NOISE IMPACT ASSESSMENT

WADHURST HOUSEHOLD WASTE SITE

CHANGE OF USE TO WASTE TRANSFER STATION FOR CONSTRUCTION AND DEMOLITION WASTE

FLUID PLANNING LTD

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VERSION HISTORY

Version	Date	Comments
0.3	20/05/22	First draft for project team review
1.0	23/05/22	Final version

CONTENTS

1 INTRODUCTION AND EXECUTIVE SUMMARY

Anderson Acoustics Ltd has been commissioned by Fluid Planning Ltd to undertake a noise impact assessment to support the application for the proposed change of use from a household waste recycling site to an aggregates recycling and metal recycling site, including the processing, storage and transfer of waste, and the siting of two welfare office at Wadhurst Household Waste Site, TN5 6PT.

The assessment has been made in accordance with the requirements of East Sussex County Council and Wealden District Council with respect to the protection of the amenity of the nearest noise-sensitive receptors. Accordingly, the assessment has been carried out to:

a) evaluate the existing acoustic environment and background sound levels at neighbouring noise-sensitive receptors;

b) predict noise emission levels from the proposed installation at the receptors accounting for appropriate noise control measures; and

c) determine the likely degree of noise impact in accordance with the relevant policy and guidance.

This report, therefore, presents: a brief description of the site and proposed operations in **Section 2**; the relevant policy and guidance in **Section 3**; the details and results of the environmental noise survey undertaken at the site in **Section 4**; and the details, results and assessment of the site noise calculations in **Section 5**.

A description of relevant noise units and acoustics terminology is provided in **Appendix A**, the details of national planning policy are provided in **Appendix B**, whilst the noise contour map is presented in **Appendix C**

The baseline survey revealed that background sound levels during the proposed hours of operation were typically around 39 dBA, with ambient conditions on average 13 dB higher, likely due to vehicle movements on Faircrouch Lane and train passbys.

The assessment (undertaken in accordance with BS 4142) indicates that the rating level due to the operation of the site would be 6 dB above the adopted background sound level, but 5 dB below the ambient levels typically.

Accordingly, whilst the default local authority requirement (that the background sound level shouldn't be exceeded) wouldn't be achieved, this is not considered to be indicative of an adverse impact.

The guidance in BS 4142 is to take the site-specific context into account. This, together with the rating level being below the ambient conditions, includes the fact that the site has historical and safeguarded use as a household waste and recycling centre, whereby some associated noise from the site is to be expected.

On balance, therefore, it is considered that there would be, at most, **No Observed Adverse Effect**, whereby "Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in quality of life."

In which case, no specific measures are considered necessary, and where the proposed use is not considered contrary to local or national policy.

It is considered that permission can be granted for the proposed development subject to suitable conditions.

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2 THE SITE AND NOISE-SENSITIVE RECEPTORS

2.1 Existing Site

The currently vacant site comprises an area of concrete hardstanding approx. 2,157 m^2. It is located adjacent to Wadhurst Business Park (see description below) and close to the London-Hastings railway line and Wadhurst Station. The site was formerly a household waste and recycling centre owned by East Sussex County Council until it was marketed for sale in 2020. The site is shown in **Figure 2-1** and **Figure 2-2** below.

Figure 2-1: Aerial photograph showing the site in the context of the wider area ©2022 Google

The nearest noise-sensitive receptor (i.e. dwelling) has been identified as a two-storey property named "Faircrouch", located approximately 42 m to the southeast of the site. Other residential properties are notably more distant, located further to the south and beyond the rail line to the north.

Wadhurst Business Park comprise a single, two-storey block of six light industrial units, with a mix of uses, seemingly ranging from car repair- to office-based uses. Given the seemingly solid (brick) construction of the building, with the rear, window-less elevation presented to the site, and also mostly below the level of the site, the Business Park is not considered to be sufficiently noise-sensitive in the context of the proposed development for further consideration.

Figure 2-2: Aerial photograph showing the site in the context of the local area ©2022 Google

The nearest residential building (Faircrouch) is shown above. Whilst there would appear to be land belonging to the property to the north, the main external amenity area is taken to be to the rear/south of the building, whereby assessing the site noise at the front of the building is considered sufficient worst case.

2.2 Historical Operation

The site is currently vacant, but it is understood to have operated as a waste management site from at least 1995 to 2018. The site is safeguarded as a household waste and recycling centre under the East Sussex Local Waste Site Plan 2017 [1].

2.3 Proposed Operation

The description of the proposed development is "a waste transfer station for construction and demolition waste and installation of two offices". At this time, it is proposed that waste is hand sorted with the support of the following items of plant for loading/unloading lorries as well as transporting waste between bays:

- HX 140L Excavator
- Hitachi ZW180 Loading Shovel

There will be on-site parking provision for six (light) vehicles. The site is expected to receive a total of 20 lorry deliveries per day, with a throughput of material of 30,000 metric tonnes per year.

Proposed hours of operation are:

- 07:00 – 17:30 Monday to Friday (excluding Bank Holidays); and
- 07:30 – 13:00 Saturdays.

No working will take place outside of these hours, or on Sundays or Bank Holidays, therefore.

3 ASSESSMENT METHODOLOGY AND CRITERIA

East Sussex County Council and Wealden District Council requirements and associated assessment guidance are summarised below. These should be read in conjunction with the government's overarching planning principles with respect to noise including: Noise Policy Statement for England [2]; National Planning Practice Framework [3] and Planning Practice Guidance – Noise [4]. These documents are summarised in **Appendix A** along with a description of relevant acoustic terminology.

3.1 Planning Noise Advice Document: Sussex

East Sussex County Council and Wealden District Council noise guidance is defined in Planning Noise Advice Document: Sussex March 2021 [5]. With regard to noise sources of an industrial and commercial nature, this document states the following:

2.6.1 For a new noise source being introduced near existing noise sensitive premises then an ambient and background noise survey (LA90) should cover the times when the proposed development will be in operation. The expected levels and duration of all the potential noise sources likely to be in operation from the proposed development, whether measured or predicted, should be provided with details of tonality, character, impulsivity and/or intermittency of each noise (e.g. BS 4142). Reference shall also be made if a noise source is anticipated to be readily distinctive against the residual acoustic environment. This could also apply to extensions / alterations to existing development.

3.2.1. The rating level of the industrial or commercial sound source should, where practicable, achieve a level no greater than the representative background sound, when measured in accordance with BS 4142:2014 + A1: 2019. There may be instances, for specific sites, where a rating level below background is deemed appropriate. This can be determined through discussion with the Local Planning Authority (LPA). A rating level below background may be required if there are concerns for potential noise creep, for example in a High Street setting. It is considered that meeting this criterion would avoid adverse noise impacts, in the interests of ensuring a good standard of amenity and protecting human health. Where these criteria are not attainable, the noise report should explain why, and how best practicable means will be implemented to control noise in order to satisfy the LPA that the development is acceptable. At all times the reports shall have regard to the context.

Details of BS 4142 [6] are provided below.

3.2 BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

At the core of the assessment approach is the comparison of the sound(s) in question with the background conditions at the nearest dwellings in the absence of such sound(s). In the first instance, the level of the sound in question is referred to as the "specific sound level." Where appropriate, this is corrected (as described below) to account for any distinguishable features to derive the "rating level," which is then compared to the "background sound level." These terms are described below. See also the glossary at **Appendix A**.

Background Sound Level

The background sound level ($L_{A90,T}$) is the A-weighted sound pressure level that is exceeded at the assessment location for 90% of a given time interval, T, measured using time weighting, Fast, and quoted to the nearest whole number of decibels. In the majority of instances – i.e. where there is no one dominant and constant source of noise – there will be a range of levels, not necessarily one absolute value. It is, of course, however, helpful to draw the line somewhere, and where the aim should be to obtain a level (per period of interest) for use in the assessment that is representative of typical conditions outside the relevant dwelling(s) (during the period(s) the sound in question does or would occur).

BS 4142 advises that, “The monitoring duration should reflect the range of background sound levels for the period being assessed.”; that, “This should comprise continuous measurements of normally not less than 15 min intervals, which can be contiguous or disaggregated.”; and that, “A representative level should account for the range of background sound levels and should not automatically be assumed to be either the minimum or modal value.”

Specific Sound Level

The specific sound level, $L_s = L_{Aeq,Tr}$, is the equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r (either 1 hour in terms of the daytime period (07:00 to 23:00) or 15 minutes during the night-time period (23:00 to 07:00). Which is why, if the specific sound does or could occur during either the day or night, the background sound level is determined (separately) for these two periods, but where the reference periods of 1 hour and 15 minutes are strictly applicable to the determination of the specific sound level. Although, based on the statement in BS 4142 above mentioning 15-minute intervals, and also a worked example of processing survey data on this basis, it is typical for background sound levels to be measured and processed in terms of 15-minuite period.

Rating Level

The rating level, $L_r = L_{Ar,Tr}$, is the specific sound level plus any adjustment for the characteristic features of the sound, as experienced (or would be experienced) at the assessment location, such as a distinguishable, discrete, continuous note (a whine, hiss, screech or hum etc.) or distinct impulses (bangs, clatters or thumps etc.). Where no correction is warranted, the rating level is equal to the specific sound level. Note, it is not referred to as rating “sound” level, since, owing to the correction, it stops being a level that can be measured with a sound level meter.

Three methods are presented for determining the degree of correction. As is typically the case for “proposed” sources, the “subjective” method has been adopted.

The corrections suggested under the subjective method are as follows. The advice is to “Correct the specific sound level if a tone, impulse or other characteristic occurs, or is expected to be present for new or modified sound sources.” Also, that, “The prominence of tonal or impulsive sound from a source can be masked by residual sound. In many cases the amount of masking varies as the residual sound changes in level and possibly character. The source’s tonal and/or impulsive characteristics could also vary with time.” It is for this reason that it is appropriate consider the correction in light of the level of the specific sound in terms of both the background and ambient conditions, and also the nature of the noise environment.

Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level should be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Bearing in mind the correction can be any value within the overall ranges suggested, the above can be summarised as:

- **Up to +6 dB due to tonality**. Subjectively this might be +2 for a tone that is just perceptible, +4 where it is clearly perceptible and +6 where it is highly perceptible.

- **Up to+9 dB for impulsivity**. Subjectively this might be +3 for impulsivity that is just perceptible, +6 where it is clearly perceptible and +9 where it is highly perceptible; and

- **Up to +3 dB for intermittency and other acoustic features** that are neither tonal nor impulsive, though readily distinctive at the receptor.

BS 4142 further notes that, "If characteristics likely to affect perception and response are present in the specific sound, within the same reference period, then the applicable corrections ought normally to be added arithmetically. However, if any single feature is dominant to the exclusion of the others then it might be appropriate to apply a reduced or even zero correction for the minor characteristics."

Assessment of the impact(s)

An "initial estimate" of the impact of the specific sound is calculated by subtracting the background sound level from the rating level. The following advice applies:

- 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.

- 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.

The significance in practice, however, depends upon not just the margin by which the rating level exceeds the background sound level, but also the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur.

Where the initial estimate of the impact needs to be modified due to the context, the assessment should take into account all pertinent factors, including:

- the absolute level of sound;
- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the receptor and whether dwellings will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

The associated guidance in BS 4142 is as follows:

1) The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

   Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

   Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

2) The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.

   NOTE 3 Consideration should be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the "Effects on humans of industrial and commercial sound" portion of the "Further reading" list in the Bibliography.

3) 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:

   i) facade insulation treatment;

   ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and

   iii) acoustic screening.

A BS 4142 assessment, therefore, is effectively in two parts. The first part results in an initial indication of the impact, which is subsequently considered in terms the context unique to the situation at hand; and where this second part may require consideration of alternative guidance and metrics. This is particularly relevant where levels are generally low. As quoted above, in such instances "…absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background." In which case, the guidance in BS 8233 [6] is considered, as presented below.

3.3 BS 8233:2014 Guidance on sound insulation and noise reduction for buildings

As stated above, when it comes to taking into account context, it is in keeping with the BS 4142 guidance to also consider the significance of the absolute level of the sound in question. This is typically done in terms of the absolute sound level thresholds given in BS 8233. It states that, "In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4." This table is reproduced as **Table 3-1** below. Note that the standard uses the term "noise" interchangeably with "sound."

Table 3-1: BS 8233 indoor ambient noise levels

Activity	Location	Daytime (07-23)	Night-time (23-07)
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

For living rooms (and bedrooms) during the day, therefore, the guideline value is 35 dB $L_{Aeq,16h}$. Assuming a partially open window providing 15 dB (during use for cooling, for example), the equivalent external level/limit would be in the order of 50 dB.

In respect of external sound levels, the guidance in BS 8233 suggests that, "…it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments…"

These are the thresholds typically applied to transport noise dominated environments, including where commercial/industrial noise is present, but not dominant. BS 8233 cautions that the guideline values are for sources without a specific character, and that where any such characteristics are present, "…lower noise levels might be appropriate." Either way, external levels no higher than 50 dB (equivalent to internal levels of 35 dB or less) can be seen to be low. Whilst a means of accounting for any specific characteristics is to adopt the rating level determined in accordance with BS 4142, as opposed to the specific sound level, to be compared to the BS 8233 criteria (as opposed to seeking lower levels).

4 BASELINE SOUND LEVELS

4.1 Survey Methodology

Continuous unattended sound level measurements were obtained at the location on site shown in **Figure 2-2** between Wednesday 16th and Monday 21st March 2022 to provide representative baseline sound levels in the vicinity of the nearest dwelling. The microphone was mounted at a height of approximately 3.0 m above local ground level and under free-field conditions (i.e. away from hard vertical surfaces other than the ground). Given similar proximity to the main sources of sound in the area, i.e. Faircrouch Lane and the railway, the survey location was considered sufficiently representative of the acoustic conditions outside the nearest dwelling.

The monitoring equipment is listed in **Table 4-1**, which conforms to Class 1 specification of BS 61672 [3], and was installed by a consultant certified as competent in environmental monitoring.

Table 4-1: Survey equipment details

Equipment	Make and Model	Serial Number	Calibration	
			Certificate Number	Expiry Date
Sound Level Meter Microphone	SV 307	104938 107140	N/A (new meter within two years of factory calibration)	11/03/2023

The measurement chain was field-calibrated at the start of the survey using an acoustic calibrator. The level was checked at the end of the survey, with no significant drift recorded. The acoustic calibrator has itself been laboratory calibrated within the preceding 12-month period.

The meter was set to store consecutive 15-minute L_{Aeq} (ambient) and L_{A90} (background) levels, the latter with the 'Fast' time weighting applied (as per standard practice).

4.2 Weather Conditions

At the time of setting up equipment, conditions were noted to be wet with light wind. At the time of collecting the equipment, conditions were noted to be dry with light winds. Weather conditions during the survey period have been obtained from an internet source www.wunderground.com (weather station Wadhurst, ID IWADHU1), as summarised in **Table 4-2**. These confirm that beyond the light rain on the day of installation, conditions remained dry with generally light winds, where by the conditions are considered conducive to the reliable measurement of typical ambient and background sound conditions.

Table 4-2: Summary of weather data

Date	Average Temperature (°C)	Wind Speed (m/s)		Rainfall (mm)	General Description
		High	Average		
Wed 16/03/22	8.4	4.2	0.6	2.1	Mild wind and very light rain
Thu 17/03/22	7.2	3.4	0.9	0.0	light wind
Fri 18/03/22	8.9	3.3	0.6	0.0	light wind
Sat 19/03/22	9.1	3.6	0.6	0.0	light wind
Sun 20/03/22	5.6	2.2	0.2	0.0	light wind
Mon 21/03/22	8.2	1.8	0.1	0.0	light wind

4.3 Results

The full results of the survey are presented in graphical form in **Figure 4-1**.

Figure 4-1: 15-minute period survey results

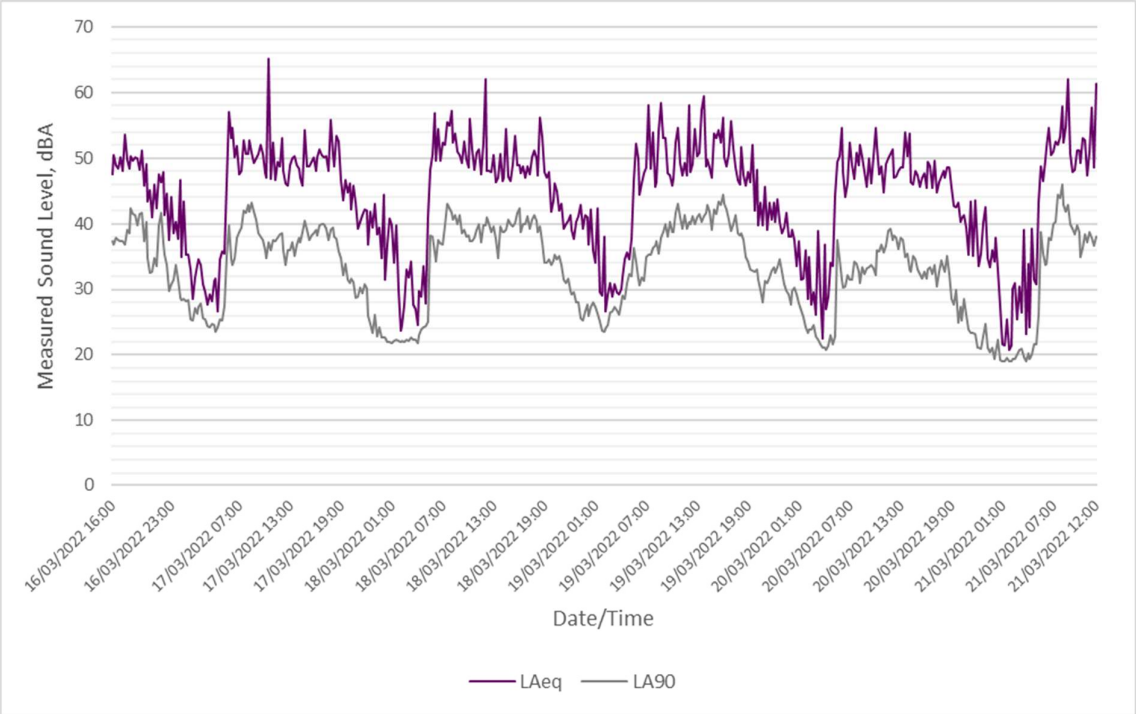


Table 4-3 presents a summary of the hourly averages of the $L_{AF90,15min}$ data during each day, taking into account the days for which data are available and the proposed hours of operation.

Table 4-3: Summary of background sound levels, dB ($L_{AF90,15min}$)

Day	Average of the $L_{AF90,15min}$ levels per hour (hh)												Ave.
	07	08	09	10	11	12	13	14	15	16	17	18	
WED	-	-	-	-	-	-	-	-	-	38	38	41	39
THU	41	43	39	36	38	36	36	39	39	39	39	38	39
FRI	41	41	39	38	39	40	38	40	41	40	41	39	40
SAT	35	37	39	41	40	40	41	-	-	-	-	-	39
MON	42	44	39	37	38	-	-	-	-	-	-	-	40
Range	35-42	37-44	39-39	36-41	38-40	36-40	36-41	39-40	39-41	38-40	38-41	38-41	35-44
Ave.	40	41	39	38	39	39	38	40	40	40	40	39	39

Notes: Periods for which data are not available or outside of hours of operation are grey-out.

The data have been condition-formatted in Microsoft Excel using the default Red – Yellow – Green colours to show the range in levels. They are not related to any particular thresholds – just a comparison of the data presented. The "Ave." row and column have been formatted separately.

It can be seen from the above that the levels were fairly consistent, with the overall averages ranging typically from 38 to 40 dB (i.e. a 2 dB variation on average). The highest levels coincide with the weekday morning peak travelling period, and where the lowest levels occurred on the Saturday morning and around the middle of the weekdays.

For context, **Table 4-4** presents the same in terms of the $L_{Aeq,15min}$ data.

Table 4-4: Summary of ambient sound levels, dB ($L_{Aeq,15min}$)

Day	Average of the $L_{Aeq,15min}$ levels per hour (hh)												Ave.
	07	08	09	10	11	12	13	14	15	16	17	18	
WED	-	-	-	-	-	-	-	-	54	49	50	50	51
THU	50	51	51	52	49	48	50	49	49	50	51	51	50
FRI	54	54	51	51	51	52	49	49	50	48	49	52	51
SAT	52	51	50	50	48	52	54	-	-	-	-	-	51
MON	52	57	49	52	51	-	-	-	-	-	-	-	52
Range	50-54	51-57	49-51	50-52	48-51	48-52	49-54	49-49	49-54	48-50	49-51	50-52	48-57
Ave.	52	53	50	51	50	51	51	49	50	49	50	52	51

Notes: Periods for which data are not available or outside of hours of operation are grey-out.
The data have been condition-formatted in Microsoft Excel using the default Red – Yellow – Green colours to show the range in levels. They are not related to any particular thresholds – just a comparison of the data presented. The "Ave." row and column have been formatted separately.

Not too surprisingly, the above L_{Aeq} levels present similar trends to the L_{AF90} levels, being reasonably consistent, and with highest and lowest levels occurring during the same periods.

Finally, **Table 4-5** presents the overall values from the above tables for comparison of the background (L_{AF90}) and ambient (L_{Aeq}) sound levels.

Table 4-5: Summary of the overall background and ambient sound levels

Metric	Average of the 15-minute level hourly average (hh)											
	07	08	09	10	11	12	13	14	15	16	17	18
$L_{AF90,15min}$	40	41	39	38	39	39	38	40	40	40	40	39
$L_{Aeq,15min}$	52	53	50	51	50	51	51	49	50	49	50	52
Difference	12	12	11	13	11	12	13	9	10	9	10	13

Note: As above, the data have been condition-formatted. Each row has been formatted separately.

The following are observed from the above data:

- The L_{Aeq} levels are, on average, between 9 to 13 dB higher than the corresponding L_{AF90} levels. This is a reasonably high difference, evidence that the area is subject to brief sounds notably higher than the background conditions, which will no doubt primarily be the vehicle movements on Faircrouch Lane and the train pass-bys.

- At between 49 and 53 dB, the L_{Aeq} levels are consistent with the criteria given in BS 8233 for external amenity areas (see **Section 3.3**).

The typical background sound level for use within the BS 4142 assessment (presented in the following section) is, therefore, considered to be 39 dB. Whilst there is clearly variation in background conditions, from hour to hour, and day to day, with lower levels being recorded at times, this level is considered to represent the "typical" conditions during the range of hours of operation for the purposes of the assessment of the noise impact. Consideration is given to the L_{Aeq} levels in the subsequent discussion on context.

5 NOISE IMPACT ASSESSMENT

5.1 Introduction and Local Authority Target Criterion

In line with the local authority noise policy outlined in **Section 3**, *"The rating level of the industrial or commercial sound source should, where practicable, achieve a level no greater than the representative background sound, when measured in accordance with BS 4142:2014 + A1: 2019"* during the proposed hours of operation at 1 m from the nearest noise sensitive properties, as detailed within the Planning Noise Advice Document: Sussex. The "local authority" target rating level is, therefore, 39 dB $L_{Ar,1h}$ during the operational period. This, however, is not to be confused with a BS 4142 assessment target, or, therefore, an indication of adverse noise impact, which is subject to context.

DataKustik's "CadnaA" modelling software has been used to determine the specific sound levels at the nearest dwelling, as described earlier. The assessment has been made over a 1-hour period, in keeping with the assessment period specified for daytime-based assessments within BS 4142.

Predictions have been carried out in accordance with the ISO 9613-2 [7] prediction methodologies, which allow consideration of the effects of the acoustic screening provided by the existing buildings surrounding the application site, the topographical conditions throughout the area, ground absorption, atmospheric absorption, acoustic reflections and acoustic screening, as well as applying a light downwind propagation correction to represent a worst-case.

5.2 Proposed Plant and Incumbent Noise Control

The sound pressure levels associated with the proposed plant are detailed in **Table 5-1**. They have been determined from historic measurements made by Anderson Acoustics and from guidance documents. To account for hand sorting, raised voices have been included within the assessment (based on a sound pressure level of 62 dBA at 1m).

Table 5-1: Assumed Sound Pressure Levels of Proposed Plant at 10m, dBA

Plant/Activity Type	Sound Pressure Level at 10m, L_p	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Hitachi ZW180 Loading Shovel	73	75	76	70	69	67	66	66
Tracked Excavator 14t	70	74	70	68	67	64	62	58
Lorry Movements	80 [1]	73	78	78	78	74	73	68

Note: [1] Based on L_{AFmax} level, adopted as worst-case for this assessment.

To undertake this assessment, the following on-times (per hour) have been assumed to establish representative conditions:

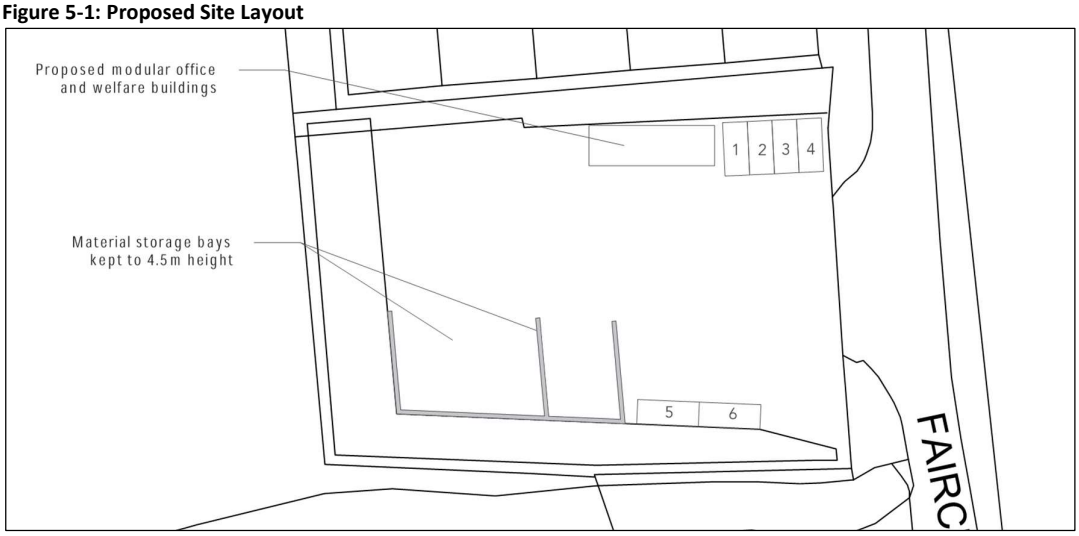
- Lorry movements: 2 mins (assumed 2 deliveries)
- Loader activities: 10 mins (unloading/loading/moving material)
- Excavator activities: 30 mins (sorting/moving material)
- Raised voices: 10 mins (x2)

Typical daily activities have been modelled to include lorries entering the site, loading and unloading materials within the proposed bays using an excavator/loader, and hand-sorting with some raised voices assumed.

As detailed in **Figure 5-1**, material storage bays are proposed to provide screening where plant will be operational. It is proposed that the outer walls of the bays will be built to a height of 4.5 m, with the partitions built to a height of 4.0 m. The use of additional screening to the east of the bays has been explored, but where,

due to the gap required for access (off Faircrouch Lane), and the lorry movements being towards the centre of the site, i.e. away from the boundary, the additional acoustic benefit was found to be limited.

Figure 5-1: Proposed Site Layout



Appendix C presents the noise contour map with the assumed activities operational. The specific sound level at the receiver position is detailed, which is subject to discussion below on character correction.

The specific sound levels for each item of plant at 1.5 m above ground and 1 m from the nearest residential property are detailed in **Table 5-2**. Acoustic character corrections have been applied using BS 4142 methodology on an individual basis. A combined rating level has then been compared against the typical background sound level, as detailed in **Table 5-3**.

A correction of +3 dB is considered to be suitable due to the proposed operation of the Loading Shovel and Tracked Excavator. No acoustic correction has been applied to the lorry movements given these should be in keeping with movements on Faircrouch Lane generally. Whilst no correction has been applied to the raised voices since the levels are well below the background level.

Table 5-2: Specific and Rating Levels of each Plant Item/Activity

Item of Plant	Predicted Specific Sound Level at Receiver Location, $L_{Aeq,1hr}$	Feature Correction	Rating Level at Receiver Location, $L_{Ar,1h}$
Hitachi ZW180 Loading Shovel	39 dB	+3 dB	42 dB
Tracked Excavator 14t	32 dB	+3 dB	35 dB
Lorry Movements	42 dB	0 dB	42 dB
Human Activity (2 x raised voices)	9 dB	0 dB	9 dB

Table 5-3: Cumulative Rating Level and Background Level Comparison

Description	Result
Cumulative Rating Level, $L_{Ar,1h}$	45 dB
Background Sound Level, L_{AF90}	39 dB
Difference	+6 dB

The assessment indicates that the operation of the proposed site would exceed the adopted background sound level by 6 dB, whereby the default "local authority" target would not be met. However, in the absence of full consideration of context, this is not necessarily an indication of an adverse impact. Context is considered below, therefore.

5.3 Consideration of Context

In accordance with BS 4142, the above comparison represents an "initial estimate" of the impact, being subject to context. In terms of context, it is recommended that consideration be given to:

1) the absolute level of sound;
2) the character and level of "residual sound" compared to the character and level of the specific sound; and
3) the sensitivity of the receptor and whether design measures are in place that secure good acoustic conditions (such as façade insulation treatment).

In terms of the first point, an external level of 50 dB ($L_{Aeq,T}$) would typically be considered sufficiently low for residential amenity (as detailed in BS 8233), and that whilst a lower limit should apply where the sound in question contains a specific character, an alternative approach is to compare the threshold with the rating level determined in accordance with BS 4142. At 45 dB ($L_{Ar,1h}$), therefore, the rating level can be seen to be below this threshold.

By comparison with the measured ambient levels, where levels on average were found to range from 9 to 13 dB above the equivalent background sound levels (see **Table 4-5**), the difference between the rating and background levels (i.e. 6 dB) can be seen to be below this range. Again, therefore, the rating level is also below the ambient sound conditions typically.

The "residual sound" referenced in the second point above relates to the existing, ambient ($L_{Aeq,T}$) sound conditions, as compared to the rating level above. But where, in addition to considering the "level," the second point refers to the "character" of the residual sound vs the specific sound. Since there is the Business Park nearby, which includes vehicle repair garages, together with Faircrouch Road and the railway, it could be argued that the existing conditions are already similarly characterful.

It is, of course, also relevant that the site operated as a household waste and recycling centre for a significant period, and is safeguarded as such under the East Sussex Local Waste Site Plan. It is not known what the noise emissions were like at the time the site was operational, but where it is anticipate they could be readily as high at times as those calculated for the proposed scheme.

The third point applies where the receptor in question is less sensitive to noise than would typically be the case, due to, for example, measures that might have been put in place due to an existing noise source, either when the dwelling was built or retrospectively. This is presumably not the case here, but where, again, the site's former and safeguarded use is highly relevant, whereby there should be an expectation for similar such use in the future.

5.4 Overall Assessment

Despite character corrections having been applied, the rating level is just 6 dB above the adopted background sound level, which is a relatively low level, and around 5 dB below the ambient conditions, which are in keeping with criteria for amenity space in the relevant British Standard. Whilst, due to the historic and safeguarded use of the site, wit there also being the Business Park in the vicinity, it is considered that some noise from its use is to be expected.

On balance, therefore, it is considered that there would be, in the terms adopted by national policy (see **Appendix B**), at most, **No Observed Adverse Effect**, whereby "Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in quality of life."

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APPENDIX A

ACOUSTICS TERMINOLOGY

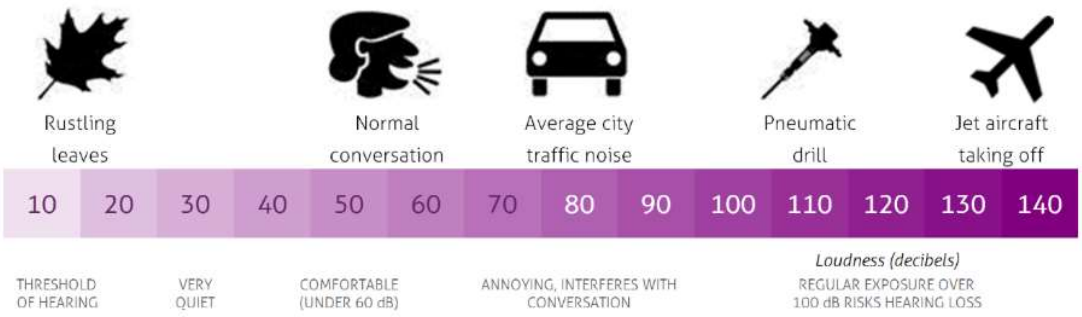
ACOUSTICS TERMINOLOGY

There is a ten million to one ratio between the threshold of hearing and the highest tolerable sound pressure. Sound is therefore measured using a logarithmic scale, to account for this wide range, called the decibel (dB) scale. Noise is defined as unwanted sound and the range of audible sound varies from around 0 dB to 140 dB.

The human ear is capable of detecting sound over a range of frequencies from around 20 Hz to 20 kHz; however, its response varies depending on the frequency and is most sensitive to sounds in the mid frequency range of 1 kHz to 5 kHz. Instrumentation used to measure sound is therefore weighted across the frequency bands to represent the sensitivity of the ear. This is called 'A weighting' and is represented as dB(A), dBA or L_{Aeq} for example (see also below).

It is generally accepted that under normal conditions humans are capable of detecting changes in steady sound levels of 3 dB, whilst a change of 10 dB is perceived as a doubling or halving of the sound level. An indication of the range of sound levels commonly found in the environment is given below.

Figure B-1: Typical sound levels



A number of different indices are used to describe the fluctuations in sound level over certain time periods. The main indices include:

$L_{A90,T}$ This is the sound level exceeded for 90% of the measurement period and provides a measurement of relatively continuous sounds that make up quieter 'lull' periods in between sound events. It is often referred to as the background sound level, and usually measured using the 'fast' time response (hence sometimes written $L_{AF90,T}$).

$L_{Aeq,T}$ This is the "equivalent continuous A weighted sound pressure level" and is the level of a notional steady sound which has the same acoustic energy as the fluctuating sound over a specified time period. It is often used for measuring all sources of sound in the environment, which can be referred to as the ambient sound.

$L_{Amax,F}$ This is the maximum sound pressure level measured in a given time period with the sound level meter set to 'fast' response. Also written $L_{Amax,fast}$ or L_{AFmax}.

Reference is often made to acoustic measurements being undertaken in 'free-field' or 'façade' locations. Free-field measurements represent a location away from vertical reflecting surfaces, normally by at least 3.5 m. A façade measurement is taken or calculated to a position 1 m from an external façade and a correction of up to 3 dB can be applied to account for the sound reflected from the façade. This latter position is often used when assessing the impact of external noise affecting residents inside properties. Further definitions relating to this report are given overleaf.

Definitions

- Airborne Sound: Sound that reaches the point of interest by propagation through air.
- Ambient Sound: Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far.
- 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.
- Background sound: Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location.
- Calibration: The measurement system/ chain should be periodically calibrated, within a laboratory, against traceable calibration instrumentation, to either National Standards or as UKAS-Accredited, as required. The calibration of the system should also be checked in the field using a portable calibrator before and after each short term measurements, and periodically for longer term monitoring.
- Class 1: The Class of a sound level meter describes its accuracy as defined by the relevant international standards – Class 1 is more accurate than Class 2. The older standard IEC 60651 referred to the grade as "Type", whereas the new standard IEC 61672 refers to it as the "Class". The most accurate meters used in the field (as opposed to a laboratory) are Class 1. Class 2 meters can be used in some instances; however, WSP use Class 1 (or Type 1) meters by default, as required by BS 4142:2014, for example.
- Context: The circumstances that form the setting for an event, statement, or idea, and in terms of which it can be fully understood. When considering context, pertinent factors include: the absolute level of sound; the character and level of the residual sound compared to the character and level of the specific sound; evidence on human response to the sound; and 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.
- Decibel (dB): A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in sound pressure level between two sounds (s1 and s2) is given by 20 $\log_{10}$ (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 20 µPa.
- Dwelling: A building used for living purposes. A mobile home used for permanent living should be included in an assessment. If calculations are being conducted for compensation purposes, then some mobile homes are dealt with under the Highways Noise Payments and Moveable Homes Regulations.
- Façade/ Façade Level: At a distance of 1 m in front of a large sound reflecting object such as a building façade. According to BS 8233:2014, "Façade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the façade." The Calculation of Road Traffic Noise (1988) uses 2.5 dB, whilst BS 5228-1:2009+A1:2014 recommends 3 dB. Owing to the latter examples, together with other historical documents, it is more usual to apply 3 dB.
- Fast time-weighting (F): Averaging time used in sound level meters. Defined in BS EN 61672-2:2013 *Electroacoustics. Sound level meters. Pattern evaluation tests*.
- Free-field/ Free-field Level: Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 m away.
- Hertz (Hz): The unit of Frequency or Pitch of a sound. One hertz equals one cycle per second. 1 kHz = 1000 Hz, 2 kHz = 2000 Hz, etc.
- IOA: The Institute of Acoustics is the UK's professional body for those working in acoustics, noise and vibration. It was formed in 1974 from the amalgamation of the Acoustics Group of the Institute of Physics and the British Acoustical Society (a daughter society of the Institution of Mechanical Engineers). It is a nominated body of the Engineering Council, offering registration at Chartered and Incorporated Engineer levels. Our consultants/engineers are individual Members.

- $L_{AF10,T}$: The A-weighted sound pressure level exceeded for 10% of the time over the period, T, measured using fast time-weighting (F), see below. It can be considered to be the "average maximum" sound level, and is generally used to describe road traffic sound.
- $L_{AF90,T}$: The 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 time fast time-weighting (F). Generally used to describe the 'background' sound conditions.
- L_{AFmax}: The maximum A-weighted sound pressure level during a given time period. L_{max} is sometimes used for the assessment of occasional loud sounds, which may have little effect on the overall L_{eq} noise level, but could still affect the sound environment. Unless described otherwise, it is measured using the fast time-weighting (F).
- $L_{eq,T}$: A sound level index called the equivalent continuous sound 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. Where the value is A-weighted, is will be presented '$L_{Aeq,T}$' or 'dBA $L_{eq,T}$', otherwise is should be an un-weighted (or linear) value.
- L_p: See Sound Pressure Level.
- Percentile Level: The sound pressure level exceeded for *N*% of a specified time interval, see $L_{AF90,T}$ etc.
- Rating Level, $L_{Ar,Tr}$: The equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$, see also Specific Level) of the sound, plus any adjustment for the characteristic features of the sound.
- Residual Sound: ambient sound remaining at the assessment location when the specific sound source is suppressed (or absent) to such a degree that it does not contribute to the ambient sound.
- Sound Level Metrics, Indices or Parameters: Sound levels usually fluctuate over time, so it is often necessary to consider an average or statistical sound level. This can be done in several ways, so a number of different metrics have been defined, according to how the averaging or statistics are carried out.
- Sound power: The sound energy radiated per unit time by a sound source. Measured in Watts (W).
- Sound pressure level (sound level), L_p: The sound level is the sound pressure relative to a standard reference pressure of 20 µPa ($20x10^{-6}$ Pascals) on a decibel scale.
- Sound pressure: Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
- Sound Pressure: Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
- Soundscape: Acoustic environment as perceived or experienced and/or understood by a person or people, in context.
- Specific sound level, $L_s = L_{Aeq,Tr}$: Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
- Specific sound source: Sound source being assessed.

APPENDIX B

NATIONAL PLANNING POLICY

NATIONAL PLANNING POLICY

Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published on 15 March 2010. It sets out the long-term vision of the Government's noise policy, which is to promote good health and a good quality of life through the management of noise within the context of sustainable development.

The NPSE sets out 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."
- The NPSE describes a number of effect levels that may be used to define effects in the context of noise policy, as follows:

- **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.
- **SOAEL – Significant Observed Adverse Effect Level -** This is the level above which significant adverse effects on health and quality of life.

National Planning Policy Framework

The National Planning Policy Framework (NPPF) was first published on 27 March 2012, revised in July 2018 and last updated in July 2021.

The NPPF sets out the Government's planning policies for England and how these are expected to be applied; with a main focus on economic, environmental and social planning policies. Clause 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:

a) 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[65]…"

Planning Practice Guidance – Noise

In March 2014 further guidance on interpreting the effect levels was published on the Government's Planning Practice Guidance – Noise. This planning practice guidance was updated and expanded on the 22nd of July 2019. This includes a table that summarises noise exposure hierarchy, noting this is based on the likely average response of a population. This is presented in Table B-1 overleaf.

This guidance has been prepared to assist in the planning permission process relating to noise. Recommendations within this guidance have been used to determine the potential impact of the proposal.

When considering the impact of noise as part of any planning concerns, it is important to consider the context and wider characteristics of a development proposal, its likely users and its surroundings, as these can have an important effect on whether noise is likely to pose a concern. It is noted that noise, where justified, may be used to override other planning concerns.

Observed effect levels may indicate the potential impact of a proposed development; however, this does not mean that the effects can only be defined in terms of a single value of noise exposure. In some circumstances, adverse effects are defined in terms of a combination of more than one factor, such as noise exposure, the number of occurrences of the noise in a given time period, the duration of the noise and the time of day the noise occurs.

Table B-4: Noise exposure hierarchy and effect levels (Planning Practice Guidance – Noise)

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in quality of life	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude, or other physiological response, 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.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

The threshold “Levels” (i.e. NOAEL, LOAEL, SOAEL and UAEL) between those “Effects” are not defined as they will be situation specific each time and, therefore, left to professional judgement.

APPENDIX C

NOISE CONTOUR MAP

Lorry + Loading Shovel + 360 Digger + 2 x Raised Voices – Combined Specific Sound Level, dB $L_{Aeq,1h}$ at 1.5m Above Ground Level