NOISE IMPACT ASSESSMENT

10 Merse Rd, Moons Moat North Industrial Estate, Redditch B98 9HF

Kaug Refinery Services Ltd

Version:	1.8	**Date:**	25th October 2024		
Doc. Ref:	2765-010-NIA	**Author(s):**	JC	**Checked:**	DY
Client No:	2765	**Job No:**	010		

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Document History:

Version	Issue date	Author	Checked	Description
1.0	13/12/2022	TB	DY	Internal draft
1.1	06/01/2023	TB	DY	Application copy
1.2	15/03/2023	TB	DY	Limited revisions to Noise Model
1.3	14/04/2023	TB	DY	Submitted to LPA with planning application
1.4	17/08/2023	TB	DY	Revision to model and proposed operating hours
1.5	18/07/2024	JC/JU	DY	Amendments as part of response to EA RFI Notice
1.6	19/07/2024	JC/JU	DY	Internal amendments
1.7	25/10/2024	JC	DY	Update in response to Schedule 5 Notice
1.8	25/10/2024	JC	DY	Submitted to EA

Key Technical Personnel & Qualifications

Author	Description
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1 Introduction

1.1 General

1.1.1 Oaktree Environmental have been commissioned by Kaug Refinery Services Ltd to undertake a Noise Impact Assessment (NIA) for a site situated at 10 Merse Rd, Moons Moat North Industrial Estate, Redditch B98 9HF.

1.1.2 The operation comprises a specialist facility for the recovery and recycling of precious metals from various metal containing waste. Up to a maximum of 250 tonnes per annum of metal containing wastes will be imported to site. Various processing operations will be undertaken to recover precious metals from the waste streams.

1.1.3 The purpose of this document is to accompany an application for the sites Environmental Permit (EP). The previous revision of this report was submitted in support of the EP and the planning application; however, the planning permission has now been granted with the noise assessment being accepted by the Worcestershire County Council.

1.2 Site Description and Proposed Development

1.2.1 The application site is located at 10 Merse Road, Redditch, B98 9HL, at national grid reference SP 07345 68860. The site consists of an existing building comprising industrial and office use with associated parking area. The site is located within a wider industrial estate/area and therefore suitable for this type of development. It is understood the existing building has been in recent active industrial/commercial use. At present, parking for staff and visitors is provided to the South-Western and North-Western side of the building. The site is accessed via Merse Road, via dedicated access point.

1.2.2 Reference should be made to Drawing No. 2765-010-02 for proposed permit boundary area. All references to ‘the site’ in this statement shall mean this area.

1.3 Hours of Operation

1.3.1 The site will routinely operate during the following hours;

- 06:00am – 17:00am (Monday – Friday)
- No operations (Saturday)
- No operations (Sundays)

1.3.2 The abatement plant (scrubber) serving the acid processing area and the alkaline process area extraction system will both be run for 24 hours per day, consistent with operations at the applicants existing site. This is to ensure that any residual fumes are abated/dispersed whilst the system is cooling down. However, there will be no operation of processing plant, including chemical, physical and thermal processing, nor delivery or export of materials to and from site outside of the above hours.

1.4 Environmental Regulation

1.4.1 An EP will be required to be in place for the site, with day-to-day operations regulated by the Environment Agency (EA). Potential impacts on air, land and water will be fully controlled and regulated under the EP.

2 Relevant Noise Guidance

2.1 Environment Agency Guidance

2.1.1 This document has been produced in accordance with the EA's guidance "Noise and vibration management: environmental permits" updated 31 January 2022.

2.2 Noise Policy Statement for England

2.2.1 The Noise Policy Statement for England (NPSE), March 2010, sets out the Government's long-term noise policy, the aims of which are:

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

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

2.2.2 The first aim of the NPSE is to avoid significant adverse effects, considering the shared UK principles of sustainable development.

2.2.3 The second aim provides guidance on the scenario when the potential noise impact falls between the LOAEL (Lowest Observed Adverse Effect Level) and the SOAEL (Significant Observed Adverse Effect Level), in which case it is stated*, "all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development".* However, it is also stated, *"This does not mean that such adverse effects cannot occur"*.

2.2.4 With regards to the SOAEL, the document states, "It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations", thus acknowledging that this is very much dependent on the noise source, the receptor, and the time of day. Therefore, the NPSE provides the necessary policy flexibility until further guidance / evidence is available.

2.2.5 Other guidance will need to be taken into account when applying the principles of the NPSE, as well the nature of the proposed development and its specific circumstances.

2.3 National Planning Policy Framework

2.3.1 The National Planning Policy Framework, revised in December 2023, states that Planning policies and decisions should also ensure that new development is appropriate for its location, taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

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

2.3.2 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.

2.3.3 The revised document also makes reference to the Noise Policy Statement for England.

2.4 Planning Practice Guidance – Noise

2.4.1 Further to the guidance set out in the NPPF, Planning Practice Guidance advises that the Local Authority should consider the following when decision making:

- Whether or not a significant adverse effect is occurring or likely to occur.
- Whether or not an adverse effect is occurring or likely to occur.
- Whether or not a good standard of amenity can be achieved.

2.4.2 As previously discussed within the NPSE, the guidance discusses the LOAEL and SOAEL and provides scenarios that could be expected for the perception level of noise, plus the associated activities that may be required to bring about the desired outcome. Again, as with the NPSE, no objective noise levels are provided for LOAEL or SOAEL.

2.4.3 It is stated that "the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation". These factors include:

- The absolute noise level of the source and the time of day it occurs.
- Where the noise is non-continuous (intermittent), the number of noise events along with any patterns of occurrence.
- The frequency of content and acoustic characteristics (tonality etc.) of the noise.
- The effects of noise on the surrounding wildlife.
- The acoustic environment of external amenity areas provided as an intrinsic part of the overall design.
- The impact of noise from certain commercial developments such as night clubs and pubs where activities are often at their peak during the evening and night.

3 Noise Assessment Criteria

3.1 To assess the impacts of existing road traffic and industrial noise from the proposed development, the following documents have been used:

- BS8233:2014
- BS4142:2014+A1:2019 (BS4142)
- World Health Organisation (WHO) Guidelines on Community Noise

3.2 BS8283:2014

3.2.1 This document provides guidance on the relevant level of sound insulation required by a variety of building types affected by general environmental noise and provides recommendations for appropriate internal ambient noise level criteria for a variety of different situations including residential dwellings. The table below includes the proposed noise criteria within BS8283:2014 with regards to residential properties:

Table 1 - BS8233:2014 Internal Criteria

Activity	Location	07:00 – 23:00	23:00 – 7:00
Resting	Living rooms	35dB $L_{Aeq, 16hour}$	-
Dining	Dining room	40dB $L_{Aeq, 16hour}$	-
Sleeping	Bedroom	35dB $L_{Aeq, 16hour}$	30dB $L_{Aeq, 16hour}$

3.3 BS4142

3.3.1 BS4142 provides a method for “assessing and rating industrial sound” of an industrial/commercial nature. The method described in the standard uses the rating level from a noise source and the existing background noise level to assess the potential effects of sound on the residential premises upon which sound is incident.

3.3.2 Using this method, the background sound level is subtracted from the rating level. The resulting figure is assessed using the following guidance from the document:

- The greater the difference between the background sound level and the rating level, the greater the impact on the receptor.
- An exceedance of the background level of around 10dB, or more, is likely to be an indication of a significant adverse impact, dependent on the context.
- An exceedance of the background level of around 5dB is likely to be an indication of an adverse impact, dependent on the context.
- The lower the rating level compared to the existing background level, the less likely an adverse impact, or a significant adverse impact. Where the rating level does not exceed the background level, this is indicative of a low impact, dependent on context.

3.3.3 The document introduces a requirement to consider and report the uncertainty in the data as well as also including guidance for applying a correction/penalty for certain adverse acoustic features such as tonality, impulsivity or intermittency. The following table summarises the corrections based on the subjective assessment of the noise.

Table 2 - BS4142:2014 Corrections and Penalties

Perceptibility	**Tonality**	**Impulsivity**	**Other characteristics**
Just perceptible	+ 2dB	+ 3dB	
Clearly perceptible	+ 4dB	+ 6dB	
Highly perceptible	+ 6dB	+ 9dB	
Readily Distinctive against Residual Environment			+ 3dB

3.4 WHO Guidelines for Community Noise

3.4.1 The WHO Guidelines (1999) recommends indoor night-time guidelines in order to avoid sleep disturbance, the document states these to be 30 dB (LAeq) and 45 dB (LA_{fmax}) for continuous and individual noise events respectively.

3.4.2 The document states that the number of noise events should also be considered and that individual noise events should not exceed 45 dB (LA_{fmax}) more than 10 – 15 times per night.

3.4.3 The WHO document also recommends that steady, continuous noise levels should not exceed 55 dB (LAeq) for outdoor living areas (balconies, terraces etc.). However, in order protect the majority of individuals from moderate annoyance, external noise levels should not exceed 50 dB (LAeq)

4 Background Noise Monitoring

4.1 Procedure and Monitoring Locations

4.1.1 For previous submissions, a background noise survey was completed on the 27th July, 5th August, 25th September as well as 14th-15th August 2023 in accordance with BS 7445-1:2003 by Thomas Benson of Oaktree Environmental Ltd.

4.1.2 Following on from this and to address comments made by the EA, additional monitoring has been conducted by NOVA Acoustics Ltd dating between the 4th-8th of July 2024 which includes unattended monitoring to gather sufficient nighttime and daytime data.

4.1.3 The locations were chosen in order to be representative of the nearest noise sensitive receptors. Access could not be gained to the gardens closest to the site. For background monitoring to be representative of the existing soundscape the site needs to have either pre agreed shutdown periods or not be operating. This is to ensure that background data measures the background noise level when the site is not in operation

4.1.4 The measurement locations are shown in Figure 1, below.

Figure 1 - Site Location and Noise Monitoring Positions

4.2 Oaktree Equipment Used During the Survey

4.2.1 Details of the equipment used during the survey are shown in the table below, these have since been calibrated from the date of survey:

Table 3 - Survey Equipment

Description	Model	Manufacturer	Serial No.	Calibration Date
Class 1 Sound Analyser	NOR 150	Norsonic	15030504	October 2020
Microphone	Norsonic Type 1225	Norsonic	305208	October 2020
Field Calibrator	NOR 1251	Norsonic	35205	June 2020

4.3 NOVA Acoustics Equipment Used During the Survey

4.3.1 Details of the equipment used during the background survey conducted by NOVA Acoustics Ltd and the calibration drift values with the traceable calibrated signal are detailed in the tables below.

Table 4 - Nova Equipment Details

Equipment	Long term Locations	Manufacturer	Model	Serial No.	Pre Calibration	Post Calibration
SLM	Measurement Point 1 (NMP 1)	Svantek	971A	143583	93.8	93.78
Stoke Cali 1		Cesva	CB006	901927		
SLM	Measurement Point 2 (NMP 2)	Svantek	971A	127628	93.13	94.14
Stoke Cali 1		Cesva	CB006	901927		

4.4 Oaktree Background Survey Weather

4.4.1 The weather during the background surveys is summarised in the table below:

Table 5 – Weather Conditions During Noise Monitoring

Date	Wind Speed (max)	Cloud Cover	Temperature	Precipitation
Wednesday 27/07/2022	Generally very still, max gusts of 1.3m/s.	100-%	17^{oc}-19^{oc}	None recorded whilst onsite.
Friday 05/08/2022	Generally very sill, with max gusts of 3.9m/s	5-10%	15^{oc}-17^{oc}	None recorded whilst onsite.
Sunday 25/09/2022	Generally very still, max gusts of 4.4m/s	80-100%	10^{oc}-12^{oc}	None recorded whilst onsite.

4.5 NOVA Background Survey Meteorological Conditions

4.5.1 As the environmental noise survey was carried out over a long-unmanned period no localised records of weather conditions were taken. However, all measurements have been compared with met office weather data for the area, specifically the closest weather station with data outlined in the table below. When reviewing the time history of the noise measurements, any scenarios that were considered potentially affected by local weather conditions have been omitted from the assessment. The analysis of the noise includes the LAmax levels as well as maximums and minimums of the vales measured which aids the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for measurement of environmental noise in accordance with BS7445: Description and Measurement of Environmental Noise. The table below presents the

average weather conditions (temperature, wind speed, rainfall, prevailing wind direction). Stated in table are the occurrences of wind speed above the 5m/s which is the threshold above which the wind speed or windshield on the microphone does not attenuate the wind according to BS7445.

Table 6 – Weather Conditions During Noise Monitoring

Date	Wind Speed (max m/s)	Wind Direction	Cloud Cover	Temperature (C)	Precipitation (inch)
04/07/2024	8 (03:20)	W	0-25%	11-17	0.0
05/07/2024	4	SW	50%	12-20	Light rain from 18:20
06/07/2024	6 (18:20)	WNW	50-75%	10-16	0.0 (Light rain until 19:50)
07/07/2024	7 (16:20) majority below	SW to N	50%	11-16	0.0 (Showers past 10:20)
08/07/2024	4	ESE to S	25%	7-17	0.0 (showers past 19:20)

4.6 Oaktree Background Survey Results

4.6.1 The results of the background noise monitoring survey that had been conducted by Oaktree within the previous submission are detailed below in Tables 7 & 8.

Table 7 - Weekday Background Monitoring Results for NMP 1

Measurement Time	Le_a (dB)	LA_{max} (dB)	LA_{90} (dB)	LA_{10} (dB)
06:10-07:10	*43.3*	*65.7*	*36.7*	*43.7*
07:10-08:10	57.4	88.5	37.7	49.9
08:10-09:10	52.1	77.0	37.8	49.4
09:14-10:14	45.9	76.1	36.7	44.1
18:20-19:20	46.0	72.2	33.8	42.1
19:42-20:42	41.8	67.3	32.2	39.3
20:45-21:45	42.8	68.4	31.5	37.6
21:45-22:45	34.8	67.3	31.4	34.9

Table 8 -Weekend Background Monitoring Results for NMP 1

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	LA_{10} (dB)
19:10-20:10	41.7	63.7	37.4	42.7
20:10-21:10	39.1	60.5	35.6	39.7
21:20-22:10	40.7	64.1	35.5	40.8

4.7 NOVA Background Survey Results

4.7.1 The results of the unattended long-term monitoring conducted by NOVA Acoustics Ltd are summarised below in Tables 9 to 16, in order to get reference value for a 1-hour period the 15 minute breakdown or results which are held in Appendix II of this report were used. In order to calculate the $LA90_{1hour}$ level, the equivalent continuous sound pressure level addition of the 4no. 15-minute sound pressure levels taken within the hour period were used. In order to choose a specific $LA90_{1hour,}$ sound pressure level, which is the reference time for daytime monitoring, the occurrence of each pressure level across the lowest background LA90 within that hour was assessed, this therefore provides a conservative approach.

Table 9 - Weekday Background Data for Daytime Hours (07:00-23:00). NMP 1

Measurement Time	**LA_{eq} (dB)**	**LA_{max} (dB)**	**LA_{90} (dB)**	**Lowest background $La90_{1hour}$ (dB)**
Day 1-04/07/2024				
12:00-13:00	51.2	65.5	46.8	45.0
13:00-14:00	49.3	72.3	45.4	45.0
14:00-15:00	48.2	64.5	44.3	43.4
15:00-16:00	51.4	77.9	45.5	44.3
16:00-17:00	50.6	69.7	45.7	45.0
17:00-18:00	49.9	71.5	46.3	46.0
18:00-19:00	48.6	67.1	45.4	44.5
19:00-20:00	46.4	65.5	43.4	42.4
20:00-21:00	45.4	65.7	42.3	41.4
21:00-22:00	45.1	59.0	41.8	39.8
22:00-23:00	43.4	62.5	39.6	39.0
Day 2-05/07/2024				
07:00-08:00	59.8	88.1	37.5	35.9
08:00-09:00	56.4	86.1	36.9	35.1
09:00-10:00	41.0	64.2	35.1	34.3
10:00-11:00	40.2	66.5	34.7	34.4
11:00-12:00	42.5	69.2	35.2	34.2
12:00-13:00	42.3	68.5	36.0	35.5
13:00-14:00	40.7	57.0	36.9	36.1
14:00-15:00	53.5	79.8	39.6	38.4
15:00-16:00	45.6	66.7	40.3	39.1
16:00-17:00	45.3	71.2	40.6	39.3
17:00-18:00	45.0	66.3	39.3	38.0
18:00-19:00	45.2	67.0	41.8	41.2
19:00-20:00	43.0	60.5	39.4	38.3
20:00-21:00	48.3	72.4	43.3	37.6

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
21:00-22:00	43.7	67.8	36.9	33.2
22:00-23:00	38.2	65.6	33.1	32.5
Day 5-08/07/2024				
07:00-08:00	44.8	68.7	39.4	37.9
08:00-09:00	43.6	67.0	38.9	37.6
09:00-10:00	45.4	72.8	37.3	36.3
10:00-11:00	44.8	68.6	38.0	37.5
Most frequently occurring LA90 background data value: 39dB				

Table 10 - Weekday Background Data for Nighttime Hours (23:00-07:00). NMP 1

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
Day 1-04/07/2024				
23:00-00:00	39.3	54.8	36.5	36.1
00:00-01:00	39.3	51.5	34.5	33.0
01:00-02:00	36.8	53.7	33.1	31.9
02:00-03:00	35.8	53.8	31.7	31.3
03:00-04:00	33.8	48.2	31.0	30.4
04:00-05:00	38.3	57.3	34.2	32.5
05:00-06:00	41.6	68.6	37.0	35.8
06:00-07:00	42.2	75.5	37.2	36.2
Day 2-05/07/2024				
23:00-00:00	33.2	48.0	30.3	29.4
00:00-01:00	31.9	48.4	28.9	27.7
01:00-02:00	34.6	53.6	29.9	28.6
02:00-03:00	41.5	61.3	34.9	31.0
03:00-04:00	43.3	57.9	39.2	33.6
04:00-05:00	38.8	60.1	34.4	34.0
05:00-06:00	40.1	66.8	34.6	33.9
06:00-07:00	41.1	61.8	37.2	36.2
Most frequently occurring LA90 background data value: Between 31dB and 36 Db. 31dB chosen				

Table 11 - Weekend Background Data for Daytime Hours (07:00-23:00). NMP 1

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
Day 3-06/07/2024				
07:00-08:00	41.6	63.5	38.6	38.2
08:00-09:00	44.8	65.2	41.0	39.9
09:00-10:00	47.5	69.2	43.5	42.1
10:00-11:00	49.3	74.4	41.4	41.0
11:00-12:00	62.6	93.6	42.5	41.1
12:00-13:00	46.6	79.4	40.8	39.0

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
13:00-14:00	46.3	68.9	42.1	41.6
14:00-15:00	46.7	77.7	41.0	40.2
15:00-16:00	46.6	66.2	42.3	41.4
16:00-17:00	45.5	65.1	41.0	40.4
17:00-18:00	50.1	81.1	42.2	41.2
18:00-19:00	47.4	71.1	41.4	39.6
19:00-20:00	44.2	68.5	40.5	39.1
20:00-21:00	43.0	63.5	39.9	39.2
21:00-22:00	43.5	72.3	40.3	39.7
22:00-23:00	41.9	53.5	40.6	40.2
Day 4-07/07/2024				
07:00-08:00	43.8	75.6	38.9	38.3
08:00-09:00	44.4	73.8	39.5	38.9
09:00-10:00	50.7	74.9	41.7	40.9
10:00-11:00	46.2	69.3	42.4	41.5
11:00-12:00	47.8	69.2	42.4	41.5
12:00-13:00	46.3	73.3	41.0	40.7
13:00-14:00	46.9	72.3	42.3	40.2
14:00-15:00	43.0	69.1	37.8	37.3
15:00-16:00	45.0	66.1	40.8	40.1
16:00-17:00	46.0	73.6	37.7	36.7
17:00-18:00	45.8	65.2	39.3	38.5
18:00-19:00	43.9	74.5	36.3	33.7
19:00-20:00	46.8	68.6	35.5	35.2
20:00-21:00	52.1	80.0	38.5	36.2
21:00-22:00	42.2	63.9	38.6	38.0
22:00-23:00	40.2	63.4	36.3	35.2
Most frequently occurring LA90 background data value: Between 40-41dB. 40dB				

Table 12 - Weekend Background Data for Nighttime Hours (23:00-07:00). NMP 1

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
Day 3-06/07/2024				
23:00-00:00	42.7	63.4	39.6	39.1
00:00-01:00	41.1	51.6	37.9	36.0
01:00-02:00	39.1	55.6	35.3	34.6
02:00-03:00	38.3	51.5	33.2	32.3
03:00-04:00	37.2	49.5	32.7	31.9
04:00-05:00	40.3	56.5	35.7	34.5
05:00-06:00	40.8	57.9	36.8	35.1
06:00-07:00	40.1	56.3	38.4	37.8
Day 4-07/07/2024				
23:00-00:00	36.3	50.2	32.7	32.1
00:00-01:00	35.9	49.8	32.2	31.7

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
01:00-02:00	34.6	47.0	30.6	29.0
02:00-03:00	34.3	48.1	29.8	27.3
03:00-04:00	39.2	69.1	32.5	32.3
04:00-05:00	42.2	55.0	38.4	35.8
05:00-06:00	45.9	58.2	43.6	42.0
06:00-07:00	46.2	71.6	42.2	41.7
Most frequently occurring LA90 background data value: 32dB				

Table 13 - Weekday Background Data for Daytime Hours (07:00-23:00). NMP 2

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
Day 1-04/07/2024				
14:00-15:00	64.3	79.9	61.2	60.7
15:00-16:00	64.0	82.9	60.8	60.5
16:00-17:00	65.1	87.0	61.1	60.4
17:00-18:00	65.4	96.2	61.4	61.2
18:00-19:00	62.9	79.7	61.1	60.9
19:00-20:00	63.2	88.9	61.1	61.0
20:00-21:00	62.8	80.9	61.2	61.0
21:00-22:00	52.0	79.2	45.7	45.0
22:00-23:00	43.0	58.8	45.0	45.0
Day 2-05/07/2024				
07:00-08:00	63.5	79.6	60.5	59.9
08:00-09:00	64.0	80.6	60.8	60.4
09:00-10:00	64.7	92.7	60.6	60.3
10:00-11:00	63.6	83.6	60.6	60.3
11:00-12:00	63.8	85.9	60.6	60.3
12:00-13:00	63.4	77.5	60.5	60.3
13:00-14:00	63.5	86.2	60.6	60.2
14:00-15:00	63.4	80.0	60.4	60.3
15:00-16:00	63.3	85.0	57.1	46.2
16:00-17:00	59.8	78.3	48.1	47.3
17:00-18:00	58.4	79.6	46.6	46.0
18:00-19:00	54.1	77.6	47.8	47.2
19:00-20:00	52.6	79.0	44.7	42.9
20:00-21:00	55.5	77.1	49.4	44.1
21:00-22:00	53.5	78.9	42.7	39.2
22:00-23:00	48.4	80.5	38.3	37.1
Day 5-08/07/2024				
07:00-08:00	63.9	79.6	61.3	61.1
08:00-09:00	64.9	83.7	61.4	61.1
09:00-10:00	63.8	82.7	60.9	60.5
10:00-11:00	63.3	79.8	60.9	60.5

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
Most frequently occurring LA90 background data value: Majority site between 60-65dB therefore 60dB used				

Table 14 - Weekday Background Data for Nighttime Hours (23:00-07:00). NMP 2

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
Day 1-04/07/2024				
23:00-00:00	54.2	81.5	44.5	43.3
00:00-01:00	49.4	76.8	43.4	43.2
01:00-02:00	47.7	74.6	41.5	40.7
02:00-03:00	43.5	58.0	40.1	39.5
03:00-04:00	44.5	70.4	39.1	38.2
04:00-05:00	51.6	79.7	39.0	38.3
05:00-06:00	57.5	80.2	43.9	40.0
06:00-07:00	63.2	81.9	60.4	60.1
Day 2-05/07/2024				
23:00-00:00	52.5	79.1	36.5	35.9
00:00-01:00	41.3	70.2	34.1	33.2
01:00-02:00	48.1	76.1	33.0	32.1
02:00-03:00	44.1	72.0	36.3	34.0
03:00-04:00	53.1	76.0	47.8	45.8
04:00-05:00	47.8	77.9	39.4	38.4
05:00-06:00	56.7	79.7	39.6	39.1
06:00-07:00	62.0	83.6	59.2	58.7
Most frequently occurring LA90 background data value: Majority sit between 35-40dB, therefore 35dB used				

Table 15 - Weekend Background Data for Daytime Hours (07:00-23:00). NMP 2

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
Day 3-06/07/2024				
07:00-08:00	62.1	79.4	59.8	59.3
08:00-09:00	61.9	82.4	60.0	59.4
09:00-10:00	62.5	77.9	60.3	60.2
10:00-11:00	62.5	78.8	60.4	60.2
11:00-12:00	62.8	81.9	59.7	58.7
12:00-13:00	55.8	79.6	44.3	42.2
13:00-14:00	56.6	80.0	47.7	47.1
14:00-15:00	50.6	74.7	45.5	44.6
15:00-16:00	55.0	79.2	47.3	45.1
16:00-17:00	54.2	77.7	46.3	45.8
17:00-18:00	57.0	84.6	46.8	45.4

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
18:00-19:00	54.9	79.5	46.7	45.7
19:00-20:00	52.5	77.8	44.9	43.5
20:00-21:00	51.0	73.9	44.7	43.5
21:00-22:00	53.5	80.3	45.8	45.0
22:00-23:00	50.1	75.2	44.4	43.8
Day 4-07/07/2024				
07:00-08:00	54.1	80.1	44.8	43.1
08:00-09:00	52.9	78.7	44.3	43.3
09:00-10:00	55.7	82.3	47.0	46.2
10:00-11:00	53.8	76.7	49.1	48.4
11:00-12:00	54.9	79.6	48.1	47.8
12:00-13:00	52.3	76.4	47.3	46.8
13:00-14:00	53.5	76.9	47.0	45.2
14:00-15:00	51.4	77.8	43.4	42.3
15:00-16:00	55.2	80.7	46.3	44.7
16:00-17:00	54.6	81.9	43.5	41.5
17:00-18:00	51.8	76.8	44.1	43.0
18:00-19:00	50.8	76.3	41.7	38.2
19:00-20:00	52.7	77.0	38.2	37.0
20:00-21:00	52.5	75.6	41.1	40.0
21:00-22:00	52.5	80.3	41.3	40.6
22:00-23:00	50.3	76.7	39.9	39.0
Most frequently occurring LA90 background data value: Majority between 40-45dB so 40dB used				

Table 16 - Weekend Background Data for Nighttime Hours (23:00-07:00). NMP 2

Measurement Time	LA_{eq} (dB)	LA_{max} (dB)	LA_{90} (dB)	Lowest background $La90_{1hour}$ (dB)
Day 3-06/07/2024				
23:00-00:00	54.6	82.1	43.4	42.4
00:00-01:00	47.8	73.1	42.6	41.9
01:00-02:00	50.6	78.3	38.9	37.8
02:00-03:00	45.7	73.9	38.4	37.3
03:00-04:00	48.8	75.3	37.3	37.0
04:00-05:00	46.4	72.6	38.5	37.6
05:00-06:00	51.4	79.5	39.2	37.7
06:00-07:00	54.0	77.6	41.7	40.6
Day 4-07/07/2024				
23:00-00:00	52.1	78.5	38.7	38.2
00:00-01:00	43.2	72.9	35.5	34.5
01:00-02:00	48.8	77.2	34.2	32.8
02:00-03:00	37.1	56.2	33.1	32.9
03:00-04:00	48.3	76.3	35.3	33.6
04:00-05:00	49.7	79.1	38.8	35.3
05:00-06:00	58.2	79.2	47.6	41.4

Measurement Time	**LA_{eq} (dB)**	**LA_{max} (dB)**	**LA_{90} (dB)**	**Lowest background $La90_{1hour}$ (dB)**
06:00-07:00	62.7	79.0	60.0	59.6
Most frequently occurring LA90 background data value: 37dB used				

4.7.2 The representative background level used for NMP 1 for weekday daytime is 39dB, for weekday nighttime the value used is 31dB. For weekends, the representative figure used for daytime at NMP1 is 40dB and for nighttime is 32dB.

4.7.3 For weekday daytimes, a figure of 60dB is representative for the background at NMP2. For the nighttime on weekdays, a figure of 35Db is appropriate. For weekend daytimes at NMP2, a value of 40dB is used, for the nighttime background a figure of 37dB is seen to be representative.

4.7.4 Should It be required, photographs and videos can be provided, along with the noise measurement files to corroborate the above observations. These are available upon request by the EA and other parties i.e. the Local Authority.

4.8 Existing Noise Climate

4.8.1 The existing noise climate/soundscape at NMP1 is low in level and the noise profile dominated by nonanthropogenic sources, such as bird song and tree rustling. At NMP2, a continuous hum was audible (most likely from fixed plant associated with the site on the opposite side of the road). HGV movements were also present throughout the setup and collection of the equipment.

4.9 Control of Uncertainty

4.9.1 Uncertainty in this assessment was controlled via the following precautions/procedures:

- Both the sound level meter and calibrator have a traceable laboratory calibration, and the meter was field-calibrated both before and after the measurements. The field calibrator is set to 114.0dB at a frequency of 1kHz, which at the time of monitoring had drifted from this calibrated value by a maximum of 0.2dB. The field calibrator used by

NOVA Acoustics Ltd is set to a traceable reference signal of 94dB at a frequency of 1kHz, the drift from the calibrated value is detailed above in Section 4.3.

- The monitoring equipment used by NOVA Acoustics included additional mitigation to outdoor interference including the use of windshield, bird spikes etc.
- The measurement locations are considered representative of the existing noise climate outside the nearest residential dwellings to the proposed development.
- Background monitoring was undertaken during favourable weather conditions (e.g. dry and under 5m/s wind speed).

5 Noise Impact Assessment

5.1 Introduction

5.1.1 It is considered the most significant noise sources associated with the development are:

- The loading and operation of the printed circuit board (PCB) shredder.
- Noise arising from the 4no. flues associated with internal extraction systems and acid scrubbing unit.
- Operation of the internal forklift; and,
- Operation of other plant items inside and outside the building, listed in Table 17.

5.1.2 Additional noise sources are located within the buildings such as grinders and gas scrubbers and the caustic scrubber located externally.

5.2 Background Levels

5.2.1 With regards to background levels, BS4142:2014 states that “the objective is not simply to ascertain a lowest measured background sound level, but to quantify what is typical during particular time periods” and also “In practice there is no “single” background sound level as this is a fluctuating parameter. However, the level for the assessment should be representative of the period being assessed”.

5.2.2 The assessment will utilise the range of levels from the results tables in section 4.7, including the background data obtained by NOVA Acoustics. In order to choose a representative $LA90_{1hour}$ (reference time interval) favourable conditions where the weather had least impact on the sound pressure levels recorded were assessed.

5.2.3 From review of the measured background levels, the LA90 levels are markedly higher during the weekend measurements than those taken on the weekday. It is anticipated that this is due to the difference in road traffic levels which were observed to be slightly higher during the weekend monitoring along with observable agricultural activity and the local hunt. Wind speed was also very slightly higher (whilst still being low enough as per BS7445).

5.3 BS4142: Assessment

5.3.1 The CadnaA noise models were constructed using OS mapping Opendata and Google Earth satellite imagery, whilst topographical data was imported as a digital terrain model obtained from DEFRA.

5.3.2 The model has been based on the Drawing No. 2765-010-03 and noise has been assessed over a one-hour period.

5.3.3 The following assumptions/parameters are made within the models:

- The intervening land between the site boundary and residential properties was modelled with G = 1.0 as it was considered that the land is predominantly acoustically absorbent. This is with the exception of the ground the site is on which is hard and reflective, acoustically modelled at G=0.0.
- Table 17 details the assumed “on-times” of each source. Source heights were chosen to be representative of each item of plant.
- Buildings were set as acoustically reflective, with a reflection loss of 0.5 dB. A maximum order of reflection of 3.0 has been assumed. The main building has been modelled with an absorption coefficient that is indicative of trapezoidal steel sheeting (45mm) in thickness. This is likely a worst-case approach as there is brick construction to a height of 2.2m surrounding the building plus the internal structures of the building with surrounding plasterboard.
- There is no pump associated with the external 700 litre alkaline effluent tanks and therefore noise generated from these tanks is considered negligible. Further to this, after consulting with the operator, it has been confirmed that there are no pumps associated with external areas of the site.
- Receiver heights have been placed at 1.5m (ground floor) and 4.0m (first floor) as per EA guidance. The receivers have been snapped to the facades of the NSRs at a distance 0.05m in order to observe the free field level incident on the facades.
- The predicted grid noise levels were free-field, A-weighted, sound pressure levels. The noise contours generated within the model have been generated at a height of 4.0m.

- Surrounding residential properties were modelled at a height of 7.0m. Commercial building heights have been taken from observations and information taking from planning public access where available.
- Barrier heights, perimeter walls and waste storage bays have also been modelled based on the proposals outlined within this document and other documents submitted in support of the EP application. These have been modelled as being hard and reflective (I.e. concrete). Barrier heights and additional building within the proposed model have been added as per Drawing No. 2765-010-03.

5.3.4 Table 17 below includes the measured noise levels for the anticipated activities, which have either been measured by Oaktree Environmental Ltd or provided by the manufacturer. Octave and 1/3 Octave bands have been used where possible. It is to be noted that whilst there are HGV vehicles on site, they are extremely infrequent, circa 3 two-way rigids per week and 6 articulated lorries per year. It has not been deemed necessary to include these in the assessment as the impact will be insignificant, when considering the site is located within an industrial area which is likely to have significantly more frequent HGV movements, including the existing industrial site.

Table 17 – Noise Levels Used Within CadnaA Modelling

Activity	Sound Power Level (dBA)	Height of Source (m)	On Time Per Hour (mins)	Comments
Steam Boiler Flue	79.6	9.44	60	Oaktree contacted the providers of the steam boiler (Fulton) for noise data of the output to the flue, however they could not provide this. Instead, an almost identical system was found with the octave band data provided by Bosch. This can be seen in Appendix II. The Fulton flue is rated at 200KW. The Bosch data has a minimum output of 600kw; therefore, the Bosch data has been used for this power output. This can be considered an overestimation given the significant higher rating/capacity

Activity	Sound Power Level (dBA)	Height of Source (m)	On Time Per Hour (mins)	Comments
Thermal Processing Area Flue/Extraction	84.7	9.44	60	Measurement by Oaktree of similar flue at a different site. Manufacturer data was provided which cited a 57dB(A) level for the stack (shown in Appendix IV). It was considered that this level seemed too low compared to the level measured at a similar site and as such the measured data was used in the assessment, ensuring a precautionary assessment.
Alkaline Processing Area Flue/Extraction	80.9	9.44	60	Manufacturer data provided by RAM environmental. They cited an output level of 65-70db(A) at 1m with a silencer pre-included as part of the installation. The upper limit of 70dB(A) was chosen to inform the assessment. Measured octave data was used and calibrated to achieve this level. This correspondence is shown in Appendix III.
Acid Scrubbing Flue	78.8	10.44	60	Measurement by Oaktree of similar flue at a different site.
Acid scrubbing	78.6	1.0	60	Measurement by Oaktree of similar scrubber at a different site.
Shredding	84.0	1.0	60	Manufacturer data.
Gas Furnace	80.3	1.0	60	Manufacturer data provided by Venta Acoustics. This is shown in Appendix IV.
Chiller	75.0	1.0	60	Manufacturer data.
Extraction Unit	75.8	1.6	60	Manufacturer data.
Compressor	102.0	1.0	5	Manufacturer data. A 5 minute on time correction has been chosen as the noise source is infrequent and for short bursts.

Activity	Sound Power Level (dBA)	Height of Source (m)	On Time Per Hour (mins)	Comments
Metal Crusher	105.0	1.0	5	CadnaA library data of similar activity as manufacturer data was not available. The crusher is run infrequently and so a 5 minute on time has been chosen. It is also likely an overestimation as the crusher used on site is a small piece of equipment just used for crushing precious metals on a small scale.
Forklift	77.0	1.0	5 movements per hour	Modelled as a moving line source using measurements taken by Oaktree at a similar site.

5.3.5 With regards to acoustic correction features/penalties as per B24142:2014, some occasional bangs/crashes are associated with the operation of the site forklift (scraping on the floor, reversing alarms, falling material etc), however, considering that the forklift will be located within the building with the roller shutter doors shut most of the time for security reasons, this is considered to be inaudible at sensitive receptors. However, there will be a tonal element to the noise emanating from the site coming from the internal shredder and external flue systems and therefore a +2dB penalty is deemed necessary to be added to the predicted specific sound level as will likely be just perceptible at the NSRs, in particular at the houses to the west of the site at NMP 1.

5.3.6 Tables 18 to 21, overleaf, outline the predicted noise levels in comparison to background associated with the application site for the proposed operations, at each of the sensitive receptor locations shown on Figure 5. These are based on the results of the modelling detailed below in Figures 2 to 4. The nighttime models detailed in Figure 4 shows the effect on sensitive receptors with the acid and alkali flues, chiller and acid scrubber in operation. The steam boiler and thermal flues will not be operated outside of the stated operating hours. The weekday daytime predictions have been assessed with roller shutter doors closed as this will be the “normal” operation of the site.

Figure 2 – Modelling of Daytime Noise Sources Associated with the Site as per the Proposed Layout (All Sources Active and Shutter Doors Closed), 4.0m height

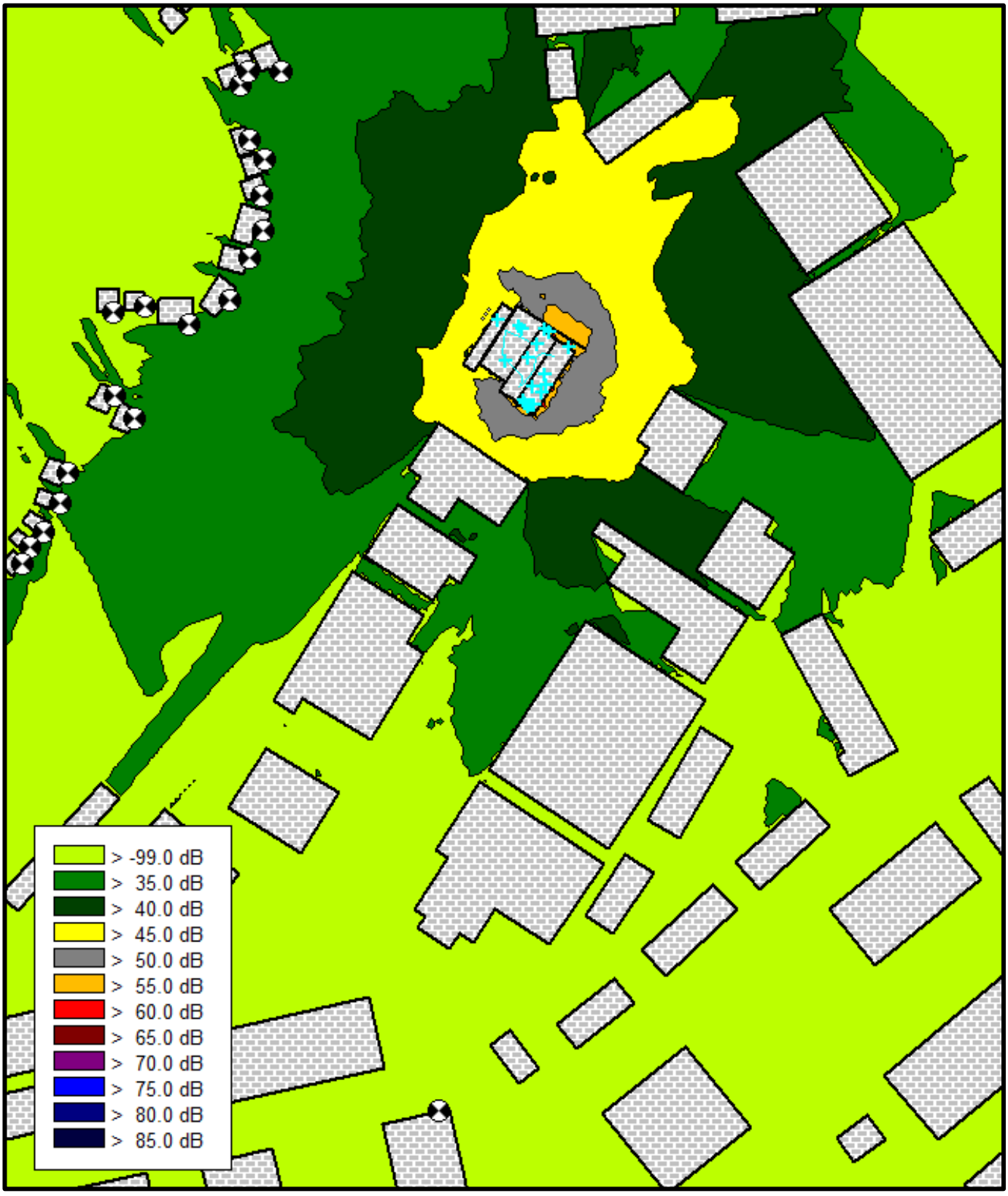


Figure 3 – Modelling of Daytime Noise Sources Associated with the Site as per the Proposed Layout (All Sources Active and Shutter Doors Open), 4.0m height

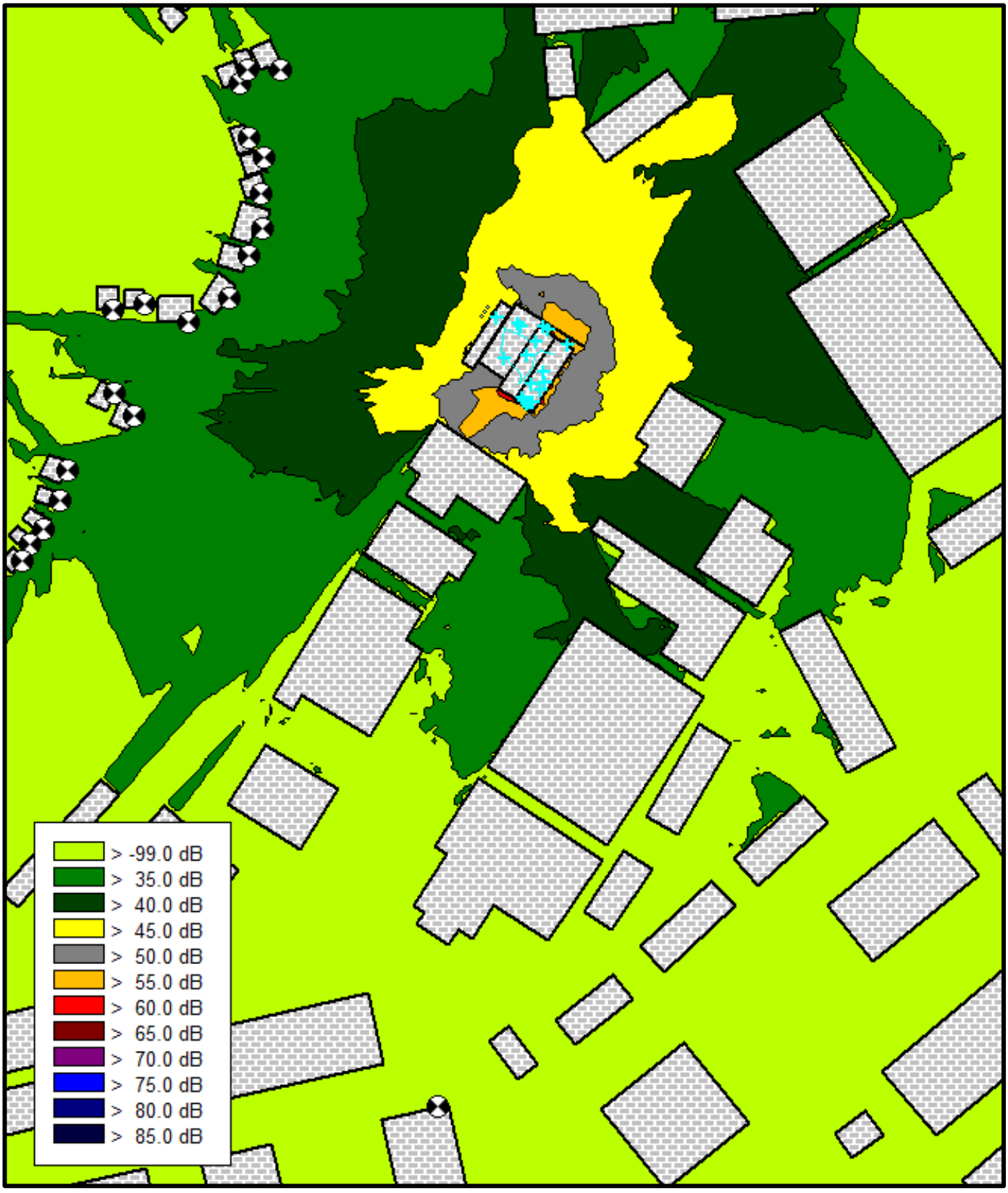


Figure 4 – Modelling of Nighttime and Weekend Noise Sources Associated with the Site as per the Proposed Layout, 4.0m height

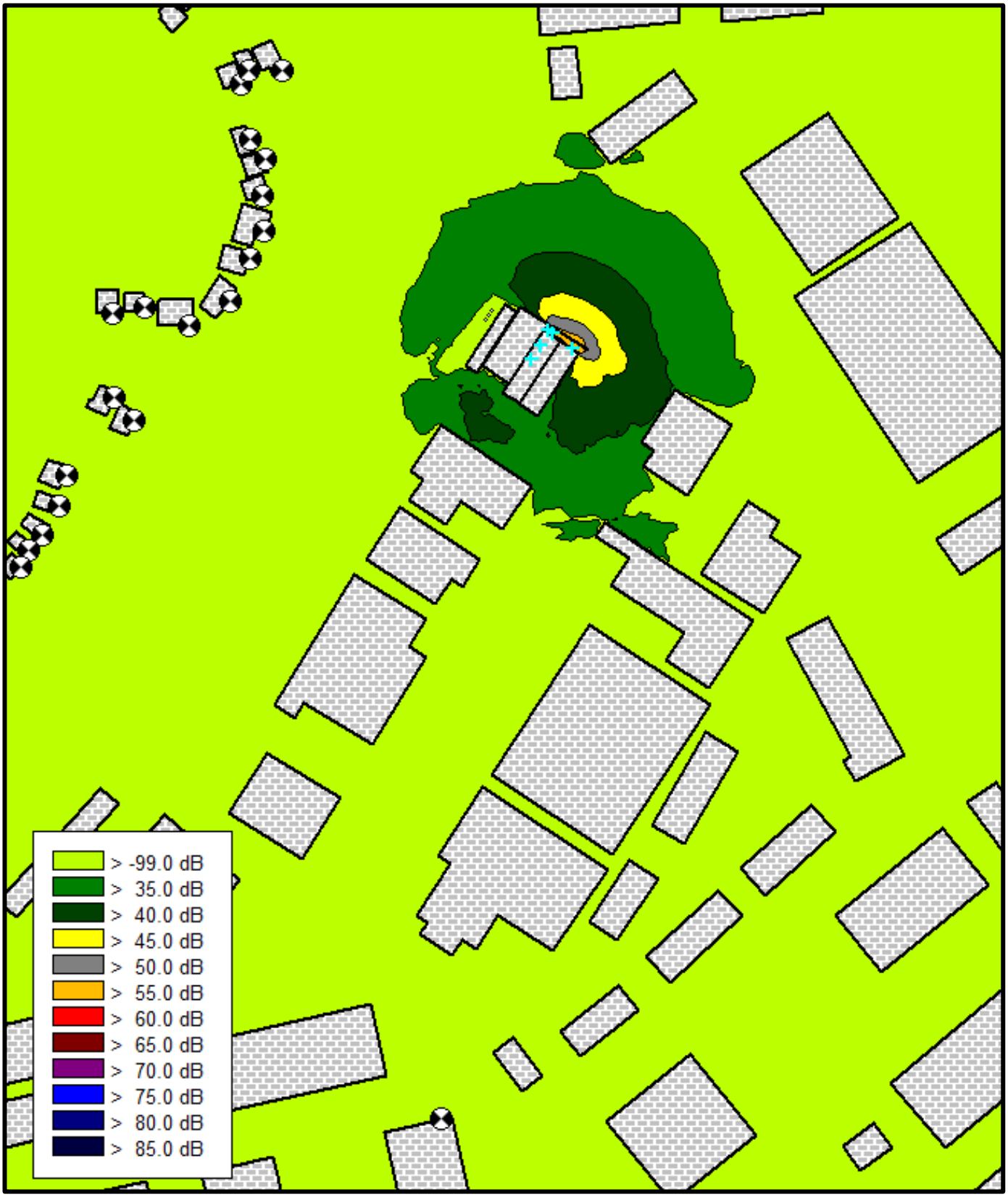


Figure 5 – Sensitive Receptor Plan

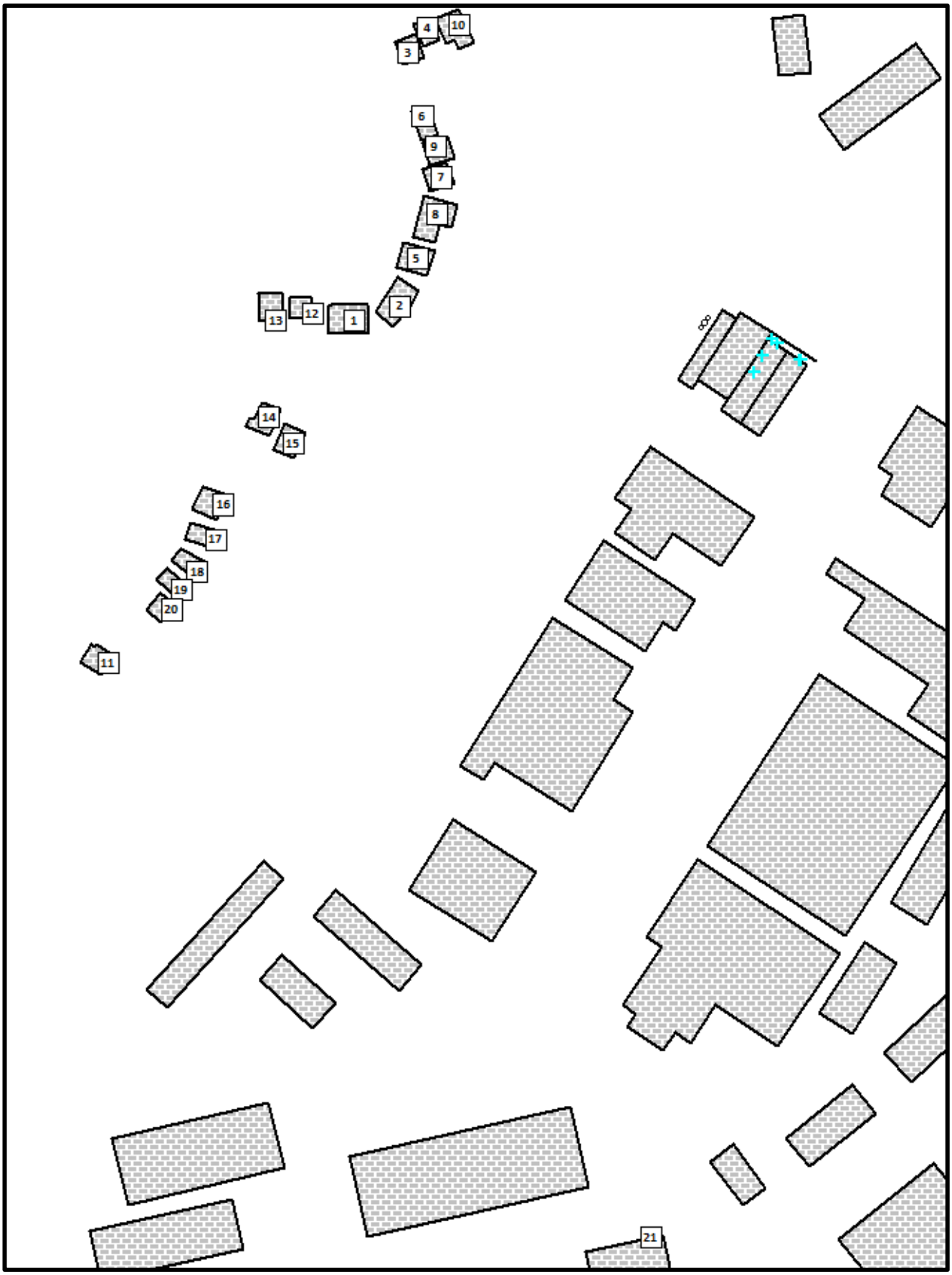


Table 18 – BS4142:2014 Assessment of Typical Daytime Noise Sources Associated with the Site with Roller Shutter Doors Closed - Weekday

Noise sensitive receptor	Floor	Sound pressure level at receiver (dB)	Penalty added (dB)	Rating level (dB)	Background (dB)	Difference with background (dB)	Assessment of impact as per BS4142
1	GF	34.5	2	36.5	39.0	-2.5	No Impact
	1F	35.8	2	37.8	39.0	-1.2	No Impact
2	GF	34.8	2	36.8	39.0	-2.2	No Impact
	1F	36.0	2	38.0	39.0	-1.0	No Impact
3	GF	34.9	2	36.9	39.0	-2.1	No Impact
	1F	36.2	2	38.2	39.0	-0.8	No Impact
4	GF	35.2	2	37.2	39.0	-1.8	No Impact
	1F	36.5	2	38.5	39.0	-0.5	No Impact
5	GF	35.6	2	37.6	39.0	-1.4	No Impact
	1F	36.8	2	38.8	39.0	-0.2	No Impact
6	GF	36.3	2	38.3	39.0	-0.7	No Impact
	1F	37.6	2	39.6	39.0	0.6	Low Impact
7	GF	36.1	2	38.1	39.0	-0.9	No Impact
	1F	37.6	2	39.6	39.0	0.6	Low Impact
8	GF	37.0	2	39.0	39.0	0.0	No Impact
	1F	38.3	2	40.3	39.0	1.3	Low Impact
9	GF	35.2	2	37.2	39.0	-1.8	No Impact
	1F	36.7	2	38.7	39.0	-0.3	No Impact
10	GF	35.8	2	37.8	39.0	-1.2	No Impact
	1F	37.3	2	39.3	39.0	0.3	Low Impact
11	GF	32.4	2	34.4	39.0	-4.6	No Impact
	1F	36.0	2	38.0	39.0	-1.0	No Impact
12	GF	26.2	2	28.2	39.0	-10.8	No Impact
	1F	28.3	2	30.3	39.0	-8.7	No Impact
13	GF	28.4	2	30.4	39.0	-8.6	No Impact
	1F	30.4	2	32.4	39.0	-6.6	No Impact
14	GF	34.0	2	36.0	39.0	-3.0	No Impact
	1F	35.1	2	37.1	39.0	-1.9	No Impact
15	GF	34.2	2	36.2	39.0	-2.8	No Impact
	1F	35.3	2	37.3	39.0	-1.7	No Impact
16	GF	33.7	2	35.7	39.0	-3.3	No Impact
	1F	34.8	2	36.8	39.0	-2.2	No Impact
17	GF	33.9	2	35.9	39.0	-3.1	No Impact
	1F	35.0	2	37.0	39.0	-2.0	No Impact

Noise sensitive receptor	Floor	Sound pressure level at receiver (dB)	Penalty added (dB)	Rating level (dB)	Background (dB)	Difference with background (dB)	Assessment of impact as per BS4142
18	GF	33.5	2	35.5	39.0	-3.5	No Impact
	1F	35.0	2	37.0	39.0	-2.0	No Impact
19	GF	33.3	2	35.3	39.0	-3.7	No Impact
	1F	36.6	2	38.6	39.0	-0.4	No Impact
20	GF	33.0	2	35.0	39.0	-4.0	No Impact
	1F	36.5	2	38.5	39.0	-0.5	No Impact
21 (NMP2)	GF	26.7	2	28.7	60.0	-31.3	No Impact
	1F	28.7	2	30.7	60.0	-29.3	No Impact

Table 19 – BS4142:2014 Assessment of Typical Nighttime Noise Sources Associated with the Site - Weekday

Noise sensitive receptor	Floor	Sound pressure level at receiver (dB)	Penalty added (dB)	Rating level (dB)	Background (dB)	Difference with background (dB)	Assessment of impact as per BS4142
1	GF	25.3	2	27.3	31.0	-3.7	No Impact
	1F	26.7	2	28.7	31.0	-2.3	No Impact
2	GF	27.0	2	29.0	31.0	-2.0	No Impact
	1F	28.2	2	30.2	31.0	-0.8	No Impact
3	GF	25.6	2	27.6	31.0	-3.4	No Impact
	1F	26.4	2	28.4	31.0	-2.6	No Impact
4	GF	26.0	2	28.0	31.0	-3.0	No Impact
	1F	26.8	2	28.8	31.0	-2.2	No Impact
5	GF	27.2	2	29.2	31.0	-1.8	No Impact
	1F	28.4	2	30.4	31.0	-0.6	No Impact
6	GF	27.6	2	29.6	31.0	-1.4	No Impact
	1F	28.7	2	30.7	31.0	-0.3	No Impact
7	GF	29.0	2	31.0	31.0	0.0	No Impact
	1F	30.0	2	32.0	31.0	1.0	Low Impact
8	GF	30.0	2	32.0	31.0	1.0	Low Impact
	1F	31.1	2	33.1	31.0	2.1	Low Impact
9	GF	27.1	2	29.1	31.0	-1.9	No Impact
	1F	28.3	2	30.3	31.0	-0.7	No Impact
10	GF	26.8	2	28.8	31.0	-2.2	No Impact
	1F	27.7	2	29.7	31.0	-1.3	No Impact
11	GF	19.5	2	21.5	31.0	-9.5	No Impact
	1F	21.1	2	23.1	31.0	-7.9	No Impact
12	GF	16.4	2	18.4	31.0	-12.6	No Impact
	1F	19.5	2	21.5	31.0	-9.5	No Impact
13	GF	17.0	2	19.0	31.0	-12.0	No Impact
	1F	20.0	2	22.0	31.0	-9.0	No Impact
14	GF	23.5	2	25.5	31.0	-5.5	No Impact
	1F	24.9	2	26.9	31.0	-4.1	No Impact
15	GF	23.9	2	25.9	31.0	-5.1	No Impact
	1F	25.3	2	27.3	31.0	-3.7	No Impact
16	GF	22.1	2	24.1	31.0	-6.9	No Impact
	1F	23.6	2	25.6	31.0	-5.4	No Impact
17	GF	21.8	2	23.8	31.0	-7.2	No Impact
	1F	23.3	2	25.3	31.0	-5.7	No Impact

Noise sensitive receptor	Floor	Sound pressure level at receiver (dB)	Penalty added (dB)	Rating level (dB)	Background (dB)	Difference with background (dB)	Assessment of impact as per BS4142
18	GF	21.4	2	23.4	31.0	-7.6	No Impact
	1F	22.8	2	24.8	31.0	-6.2	No Impact
19	GF	21.0	2	23.0	31.0	-8.0	No Impact
	1F	22.5	2	24.5	31.0	-6.5	No Impact
20	GF	20.7	2	22.7	31.0	-8.3	No Impact
	1F	22.2	2	24.2	31.0	-6.8	No Impact
21 (NMP2)	GF	18.5	2	20.5	35.0	-14.5	No Impact
	1F	19.8	2	21.8	35.0	-23.2	No Impact

Table 20 – BS4142:2014 Assessment of Typical Daytime Noise Sources Associated with the Site - Weekend

Noise sensitive receptor	Floor	Sound pressure level at receiver (dB)	Penalty added (dB)	Rating level (dB)	Background (dB)	Difference with background (dB)	Assessment of impact as per BS4142
1	GF	25.3	2	27.3	40.0	-12.7	No Impact
	1F	26.7	2	28.7	40.0	-11.3	No Impact
2	GF	27.0	2	29.0	40.0	-11.0	No Impact
	1F	28.2	2	30.2	40.0	-9.8	No Impact
3	GF	25.6	2	27.6	40.0	-12.4	No Impact
	1F	26.4	2	28.4	40.0	-11.6	No Impact
4	GF	26.0	2	28.0	40.0	-12.0	No Impact
	1F	26.8	2	28.8	40.0	-11.2	No Impact
5	GF	27.2	2	29.2	40.0	-10.8	No Impact
	1F	28.4	2	30.4	40.0	-9.6	No Impact
6	GF	27.6	2	29.6	40.0	-10.4	No Impact
	1F	28.7	2	30.7	40.0	-9.3	No Impact
7	GF	29.0	2	31.0	40.0	-9.0	No Impact
	1F	30.0	2	32.0	40.0	-8.0	No Impact
8	GF	30.0	2	32.0	40.0	-8.0	No Impact
	1F	31.1	2	33.1	40.0	-6.9	No Impact
9	GF	27.1	2	29.1	40.0	-10.9	No Impact
	1F	28.3	2	30.3	40.0	-9.7	No Impact
10	GF	26.8	2	28.8	40.0	-11.2	No Impact
	1F	27.7	2	29.7	40.0	-10.3	No Impact
11	GF	19.5	2	21.5	40.0	-18.5	No Impact
	1F	21.1	2	23.1	40.0	-16.9	No Impact
12	GF	16.4	2	18.4	40.0	-21.6	No Impact
	1F	19.5	2	21.5	40.0	-18.5	No Impact
13	GF	17.0	2	19.0	40.0	-21.0	No Impact
	1F	20.0	2	22.0	40.0	-18.0	No Impact
14	GF	23.5	2	25.5	40.0	-14.5	No Impact
	1F	24.9	2	26.9	40.0	-13.1	No Impact
15	GF	23.9	2	25.9	40.0	-14.1	No Impact
	1F	25.3	2	27.3	40.0	-12.7	No Impact
16	GF	22.1	2	24.1	40.0	-15.9	No Impact
	1F	23.6	2	25.6	40.0	-14.4	No Impact
17	GF	21.8	2	23.8	40.0	-16.2	No Impact
	1F	23.3	2	25.3	40.0	-14.7	No Impact

Noise sensitive receptor	Floor	Sound pressure level at receiver (dB)	Penalty added (dB)	Rating level (dB)	Background (dB)	Difference with background (dB)	Assessment of impact as per BS4142
18	GF	21.4	2	23.4	40.0	-16.6	No Impact
	1F	22.8	2	24.8	40.0	-15.2	No Impact
19	GF	21.0	2	23.0	40.0	-17.0	No Impact
	1F	22.5	2	24.5	40.0	-15.5	No Impact
20	GF	20.7	2	22.7	40.0	-17.3	No Impact
	1F	22.2	2	24.2	40.0	-15.8	No Impact
21 (NMP2)	GF	18.5	2	20.5	40.0	-19.5	No Impact
	1F	19.8	2	21.8	40.0	-18.2	No Impact

Table 21 – BS4142:2014 Assessment of Typical Nighttime Noise Sources Associated with the Site - Weekend

Noise sensitive receptor	Floor	Sound pressure level at receiver (dB)	Penalty added (dB)	Rating level (dB)	Background (dB)	Difference with background (dB)	Assessment of impact as per BS4142
1	GF	25.3	2	27.3	32.0	-4.7	No Impact
	1F	26.7	2	28.7	32.0	-3.3	No Impact
2	GF	27.0	2	29.0	32.0	-3.0	No Impact
	1F	28.2	2	30.2	32.0	-1.8	No Impact
3	GF	25.6	2	27.6	32.0	-4.4	No Impact
	1F	26.4	2	28.4	32.0	-3.6	No Impact
4	GF	26.0	2	28.0	32.0	-4.0	No Impact
	1F	26.8	2	28.8	32.0	-3.2	No Impact
5	GF	27.2	2	29.2	32.0	-2.8	No Impact
	1F	28.4	2	30.4	32.0	-1.6	No Impact
6	GF	27.6	2	29.6	32.0	-2.4	No Impact
	1F	28.7	2	30.7	32.0	-1.3	No Impact
7	GF	29.0	2	31.0	32.0	-1.0	No Impact
	1F	30.0	2	32.0	32.0	0.0	No Impact
8	GF	30.0	2	32.0	32.0	0.0	No Impact
	1F	31.1	2	33.1	32.0	1.1	Low Impact
9	GF	27.1	2	29.1	32.0	-2.9	No Impact
	1F	28.3	2	30.3	32.0	-1.7	No Impact
10	GF	26.8	2	28.8	32.0	-3.2	No Impact
	1F	27.7	2	29.7	32.0	-2.3	No Impact
11	GF	19.5	2	21.5	32.0	-10.5	No Impact
	1F	21.1	2	23.1	32.0	-8.9	No Impact
12	GF	16.4	2	18.4	32.0	-13.6	No Impact
	1F	19.5	2	21.5	32.0	-10.5	No Impact
13	GF	17.0	2	19.0	32.0	-13.0	No Impact
	1F	20.0	2	22.0	32.0	-10.0	No Impact
14	GF	23.5	2	25.5	32.0	-6.5	No Impact
	1F	24.9	2	26.9	32.0	-5.1	No Impact
15	GF	23.9	2	25.9	32.0	-6.1	No Impact
	1F	25.3	2	27.3	32.0	-4.7	No Impact
16	GF	22.1	2	24.1	32.0	-7.9	No Impact
	1F	23.6	2	25.6	32.0	-6.4	No Impact
17	GF	21.8	2	23.8	32.0	-8.2	No Impact
	1F	23.3	2	25.3	32.0	-6.7	No Impact

Noise sensitive receptor	Floor	Sound pressure level at receiver (dB)	Penalty added (dB)	Rating level (dB)	Background (dB)	Difference with background (dB)	Assessment of impact as per BS4142
18	GF	21.4	2	23.4	32.0	-8.6	No Impact
	1F	22.8	2	24.8	32.0	-7.2	No Impact
19	GF	21.0	2	23.0	32.0	-9.0	No Impact
	1F	22.5	2	24.5	32.0	-7.5	No Impact
20	GF	20.7	2	22.7	32.0	-9.3	No Impact
	1F	22.2	2	24.2	32.0	-7.8	No Impact
21 (NMP2)	GF	18.5	2	20.5	37.0	-16.5	No Impact
	1F	19.8	2	21.8	37.0	-15.2	No Impact

5.3.7 As can be seen in the results in the tables above, there is no noise impact predicted at most of the sensitive receptors for both daytime and nighttime periods during weekdays and weekends. There is a low impact predicted at a small number of receptors with a maximum exceedance of 2.1dB. It is considered that this would not be perceptible at the receptors.

5.3.8 It should of course also be observed that the assessment comprises an over estimation of the rating level, with numerous worst-case assumptions being made. The model has been constructed with all noise sources operating at once during the daytime. This is highly unlikely as the site uses the majority of the plant sporadically throughout the day as and when it is needed, with some plant not being used for multiple days/weeks at a time on occasions. This includes the steam boiler and thermal flues.

5.3.9 The assessment has been carried out using levels from the scenario with closed roller shutter doors. Whilst they will remain closed for security reasons, at infrequent times they will need to be open. The main noise source recorded at the receptors is noise from the flues, so the opening and shutting of the roller door does not change the noise levels significantly, especially at the most affected receivers, as shown in Table 22, below. Again, it is to be noted that this is an absolute worst-case approach and will be an infrequent occurrence.

Table 22 - Difference Between Opening and Closing of Shutter Doors

Noise sensitive receptor	Floor	Precited Level with Shutter Closed (dB)	Predicted Level with Shutter Open (dB)	Difference (dB)
1	GF	34.5	35.9	1.4
	1F	35.8	37.0	1.2
2	GF	34.8	34.9	0.1
	1F	36.0	36.1	0.1
3	GF	34.9	35.0	0.1
	1F	36.2	36.3	0.1
4	GF	35.2	35.2	0
	1F	36.5	36.5	0
5	GF	35.6	35.7	0.1
	1F	36.8	36.8	0
6	GF	36.3	36.3	0
	1F	37.6	37.6	0
7	GF	36.1	36.1	0
	1F	37.6	37.6	0
8	GF	37.0	37.0	0
	1F	38.3	38.3	0
9	GF	35.2	35.2	0
	1F	36.7	36.7	0
10	GF	35.8	35.8	0
	1F	37.3	37.3	0
11	GF	32.4	32.7	0.3
	1F	36.0	36.1	0.1
12	GF	26.2	26.4	0.2
	1F	28.3	28.3	0
13	GF	28.4	28.5	0.1
	1F	30.4	30.6	0.2
14	GF	34.0	36.1	2.1
	1F	35.1	37.0	1.9
15	GF	34.2	36.6	2.4
	1F	35.3	37.5	2.2
16	GF	33.7	35.3	1.6
	1F	34.8	36.2	1.4
17	GF	33.9	35.3	1.4
	1F	35.0	36.3	1.3
18	GF	33.5	34.9	1.4
	1F	35.0	36.2	1.2

Noise sensitive receptor	**Floor**	**Precited Level with Shutter Closed (dB)**	**Predicted Level with Shutter Open (dB)**	**Difference (dB)**
19	GF	33.3	34.7	1.4
	1F	36.6	37.4	0.8
20	GF	33.0	33.8	0.8
	1F	36.5	36.8	0.3
21 (NMP2)	GF	26.7	27.0	0.3
	1F	28.7	29.1	0.4

6 Best Available Techniques

6.1 Summary & Recommendations

6.1.1 The following will be considered when operating the site:

- Prevent generation of noise by good design and maintenance
- Daily maintenance checks – operational and maintenance staff
- Preventative maintenance schedule – based on manufactures guidance and historical data, experience. Pro-active and pre-emptive maintenance
- Noise monitoring and audits – noise monitoring as part of the daily site inspection, any abnormal findings are recorded in the site log and reported to the site supervisor. Rattles, hums, squeaks, relief valves, irregular sounds recorded etc
- Prioritising maintenance activities – short and long-term action plans, monitor reliability.
- Critical spares or supplier identified – spares available on demand.
- Daily operational checks - external doors are closed when not in use, hatchways or access doors left open, acoustic hoods not attached/fixed correctly, engines idling when not in use, suitable PPE being used as required.
- Daily operational checks – perimeter checks to assess noise levels, changes in level tone, intermittent noise, nuisance noise. This noise assessment is subjective, dependent on experience, familiarisation.
- Records – site logs record operational and maintenance issues/findings.
- Communication – open 2-way communication, listen to concerns raised, investigate as required and feedback to group or individual.
- Procurement – equipment selection, noise rating, inclusive attenuation, replacement policy, life cycle of product
- Signage – Appropriate signage denoting noise control areas and quite zones.

6.1.2 Site specific noise control techniques include the following:

- Majority of operations are internal with the roller shutter door only being open at times of deliveries which are infrequent. At the request of the EA, roller shutter doors must also not be opened before 7am.
- Barrier around the principal noise source (acid scrubber, external) this will lessen the affect at NMP 1 in particular.
- Further noise monitoring when the site is in operation to confirm predicted noise levels within the assessment. This can be an Improvement Condition within the EP, if considered necessary, consistent with the approach taken by the EA on other EP applications. It would be unreasonable to include a pre-operational condition for this aspect.

7 Conclusion

7.1 Summary & Recommendations

7.1.1 Oaktree Environmental Limited have undertaken an NIA for the proposed operation of a facility for the recovery of precious metals from wastes, to be situated at 10 Merse Rd, Moons Moat North Industrial Estate, Redditch B98 9HF.

7.1.2 The primary receptors are the residential dwellings on Hillmorton Close to the West.

7.1.3 The NIA has been updated to include additional background noise monitoring data, additional information and review of previous assumptions, in response to a Request for Further Information from the EA.

7.1.4 The NIA includes details of the site layout. Currently the site is arranged as per Drawing No. 2765-010-03 rev G.

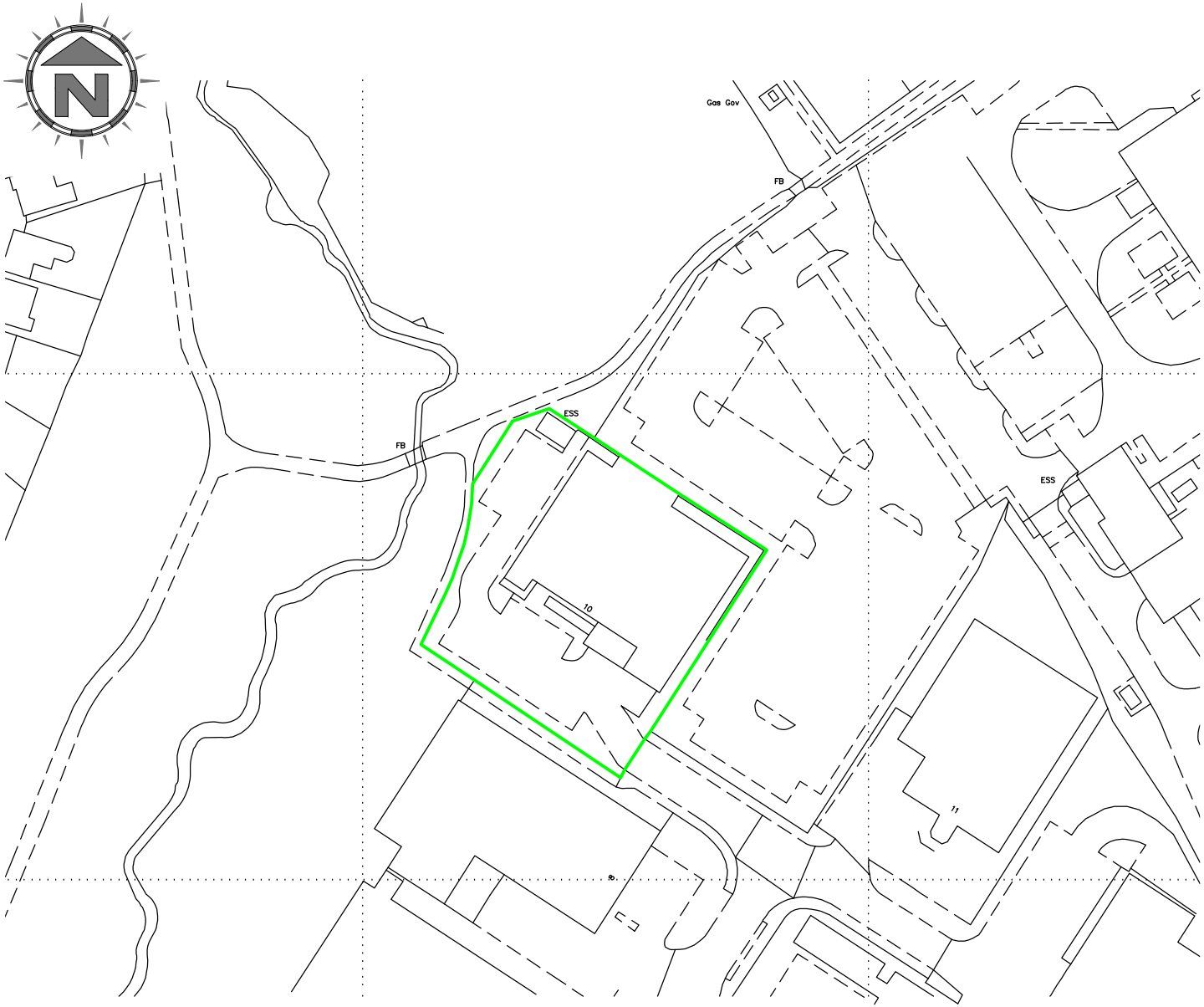
7.1.5 The NIA found that with the site operating as proposed there would be potential for low impacts at some of the noise receptors with most receptors experiencing no impact. The impacts have a maximum exceedance of 2.1dB with most impacts being less than or equal to 1dB.

7.1.6 The proposed layout of the site has been designed with acoustic issues in mind and the site has been assessed with regards to BS4142:2014. The NIA has demonstrated that resulting noise levels will be equal to or below background levels at sensitive receptor locations, with some minor exceptions of low impacts that will not be perceptible.

7.1.7 Oaktree Environmental Limited therefore concludes that there should be no impact due to noise from the site and that the permit application should not be refused based on noise.

Appendix I

Drawings



NOTES

REVISION HISTORY

Rev:	Date:	Init:	Description:
-	05.12.22	JH	Initial drawing
A	05.01.23	IA	Address update
B	17.04.23	IA	Drawing title change

KEY:

EP Permit boundary

Oaktree Environmental Ltd
Waste, Planning and Environmental Consultants

DRAWING TITLE
EP PERMIT BOUNDARY PLAN

CLIENT
Kaug Refinery Services Ltd

PROJECT/SITE
10 Merse Road, North Moons Moat, Redditch, B98 9HL

SCALE @ A4	CLIENT NO	JOB NO
1:1,250	2765	010

DRAWING NUMBER	REV	STATUS
2765-010-02	B	Issued

DRAWN BY	CHECKED	DATE
JH/IA	RS	17.04.23

Lime House, Road Two, Winsford, Cheshire, CW7 3QZ
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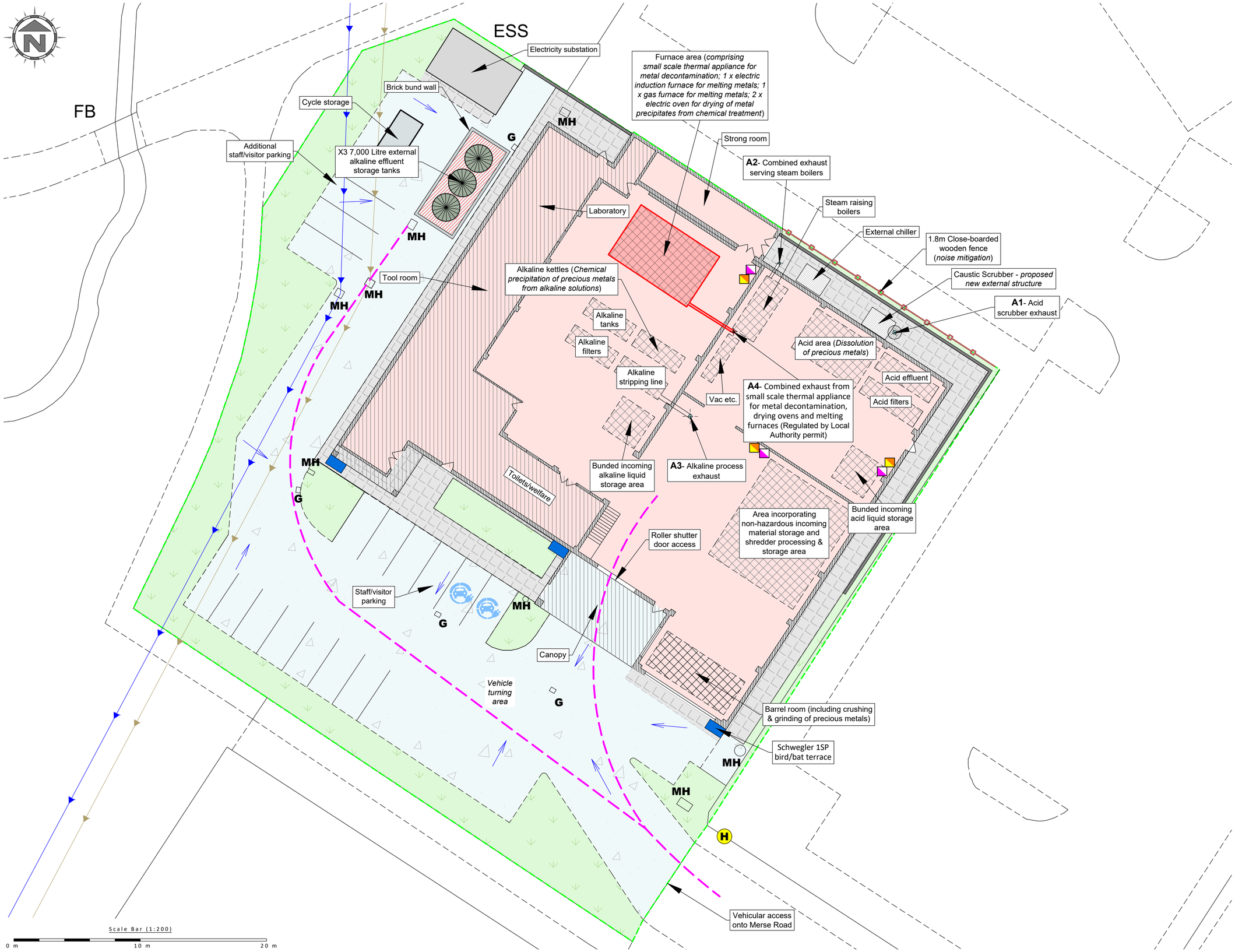

NOTES

Site survey undertaken using Intel Falcon 8+ drone in September 2022. Ordnance Survey data reproduced with the permission of the controller of H.M.S.O. Crown copyright licence No. 100022432. This drawing is copyright and property of Oaktree Environmental Ltd.

REVISION HISTORY

Rev:	Date:	Init:	Description:
-	05.12.22	JH	Initial drawing
A	15.12.22	IA/JH	Drawing amendments
B	05.01.23	IA	Address update
C	22.03.23	IA	Layout changes
D	17.04.23	IA	Drawing amendments
E	04.05.23	IA	EA comments
F	28.07.23	IA	Drawing amendments
G	22.01.24	IA	Application resubmission

KEY:

- Waste EP Permit boundary (regulated by Environment Agency)
- Part B Permit boundary (regulated by Local Authority)
- Sealed buildings
- Concreted areas
- Spill kit
- Firefighting equipment
- Access routes for emergency vehicles
- Hydrant
- MH Manhole
- G Gully
- Fall direction arrows
- Paved areas
- Un-surfaced areas

Oaktree Environmental Ltd
Waste, Planning and Environmental Consultants

DRAWING TITLE
SITE LAYOUT PLAN

CLIENT
Kaug Refinery Services Ltd

PROJECT/SITE
10 Merse Road, North Moons Moat, Redditch, B98 9HL

SCALE @ A2	CLIENT NO	JOB NO
1:200	2765	010

DRAWING NUMBER	REV	STATUS
2765-010-03	G	Issued

DRAWN BY	CHECKED	DATE
JH/IA	RS/DY	22.01.24

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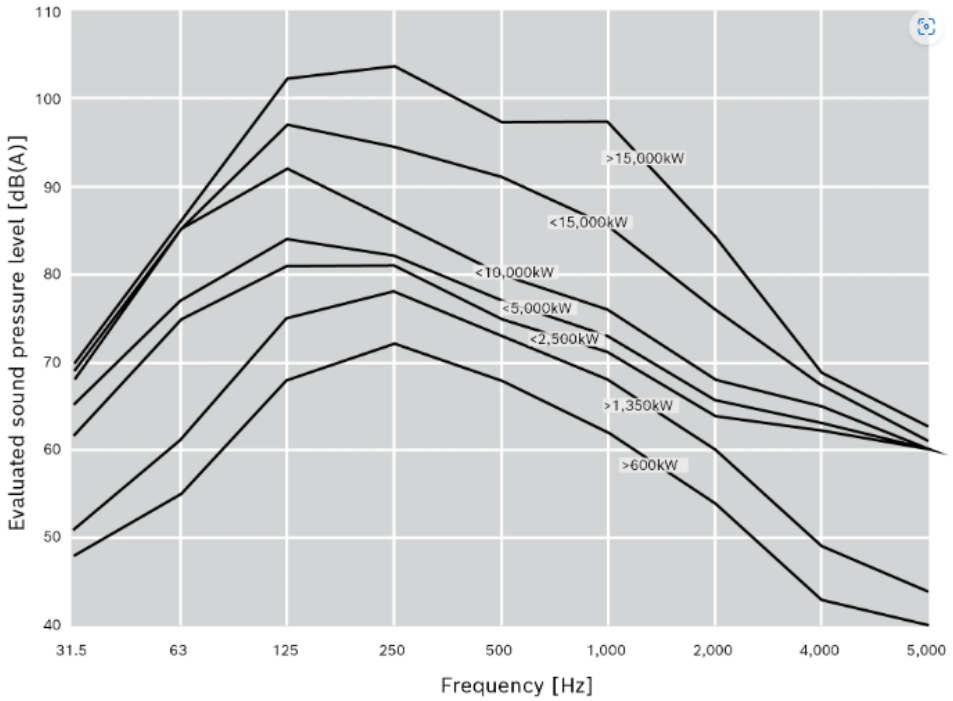
Appendix II

Steam Boiler Flue Data



A-rated frequency analysis and corresponding total sound pressure level with reference to boiler output

Boiler output	[kW]	≤ 600	≤ 1,350	≤ 2,500	≤ 5,000	≤ 10,000	≤ 15,000	> 15,000
Empirical value for the total sound pressure level	[dB(A)]	75	81	85	87	94	100	107

The values shown in the figure above (A-rated frequency analysis and corresponding total sound pressure level with reference to boiler output) are only guide values for a single boiler without flue gas silencer. The measurement was performed 1m from the chimney outlet at an angle of 45°.

https://www.boiler-planning.com/en/technology/peripherals/flue-gas-system.html#:~:text=The%20noise%20produced%20during%20combustion%20is%20emitted%20as,be%20effectively%20reduced%20with%20a%20flue%20gas%20silencer

Appendix III

Alkaline Extraction System Data

Hi Adrian

I hope you are well.

Further to my recent telephone conversation with Ian, please find details of the recommended fan to provide extraction to your 3 x Kettles and Stripping Line.

The current air volume from the fan serving your 3 x kettles is 4543m3/hr.
The current air volume from the fan serving your Stripping line is 3210m3/hr.

Total air volume for the two fans combined is 7753 m3/hr.

I would add 10 percent to this total to give a margin to play with. This would bring the total air volume for both systems to 8500m3/hr.

Ian mentioned you may wish to add a frequency inverter to slow down and speed up the fan depending upon the demand. This is possible using a PID controller and inverter to monitor and maintain static pressure in the main duct. As dampers are closed the static pressure would increase, the inverter would then slow down to maintain the static pressure set point when dampers are closed.

Assuming the stripping line and 1 kettle is a normal minimum air requirement this would be 5730m3/hr.

We would need to achieve a minimum air velocity of 10m/sec in the main duct from the fan therefore a 450mm main duct would be required for 5730 m3/hr.

On full power, at 8500m3/hr the main duct velocity would be 14.85 m/second.

I would specify a 5.5kw, 1440 rpm, 3 phase centrifugal fan producing 8500m3/hr at a static pressure of approximately 1200Pa (Pascals) The static pressure will not be completely accurate until the system design and layout is confirmed.

I would recommend adding a 450mm diameter x 1800mm long duct silencer is installed on the discharge of the fan and would anticipate a noise level of approximately 65-70 dbA @ 1 meter from the outlet. This is an estimation only as site conditions are not determined and will cause variations.

I hope this information is to your requirements, please do not hesitate to contact me if you require any further help.

Kind regards

Richard

RAM Environmental

Richard Maiklem
RAM Environmental Ltd

Appendix IV

Thermal Decontamination Appliance Data

Venta Acoustics
73 Westman Road
Winchester
Hampshire
SO22 6DX

01962 461016
0203 8650332

ADDFIELD PET-200 CREMATOR

Sound Level Measurements

Measurements of the sound emissions from the Addfield PET-200 Cremator have been undertaken within the semi-reverberant environment in the Addfield factory. All measurements have been undertaken with a calibrated Class 1 sound level meter. All fans of the Cremator were operating at full duty during the measurements. The measurements were undertaken in the centre of the factory floor (single reflecting plane).

Sound power levels have been determined of the plant as a whole in general accordance with the methodology of BS EN ISO 3744-2010 using a traverse microphone method.

Induct sound power levels of the chimney have been determined in general accordance with the methodology of BS EM ISO 5136-2003 using a traverse microphone method.

	Octave Band Centre Frequency (Hz) Sound Power Level, L_w (dB)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
PET-200 Casing Radiated	73	76	78	77	76	73	67	64	80
PET-200 Chimney	64	69	62	52	42	36	36	32	57

Table 1.1 – Measured Sound Power of PET-200 Cremator

The sound pressure level of the plant has been measured at a distance of 5m to the side of the unit.

	Octave Band Centre Frequency (Hz) Sound Pressure, L_p@5m (dB)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
PET-200 Casing Radiated	53	51	53	54	53	50	43	39	57

Table 1.2 – Measured Sound Pressure level of PET-200 Cremator

Third octave measurement results are provided on the attached chart.

All measurements have been corrected for background noise. Measurements have not been corrected for reverberation within the factory.