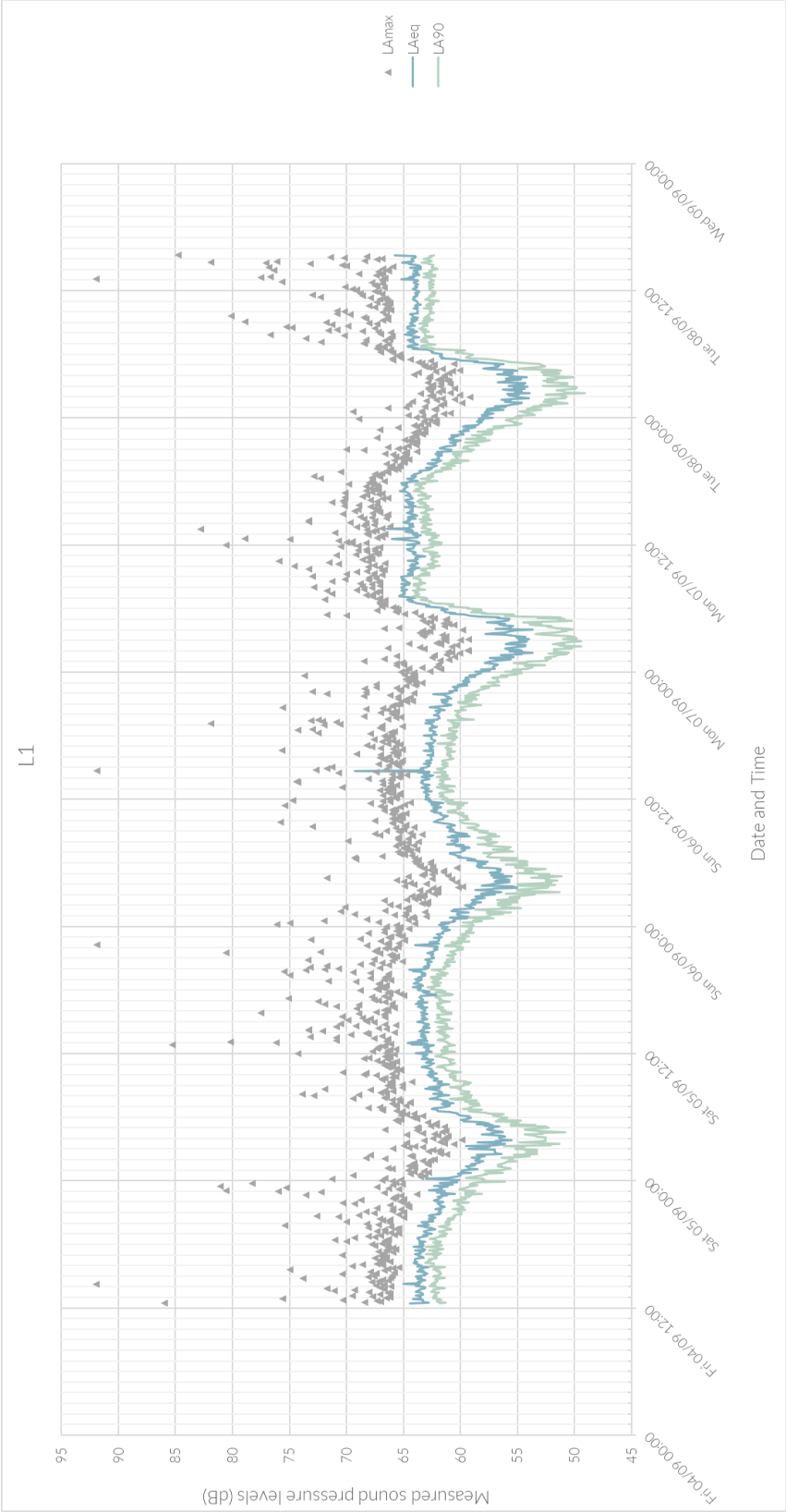
Table B1 Equipment used during environmental noise survey

Item	Description	Serial Number	Calibration Date
Unattended sound level meter	Rion - Microphone: UC-59 Rion - Pre-amplifier: NH-25 Rion - Sound Level Meter: NL-52	16798 32190 00732162	02/03/2020

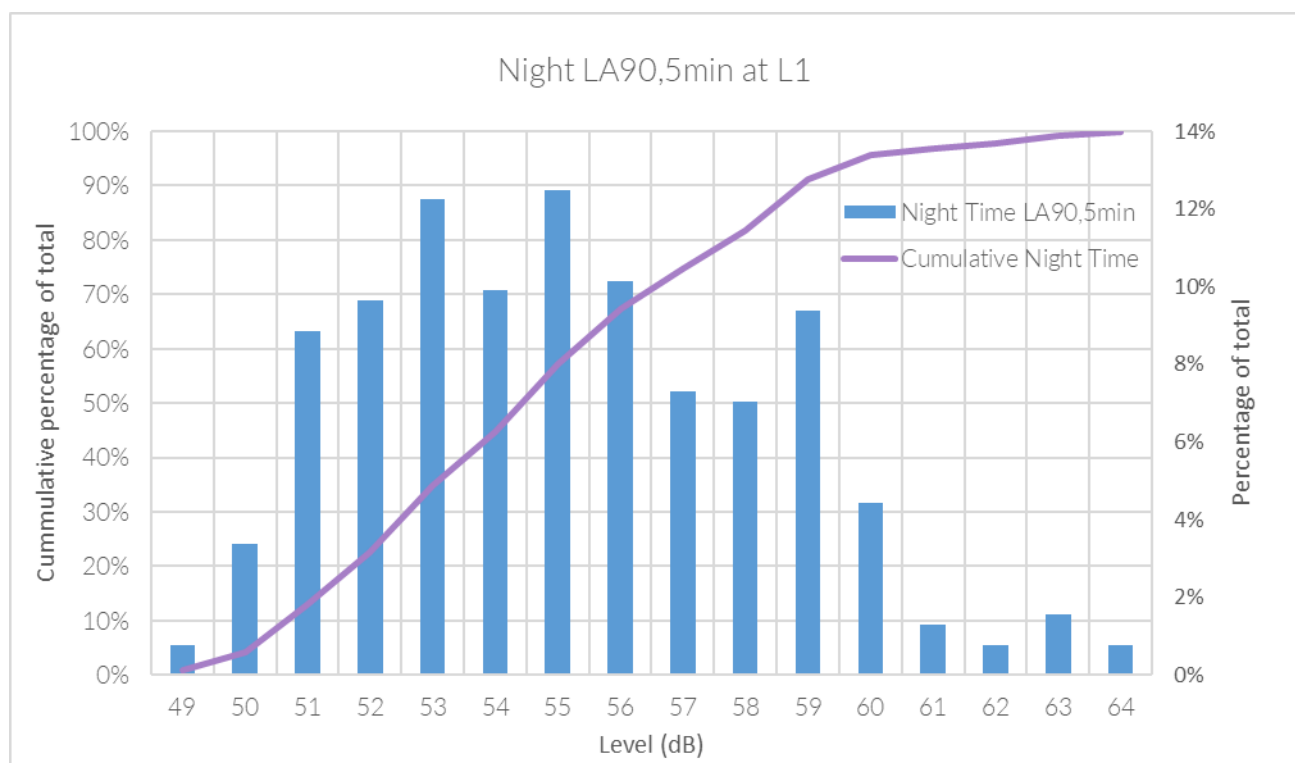
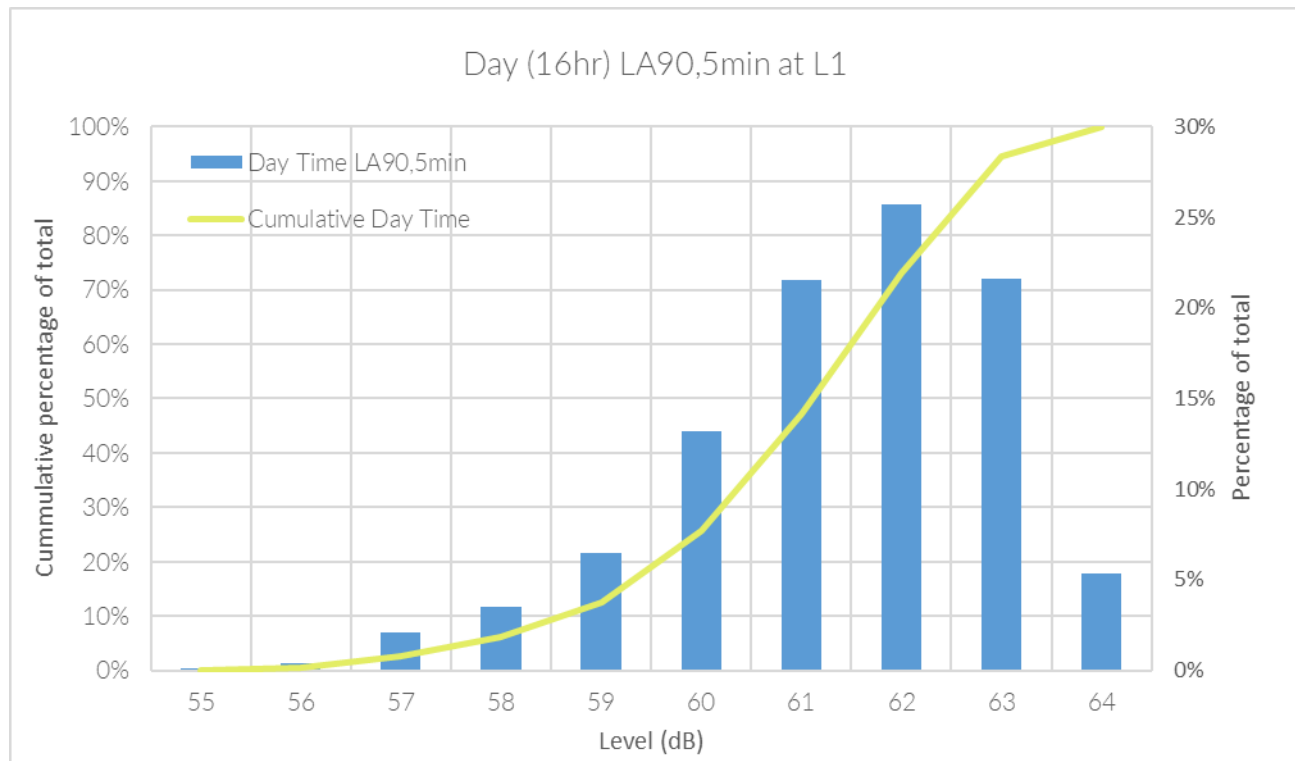
Weather information.

Weather reports for the area indicate that temperatures ranged between 10 °C to 22 °C. Wind speeds and rain and not expected to contribute adversely, therefore the measured data is considered suitable as being representative of typical conditions.

Appendix B: Time history of unattended measurements.



Appendix C: Statistical analysis of background sound levels.





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