



Cascades Leisure Centre

Noise Impact Assessment Report

On behalf of **Gravesham Borough Council**

Project Ref: 332410895 | Rev: 0 | Date: November 2022

Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address: 61 Oxford Street, Manchester, M1 6EQ
T: 0161 245 8900 E: Manchester.UK@Stantec.com

Stantec Document Classification: Stantec Internal

Document Control Sheet

Project Name: Gravesham Leisure Centre

Project Ref: 332410895

Report Title: Noise Impact Assessment Report

Doc Ref: ACO/REP/01

Date: November 2022

	Name	Position	Signature	Date
Prepared by:	Jameson Musyoki	Consultant Acoustician	JM	November 2022
Reviewed by:	Paul Taylor	Associate Acoustician	PT	November 2022
Approved by:	Gary Heard	Director	GH	November 2022
For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved

This report has been prepared by Stantec UK Limited ('Stantec') on behalf of its client to whom this report is addressed ('Client') in connection with the project described in this report and takes into account the Client's particular instructions and requirements. This report was prepared in accordance with the professional services appointment under which Stantec was appointed by its Client. This report is not intended for and should not be relied on by any third party (i.e. parties other than the Client). Stantec accepts no duty or responsibility (including in negligence) to any party other than the Client and disclaims all liability of any nature whatsoever to any such party in respect of this report.

Contents

1	Introduction.....	1
1.1	Background	1
1.2	Scope of Report.....	1
1.3	Site Description and Location.....	2
2	Assessment Criteria.....	3
2.1	Local Policy	3
2.2	National Policy	4
2.3	British Standards	6
2.4	Guidelines.....	8
2.5	Proposed Assessment Criteria.....	9
3	Environmental Sound Survey	10
3.1	Procedure	10
3.2	Measurement Location	10
3.3	Meteorological Conditions	11
4	Environmental Sound Survey Results	12
5	Change in Road Traffic Noise Levels	13
5.1	Purpose of Assessment	13
5.2	Calculation Procedure	13
5.3	Results of Assessment.....	13
6	Plant Noise Emission Limits	15
6.2	Proposed Plant Noise Emission Limits.....	15
7	Conclusions	16

Figures

Figure 1.1: Site Location Plan	2
Figure 3.1: Environmental Sound Measurement Location	10

Tables

Table 2.1: Magnitude of Change and Description of Effect at a Receptor with High Sensitivity.....	8
Table 2.2: Change in Road Traffic Noise Level Criteria	9
Table 3.1: Meteorological Conditions	11
Table 4.1: Summary of Measured Environmental Sound Survey Results	12
Table 5.1: Change in Road Traffic Noise levels	13
Table 6.1: Proposed Plant Noise Emission Limits	15

Appendices

Appendix A	Acoustic Terminology
Appendix B	Equipment Calibration Information
Appendix C	Time History Graph and Histogram
Appendix D	Road Traffic Flow Data

1 Introduction

1.1 Background

- 1.1.1 Stantec (UK) Ltd has been commissioned by Gravesham Borough Council to undertake a noise impact assessment in relation to the proposed redevelopment of the Cascades Leisure Centre, Gravesham.
- 1.1.2 An environmental sound survey has been undertaken by Stantec, to establish the existing environmental sound levels at a position considered representative of the nearest noise sensitive receptors.
- 1.1.3 The results of the environmental sound survey have been used to establish existing sound levels at the nearest noise sensitive receptors, which form the basis of our assessment.
- 1.1.4 This report presents the relevant results of the environmental sound survey, and details of our assessment.
- 1.1.5 An explanation of the acoustic terminology used in this report is included in **Appendix A**.

1.2 Scope of Report

- 1.2.1 The scope of this report is to:
 - Establish, by means of a detailed daytime and night-time environmental sound survey, the existing environmental sound levels at locations considered representative of the nearest noise sensitive receptors.
 - Determine relevant plant noise emission criteria based on Local Planning Authority requirements and the results of the environmental sound survey.
 - Determine potential noise impact due to the change in road traffic flows associated with the proposed redevelopment.

1.3 Site Description and Location

- 1.3.1 The proposed development site is located at the existing Cascades Leisure Centre in Gravesham, approximately 3.5 km south-east from Gravesend town centre and falls within the jurisdiction of Gravesham Borough Council.
- 1.3.2 The site is currently used as a leisure centre which includes gym and pool facilities. The site is bound by Gravesend Golf Centre to the north, south and east and Thong Lane to the south and west.
- 1.3.3 The location of the site is indicated in **Figure 1.1**.

Figure 1.1: Site Location Plan



Image courtesy of Maxar, Microsoft, OS, Esri, HERE, Garmin and GeoTechnologies Inc.

2 Assessment Criteria

2.1 Local Policy

Gravesham Local Plan Core Strategy

- 2.1.1 The Gravesham Local Plan Core Strategy (September 2014) states the following in relation to noise.

Policy CS19: Development and Design Principles:

“New development will be visually attractive, fit for purpose and locally distinctive. It will conserve and enhance the character of the local built, historic and natural environment, integrate well with the surrounding local area and meet anti-crime standards. The design and construction of new development will incorporate sustainable construction standards and techniques, be adaptable to reflect changing lifestyles, and be resilient to the effects of climate change. This will be achieved through the criteria set out below:

[...]

avoid adverse environmental impacts from pollution, including noise, air, odour and light pollution, and land contamination; and

[...]”

Draft Development Management Policies Document (Part 2, October 2022)

- 2.1.2 Gravesham Borough Council published Part 2 of the Local Plan *Part 2: Draft Development Management Policies Document* in October 2020. Within the document, Gravesham Borough Council sets out the approach to implement Core Strategy Policy CS19. The Proposed Text relating to noise and vibration is set out in Section 10.5, Paragraphs 10.5.3, 10.5.5 and 10.5.6 state the following:

“10.5.3: New development should not create unacceptable impacts on health and quality of life as a result of noise or vibration during both construction and operational phases and cumulatively with other development. [...]

10.5.5: localised noise from plant and machinery and equipment such as air conditioning units and kitchen extractor fans can cause disturbance to neighbours. Shops, restaurants, pubs and places of entertainment also have the potential to create noise disturbance to nearby residents both from the premises themselves and those entering and leaving.

10.5.6: the starting point should be to minimise noise generation and vibration at source where this is possible.”

- 2.1.3 Policy AM5: Noise and Vibration states the following which relates to the proposed development.

“10.5.9: Proposals for development generating noise and/or vibration that may impact upon sensitive receptors or be impacted on by existing or potential sources of noise and/or vibration must be supported by a noise/vibration

assessment prepared by a suitably qualified person in accordance with best practice.

10.5.10: The assessment will be required to demonstrate in full that either the noise and/or vibration impacts are acceptable without mitigation or how impacts will be mitigated through design or other means to make them acceptable and how those measures will be delivered.

10.5.11: Planning permission will only be granted where:

- In the case of development that may generate noise or vibration, that resulting impacts on sensitive receptors due to noise and/or vibration are acceptable both during the construction and operational phases of the development and in combination with other sources of noise and/or vibration.”*

2.2 National Policy

The National Planning Policy Framework (NPPF)

2.2.1 The revised National Planning Policy Framework (NPPF) was published in July 2021. In respect of noise, paragraph 174 states that in relation to conserving and enhancing the natural environment:

“Planning policies and decisions should contribute to and enhance the natural and local environment by...

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of ... noise pollution...”

2.2.2 In relation to ground conditions and pollution, paragraph 185 states that:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life;*
- identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason...”*

2.2.3 In relation to the integration of new development with existing premises and community facilities, paragraph 187 states that:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new

development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

- 2.2.4 The NPPF indicates that the Noise Policy Statement for England (NPSE) should be used to define the "significant adverse impacts".

Planning Practice Guidance

- 2.2.5 The Planning Practice Guide (PPG) was launched in 2014 (with the latest update being in 2019) and provides additional guidance and interpretation to the Government's strategic policies outlined within the NPPF in a regularly updated, web-based resource.
- 2.2.6 The PPG provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the no observed effect level (NOEL) and, as exposure increases, the lowest observed adverse effect level (LOAEL) and significant observed adverse effect level (SOAEL).
- 2.2.7 As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.
- 2.2.8 Exposure to noise above the LOAEL is described in PPG (Paragraph: 005 Reference ID: 30-005-20190722) as:

"...noise starts to cause small changes in behaviour and/or attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise)."

- 2.2.9 Exposure to noise above SOAEL is described as:

"...noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is predicted to be above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan-making stage, or by use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused."

Noise Policy Statement for England

- 2.2.10 The Noise Policy Statement for England (NPSE) was published in March 2010 and clarifies the underlying principles and aims of existing policy documents that relate to noise. It also sets out the long-term vision of Government noise policy which is: "to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".
- 2.2.11 The NPSE states that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and its effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.
- 2.2.12 Paragraphs 2.20 and 2.21 define 'significant adverse' and 'adverse' impacts as applied to noise as follows:

“There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.”

- 2.2.13 It is necessary to define the LOAEL and SOAEL for the potential source of noise to relate the potential impact to the aims and requirements of the NPSE.

2.3 British Standards

British Standard 4142:2014 + A1 2019 ‘Methods for Rating and Assessing Industrial and Commercial Sound’

- 2.3.1 British Standard 4142:2014 + A1 2019 “Methods for rating and assessing industrial and commercial sound” (BS4142) describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in the standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.
- 2.3.2 The standard is used to determine the rating levels for sources of sound of an industrial and/or commercial nature and the ambient, background and residual sound levels at outdoor locations. These levels could be used for the purposes of investigating complaints; assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and assessing sound at proposed new dwellings or premises used for residential purposes. However, the determination of noise amounting to a nuisance is beyond the scope of the standard.
- 2.3.3 The standard should not be used to assess sound from the passage of vehicles on public roads and railway systems; recreational activities; people among other sources; and other sources falling within the scopes of other standards or guidance. The standard cannot be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.
- 2.3.4 The procedure contained in BS 4142 assesses the significance of sound which depends upon the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs/will occur.
- 2.3.5 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level and considering the following:
- Typically, the greater this difference, the greater the magnitude of the impact;

- b. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context; and
 - c. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- 2.3.6 The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
- 2.3.7 Where the initial estimate of the impact needs to be modified due to the context, the following factors should be considered:
 - a. The absolute level of sound, as BS 4142 notes that the magnitude of the overall impact might be greater where the residual sound level is high than for an acoustic environment where the residual sound level is low;
 - b. The character and level of the residual sound compared to the character and level of the specific sound;
 - c. The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions such as:
 - Façade insulation treatment;
 - Ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
 - Acoustic screening.

2.4 Guidelines

Guidelines for Environmental Noise Impact Assessment

- 2.4.1 The IEMA Guidelines for Environmental Noise Impact Assessment 2014 detail an assessment process applicable to a wide range of potential environmental noise sources where a specific assessment method either does not exist or is not considered to be appropriate.
- 2.4.2 The guidelines suggest that by defining the sensitivity of receptors, the change in noise environment as a result of the source under consideration, and considering the type of noise, an assessment of the potential noise impact can be undertaken.
- 2.4.3 Receptors are those aspects of the environment sensitive to changes in baseline conditions. The sensitivity of a particular receptor depends upon the extent to which it is susceptible to such changes. Residential receptors are typically considered to have a high sensitivity.
- 2.4.4 Based on the IEMA guidelines, **Table 2.1** details the relative change in sound level and the corresponding magnitude of change at a typical receptor of high sensitivity (e.g. a residential receptor).

Table 2.1: Magnitude of Change and Description of Effect at a Receptor with High Sensitivity

Relative Change in Sound Level	Magnitude of Change	Description of Effect
Greater than 10 dB change	Large	Noticeable and Very Disruptive Very Substantial Impact
5 to 9.9 dB change	Medium	Noticeable and Disruptive Substantial Impact
3 to 4.9 dB change	Small	Noticeable and Intrusive Moderate Impact
2.9 dB or less change	Negligible	Noticeable and Not Intrusive

2.5 Proposed Assessment Criteria

Building Services Plant Noise

- 2.5.1 Based guidance in BS 4142, plant noise emissions should not exceed the measured background sound level.

Change in Road Traffic Noise Levels

- 2.5.2 Change in road traffic noise levels criteria is based on guidance provided within IEMA and shown in **Table 2.2**.

Table 2.2: Change in Road Traffic Noise Level Criteria

Relative Change in Sound Level	Magnitude of Change	Description of Effect
Greater than 10 dB change	Large	Noticeable and Very Disruptive Very Substantial Impact
5 to 9.9 dB change	Medium	Noticeable and Disruptive Substantial Impact
SOAEL		
3 to 4.9 dB change	Small	Noticeable and Intrusive Moderate Impact
LOAEL		
2.9 dB or less change	Negligible	Noticeable and Not Intrusive

3 Environmental Sound Survey

3.1 Procedure

- 3.1.1 An unattended environmental sound survey was undertaken between approximately 12:30 hours on 13 October 2022 and approximately 12:30 hours on 14 October 2022 to determine the typical background sound level at a location representative of the nearest noise sensitive receptor.
- 3.1.2 The survey was undertaken over a 24-hour weekday period. Measurements were made over 15-minute periods of the L_{Aeq} , L_{A90} and L_{AFMax} sound levels.
- 3.1.3 The sound level meter was located in an environmental case. The microphone was connected to the meters via an extension cable and fitted with the manufacturer's windshield.
- 3.1.4 The instrumentation used in the survey (including calibration information) is listed in **Appendix B**.
- 3.1.5 Field calibrations were performed before and after the measurements with no significant fluctuations recorded (< 0.5 dB). Calibration certificates are available upon request.

3.2 Measurement Location

- 3.2.1 Sound measurements were undertaken at a single position at the site. The measurement position is detailed in **Figure 3.1**. The microphone was located in free field conditions to the western boundary of the proposed development site. The microphone was located approximately 1.5 m above ground level at approximately 13 m from Thong Lane.

Figure 3.1: Environmental Sound Measurement Location



Contains public sector information licensed under the Open Government Licence v3.0, Maxar, Microsoft

3.3 Meteorological Conditions

- 3.3.1 Due to the nature of the survey (i.e. unattended), it is not possible to accurately comment on the meteorological conditions throughout the entire survey period. However, based on a review of publicly available weather forecasts and observations at the beginning and end of the survey period, the weather conditions are detailed in **Table 3.1**.

Table 3.1: Meteorological Conditions

Description	13/10/22	14/10/22
Temperature (°C)	14	16
Precipitation (mm)	6	0
Cloud Cover (%)	70	70
Wind Speed (m/s)	1.34	3.6
Wind Direction	NE	NW

- 3.3.2 These conditions are considered suitable for obtaining representative sound level measurements.
- 3.3.3 A small amount of rain was noted to occur between 12:30 hours to 18:00 hours on 13 October 2022 and 08:54 hours to 09:44 hours on 14 October 2022. Sound level measurements during these periods have not been used for the assessment.

4 Environmental Sound Survey Results

4.1.1 A summary of the survey results is provided in **Table 4.1**.

Table 4.1: Summary of Measured Environmental Sound Survey Results

Location	Date	Period, T	Measured Sound Level (dB)	
			L _{Aeq,T}	Typical* L _{A90,T}
LT1	13/10/22 to 14/10/22	Daytime (07:00 – 23:00 hours)	59	38
		Night-time (23:00 – 07:00 hours)	47	34

* Calculated based on the statistical distribution of background sound levels during the measurement period in general accordance with guidance in BS 4142:2014+A1:2019

5 Change in Road Traffic Noise Levels

5.1 Purpose of Assessment

- 5.1.1 The proposed development has the potential to change noise levels on the surrounding road network. The change in traffic levels could result in a change to sound levels experienced at dwellings overlooking the existing road network. The likely effect on the existing sound climate has been calculated in terms of the change in sound levels on the surrounding road network. The change in sound level has been assessed against the criteria outlined in **Table 2.2**, where a change of less than 3 dB is considered to constitute a 'negligible' impact and be 'noticeable and not intrusive'.

5.2 Calculation Procedure

- 5.2.1 The road traffic data used within the assessment has been calculated and provided by applicant's transport consultant, Stantec, and is based on measured and predicted traffic flows provided in **Appendix D**.
- 5.2.2 The impact of changes in road traffic flows and any resultant change in noise levels due to the proposed redevelopment has been determined by evaluating the change in noise level with and without the scheme in the opening year (2028).

5.3 Results of Assessment

- 5.3.1 The change in road traffic noise levels from 2028 without the proposed development to 2028 with the proposed development is shown in **Table 5.1**.

Table 5.1: Change in Road Traffic Noise levels

Link	Change in sound level (dB L _{A10, 18 hr}) (2028 with and without development)
A226 Rochester Road East of junction	< +1
A226 Rochester Road West of junction	
Thong Lane South of A226	
Thong Lane (North of Access In)	
Thong Lane (South of Access In)	
Thong Lane (North of Access Out)	
Thong Lane (South of Access Out)	
Cascades Leisure Centre	
Darnley Lodge Lane West	
A2 Slip Road West	
Halfpence Lane South	
Brewers Road East	
Brewers Road West of Slip	
Brewers Road East of Slip	
A2 Slip Road East	

- 5.3.2 The assessment of the change in road traffic noise with and without development flows is based on criteria shown in **Table 2.2**. The results of the assessment indicate that the change in road traffic noise and impact on nearby noise sensitive receptors is likely to be negligible and unintrusive, and below the LOAEL.

Gravesham Borough Council

6 Plant Noise Emission Limits

6.1.1 Building services plant have not been confirmed at this stage. Therefore, plant noise emission limits for the proposed redevelopment are set as follows.

6.2 Proposed Plant Noise Emission Limits

6.2.1 Based guidance in BS 4142, plant noise emissions should not exceed the measured background sound level.

6.2.2 The plant noise emission limits are proposed in **Table 6.1**. The proposed plant noise emission limits should be achieved at the nearest noise sensitive receptor.

Table 6.1: Proposed Plant Noise Emission Limits

Receptor	Time Period	Proposed Plant Noise Emission Limit (L _{Ar,Tr} dB)
Residential receptors on Thong Lane	Daytime (07:00 – 23:00 hours)	38
	Night-time (23:00 – 07:00 hours)	34

7 Conclusions

- 7.1.1 Stantec (UK) Ltd has been commissioned by Gravesham Borough Council to undertake a noise impact assessment in relation to the proposed redevelopment of the Cascades Leisure Centre, Gravesham.
- 7.1.2 An environmental sound survey has been undertaken by Stantec (UK) Ltd, to establish the existing environmental sound levels at locations representative of the nearest noise sensitive receptors.
- 7.1.3 The results of the environmental sound survey have been used to determine background sound levels which form the basis of the target noise criteria.
- 7.1.4 Assessment criteria have been proposed based on the requirements of the Local Planning Authority and applicable guidance documents.
- 7.1.5 The change in noise level due to road traffic noise associated with the proposed redevelopment is likely to be negligible and unintrusive and below the LOAEL.
- 7.1.6 Building services plant noise emission limits criteria have been set to background sound level based on guidance provided within BS 4142:2014+A1:2019.

Appendix A Acoustic Terminology

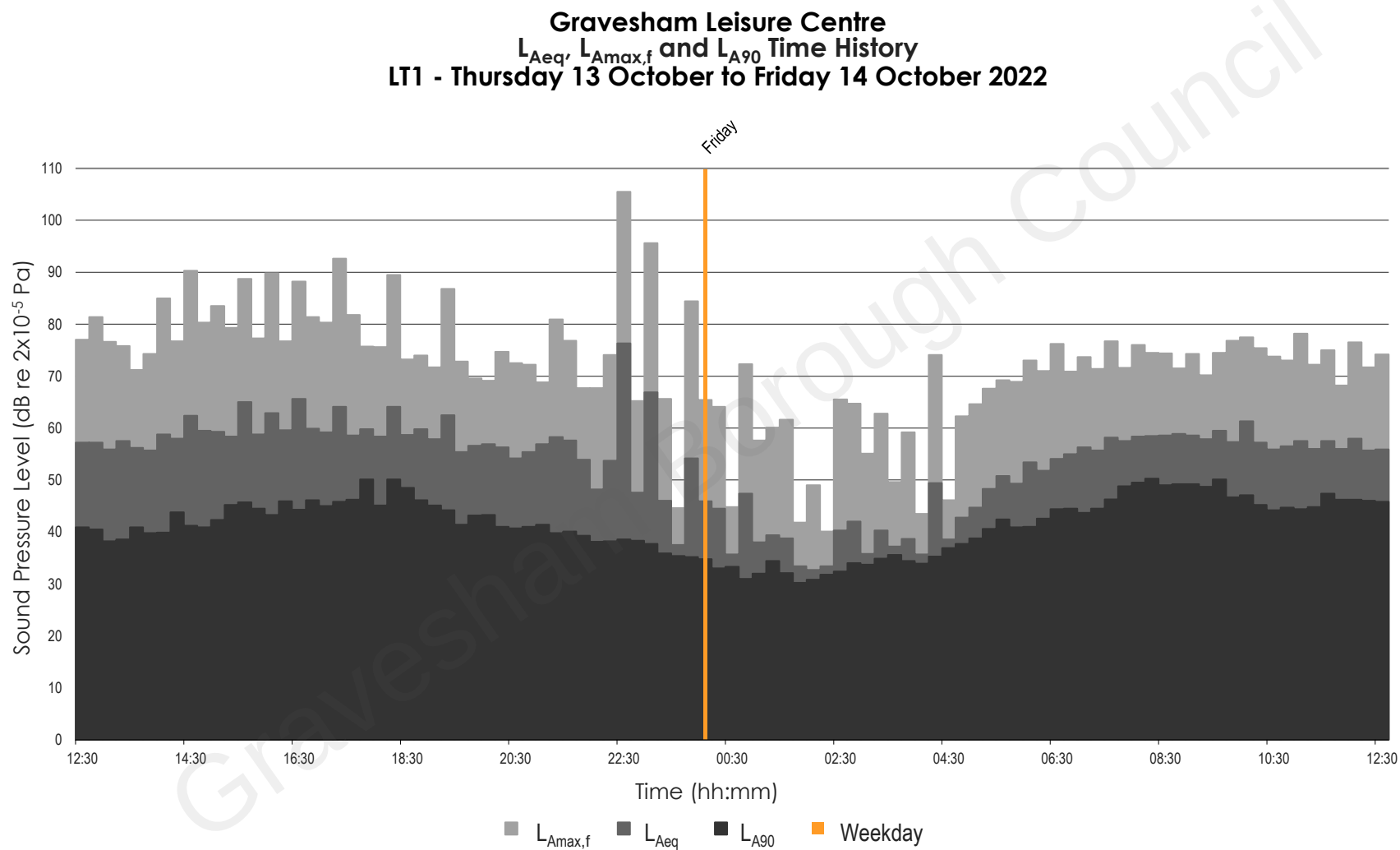
Parameter	Description
Ambient Sound Level ($L_a = L_{Aeq,T}$)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
A-Weighted Decibel (dBA)	A decibel level that has been corrected for the A-Weighting curve.
A-Weighting	Octave band and 1/3 octave band filters that correlate to the response of the human hearing system to sound pressure levels at different frequencies.
Background Sound Level ($L_{A90,T}$)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using a fast time-weighting and quoted to the nearest whole number of decibels.
Decibel (dB)	A logarithmic unit used to describe the ratio between the measured level and a reference level of 0 dB. The ratio can be sound pressure, intensity or power. The reference value for sound pressure is 20 μ Pa and for sound power is 1 ρ W.
Equivalent Continuous A-Weighted Sound Pressure Level ($L_{Aeq,T}$)	Value of the time-averaged A-weighted sound pressure level, in decibels (dB), of a continuous steady sound for the duration of the specified time interval, T.
Façade Level	The sound pressure level at a distance of 1 metre from the façade
Fast Time Weighted	The speed at which the instrument responds to changes in amplitude of the measured signal. The response time of a fast time-weighted instrument is 0.125 seconds.
Free-Field Level	The sound pressure level measured away from any reflective surfaces.
Frequency (f)	The number of cycles of pressure fluctuations within a given period of time. Measured in Hertz.
Hertz (Hz)	The unit of frequency or pitch of a sound. One hertz is equal to one cycle per second.
Octave Band	Band of frequencies where the upper limit of the band is twice the frequency of the lower limit. E.g., the 1000 Hz band contains noise energy at all frequencies from 707 to 1414 Hz.
Percentile Level ($L_{AN,T}$)	The A-Weighted Sound Pressure Level which is exceeded for N% of the specified time interval. E.g., the $L_{A90,1\text{hour}}$ is the A-weighted sound level exceeded for 90% of 1 hour/
Reference Time Interval (T)	Specified interval over which the specific sound level is determined.
Sound Pressure Level (L_p)	The logarithm of the ratio of a given sound pressure (p) to the reference sound pressure (p_0). The reference value for sound pressure is 20 μ Pa. Defined as: $L_p = 20 \log \left(\frac{p}{p_0} \right)$

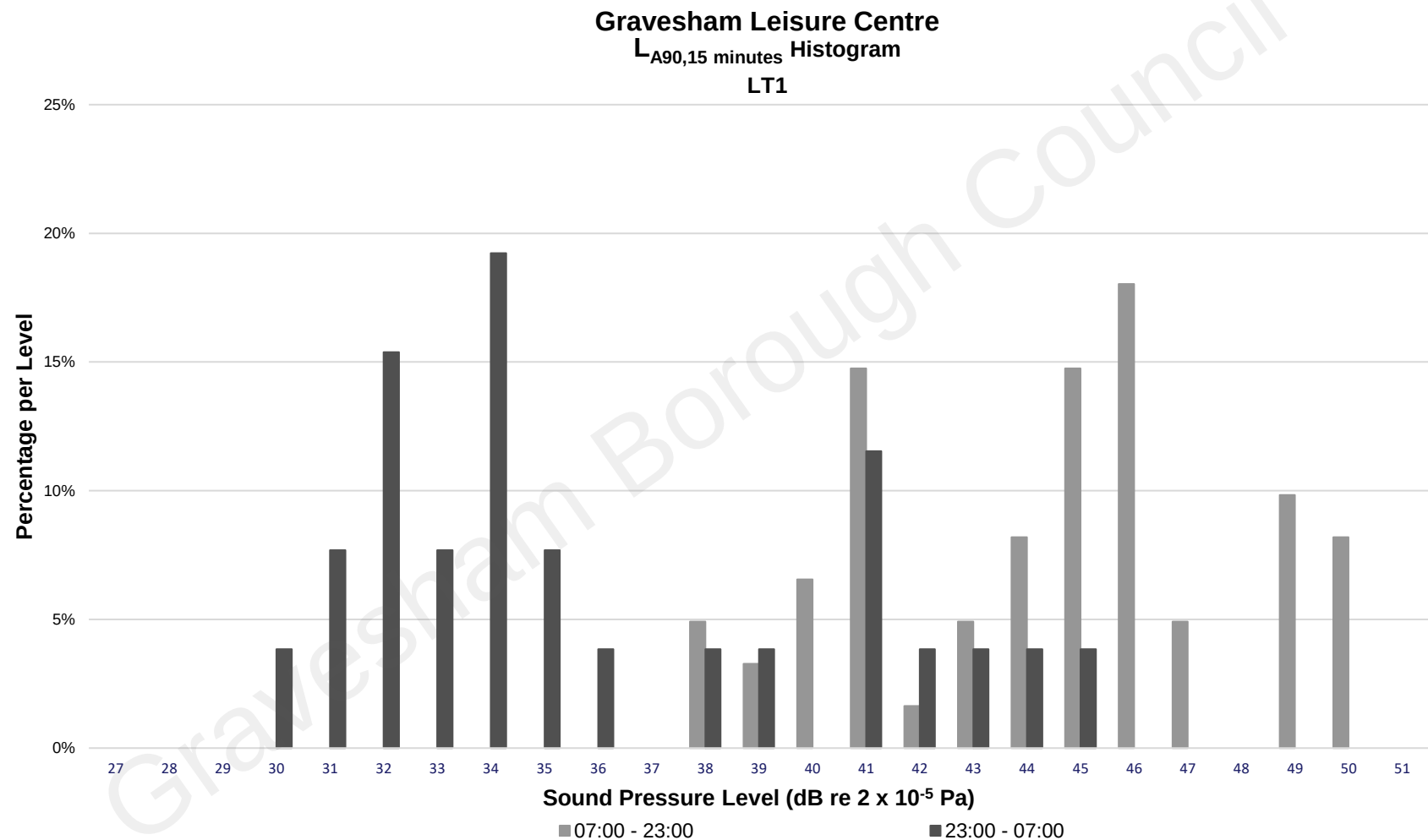
Appendix B Equipment Calibration Information

Description	Manufacturer	Type	Serial Number	Laboratory Calibration Date
Sound Level Meter	RION	NL-52	810643	23/03/2022
½" Pre-polarised microphone		UC-59	20051	23/03/2022
Pre-amplifier		NH-25	11186	23/03/2022
Sound Calibrator	Brüel & Kjær	4231	2389171	25/08/2022

Appendix C Time History Graph and Histogram

Gravesham Borough Council





Appendix D Road Traffic Flow Data

Link	18hr Annual Average Weekday Traffic Data (AAWT)					
	2022 Baseline		2028 Baseline		2028 Baseline + Development	
	All Vehicles	% HGV	All Vehicles	%HGV	All Vehicles	%HGV
A226 Rochester Road East of junction	12,140	3.1%	12,614	3.1%	12,661	3.1%
A226 Rochester Road West of junction	13,456	2.6%	13,972	2.6%	14,056	2.6%
Thong Lane South of A226	6,251	1.4%	6,459	1.4%	6,589	1.4%
Thong Lane (North of Access In)	4,332	1.7%	4,464	1.7%	4,594	1.7%
Thong Lane (South of Access In)	4,146	1.5%	4,278	1.5%	4,385	1.5%
Thong Lane (North of Access Out)	3,734	1.5%	3,849	1.5%	3,956	1.5%
Thong Lane (South of Access Out)	3,495	1.8%	3,610	1.8%	3,687	1.8%
Cascades Leisure Centre	2,302	2.8%	2,302	2.8%	2,587	2.8%
Darnley Lodge Lane West	3,852	1.9%	3,981	1.9%	4,059	1.9%
A2 Slip Road West	6,489	2.1%	6,737	2.1%	6,770	2.1%
Halfpence Lane South	6,800	1.3%	7,065	1.3%	7,084	1.3%
Brewers Road East	6,168	2.9%	6,408	2.9%	6,432	2.9%
Brewers Road West of Slip	6,192	2.0%	6,433	2.0%	6,458	2.0%
Brewers Road East of Slip	3,886	1.4%	4,040	1.4%	4,048	1.4%
A2 Slip Road East	5,502	1.9%	5,718	1.9%	5,735	1.9%