Colomendy Denbighshire, Waste Transfer Site Ref: PPN00393

Noise Impact Assessment

On behalf of **Eunomia Research & Consulting Ltd**

Project Ref: 332511130 | Rev: 3 | Date: November 2023

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Document Control Sheet

Project Name: **Colomendy Denbighshire, Waste Transfer Site**

Project Ref: **332511130**

Report Title: **Noise Impact Assessment**

Doc Ref: **ACO/01**

Date: **August 2023**

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For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved
1	June 2022	Revised following minor comments	PT	MB	OB
2	August 2023	Revised following comments from NRW	PT	MM	OB
3	November 2023	Revised following comments from NRW	PT	MM	MB

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Non Technical Summary

This noise assessment has been prepared by Stantec UK Ltd. on behalf of Eunomia Research & Consulting Ltd to accompany an environmental permit application for the proposed Waste Transfer Station (WTS) at the Colomendy Industrial Estate, Denbigh.

A baseline sound survey has been undertaken to establish the prevailing sound climate at the closest existing noise sensitive receptor. The results of the survey have formed the basis of the assessment to determine the impact from the proposed operations.

An assessment in general accordance with BS 4142:2014+A1:2019 has been undertaken to determine the likely noise impact associated with the proposed facility at the nearest noise sensitive receptors.

The numerical assessment indicates that the operation from the development is likely to have a low impact during the operational daytime periods at the nearest noise sensitive receptors.

Therefore, the assessment demonstrates that the proposed development is likely to be acceptable in relation to the potential noise impacts identified herein.

1 Introduction

1.1 Background

1.1.1 Stantec UK Limited (Stantec) has been commissioned by Eunomia Research & Consulting to undertake a noise impact assessment to support a permit application for the proposed Waste Transfer Station (WTS) located approximately 1 km north of Denbigh Town (British National Grid 305407 367427) for WRAP.

1.1.2 Denbighshire County Council have had pre-application advice in relation to the scheme (ref. PPN00393).

1.1.3 An environmental sound survey has been undertaken to measure the existing sound climate at the nearest noise sensitive receptor. The results of the environmental sound survey have been used to inform the assessment of the potential noise impact at the nearest noise sensitive receptors and support the permit application for the WTS.

1.1.4 The report author and reviewers are fully accredited members with the Institute of Acoustics. Stantec is a sponsor member of the Institute of Acoustics and member of the Association of Noise Consultants.

1.1.5 Matthew Harper TechIOA has a BSc in Music Technology and undertook the environmental sound survey. Matthew is an acoustics engineer at Stantec with over 3 years of experience in acoustics consultancy.

1.1.6 Paul Taylor CEng MIOA has an MEng in Acoustical Engineering and undertook the acoustic assessment and is the author of the report. Paul is an Associate at Stantec with over 11 years of acoustics consultancy experience.

1.1.7 Mubassir Malik MIOA has an MEng in Mechanical Engineering and provided a technical review of the report. Mubassir is an Associate at Stantec with over 15 years of acoustics consultancy experience.

1.1.8 Matthew Barlow MIOA has an MSc in Audio Acoustics, and technically reviewed the report. Matthew is a Technical Director at Stantec with over 14 years of experience in acoustics consultancy.

1.1.9 A glossary of acoustic terminology used within this report is contained in **Appendix A**.

1.2 Scope of Report

1.2.1 The scope of this acoustic report is to:

- Present the results of the environmental sound survey undertaken by Stantec, and previous survey results provided by Hoare Lea.
- Calculate the rating level of the proposed on-site activities and plant items at the nearest noise sensitive receptors, in accordance with BS 4142:2014+A1:2019.
- Compare the calculated rating level with the criteria and guidance outlined in BS 4142:2014+A1:2019.
- Detail our findings in a report to support the permit application for the WTS.

2 Standards and Guidance

2.1 Natural Resource Wales

2.1.1 The Natural Resource Wales website (last accessed 28 April 2022) advises that the guidance provided by The Environment Agency (EA) on noise and vibration management should be followed (*Noise and vibration management – environmental permits*).

2.2 Environmental Agency (EA) Permitting Requirement – Noise

2.2.1 The Environment Agency (EA) requires that operators must consider the potential noise impact of their site. They may need to carry out noise impact assessments:

- At the permit application stage.
- When applying to vary a permit.
- To comply with specific permit conditions.

2.2.2 The EA will treat noise in the same way as any other polluting emission. If noise is audible at any of the following types of locations, they may regard it as '*possibly causing an impact*':

- Residential properties
- Schools
- Hospitals
- Offices
- Public recreation areas
- Other NSRs

2.2.3 Where noise is possibly causing an impact, the operator must carry out an assessment to determine:

- The level of impact.
- How much work needs to be done to prevent or minimise noise pollution.

2.2.4 Operators must prevent significant pollution and comply with the requirements to use 'appropriate measures' (Waste Framework Directive 2018/851) or 'best available techniques' (BAT) to prevent or minimise noise pollution.

2.2.5 Guidance on the noise assessment process for permit applications is detailed in Noise and vibration management: environmental permits.

2.3 Requirements For Quantitative Noise Impact Assessments

2.3.1 The information requirements of the EA with regards to what must be submitted if an assessment uses computer modelling or spreadsheet calculations are detailed in guidance '*Noise impact assessments involving calculations or modelling'*.

2.4 Best Applicable Techniques (BAT)

2.4.1 Information on BAT is detailed in the 'Commission Implementing Decision (EU) 2018/1147 of 10 August 2018'. With respect to noise, section 1.4 states:

> *"BAT 17. In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:*
>
> *1. A protocol containing appropriate actions and timelines;*
>
> *2. A protocol for conducting noise and vibration monitoring;*
>
> *3. A protocol for response to identified noise and vibration events, e.g. complaints;*
>
> *4. A noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.*
>
> *Applicability*
>
> *The applicability is restricted to cases where a noise or vibration nuisance at sensitive receptors is expected and/or has been substantiated*
>
> ***BAT 18.** In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below."*

Technique		Description	Applicability
a.	*Appropriate location of equipment and buildings*	*Noise levels can be reduced by increasing the distance between the emitter and the receiver, by using buildings as noise screens and by relocating building exits or entrances.*	*For existing plans, the relocation of equipment and building exits or entrances may be restricted by a lack of space or excessive costs.*
b.	*Operational measures*	*This includes techniques such as:* *1. inspection and maintenance of equipment;* *2. closing of doors and windows of enclosed areas, if possible;* *3. equipment operation by experienced staff;* *4. avoidance of noisy activities at night, if possible;* *5. provisions for noise control during maintenance, traffic, handling and treatment activities.*	*Generally applicable.*
c.	*Low-noise equipment*	*This may include direct drive motors, compressors, pumps and flares.*	
d.	*Noise and vibration control equipment*	*This includes techniques such as:* *1. noise reducers;* *2. acoustic and vibrational insulation of equipment;* *3. enclosure of noisy equipment;* *4. soundproofing of buildings.*	*Applicability may be restricted by a lack of space (for existing plants).*
e.	*Noise attenuation*	*Noise propagation can be reduced by inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).*	*Applicable only to existing plants, as the design of new plants should make this technique unnecessary. For existing plans, the insertion of obstacles may be restricted by a lack of space.*

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

2.5.1 BS 4142:2014+A1:2019 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in the standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

2.5.2 The standard is used to determine the rating levels for sources of sound of an industrial and/or commercial nature and the ambient, background and residual sound levels at outdoor locations. These levels could be used for the purposes of investigating complaints; assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and assessing sound at proposed new dwellings or premises used for residential purposes. However, the determination of noise amounting to a nuisance is beyond the scope of the standard.

2.5.3 The procedure contained in BS 4142 assesses the significance of sound which depends upon the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs/will occur.

2.5.4 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level and considering the following:

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

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

- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.5.5 Where the initial estimate of the impact needs to be modified due to the context, the following factors should be considered:

- The absolute level of sound;

- The character and level of the residual sound compared to the character and level of the specific sound; and

- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions such as:

    - Façade insulation treatment;

    - Ventilation and/or cooling that will reduce the need to have windows open to provide rapid or purge ventilation; and

    - Acoustic screening.

3 Site Description

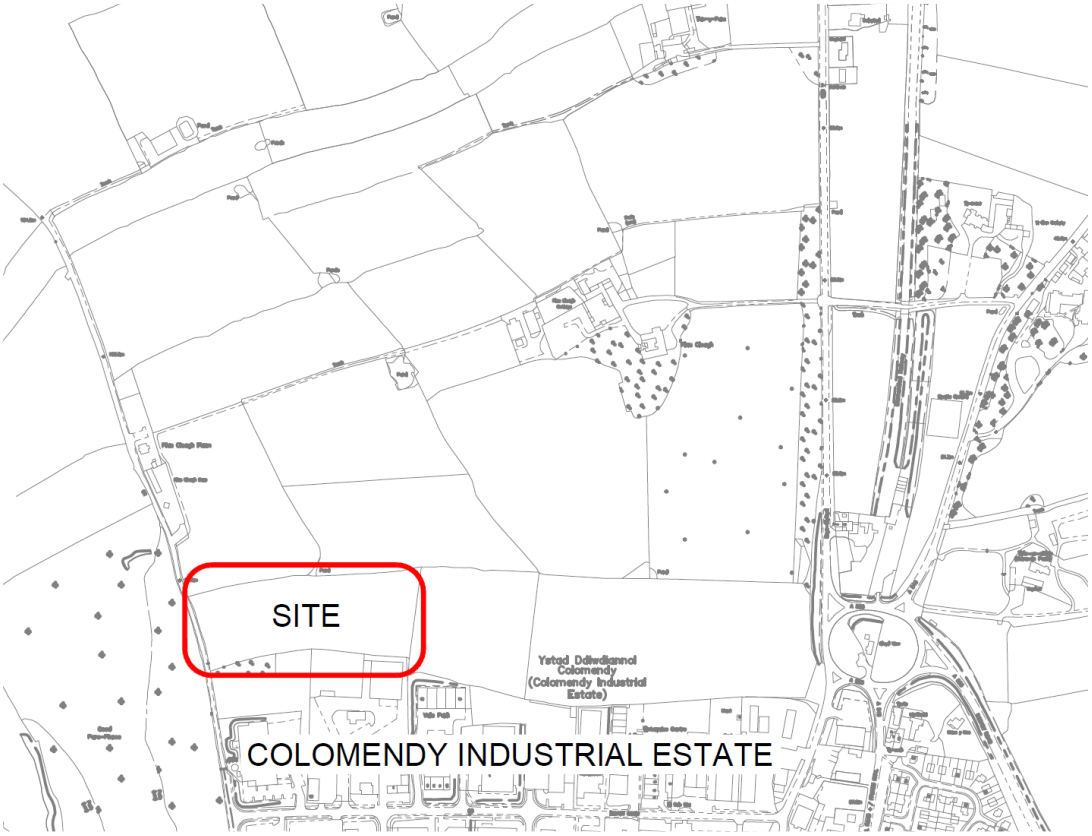
3.1 Background

3.1.1 The facility will receive, store, process and bulk a range of primarily pre-sorted materials to include mixed recyclables, materials (including glass, plastic and cans and highway materials), residual and AHP waste and organic material (including garden waste, household food waste, wood, paper and card).

3.1.2 The principal elements of the proposals include a new main storage building which will house the main elements of the WTS including two balers and, mechanical and manual sort lines.

3.1.3 The location of the site is indicated in **Figure 3.1**.

Figure 3.1: Site Location



Source: Drawing H3/18304/P1/LP-01 A

3.2 Site Layout

3.2.1 The site layout is presented in **Appendix B**.

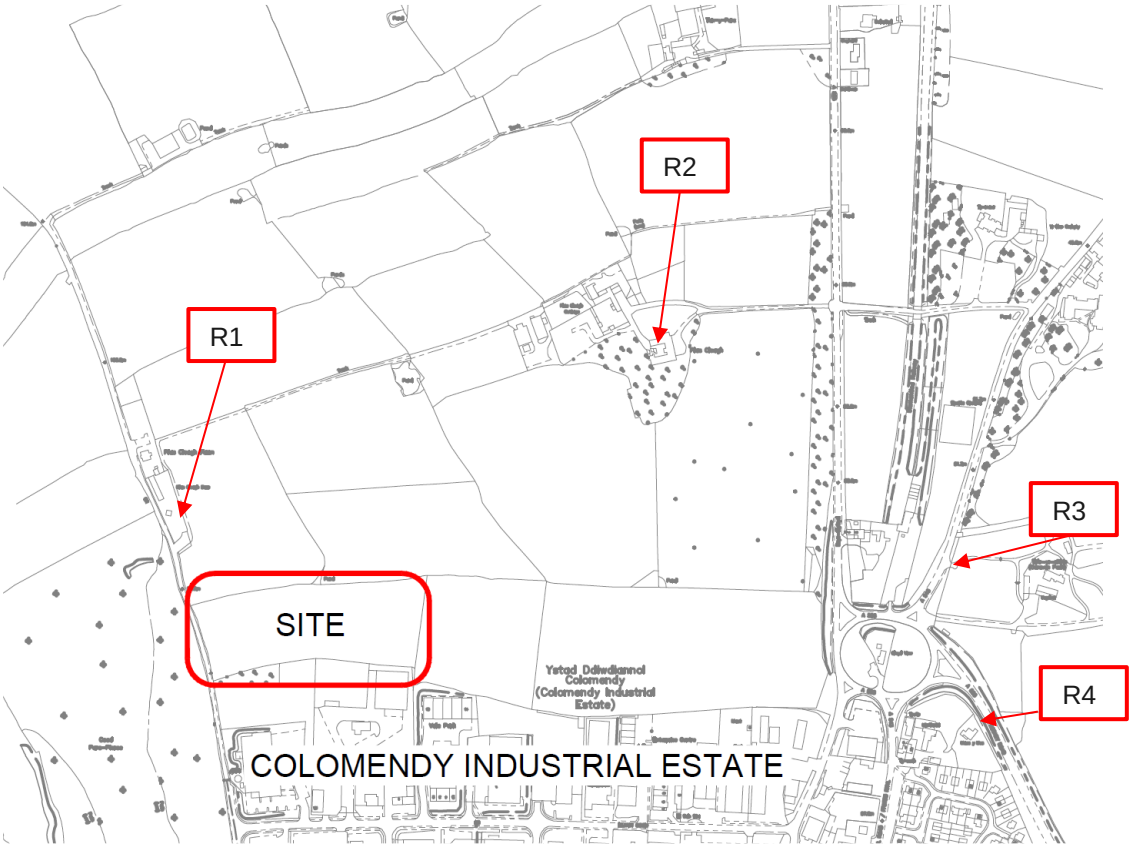
3.3 Hours of Operation

3.3.1 The site is proposed to operate between 06:00 and 19:00 hours Monday to Saturday, and between 09:00 and 16:00 hours on Sunday.

3.4 Noise Sensitive Receptors

3.4.1 The assessment has been undertaken at the nearest existing noise sensitive receptors. The locations of the receptors are illustrated in **Figure 3.2** and are described in **Table 3.2**.

Figure 3.2: Noise Sensitive Receptors



Source: Drawing H3/18304/P1/LP-01 A

Table 3.1: Identified Noise Sensitive Receptors

Identified Noise Sensitive Receptor	Reference	Grid Reference (Easting Northing)	No. Storeys	Sensitivity
Residential property along Ffordd Y Craig	R1	305234 367568	2	High
Residential property west of A525	R2	305720 367763	2	High
Residential property east of A525	R3	305989 367526	2	High
Residential property on A525 roundabout	R4	306015 367407	2	High

4 Environmental Sound Survey

4.1 Procedure

4.1.1 An unattended environmental sound survey was undertaken between approximately 13:00 hours on Thursday 19 May 2022 and approximately 11:00 hours on Tuesday 24 May 2022 to measure environmental sound levels at a location considered representative of the nearest noise sensitive receptor.

4.1.2 The survey was undertaken over a weekday and weekend period during the daytime and night-time. Measurements were made over 15-minute periods of the L_{Aeq}, and L_{A90}.

4.1.3 The sound level meter was located on a tripod. The microphone was fitted with the manufacturer's windshield.

4.1.4 The instrumentation used in the survey (including calibration information) is listed in **Appendix D**.

4.1.5 Field calibrations were performed before and after the measurements with no significant fluctuations recorded (< 0.5 dB). Calibration certificates are available upon request.

4.1.6 As part of the planning submission for the proposed development, a noise impact assessment of the was produced by Hoare Lea (document reference REP-1011600-LR-20191004 – Plot 1 planning acoustic report-Rev03-F, provided in **Appendix F**). Full details of the survey procedure including the dates and times of the survey are detailed in Hoare Lea's report, and reference to the measurement results are included within this report.

4.1.7 The survey to support the report produced by Hoare Lea was undertaken in September 2019 at three locations. Position L1 of the survey was in the north-west corner of the proposed development, in a comparable location to Position A presented within this report.

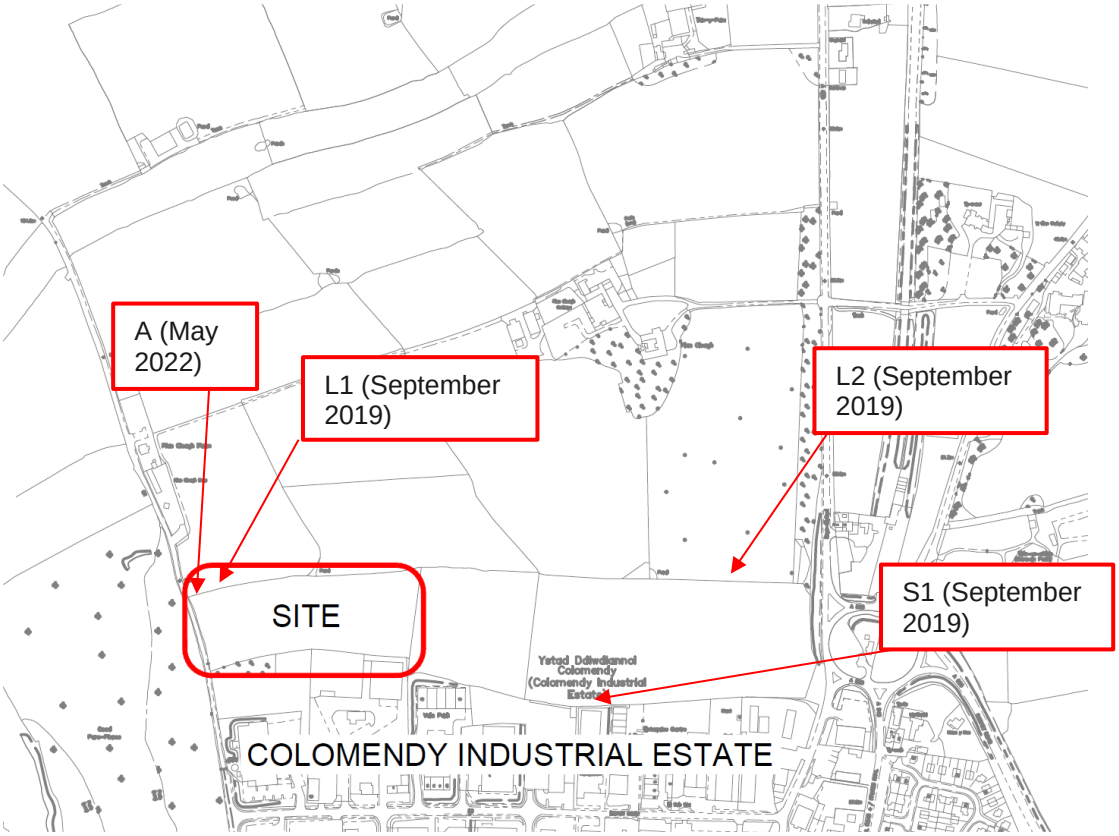
4.2 Measurement Locations

4.2.1 Position A measured during the 2022 survey was considered representative of the nearest noise sensitive receptor (R1). Position LT2 measured during the 2019 survey was considered representative of receptors R2, R3 and R4 based on the description provided in Hoare Lea's report provided in **Appendix F**.

4.2.2 Position S1 is set back from the A525 by approximately the same distance as Receptor R2. Based on the description of the sound environment at S1 within Hoare Lea's report, it is considered unlikely that noise due to operations from the industrial estate during the survey would have a significant effect on the measured background sound level at this location. Position S1 is therefore considered representative of the background sound level as experienced at Receptor R2.

4.2.3 The measurement positions (May 2022 and September 2019) are detailed in **Figure 4.1**. The measurement position of the May 2022 survey is described in **Table 4.1**. The measurement positions of the 2019 survey are described in **Appendix F**.

Figure 4.1: Environmental Sound Measurement Locations



Source: Drawing H3/18304/P1/LP-01 A

Table 4.1: Description of Measurement Locations

Position	Description	Dominant Sound Source
A	The microphone was located at a height of 1.5 m from ground level. The microphone was approximately 8 m from the edge of the nearest carriageway. Vehicle movements on the Colomendy Industrial estate were intermittently audible.	Local road network (Ffordd y Graig)
L1	Refer to **Appendix F** of this report.	
L2	Refer to **Appendix F** of this report.	
S1	Refer to **Appendix F** of this report.	

4.3 Meteorological Conditions

4.3.1 The sound surveys reported were undertaken in September 2019 and May 2022. These dates preceded the BS 4142 Method Implementation Document (MID) which was produced in March 2023.

4.3.2 The measurements were therefore based on guidance provided with BS 4142:2014+A1:2019. In relation to weather conditions, BS 4142:2014+A1:2019 states in Section 6.4:

> *"Record the weather conditions that could affect measurements. Monitor wind speed at the measurement location, using an anemometer, and record the wind speed together with the wind direction. Exercise caution when making measurements in poor weather conditions such as wind speeds greater than 5 m/s.*
>
> *Visually estimate cloud cover by eye as either a percentage of sky covered by cloud or in oktas. Record all forms of precipitation together with the period over which the precipitation occurred, having regard to how this might affect uncertainty (see Clause 10 and Annex B).*
>
> *Record the temperature at the measurement location, in °C, at the beginning and the end of the measurement period, and at any other appropriate time if there is a change in the weather conditions.*
>
> *Where appropriate, use instruments for measuring meteorological parameters during long-term unattended measurements by means of a logging meteorological station at the measurement location.*
>
> *NOTE 1 Weather conditions can affect sound levels by influencing sound propagation or generating sound which can be pertinent to the assessment.*
>
> *NOTE 2 Whilst regional weather forecasts are useful in planning when to measure, local conditions can often vary significantly from the regional forecast. Forecasts should not be used instead of site measurements of the actual weather during the survey.*
>
> *NOTE 3 It might be appropriate to make more than one assessment to account for varying weather conditions."*

4.3.3 During the 2022 survey, guidance was also taken from the BS 4142 Technical Note produced by the ANC in March 2020 which states the following in relation to weather conditions:

> *The purpose of Subclause 6.4 is to enable an assessment of local meteorological influences or interferences at the measurement location, rather than to understand propagation effects; high precision measurements are not essential. For attended sound measurements, a hand-held anemometer and compass should be sufficient for a practitioner to adequately record weather conditions at the beginning of the survey and additionally as necessary.*
>
> *For unattended measurement locations, the need for a co-located MET station should be assessed on a site-by-site basis. It will not always be practical nor is it considered essential where, for example, the site is reasonably open and reliable representative data is available from a credible alternative source. The reliability and applicability of externally sourced MET data should be considered in the uncertainty assessment.*
>
> *Subclause 6.4 could also be read to imply that a MET station is required at each measurement location; it is the view of the WG that one MET station is likely to be*

sufficient per assessment site provided that the conditions are considered representative of all the measurement locations.

In some circumstances, a single position attended sound survey with manually noted MET information may be appropriate, for example when considering a small ventilation unit affecting a limited number of receivers.

More normally, unattended measurements over several days at one or two positions would be appropriate with logged MET data or a reliable third-party weather data source.

In larger or more complex scenarios, where data from a single MET station may not represent weather conditions at all measurement locations, several MET stations may be required.

4.3.4 It is noted that neither BS 4142:2014+A1:2019 nor the BS 4142 Technical Note require measurements of weather conditions to be monitored on-site for the duration of the survey, if it is not necessary to do so.

4.3.5 Based on observations on-site and publicly available data on Wunderground (weather station reference IDENBI8 located approximately 2km south-east of the site), the meteorological conditions during the survey are detailed in **Table 4.2**.

Table 4 2: Meteorological Conditions

Description	Thursday 19/05/2022	Friday 20/05/2022	Saturday 21/05/2022	Sunday 22/05/2022	Monday 23/05/2022
Temperature (°C)	10-21	11-17	8-19	13-18	11-15
Precipitation (mm)	0	0	0	0.25	1
Cloud Cover (%)	10	-	-	-	40
Wind Description	S	S	W	S	W
Wind Speed (m/s)	<4	<6	<5	<5	<5

4.3.6 The weather conditions observed during the survey suggest that local meteorological conditions would not have influenced or interfered with measurements at the measurement location, and therefore the use of publicly available weather data is considered appropriate within the assessment.

4.3.7 Our review of the measured sound levels indicates that the weather conditions did not affect the measured sound levels. These conditions are considered suitable for obtaining representative sound level measurements.

4.3.8 Weather conditions during the 2019 sound survey are reported in **Appendix F**, where it is concluded that the measured data is considered suitable as being representative of typical conditions.

4.4 Assumptions and Limitations

4.4.1 The engineer noticed nothing unusual in terms of the sound climate at the time of the survey. This report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

4.5 Environmental Sound Climate

4.5.1 During the survey at the survey location, it was noted that on-site sound levels were dominated by vehicular movements on the surrounding road network, namely Ffordd y Graig. Vehicle movements on the Colomendy Industrial estate were intermittently audible, although were not a dominating sound source.

5 Environmental Sound Survey Results

5.1.1 The time history graph of the unattended measurements during the May 2022 environmental sound survey are presented in **Appendix D**.

5.1.2 The results of the sound survey conducted in 2019 are provided in **Appendix F**.

5.1.3 The results of the 2022 survey undertaken at the locations considered representative of the nearest noise sensitive receptors are detailed in **Table 5.1**.

Table 5.1: Summary of Measured Environmental Sound Survey Results

Period	Measured Sound Level (dB)	
	$L_{Aeq,15mins}$	Typical $L_{A90,15mins}$
Position A (May 2022)		
07:00 – 23:00 hours	51	38
23:00 – 07:00 hours	48	29
06:00 – 19:00 hours (Excluding Sunday)	52	40
09:00 – 16:00 hours (Only Sunday)	51	40
Position L1 (September 2019)		
07:00 – 19:00 hours	55	37
23:00 – 07:00 hours	46	26
Position L2 (September 2019)		
07:00 – 19:00 hours	49	41
23:00 – 07:00 hours	41	25
Position S1 (September 2019)		
06:40 – 12:00 hours	42-50 dB $L_{Aeq,15mins}$ 44-48 dB $L_{Aeq,1hour}$	Not reported in **Appendix F**. Further discussion provided in this report. See Section 5.2 of this report.

*Calculated based on the statistical distribution of background sound levels during the measurement period in general accordance with guidance in BS 4142:2014+A1:2019 – see Section 5.2.

5.2 Background Sound Levels

5.2.1 Based on the results of the environmental sound survey, a statistical analysis of the background sound levels of the May 2022 sound survey has been undertaken. The histogram of measured $L_{A90,15minute}$ sound levels between 06:00 and 19:00 hours (for all days except Sunday), and between 07:00 and 16:00 (only on Sunday) can be seen in **Figure 5.1 and 5.2** respectively.

Figure 5.1: Histogram of Measured $L_{A90,15minutes}$ Between 06:00 – 19:00 hours (excluding Sunday)

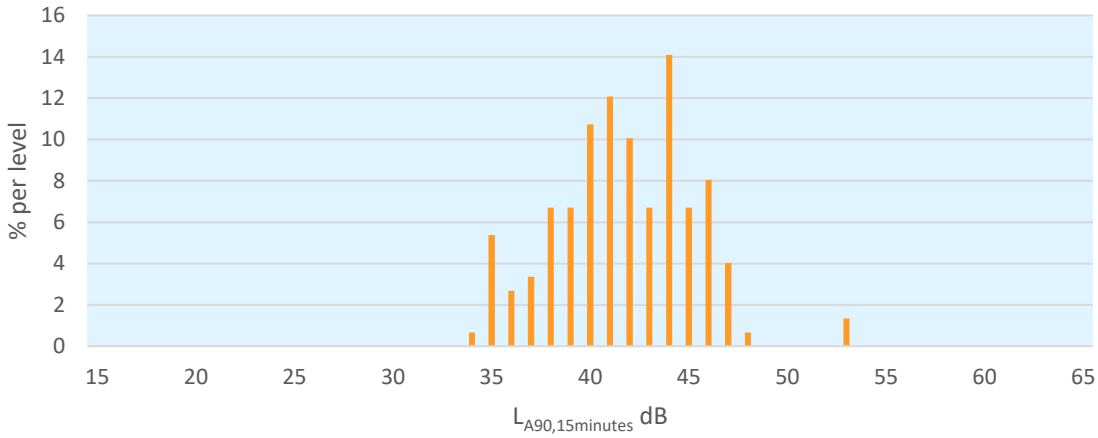
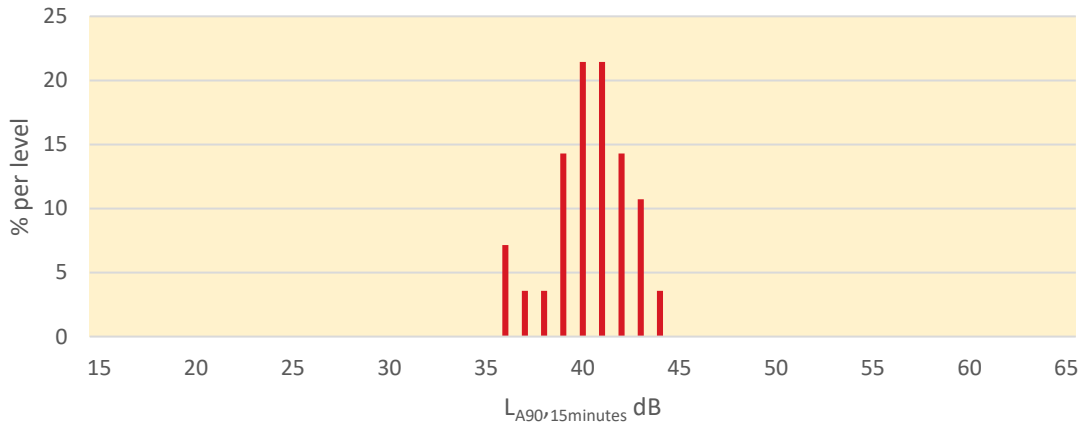


Figure 5.2: Histogram of Measured $L_{A90,15minutes}$ Between 07:00 – 16:00 hours (Only Sunday)



5.2.2 The typical background sound levels at locations L1 and L2 from the 2019 survey are derived in Hoare Lea's Planning Acoustic Report attached in **Appendix F**, where histograms of the measurement data are presented.

5.2.3 Measurements at location S1 were taken between 06:40 and 12:00 on 10 September 2019. Based on the time history graph presented in Appendix B within **Appendix F** of this report, the background sound level varied between 37 dB $L_{A90,15minutes}$ and 49 dB $L_{A9015minutes}$. The measured $L_{A90,1hour}$ is not presented in **Appendix F**, however visual inspection of the graph suggests that the typical background sound level is considered to be 39 dB $L_{A90,1hour}$ during daytime hours. This measurement location is set back at a greater distance from the A525 when compared with measurement Position L2, and it is considered that background sound levels at this location are more likely to be representative of background sound levels experienced at receptor R2.

5.3 Verification of Survey Results

5.3.1 To validate the sound levels measured in May 2022, the measured sound levels at positions A (May 2022) and L1 (September 2019) have been compared.

5.3.2 The typical background sound level measured at L1 (September 2019) between 07:00 hours and 19:00 hours was 37 dB L_{A90}. The background sound level at position A (May 2022) between 06:00 hours and 19:00 hours is 40 dB L_{A90}.

5.3.3 Based on position A being located slightly closer to Ffordd y Graig, we would expect the background sound level at position A (May 2022) to be slightly higher when compared to position L1 (September 2019). Given the similarity in measured sound levels, reference has also been made within the assessment to the background sound levels as measured at L2, as presented within the Hoare Lea report.

6 Acoustic Model

6.1 General

6.1.1 An assessment has been undertaken in general accordance with BS 4142:2014+A1:2019 to determine the likely noise impacts associated with the operation of the development at nearby dwellings.

6.2 Proposed Operations

6.2.1 The assessment has been based on the drawing 'Plot 1 Phase 2 General Arrangement Sheet 1 of 1 H3/18304/PH2/GA-01A, dated 18 March 2022 and includes consideration of:

- Sound associated with operational processes.
- Sound associated with deliveries to and from the site.

6.2.2 Based on our understanding of the site, the assessment has been based on the following operational parameters:

- The hours of operation when noisy works could occur will be between 06:00 hours and 19:00 hours Monday to Saturday, and between 09:00 and 16:00 hours on Sundays.
- There will be approximately 20 vehicles delivering waste per day. As a worst-case it is assumed that three deliveries could be made per hour to the site. As a further worst-case assumption, our assessment is based on three vehicles travelling through the main building, and three vehicles travelling around the western car park (i.e. six vehicles in total). The assessment includes vehicles reversing for approximately 25 m.
- Operational activities within the main building will comprise the use of the balers, sort line and loaders. The assessment assumes that these operations occur continuously for the entire 1-hour assessment period.
- The main building includes roller shutter doors which will remain mainly closed, but will open when vehicles are entering and leaving the building. The assessment assumes that each roller door is open for one minute every hour. The model assumes a typical sound insulation performance R_w of 18 dB for the roller shutter doors when shut.
- Glass being deposited to site could occur 20 times per day. The assessment includes three glass deposits in the assessed hour.
- A JCB will process glass eight times per hour. The assessment includes this operation occurring eight times in the assessed hour.
- A JCB loading glass into an RRV will occur approximately 2-3 times a week. The assessment includes this operation in the assessed hour.

6.3 Calculation Procedure

6.3.1 An acoustic model of the site and the surrounding area has been prepared using computer software SoundPLAN version 9.0. The acoustic model has been used to evaluate the likely noise impact from the site at the noise sensitive receptors.

6.3.2 The model includes the followings elements which are part of the proposals:

- 7 m high wall surrounding the glass bay.
- 5 m high bays.

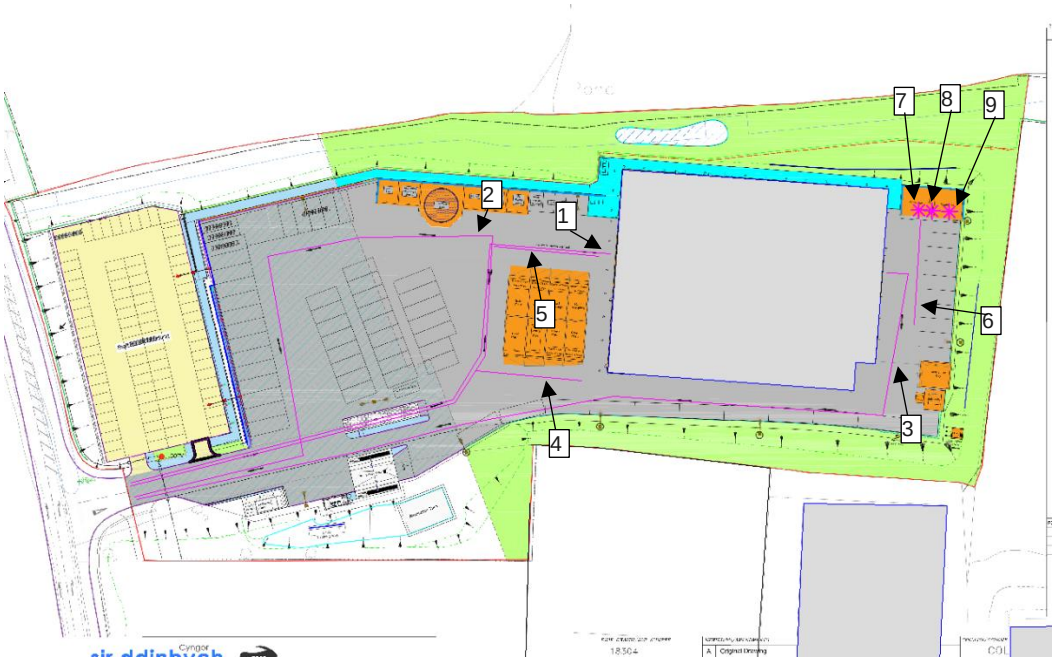
6.3.3 Source levels ($L_{Aeq,T}$) have been provided by the operator based on measurements at a similar existing facility. Details of the source levels used in the assessment are provided in **Table 6.1**.

Table 6.1: Summary of Measured Source Sound Levels

Activity	Measurement Duration	Distance (m)	Measured Sound Pressure Level (L_{eq} dB) at Octave Band Centre Frequency (Hz)								dBA
			63	125	250	500	1k	2k	4k	8k	
RRV moving forward	12 seconds	5	81	70	66	59	59	58	54	53	66
RRV reversing	30 seconds	3	76	67	68	63	72	67	59	61	74
Truck depositing glass	1 minute	2	74	72	76	77	78	87	88	80	92
JCB processing glass	30 seconds	12	86	90	87	86	85	81	78	72	89
JCB tipping glass into truck empty	26 seconds	10	81	82	84	87	88	89	87	81	94
General activity noise from main building (based on open doors)	53 seconds	1	75	78	82	82	81	81	78	73	87

6.3.4 The location of modelled noise sources are shown in **Figure 6.1**.

Figure 6.1: Location of Site Noise Sources



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6.3.5 Descriptions, sound power levels and grid references of line (moving) and static (point) sources used within the acoustic model are shown in **Table 6.2**. The derivation of the sound power levels in **Table 6.2** are presented within **Appendix E**.

Table 6.2: Descriptions, Sound Power Levels and Grid References of Site Noise Sources

Source	Description	Sound Power Level (L_w/unit, dB)	Assumed Speed (km/h)	Grid Reference (Easting Northing)
1	Truck, Path 1 Entering main building Path distance 150 m	77	5	305421 367440
2	Truck Path 2 Around car park Path distance 270 m	80		305377 367445
3	Truck Path 3 Leaving main building Path distance 225 m	79		305494 367435
4	Truck reversing 1 Car park Path distance 26 m 3No. occurrences / hour	78		305401 367411
5	Truck reversing 2 Car park Path distance 26 m 3No. occurrences / hour	78		305418 367440
6	Truck reversing 3	84		305497 367436

	Car park Path distance 26 m 11No. occurrences / hour			
7	JCB processing glass 8.No occurrences / hour	107	-	305497 367451
8	JCB depositing glass 1.No occurrence / hour	93	-	305500 367451
9	JCB tipping glass into empty truck 1.No occurrence / hour	101	-	305504 367451

6.3.6 The doors associated with general activity noise from the main building are shown in **Figure 6.2 and 6.3**.

Figure 6.2: Main Building Doors/Louvres – West

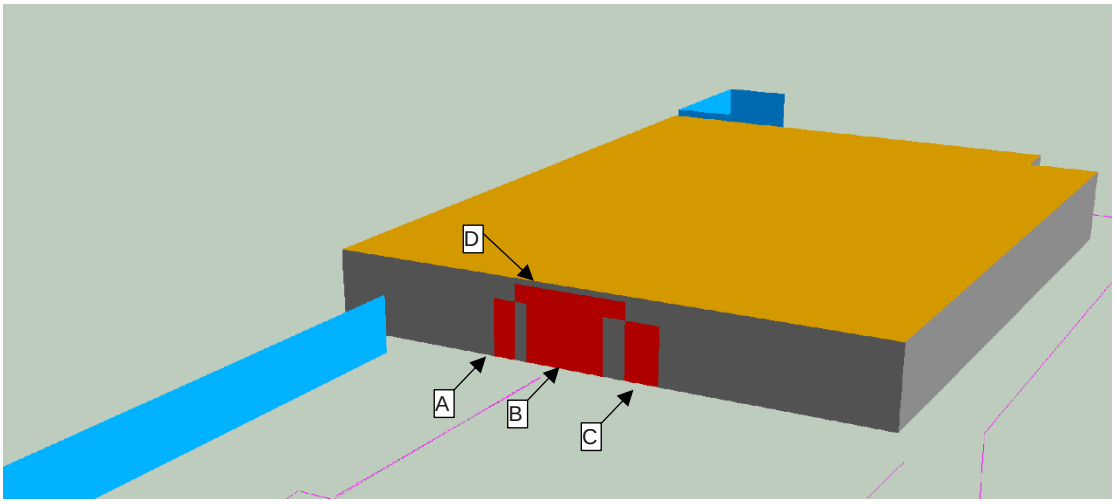
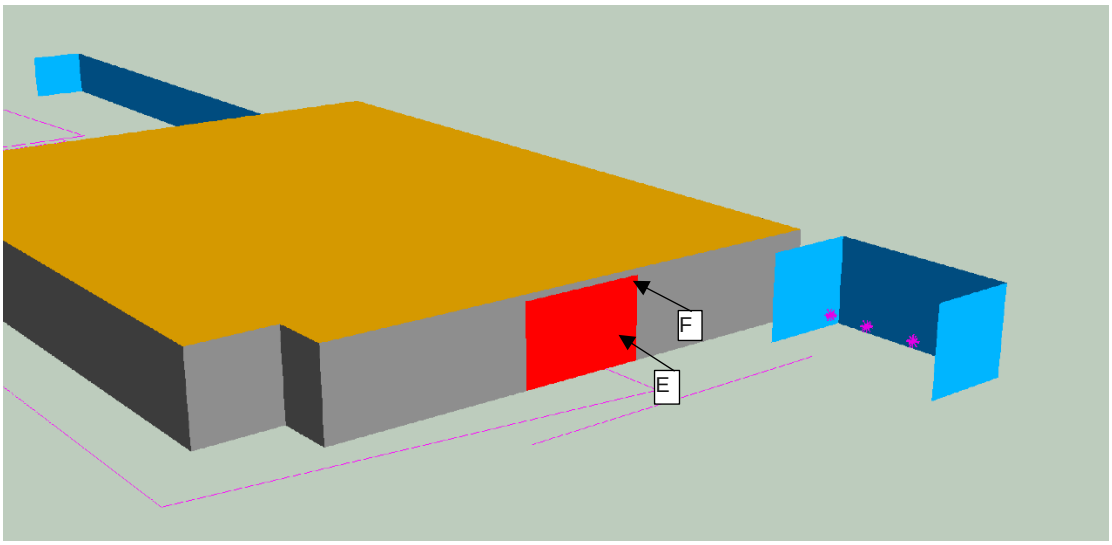


Figure 6.3: Main Building Doors/Louvres – East



6.3.7 Sound power level and grid references of general activity noise at the doors/louvres of the main building are shown in **Table 6.3**. Sources B and E have been corrected to account for the roller shutter doors being open for one minute per hour.

Table 6.3: Main Building Sound Power Levels and Grid References

Door	L_w/m^2 (dB)	Surface Area (m^2)	Sound Power Level (L_w/element, dB)	Grid Reference (Easting Northing)
A	0	-	0	305424 367445
B	73	35	88	305423 367439
C	71	15	82	305422 367429
D	87	15	99	305423 367439
E	73	50	90	305488 367436
F	87	15	99	305488 367436

6.4 Specific Sound Level

6.4.1 The calculated specific sound levels ($L_{Aeq,1hour}$) at the receptors are presented in **Table 6.4**.

Table 6.4: Calculated Specific Sound Levels

Receptor	Specific Sound Level $L_{Aeq,T}$
	Daytime (07:00 – 23:00 hours) Reference Interval, T = 1 hour
R1	41
R2	36
R3	36
R4	38

6.4.2 At Receptor R1, the specific sound level is in-line with the typical background sound level and more than 10 dB below the average daytime residual sound level.

6.4.3 At Receptor R2, the specific sound level is 3 dB below the typical background sound level and 6 dB below the lowest measured 15 minute residual sound level.

6.4.4 At Receptor R3, the specific sound level is 5 dB below the typical background sound level and more than 10 dB below the average daytime residual sound level.

6.4.5 At Receptor R4, the specific sound level is 3 dB below the typical background sound level, and more than 10 dB below the average daytime residual sound level.

6.5 Acoustic Feature Corrections

6.5.1 BS 4142 advises that certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound levels and the background sound level.

6.5.2 As part of the development, trucks will be arriving and departing intermittently throughout a typical hour. Glass tipping, processing and tipping into trucks will occur intermittently, as will the main building doors be open intermittently.

6.5.3 Based on the calculated specific sound levels at the receptors, there is a low likelihood that the intermittency will be readily distinguishable. However, to provide a robust assessment a correction of +3dB has been applied to the specific sound levels (obtained through the acoustic model) to calculate the rating level to account for the potential of intermittency being readily distinctive at the receptor locations.

6.5.4 Tonal corrections are not considered to be required based on our understanding of operations and our review of the available octave-band data.

6.6 Indicative Assessment

6.6.1 The rating level of the WTS operations at the nearest receptors has been calculated using the acoustic model and the results are summarised in **Table 6.5**.

Table 6.5: BS4142 Assessment

Description	**Sound Level (dB) at Receptor (1st Floor Level)**			
	R1	**R2**	**R3**	**R4**
Calculated Rating Level at Receptor ($L_{Ar,Tr}$)	44	40	39	41
Background Sound Level ($L_{A90,15minutes}$)	40 (from A, May 2022)	39 (from S1, September 2019)	41 (from L2, September 2019)	
Difference between Rating Level and Background Sound Level	+4	+1	-2	0
Assessment of Impact	Below a level which is likely to be an indication of an adverse impact.			

6.7 Context and Mitigating Factors

6.7.1 The above assessment details the results of the numerical assessment of sound levels at the nearest noise sensitive receptors. It is important to note that the numerical assessment of impact is influenced by the context of the proposals including the surrounding environment and the operating characteristics.

6.7.2 The above represents a worst-case assessment and therefore in many instances operational activities may take less time than assumed and may occur less frequently within the assessment period. These factors would reduce the likely impact of the operations.

6.7.3 It should also be noted that the land uses in the area are of an industrial nature. Therefore, this development would not be a new type of noise source for the surrounding area as a whole.

6.8 Uncertainty

6.8.1 Care has been taken to reduce uncertainty as far as reasonably possible. However, it should be recognised that in any environmental sound survey and assessment process uncertainty exists.

6.8.2 Uncertainty in measured background sound levels can occur due to variation in temporary/non representative meteorological conditions. In this instance all possible steps were taken to minimise the risk of meteorological conditions affecting the survey results. However, it should be recognised that there is a degree of uncertainty inherent in the baseline environmental sound data.

6.8.3 The level of uncertainty in source sound levels has been reduced by referring to measured sound levels of the same activities taking place at another existing site.

6.9 Summary

6.9.1 The noise impacts at the nearest sensitive receptors have been calculated by comparing the existing background sound levels, with the calculated future rating level.

6.9.2 Acoustic feature corrections have been applied where sound sources are judged to be discernible from the background sound climate at the noise sensitive receptors.

6.9.3 Considering the preliminary results of the assessment and the context detailed above, the proposed use of the site as a WTS should be considered acceptable, in relation to noise without any further acoustic mitigation.

7 Noise Control

7.1 Embedded Mitigation

7.1.1 Embedded mitigation, in the form of acoustic barriers, is included within the design proposals is shown in **Figure 1.1** and described in **Table 7.1**.

Figure 1.1: Embedded Mitigation – Acoustic Barriers

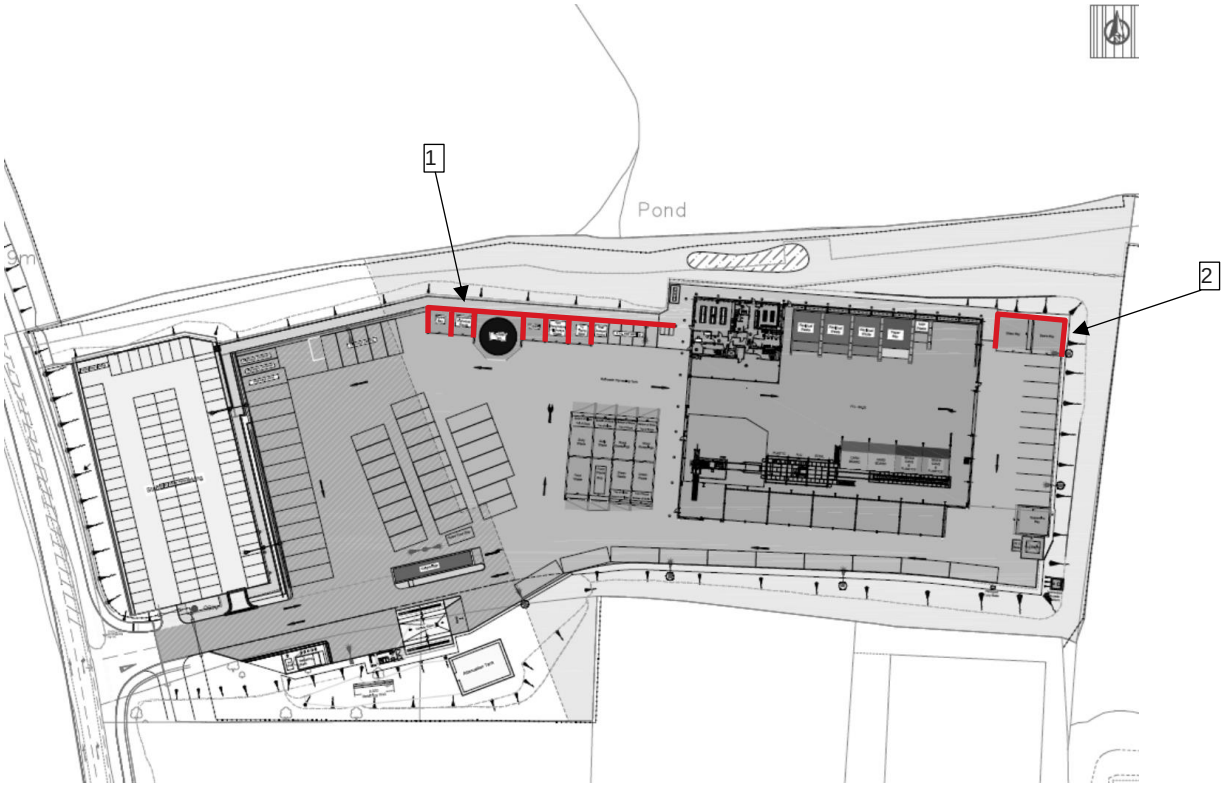


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Table 7.1: Embedded Mitigation – Acoustic Barriers – Descriptions

Acoustic Barrier	Construction details	Mass per square metre (kg/m^2)	Height (m)	Grid Reference (Easting Northing)
1	Barrier	≥10	5	305392 367457
2			7	305501 367456

8 Conclusions

8.1.1 Stantec UK have been commissioned to support the permit application for the proposed Waste Transfer Station (WTS) at the Colomendy Industrial Estate.

8.1.2 A baseline sound survey has been undertaken to establish the prevailing sound climate at the closest existing receptor. A sound survey was undertaken in 2019 by Hoare Lea to support the planning application, and the results from these surveys have formed the basis of the assessment to determine the impact from the proposed operations.

8.1.3 An assessment in general accordance with BS 4142:2014 has been undertaken to determine the likely noise impact associated with the proposed facility at the nearest noise sensitive receptors.

8.1.4 The numerical assessment indicates that the operation from the development is likely to have a low impact during the daytime periods at the nearest noise sensitive receptors.

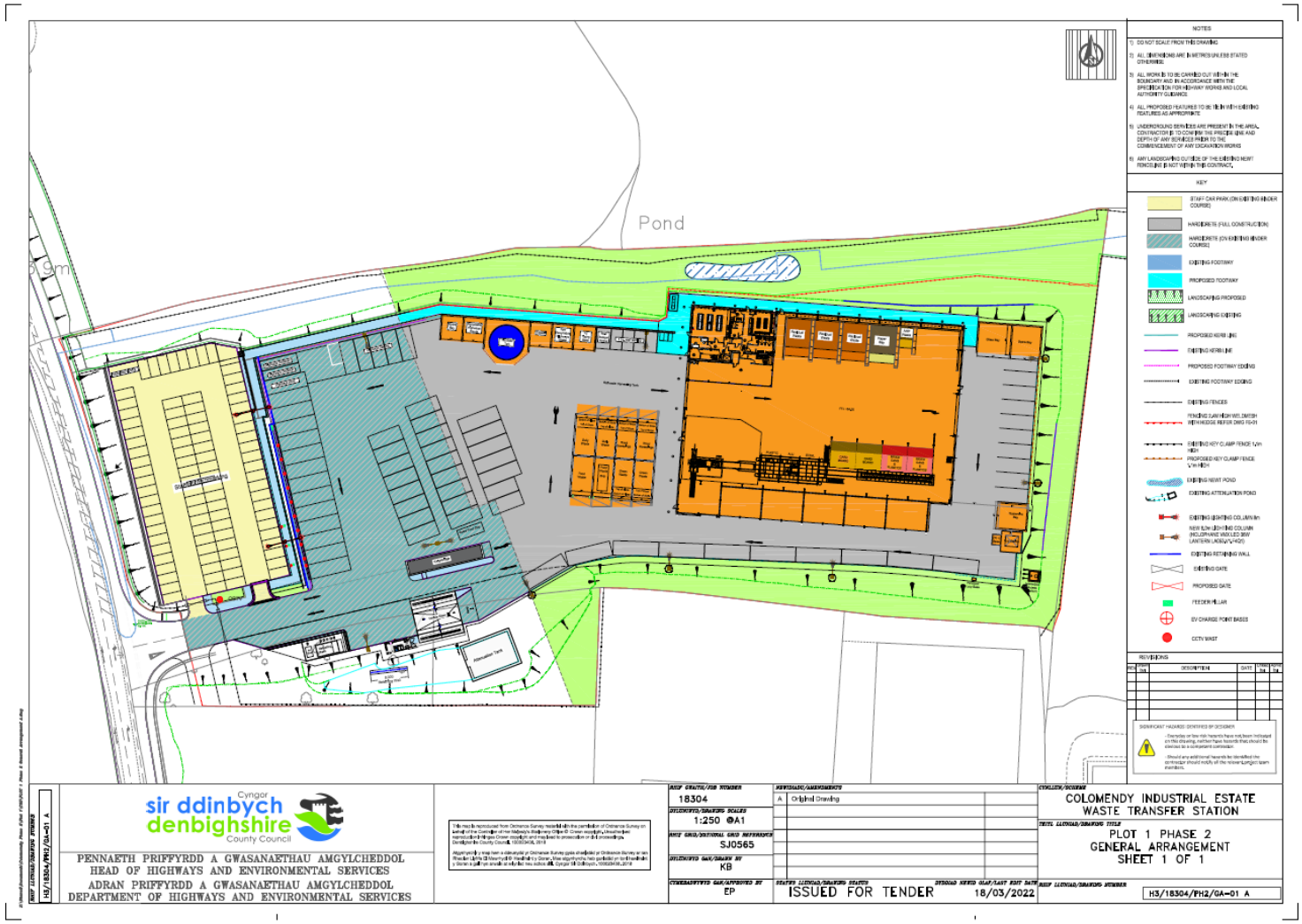
8.1.5 Therefore, the assessment has demonstrated that the proposed development is likely to be acceptable in relation to the potential noise impacts identified herein.

Appendix A Acoustic Terminology

Parameter	Description
Ambient Sound Level (La = $L_{Aeq,T}$)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
A-Weighted Decibel (dBA)	A decibel level that has been corrected for the A-Weighting curve.
A-Weighting	Octave band and 1/3 octave band filters that correlate to the response of the human hearing system to sound pressure levels at different frequencies.
Background Sound Level (LA90,T)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using a fast time-weighting and quoted to the nearest whole number of decibels.
Decibel (dB)	A logarithmic unit used to describe the ratio between the measured level and a reference level of 0 dB. The ratio can be sound pressure, intensity or power.
The reference value for sound pressure is 20 µPa and for sound power is 1 ρW.	
Equivalent Continuous A-Weighted Sound Pressure Level ($L_{Aeq,T}$)	Value of the time-averaged A-weighted sound pressure level, in decibels (dB), of a continuous steady sound for the duration of the specified time interval, T.
Façade Level	The sound pressure level at a distance of 1 metre from the façade
Fast Time Weighted	The speed at which the instrument responds to changes in amplitude of the measured signal. The response time of a fats time-weighted instrument is 0.125 seconds.
Free-Field Level	The sound pressure level measured away from any reflective surfaces.
Frequency (f)	The number of cycles of pressure fluctuations within a given period of time. Measured in Hertz.
Hertz (Hz)	The unit of frequency or pitch of a sound. One hertz is equal to one cycle per second.
Octave Band	Band of frequencies where the upper limit of the band is twice the frequency of the lower limit. E.g., the 1000 Hz band contains noise energy at all frequencies from 707 to 1414 Hz.
Percentile Level ($L_{AN,T}$)	The A-Weighted Sound Pressure Level which is exceeded for N% of the specified time interval. E.g., the LA90,1hour is the A-weighted sound level exceeded for 90% of 1 hour/
Reference Time Interval (T)	Specified interval over which the specific sound level is determined.

Appendix B Site Layout

Figure B.1: Proposed Site Layout



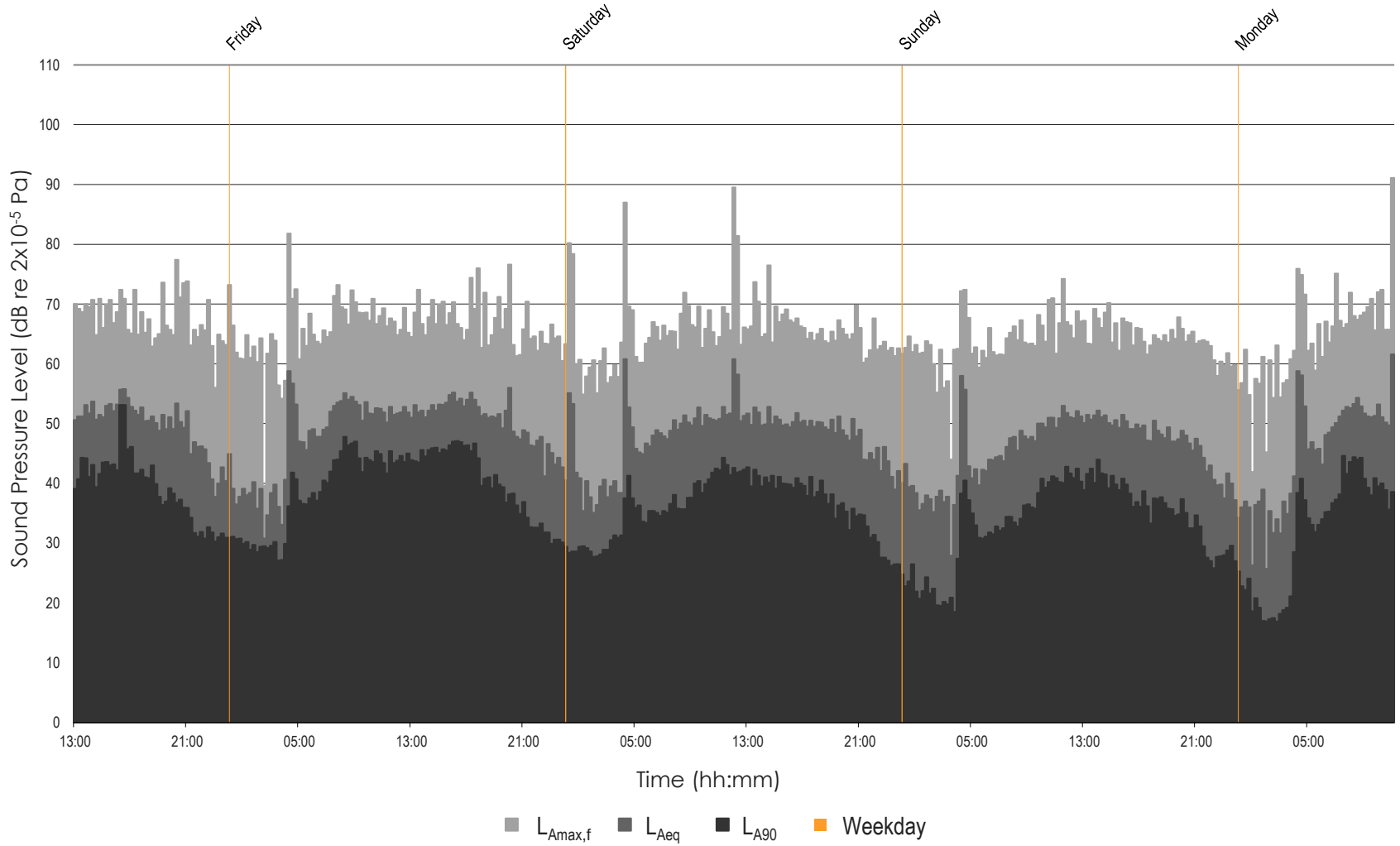
Appendix C Measurement Instrumentation

Table C.1: Measurement Instrumentation

Description	Manufacturer	Type	Serial Number	Laboratory Calibration Date
Sound Level Meter	RION	NL-52	00231668	11/02/2022
Pre-amplifier		NH-25	21612	11/02/2022
½" Pre-polarised microphone		UC-59	04713	11/02/2022
Sound Calibrator		NC-74	34546109	11/02/2022

Appendix D Time History Graphs

Colomendy Denbighshire, Waste Transfer Site
L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History
MP1 - Thursday 19 May to Monday 23 May 2022



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Appendix E Noise Source Data

E.1.1 For moving point sources, the following corrections have been applied:

Ref.	Description	Measurement Distance (m)	L_p (Average per Activity) (dB)	L_w (Average per Activity) (dB)	No. Occurrences per Hour	No. Occurrences Correction (dB)	Path Distance (m)	Travel Time (Path Distance @ 5km/h) Seconds	On Time Correction (per hour) (dB)	Overall L_w (Average per Hour)
1	Truck, Path 1 Entering main building	5	66	88	3	+5	150	108	-15	77
2	Truck Path 2 Around car park	5	66	88	3	+5	270	194	-5	80
3	Truck Path 3 Leaving main building	5	66	88	3	+5	225	162	-13	79
4	Truck reversing 1 Car park	5*	75	97	3	+5	26	19	-23	78
5	Truck reversing 2 Car park	5*	75	97	3	+5	26	19	-23	78
6	Truck reversing 3 Car park	5*	75	97	11	+10	26	19	-23	84

*The measurement distance was 3 m, however to provide a worst-case robust assessment, this has been assumed to be 5 m, which would result in an overestimate in the overall sound power level.

Appendix F Hoare Lea's Planning Acoustics Report

HOARE LEA

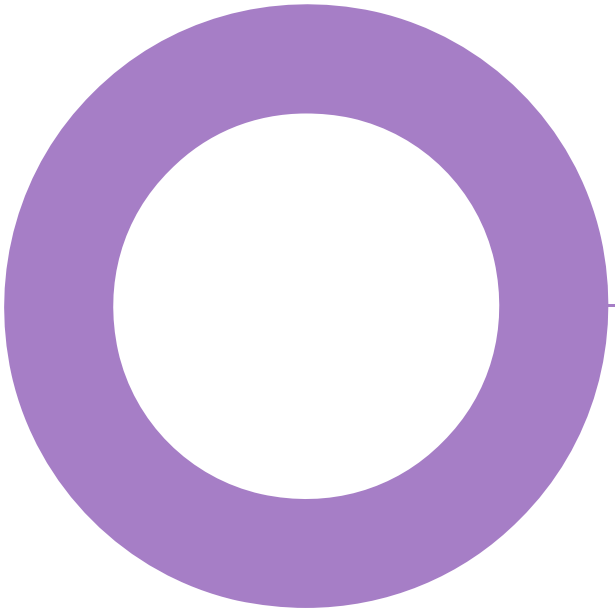
Plot 1 - Waste Transfer Centre. Colomendy Industrial Estate, Denbigh.

Denbighshire County Council.

ACOUSTICS

PLANNING ACOUSTIC REPORT

REVISION 03 – 21 NOVEMBER 2019



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	04/10/2019	Issued for comment	LR	PM	PM
01	24/10/2019	Formal issue	LR	PM	PM
02	21/11/2019	Minor updates following design changes	LR	PM	PM
03	21/11/2019	Minor update	LR	PM	PM

This document has been prepared for Denbighshire County Council only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

Project number: 10-11600
Document reference: REP-1011600-LR-20191004 - Plot 1 planning acoustic report-Rev03-F

Contents.

Executive summary.

Hoare Lea Acoustics have been appointed by Denbighshire County Council to carry out an environmental noise survey and noise impact assessment in relation to a proposed new-build industrial plot within a wider extension of Colomendy Industrial Estate in Denbigh.

The proposed development at Plot 1 comprises the construction of a Local Authority waste transfer facility to provide a base for sorting and baling of separately collected recyclable waste.

An environmental sound survey has been carried out between 4 and 10 September 2019. The representative background noise levels applicable at the nearest noise sensitive receivers were identified during the daytime (07:00 to 23:00 hrs) and night-time (23:00 to 07:00 hrs).

A noise assessment based on the results from the surveys concluded that noise from the proposed mitigated waste transfer scheme is expected to be noticeable but not intrusive at the worst-affected residential receiver, due to the retained character of noise in the area between the existing and proposed school developments.

Noise limits have also been set for the cumulative noise egress from future plant, equipment and machinery associated with the development at 1 m from the façade of the nearest noise sensitive premises. If the plant contains any tonal characteristics a further correction will be required.

1. Introduction.

It is proposed to extend the Colomendy Industrial Site in Denbigh by developing the existing agricultural plot of land to the north into discrete plots for industrial use, as presented in Figure 1.

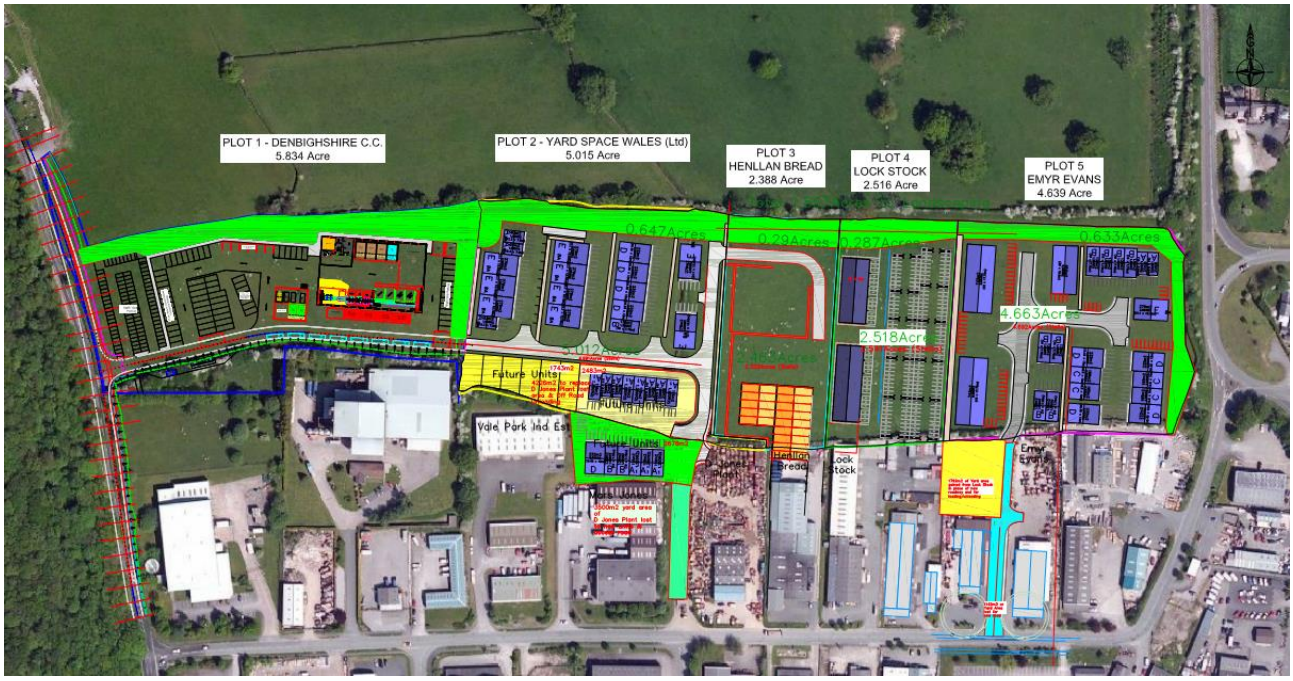


Figure 1 Proposed aerial photograph mark-up indicating proposed development site

Hoare Lea has been appointed by Denbighshire County Council (DCC) to assess the predicted noise impact from the proposed development at Plot 1 as part of the proposed extension of Colomendy Industrial Estate.

This includes an assessment of the predicted noise impact on nearby noise sensitive residential receivers and deriving noise limits to protect nearby residences against adverse effects associated with noise.

The following are contained in this report:

- A site description.
- A review of the relevant policy and guidance documents.
- A summary of the acoustic survey carried out.
- Noise limits for fixed plant associated with the proposed development (such as ventilation and cooling systems)
- An assessment of the current proposals against the derived noise limits.

This report serves to accompany the planning application submission for the proposed development to the Local Planning Authority.

2. Site.

2.1 Site description.

The proposed development at Plot 1 comprises the construction of a Local Authority waste transfer facility to provide a base for sorting and baling of separately collected recyclable waste. As part of the works, a waste facility building is proposed to house most of the waste streams and bailing operations, with externally located glass bays located on the north eastern corner of the site. The site location in relation to its surroundings is indicated in Figure 2.

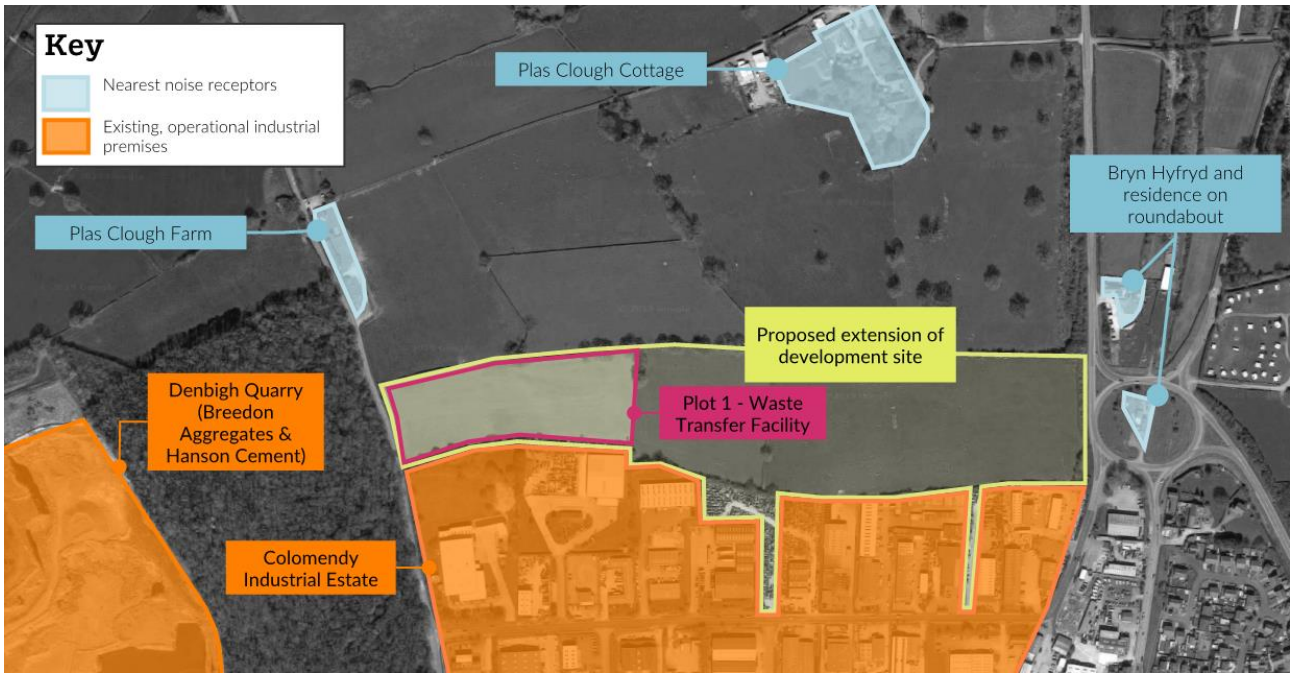


Figure 2 Annotated aerial photograph denoting proposed site and surroundings

2.2 Surrounding area.

The proposed development is located within a mixed agricultural and industrial area north of Denbigh. The site is immediately adjacent to the north boundary of the existing Colomendy Industrial Estate park. It is bonded by local road Fford Y Graig to the west and agricultural pasture land to the north. The A525 lies to the east of the site.

The closest residential receiver to the proposed development is Plas Clough Farm, a residence located approximately 165m from the nearest site boundary to the north, and Plas Clough Cottage, a listed residence located approximately 340m to the north east of the nearest site boundary. These will form the basis against which to assess noise impact from the site.

2.3 Local noise climate.

The existing local noise climate is currently dominated by road traffic noise along Fford Y Graig to the west, a main access route to the existing industrial site and Denbigh less than 2 miles to the south of the site location.

The site is also generally exposed to occasional noise from the existing industrial site premises and quarry activity.

3. Proposed development details.

From review of the proposed scheme as described in *Scoping Report - Plot 1 2019.107.02 SR Plot 1 ISS FV 29.08.19*, received 12 September 2019, *0 Colomendy Depot - Waste Operating Techniques OT 041019*, received 4 October 2019, and discussions with Eric Price from DCC, this section summarises the acoustically relevant proposals for the development.

3.1.1 Operating hours.

The proposed waste transfer centre is understood to operate as follows:

- Weekdays: 06:00 to 19:00 hours, core operational hours 10:30 hours to 15:00 hours
- Weekends: Normally closed, except for contingency operation
- Bank holidays: Open excluding Christmas Day & New Year's Day

The sequence of activities predicted on the site during a typical day of operation are presented below.

Time	Activity	Notes
06.00	Site open Staff begin to arrive at depot	Quiet site maintenance activity only Staggered staff cars arrive on site
06.00 – 06:15	Waste fleet (No. 15 vehicles total) check and refuelling	Quiet site maintenance activity only
06:15 – 06:45	Waste fleet depart from site	Waste fleet departs site for collection rounds, staggered departures
08:30 – 10:30	Glass bulking and baled waste transfer from site	Beginning of waste transfer / baling operational activity on site Glass bulking and bale removal to occur at most once a day
10:30 - 15:00	Waste fleet return to site and tip (2 rounds per vehicle) Baling of tipped waste Compacting of glass	Core hours of site activity
15:00 - 17:00	Glass bulking and baled waste transfer from site Fleet parks up for the day	Glass bulking and bale removal to occur at most once a day End of waste transfer / baling operational activity on site
17:00 – 19:00	Sitewide wind down Cleaning Site departure from site	Quiet site maintenance activity only Staggered staff cars depart site
19:00	Site closed	All activity ceases

3.1.2 Proposed baseline constructions.

The main building construction will be formed of light-weight cladding and supporting steel frame. With the exception of glass and highways waste, all other waste streams will be tipped and baled within the main building structure. Vehicle openings are provided on the west and east elevations to permit vehicle flow around the proposed site.

It is understood that the proposed external bays are to be formed from 4m high pre-cast concrete walls at least 300 mm thick.

4. Planning policy and relevant guidance.

4.1 Environmental noise regulations - Wales.

The Environmental Noise (Wales) Regulations 2006 as amended by the Environmental Noise (Wales) (Amendment) Regulations 2009 aim to define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to environmental noise. In this assessment these Regulations are collectively referred to as the 'Environmental Noise Regulations'.

4.2 Planning Policy Wales.

Current government planning advice to Local Authorities in Wales concerning noise takes two forms. General guidance is provided by 'Planning Policy Wales' (PPW). Section 6.7 of PPW details guidance on Air Quality and Soundscape, recognising the association between exposure to air pollution, which includes noise, and health risks. PPW advises that certain sounds associated with nature, such as those created by trees, wildlife or water can contribute to a sense of tranquillity and that problematic forms of sound are generally experienced as noise pollution and can affect amenity and be prejudicial to health.

PPW advises that in proposing new development, planning authorities and developers must address any implication arising because of its location within noise action planning policy areas; not create areas of inappropriate soundscape; and seek to incorporate measures which reduce overall exposure to noise pollution and create appropriate soundscapes.

4.3 Technical Advice Note (Wales) 11: Noise.

PPW is supplemented by 'Technical Advice Note (Wales) 11: Noise' (TAN11). The introduction to TAN11 sets out the importance of appropriately considering noise in planning applications and states how the planning system can be used to:

'minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business.'

4.4 Other planning guidance.

While addressing the point that careful consideration of the noise impact of new developments, existing Welsh guidance documents do not state specific noise levels of outdoor noise to judge acceptability. As such, reference is made in this section to additional planning guidance documents applicable to England.

The National Planning Practice Guidance (NPPG) also avoids stating a specific level of outdoor noise to judge acceptability, but does guide on factors that may influence whether noise could be a concern. It notes that the subjective nature of sound means that there is not a simple relationship between sound level and the impact on those affected, and that this will depend on how various factors combine in a particular situation.

The NPPG also provides examples of responses to the adverse effects of noise.

Table 1 Example responses to increased noise effects, from NPPG.

Perception	Examples of outcomes	Increasing effect level	Action
Not noticeable	No effect	No observed effect (NOEL)	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed adverse effect (NOAEL)	No specific measures required
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Lowest Observed adverse effect level (LOAEL)	Mitigate and reduce to a minimum
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed adverse effect level (SOAEL)	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable adverse effect	Prevent

4.5 Summary of planning policy.

A review of planning policy at local and national level highlights a clear need for noise impact to be assessed and that noise should be controlled to minimise adverse effects. However, there is no numeric guidance provided at policy level on 'acceptable levels' of noise. Further reference is therefore made to a number of additional guidance documents which are set out in the section below.

4.6 Local Authority planning policy.

From correspondence and discussions with DCC Environmental Health Officers it is understood that standard planning guidance with regards to noise egress is based upon the guidance of BS 4142:2014 and World Health Organisation guidelines for external noise levels outside existing residences.

4.7 Standard guidance documents.

4.7.1 British Standard 4142:2014 Methods for rating and assessing industrial and commercial sound.

Current Government advice to Local Planning Authorities in both England and Wales makes reference to British Standard 4142:2014 (BS 4142) (British Standards Institution, 2014) as being the appropriate guidance for assessing commercial operations and fixed building services plant noise. The British Standard provides an objective method for rating the significance of impact from industrial and commercial operations. It describes a means of determining sound levels from fixed plant installations and determining the background sound levels that prevail on a site.

The assessment of the impacts is based on the subtraction of the pre-existing background sound level ($L_{A90,T}$) from the rating level ($L_{Ar,Tr}$).

The standard does not give a definitive method for determining the background sound level but instead, as a commentary, states that *"the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods"*.

Clause 8.1.4, which discusses the monitoring duration, states *"there is no "single" background sound level as this is a fluctuating parameter. However, the background sound level used for the assessment should be representative of the period being assessed."* As a note to this clause the following commentary is given on obtaining a representative backgrounds sound level:

"To obtain a representative background sound level a series of either sequential or disaggregated measurements ought to be carried out for the period(s) of interest, possibly on more than one occasion. A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value."

The rating level is defined objectively as the specific source noise level in question (either measured or predicted) with graduated corrections for tonality (up to +6 dB(A)), impulsivity (up to +9 dB(A)), intermittency (+3 dB(A)) and other sound characteristics (+3 dB(A)) which may be determined either subjectively or objectively, if necessary.

The background sound level is subtracted from the rating level for assessment against the following criteria:

- A difference of around +10 dB is likely to be an indication of a significant adverse impact, depending on context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on context; and
- A difference of +0 dB or less is an indication of the specific sound source having a low impact, depending on the context.

BS 4142 also notes the importance of absolute levels:

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

4.7.2 World Health Organisation guidance.

The World Health Organisation (WHO) recognise noise as an important public health issue.

WHO Environmental Noise Guidelines for the European Region, published in October 2018, states:

- "Environmental noise is an important public health issue, featuring amongst the top environmental risks to health. It has negative impacts on human health and well-being, and is a growing concern among both the general public and policy makers in Europe".

The current 2018 guidelines focus upon transportation and leisure noise (defined as "attending nightclubs, pubs, fitness classes, live sporting events, concerts or live music venues, and listening to loud music through personal listening devices"), but do not extend to cover 'neighbourhood' noise; which may include noise from neighbours, commercial, recreational and occupational activities. However, it does recognise that these sources can "cause considerable concern" even at low levels when located in proximity of where people are living.

A key health effect that is considered in the WHO guidelines is 'annoyance, which is defined as "a feeling of displeasure, nuisance, disturbance, or irritation caused by a specific sound". Annoyance is listed as a "critical health outcome" within the guidelines, and can be a causal pathway to other health effects such as cardiovascular disease.

The latest document advises that, whilst the guidelines supersedes the previous "Guidelines for Community Noise" (1999), it is advised that any values not covered by the current guidance should remain valid.

The research within the 1999 guidance document advised that external noise should be controlled to less than $L_{Aeq,16hr}$ 50 dB to protect the majority of people from being "moderately annoyed". The upper level of $L_{Aeq,16hr}$ 55 dB corresponds to the threshold for "serious annoyance".

5. Acoustic surveys.

A long term spectral noise survey of the site was undertaken between 4 and 10 September 2019 to capture the prevalent ambient and background noise levels in the surrounding area, as well as characterise existing industrial activity.

As part of the survey exercise, two long term noise monitoring positions were used to characterise the noise levels in the wider area, complemented by a short term noise monitoring exercise at the existing Henllan Bakery site boundary. The method described above was discussed with and approved by DCC Environmental Health Officers in discussions on 22 August 2019.

Full details of the method and equipment used, as well as weather information are provided in Appendix A. The survey measurement positions and prevalent sound levels around the site are summarised in the annotated aerial photograph presented in Figure 3. The daytime values presented are based on the 12-hour period (07:00 to 19:00) that covers the proposed site opening hours.

Graphs showing the timeline results from the noise monitoring survey are provided in Appendix B.

In line with BS 4142:2014, for the purpose of analysis and establishing representative background sound levels during the periods of interest, the background sound levels have been quantified using statistical analysis from the continuous logging measurements. These are presented in Appendix C.

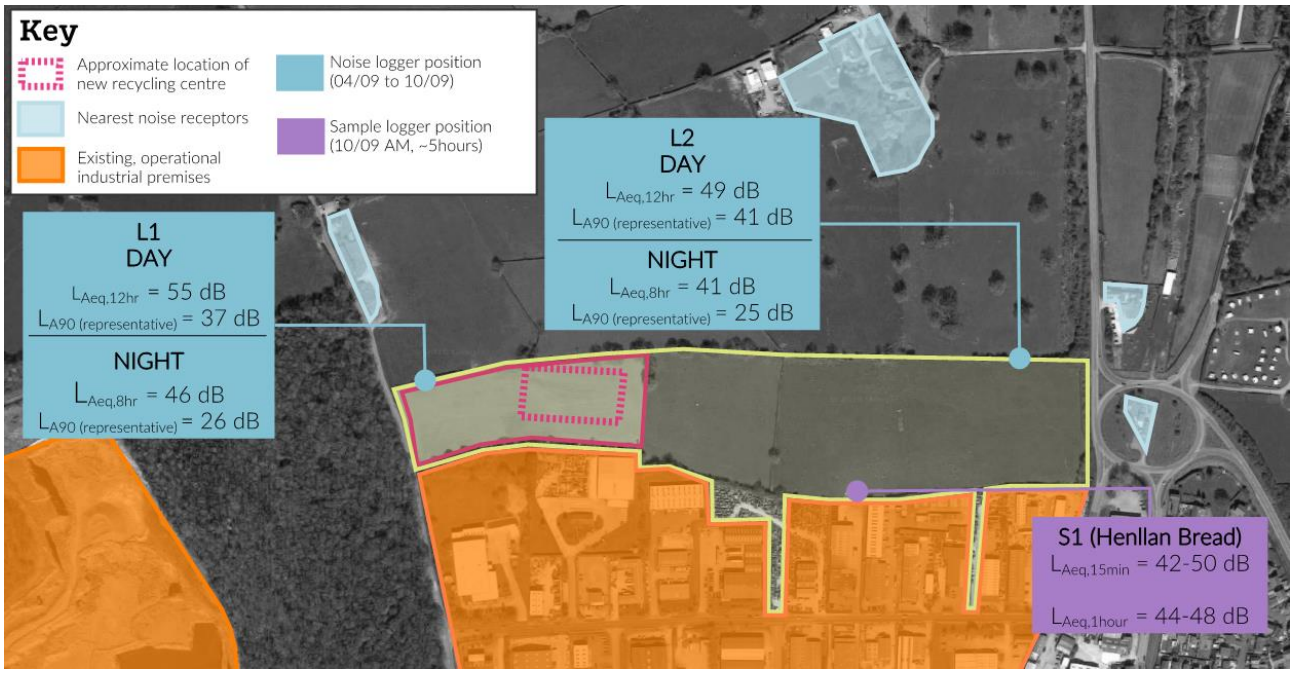


Figure 3 Aerial photograph indicating measurement positions and prevalent sound levels (courtesy of Google Earth)

5.1 Observations.

Notes from site visits on 4 and 10 September 2019 identified local road traffic noise to be the dominant noise source across the proposed development site and wider area.

It was noted that operational noise from the quarry, understood to be from mining activity, was present and contributing to the background noise levels during the first site visit on 4 September. Additionally, regular recreational and light aircraft fly-bys were noted on both site visits directly over the development site and the nearest noise sensitive receptors, contributing to the ambient and background noise levels.

Some localised industrial activity was occasionally audible along the south boundary during both site visits, however this was not significant along the proposed northern boundary.

6. Waste transfer facility – noise impact assessment.

6.1 Basis of noise impact assessment.

The noise impact assessment presented within this section was based on the following:

- *H3-18304-D-54B - Land Plan Plots 1-5 Aerial Background*, received 21 August 2019
- *20 – M Sound levels* datasheet for baling machinery, received 4 September 2019
- *Scoping Report - Plot 1 2019.107.02 SR Plot 1 ISS FV 29.08.19*, received 12 September 2019
- Proposed site plan: EWP7751 A 27 L006 Planning Issue 1911119, received 19 November 2019
- External elevations: EWP7751 A 27 L001 Planning Issue 2011119 and EWP7751 A 27 L002 Planning Issue 2011119, received 20 November 2019.
- Proposed general arrangement: EWP7751 A 27 L003 Planning Issue 2011119 and EWP7751 A 27 L004 Planning Issue 2011119, received 20 November 2019
- Proposed roof plan: EWP7751 A 27 L005 Planning Issue 1911119, received 19 November 2019
- Superlite noise data sheet MX-2610N_20191031_091703 received 20 November 2019.

6.2 Benchmark waste transfer activity noise survey.

In order to benchmark the levels associated with the operations proposed at the proposed development site, a noise survey was arranged and carried out at an existing waste transfer facility operated by Conwy County Council located on Rhuddlan Road, Abergele.

Attended spectral sample measurements were taken of site activity at various points around the site perimeter, with additional localised measurements carried out to characterise the noise profile of specific noise activities. The resulting noise levels from this survey used to characterise the expected noise levels at the proposed site are summarised in Table 2.

Table 2 Summary of benchmark operational levels

Activity captured	Measurement position	Noise level measured	Notes / comments
Glass tipping (per event)	Between 2m and 10m from tipping point by edge of bay	$L_{Aeq,event}$ 88 – 94 dB	Lower and heavier duty recycling vehicles captured during survey Distance to microphone varied with available space within bay between compacting events
Glass compacting (per event)	Circa 10 m from glass pile by edge of bay	$L_{Aeq,event}$ 93 dB	Worst-case glass activity measured, JCV using space to compress and compact the glass pile
Plastic baling (per cycle)	Circa 5 m from baling equipment within semi-enclosed shed	$L_{Aeq,event}$ 88 dB	Noise dominated by vehicle movement feeding tipped plastic into baling processing equivalent
Paper baling (per cycle)	Circa 5 m from baling equipment within semi-enclosed shed	$L_{Aeq,event}$ 78 dB	Noise dominated by vehicle movement feeding tipped paper into baling processing equivalent

It is understood that in addition to the above, 7 rooftop extract fan units are proposed, located on the southern slope of the roof.

6.3 Noise impact assessment - modelling.

In order to determine the expected external noise levels from plant and equipment associated with the proposed development at the nearest noise sensitive receivers, a 3D noise map of the site has been created using the acoustic modelling software CadnaA. The software is a proprietary analysis package based on the calculation principles of ISO 9613-2-1996 *"Acoustics - Attenuation of sound during propagation outdoors - Part 2- General method of calculation"*. The software includes for distance attenuation, acoustic screening and reflection / absorption from the ground/buildings.

The model was created and calibrated on the basis of the received site layout drawings, available building height information for the scheme and the results of the noise survey results. Topographic information from the proposed drawings and existing Ordnance Survey data was used to calibrate the model. In order to enable a conservative worst-case assessment, the worst-case benchmark results presented in Table 2. A 3D screenshot of the environmental model is presented in Figure 4.

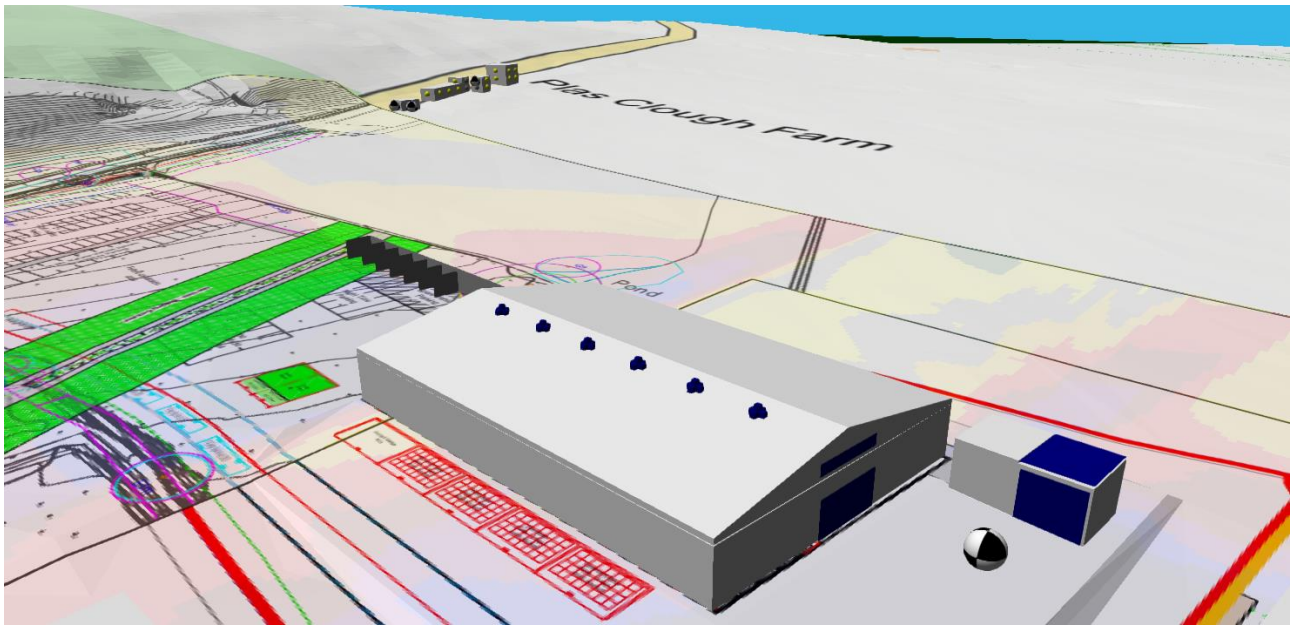


Figure 4 3D environmental noise model

6.3.1 Basis of noise modelling.

In order to present a conservative worst-case assessment of the noise impact of proposed operations at the nearest residential receivers, and to reflect the dominating noise sources identified during the benchmark survey, the following main noise sources were contemplated within the modelling exercise:

- Main building activity: Noise break-out at main building entrance points from waste collection vehicles unloading within the enclosed building, waste tipping, transferring onto the baling machinery and compacting. 7no external vent Superlite DSC 630 fans mounted on southern aspect of the roof.
- External glass bay activity: Noise propagation from glass compacting activity in between individual glass tipping.

Received data from a baling machinery manufacturer was reviewed, with a stated sound pressure level of approximately 80 dB measured at 1 m from the machine. However this does not take into account the noted contributions from on-site vehicles tipping waste and assisting in feeding waste streams into the machinery, as noted during the benchmark survey. As such, the assessment of noise break-out from the main building was based on the worst-case baling cycle presented in Table 2, to provide a realistic worst-case operational scenario within the main building waste operations area.

Appropriate corrections were taken to estimate the resulting sound power levels at the entrance doors to the building for input into the model.

A similar consideration was taken to characterise the worst-case glass bay activity, and the propagation from glass bay activity was modelled based on a worst-case impact point of tipped glass from an industrial vehicle spade at a height of 3 m above ground. Although glass tipping and compacting activities are mostly discrete events, during the core hours of operation these have been assumed to occur with sufficient frequency as to constitute a relatively steady source of noise during the period of 10:30 to 15:00.

Appropriate corrections were taken to estimate the expectable sound power levels for input into the model.

6.3.2 Baseline.

Following the above, an iteration of the model was run to determine the expected impact of the scheme upon the neighbouring area without any specific mitigation measures. Based on this, calculations show that levels of L_{Aeq} 55 dB and L_{Aeq} 46 dB would be incident upon the worst-affected facades of Plas Clough Farm and Plas Clough Cottage respectively, during the worst-case scenario of simultaneous continuous operational noise from the main building and the external glass bay.

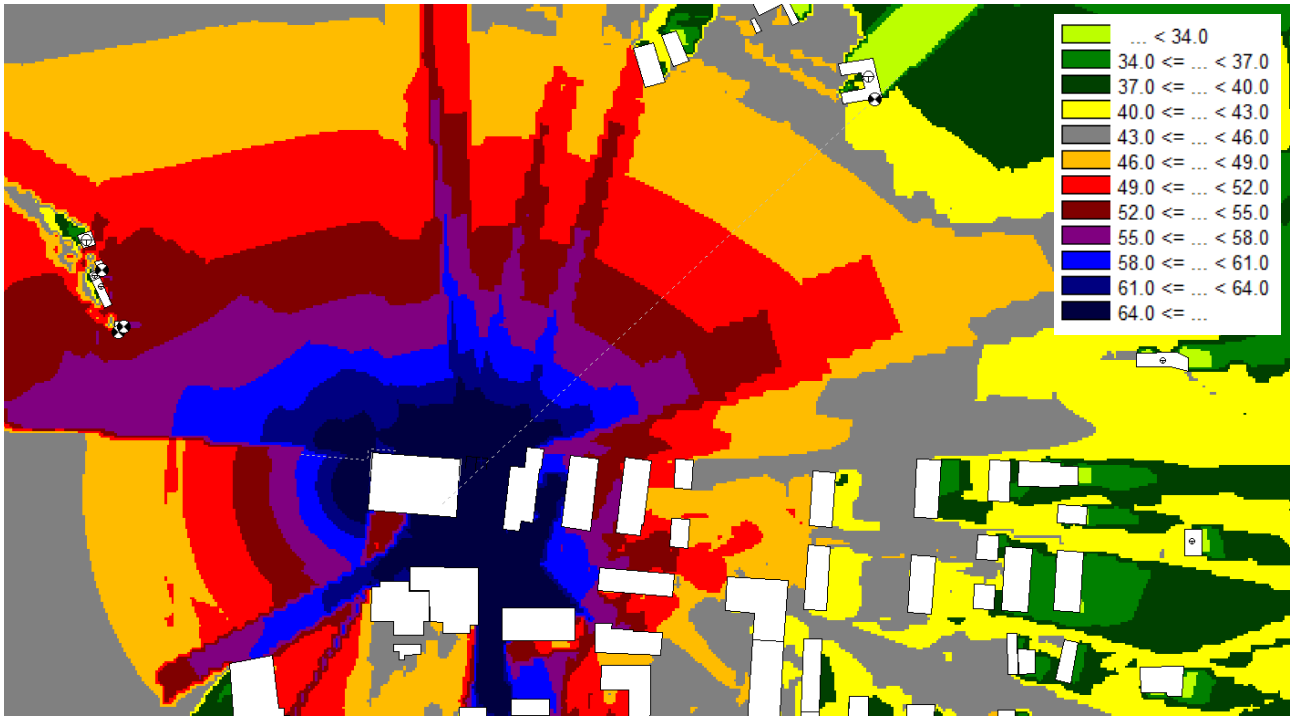


Figure 5 Baseline noise model with no mitigation measures – main building activity and glass bay operations

6.3.3 Proposed mitigation measures.

Further to discussions with Eric Price and Richard Taylor from DCC and a review of the scheme proposals, the following elements are proposed to mitigate the acoustic impact of the scheme:

- Vehicular access entrances to main building to be limited to a height of 5m above ground.
- Glass bays and spare bays to be covered by a lightweight single skin cladding system, with south elevations open to direct tipping glass noise away from the nearest sensitive receivers.
- Solid acoustic barrier to be provided between Highways Storage bays and the main building, at a height of 4m above ground level.

Based on this, calculations show that levels of L_{Aeq} 41 dB and L_{Aeq} 35 dB would be incident upon the worst-affected facades of Plas Clough Farm and Plas Clough Cottage respectively, during the worst-case scenario of simultaneous continuous operational noise from the main building and the external glass bay.

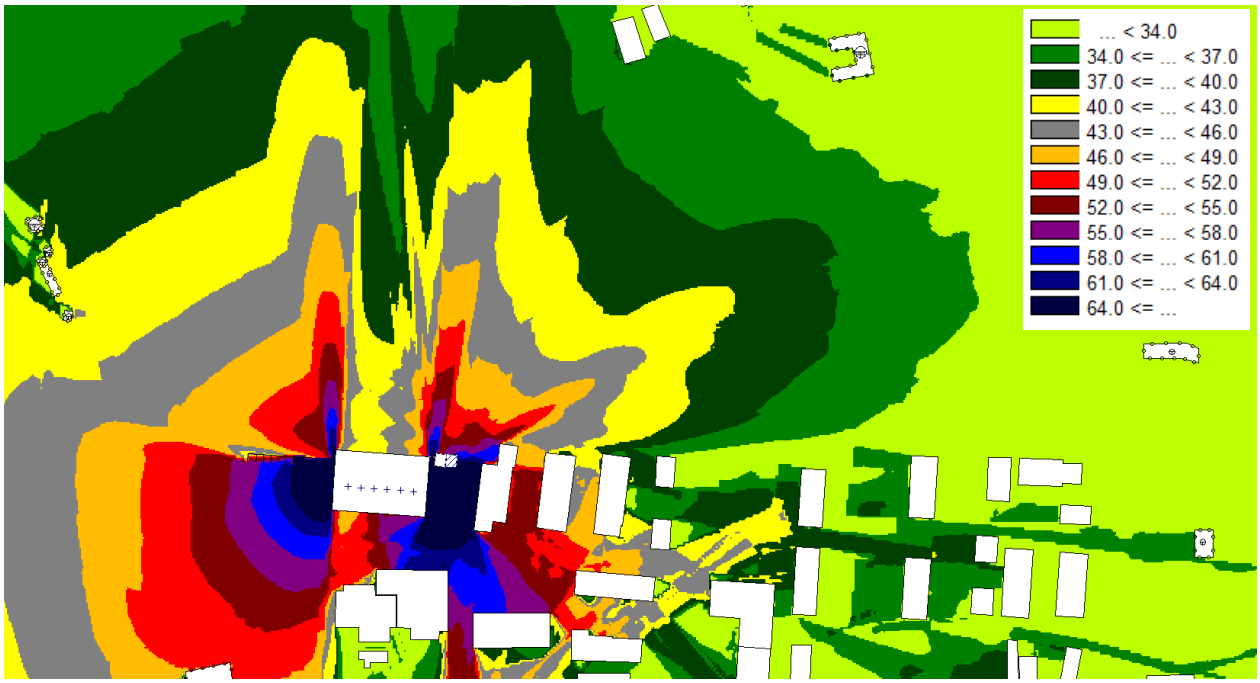


Figure 6 Noise model incorporating mitigation elements – main building activity and glass bay operations

6.4 Noise impact assessment - discussion.

The resulting calculated noise levels arising from site activity at the nearest noise sensitive receivers, as set out in the previous section, are summarised in Table 3.

Table 3 Summary of noise impact assessment

Noise receptor	Representative background noise levels at receivers, L_{A90} (dB)	Calculated operational noise level incident at residential facades, L_{Aeq}, dB		Comments
		Baseline	With mitigation	
Plas Clough Farm	37	55	41	+4 dB above background with mitigation during core operational hours
Plas Clough Cottage	41	46	35	Significantly below background with mitigation during core operational hours

The following sections present an assessment of the proposed mitigated impact from the scheme in accordance with the standard guidance presented in Section 4.7 at the relevant identified noise sensitive receptors.

6.4.1 Plas Clough Cottage.

The proposed scheme with mitigation is expected to be 7 dB below the existing background noise levels at Plas Clough Cottage. While the receiver is located some distance from the A525 and rest of the local road network, road traffic noise along with quarry and aircraft noise currently dominate the noise climate at this receiver.

The resulting operational noise levels are significantly below the WHO threshold guidelines for "moderate annoyance".

Within this context, operational noise from the proposed mitigated scheme would be deemed to have a low impact on residential amenity at this receiver, in accordance with BS 4142 guidance with adverse comment deemed unlikely.

6.4.2 Plas Clough Farm.

The proposed scheme with mitigation is expected to be up to 4 dB above the existing background noise levels at Plas Clough Farm directly to the North of the proposed site, which would indicate a likelihood of adverse impact under BS 4142:2014 guidance before local context is considered.

This receiver borders onto Fford Y Graig to the west and is exposed to high levels of road traffic noise throughout the relevant period of assessment (07:00 to 19:00), although contributions from this source are attenuated at the rear elevations facing away from the local road. Similarly to Plas Clough Cottage however, road traffic noise along with quarry and aircraft noise currently dominate the noise climate at this receiver.

While the resulting operational noise levels from the scheme would be expected to be perceptible at Plas Clough Farm during quieter periods of the day, the results indicate that this would be dominated by noise break-out from the main building and not from contributions from the mitigated glass bay activity which are expected to fall below background noise levels.

Furthermore, the quoted operational noise levels would only apply during the core hours of operation, between 10:30 and 15:00 on weekdays. They would also be significantly below the WHO threshold guidelines for "moderate annoyance" during peak times of operation. By comparison, the current representative ambient noise levels over the 16-hour daytime period at the receptor measured at position L1 ranged from $L_{Aeq,16hour}$ 50 to 55 dB without the proposed scheme.

Within this context, the mitigated operational noise from the proposed mitigated scheme would be deemed to have a low impact on residential amenity at this receiver. While noise from the operational site may be noticeable during core operational hours, it is not expected to be intrusive, resulting in a no adverse effect impact.

Given the calculated reduction in the potential noise impact of the scheme on this receptor following mitigation, it is considered that the proposals comply with the TAN11 guidelines of limiting adverse effect without placing unduly onerous restrictions on the development.

6.5 Operational noise limits for externally mounted building equipment.

Based on the proposed scheme details set in Section 3, the criteria set out in Section 4.6 and the survey results, the cumulative maximum sound pressure levels for any further fixed plant, equipment and machinery associated with the development not covered by this noise assessment shall not exceed the levels presented in Table 4 at 1 m from the nearest noise sensitive premises.

Table 4 Maximum permissible sound pressure levels at 1m from the nearest noise sensitive premises

Residential receiver	Maximum sound pressure level at 1m from the nearest noise sensitive premises during proposed operational times ($L_{Ar,T}$, dB) *
Plas Clough Farm	32
Plas Clough Cottage	36

*If plant noise contains any tonal or impulsive characteristics, a further correction shall be applied to the levels set out above, see Section 4.7.1 for details.

6.6 Comments on rooftop extract fan operation.

The 7 rooftop fan units are understood to operate only in the case of gas build-up during the day and are to be switched to a significantly reduced 'trickle' ventilation mode during the night period (23:00 – 07:00).

While no noise data has been received for this mode of operation, this is understood to be a significantly reduced mode intended to provide a nominal flow of air through the roof openings. As such, while they have been incorporated into the full daytime (07:00 - 23:00) noise assessment for the site, the rooftop fan units have not been considered significant noise sources during the night period (23:00 - 07:00).

7. Conclusion and recommendations.

A noise impact assessment has been undertaken to understand the effect of the proposed waste transfer facility scheme on the nearby residences. The assessment considers noise from activities on the site to the nearest residences and the effect of proposed mitigation measures in addressing this.

The assessment suggests that generally the noise from the mitigated scheme will have no observable effect to the adjacent residential properties. In addition to the assessed physical mitigation measures put in place the following are recommended for inclusion within a site management strategy:

- Where possible minimise the tipping of material from height
- Switch off all plant when not in use
- Adopt a low-speed limit for vehicles and machinery on site, to limit vehicle noise
- Carry out timely periodic maintenance of site vehicles and machinery to minimise noise from continuous wear and tear
- Procure or fit broadband vehicle reverse alarm signals rather than tonal ones.

Any future considerations with regards to extended hours of operation and expansion will need to be assessed by a suitably qualified acoustician.

Appendix A: Noise survey details.

Survey methodology

Long-term noise monitoring was carried out at the proposed site between 12:45 on 4 September 2019 and 07:00 on 10 September 2019.

Prior to commencement of the unattended survey, a subjective assessment of the noise climate was undertaken and compared to that of the immediate vicinity of the nearest residential receptors. The chosen logger positions L1 and L2 were deemed to be representative of the noise levels at the nearest noise sensitive premises.

An additional short-term monitoring survey was carried out between 06:40 and 12:00 on 10 September at the site boundary with the existing Henllan Bakery premises, position S1, to capture typical activity levels from current operations.

The microphones were fitted with windshields. The meters were calibrated before and after the survey and no significant drift was noted. Photographs showing the long-term monitoring positions L1 and L2 are presented in Figure A1 to A5 is presented in figure A6. Photographs showing the short-term monitoring position S1 are presented in Figure A6 and A7.

Figure A 1- Measurement Position 1 (1 of 3) - Sound level meter 1 - unattended

Figure A 2- Measurement Position 1 (2 of 3) - Sound level meter 1

Figure A 3- Measurement Position 1 (3 of 3) - Sound level meter 1

Figure A 4- Position L2 (1 of 2) - Sound level meter 2

Figure A 5- Position L2 (2 of 2) - Sound level meter 2

Figure A 6- Position S1 (1 of 2) - Sound level meter 2

Figure A 7- Position S1 (2 of 2) - Sound level meter 2

Equipment details.

The details of the equipment used during the environmental noise survey are summarised below. All equipment used was within dates of calibration and calibration certificates are available on request.

Table A1 - Sound level meter 1 – Position L1

Equipment	Type	Serial Number	Last Calibrated
Sound Level Meter	Rion NL-52	00732162	15/05/2019
Pre-amplifier	Rion NH-25	32190	15/05/2019
Microphone	Rion UC-59	05354	15/05/2019

Table A2 - Sound level meter 2 – Position L2 and S1

Equipment	Type	Serial Number	Last Calibrated
Sound Level Meter	Rion NL-52	00297868	08/04/2019
Pre-amplifier	Rion NH-25	88079	08/04/2019
Microphone	Rion UC-59	14887	08/04/2019

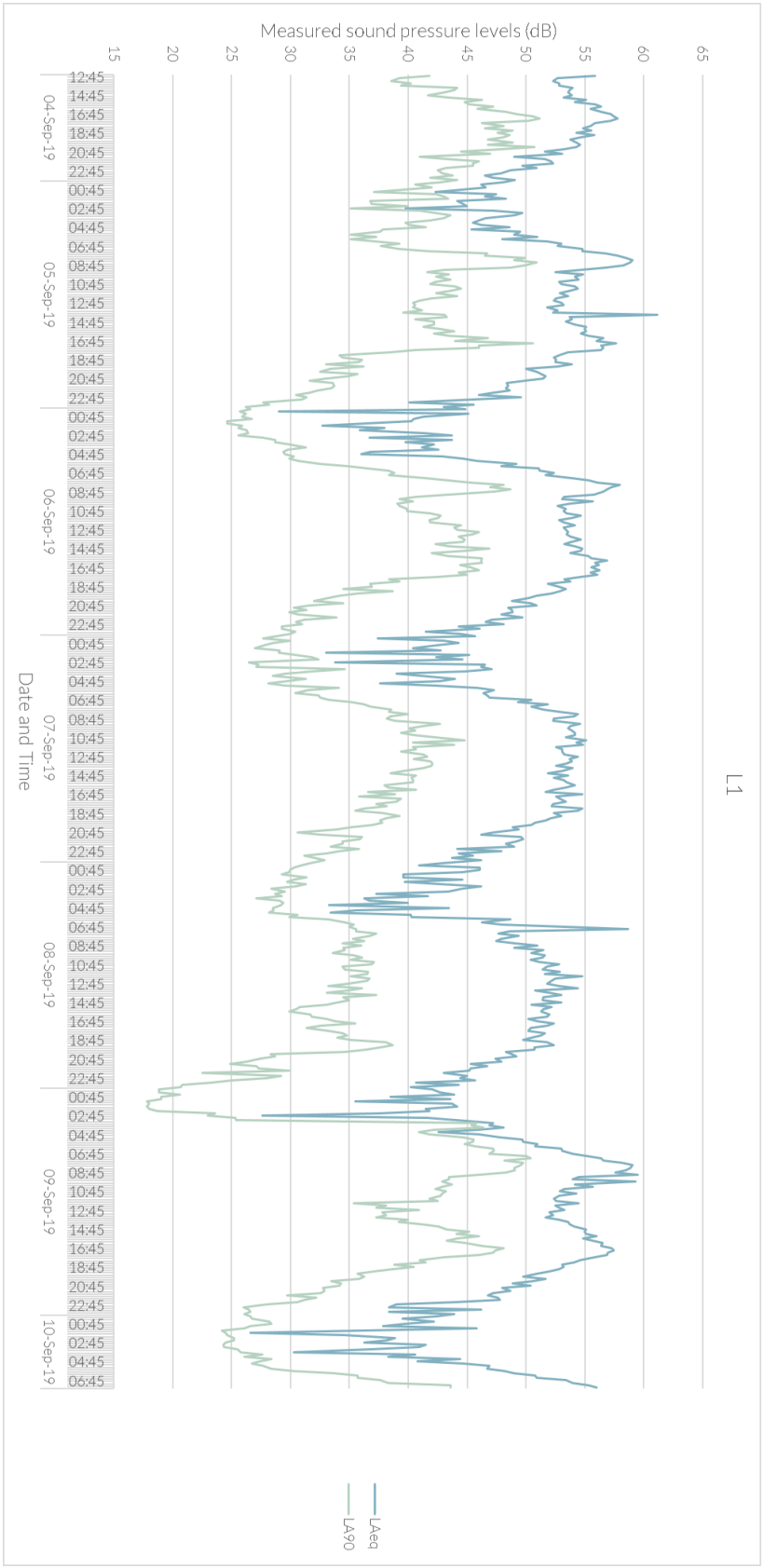
Field calibrations were carried out at the start and end of the measurements, using:

Equipment	Type	Serial Number	Last Calibrated
Calibrator	Rion NC-74	34172703	02/07/2019

Weather

The weather was noted to be dry during the set-up visit with approximately 50% cloud coverage; prevalent wind speeds were generally below 5m/s. While light rain spells are understood to have occurred during the survey period these are not considered to have adversely affected the measurements. The measured data is therefore considered suitable as being representative of typical conditions.

Appendix B: Time History of unattended measurements.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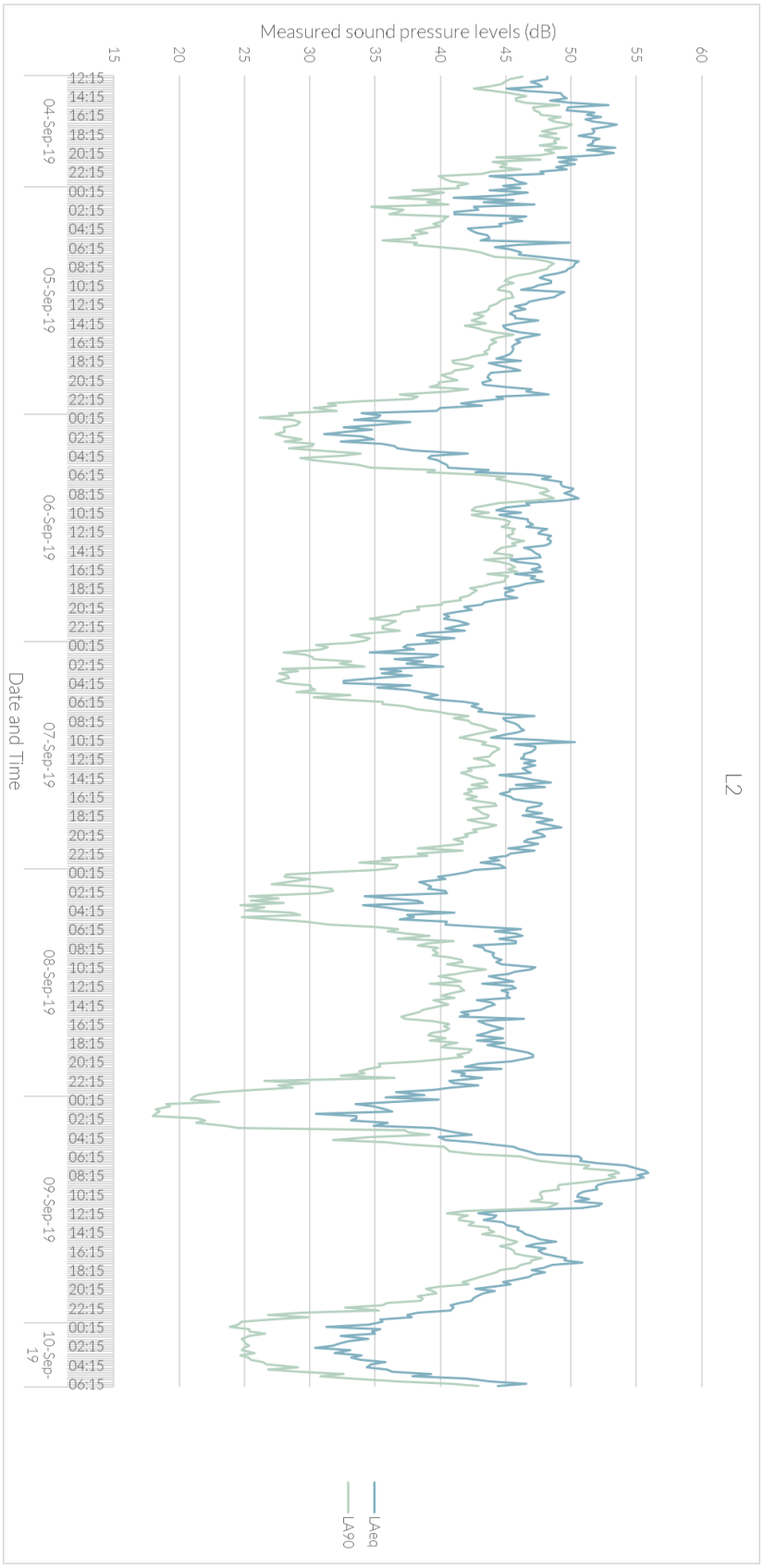
20
25
30
35
40
45
50
55
60
65
Date and Time
04-Sep-19
05-Sep-19
06-Sep-19
07-Sep-19
08-Sep-19
09-Sep-19
10-Sep-19
LA90
LAeq
L1


Measured sound pressure levels (dB)
15
20
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30
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40
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55
60
Date and Time
04-Sep-19
05-Sep-19
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07-Sep-19
08-Sep-19
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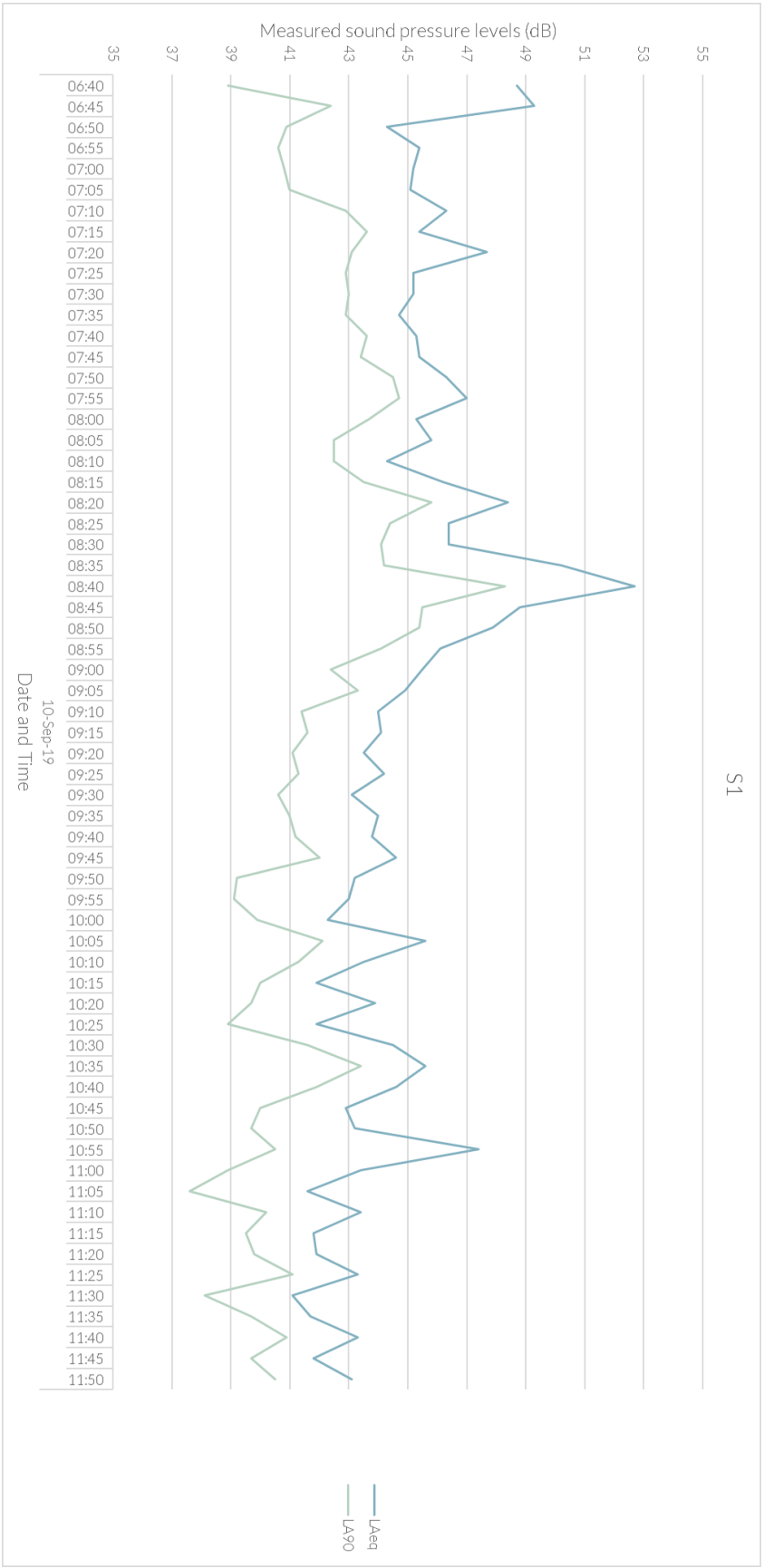
LA90
LAeq
L2


Measured sound pressure levels (dB)
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51
53
55
Date and Time
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07:00
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07:10
07:15
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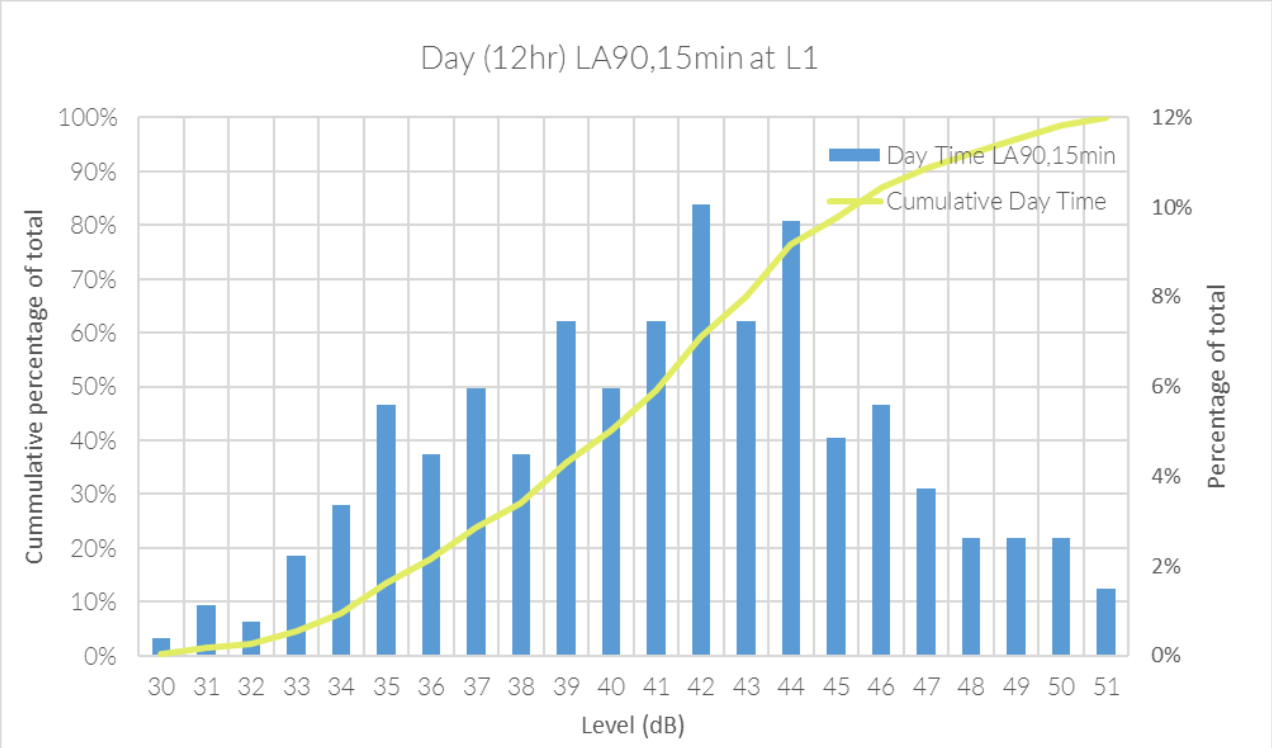
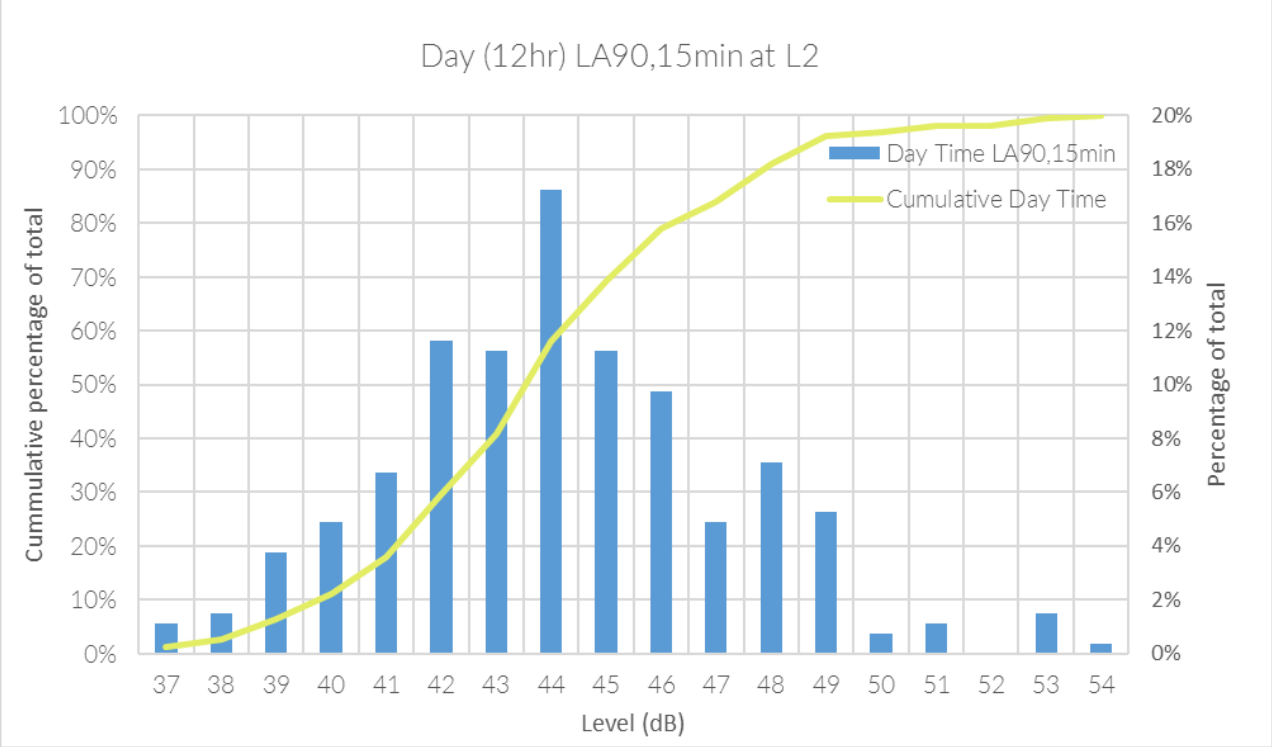
S1
LAeq
LA90

Appendix C: Statistical analysis of background sound levels.





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