SHARPS REDMORE

ACOUSTIC CONSULTANTS • Established 1990

Report 1

Old Coal Depot,

Tavistock Road, Hillingdon

Sound Level Assessment

Prepared by
Sam Moran BEng(Hons) MIOA

Senior Consultant

Date 20th November 2023
Project No 2321960

North England
Sharps Redmore
The Plex, 15 Margaret Street,
Wakefield, WF1 2DQ
T 01924 586468
E northengland@sharpsredmore.co.uk
W sharpsredmore.co.uk

Regional Locations
North England,
South England (Head Office),
Wales, Scotland

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1.0 Introduction

1.1 Sharps Redmore have been appointed by Heaton Planning on behalf of Punjab Skips to undertake a sound level assessment in relation to a waste transfer station at an existing industrial estate at the Old Coal Yard, Hillingdon. The proposals are to allow for the receipt, storage and treatment of waste collected from the operators' skip collection service with the development being temporary in nature for a period of five years.

1.2 The proposed operating hours of the facility are as follows:

The site would be open to receive waste between the hours of:

- 07:00-18:00 Monday to Friday
- 08:00 – 13:00 Saturdays
- With no operations on Sunday or Public Holidays

Waste processing using fixed processing plant (trommel) hours of operation:

- 07:00 – 18:00 Monday to Friday only

1.3 This sound level assessment considers the impact at the nearest residential properties and has been undertaken in accordance with the guidance provided within BS 4142:2014+A1:2019[1] and relevant planning policy.

1.4 A guide to the acoustic terminology used within this report is included in Appendix A.

[1] BS 4142:2014+A1:2019, Methods for rating and assessing industrial and commercial sound

2.0 Assessment Methodology and Criteria

2.1 The National Planning Policy Framework[2] (NPPF), September 2023, sets out the Government's planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 185 of the NPPF states the following:

2.2 "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;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation".

2.3 In addition, Paragraph 187 states:

2.4 *"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"*.

2.5 Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance[3] (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The guidance contained in the NPPG is summarised in Table 2.1:

[2] National Planning Policy Framework, Ministry of Housing, Communities and Local Government, September 2023

[3] Planning Practice Guidance: Noise, Ministry of Housing, Communities and Local Government, July 2019

TABLE 2.1: Noise Exposure Hierarchy

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 the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
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 (SOAEL)			
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

2.6 The NPPF and NPPG reinforce the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE)[4], which states three policy aims, as follows:

[4] Noise Policy Statement for England, Department for Environment, Food and Rural Affairs, March 2010

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

a) avoid significant adverse impacts on health and quality of life;

b) mitigate and minimise adverse impacts on health and quality of life; and

c) where possible, contribute to the improvement of health and quality of life."

2.8 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

2.9 "… all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

2.10 Taking an overview of national policy aims and guidance it is clear that when considering the impact of noise that the fact it can be heard and causes impact, is not reason to refuse an application as consideration should also be given to the significance of the impact and the mitigation measures available.

2.11 The NSPE also states "*…the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications*".

2.12 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, such as:

i) The effect may be determined by reference to guideline noise values, such as those contained in the World Health Organisation (WHO) "Guidelines for Community Noise"[5].

ii) Another method is described within BS 4142:2014+A1:2019[6] to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

iii) Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.

[5] World Health Organisation (1999), "Guidelines for Community Noise"
[6] BS 4142:2014+A1:2019, Methods for rating and assessing industrial and commercial sound

Guidelines for Community Noise

2.13 The WHO "Community Noise Guidelines" (CNG) values are appropriate to what are termed "critical health effects". This means that the limits are at the lowest noise level that would result in any psychological or physiological effect. They are, as defined by NPSE, set at the Lowest Observed Adverse Effect Level (LOAEL), but do not define the level above which effects are significant (the SOAEL). Compliance with the LOAEL should, therefore, be seen as a robust aim, depending on context.

2.14 In 2018 the WHO published the "Environmental Noise Guidelines for the European Region" (ENGER). The latest WHO Environmental Noise Guidelines (page 28) explain that "The current environmental noise guidelines for the European Region supersede the CNG from 1999. Nevertheless, the GDG (Guideline Development Group) recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid". Hence the CNG remain relevant to this assessment.

2.15 The WHO ENGER brings together the latest research on the effects of specific types of noise on health in relation to transportation noise sources (road, rail and aircraft noise exposure), wind turbines and leisure noise. Hence in direct relation to the specific proposal that this noise assessment considers, the new WHO ENGER are not of material consideration.

2.16 The relevant World Health Organisation (CNG) noise values are summarised in the following table:

Table 2.2: WHO CNG values

Document	Level	Guidance
World Health Organisation "Guidelines for Community Noise 1999"	L_{AeqT} = 55 dB	Serious annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	L_{AeqT} = 50 dB	Moderate annoyance, daytime and evening. (Continuous noise, outdoor living areas).
	L_{AeqT} = 35 dB	Moderate annoyance, daytime and evening. (Continuous noise, dwellings, indoors)
	L_{AeqT} = 45 dB	Sleep disturbance, windows open at night. (external level).
	L_{AeqT} = 30 dB	Sleep disturbance, night-time (indoors)
	L_{Amax} = 60 dB	Sleep disturbance, windows open at night. (Noise peaks outside bedrooms, external level).
	L_{Amax} = 45 dB	Sleep disturbance at night (Noise peaks inside bedrooms, internal level)

Assessment using BS 4142:2014+A1:2019

2.17 In brief, the BS 4142 assessment method is to obtain an initial potential impact finding by comparing the difference in level between the site-attributable sound (called the rating level) and the background sound. The latter is the underlying value in the absence of the site sound. The initial impact finding is then to be considered in context and that can modify the outcome. In terms of the 'difference' comparison, a difference of around +10dB or more is considered likely to be an indication of a significant adverse impact, depending on the context. A difference of around +5dB is likely to be an indication of an adverse impact,

depending on the context. When the difference is around zero or negative in magnitude, the indication is of a low impact, again depending on the context.

2.18 Context is key and pertinent factors to consider include the absolute level of the source; the character of the neighbourhood sounds (with and without the site contribution); the sensitivity of the receptor and the presence or otherwise of sound mitigation measures. (Clause 11 of BS4142). This includes 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 facade insulation treatment.

2.19 It is therefore entirely possible that whilst the numerical outcome of a BS 4142 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in *context* the significance of the impact is reduced to an acceptable level.

Changes in noise level

2.20 Changes in noise levels of less than 3 dBA are not perceptible under normal conditions and changes of 10 dBA are equivalent to a doubling of loudness. This guidance has been accepted by inspectors, at inquiry, to encompass changes in noise levels in the index L_{AeqT}.

2.21 Table 2.3 below shows the response to changes in noise (known as a semantic scale); this table has been developed from general consensus opinion of acousticians.

Table 2.3: Change in noise level

Change in noise level L_{AeqT} dB	Response	Impact
<3	Imperceptible	None
3 – 5	Perceptible	Slight/moderate
6 – 10	Up to a doubling	Moderate/significant
11 – 15	More than a doubling	Substantial
>15	-	Severe

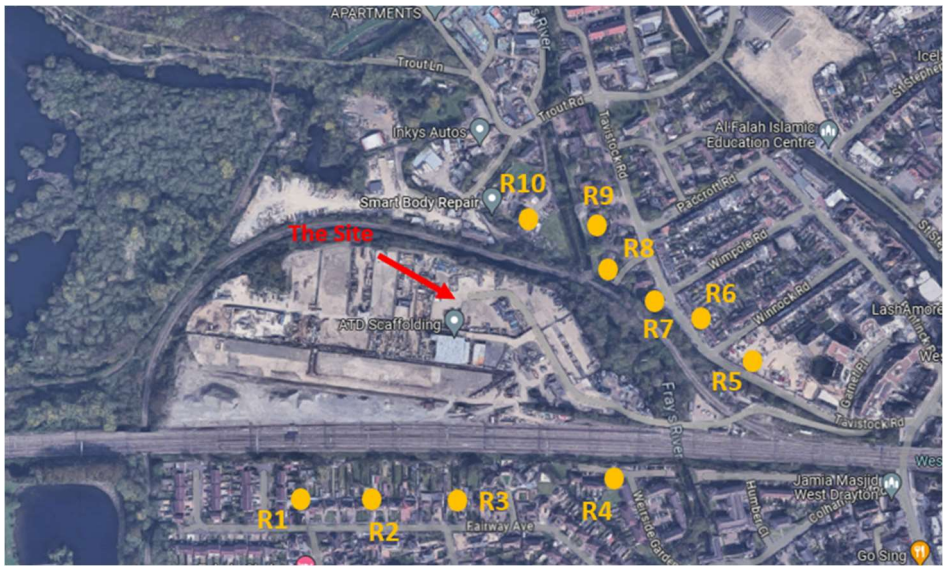
3.0 Description of Neighbourhood and Sound Level Survey

3.1 The site is located within an existing industrial estate with a variety of uses present within the surrounding area including existing waste facilities. In the southern part of the industrial estate, a rail freight sidings is present and is currently used by Hanson as an aggregates rail depot. It is understood that there are no operating hours restrictions, however, the depot is in operation during daytime hours seven days a week. An extensive rail network is located to the south of the depot which is used by both passenger and freight trains with residential premises located beyond where existing ground levels are around 4m below the height of the railway.

3.2 An additional rail line traverses around the remaining boundary of the industrial estate with residential premises located off Tavistock Road beyond the line to the east. A household waste recycling depot is located within the industrial estate between the site and dwellings to the east. Various commercial / industrial premises are located beyond the rail line to the north with these uses surrounding a residential dwelling. The M25 is located around 1.5km to the west with Heathrow Airport located around 3.5km to the south.

3.3 Figure 3.1 below presents representative locations of the closest residential receptors around the site.

Figure 3.1: Site and Sensitive Receptor Location Plan



Baseline Sound Survey

3.4 An environmental sound level survey has been undertaken by Sharps Redmore on Friday 29th and Saturday 30th September 2023.

3.5 Attended measurements were collected at two locations (NML1 and NML2) which were representative of the closest residential receptors.

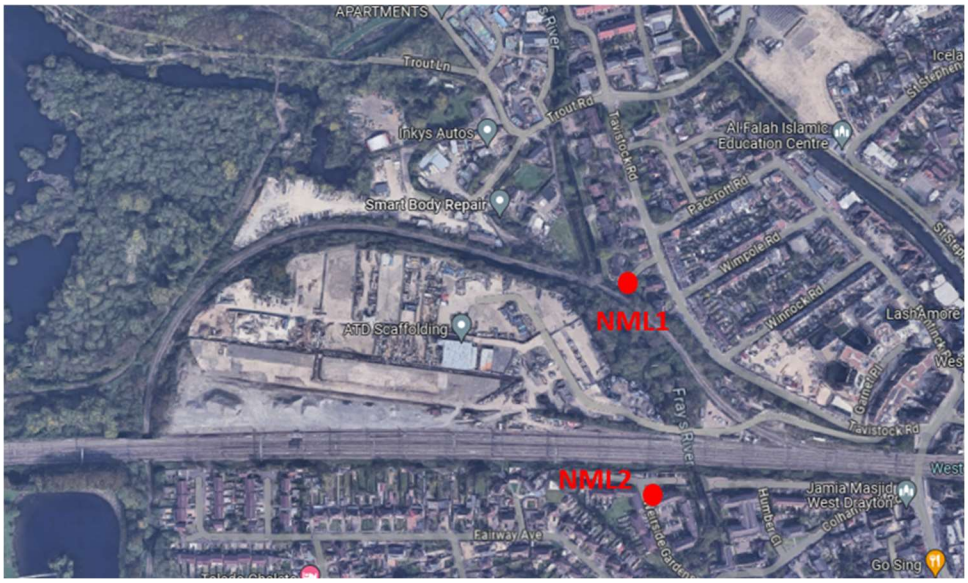
3.6 A description of the sound monitoring locations is as follows:

- NML1 – To the rear of dwellings on the western end of Merridale Mews which is located off Tavistock Road

- NML2 – on grassland in front of apartments on Weirside gardens

3.7 A plan showing the sound level monitoring locations is presented in Figure 3.2.

Figure 3.2 Sound Level Monitoring Location



3.8 The sound level measurements were carried out in free-field conditions with the microphones mounted at a height of approximately 1.5m above local ground level. Details of the type 1/class 1 sound level meters and calibrators used for the survey are presented in Appendix B. The sound level meters were calibrated before and after the survey with no drift recorded.

3.9 The dominant sound source in the area around the site was road and rail traffic sources along with overhead aircraft. Rail traffic included passenger and freight trains. Sources of an industrial sound were also audible including clunks and bunks along with existing vehicle movements including skip lorries traversing along the site access road into the industrial estate.

3.10 A summary of the measured sound levels is presented in Table 3.1 with the raw data tabulated in Appendix C.

Table 3.1: Summary of Measured Sound Levels

Location	Date and Time	Ambient / average sound level dB $L_{Aeq,T}$	Typical maximum sound level dB L_{Amax}	Underlying / background sound level dB $L_{A90,T}$
NML 1	29/09/23: 10:19 – 10:49 13:08 – 14:10	53	71	48
	30/09/23: 07:00 – 07:30 09:22– 10:24*	52	69	40 to 45
NML 2	29/09/23: 10:56 – 11:27 14:17 – 15:19	65	84	48
	30/09/23: 07:37 – 08:07 10:36 – 11:37	59	82	40 to 44

*sound from a freight train including wheel squeal influenced the measurements at around 09:40. This data is presented in Appendix C but excluded from the summary presented in Table 3.1 as a conservative approach.

3.11 Observations of weather conditions at the site and in the surrounding area were made during the survey. Weather conditions on the 29th September were categorised by dry conditions with a moderate north westerly breeze, 80% cloud cover and temperature of approximately 17°C. Weather conditions on the 30th September were categorised by dry conditions with a low westerly breeze, overcast and temperature of approximately 10°C. Wind speeds were measured using a handheld anemometer with speeds being below 5 m/s throughout the survey.

3.12 Further to the above, Receptor R5 (as shown in Figure 3.1) is representative of a proposed residential development at the former Comag works site off Tavistock Road which is located within a wider parcel of land designated for residential development. This development is the closest proposed residential development within this wider development area to the site. A noise assessment[7] was undertaken to accompany the planning application[8] which included a sound survey at the site.

3.13 With reference to the sound survey data presented within the submitted noise report, daytime ambient sound levels at positions representative of the closest apartments, were measured to be around 60 dB $L_{Aeq,T}$ with typical background sound levels measured to be around 48 dB $L_{A90,T}$ during weekdays and 46 dB $L_{A90,T}$ during weekends. This data has been used to represent baseline sound levels at R5 (representative of the proposed residential apartments at the Comag site) and R6 which is located adjacent to Tavistock Road a short distance to the north.

[7] Mayer Brown, Former Comag Works, Noise and Vibration Assessment, July 2022, 6020_BHTavistockRoad(N).9, Ver 1.0

[8] Planning application Ref: 24843/APP/2022/2403

4.0 Key Findings

Development Description and Site-Attributable Sound Levels

4.1 A description of the proposed operations is provided in the Planning Statement application prepared by Heaton Planning. In summary, the operation will be waste sorting and separation with manual and mechanical sorting to separate waste.

4.2 Waste would be tipped onto the floor with the skip lorry lifting equipment. The waste would be sorted within the WTS building using two 14 tonne excavators with selector grabs, which would separate larger items of waste into separate fractions. Waste may be further sorted using a trommel screen when operations have been scaled up. Ground staff would also manually sort smaller fractions of waste along a picking line where it would be placed into different containers.

4.3 Inert waste, for example hardcore, soils and stone, would be transferred to storage bays within the building. Non inert waste, such as plastic, wood, card, metal and mixed waste, would be transferred to a number of roll on/off steel containers, which would also be stored within the building.

4.4 Waste would be removed from the site in accordance with the requirements of the site's Environmental Permit. Inert waste would be loaded into tipper lorries using a loading excavator. Non-inert material stored in 40 yard containers would be taken off site by hookloader lorries.

4.5 With regard to vehicle movements, the Traffic Statement which accompanies the application indicates that the proposed development could generate 68 skip wagons importing waste and 31 HGV's exporting waste per day. Based on the results of a traffic survey (between 07:00 and 19:00) the existing number of vehicles movements using the existing site access into the industrial estate is 720 vehicles of which 420 are HGV's. The existing flows also include movements associated with the operators existing business which is located within the industrial estate. Therefore, the number of proposed development vehicle movements within the site within the context of the existing movements is considered to be negligible and not required to be assessed further.

4.6 In order to quantify an internal specific sound level within the proposed building, reference is given to measured sound levels from within the Sharps Redmore database of waste processing plant and activities operating at full capacity which have been obtained at a number of comparable sites. In the specific context of sound emissions, based on previous experience of Sharps Redmore on similar sites, sound from the processing of waste using a trommel would be expected to be the principle source of sound associated with the proposed operations.

4.7 The following source sound power levels have been used as a basis of the assessment:

- Trommel being fed by a 360^0 excavator with grab – 110 dB $L_{WA,1hour}$. Prior to the installation of a trommel, material would be sorted using the excavator only.
- Additional 360^0 excavator with grab handling and loading waste - 99 dB $L_{WA,1hour}$.
- Skip manoeuvre, tip and depart - 92 dB $L_{WA,1hour}$ (Activity sound level of 97dB $L_{WA,3mins}$ per event and average of six events per hour).

4.8 Within the context of the above sources and activities occurring within the industrial estate, the limited number and short duration loading of containers onto hookloader lorries would be insignificant.

4.9 With regard to proposed operations, processing (using a trommel) would only occur on a weekday. On a Saturday, operations would be reduced with incoming skip waste and one excavator handling material within the building occurring. Therefore, the following combined sound levels have been applied:

- Weekday: Trommel with excavator 110 dB L_{WA}, excavator 99 dB L_{WA}, skips 92 dB L_{WA}: Total 110 dB $L_{WA,1hour}$ [9]
- Saturday: Excavator 99 dB L_{WA}, skips 92 dB L_{WA}: Total 100 dB $L_{WA,1hour}$ [10]

4.10 Based on these assumptions of the processing of skip waste it is considered that the following presents a reasonable worst-case scenario.

Assessment

4.11 Acoustic computer modelling has been undertaken using SoundPLAN 8.2 to calculate the sound propagation from the site based on measured specific source sound levels which are representative of proposed operations. The model uses the calculation methodology described by ISO 9613-2[11] with the model input parameters presented in Appendix E.

4.12 Table 4.1 presents a comparison of the background sound level with the predicted rating level at identified receptors during a weekday with the comparison for a Saturday presented in Table 4.2. The reference existing background sound levels are based on a review of the baseline survey data and represent a reasonable worst-case scenario. A noise contour plot of the weekday noise model is presented for visual purposes in Appendix F.

4.13 In Sharps Redmore's experience, sound from processing operations as those proposed are neither tonal nor impulsive. Depending on specific circumstances, the character of the sound from the proposed operations could be considered to be intermittent or distinctive in nature. However, within the context of the site and existing sound environment, it is not considered that the sounds from activities would be readily distinctive at the identified receptor locations. This is based on the context that there are already existing waste facilities within the industrial estate as well as the presence of the aggregates loading depot to the south of the site. Additionally, on both weekday and weekends, predicted specific levels are predicted to be below or around background sound levels and below existing ambient levels at all receptor locations. Therefore, on the basis of the above, when deriving the rating level, it is considered reasonable to conclude that the addition of a character correction to the specific level would not be appropriate.

[9] 110 dBA = 10*log(10^(110/10)+10^(99/10)+10^(92/10)
[10] 100 dBA = 10*log(10^(99/10)+10^(92/10)
[11] ISO 9613-2:1996, Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation

Table 4.1: Comparison between background sound levels and rating levels (Weekday)

Location	Reference Existing Background Sound Level (dB $L_{A90,T}$)	Predicted Specific Level (dB $L_{Aeq,1hour}$)	Predicted Rating Level (dB $L_{A,Tr}$)	Difference (dB)
R1	48	46	46	-2
R2	48	43	43	-5
R3	48	43	43	-5
R4 (2nd Floor)*	48	49	49	1
R5 (7th Floor)*	48	48	48	0
R6	48	45	45	-3
R7 (2nd Floor)*	48	45	45	-3
R8	48	42	42	-6
R9	48	43	43	-5
R10	48	42	42	-6

*Highest predicted sound level at apartments presented

Table 4.2: Comparison between background sound levels and rating levels (Saturday)

Location	Reference Existing Background Sound Level (dB $L_{A90,T}$)	Predicted Specific Level (dB $L_{Aeq,1hour}$)	Predicted Rating Level (dB $L_{A,Tr}$)	Difference (dB)
R1	40	37	37	-3
R2	40	35	35	-5
R3	40	35	35	-5
R4 (2nd Floor)*	40	40	40	0
R5 (7th Floor)*	46	40	40	-6
R6	46	38	38	-8
R7 (2nd Floor)*	40	38	38	-2
R8	40	35	35	-5
R9	40	36	36	-4
R10	40	35	35	-5

*Highest predicted sound level at apartments presented

4.14 The initial impact outcome is predicted to be low at all receptors on both weekdays and Saturdays.

4.15 Further points of context which are pertinent and where assessment uncertainty has been minimised are as follows:

- The site is located within an existing industrial estate where existing waste premises are currently operating including skip waste operations. The clients existing skip waste facility is located a short distance to the west within the industrial estate. A rail aggregates depot is located to the south of the site with an associated siding for the loading of aggregates onto freight trains. This facility is understood to be operational during the daytime period seven days a week.

- Based on measurements obtained at NML1 and NML2 during weekday and weekend periods, the predicted specific levels are below existing ambient sound levels ($L_{Aeq,T}$). This would result in a change in sound level of less than 3dB which would represent a negligible impact when compared to the criteria presented in Table 2.3.

- A justification has been provided in Paragraph 4.13 regarding the context of the nature of the existing uses that occur within the existing industrial estate including the presence of existing waste operators and an aggregates rail depot. It is not considered that sound from the proposed operations would be readily distinctive at identified receptor locations. This includes the context of the baseline sound environment and existing activities occurring in the area around the site.

- Uncertainty in the source sound level has been reduced as the assessment is based on measurements obtained of comparable activities and plant operating at full capacity. The processing of skip waste using a trommel has been used as a basis of the assessment.

- The proposed operating hours are during less sensitive typical working daytime hours. Additional noise control has been provided by restricting the use of fixed processing plant (trommel) which would be expected to generate the highest sound levels associated with proposed operations to weekdays only.

Final Impact

4.16 In view of the assessment presented above including taking into account context, Sharps Redmore consider the impact to be low at all receptors.

4.17 This assessment has objectively demonstrated in the context of nationally recognised standards and planning guidance that operations at the site during the proposed operating hours would not give rise to significant adverse impact and hence would comply with the requirements of the NPPF.

5.0 Conclusions

5.1 Sharps Redmore have undertaken an environmental sound assessment to consider the sound impact associated with a proposed waste transfer station within an existing industrial estate at the Old Coal yard, Hillingdon.

5.2 The proposed operating hours are:

The site would be open to receive waste between the hours of:

- 07:00-18:00 Monday to Friday
- 08:00 – 13:00 Saturdays
- With no operations on Sunday or Public Holidays

Waste processing using fixed processing plant (trommel) hours of operation:

- 07:00 – 18:00 Monday to Friday only

5.3 A baseline sound survey has been undertaken and background sound levels representative of the closest residential receptors have been established. Specific source sound levels have been modelled and rating levels predicted at the closest residential receptors on both weekdays and weekends.

5.4 This assessment has objectively demonstrated in the context of BS 4142 that sound levels from proposed operations would not be expected to give rise to a significant adverse impact at nearby residential receptors and that a low impact is predicted.

5.5 This assessment has objectively demonstrated in the context of nationally recognised standards and planning guidance that the effects of identified sources of noise being emitted from the surrounding environment or being generated as a result of the proposed development would not give rise to a significant adverse impact.

APPENDIX A

ACOUSTIC TERMINOLOGY

Acoustic Terminology

A1 Noise, which is sometimes defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0 dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB, i.e. 50 dB + 50 dB = 53 dB. Increases in continuous sound are perceived in the following manner:

1 dB increase - barely perceptible.

3 dB increase - just noticeable.

10 dB increase - perceived as twice as loud.

A2 Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18000Hz (or 18kHz). The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies.

A3 To take account of the varying sensitivity of people to different frequencies a weighting scale has been universally adopted called "A-weighting". The measuring equipment has the ability automatically to weight (or filter) a sound to this A scale so that the sound level it measures best correlates to the subjective response of a person. The unit of measurement thus becomes dBA (decibel, A-weighted).

A4 The second important characteristic of sound is amplitude or level. Two units are used to express level, a) sound power level - L_w and b) sound pressure level - L_p. Sound power level is an inherent property of a source whilst sound pressure level is dependent on surroundings/distance/directivity, etc. The sound level that is measured on a meter is the sound pressure level, L_p.

A5 External sound levels are rarely steady but rise or fall in response to the activity in the area - cars, voices, planes, birdsong, etc. A person's subjective response to different noises has been found to vary dependent on the type and temporal distribution of a particular type of noise. A set of statistical indices have been developed for the subjective response to these different noise sources.

A6 The main noise indices in use in the UK are:

L_{A90}: The sound level (in dBA) exceeded for 90% of the time. This level gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the "background sound level" of an area.

L_{Aeq}: The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as aircraft and trains.

L_{A10}: The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given sample. It has been used over many years to measure and assess road traffic noise.

L_{AMAX}: The maximum level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.

A7 The sound energy of a transient event may be described by a term SEL - Sound Exposure Level. This is the L_{Aeq} level normalised to one second. That is the constant level in dBA which lasting for one second has the same amount of acoustic energy as a given A weighted noise event lasting for a period of time. The use of this unit allows the prediction of the L_{Aeq} level over any period and for any number of events using the equation;

$$L_{AeqT} = SEL + 10 \log n - 10 \log T \text{ dB}.$$

Where

n = Number of events in time period T.

T = Total sample period in seconds.

A8 In the open, known as free field, sound attenuates at a rate of 6 dB per each doubling of distance. This is known as geometric spreading or sometimes referred to as the Inverse Square Law. As noise is measured on a Logarithmic scale, this attenuation in distance = 20 Log (ratio of distances), e.g. for a noise level of 60 dB at ten metres, the corresponding level at 160 metres is:

$$60 - 20 \text{ Log } {}^{160}/_{10} = 60 - 24 = 36 \text{ dB}.$$

APPENDIX B

EQUIPMENT DETAILS

Equipment	Location	Serial Number	Date Last Calibrated	Calibration Drift
Norsonic 118 SLM	NML1 & NML2	31797	15.07.23	-0.0 dB
Norsonic 1251 Calibrator		31426	15.07.23	-

*SLM: Sound Level Meter

APPENDIX C

SOUND SURVEY DATA

Location	Date / Start Time	Duration (Mins)	dB $L_{Aeq,T}$	dB L_{Amax}	dB $L_{A10,T}$	dB $L_{A90,T}$
NML1	29/09/2023 10:19	15	53	71	55	49
	29/09/2023 10:34	15	53	71	56	48
	29/09/2023 13:08	15	52	64	54	48
	29/09/2023 13:24	15	52	70	55	47
	29/09/2023 13:39	15	52	71	55	48
	29/09/2023 13:55	15	55	69	57	48
	30/09/2023 07:00	15	51	70	54	43
	30/09/2023 07:15	15	51	75	52	45
	30/09/2023 09:22	15	52	69	56	41
	30/09/2023 09:38	15	67	90	66	41
	30/09/2023 09:53	15	53	71	56	41
	30/09/2023 10:09	15	50	69	53	40
NML2	29/09/2023 10:56	15	66	84	62	48
	29/09/2023 11:12	15	63	84	57	46
	29/09/2023 14:17	15	66	84	58	48
	29/09/2023 14:33	15	64	85	56	48
	29/09/2023 14:48	15	64	84	59	49
	29/09/2023 15:04	15	67	84	62	50
	30/09/2023 07:37	15	57	80	51	44
	30/09/2023 07:53	15	50	71	50	44
	30/09/2023 10:36	15	61	82	51	40
	30/09/2023 10:51	15	59	82	60	40
	30/09/2023 11:07	15	56	80	54	41
	30/09/2023 11:22	15	62	82	53	40

APPENDIX D

PROPOSED SITE PLAN

APPENDIX E

NOISE MODEL INPUT DETAILS

Table E.1: SoundPlan Model Sources and Parameters

Parameter	Source	Details
Base Plan	OS	OS Vector Map
Ground Levels	Defra	2m Lidar (DTM)
Building Heights	SR Observations	On site proposed buildings based on elevation plans: 8 metres for off-site buildings (2.5 – 3.5m for single storey buildings)
Barriers	SoundPlan	No barriers included in the model
Receptor Positions	SoundPlan	1.5m height except for apartments (Each floor modelled: 3m height per storey). Receptors: 1m from façade (freefield of the façade) R5 – Freefield
Absorbent Ground	SoundPlan	G=0 (hard ground)
Reflections	SoundPlan	3rd order reflections
Site Layout	Heaton Planning	Site Layout Plan: 230818 Hea043-SLP

Table E.2: Modelled Source Sound Power Level

Scenario	Octave band centre frequency Hz – dB L_{eq}								Apparent Sound Power Level (dB $L_{WA',1hour}$)
	63	125	250	500	1k	2k	4k	8k	
Weekday	108	103	102	103	104	105	101	92	110
Weekend	98	93	92	93	94	95	91	82	100

Using the SoundPlan 'Indoor Noise' Module, it is possible to calculate the sound level within a building from a sound power level associated with a source assigned at a particular position within the building. SoundPlan calculates an sound level within the space taking into account the properties of the building including transmission and absorption spectra of the building construction. The building has been assigned as being open on the southern elevation.

A point source has been assigned in an approximate central position of the building at a height of 2.5m. Assumptions have been made with regard to the building construction in terms of the sound insultation performance and absorption coefficient of the observed building materials which are presented in Tables E.3 and E.4 below.

Table E.3: Estimated Sound Reduction Index of the Building Elements

Building Element	Description	Source	Octave Band Sound Reduction Index Hz - dB							
			63	125	250	500	1k	2k	4k	8k*
South elevation	Open		0	0	0	0	0	0	0	0
North, east and west elevations and roof cladding	0.4 mm steel	Marshall Day Insul Software	6	7	11	15	20	26	31	31

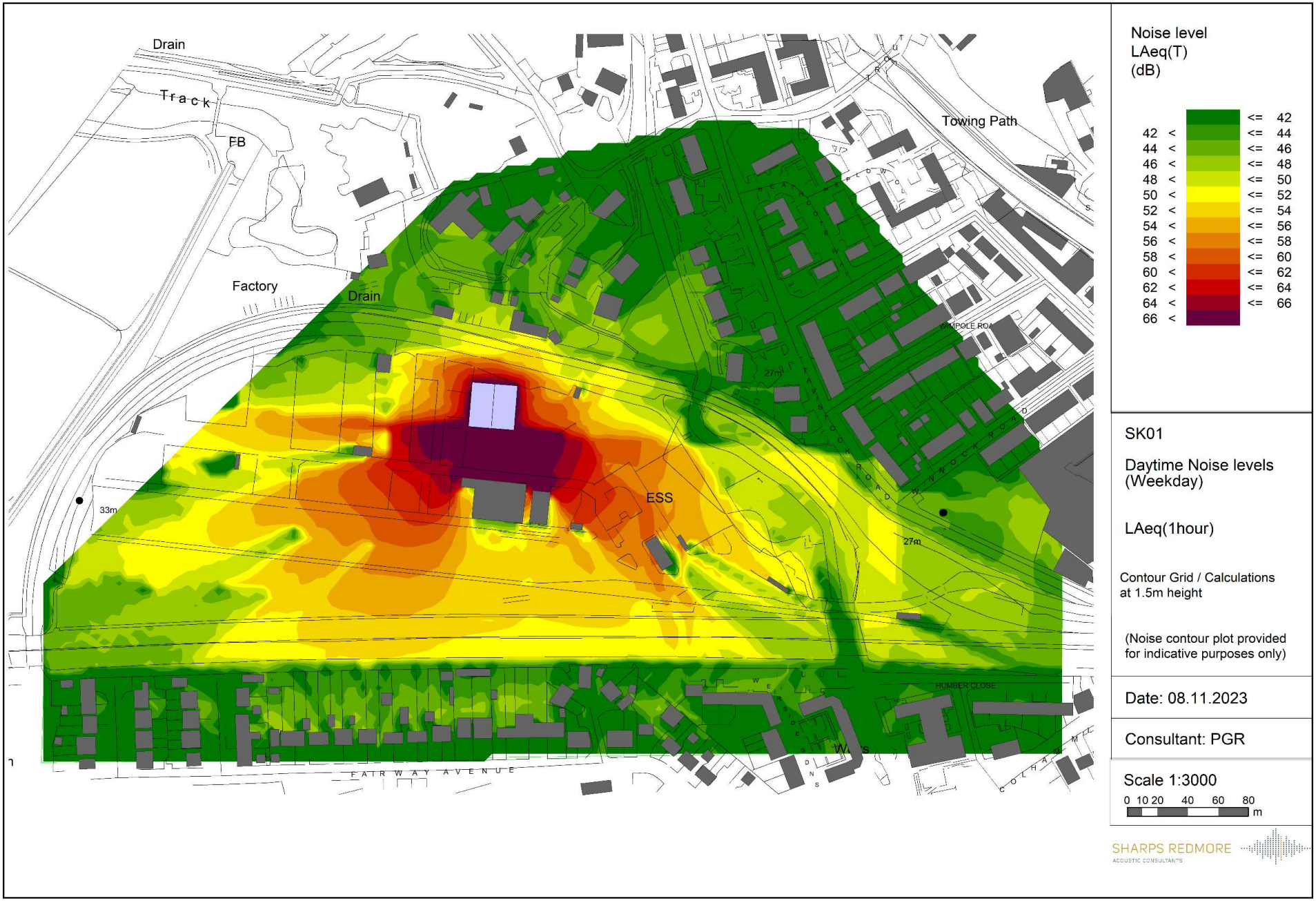
Table E.4: Estimated Absorption Coefficient of the Building Elements

Building Element	Description	Source	Octave Band Absorption Coefficient – Sabine m^2							
			63	125	250	500	1k	2k	4k	8k*
South elevation	Open		1	1	1	1	1	1	1	1
North, east and west elevations and roof cladding	0.4 mm steel (Untreated walls and ceiling surfaces)	SoundPlan	0.050	0.060	0.070	0.080	0.080	0.090	0.100	0.110

*8k estimated

APPENDIX F

SKETCHES


Drain
Track
FB
Factory
Drain
Towing Path
ESS
33m
27m
27m
FAIRWAY AVENUE
HUMBER CLOSE
Noise level
LAeq(T)
(dB)
42 < <= 42
44 < <= 44
46 < <= 46
48 < <= 48
50 < <= 50
52 < <= 52
54 < <= 56
56 < <= 58
58 < <= 60
60 < <= 62
62 < <= 64
64 < <= 66
66 <
SK01
Daytime Noise levels
(Weekday)
LAeq(1hour)
Contour Grid / Calculations
at 1.5m height
(Noise contour plot provided
for indicative purposes only)
Date: 08.11.2023
Consultant: PGR
Scale 1:3000
0 10 20 40 60 80
m
SHARPS REDMORE
ACOUSTIC CONSULTANTS