Locksbrook Road, Bath

Commercial Noise Assessment

Locksbrook Road, Bath

Commercial Noise Assessment

Revision	Date	Notes	Author	Checked	Approved
Ver.1-0	13-08-2024	E3825	SB	ND	ND

Entran Limited
2nd & 3rd Floors
Northgate House
Upper Borough Walls
Bath
BA1 1RG

T: 0117 937 4077
www.entranltd.co.uk

CONTENTS **PAGE**

1 INTRODUCTION

1.1 Entran Ltd has been commissioned to undertake an assessment pertaining to activities associated with the proposed Household Recycling Centre at Locksbrook Road, Bath.

1.2 The assessment considers the potential impacts on the nearest sensitive receptors in the vicinity of the proposed site in accordance with the most relevant national and local standards and guidelines.

1.3 Details of the site, including plant quantities and expected usage, have been compiled based on information provided by the applicant and measurements obtained at similar facilities, and are understood to be representative of extant and proposed on-site activities.

1.4 This report is necessarily technical in nature and contains terminology relating to acoustics and noise. Therefore, a glossary together with a brief introduction to the subject of noise has been provided in Appendix A.

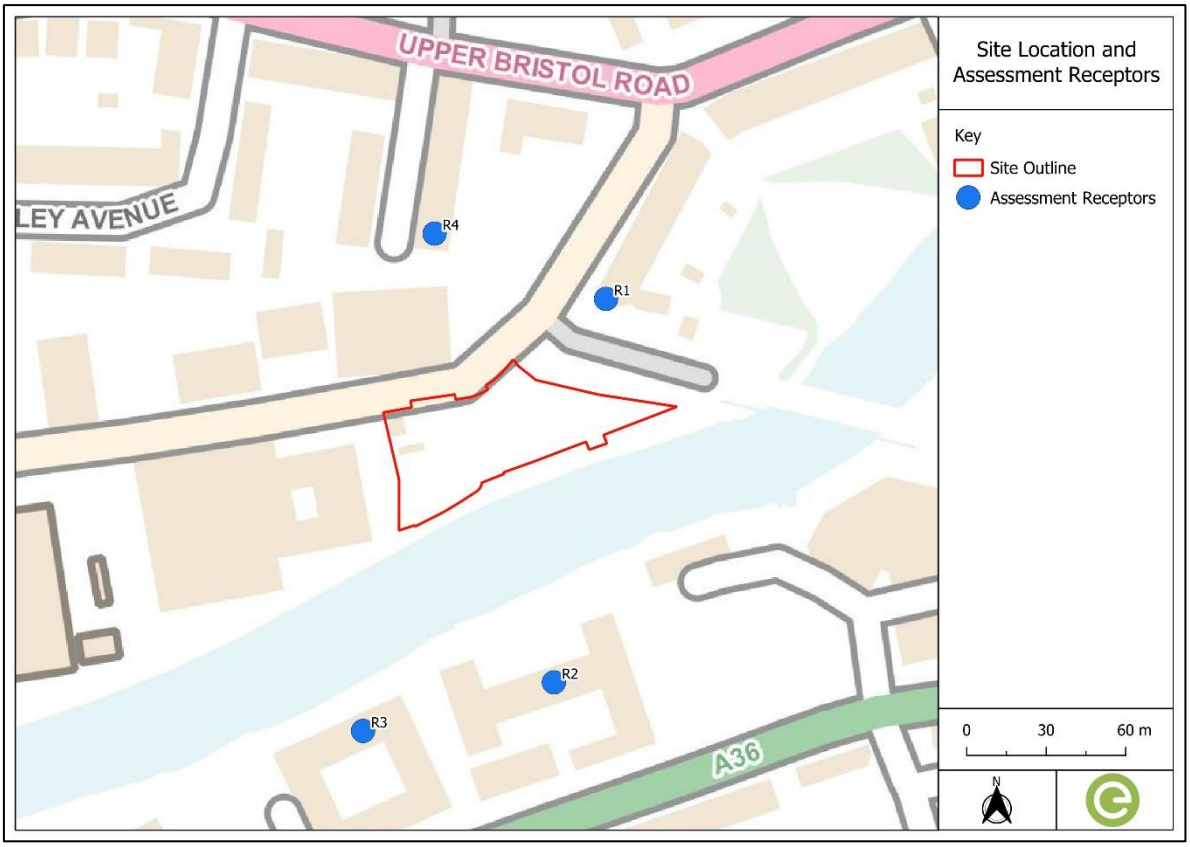
2 SITE DESCRIPTION

2.1 The site is located at Locksbrook Road, to the east of the existing Locksbrook Road trading estate.

2.2 Existing commercial units are situated to the north and west of the site. The nearest residential receptors are situated on Locksbrook Road, approximately 25m northeast of the site. Further residential receptors are located to the north, beyond the existing Bath Volkswagen building and at the Unite Students accommodation blocks are situated to the south across the river, approximately 60m from the site at the closest boundary.

2.3 The site location and identified assessment receptors are identified in Figure 1 below. Details of on-site activities are provided within chapter 5 of this report.

Figure 1: Site Location and Nearby Identified Receptors



3 ASSESSMENT METHODOLOGY

National Planning Policy Framework (NPPF) (Dec 2023)

3.1 The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social planning policies for England. It attempts to summarise in a single document all previous national planning policy advice. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

3.2 Under Section 15; Conserving and enhancing the natural environment, the following is stated in paragraph 180:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: …

preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability…"

3.3 The NPPF goes on to state in paragraph 191 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 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 the 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"

Noise Policy Statement for England NPSE (March 2010)

3.4 The Government is committed to sustainable development and the Department for Environment Food and Rural Affairs (Defra) plays an important role in this by working to secure a healthy environment in which current and future generations can prosper. One

aspect of meeting these objectives is the need to manage noise for which Defra has the overall responsibility in England.

3.5 In March 2010, the Noise Policy Statement for England (NPSE) set out the long-term vision of Government noise policy as 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.'

3.6 The long-term vision is supported by the following aims:

'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life: and,*
- *Where possible, contribute to the improvement of health and quality of life.'*

3.7 The explanatory note to the policy statement emphasises that sustainable development is a core principle underpinning all government policy. In this respect, there is a need to integrate consideration of the economic and social benefit of the activity under examination with proper consideration of the adverse environmental effects.

3.8 To achieve these objectives the NPSE sets out three noise conditions to be determined by the assessor:

NOEL - No Observed Effect Level

3.9 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

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

SOAEL - Significant Observed Adverse Effect Level

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

3.12 The NPSE considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable.

3.13 Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the NPSE requires that:

'All reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development…. This does not mean that such adverse effects cannot occur.'

3.14 No objective values are offered within the NPSE, as the document does indicate that each site should be considered on its own merits. Consequently, consideration of the observed effects is made through an assessment methodology as detailed below.

The Institute of Environmental Management & Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014)

3.15 The Institute of Environmental Management and Assessment (IEMA) have published the '*Guidelines for Environmental Noise Impact Assessment*'. The guidelines are applicable to noise impact assessment for any scale of development proposal, including core principles to achieve effectively integration with the EIA, and provide advice on the issues that need to be considered in a noise impact assessment and whether the appropriate conclusions are being reached. The factors include:

- The appropriateness of the noise parameters used for the situation;
- The reference time period used in making the assessment;
- The level, character and frequency content of the noise sources under investigation; and,
- How the predicted noise levels relate to relevant Standards and guidelines.

3.16 The guidelines also recommend that the assessor should determine the degree of impact based on evidence derived from the assessment.

The Professional Practice Guidance on Planning and Noise (2017)

3.17 The '*Professional Practice Guidance on Planning and Noise'* (ProPG) was produced by a Working Group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH) to provide acoustical practitioners with guidance on the management of noise within the planning system in England.

3.18 The reparation of the ProPG acknowledges and reflects the Government's overarching NPSE, the NPPF and Planning Practice Guidance (including PPG-Noise), as well as other authoritative sources of guidance. It provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers which complements Government planning and noise policy and guidance and, in particular, aims to:

- advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- encourage the process of good acoustic design in and around new residential developments;
- outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- promote appropriate noise exposure standards; and,
- assist the delivery of sustainable development.

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

3.19 British Standard BS 4142: 2014 *Methods for Rating and Assessing Industrial and Commercial Sound* is intended to be used for the assessment of whether sound of industrial and/or commercial nature is likely to give rise to complaints from people residing in nearby dwellings. The Standard, which was updated in 2014, states that such sound can include:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and,

- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

3.20 The procedure contained in BS 4142 for assessing the likelihood of complaints is to compare the measured or predicted sound level from the source in question, the *'specific sound level'*, at the assessment position with the background sound level. Where sound contains acoustic features, such as tonality, impulsivity or other noticeable characteristics then a correction is added to the specific sound to obtain the '*rating level*' that reflects the contextual setting of the Site.

3.21 To assess the likelihood of complaints, the measured background sound level is subtracted from the rating level. BS 4142 states:

'Typically, the greater this difference, the greater the magnitude of the impact;

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*

- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and,*

- *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.*

3.22 BS 4142 also states that *"where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation."*

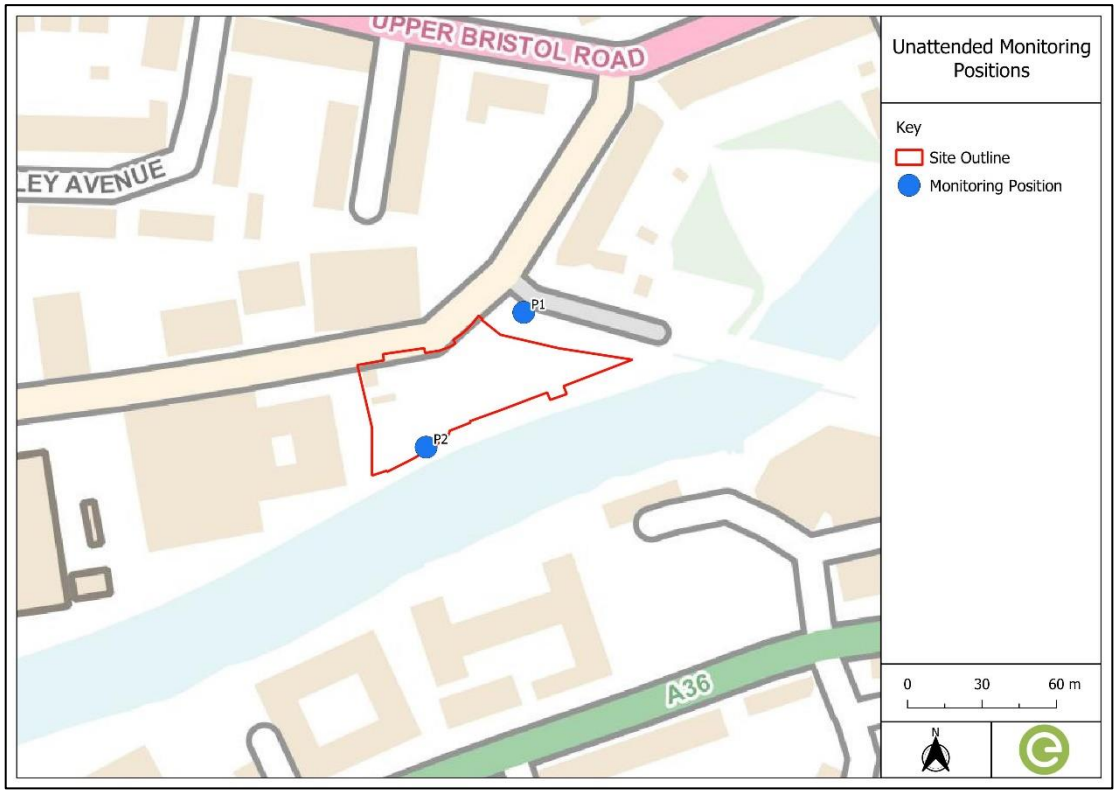
4 ENVIRONMENTAL SOUND MEASUREMENTS

4.1 Background sound conditions at nearby receptors have been determined by an environmental survey conducted between 5th and 9th July 2024.

4.2 The dominant source at the monitoring positions was noted to be road traffic on the surrounding road network and vehicles within the existing trading estate. The site is currently employed as a depot for street cleaning vehicles and is in use within both the day and night-time assessment periods (07:00 – 23:00, 23:00 – 07:00). Activities on site were identified to give rise to 15-minute L_{Aeq} values of approximately 57 dB $L_{Aeq,15min}$ and sound emanating from the extant site activities was noted to be perceptible at the nearest residential receptor.

4.3 The monitoring positions are presented in Figure 2.

Figure 2: Unattended Monitoring Positions



4.4 A summary of the unattended survey is provided in Table 1.

Table 1: Summary of Noise Survey

Position	Date	Day Time (07:00 - 23:00)			Night-time (23:00 - 07:00)		
		$L_{Amax,F}$	$L_{Aeq,T}$	$L_{A90,T}$	$L_{Amax,F}$	$L_{Aeq,T}$	$L_{A90,T}$
P1	05/07/2024	85.3	57.2	48.4	83.8	56.1	46.8
	06/07/2024	86.7	58.5	49.2	71.3	47.6	38.6
	07/07/2024	82.5	51.8	44.1	79.6	52.6	38.8
	08/07/2024	81.5	55.2	47.2	79.4	53.8	45.7
	09/07/2024	82.4	56.8	47.8	-	-	-
P2	05/07/2024	89.4	58.8	47.8	75.1	54.1	44.6
	06/07/2024	83.9	55.3	48.5	77.2	49.9	40.2
	07/07/2024	80.4	51.4	44.9	88.6	53.6	40.7
	08/07/2024	93.5	57.0	48.5	81.5	57.3	46.5
	09/07/2024	87.0	55.9	49.1	-	-	-

Maximum levels represent the highest $L_{Amax,F}$ sound level during the given period.
The period $L_{Aeq,T}$ is obtained from the logarithmic average of measured sound levels.
The period $L_{A90,T}$ is obtained from the average of the measured sound levels.

4.5 The unattended monitoring was undertaken to allow assessment in accordance with BS 4142 and to determine the likelihood of adverse effects relating to the proposed plant items.

4.6 Background sound levels have been obtained by statistical analysis based on the operational hours of existing facilities within Bath (weekdays 08:00 – 18:00, Saturday 08:00 - 18:00, Sunday 09:00 – 13:00). The adopted background sound levels are presented in Table 2 and statistical analysis is presented graphically in Appendix B. For the purposes of maintaining a cautious assessment the lowest identified background sound level, following consideration of statistical analysis, has been adopted for all receptors regardless of the monitoring position. The adopted background sound levels are indicated in bold in Table 2.

Table 2: Background Sound Levels for Assessment Periods

Position	Time Period	Background Sound Level, $L_{A90,T}$, dB re. $2x10^{-5}$ Pa.
P1	Weekdays 08:00 – 18:00	**47**
	Saturday 08:00 – 18:00	55
	Sunday 09:00 – 13:00	**46**
P2	Weekdays 08:00 – 18:00	48
	Saturday 08:00 – 18:00	**51**
	Sunday 09:00 – 13:00	**46**

4.7 All measurements were undertaken by competent individuals with experience in environmental monitoring. Measurements were obtained in accordance with the principles of BS 7445: 2003: '*Description and measurement of environmental noise'* and following the guidance given in BS 4142.

4.8 The microphones were positioned at approximately 1.8 m above local ground level and in free-field conditions. The microphones were fitted with protective windshields and situated in a weatherproof case.

4.9 All acoustic measurement equipment used during the surveys conformed to Type 1 specification of British Standard 61672: 2003: *Electroacoustics. Sound level meters. Part 1 Specifications*. The measurement equipment used during the survey was calibrated at the start and end of the measurement period. The calibrator used had itself been calibrated by an accredited calibration laboratory within the twelve months preceding the measurements.

5 ASSESSMENT

5.1 The potential impacts due to on-site activities have been determined by calculation of $L_{Aeq,T}$ sound levels during the operation of the proposed plant items. Sound levels have been calculated at nearby residential receptors. Calculated sound levels, including consideration of any necessary corrections for acoustic features, have been assessed against the identified background sound levels.

5.2 Sound emission levels from the site have been calculated using predictive computer noise modelling. The noise modelling software (Cadna-A) uses algorithms based on ISO 9613 'Attenuation of sound during outdoor propagation' to predict noise levels generated at receiver locations by potentially noisy sources.

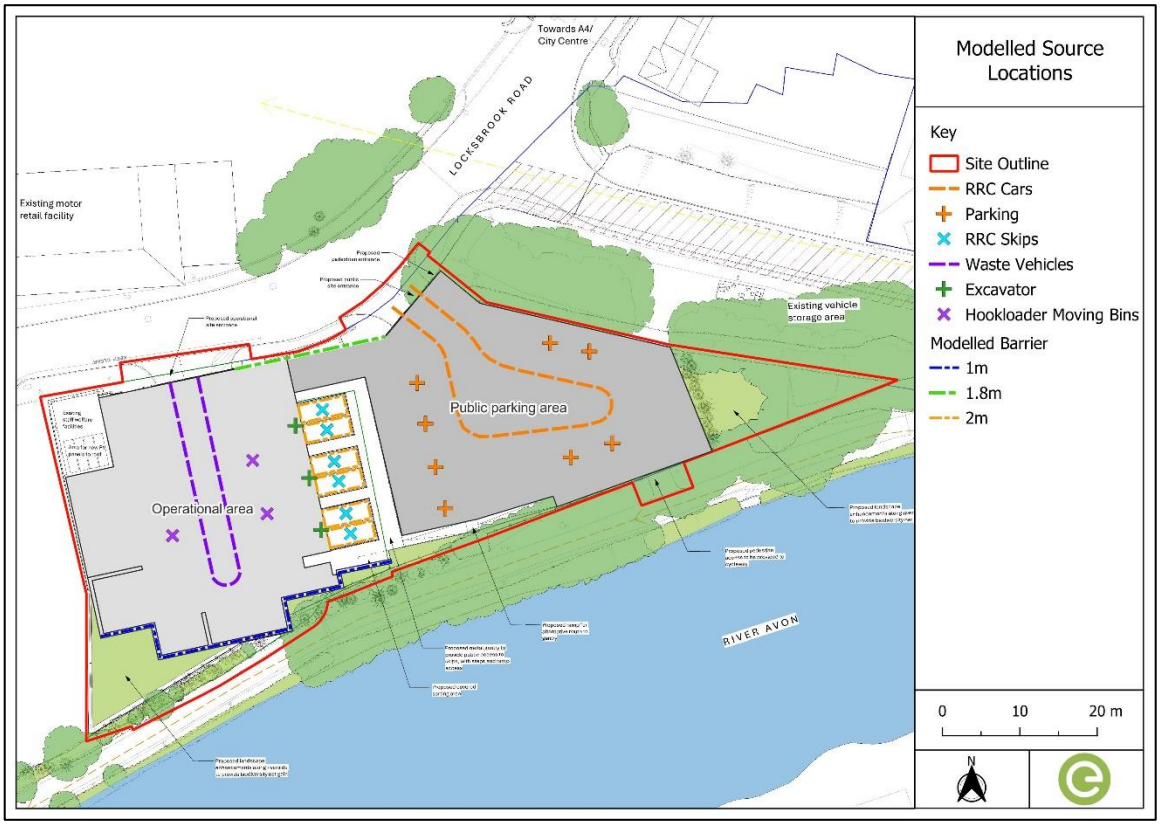
5.3 The proposed activities have been assessed to ensure compliance with the relevant design standards contained within BS 4142:2014+A1:2019. Operation of the proposed activities is assessed for the operational periods weekdays 08:00 – 18:00, Saturday 08:00 - 18:00, Sunday 09:00 – 13:00. The site activities occur within the BS 4142 daytime period and therefore calculated sound levels have been assessed over an hourly period.

5.4 Typical on-site activities will comprise public access the Recycling Centre, including car access to the associated parking area. Hookloader and street cleaning vehicles will attend occasionally to the operational area at the west of the site. An excavator will be employed infrequently within the operational area to compress materials within skips.

5.5 Screening is inherent to the design of the site, with the proposed skips screening properties to the north/east from sources within the operational area. A concrete wall is proposed to the south of the site, with a relative height of 1.6m. An additional 1m height will be required at the southern boundary. A barrier of at least 1.8m in height will be required at the north of the site to mitigate propagation from the operational area of the site.

5.6 The modelled on-site activities and barrier positions are presented in Figure 3.

Figure 3: Modelled Activity Locations



5.7 The specific levels were calculated using source sound levels from similar sites. A -10 dB correction has been applied to measurements of waste skips movement to account for the requirement for polyurethane 'silenced' rollers, which will be adopted at the proposed site. Octave band sound levels for recycling wagons have been adopted as representative of sound arising from street cleaners.

5.8 The adopted sound power levels and proposed usage during typical and out of hours periods are presented in Table 3. The source sound power levels and derived octave band sound power levels are presented in Tables C1 and C2 of Appendix C.

Table 3: Source Sound Levels

Plant Item/Activity	Source Sound Power Level, dB L_{WA}	Quantity (per hr)	Minutes Use	Resultant Sound Power Level, dB L_{WA}
Hookloader Movement	84.8	1	0.5	84.8
Hookloader Moving Bins	96.8[1]	1	5	106.8
Street Cleaner	84.7[2]	6	1	84.7
Excavator	101.3	1	5	101.3
Recycling Centre	85.9	-	-	85.9
Passing Car (approx 15 mph)	69.3	112	0.5	69.3
Car Doors	84.0[3]	112	-	76.9

1 -10 dB correction assumed for polyurethane rollers
2 adopted from measurement of recycling wagon
3 Broadband Sound Exposure Level

5.9 The derived source sound power levels have been corrected based on the expected number of operations. It is understood that excavator, hookloader and street cleaner access is unlikely to take place within the same period and therefore these are assessed individually. The Recycling Centre is taken to be operational during each of these scenarios. The resultant sound power levels, corrected for likely hourly usage, are presented in Table C2 of Appendix C. The calculated specific sound levels at the assessment receptors are presented in Table 4.

Table 4: Calculated Specific Sound Levels

Activity	Receptor	Specific Level, $L_{Aeq,T}$		
		Weekday	Saturday	Sunday
Typical	R1	37	37	37
	R2	36	36	36
	R3	32	32	32
	R4	36	36	36
Excavator	R1	39	39	39
	R2	40	40	40
	R3	40	40	40
	R4	42	42	42
Hookloader	R1	38	-	-
	R2	39	-	-
	R3	36	-	-
	R4	37	-	-
Scarab	R1	37	-	-
	R2	36	-	-
	R3	32	-	-
	R4	36	-	-

5.10 BS 4142 requires that an acoustic feature correction is applied to the specific sound level, where applicable, in order to obtain a rating level $L_{Ar,Tr}$ at the identified receptor. Any correction is applied to account for the effect of additional acoustic characteristics present in the source of interest. The correction is applied based on tonality, impulsivity and intermittency that may be perceptible at the receptor location. A correction may also be applied where these features may not be present but the sound may still be distinctive at the receptor.

5.11 The specific levels are below both the identified background and measured ambient sound levels and are therefore no correction to account for potential acoustic features is identified as required. Notwithstanding this, a 3 dB correction has been applied to excavator and hookloader activity to account for impulsive sounds that may be perceptible at the receptor locations. The resultant rating levels and excess over the identified background sound levels are presented in Table 5.

Table 5: Calculation of Rating Sound Level and BS 4142 Assessment

Period	Activity	Rec.	Specific Level, $L_{Aeq,T}$	Acoustic Feature Correction	Rating Level $L_{Ar,Tr}$	Excess of Rating Level Over Background, dB
Weekday	Typical	R1	37	0	37	-10
		R2	36	0	36	-11
		R3	32	0	32	-15
		R4	36	0	36	-11
	Excavator	R1	39	3	42	-5
		R2	40	3	43	-4
		R3	40	3	43	-4
		R4	42	3	45	-2
	Hookloader	R1	38	3	41	-6
		R2	39	3	42	-5
		R3	36	3	39	-8
		R4	37	3	40	-7
	Scarab	R1	37	0	37	-10
		R2	36	0	36	-11
		R3	32	0	32	-15
		R4	36	0	36	-11
Saturday	Typical	R1	37	0	37	-14
		R2	36	0	36	-15
		R3	32	0	32	-19
		R4	36	0	36	-15
	Excavator	R1	39	3	42	-9
		R2	40	3	43	-8
		R3	40	3	43	-8
		R4	42	3	45	-6
Sunday	Typical	R1	37	0	37	-9
		R2	36	0	36	-10
		R3	32	0	32	-14
		R4	36	0	36	-10
	Excavator	R1	39	3	42	-4
		R2	40	3	43	-3
		R3	40	3	43	-3
		R4	42	3	45	-1

5.12 The resultant calculated rating levels fall below the identified background sound levels at all assessment locations. BS 4142 indicates that where the rating level does not exceed the background sound level the impact of the specific sound level is likely to be low.

5.13 Typical activity at the site will comprise largely car movements. The extant environment is predominantly car movements and therefore typical activities are expected to be largely anonymous against the extant environment.

5.14 Proposed activities may be perceptible at times. However, the proposed change of use will remove early morning activities within the site, which typically take place at around 5am. Proposed activities will take place within the daytime period it is considered that the impact of sound propagating from the site is therefore likely to be lower.

Uncertainty

5.15 The assessment scenarios considered within this report are based on the measurements and assumptions of external plant items presented within this assessment, as obtained on similar sites. Any changes to these assumptions, such as revised design or changed to activities, would require assessment based on the specific plant items and site details.

5.16 The noise emitted during this activity is largely due to contact between the metal roller and concrete. Polyurethane rollers will be employed at the proposed site to ensure that this noise is mitigated. A -10 dB correction has been applied to measurements of skip movements and is considered to be a suitable assumption. The skips at the proposed site will need to adopt these rollers in order to maintain the calculations within this assessment.

5.17 The lowest identified background sound levels, following consideration of statistical analysis, have been adopted as representative for all residential receptors. The unattended measurements indicate that a background sound level of 55 dB would be suitable to adopt for Saturdays at P1. This would result in an increase in the background sound level at Receptors R1 and R4 for Saturdays, which would result in the rating levels falling further below the background.

6 MITIGATION

6.1 The assessment of activities at the proposed Recycling Centre has been undertaken based on the information and calculations as detailed within this report. The calculated rating levels indicate that there is a low likelihood of impact due to site operations.

6.2 Tonal reversing alarms will be limited onsite, with white noise or in-cab proximity alert systems employed as far as practicable.

6.3 Polyurethane rollers will be employed for on-site skips to reduce the sound emitted from contact between the skip rollers and concrete.

6.4 The design of the site includes inherent mitigation to dwellings to the north and east, with the proposed skip locations providing screening between the operational area of the site and nearest receptors.

6.5 A concrete wall is to be constructed at the south of the site. This is understood to be 1.6m above local ground level. An additional barrier of at least 1m should be installed above this level to further screen receptors to the south.

6.6 A barrier of at least1.8m in height will be required to the north of the site to mitigate sound propagating to the north.

6.7 To provide adequate acoustic screening any barrier material should have a mass per unit of surface area in excess of 12 Kg/m2 and be of a continuous/close-boarded construction with a minimum thickness of 15 mm. Wooden fencing should also be suitably treated to prevent warping and rot due to weathering.

6.8 Whilst no further mitigation is required, in excess of that already included within the calculations, further screening can be employed to the gantry area. Mitigation such as solid walls and perimeter screening at the top level would serve to further reduce the likelihood of impact to receptors on Locksbrook Road.

CONCLUSIONS

6.9 An assessment has been undertaken for the potential impacts attributable to the sound emitted from the proposed Recycling Centre at Locksbrook Road in Bath.

6.10 The information as detailed within this report has been used to calculate the specific sound levels at the nearest receptors.

6.11 Based on the information as adopted within this assessment, the excess of the calculated rating levels over the background sound level indicates that there is low likelihood of adverse impact from external sources during typical on-site activities.

6.12 BS 4142 indicates that where there is no excess of the rating over the background sound level there is a low likelihood of adverse impact.

6.13 With consideration to the calculated sound levels, the existing site context, and the removal of early morning activities currently associated with the site, it is considered unlikely that the impact of the site would be increased.

6.14 The assessment, based on the information provided and the calculations and considerations as presented within this report, indicates that significant impacts at the nearest residential receptors are unlikely.

APPENDIX A – INTRODUCTION TO NOISE

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB.

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs. For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest.

In the UK, traffic noise is measured as the L_{A10}, the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq}. This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 5 minutes during the night. The noise levels are commonly symbolised as $_{A90(1hour)}$ and $L_{A90(5mins)}$. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

Table A1: Glossary of Terms

Term	Definition
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,F}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the 'average minimum' noise level and is often used to describe the background noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Residual Noise Level	The ambient noise remaining at a given position in a given situation when specified sources are suppressed to a degree such that they do not contribute to the ambient noise level ($L_{Aeq,T}$)
Specific Noise Level	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source (the noise source under investigation) over a given time interval ($L_{Aeq,T}$)
Rating Noise Level	The specific noise level plus any adjustment for the characteristic features of the noise ($L_{Ar,Tr}$).

APPENDIX B – GRAPHICAL REPRESENTATION OF MEASUREMENT RESULTS

Figure B1: Statistical Analysis of Background Sound Levels, P1

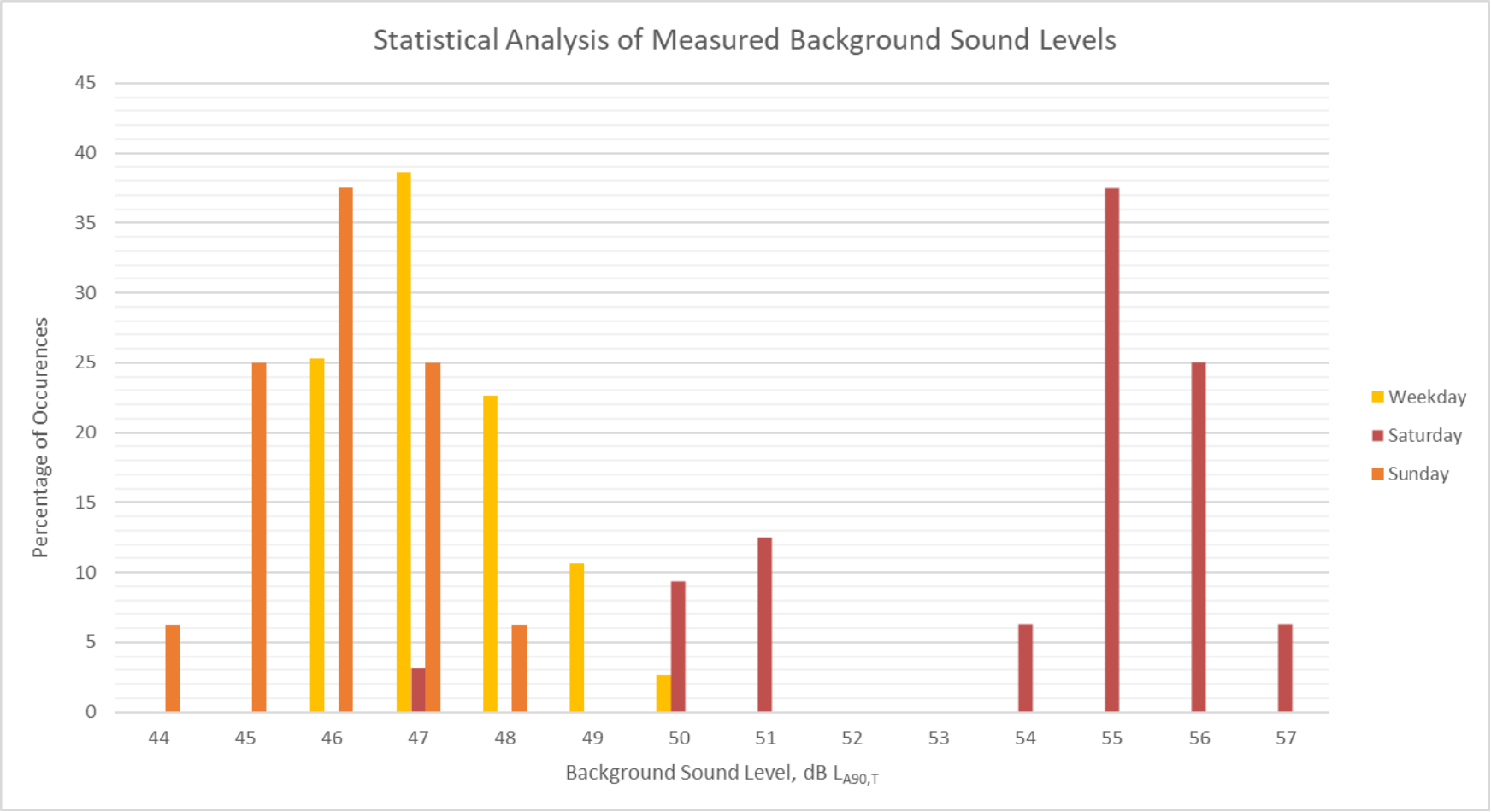
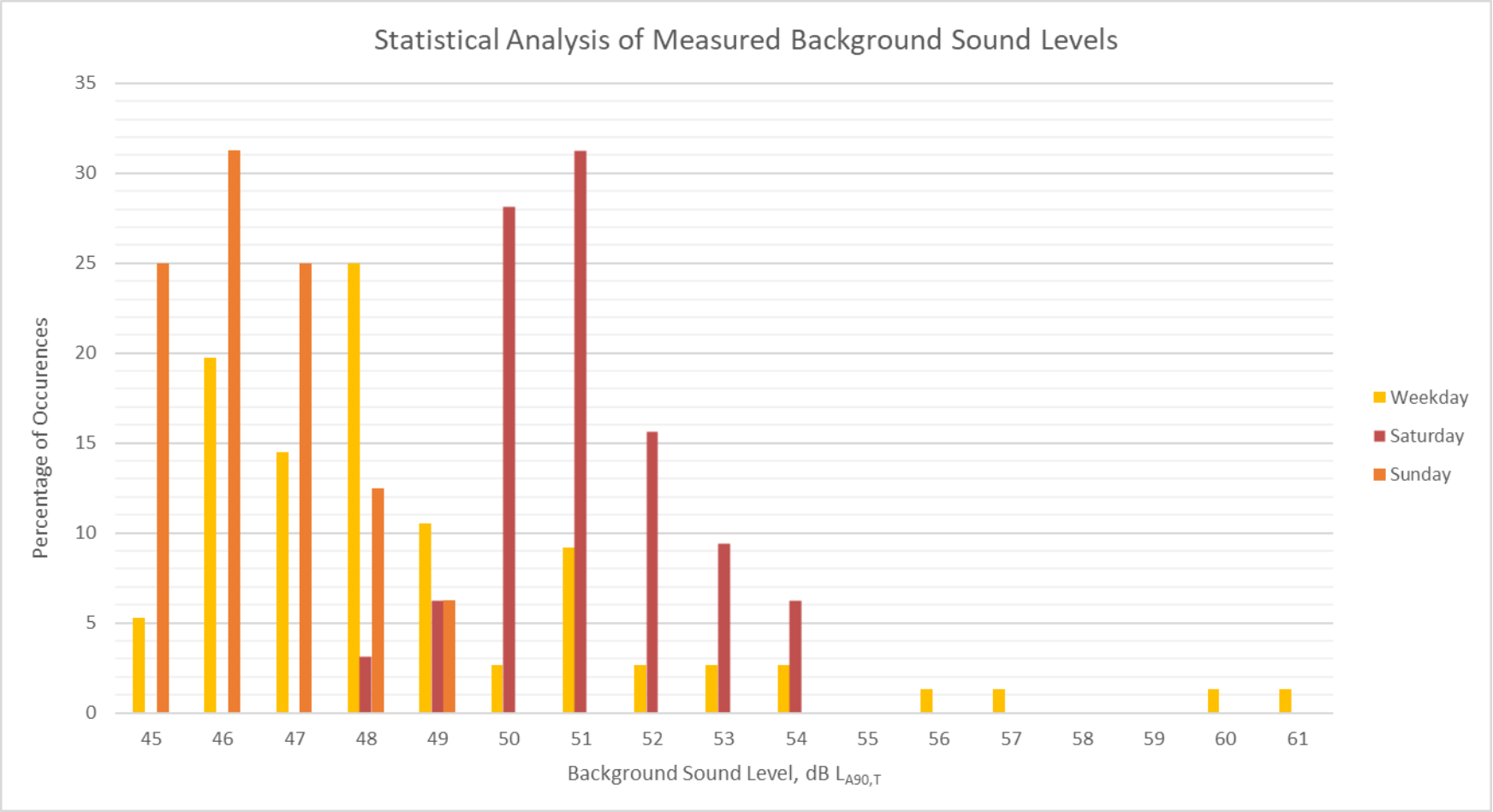


Figure B2: Statistical Analysis of Background Sound Levels, P2



APPENDIX C – TABLES

Table C1: Octave Band Source Sound Power Levels

Activity	Octave Band Sound Level Power Level, dB L_{WA}								
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Hookloader Movement	84.4	83.2	82.0	80.6	80.1	81.3	78.0	72.6	66.9
Hookloader Moving Bins	*104.7*	*102.3*	*101.7*	*100.2*	*101.7*	*101.7*	*100.6*	*98.4*	*89.6*
Corrected for polyurethane skip roller (-10 dB)	94.7	92.3	91.7	90.2	91.7	91.7	90.6	88.4	79.6
Recycle Wagon Movement	*88.8*	*85.8*	*84.2*	*80.2*	*78.6*	*79.9*	*79.4*	*74.6*	*68.1*
Street Cleaner (adopted from recycle wagon)	88.8	85.8	84.2	80.2	78.6	79.9	79.4	74.6	68.1
Excavator	97.5	106.5	95.0	100.8	95.5	98.4	91.5	87.9	82.9
Tip Activity	94.4	94.3	86.6	83.9	81.2	81.3	78.8	75.9	71.4
Passing Car (approx 15 mph)	73.1	72.6	66.7	65.5	65.1	66.6	61.3	53.0	47.3

Table C2: Modelled Octave Band Sound Power Levels

Activity	Octave Band Sound Level Power Level, dB L_{WA}								
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Hookloader Movement	63.6	62.4	61.2	59.8	59.3	60.5	57.2	51.8	46.1
Hookloader Moving Bins	83.9	81.5	80.9	79.4	80.9	80.9	79.8	77.6	68.8
Scarab Street Cleaner	78.8	75.8	74.2	70.2	68.6	69.9	69.4	64.6	58.1
Excavator	86.7	95.7	84.2	90.0	84.7	87.6	80.7	77.1	72.1
Recycling Centre	94.4	94.3	86.6	83.9	81.2	81.3	78.8	75.9	71.4
Passing Car (approx 15 mph)	72.8	72.3	66.4	65.2	64.8	66.3	61.0	52.7	47.0