Noise Impact Assessment for Environmental Permit

The Old Crown Dyeworks, Bradford

Reference: 50-980-R1-2

Date: September 2023

NOISE IMPACT ASSESSMENT FOR ENVIRONMENTAL PERMIT

The Old Crown Dyeworks
Bradford

Prepared for:

EFR

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E3P

Manchester Office
Taylor Road
Urmston
M41 7JQ

+ 44 (0) 161 707 9612
https://e3p.co.uk

Registered in England
CRN: 807255262

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PREPARED BY	L Faulkner	L Faulkner	
QUALIFICATIONS	BSc (Hons) MIOA MIEnvSci	BSc (Hons) MIOA MIEnvSci	
POSITION	Associate Director	Associate Director	
CHECKED BY	S Boughton	S Boughton	
QUALIFICATIONS	BEng (Hons) MIOA	BEng (Hons) MIOA	
POSITION	Associate Director	Associate Director	
AUTHORISED BY	L Faulkner	L Faulkner	
QUALIFICATIONS	BSc (Hons) MIOA MIEnvSci	BSc (Hons) MIOA MIEnvSci	
POSITION	Associate Director	Associate Director	

EXECUTIVE SUMMARY

BACKGROUND

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Site Address	The Old Crown Dyeworks, Birkshall Lane, Bradford BD4 8TB
National Grid Reference	E 417969 N 432576
Proposed Development	Application to vary an existing Standard Rules Environmental Permit to a Bespoke Permit at Ellis Fairbank Recycling Ltd. The proposals are to add the waste code 19 12 12 to the existing permit, to increase the tonnage from 75,000 tonnes per annum (tpa) to 150,000 tpa, and to update the site layout, including the addition of a new building.
Report Objectives	The objectives of this report are to: • Identify, measure, and assess the potential impact of any proposed sound sources associated with the development upon existing receptors in the immediate vicinity of the Site. The report follows current and relevant British Standards to provide a robust assessment.

ASSESSMENT

Surveys Completed	E3P have undertaken a full weekday and weekend background and ambient sound survey within the site boundaries considered representative of receptors to the south. Background sound levels immediately prior to and after on site operations are to be used.
Assessments	A 3D noise model has been constructed to assess potential sound impact associated with the proposed development which includes for a trommel, delivery of waste and movement of waste within the development boundaries. Any existing operations are also included to inform a cumulative assessment. The model has been used to predict the Rating Level at the receptors which has been compared with the typical background sound level, accounting for any acoustic characteristics associated with the sound in accordance with BS 4142:2014+A1:2019.
Mitigation Requirements	The assessment has determined that there would be an exceedance of the background sound level by the predicted rating levels at certain receptors, in accordance with BS 4142. However, when considering context, the exceedances are not considered significant and absolute noise levels are sufficiently low.

CONCLUSIONS

This assessment has shown that no adverse impact is predicted at the receptors due to the proposed development.

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1. INTRODUCTION

1.1. BACKGROUND

E3P has been commissioned by EFR to provide a Noise Impact Assessment to support the Environmental Permit Application for the application to vary an existing Standard Rules Environmental Permit to a Bespoke Permit at Ellis Fairbank Recycling Ltd, The Old Crown Dyeworks in Bradford.

The proposals are to add the waste code 19 12 12 to the existing permit, to increase the tonnage from 75,000 tonnes per annum (tpa) to 150,000 tpa, and to update the site layout, including the addition of a new building.

The proposed new site layout is shown on Drawing ref: 346/1 – 4 Rev 1.3. It includes the provision of a new building, within internal bays constructed from concrete 'lego bricks', as well as conveyor belt systems to deliver waste to each of these bays after initial sorting / processing.

It is understood that a Noise management plan is to be implemented, and controls on operation hours (processing of waste only to take place 06:00 to 18:00 weekdays and 8:00 to 16:00 weekends). The majority of processing is not adjacent to southern boundary (nearest boundary to travellers' site). Next nearest residential receptor is over 150m away, separated from site by railway line and other industrial buildings / sites. Adjacent operations include other waste activities such as scrap metal recycling. Some noise is already established in the locale of the Site.

1.2. LIMITATIONS

Where a noise or vibration survey is required to inform an assessment, E3P will endeavour to ensure that all noise and vibration measurements taken are robust, representative, and reliable to inform an accurate assessment at the time.

E3P will endeavour to capture all existing and proposed sources of sound and vibration at the time of the surveys and/or assessments. However, should new sources of sound be introduced, existing sources modified/changed, or characteristics of the sound be altered following completion of such, E3P cannot be held accountable for this.

Where mitigation measures are specified in this report, it should be noted that these measures are relative to a specific sound or vibration source, both in terms of the measured sound pressure and vibration level and the character of the sound source. Where either the sound pressure level or the character of the sound varies following completion of the sound survey, E3P cannot be held responsible for any subsequent variations in the proposed mitigation performance, for either absolute levels or frequency content.

2. GUIDANCE

2.1. ENVIRONMENT AGENCY (2022) NOISE AND VIBRATION MANAGEMENT: ENVIRONMENTAL PERMITS

Environmental permits have conditions that require operators to control pollution – this includes controlling noise and vibration. E3P note that the following are required competencies and standards required in relation to Noise Assessments submitted as part of an Environmental Permit Application:

> *Noise impact assessments should be carried out to an appropriate standard and by competent personnel, for example, holders of either an Institute of Acoustics:*
>
> - *Diploma in Acoustics and Noise Control*
> - *Certificate of Competence in Environmental Noise Measurement, with relevant experience*
>
> *Monitoring noise in the environment is a specialist field. Monitoring should be carried out by a qualified acoustician who can demonstrate competency in environmental work rather than, for example, occupational health and safety work.*
>
> *You must use 'BS 4142: Methods for rating and assessing industrial and commercial sound' to quantify the level of environmental noise impact from industrial processes. In rare circumstances, other methods may also be appropriate, for example, NANR45 for assessing existing low frequency sound inside a residential property.*
>
> *If you want to assess impact using another method, you should discuss and agree this with your regulator before you start the assessment.*
>
> *Where vibration is an issue, you should contact your regulator for specific advice.*

E3P note from the above and the guidance that the EA require a BS 4142 assessment to be conducted.

2.2. BS 4142: 2014+A1:2019 'METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND'

This standard describes methods for rating and assessing sound of an industrial or commercial nature which includes:

- Sound from industrial and manufacturing processes.
- Sound from fixed installations which comprise mechanical and electrical plant and equipment.
- Sound from the loading and unloading of goods and materials at industrial and / or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial Site.

The procedure detailed in the standard compares the measured or predicted specific noise level from any of the above with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but to quantify what is typical.

The specific noise level also acknowledges the reference time intervals depending upon whether the noise source operates during daytime (1-hour) or night-time (15-minute) periods.

There are several 'penalties' which can be attributed to the specific sound level depending upon the 'acoustic features' of the sound level under investigation as follows:

Tonality

- +2 dB: where the tonality is just perceptible.
- +4 dB: where the tonality is clearly perceptible; and
- +6 dB: where the tonality is highly perceptible.

Impulsivity

- +3 dB: where the impulsivity is just perceptible.
- +6 dB: where the impulsivity is clearly perceptible; and
- +9 dB: where the impulsivity is highly perceptible.

Intermittency

- +3 dB: where the intermittency is readily distinctive against the acoustic environment.

In addition to the above, there is a penalty for 'other sound characteristics' of +3 dB where a sound exhibits characteristics that are neither tonal nor impulsive, though are readily distinctive against the acoustic environment. BS 4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

Assessment of the rating level relative to the background sound level can yield the following commentary:

- Typically, the greater this difference (between the rating level and the background sound level), the greater the magnitude of impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

It is common that a Local Planning Authority (LPA) will specify their own criterion and, where this is the case, this criterion will usually take precedence over a simple comparison of the rating level against the background sound level.

3. DESCRIPTION OF WORKS AND SOURCES OF NOISE

The proposals are to add the waste code 19 12 12 to the existing permit, to increase the tonnage from 75,000 tonnes per annum (tpa) to 150,000 tpa, and to update the site layout, including the addition of a new building.

The proposed new site layout is shown on Drawing ref: 346/1 – 4 Rev 1.3. It includes the provision of a new building, within internal bays constructed from concrete 'lego bricks', as well as conveyor belt systems to deliver waste to each of these bays after initial sorting / processing.

It is understood that the above works and associated plant are already in place and, as such, E3P have conducted attended source measurements of all activity on site to inform this assessment.

The on-site sources of noise are to remain unchanged, however, the nature of movements and locations of these sources is to change with the amended layout and proposed building.

There are three main sources of noise associated with the site and the following measured sound pressure levels are used, which are shown in detail in section 4.0:

- Tipping of material within building – 76.2 dB at 5 m.
- Front loader moving material – 71.9 dB at 5 m.
- Trommel operating with 360 Excavator feeding material within building – 82.2 dB at the opening of the existing building.

4. NOISE SURVEY RESULTS

Figure 1 details the Noise Measurement Positions with the layout plan overlaid on Google Maps.

4.1. SOURCE NOISE SURVEY – ON-SITE OPERATIONS

E3P has conducted attended measurements of existing operations, which are to be retained and continue to be operational, albeit in new locations and configurations. The main sources of sound were noise break-out from the building which included the Trommel sorting material, a 360-excavator scooping material and emptying on to the feeder conveyor and the movement of material within the site by a front loader.

The survey was carried out prior to the installation of the background sound position below. Two 15-minute measurements were captured of the operations, one for the break-out from the building which allowed for the above and a separate measurement of a waste delivery and the movement of this by the front loader which took place outside.

Table 4.1 details the measured sound pressure levels for each operation. Given that the full operation of the site was captured in the 15-minute measurements it is assumed these operations could take place over a full hour period and, as such, no time correction is applied.

TABLE 4.1 SOURCE NOISE LEVELS

SOURCE	MEASURED SOUND PRESSURE LEVEL, $L_{Aeq,T}$ (dB)	MEASUREMENT DISTANCE (m)	ON-TIME (seconds)
Front loaders moving material	**71.9**	**3**	**360**
Skip unloading material (front loader stopped)	70.6	3	180
Front loader squashing and moving material	81.4	3	120
Total for this operation	**76.2**	**3**	**3600**
Trommel operation and loading by 360 excavator	**82.2**	**At opening of building.**	**3600**

4.2. UNATTENDED BACKGROUND AND AMBIENT SOUND SURVEY

E3P has conducted a full weekday and weekend ambient and background Sound Survey in order to quantify the existing levels of background and ambient sound at a position considered representative of the closest residential receptors to the immediate south.

The survey was carried out over the following period:

- 10:00 Thursday 31st August to 09:00 Monday 4th September 2023.

The following noise measurement position was chosen for the Background Sound Survey:

- Noise Measurement Position 1 (NMP1): Located on the south east boundary of the site, approximately 125 m from the closest receptor to the south, within the Traveller's Site. The measurement position was under free-field conditions. The microphone of the sound level meter was attached to a tripod at a height of 1.5 m above ground level. Sound sources here were dominated by on-site activities during operational hours, surrounding industrial sound, railway pass-bys and road traffic sound.

Although a position at the receptors was not possible long-term, the on-site position is considered robust as the position was fully shielded from existing on site activities for the majority of the time and there is little variation between the backgrounds during operational periods and those either side of these periods.

The Traveller's Site is subject to noise from the road and surrounding industrial sources. Indeed, the Bowling Back Lane HWRC borders the receptors and is likely to be a dominant source of sound, NMP1 allows for this but at further distance. As such, the measured background sound levels are considered robust and worst-case.

Table 4.2 details the range of measured background and ambient sound levels. The daytime levels correspond to the $L_{A90,1hr}$ and the night-time levels to the $L_{A90,15mins}$. The processing of waste will only take place between 06:00 to 18:00 weekdays and 8:00 to 16:00 weekends. As such, the median measured background sound levels for the daytime and night-time correspond to these periods. Weekend nights are not included.

TABLE 4.2 RANGE OF MEASURED BACKGROUND AND AMBIENT SOUND PRESSURE LEVELS

DATE	ASSESSMENT PERIOD	RANGE OF MEASURED BACKGROUND SOUND LEVELS, $L_{A90,T}$ (dB)	MEDIAN MEASURED BACKGROUND SOUND LEVEL, $L_{A90,T}$ (dB)
Thursday 31st August 2023	Day (10:00 – 23:00)	31.9-44.2	42
	Night (23:00 – 07:00)	29.2-37.3	35
Friday 1st September 2023	Day (07:00 – 23:00)	36.1-42.2	38
	Night (23:00 – 07:00)	31.0-37.7	36
Saturday 2nd September 2023	Day (07:00 – 23:00)	31.5-40.8	34
Sunday 3rd September 2023	Day (07:00 – 23:00)	37.0-40.3	39

The full hourly data set can be found in Appendix II of this report.

TABLE 4.3 NOISE MEASUREMENT EQUIPMENT AND CALIBRATION DATES

MEASUREMENT POSITION	EQUIPMENT DESCRIPTION	MANUFACTURER & TYPE NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE
NMP1	Sound Level Meter	01dB Fusion	14616	29th June 2024
	Pre-amplifier	01dB Pre22	20951	
	Microphone	GRAS 40CD	494264	
	Calibrator	Cirrus CR515	99206	3rd August 2024

The sound level meter was field calibrated on site using the above-mentioned calibrator prior to and after noise measurements were taken. No significant drift was witnessed as noted above. Calibration certificates are available upon request.

5. BS 4142 ASSESSMENT

This section considers the likely rating levels from the operations in accordance with BS 4142 and advice given in the Noise and Vibration Management guidance from the EA.

For the purposes of the assessments, E3P has used noise modelling software, CadnaA 2023 MR2, to determine the impact of noise from the proposed sound sources associated with the development, as well as accounting for any existing sound sources.

The following inputs have been included in the model:

- Proposed new site layout (Drawing ref: 346/1 – 4 Rev 1.3).
- Ground elevations around the site have been taken as existing by way of a 2 m grid Digital Terrain Model (DTM) which contains public sector information licensed under the Open Government License v3.0.
- Existing buildings have been included in the model and assumed to have a smooth façade.
- Any brick walls are included in the model.
- The delivery of material and movement of this in the yard is not expected to take place at night. However, the noise break-out from the building is assumed to take place.
- A reflection order of two has been used in all calculations.
- Ground absorption is set at 0.5 to allow for the wooded area to the south. Hardstanding is included to counter this in the noise model.
- Noise levels generated using ISO 9613-1 and ISO 9613-2 "*Acoustics – Attenuation of sound during propagation outdoors*" as incorporated into CadnaA software.
- Specific noise levels are calculated within external amenity areas or at the façade, whichever is closer.

For the BS 4142:2014+A1:2019 assessment, penalties are applied to the specific sound level to provide the rating level. These penalties relate to the acoustic features of the sound source. However, as the sound sources already exist on site and will only be relocated within the site, no acoustic feature corrections are applied.

Figure 2 shows the resultant rating levels from the site during the daytime and Figure for the night-time period.

Tables 5.1 to 5.3 below detail the BS 4142 assessments for each assessment period, as noted below:

- Assessment 1 – Weekday Daytime.
- Assessment 2 – Weekday Night-time 06:00-07:00.
- Assessment 3 – Weekend Daytime.

To inform a worst-case assessment, the lowest median measured background sound levels for each respective assessment are used. These are highlighted below for reference:

- Assessment 1 – Background between 18:00-20:00 Monday to Friday – 38 dB $L_{A90,1hr}$.
- Assessment 2 – Background between 05:00-06:00 Monday to Friday – 35 dB $L_{A90,15mins}$.
- Assessment 3 – Background between 16:00-18:00 Saturday and Sunday – 34 dB $L_{A90,1hr}$.

TABLE 5.1 ASSESSMENT 1 – WEEKDAY DAYTIME BS 4142 ASSESSMENT

RECEPTOR	PREDICTED RATING LEVEL, $L_{A,r}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,T}$ (dB)	DIFFERENCE, +/- (dB)
R1 – Traveller's Site	41	38	**+3**
R2 – Gibson Street	28	38	-10

TABLE 5.2 ASSESSMENT 2 – WEEKDAY NIGHT-TIME BS 4142 ASSESSMENT

RECEPTOR	PREDICTED RATING LEVEL, $L_{A,r}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,T}$ (dB)	DIFFERENCE, +/- (dB)
R1 – Traveller's Site	39	35	**+4**
R2 – Gibson Street	26	35	-9

TABLE 5.3 ASSESSMENT 3 – WEEKEND DAYTIME BS 4142 ASSESSMENT

RECEPTOR	PREDICTED RATING LEVEL, $L_{A,r}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,T}$ (dB)	DIFFERENCE, +/- (dB)
R1 – Traveller's Site	41	34	**+7**
R2 – Gibson Street	28	34	-6

It is found that rating levels are expected to exceed the background sound level at receptors to the south but well below background at receptors to the north. As such, BS 4142 provides the following advice:

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

In terms of actual specific noise levels, the highest predicted daytime rating level here is 41 dB at receptors to the south which is 9 dB below a criterion of 50 dB. The character of the sound is the same to that already output from the site. However, given the exceedance of the background sound level, it is important to consider context to ascertain whether an adverse impact is likely.

The above levels also closely correspond to the highest measured ambient sound levels at NMP1 during operational periods, up to 47 dB.

As such, the absolute noise levels predicted at the receptors to the south are not considered significant but are discussed further below.

5.1. CONTEXT AND UNCERTAINTY

In order to determine the final outcome of the assessment, the context must be considered, in accordance with BS 4142:2014+A1:2019, Section 11. The factors to be considered are discussed below:

THE ABSOLUTE LEVEL OF THE SOUND

Since the assessment relates to a future noise source, it is not possible at present to compare the Specific Noise Level with the residual sound, as discussed within the standard. However, the absolute noise level at the façade of the most affected receptor is 41 dB $L_{Aeq,1hr}$ and 39 dB $L_{Aeq,15mins}$. Assuming 13 dB for attenuation provided by an open window, this would result in the internal noise level falling below the internal daytime criterion by 7 dB and below the night-time bedroom criterion given in BS 8233:2014 by 4 dB.

As such, this would not cause adverse impact.

THE CHARACTER AND LEVEL OF THE RESIDUAL SOUND COMPARED TO THE CHARACTER AND LEVEL OF THE SPECIFIC SOUND

As discussed above, this is not directly possible since the assessment relates to a proposed noise source rather than an existing noise source, albeit the noise character remains the same but the location of sources does not. However, there is existing commercial/industrial uses at the site, including the site, to the immediate north (HWRC) and, as such, commercial sound already forms part of the existing acoustic environment, and this would therefore form part of the Residual Sound. This is significant because the proposed noise source would therefore be contributing to an existing impact, rather than presenting a brand-new impact within the area.

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.

The receptors are residential, assumed to be permanent and are therefore considered to be sensitive. Given that details of the existing receptors are not known, it is assumed that no design measures are incorporated, i.e. open windows. Based on the absolute noise levels at the façade, the internal noise levels would be below BS 8233:2014 criteria and would be acceptable when the windows are open. This is significant during the night-time, when indoor conditions are of paramount importance, and outdoor conditions are of less importance.

Given the contextual factors discussed above in accordance with BS 4142:2014+A1:2019, it is concluded that the sound sources proposed are likely to have a low adverse impact during the daytime and night-time periods at the receptors when accounting for context..

6. CONCLUSION AND RECOMMENDATIONS

E3P were commissioned to undertake a Noise Impact Assessment for the proposed development at The Old Crown Dyeworks in Bradford.

E3P have undertaken a full weekday and weekend background and ambient sound survey within the site boundaries considered representative of receptors to the south.

A 3D noise model has been constructed to assess potential sound impact associated with the proposed development which includes for a trommel, delivery of waste and movement of waste within the development boundaries. Any existing operations are also included to inform a cumulative assessment. The model has been used to predict the rating level at the receptors which has been compared with the typical background sound level, accounting for any acoustic characteristics associated with the sound in accordance with BS 4142:2014+A1:2019.

The BS 4142 assessment determined that the predicted rating levels would exceed the background sound level at receptors to the south. However, the impact when considering context is not considered significant. Indeed, noise levels fall below 42 dB at the closest receptors with internal noise levels of no more than 28 dB expected during the day at all receptors and 39 dB at night.

Considering this, it is concluded that there should be no adverse impact due to the operations of the proposed operations upon existing receptors.

END OF REPORT

APPENDIX I
GLOSSARY OF ACOUSTIC TERMINOLOGY

NOISE

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source. The most widely used weighting mechanism that best corresponds to the response of the human ear is the "A"-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective but, as a general guide, a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. An indication of the range of sound levels commonly found in the environment is given in the following table.

TABLE A1 TYPICAL SOUND PRESSURE LEVELS

SOUND PRESSURE LEVEL	LOCATION/EXAMPLE
0	Threshold of hearing
20–30	Quiet bedroom at night
30–40	Living room during the day
40–50	Typical office
50–60	Inside a car
60–70	Typical high street
70–90	Inside a factory
100–110	Burglar alarm at 1 m away
110–130	Jet aircraft on take off
140	Threshold of pain

ACOUSTIC TERMINOLOGY

TABLE A2 TERMINOLOGY

DESCRIPTOR	EXPLANATION
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq, T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the "fast" sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the "average maximum level". Similarly, L_{90} is the "average minimum level" and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Fast	A time weighting used in the root-mean-square section of a sound level meter with a 125-millisecond time constant.
Slow	A time weighting used in the root-mean-square section of a sound level meter with a 1000-millisecond time constant.

APPENDIX II
MEASURED SOUND PRESSURE LEVELS

TABLE A1: HOURLY AMBIENT AND BACKGROUND SOUND LEVEL DATA

PERIOD START	AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
31/08/2023 11:02	48.8	44.2
31/08/2023 12:02	47.2	42.7
31/08/2023 13:02	48.6	41.6
31/08/2023 14:02	46.5	39.6
31/08/2023 15:02	49.7	43.8
31/08/2023 16:02	43.7	35.8
31/08/2023 17:02	48.8	36.3
31/08/2023 18:02	43.9	35.4
31/08/2023 19:02	44.7	34
31/08/2023 20:02	41.1	33.2
31/08/2023 21:02	35.3	33.3
31/08/2023 22:02	39.4	31.9
31/08/2023 23:02	36.9	32
01/09/2023 00:02	38.1	30.4
01/09/2023 01:02	33.1	29.8
01/09/2023 02:02	37.1	30.7
01/09/2023 03:02	31.8	30.5
01/09/2023 04:02	32.3	30.8
01/09/2023 05:02	40.2	31.6
01/09/2023 06:02	45.7	34.4
01/09/2023 07:02	45.9	38.2
01/09/2023 08:02	50.7	42.2
01/09/2023 09:02	45.7	37.9
01/09/2023 10:02	48.4	39
01/09/2023 11:02	42.6	37.2
01/09/2023 12:02	46.8	36.1
01/09/2023 13:02	46.5	36.4
01/09/2023 14:02	44.8	38.4
01/09/2023 15:02	46.5	39.2
01/09/2023 16:02	43.2	37.4
01/09/2023 17:02	42.8	36.4

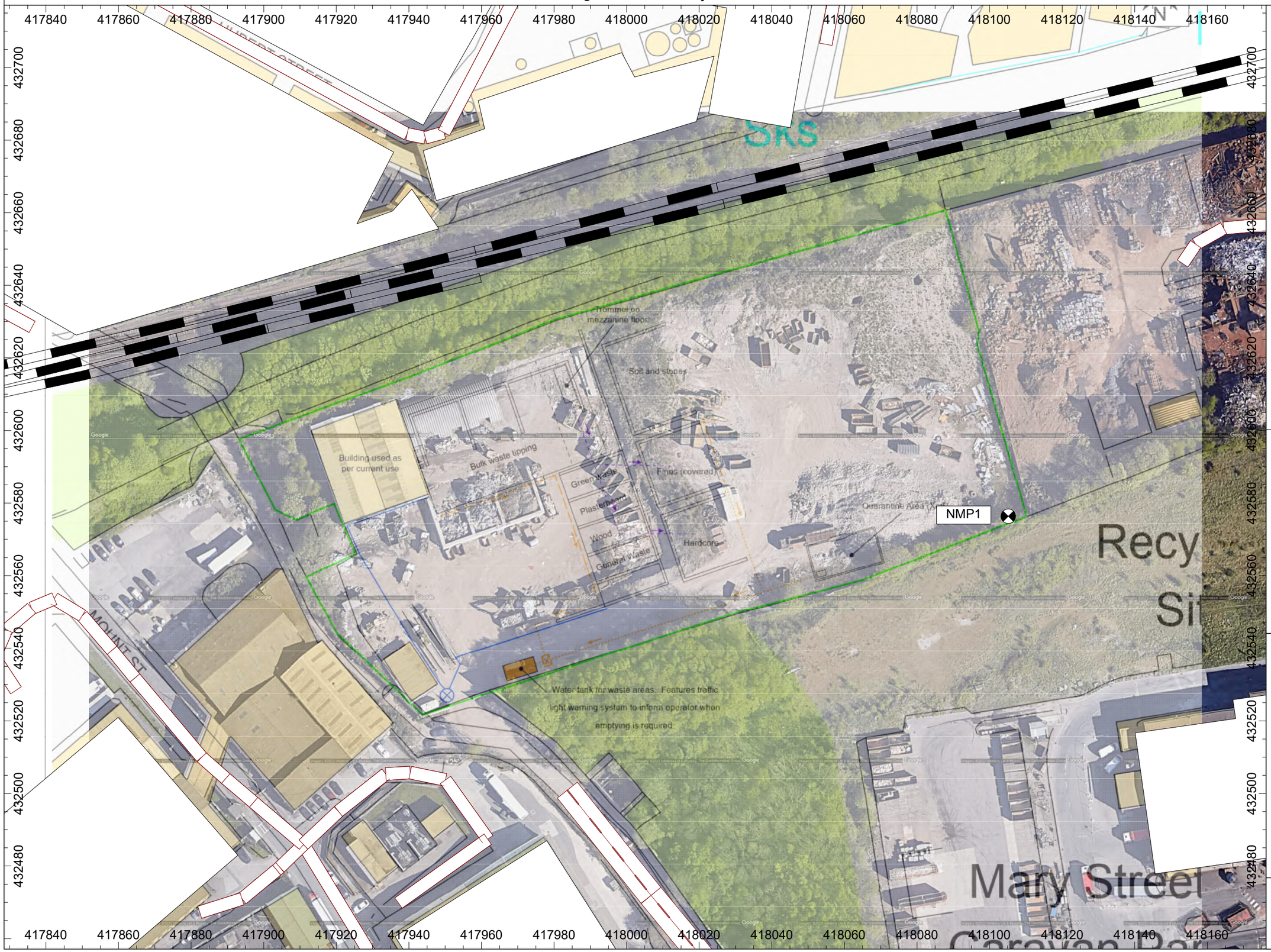
PERIOD START	AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
01/09/2023 18:02	40.5	36.4
01/09/2023 19:02	42	38.6
01/09/2023 20:02	39.7	37.4
01/09/2023 21:02	42.5	37.8
01/09/2023 22:02	39.7	36.9
01/09/2023 23:02	39.1	36.4
02/09/2023 00:02	36.3	34.2
02/09/2023 01:02	36.5	34
02/09/2023 02:02	34.8	32.4
02/09/2023 03:02	35.5	32.7
02/09/2023 04:02	33.5	31.3
02/09/2023 05:02	39	32.7
02/09/2023 06:02	44.1	35.7
02/09/2023 07:02	45.3	36.2
02/09/2023 08:02	44.3	37.1
02/09/2023 09:02	46	34.3
02/09/2023 10:02	44.7	35.9
02/09/2023 11:02	39.8	34.8
02/09/2023 12:02	43.4	32.7
02/09/2023 13:02	35.6	32
02/09/2023 14:02	42.9	31.5
02/09/2023 15:02	39.9	32.1
02/09/2023 16:02	48	32
02/09/2023 17:02	43.8	33.1
02/09/2023 18:02	35.2	32.7
02/09/2023 19:02	41.6	33.7
02/09/2023 20:02	41.2	38.9
02/09/2023 21:02	42.9	40.8
02/09/2023 22:02	45	40.5
02/09/2023 23:02	43.3	40.2
03/09/2023 00:02	40	36.3

PERIOD START	AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
03/09/2023 01:02	38.4	35.9
03/09/2023 02:02	38.9	37.4
03/09/2023 03:02	39.2	37.5
03/09/2023 04:02	39.6	37.5
03/09/2023 05:02	41.9	39.5
03/09/2023 06:02	45.2	41
03/09/2023 07:02	41.9	39.1
03/09/2023 08:02	46.6	40.3
03/09/2023 09:02	41.9	37.1
03/09/2023 10:02	43.7	37.8
03/09/2023 11:02	45.2	39.5
03/09/2023 12:02	43.2	39.4
03/09/2023 13:02	44.1	38.5
03/09/2023 14:02	43.2	39.1
03/09/2023 15:02	42	37
03/09/2023 16:02	43.9	39.3
03/09/2023 17:02	44.9	39.4
03/09/2023 18:02	39.9	37.2
03/09/2023 19:02	41.4	37.5
03/09/2023 20:02	42.8	39.8
03/09/2023 21:02	41.8	39.6
03/09/2023 22:02	41.9	39
03/09/2023 23:02	47.9	38.4
04/09/2023 00:02	39.2	37.7
04/09/2023 01:02	38.7	37.4
04/09/2023 02:02	37.5	36
04/09/2023 03:02	37.7	36.5
04/09/2023 04:02	38.2	36.9
04/09/2023 05:02	43.1	38.8
04/09/2023 06:02	45.3	41.2
04/09/2023 07:02	46.7	42.9

PERIOD START	AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
04/09/2023 08:02	47.6	40.4
04/09/2023 09:02	45.7	37.3

APPENDIX III
FIGURES

Figure 1 - Noise Survey Measurement Positions



Project:
The Old Crown Dyeworks

Project-No:
50-980

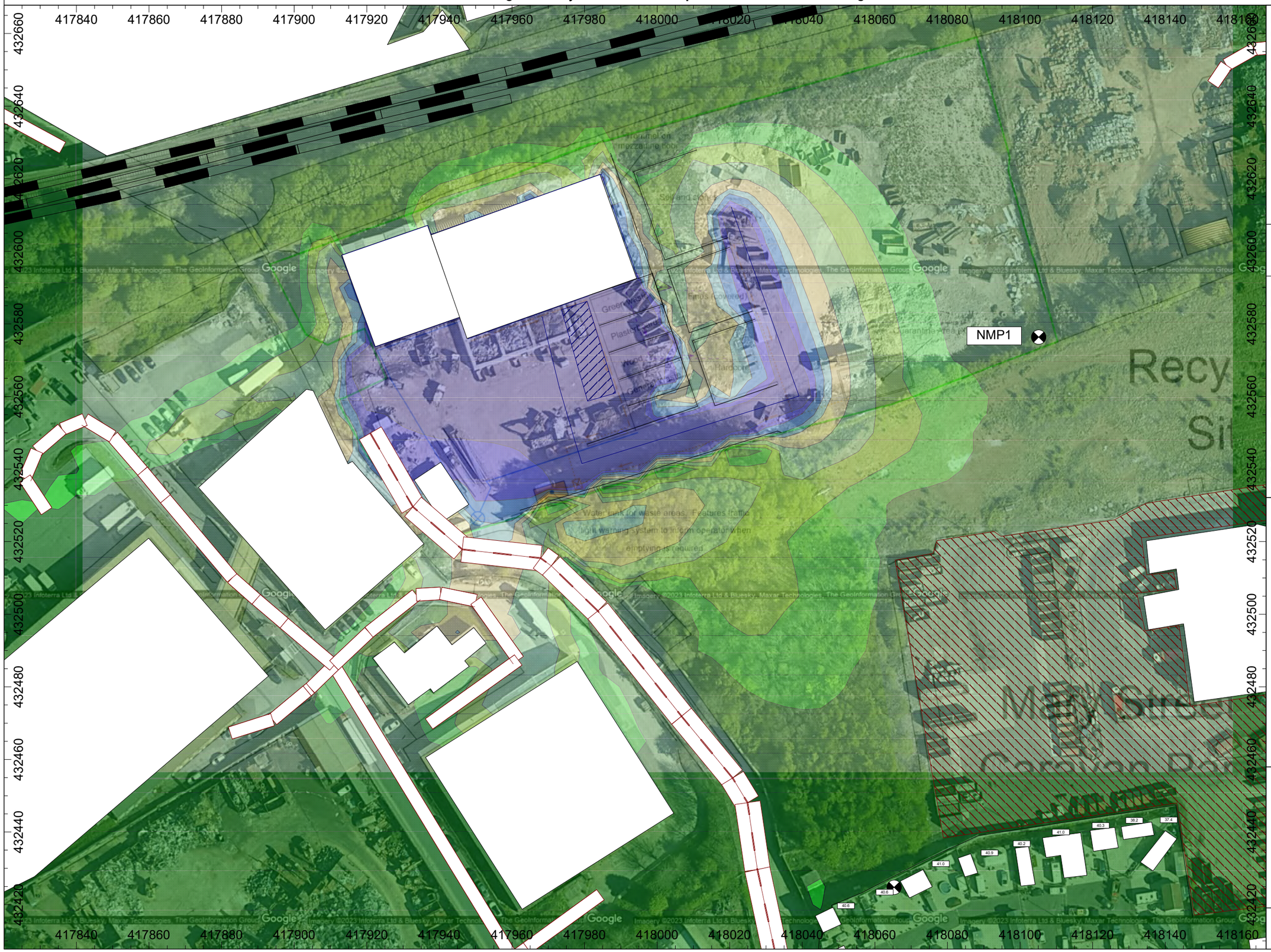
Client:
EFR

N

e3p

Project Engineer: L Faulkner
Date: 31/08/2023

Figure 2 - Daytime Grid Noise Map - Calculation at 1.5m above ground level



Project:
Old Crown Dyeworks

Project-No:
50-980

Client:
ERF

Rating Level, LA,r (dB)

- ... <= 48
- 48 < ... <= 50
- 50 < ... <= 52
- 52 < ... <= 55
- 55 < ... <= 58
- 58 < ... <= 60
- 60 < ... <= 62
- 62 < ... <= 65
- 65 < ...

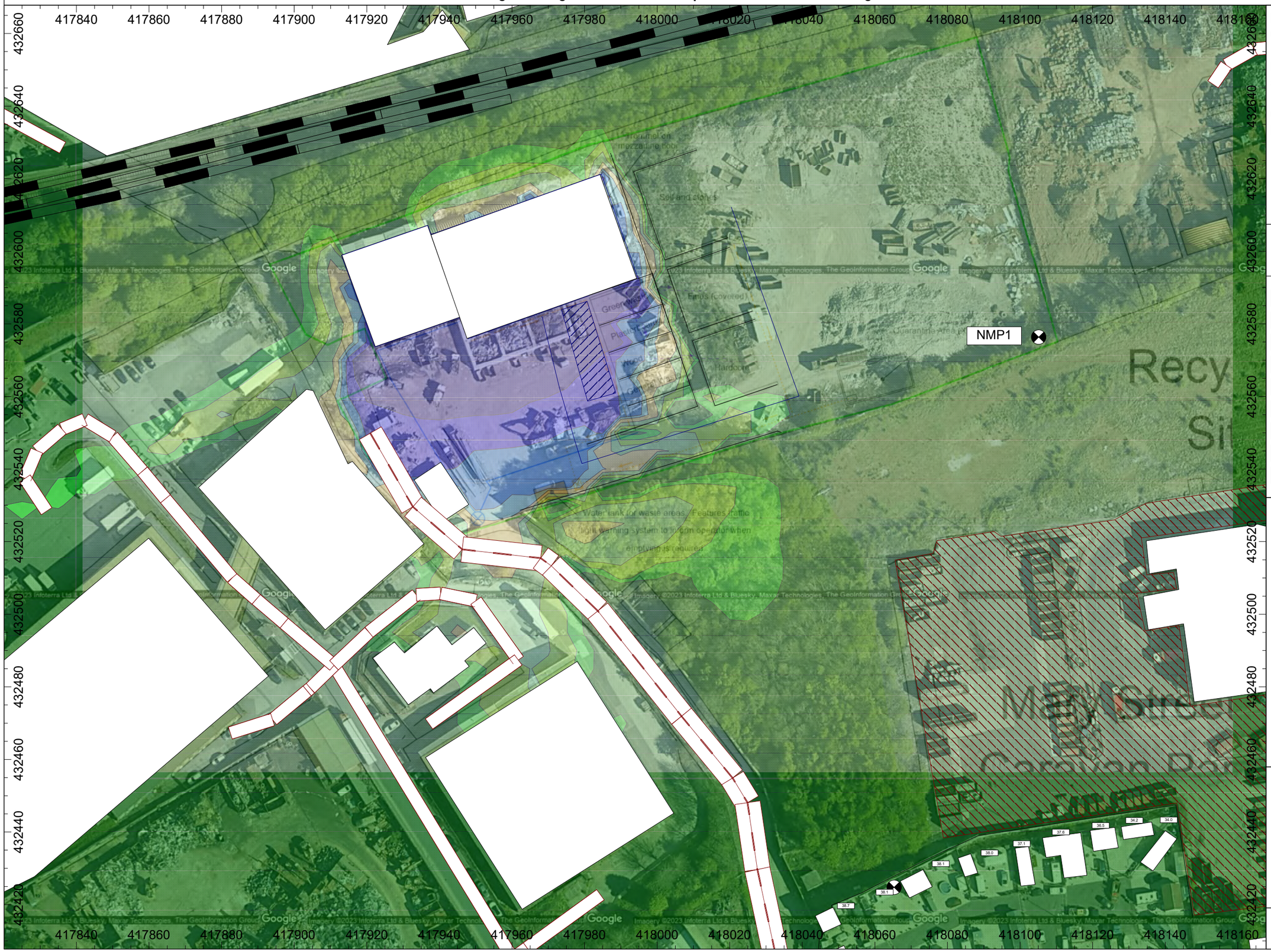
Noise Map Objects

- Line Source
- Area Source
- vert. Area Source
- Road
- Parking Lot
- Railway
- Building
- Barrier
- Receiver
- Calculation Area

e3p

Project Engineer: L Faulkner
Date: 04/09/2023

Figure 3 - Night-time Grid Noise Map - Calculation at 1.5m above ground level



Project:
Old Crown Dyeworks

Project-No:
50-980

Client:
ERF

Rating Level, LA,r (dB)

- ... <= 48
- 48 < ... <= 50
- 50 < ... <= 52
- 52 < ... <= 55
- 55 < ... <= 58
- 58 < ... <= 60
- 60 < ... <= 62
- 62 < ... <= 65
- 65 < ...

Noise Map Objects

- Line Source
- Area Source
- vert. Area Source
- Road
- Parking Lot
- Railway
- Building
- Barrier
- Receiver
- Calculation Area

e3p

Project Engineer: L Faulkner
Date: 04/09/2023