REPORT

CANFORD EFW CHP

CANFORD RESOURCE PARK, POOLE

NOISE IMPACT ASSESSMENT
RWDI # 2402670 02
June 4, 2024

SUBMITTED TO

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AMENDMENT HISTORY			
Issue	**Status**	**Description**	**Date**
01	Draft	Draft report for client comment	02/04/2024
02	Final	Final Issue following client review	04/06/2024

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EXECUTIVE SUMMARY

A noise assessment of the proposed Canford Energy from Waste Combined Heat and Power Facility at Canford Resource Park has been undertaken. The assessment was undertaken following the principles of BS 4142:2014-A1:2019 and further guidance provided by the Environmental Agency.

The assessment consisted of measurements of existing sound levels in the local area in the vicinity of identified noise sensitive receptors. A noise model was developed using information provided by MVV Environment Limited. The output of the model was used to generate rating levels which were compared to the background sound levels for use in the BS 4142 assessment. The results of the assessment indicated a difference of up to +11 dB at the worst affected receptor (R11 – residential) during night-time periods. However, when considering the context of the situation, it was deemed that the internal noise level at this dwelling could be considered to be barely audible or not detectable. Therefore, the impact of the predicted rating levels is considered to be low.

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1 INTRODUCTION

MVV Environment Limited (the Applicant) has submitted a full planning application for a Carbon Capture Retrofit Ready (CCRR) Energy from Waste Combined Heat and Power (EfW CHP) Facility at Canford Resource Park (CRP), off Magna Road, in the northern part of Poole. Together with associated CHP Connection, Distribution Network Connection (DNC) and Temporary Construction Compounds (TCCs), these works are the Proposed Development.

The primary purpose of the Proposed Development is to treat Local Authority Collected Household (LACH) residual waste and similar residual Commercial and Industrial (C&I) waste from Bournemouth, Christchurch, Poole and surrounding areas, that cannot be recycled, reused or composted and that would otherwise be landfilled or exported to alternative EfW facilities further afield, either in the UK or Europe.

Air Quality Consultants Ltd (AQC) have been commissioned by MVV Environmental Limited to create the application for an Environmental Agency (EA) permit. RWDI have been commissioned by AQC to undertake noise modelling of the Proposed Development.

The Proposed Development would recover useful energy in the form of electricity and hot water from up to 260,000 tonnes of non-recyclable (residual), non-hazardous municipal, commercial and industrial waste each year. The Proposed Development has a generating capacity of approximately 31 megawatts (MW), exporting around 28.5 MW of electricity to the grid. Subject to commercial contracts, the Proposed Development will have the capability to export heat (hot water) and electricity to occupiers of the Magna Business Park and lays the foundations for a future CHP network to connect to customers off Magna Road.

The location and the extent of the Proposed Development is identified by the red line shown on Figure 1. In total, the Proposed Development covers an area of 10.1 hectares (Ha).

The noise assessment comprises the following elements:

- a noise survey at a selection of the nearest noise sensitive Receptors in order to obtain a measure of the baseline noise conditions;
- an assessment of the predicted potential operational noise effects of the Proposed Development following the principles of the British Standard (BS) 4142:2014+A1:2019[1] assessment methodology and using guidance given by the Environment Agency (EA) on the management of noise and vibration.

The potential noise effects identified are presented, along with any potential mitigation measures required to prevent or minimise noise. Any residual effects (of moderate or major significance) that remain with these mitigation measures are then referred to as temporary or permanent significant effects.

[1] British Standards Institution. BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'. 2019

2 ASSESSMENT LOCATION

2.1 Site Boundary

The site boundary is located upon Canford Resource Park (CRP), off Magna Road (A341), in the northern part of Poole. The proposed site layout and boundary is indicated on Figure 1.

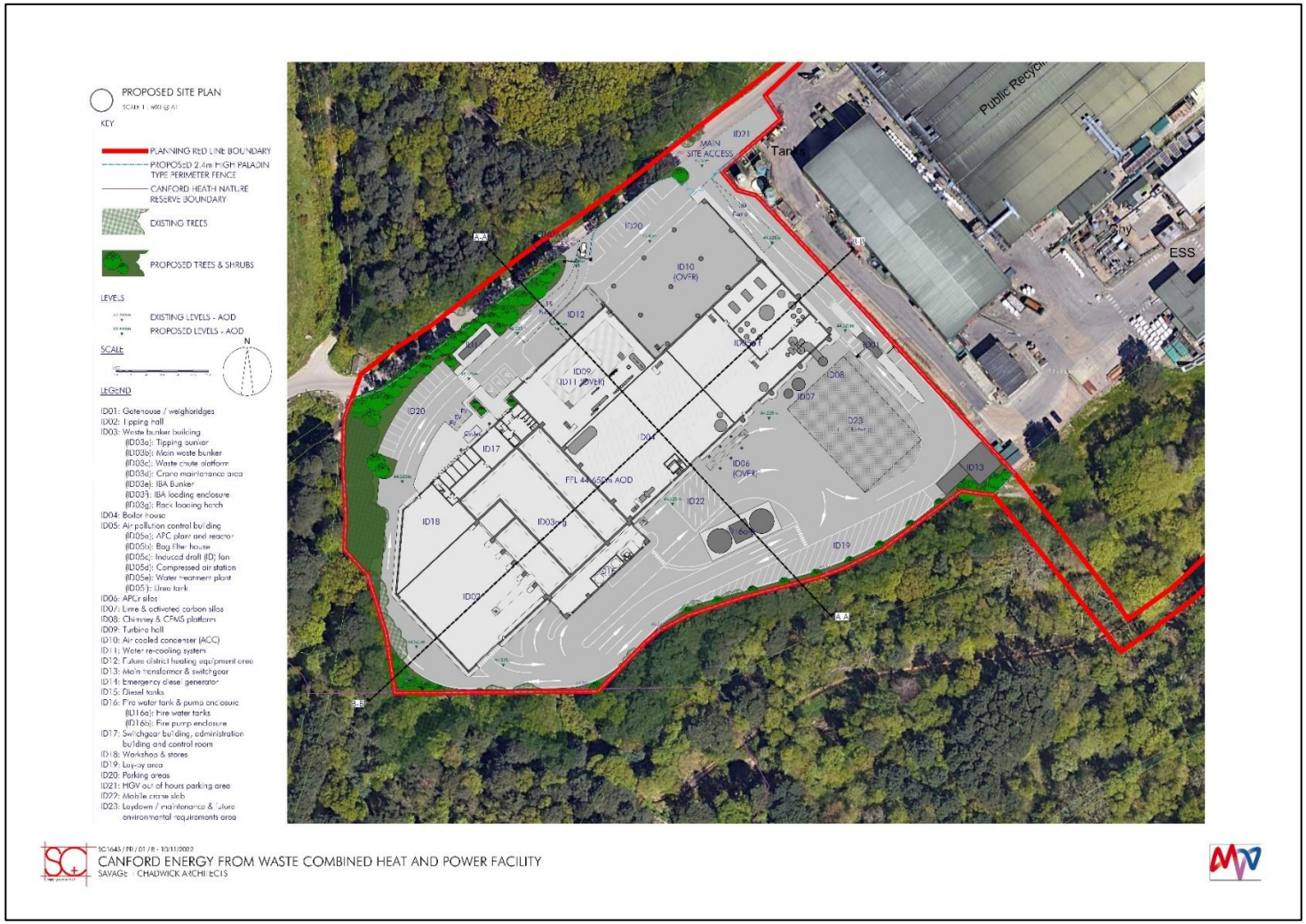
The existing noise environment in the vicinity of the proposed EfW CHP Facility is dominated by the existing waste treatment site and Magna Road/A341 to the north. The main traffic exists on Magna Road/A341 between Oakley and Bear Cross. The operational noise sources are tabulated in Table 1.

Table 1 Operational Noise Sources

Source ID	Receptor Address	Approx Number of Sources	Height Above Ground Level, m
ID02	Tipping hall (during delivery hours)	1	16.5
ID02	Tipping hall (outside delivery hours)	1	16.5
ID02	Tipping hall doors (weekday delivery hours)	2	6
ID02	Tipping hall Doors (weekend delivery hours)	2	6
ID03	Waste bunker building	1	36.5
ID04	Boiler house building	1	50
ID05a	APC plant, silos and reactor	1	22
ID05b	Bag filter	2	25
ID05c	Induced draft fan	2	10
ID05d	Compressed air station	1	8
ID05e	Water treatment plant	1	16
ID08	Chimney outlet	2	90.5
ID09	Turbine hall	1	25
ID10	Air cooled condenser	6	25
ID11	Water re-cooling system (full load)	1	25
ID13	Main transformer	1	11
ID17	Switchgear building	1	16
A	HGV deliveries of waste	1	1
B	Loader (external movements)	1	1

Source ID	Receptor Address	Approx Number of Sources	Height Above Ground Level, m
C	Exhaust Steam Pipe (Turbine Normal Operation) (between turbine hall and ACC)	1	12.0-26.0
D	Exhaust Steam Pipe (Turbine Bypass Operation) (between turbine hall and ACC)	1	12.0-26.0

Figure 1 Site Boundary and Layout



The Noise Sensitive Receptors (NSR) are tabulated in Table 2**.**

Although the majority of sensitive Receptors in the area are residential premises, there is also a nearby school, noise sensitive commercial premises and an ecological receptor.

The housing development of Canford Park, located to the north east of the proposed EfW CHP site, had not been constructed at the time of the sound surveys. This incoming development is represented by Receptor IDs R18 to R21 in Table 2**.**

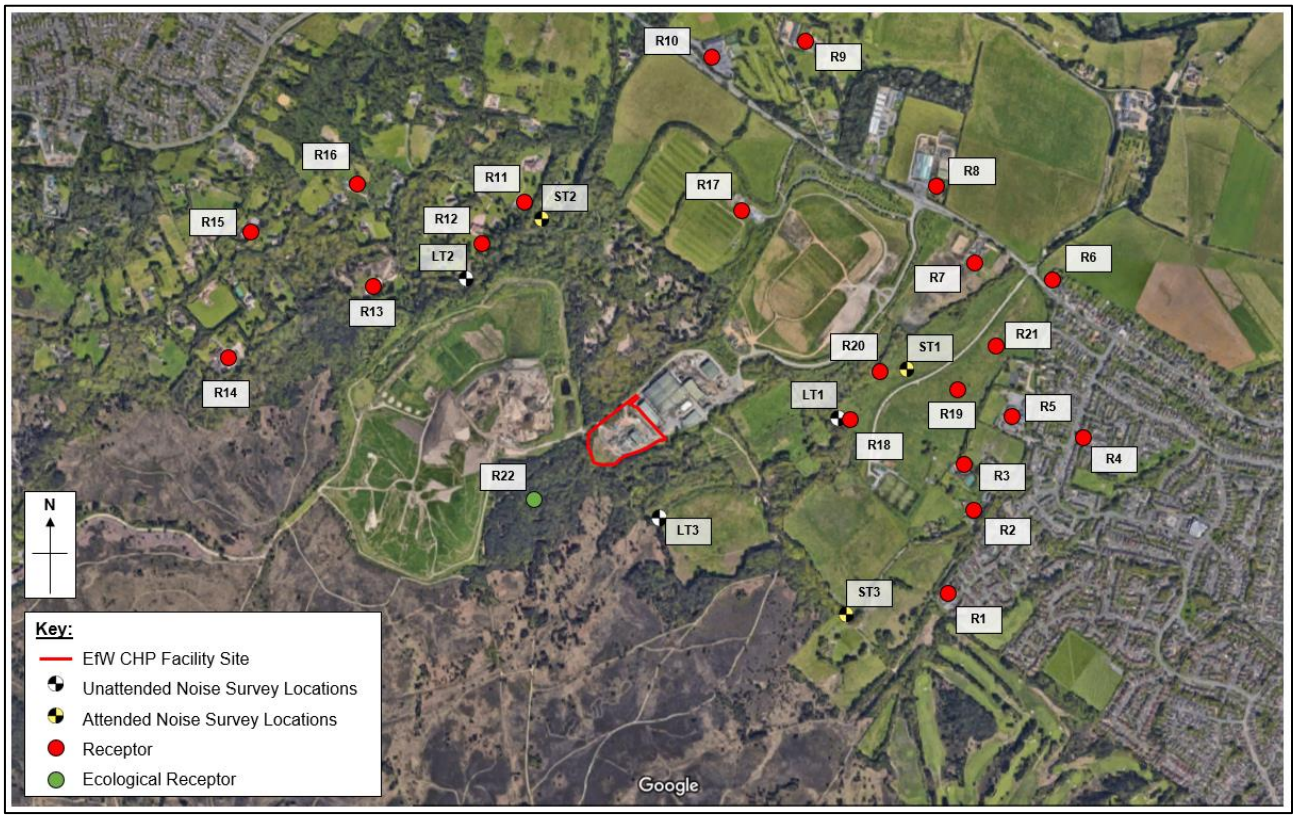
Table 2 Noise Sensitive Receptors

Receptor ID	Receptor Address	Approx Number of Properties	Receptor Type
R1	188 Viscount Walk, Bournemouth, BH11 9TJ	28	Residential
R2	Pine Lodge, Wheelers Lane, Bournemouth, BH11 9QW	1	Residential
R3	Wheelers Lane, Bournemouth, BH11 9QJ	4	Residential
R4	171 King John Ave, Bournemouth, BH11 9SJ	30	Residential
R5	Bearwood Primary & Nursery School, Barons Rd, Bournemouth, BH11 9UN	1	School
R6	154 Magna Rd, Bournemouth, BH11 9NB	15	Residential
R7	Waggy Tails Rescue, 143 Magna Rd, Poole, Bournemouth, Wimborne, BH21 3AW	1	Commercial
R8	White House, Canford Magna Garden Centre, 170 Magna Rd, Bournemouth, Wimborne, BH21 3AP	1	Commercial
R9	Moortown Dr, Bournemouth, Wimborne, BH21 3AR	15	Residential
R10	The Hamworthy Club, Magna Rd, Canford Magna, Bournemouth, Wimborne, BH21 3AP	1	Commercial
R11	Arrowsmith Rd, Bournemouth, BH21 3BE	3	Residential
R12	Arrowsmith Rd, Bournemouth, Wimborne, BH21 3BE	4	Residential
R13	Maranello, Bournemouth, Wimborne, BH21 3BE	1	Residential
R14	Magna Care Centre, Arrowsmith Rd, Poole, Bournemouth, Wimborne, BH21 3BQ	1	Care Centre
R15	Tanglewood, Bournemouth, Wimborne, BH21 3BG	8	Residential
R16	Hyperion, Arrowsmith Rd, Bournemouth, Wimborne, BH21 3BE	4	Residential

Receptor ID	Receptor Address	Approx Number of Properties	Receptor Type
R17	Canford Park Sports Pitches Club House, Magna Rd, Bournemouth, Wimborne, BH21 3AP	1	Commercial
R18	Canford Park (To become Provence Dr, Bournemouth, BH11 9FE)	10	Residential
R19	Canford Park (To become Neville Gardens, Bournemouth, Wimborne, BH11 9QJ)	10	Residential
R20	Canford Park (To become 67 Provence Dr, Bournemouth, Wimborne, BH11 9FE)	10	Residential
R21	Canford Park (To become 28 Becket Cres, Bearwood, Poole, Bournemouth, BH11 9FN)	10	Residential
R22	Ecological Receptor	-	Ecological

A map of Receptors is presented on Figure 2.

Figure 2 Noise Sensitive Receptor Locations



Within the site boundary, the ground type is predominantly hardstanding and is considered acoustically hard (G=1). Between the site boundary and the identified NSRs is a combination of open fields and foliage which has been considered acoustically soft (G=0).

2.2 Off-Site Measurement Locations

Unattended long term (LT) sample measurements were undertaken between 09:15 on Thursday 7 July 2022 and 14:56 hours on Wednesday 13 July 2022 at monitoring locations LT1-LT3.

Attended short term (ST) sample measurements were undertaken between 12:05 and 15:55 hours on Thursday 7 July 2022 at monitoring locations ST1.

Unattended and attended monitoring locations LT1-LT3 and ST1-ST3 are shown in Figure 2.

The housing development of Canford Park, located to the north east of the proposed EfW CHP site, had not been constructed at the time of the sound surveys. This incoming development is represented by Measurement Locations LT1 and ST1 shown in Table 3 and Figure 3**.**

Table 3 Attended Baseline Noise Monitoring Locations

ID	Monitoring Co-ordinates	Free-field/facade
LT1	50.770079, -1.944457	Free-Field
LT2	50.773322, -1.958477	Free-Field
LT3	50.767946, -1.951157	Free-Field
ST1	50.771770, -1.941406	Free-Field
ST2	50.774747, -1.955776	Free-Field
ST3	50.766534, -1.948263	Free-Field

Figure 3 Measurement Locations

2.3 Equipment and Meteorology

Table 4 Monitoring Equipment Details (at time of surveys)

Date of Monitoring	Item of Equipment	Serial No.	Date Last Calibrated	Date Calibration Due
07/07/2022 (ST1-ST3)	Rion NA-28 Class 1 Real-Time 1/3 Octave Integrating Sound Analyser	00711681	18/06/2021	18/06/2023
	Rion NC-74 Acoustic Calibrator	34746695	28/03/2022	28/03/2023
07/07/2022 – 13/07/2022 (LT1)	Rion NL-32 Class 1 Integrating Datalogger Sound Level Meter	630460	21/04/2022	21/04/2024
07/07/2022 – 13/07/2022 (LT2)	Rion NL-31 Class 1 Integrating Datalogger Sound Level Meter	410229	06/01/2022	06/01/2024
07/07/2022 – 13/07/2022 (LT3)	Rion NL-32 Class 1 Integrating Datalogger Sound Level Meter	623771	29/09/2020	29/09/2022
N/A	Rion NC-74 Acoustic Calibrator	34746695	28/03/2022	28/03/2023

Measurements were obtained using the 'F' time weighting and A-weighting frequency network.

The sound level meter was calibrated before and after each survey period using a Rion NC-74 Class 1 Acoustic Calibrator. No drift in the calibration levels were recorded during either survey period. The measurements were undertaken with the microphone at a height of 1.5m above ground level.

$L_{Amax,F}$, $L_{A10,T}$, $L_{Aeq,T}$, $L_{A50,T}$ and $L_{A90,T}$ noise levels were measured at each of the attended monitoring locations. Measured levels were obtained over three consecutive five-minute periods, with the 15-minute cumulative levels derived using combination of logarithmic and arithmetic averaging.

Weather conditions during the attended baseline monitoring surveys were recorded using a handheld weather anemometer. The conditions on Thursday 7 July 2022 were observed as full cloud cover in the morning, with sunny clear skies in the afternoon. Wind speeds were mostly below 0.5m/s, with occasional gusts up to 2m/s. No rain was observed. The temperature at the start of the survey was 19.5°C rising steadily to 26°C at the end of the monitoring period.

2.4 Methodology

2.4.1 Environment Agency – Noise and Vibration Management: Environmental Permits

The Environmental Agency (EA) has published guidance[2] in relation to the management of noise and vibration as part of the conditions for an environmental permit which states:

"The environment agencies 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 will regard it as 'possibly causing an impact':

residential properties

- *schools*
- *hospitals*
- *offices*
- *public recreation areas*
- *other noise sensitive receptors (NSR)*
- *noise sensitive habitats*

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] Environment Agency (EA), 2021 (last updated 2022). *Noise and Vibration Management: Environmental Permits*

Operators must prevent significant pollution and also comply with the requirements to use 'appropriate measures' (Waste Framework Directive 2018/851) or 'best available techniques' (BAT) to prevent or minimise noise pollution. For Landfill Directive installations you should interpret this as meaning all reasonable steps must be taken to prevent noise nuisance. In this guidance, appropriate measures and BAT are equivalent and interchangeable"

The operational noise impact assessment is broken down into 4 steps; desktop risk assessment, off-site monitoring, source assessment, and BAT or appropriate measures justification.

The desktop risk assessment identifies plant or operations that may be audible at any NSR.

Off-site monitoring is required to measure and determine the existing background acoustic environment as per the standard BS 4142.

The source assessment quantifies the emissions from the identified plant or operations at NSR locations. The resulting level of operational noise impact is described as:

- *"Unacceptable level of audible or detectable noise*
    - *This level of noise means that significant pollution is being, or is likely to be, caused at a receptor (regardless of whether you are taking appropriate measures).*
    - *You must take further action or you may have to reduce or stop operations. The environment agencies will not issue a permit if you are likely to be operating at this level.*
    - *The closest corresponding BS 4142 descriptor is 'significant adverse impact' (following consideration of the context).*
- *Audible or detectable noise*
    - *This level of noise means that noise pollution is being (or is likely to be) caused at a receptor.*
    - *Your duty is to use appropriate measures to prevent or, where that is not practicable, minimise noise. You are not in breach if you are using appropriate measures. But you will need to rigorously demonstrate that you are using appropriate measures.*
    - *The closest corresponding BS 4142 descriptor is 'adverse impact' (following consideration of the context)*
- *No noise, or barely audible or detectable noise*
    - *This level of noise means that no action is needed beyond basic appropriate measures or BAT.*
    - *The closest corresponding BS 4142 descriptor is 'low impact or no impact' (following consideration of context).*
    - *Low impact does not mean there is no pollution. However, if you have correctly assessed it as low impact under BS 4142, the environment agencies may decide that taking action to minimise noise is a low priority. Note that BS 4142 is unlikely to be the appropriate methodology on its own to assess low frequency noise."*

The findings of the source assessment should be assessed, contextualised and justification provided to confirm that BAT will be implemented to prevent or minimise polluting noise.

2.4.2 British Standard BS 4142:2014+A1:2019

BS 4142:2014+A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (BSI, 2019) provides a procedure for the measurement and assessment of sound of an industrial and/or commercial nature and the likely effects of such sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

The standard states that:

> *"This standard is applicable to the determination of the following levels at outdoor locations:*
>
> *a) rating levels for sources of sound of an industrial and/or commercial nature; and*
>
> *b) ambient, background and residual sound levels*
>
> *for the purposes of:*
>
> *1) investigating complaints;*
>
> *2) assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and*
>
> *3) assessing sound at proposed new dwellings or premises used for residential purposes."*

The determination of sound amounting to a nuisance is beyond the scope of BS 4142:2014.

The significance of sound of an industrial and/or commercial nature depends upon the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.

Typically, the greater the difference between rating level and background sound level, the greater the magnitude of the impact. BS 4142+A1:2019 provides the following guidance when assessing the difference in the rating level and background sound assessment level:

- 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 context; and

the lower the rating level is relative to the measured background sound level, the less likely it is that the specific 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.

Certain acoustic features can increase the significance of the impact over that expected from a basic comparison between specific sound level and the background sound level. These features include tonality and impulsivity, as well as additional characteristics and intermittency of the sound.

Where appropriate, a rating penalty for sound based on a subjective assessment of its characteristics should be established. In other circumstances an objective appraisal of tonal and/or impulsive characteristics may be appropriate.

BS 4142 indicates that certain acoustic features such as tonality, impulsivity and intermittency can increase the significance of an effect over that expected from a basic comparison between the specific $L_{Aeq,T}$ sound level and the background $L_{A90,T}$ sound level. Where such features are present at the assessment location, a character correction should be added to the specific sound level to obtain the rating level for comparison with the background sound assessment level.

The corrections that can be applied to account for acoustical features in the specific sound level at the Receptor are summarised in Table 5.

Table 5 BS 4142 Corrections for Acoustic Features

Acoustic Feature	Description	Character Correction, dB
Tonality	Just perceptible	+2
	Clearly perceptible	+4
	Highly perceptible	+6
Impulsivity	Just perceptible	+3
	Clearly perceptible	+6
	Highly perceptible	+9
Intermittency	Intermittency is readily distinctive against the residual acoustic environment.	+3
Other sound characteristics	Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment.	+3

An individual's response to sound can be subjective and the significance of a sound level impact can depend on such factors as the margin by which a sound exceeds the background sound level, its absolute level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood. BS 4142:2014 therefore recognises the importance of the context in which a sound occurs and has taken into account the acoustical terms 'sound' and 'noise' in its development. BS 4142 refers to 'sound' as being measured by a sound level meter or other measuring system. The Standard refers to 'noise' as relating to a human response and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive.

2.5 Noise Modelling

A sound model has been constructed to calculate the propagation of sound away from the EfW CHP Facility Site and to calculate the resulting sound levels at the residential Receptors.

The sound modelling has been undertaken using the SoundPLAN (version 8.2) sound modelling software. SoundPLAN is a propriety software package which calculates sound levels using acoustical ray-tracing techniques through implementation of a prediction procedure, which, in this section is ISO 9613-2: 1996 (ISO, 1996).

ISO 9613-2 provides a method of calculation for predicting the attenuation of sound during propagation outdoors. The environmental sound propagation from source to receiver position is calculated using the following acoustic algorithm:

$$LfT(DW) = Lw + Dc - A$$

where:

Lft(DW)	=	equivalent continuous downwind octave-band sound pressure level at a receiver location, representing a worse case assessment;
Lw	=	octave-band sound power level of the sound source, where available, otherwise overall dB(A) level used;
Dc	=	directivity correction;
A	=	octave-band attenuation that occurs during propagation from the sound source to the receiver. A = Adiv + Aatm + Agr + Abar +Amisc
Adiv	=	attenuation due to geometrical divergence;
Aatm	=	attenuation due to atmospheric absorption;
Agr	=	attenuation due to the ground effect;
Abar	=	attenuation due to a barrier; and
Amisc	=	attenuation due to miscellaneous other effects.

2.5.1 Noise Model assumptions

Principal features of the surrounding area included in the modelling such as buildings and other intervening structures have been based on Ordinance Survey mapping, site plans, and supplemented with on-site observations. Residential building heights have been modelled based on the observed number of floors, with the assumption of 2.5 m in height per floor level and 1m for a roof.

The topography of the area has been modelled as using Lidar data from DEFRA (Department for Environmental Foot & Rural Affairs). Areas of hard and soft ground and areas of foliage have been estimated based on Google aerial mapping images.

BS 4142 'Specific' sound levels have been calculated at each receptor 1 m from the façade of the residential dwelling. The calculated sound level is a free-field level as required by the BS 4142:2014+A1:2019 assessment methodology.

Daytime Specific sound levels have been calculated at a height of 1.5 m above local ground.

Night-time Specific sound levels have been calculated at a height of 4.0 m above local ground to be representative of first floor height.

Within the site boundary, the ground type is predominantly hardstanding and is considered acoustically hard (G=1). Between the site boundary and the identified NSRs is a combination of open fields and foliage which has been considered acoustically soft (G=0).

Reference sound levels for the operational noise sources are presented in Table 6**.**

Table 6 Operational Noise Source Inputs

ID	Source	Source Type	Index*	No. in Model	Height Above Ground Level, m	On time/ Other inputs	Overall, dBA	Spectral Sound Levels, dB per Octave Band (63 Hz - 8 kHz)							
								63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
ID02	Tipping hall (during delivery hours)	Building	L_{pi}	1	16.5	100%, 0700 - 2000 hrs	89	56	71	75	80	81	85	81	77
ID02	Tipping hall (outside delivery hours)	Building	L_{pi}	1	16.5	100%, 2000 - 0700 hrs	86	59	73	76	83	81	79	73	70
ID02	Tipping hall doors (weekday delivery hours)	Area	L_{pi}	2	6	Open 100% 0700 - 2000 hrs	89	56	71	75	80	81	85	81	77
ID02	Tipping hall Doors (weekend delivery hours)	Building	L_{pi}	2	6	Open 50% 0700 - 2000 hrs	86	56	71	75	80	81	85	81	77
ID03	Waste bunker building	Building	L_{pi}	1	36.5	100%	78	48	56	66	71	74	73	65	60
ID04	Boiler house building	Building	L_{pi}	1	50	100%	86	59	73	76	83	81	79	73	70
ID05a	APC plant, silos and reactor	Building	L_w	1	22	100%	86	59	73	76	83	81	79	73	70
ID05b	Bag filter	Building	L_{pi}	2	25	100%	86	59	73	76	83	81	79	73	70
ID05c	Induced draft fan	Building	L_{pi}	2	10	100%	89	62	76	79	86	84	82	76	73

ID	Source	Source Type	Index*	No. in Model	Height Above Ground Level, m	On time/ Other inputs	Overall, dBA	Spectral Sound Levels, dB per Octave Band (63 Hz - 8 kHz)							
								63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
ID05d	Compressed air station	Building	L_{pi}	1	8	100%	85	94	89	86	81	79	76	74	72
ID05e	Water treatment plant	Building	L_{pi}	1	16	100%	85	58	72	75	82	80	78	72	69
ID08	Chimney outlet	Point	L_w	2	90.5	100%	90	67	76	87	90	83	80	68	69
ID09	Turbine hall	Building	L_{pi}	1	25	100%	89	56	71	75	80	81	85	81	77
ID10	Air cooled condenser	Point	L_w	6	25	100%	88	89	84	83	90	78	74	68	60
ID11	Water re-cooling system (full load)	Area	L_w	1	25	100%	89	67	72	77	81	85	84	78	72
ID13	Main transformer	Point	L_w	1	11	100%	72	75	77	72	72	66	61	56	49
ID17	Switchgear building	Building	L_{pi}	1	16	100%	75	84	79	76	71	69	66	64	62
A	HGV deliveries of waste	Line	L_w	1	1	10 mph on site 0700 - 2000 hrs	108	101	106	106	106	102	101	96	94
B	Loader (external movements)	Line	L_w	1	1	10 mph on site 0700 - 2000 hrs 2 movements per hour	99	111	100	98	97	93	92	85	77
C	Exhaust Steam Pipe (Turbine Normal	Line	L_w	1	12-26	100%	75	42	53	59	68	73	68	60	50

ID	Source	Source Type	Index*	No. in Model	Height Above Ground Level, m	On time/ Other inputs	Overall, dBA	Spectral Sound Levels, dB per Octave Band (63 Hz - 8 kHz)							
								63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
	Operation) (between turbine hall and ACC)														
D	Exhaust Steam Pipe (Turbine Bypass Operation) (between turbine hall and ACC)	Line	L_w	1	12-26	100% when in turbine bypass mode	88	60	65	71	80	85	80	72	54

* - L_{pi} = internal sound pressure level

3 NOISE MONITORING DATA AND PREDICTIONS

3.1 Attended Sound Survey Results

The survey results are summarised in Table 7.

Table 7 Attended noise monitoring Results

Rec. ID	Date of Meas.	Start Time	Dur (mins)	Measured Noise Levels, dB re. 2 X 10^{-5} Pa.				
				$L_{Amax,F}$	$L_{A10,15min}$	$L_{Aeq,15min}$	$L_{A50,15min}$	$L_{A90,15min}$
ST1	07/07/2022	12:05	15	77.4	62.5	59.8	50.3	45.4
		13:55	15	79.7	55.6	56.5	45.2	42.2
ST2		11:15	15	64.4	45.4	44.5	42.2	40.3
		13:20	15	54.7	40.1	38.9	37.9	36.6
		15:40	15	70.4	39.4	39.5	37.3	36.2
ST3		12:40	15	63.6	50.5	48.6	48.0	46.1
		14:55	15	66.8	48.9	47.3	46.4	44.7

Table 7 shows that ambient daytime $L_{Aeq,15min}$ noise levels ranged between 38.9 and 59.8 dB across all locations. Background $L_{A90,15min}$ noise levels ranged from 36.2 to 46.1 dB across the three attended measurement locations.

During the attended survey on the 7th July 2022, the main source of sound observed at ST1 was road noise from Magna Road. Other sources of environmental sound observed at ST1 included audible activity from the existing recycling facility and the housing construction site located on Provence Drive.

During the attended survey on the 7th July 2022, the main source of sound observed at ST2 was road noise from Magna Road. Other sources of environmental sound observed at ST2 included local wildlife and low-level activity noise from the existing recycling facility.

During the attended survey on the 7th July 2022, the main source of sound observed at ST3 was activities from the existing recycling facility. Other sources of environmental sound observed at ST3 included local wildlife and the housing construction site located on Provence Drive.

3.2 Unattended Sound Survey Results

Daytime $L_{Aeq,12hr}$, evening $L_{Aeq,4hr}$ and night-time $L_{Aeq,8hr}$ ambient sound levels presented in Table 13 8, Table 13 9 and Table 13 10 have been calculated using logarithmic averaging, whilst mean $L_{Amax,F}$ and $L_{A90,T}$ sound levels have been calculated using arithmetic averaging. The range of 15-minute values over which each logarithmic or mean value has been calculated is shown in parenthesis.

A summary of the unattended monitoring results at LT1 is presented in **Error! Not a valid bookmark self-reference.**.

Table 8 Summary of unattended sound monitoring results at LT1

Notes:
[1] the range of 15-minute levels measured during the monitoring periods are shown in parenthesis;
[2] incomplete daytime periods due to equipment set-up/retrieval;

Day of Measurement	Date	Measured Sound Pressure Levels, dB re. 2 x 10^{-5} Pa.											
		Daytime (07:00 – 19:00)				Evening (19:00 – 23:00)				Night-time (23:00 – 07:00)			
		$L_{Amax,F}$	$L_{A10,12\ hr}$	$L_{Aeq,12\ hr}$	$L_{A90,12\ hr}$	$L_{Amax,F}$	$L_{A10,4\ hr}$	$L_{Aeq,4\ hr}$	$L_{A90,4\ hr}$	$L_{Amax,F}$	$L_{A10,8\ hr}$	$L_{Aeq,8\ hr}$	$L_{A90,8\ hr}$
Thu	07-Jul-22	61 (50-86)[2]	45 (41-51)[2]	46 (41-52)[2]	40 (38-42)[2]	52 (41-75)	40 (35-49)	44 (34-54)	35 (33-37)	49 (36-75)	40 (34-52)	44 (33-56)	35 (32-39)
Fri	08-Jul-22	60 (52-80)	47 (44-57)	49 (41-59)	43 (37-46)	53 (44-79)	42 (37-46)	46 (36-56)	37 (35-41)	49 (37-68)	39 (33-49)	39 (32-46)	34 (31-36)
Sat	09-Jul-22	60 (47-80)	46 (44-52)	48 (41-56)	42 (34-46)	56 (47-65)	39 (35-43)	40 (35-45)	34 (32-39)	48 (36-77)	36 (30-48)	42 (29-55)	30 (27-34)
Sun	10-Jul-22	58 (47-79)	46 (39-52)	48 (37-57)	42 (30-48)	53 (44-76)	39 (36-45)	45 (34-55)	34 (32-38)	52 (39-77)	39 (31-50)	45 (30-56)	34 (28-42)
Mon	11-Jul-22	60 (45-76)	47 (42-52)	47 (40-55)	43 (37-48)	52 (40-75)	41 (37-46)	44 (36-52)	35 (32-38)	50 (42-70)	43 (37-50)	41 (36-47)	39 (35-41)
Tue	12-Jul-22	61 (49-77)	48 (44-62)	50 (43-59)	44 (40-47)	50 (44-72)	42 (41-44)	44 (39-54)	39 (38-41)	51 (44-76)	44 (40-50)	46 (39-56)	40 (38-42)
Wed	13-Jul-22	65 (53-82)[2]	50 (47-59)[2]	52 (46-58)[2]	46 (44-50)[2]	-	-	-	-	-	-	-	-
Mean Average		61 (58-65)	47 (45-50)	49 (46-52)	43 (40-46)	53 (50-56)	41 (39-42)	44 (40-46)	36 (34-39)	50 (48-52)	40 (36-44)	43 (39-46)	35 (30-40)

The results of the unattended sound monitoring show that during daytime periods, ambient sound levels ranged between 46 and 52 dB $L_{Aeq,12hr}$, with a mean level of 49 dB $L_{Aeq,12hr}$.

Mean background sound levels measured during the daytime periods ranged between 40 and 46 dB $L_{A90,12hr}$. The overall mean 12-hour daytime background sound level measured over the 7-day monitoring period was 43 dB $L_{A90,12hr}$.

The results of unattended sound monitoring show that during evening periods, ambient sound levels ranged between 40 and 46 dB $L_{Aeq,4hr}$, with a mean level of 44 dB $L_{Aeq,4hr}$.

Mean background sound levels measured during the evening periods ranged between 34 and 39 dB $L_{A90,4hr}$. The overall mean 4-hour daytime background sound level measured over the 7-day monitoring period was 36 dB $L_{A90,4hr}$.

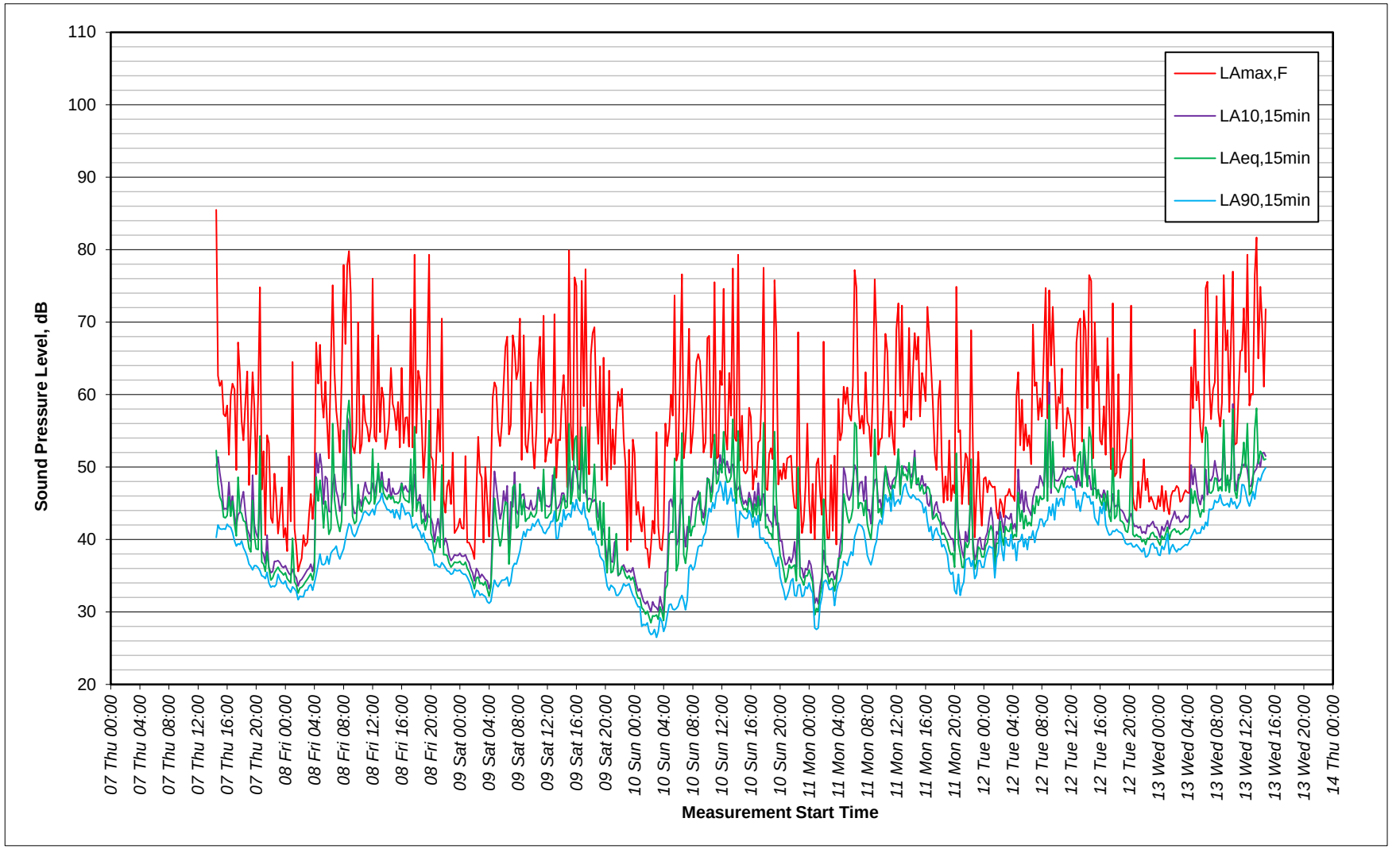
During night-time periods ambient sound levels ranged between ranged between 39 and 46 dB $L_{Aeq,8hr}$, with a mean level of 43 dB $L_{Aeq,8hr}$.

Mean background sound levels measured during the night-time periods ranged between 30 and 40 dB $L_{A90,8hr}$ with an overall mean value of 35 dB $L_{A90,8hr}$.

The results of the unattended sound monitoring at LT1 are presented graphically on A summary of the unattended monitoring results at LT1 is presented in **Error! Not a valid bookmark self-reference.**.

Table 8.

Figure 4 Unattended sound survey results at LT1



A summary of the unattended monitoring results at LT2 is presented in Table 9.

Table 9 Summary of unattended sound monitoring results at LT2

Notes:
[1] the range of 15-minute levels measured during the monitoring periods are shown in parenthesis;
[2] incomplete daytime periods due to equipment set-up/retrieval;

Day of Measurement	Date	Measured Sound Pressure Levels, dB re. 2 x 10^{-5} Pa.											
		Daytime (07:00 – 19:00)				Evening (19:00 – 23:00)				Night-time (23:00 – 07:00)			
		$L_{Amax,F}$	$L_{A10,12\ hr}$	$L_{Aeq,12\ hr}$	$L_{A90,12\ hr}$	$L_{Amax,F}$	$L_{A10,4\ hr}$	$L_{Aeq,4\ hr}$	$L_{A90,4\ hr}$	$L_{Amax,F}$	$L_{A10,8\ hr}$	$L_{Aeq,8\ hr}$	$L_{A90,8\ hr}$
Thu	07-Jul-22	62 (46-89) [2]	41 (37-45) [2]	50 (35-59) [2]	33 (33-34) [2]	53 (43-75)	38 (35-50)	44 (34-55)	32 (31-35)	46 (35-73)	35 (28-47)	41 (26-54)	28 (22-39)
Fri	08-Jul-22	60 (48-79)	43 (38-56)	48 (37-58)	35 (33-38)	54 (44-76)	40 (37-45)	45 (36-55)	35 (33-38)	49 (37-64)	35 (29-47)	36 (27-42)	29 (23-34)
Sat	09-Jul-22	59 (44-79)	43 (37-48)	47 (35-56)	35 (31-39)	53 (38-75)	37 (33-42)	38 (32-44)	32 (30-34)	46 (34-76)	33 (27-42)	40 (25-54)	27 (22-31)
Sun	10-Jul-22	56 (44-83)	40 (33-50)	46 (33-57)	32 (29-34)	54 (42-76)	35 (29-44)	45 (28-56)	29 (26-34)	47 (32-78)	32 (25-44)	44 (24-57)	27 (22-35)
Mon	11-Jul-22	56 (47-79)	41 (36-51)	44 (34-56)	33 (31-35)	49 (35-71)	33 (27-40)	41 (27-52)	28 (26-32)	45 (32-73)	32 (26-43)	38 (25-49)	27 (23-35)
Tue	12-Jul-22	61 (45-77)	42 (36-61)	48 (34-58)	33 (30-36)	49 (37-74)	36 (32-41)	44 (30-55)	30 (29-33)	48 (33-77)	34 (26-53)	44 (23-55)	27 (21-39)
Wed	13-Jul-22	65 (46-79) [2]	43 (37-58) [2]	50 (36-57) [2]	34 (33-40) [2]								
Mean Average		60 (56-65)	42 (40-43)	48 (44-50)	34 (32-35)	52 (49-54)	37 (33-40)	43 (38-45)	31 (28-35)	47 (45-49)	34 (32-35)	41 (36-44)	28 (27-29)

The results of unattended sound monitoring show that during daytime periods, ambient sound levels ranged between 44 and 50 dB $L_{Aeq,12hr}$, with a mean level of 48 dB $L_{Aeq,12hr}$.

Mean background sound levels measured during the daytime periods ranged between 32 and 35 dB $L_{A90,12hr}$. The overall mean 12-hour daytime background sound level measured over the 7-day monitoring period was 34 dB $L_{A90,12hr}$.

The results of unattended sound monitoring show that during evening periods, ambient sound levels ranged between 38 and 45 dB $L_{Aeq,4hr}$, with a mean level of 43 dB $L_{Aeq,4hr}$.

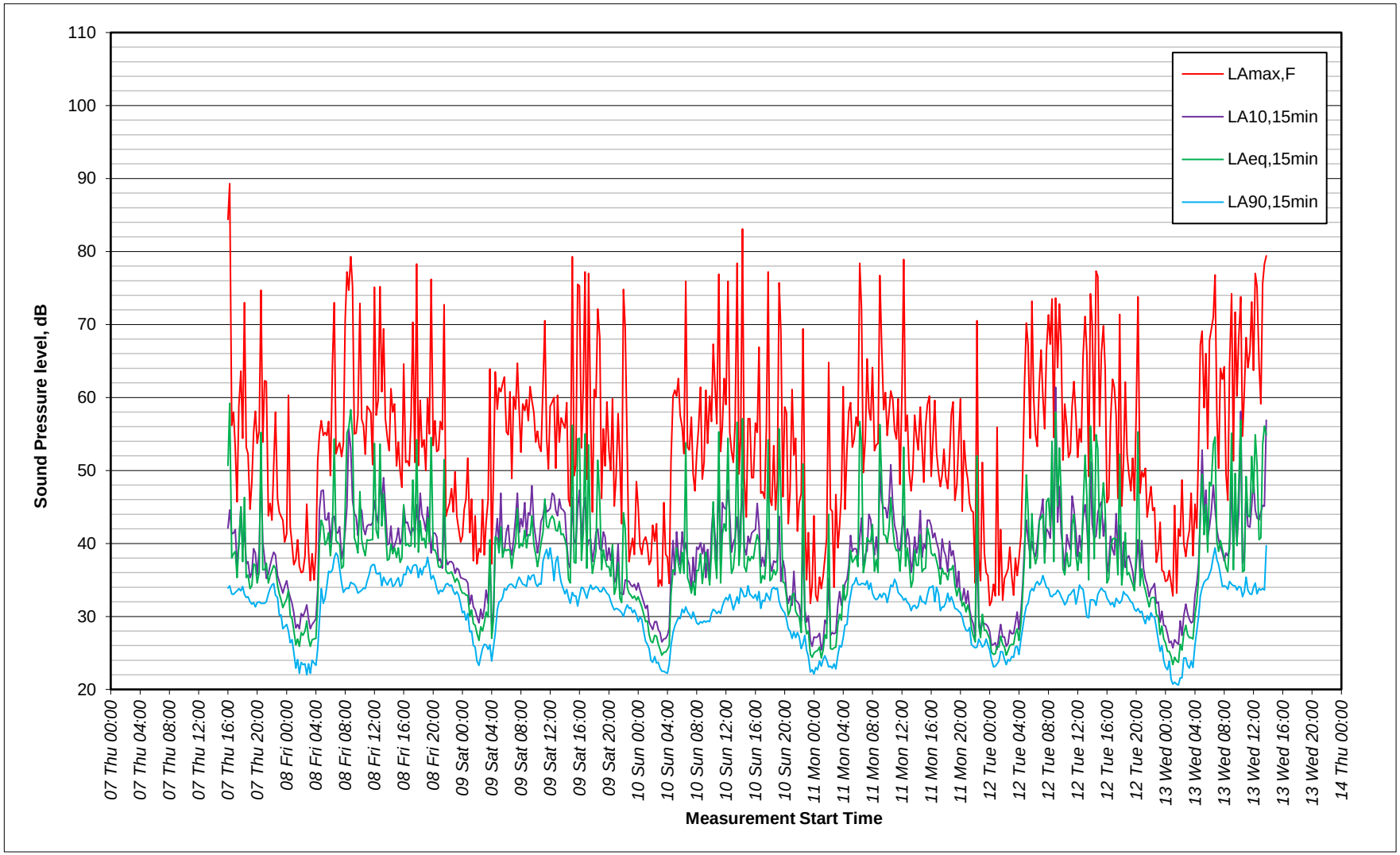
Mean background sound levels measured during the evening periods ranged between 28 and 35 dB $L_{A90,4hr}$. The overall mean 4-hour daytime background sound level measured over the 7-day monitoring period was 31 dB $L_{A90,4hr}$.

During night-time periods ambient sound levels ranged between ranged between 36 and 44 dB $L_{Aeq,8hr}$, with a mean level of 41 dB $L_{Aeq,8hr}$.

Mean background sound levels measured during the night-time periods ranged between 27 and 29 dB $L_{A90,8hr}$ with an overall mean value of 28 dB $L_{A90,8hr}$.

The results of the unattended sound monitoring at LT2 are presented graphically on Figure 5.

Figure 5 Unattended sound survey results at LT2



A summary of the unattended monitoring results at LT3 is presented in Table 10.

Table 10 Summary of unattended sound monitoring results at LT3

Notes:
[1] the range of 15-minute levels measured during the monitoring periods are shown in parenthesis;
[2] incomplete daytime periods due to equipment set-up/retrieval; and
[3] period discounted from average due to unknown event.

Day of Measurement	Date	Measured Sound Pressure Levels, dB re. 2 x 10^{-5} Pa.											
		Daytime (07:00 – 19:00)				Evening (19:00 – 23:00)				Night-time (23:00 – 07:00)			
		$L_{Amax,F}$	$L_{A10,12\ hr}$	$L_{Aeq,12\ hr}$	$L_{A90,12\ hr}$	$L_{Amax,F}$	$L_{A10,4\ hr}$	$L_{Aeq,4\ hr}$	$L_{A90,4\ hr}$	$L_{Amax,F}$	$L_{A10,8\ hr}$	$L_{Aeq,8\ hr}$	$L_{A90,8\ hr}$
Thu	07-Jul-22	61 (50-87) [2]	47 (44-49) [2]	48 (43-52) [2]	45 (42-46) [2]	50 (41-72)	39 (35-47)	42 (34-52)	36 (33-41)	48 (39-74)	41 (37-52)	44 (36-56)	38 (35-44)
Fri	08-Jul-22	63 (54-79)	50 (46-58)	50 (45-59)	47 (43-49)	54 (43-78)	43 (40-46)	46 (39-56)	40 (38-43)	50 (43-59)	43 (40-50)	42 (39-46)	39 (38-43)
Sat	09-Jul-22	60 (48-79)	49 (45-54)	50 (44-54)	46 (43-49)	55 (43-68)	42 (40-45)	43 (39-48)	40 (37-43)	49 (41-74)	42 (39-51)	42 (37-52)	37 (35-40)
Sun	10-Jul-22	58 (47-78)	48 (44-52)	49 (42-56)	46 (41-49)	51 (39-73)	39 (34-45)	45 (33-53)	36 (31-42)	48 (38-73)	41 (36-51)	45 (35-56)	37 (33-48)
Mon	11-Jul-22	59 (48-75)	48 (44-55)	49 (43-55)	46 (42-49)	53 (47-67)	43 (40-46)	43 (39-50)	40 (37-43)	52 (42-75)	43 (39-53)	45 (38-55)	39 (37-44)
Tue	12-Jul-22	66 (49-116)[3]	51 (42-70) [3]	76 (41-93) [3]	44 (40-51) [3]	50 (42-73)	42 (38-53)	44 (37-54)	37 (35-39)	50 (39-74)	43 (36-56)	46 (35-55)	38 (34-44)
Wed	13-Jul-22	65 (56-80)[2]	49 (47-59) [2]	51 (46-57) [2]	45 (44-46) [2]								
Mean Average		60 (56-65)	61 (58-65)	49 (47-50)	50 (48-51)	46 (45-47)	52 (50-55)	41 (39-43)	44 (42-46)	38 (36-40)	50 (48-52)	42 (41-43)	44 (42-46)

Data measured during the daytime period of Tuesday 12th July 2022 appears to be atypically high however the cause of this is unknown, therefore this period of data has been excluded from analysis.

The results of unattended sound monitoring show that during daytime periods, ambient sound levels ranged between 48 and 51 dB $L_{Aeq,12hr}$, with a mean level of 50 dB $L_{Aeq,12hr}$.

Mean background sound levels measured during the daytime periods ranged between 45 and 47 dB $L_{A90,12hr}$. The overall mean 12-hour daytime background sound level measured over the 7-day monitoring period was 46 dB $L_{A90,12hr}$.

The results of unattended sound monitoring show that during evening periods, ambient sound levels ranged between 42 and 46 dB $L_{Aeq,4hr}$, with a mean level of 44 dB $L_{Aeq,4hr}$.

Mean background sound levels measured during the evening periods ranged between 36 and 40 dB $L_{A90,4hr}$. The overall mean 4-hour daytime background sound level measured over the 7-day monitoring period was 38 dB $L_{A90,4hr}$.

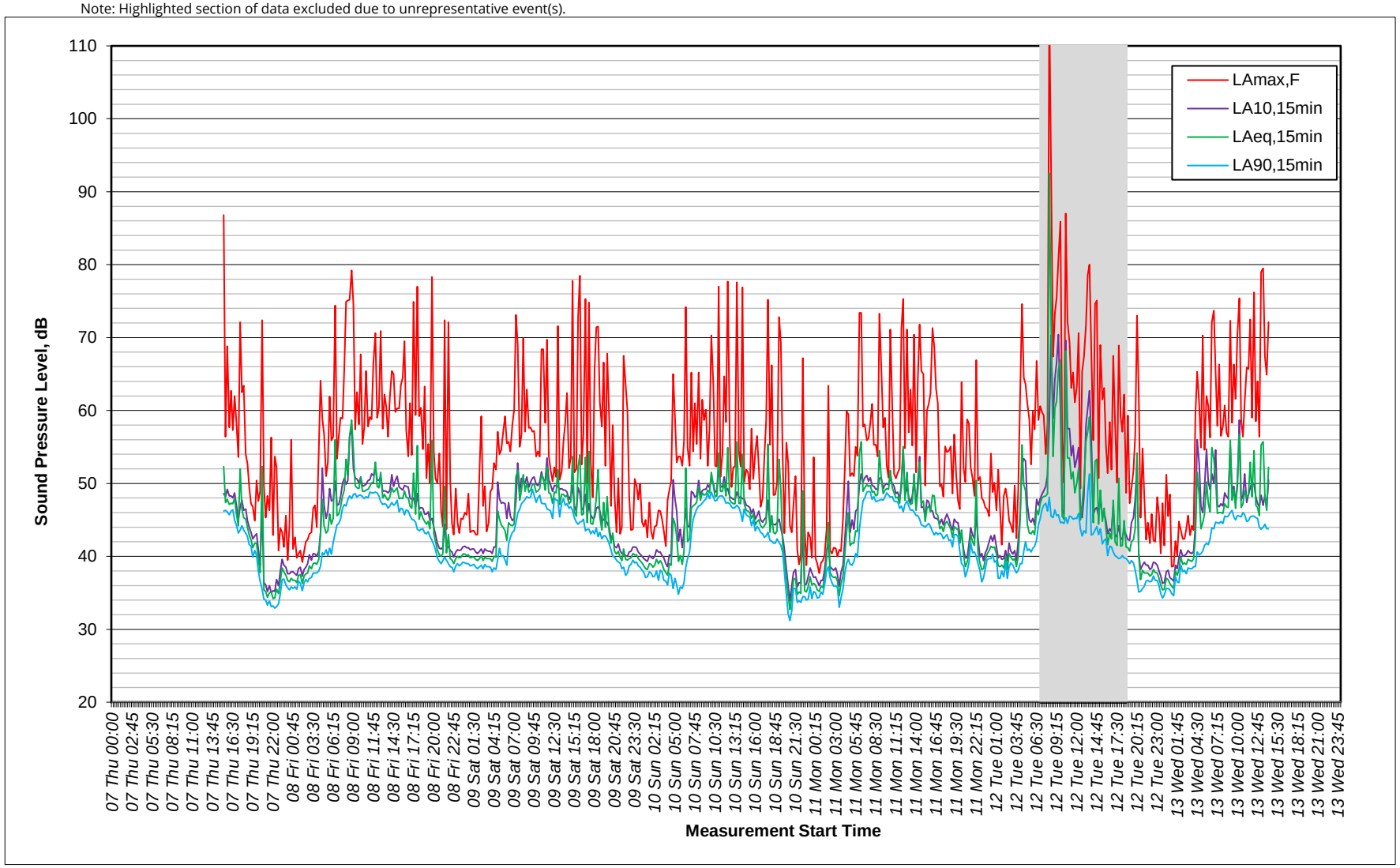
During night-time periods ambient sound levels ranged between ranged between 42 and 46 dB $L_{Aeq,8hr}$, with a mean level of 44 dB $L_{Aeq,8hr}$.

Mean background sound levels measured during the night-time periods ranged between 37 and 39 dB $L_{A90,8hr}$ with an overall mean value of 38 dB $L_{A90,8hr}$.

The results of the unattended sound monitoring at LT3 are presented graphically on Figure 6.

Figure 6 Unattended sound survey results at LT3

Note: Highlighted section of data excluded due to unrepresentative event(s).



3.3 Derivation of Background Sound Levels

The results of the sound monitoring at unattended locations provide an indication of the diurnal variation in sound levels in the vicinity of the Proposed Development, whilst short-term attended measurements provide an indication of the variation in sound levels between the unattended and attended locations.

The results of the attended sound measurements have been compared with the corresponding levels measured at LT1, LT2 and LT3, with the calculated difference used to derive a correction factor to extrapolate mean 16-hour and 8-hour $L_{A90,T}$ sound levels at the attended monitoring locations.

Histograms of the background $L_{A90,15min}$ sound levels measured at LT1, LT2 and LT3 are presented in Figure 7, Figure 8 and Figure 9, respectively.

Figure 7 Modal Analysis of Background $L_{A90,15min}$ Sound Levels Measured at LT1

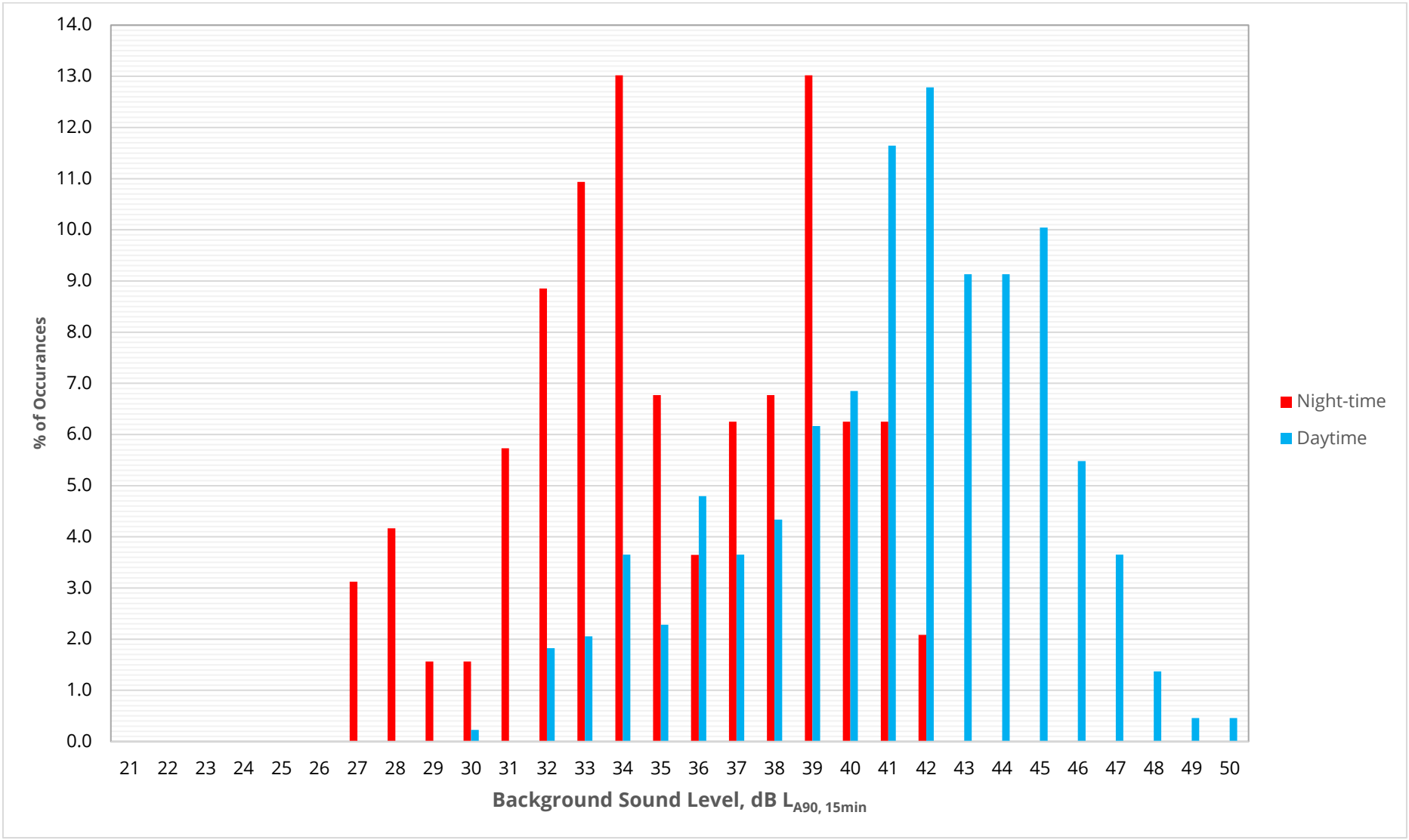


Figure 8 Modal Analysis of Background $L_{A90,15min}$ Sound Levels Measured at LT2

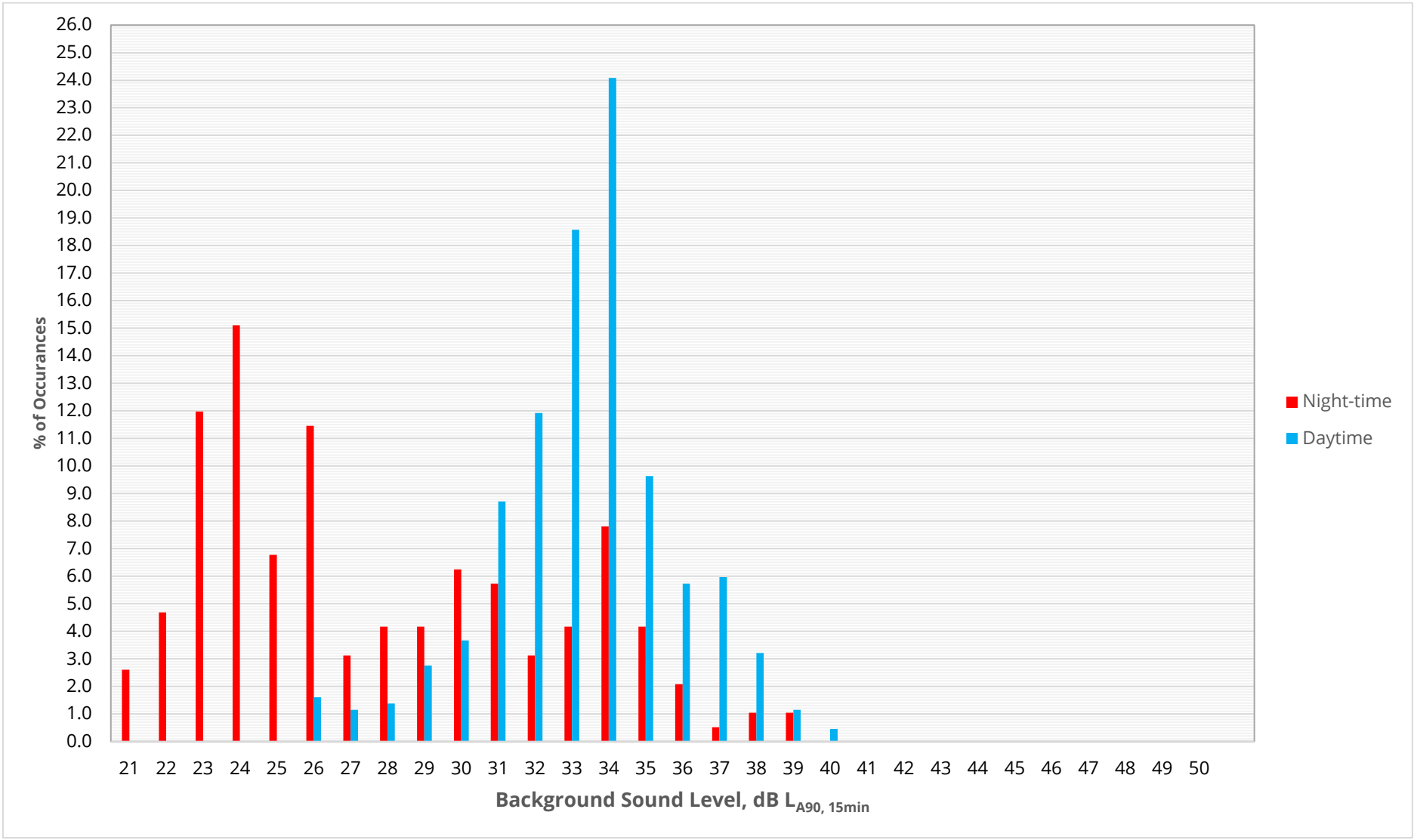
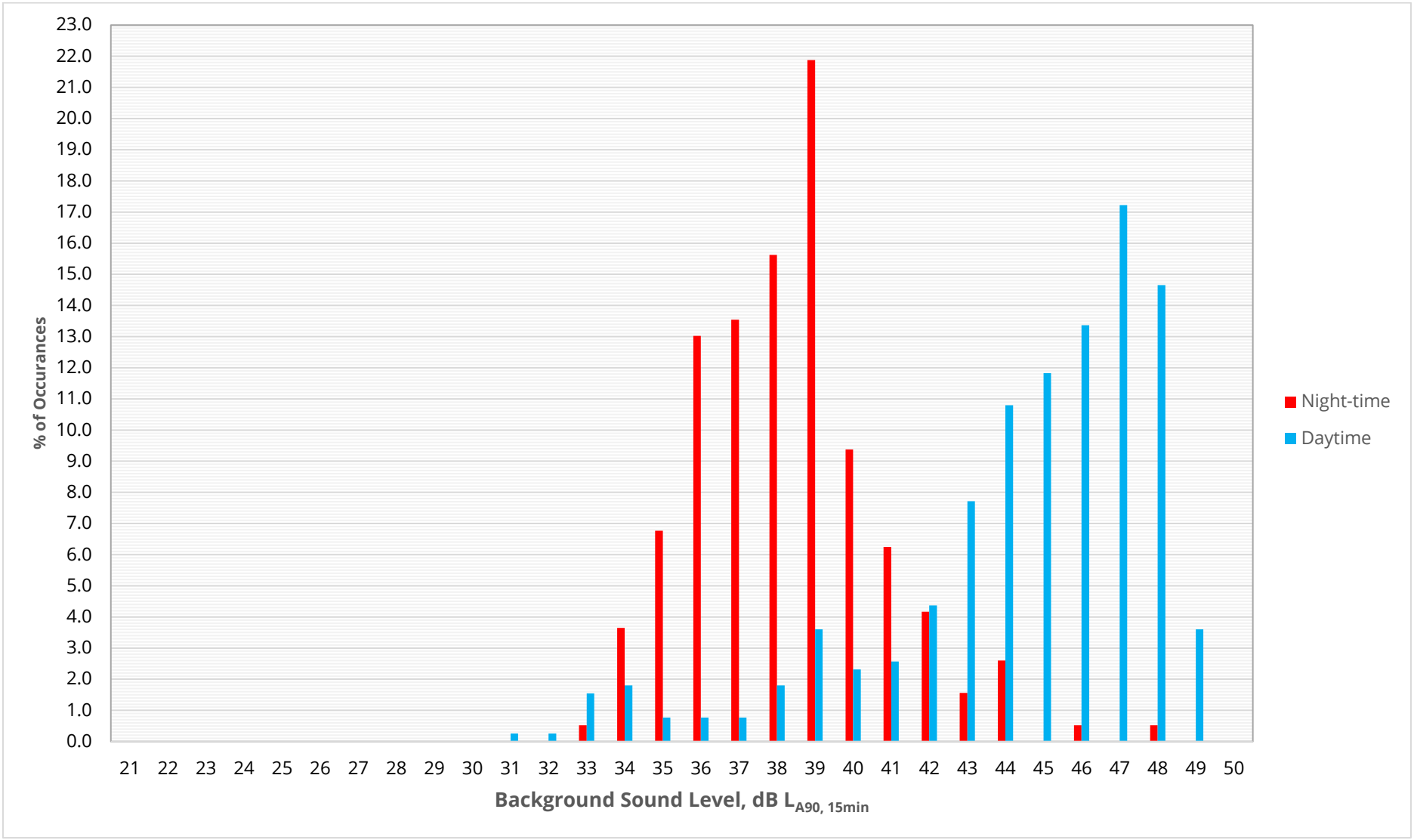


Figure 9 Modal Analysis of Background $L_{A90,15min}$ Sound Levels Measured at LT3



Statistical analysis of the $L_{A90,15min}$ sound levels measured at LT1 in free-field conditions shows the modal value of $L_{A90,15min}$ data measured during the daytime periods to be 42 dB $L_{A90,15min}$ and the modal value of the $L_{A90,15min}$ sound data measured during the night-time periods to be 34 dB $L_{A90,15min}$.

Statistical analysis of the $L_{A90,15min}$ sound levels measured at LT2 in free-field conditions shows the modal value of $L_{A90,15min}$ data measured during the daytime periods to be 34 dB $L_{A90,15min}$ and the modal value of the $L_{A90,15min}$ sound data measured during the night-time periods to be 24 dB $L_{A90,15min}$.

Statistical analysis of the $L_{A90,15min}$ sound levels measured at LT3 in free-field conditions shows the modal value of $L_{A90,15min}$ data measured during the daytime periods to be 47 dB $L_{A90,15min}$ and the modal value of the $L_{A90,15min}$ sound data measured during the night-time periods to be 39 dB $L_{A90,15min}$. When considering the overall spread of $L_{A90,15min}$ values measured at LT3, this assessment will use daytime and night-time values of 46 dB $L_{A90,15min}$ and 38 dB $L_{A90,15min}$ for a more cautious assessment.

The $L_{A90,5min}$ background sound levels measured at ST1 have been compared to corresponding levels measured at LT1, $L_{A90,5min}$ sound levels at ST2 have been compared to corresponding levels measured LT2, and $L_{A90,5min}$ sound levels at ST3 has been compared to corresponding levels measured LT3.

The daytime background sound levels measured at LT1, LT2 and LT3 during the coincident time periods with the attended measurements are presented in Table 11.

Table 11 Comparison of daytime background sound levels measured at LT1, LT2 LT3 and attended locations (ST1, ST2 & ST3)

Measurement Time	Background Sound Level, dB $L_{A90,5min}$					
	LT1	ST1	LT2	ST2	LT3	ST3
11:15:00	-	-	38.0	40.2	-	-
11:20:00	-	-	38.0	40.7	-	-
11:25:00	-	-	37.0	40.1	-	-
12:05:00	42.7	45.0	-	-	-	-
12:10:00	42.3	46.4	-	-	-	-
12:15:00	41.6	44.8	-	-	-	-
12:40:00	-	-	-	-	47.7	46.1
12:45:00	-	-	-	-	46.8	46.5
12:50:00	-	-	-	-	45.2	45.6
13:20:00	-	-	35.3	36.5	-	-
13:25:00	-	-	34.3	36.7	-	-
13:30:00	-	-	34.7	36.7	-	-
13:55:00	42.4	44.3	-	-	-	-
14:00:00	42.1	40.8	-	-	-	-

Measurement Time	Background Sound Level, dB $L_{A90,5min}$					
	LT1	ST1	LT2	ST2	LT3	ST3
14:05:00	40.9	41.5	-	-	-	-
14:55:00	-	-	-	-	46.6	44.2
15:00:00	-	-	-	-	46.4	44.7
15:05:00	-	-	-	-	46.7	45.2
15:40:00	-	-	34.2	35.6	-	-
15:45:00	-	-	35.1	36.4	-	-
15:50:00	-	-	34.7	36.7	-	-
Average Difference (ST minus LT)	+1.8		+2.0		-1.2	

Due to influence on the attended sound measurements at ST1 from the local residential construction site, the difference between LT1 and ST1 has been discounted. Assumed ambient sound levels at ST1 are based directly on measurements at LT1.

The corrections have not been applied to the night-time background levels as the existing recycling facility does not operate during the night-time period.

The extrapolated free-field background sound levels at all measurement locations are presented in Table 12.

Table 12 Derived free-field background sound levels

Measurement Time	Derived Free-field Background Sound Levels, dB re. 2x 10^{-5} Pa	
	$L_{A90,16hr}$	$L_{A90,8hr}$
LT1	42	34
LT2	34	24
LT3	46	38
ST1	42	34
ST2	36	24
ST3	45	38

3.4 Acoustic Corrections

A +3 dB correction has been applied to specific sound levels to account for the potential risk of the specific sound having a characteristic which may be distinctive against the residual sound environment in the vicinity of the EfW CHP Facility Site as per the guidance of BS 4142.

Where a noise source calculation includes data of sound reduction index, a safety margin of 5 dB has been included as per the EA guidance.

A +3 dB correction has also been applied to the specific sound levels to compensate for potential uncertainty within the source data provided in the sound model.

3.5 Model Results – Specific and Rating Sound Level

Two modes of operation have been assessed: 'Normal Mode' and 'Turbine Bypass Mode'. The only differential between these modes is the sound level from the exhaust steam pipe between the turbine hall (ID09) and the air-cooled condenser (ID10) which is higher in bypass mode.

The calculated specific and rating sound levels at the Receptor locations during normal operation are presented in in Table 13 and Table 14 for the daytime and night-time assessment periods.

Table 13 Daytime BS 4142 Sound Assessment – Normal Operation

Note: [1] Specific and Rating Levels calculated at a free-field location, 1.5 m above local ground;
[2] where multiple facades may be exposed to the specific sound, the façade with the highest calculated Specific Sound Level is presented; and
[3] Non-residential Receptors are normally considered beyond the scope of BS 4142.

Rep ID	Specific Sound Level, $L_{Aeq,1hr}$[1,2]	Uncertainty	Acoustic Feature Correction, dB	Rating Level, $L_{Aeq,1hr}$
R1	19	+3	+3	25
R2	21	+3	+3	27
R3	21	+3	+3	27
R4	18	+3	+3	24
R5[3]	20	+3	+3	26
R6	22	+3	+3	28
R7[3]	11	+3	+3	17
R8[3]	29	+3	+3	35
R9	21	+3	+3	27
R10[3]	24	+3	+3	30
R11	28	+3	+3	34
R12	12	+3	+3	18
R13	7	+3	+3	13
R14	17	+3	+3	23
R15	3	+3	+3	9
R16	19	+3	+3	25
R17[3]	27	+3	+3	33
R18	30	+3	+3	36
R19	22	+3	+3	28
R20	31	+3	+3	37

Rep ID	Specific Sound Level, $L_{Aeq,1hr}$[1,2]	Uncertainty	Acoustic Feature Correction, dB	Rating Level, $L_{Aeq,1hr}$
R21	19	+3	+3	25
R22[3]	26	+3	+3	32

Table 14 Night-time BS 4142 Sound Assessment – Normal Operation

Note: [1] Specific and Rating Levels calculated at a free-field location, 4.0 m above local ground;
[2] where multiple facades may be exposed to the specific sound, the façade with the highest calculated Specific Sound Level is presented; and
[3] Non-residential Receptors are normally considered beyond the scope of BS 4142.

Rep ID	Specific Sound Level, $L_{Aeq,15min}$[1,2]	Uncertainty	Acoustic Feature Correction, dB	Rating Level, $L_{Aeq,15min}$
R1	18	+3	+3	24
R2	20	+3	+3	26
R3	14	+3	+3	20
R4	16	+3	+3	22
R5[3]	17	+3	+3	23
R6	17	+3	+3	23
R7[3]	9	+3	+3	15
R8[3]	21	+3	+3	27
R9	20	+3	+3	26
R10[3]	25	+3	+3	31
R11	29	+3	+3	35
R12	13	+3	+3	19
R13	10	+3	+3	16
R14	18	+3	+3	24
R15	8	+3	+3	14
R16	19	+3	+3	25
R17[3]	27	+3	+3	33
R18	23	+3	+3	29
R19	19	+3	+3	25
R20	22	+3	+3	28
R21	17	+3	+3	23
R22[3]	23	+3	+3	29

The calculated specific and rating sound levels at the Receptor locations during normal operation are presented in in Table 15 and

Table 16 for the daytime and night-time assessment periods.

Table 15 Daytime BS 4142 Sound Assessment – Turbine Bypass Operation

Note: [1] Specific and Rating Levels calculated at a free-field location, 1.5 m above local ground;
[2] where multiple facades may be exposed to the specific sound, the façade with the highest calculated Specific Sound Level is presented; and
[3] Non-residential Receptors are normally considered beyond the scope of BS 4142.

Rep ID	Specific Sound Level, $L_{Aeq,1hr}$[1,2]	Uncertainty	Acoustic Feature Correction, dB	Rating Level, $L_{Aeq,1hr}$
R1	19	+3	+3	25
R2	21	+3	+3	27
R3	21	+3	+3	27
R4	18	+3	+3	24
R5[3]	20	+3	+3	26
R6	22	+3	+3	28
R7[3]	11	+3	+3	17
R8[3]	29	+3	+3	35
R9	21	+3	+3	27
R10[3]	24	+3	+3	30
R11	28	+3	+3	34
R12	12	+3	+3	18
R13	7	+3	+3	13
R14	17	+3	+3	23
R15	3	+3	+3	9
R16	20	+3	+3	26
R17[3]	28	+3	+3	34
R18	30	+3	+3	36
R19	22	+3	+3	28
R20	31	+3	+3	37
R21	19	+3	+3	25

Rep ID	Specific Sound Level, $L_{Aeq,1hr}$[1,2]	Uncertainty	Acoustic Feature Correction, dB	Rating Level, $L_{Aeq,1hr}$
R22[3]	26	+3	+3	32

Table 16 Night-time BS 4142 Sound Assessment – Turbine Bypass Operation

Note: [1] Specific and Rating Levels calculated at a free-field location, 4.0 m above local ground;
[2] where multiple facades may be exposed to the specific sound, the façade with the highest calculated Specific Sound Level is presented; and
[3] Non-residential Receptors are normally considered beyond the scope of BS 4142.

Rep ID	Specific Sound Level, $L_{Aeq,15min}$[1,2]	Uncertainty	Acoustic Feature Correction, dB	Rating Level, $L_{Aeq,15min}$
R1	18	+3	+3	24
R2	20	+3	+3	26
R3	14	+3	+3	20
R4	16	+3	+3	22
R5[3]	17	+3	+3	23
R6	17	+3	+3	23
R7[3]	10	+3	+3	16
R8[3]	21	+3	+3	27
R9	21	+3	+3	27
R10[3]	25	+3	+3	31
R11	29	+3	+3	35
R12	13	+3	+3	19
R13	10	+3	+3	16
R14	18	+3	+3	24
R15	8	+3	+3	14
R16	20	+3	+3	26
R17[3]	28	+3	+3	34
R18	23	+3	+3	29
R19	19	+3	+3	25
R20	22	+3	+3	28
R21	17	+3	+3	23
R22[3]	23	+3	+3	29

4 NOISE IMPACT ASSESSMENT

4.1 Rating Levels Assessment

The method for predicting the significance of sound of an industrial and/or commercial nature in accordance with the principles of BS 4142:2014+A1:2019 is based on a comparison of the EfW CHP Facility's Rating Level ($L_{Ar,T}$) with the background $L_{A90,T}$ assessment sound level at a Receptor location.

A sound model has been constructed to calculate the propagation of sound away from the Proposed Development and sound levels at the residential Receptors.

Two modes of operation have been assessed: 'Normal Mode' and 'Turbine Bypass Mode'. The only differential between these modes is the sound level from the exhaust steam pipe between the turbine hall (ID09) and the air-cooled condenser (ID10) which is higher in bypass mode.

A summary of the operational sound assessment for Normal Mode is presented in Table 17.

Table 17 Assessment of Operational Noise Levels – Normal Mode

Note: [1] Specific and Rating Levels calculated at a free-field location, 1.5 m above local ground;
[2] where multiple facades may be exposed to the specific sound, the façade with the highest calculated Specific Sound Level is presented; and
[3] Non-residential Receptors are normally considered beyond the scope of BS 4142.

Receptor	Rating Level		Background Sound Level		Excess of rating over background sound level	
	Daytime dB $L_{Ar,1hr}$	Night-time dB $L_{Ar,15min}$	Daytime dB $L_{A90,1hr}$	Night-time dB $L_{A90,15min}$	Daytime dB	Night-time dB
R1	25	24	45	38	-20	-14
R2	27	26	45	38	-18	-12
R3	27	20	45	38	-18	-18
R4	24	22	42	34	-18	-12
R5[3]	26	23	42	34	-16	-11
R6	28	23	42	34	-14	-11
R7[3]	17	15	42	34	-25	-19

Receptor	Rating Level		Background Sound Level		Excess of rating over background sound level	
	Daytime dB $L_{Ar,1hr}$	Night-time dB $L_{Ar,15min}$	Daytime dB $L_{A90,1hr}$	Night-time dB $L_{A90,15min}$	Daytime dB	Night-time dB
R8[3]	35	27	36	24	-1	+3
R9	27	26	36	24	-9	+2
R10[3]	30	31	42	34	-12	-3
R11	34	35	36	24	-2	+11
R12	18	19	34	24	-16	-5
R13	13	16	34	24	-21	-8
R14	23	24	34	24	-11	0
R15	9	14	34	24	-25	-10
R16	25	25	34	24	-9	+1
R17[3]	33	33	36	24	-3	+9
R18	36	29	42	34	-6	-5
R19	28	25	42	34	-14	-9
R20	37	28	42	34	-5	-6
R21	25	23	42	34	-17	-11
R22[3]	32	29	46	38	-14	-9

The level differences presented in Table 17 show that, during normal mode operations, rating levels are predicted to fall below the background sound assessment levels during daytime periods. During night-time periods, rating levels are predicted to exceed the background sound assessment levels by up to 11 dB at the worst affected receptor, R11.

According to BS 4142, a difference between the rating level and background sound level of around +10 dB or more is likely to be indication of a specific sound source having a significant adverse impact.

BS 4142 goes on to indicate that the impact derived by the comparison of the Rating Level with background sound level is however dependent on the context of the sound environment at an assessment location.

A summary of the operational noise assessment for bypass mode is presented in Table 18.

Table 18 Assessment of Operational Noise Levels – Turbine Bypass Mode

Note: [1] Specific and Rating Levels calculated at a free-field location, 1.5 m above local ground;
[2] where multiple facades may be exposed to the specific sound, the façade with the highest calculated Specific Sound Level is presented; and
[3] Non-residential Receptors are normally considered beyond the scope of BS 4142.

Receptor	Rating Level		Background Sound Level		Excess of rating over background sound level	
	Daytime dB $L_{Ar,1hr}$	Night-time dB $L_{Ar,15min}$	Daytime dB $L_{A90,1hr}$	Night-time dB $L_{A90,15min}$	Daytime dB	Night-time dB
R1	25	24	45	38	-20	-14
R2	27	26	45	38	-18	-12
R3	27	20	45	38	-18	-18
R4	24	22	42	34	-18	-12
R5[3]	26	23	42	34	-16	-11
R6	28	23	42	34	-14	-11
R7[3]	17	16	42	34	-25	-18
R8[3]	35	27	36	24	-1	+3
R9	27	27	36	24	-9	+3
R10[3]	30	31	42	34	-12	-3
R11	34	35	36	24	-2	+11
R12	18	19	34	24	-16	-5
R13	13	16	34	24	-21	-8
R14	23	24	34	24	-11	0
R15	9	14	34	24	-25	-10
R16	26	26	34	24	-8	+2
R17[3]	34	34	36	24	-2	+10
R18	36	29	42	34	-6	-5
R19	28	25	42	34	-14	-9
R20	37	28	42	34	-5	-6
R21	25	23	42	34	-17	-11
R22[3]	32	29	46	38	-14	-9

The level differences presented in Table 18 show that, during bypass mode operations, rating levels are predicted to fall below the background sound assessment levels during daytime periods. During night-time periods, rating levels are predicted to exceed the background sound assessment levels by up to 11 dB at the worst affected receptor, R11.

According to BS 4142, a difference between the rating level and background sound level of around +10 dB or more is likely to be indication of a specific sound source having a significant adverse impact.

BS 4142 goes on to indicate that the impact derived by the comparison of the Rating Level with background sound level is however dependent on the context of the sound environment at an assessment location.

4.2 Context

When considering the significance of an effect, BS 4142 advises that the context of the impact should be considered. The context of the effect should consider factors such as: the absolute level of sound; the character and level of the residual sound compared to the character and level of the specific sound; the sensitivity of the Receptor; and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

The Proposed Development will operate 24-hours a day 365-days a year. Residual waste will only be accepted between 07:00 and 20:00 hours.

At the Receptors predicted to exceed the background by 10 dB or more, the background assessment level is based on measured levels at LT2.

The daytime (07:00 – 23:00 hrs) baseline ambient $L_{Aeq,15min}$ sound levels measured at LT2 ranged from 38 to 50 dB $L_{Aeq,15min}$. The specific daytime sound levels at R11 and R17, inclusive of +3dB for uncertainty, fall below this range of sample $L_{Aeq,15min}$ sound levels, by at least 1 dB.

The night-time (23:00 – 07:00 hrs) baseline ambient $L_{Aeq,15min}$ sound levels measured at LT2 ranged from 36 to 44 dB $L_{Aeq,15min}$. The specific night-time sound levels at R11, R17 fall below this range of sample $L_{Aeq,15min}$ sound levels, by at least 6 dB.

R17 is a commercial receptor which is normally beyond the scope of BS 4142. The receptor acts as a club house for Canford Park Sports Pitches which is likely to be less sensitive during night-time periods (23:00 – 07:00 hrs).

The existing CRP has industrial premises, including a Mechanical and Biological Treatment (MBT) facility and Materials Recycling Facility (MRF), which processes waste during daytime hours. The character of noise produced by the existing activities are similar to the Proposed Development.

Calculations indicate that the continuous operation of the EfW CHP Facility will not produce tonal, impulsive and/or intermittent sounds and therefore may be described, using terminology referred to in the EA's guidance, as a bland/characterless sound, which is likely to reduce the sensitivity of the situation.

The night-time background sound level at this location can be considered to be low at 24 dB $L_{A90,15min}$.

The main noise-sensitive activity undertaken during the night-time period is resting/sleeping within bedrooms. ProPG: Planning & Noise [3] indicates that a partially open window can offer an attenuation of between 10 and 15

[3] Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health, 2017. *ProPG: Planning & Noise – New Residential Development.*

dB(A) from external noise sources. Subtracting this attenuation from the specific operational sound pressure level of 33 dB(A) results in an internal noise level of between 18-23 dB(A).

In line with guidance presented in the EA's noise guidelines, barely audible or detectable noise should be categorised as 'low impact or no impact'. Although the performance of human hearing ranges from person to person, a continual noise source of between 18-23 dB(A) is considered to be barely audible or not detectable.

5 NOISE CONTROL MEASURES

The design of the Proposed Development has incorporated a number of measures from the outset to prevent or reduce potential adverse effects which might otherwise have arisen. The relevant designed-in measures to this noise chapter are discussed below:

- The Applicant, and its EPC Contractor will be required to develop good relationships with people living and working in the surrounding area. To keep the local community informed of project developments during construction and operation, the Applicant will establish and operate a Community Liaison Group. Any complaints will be investigated.
- The location of the EfW CHP Facility within the existing CRP, reduces the risk of adverse effect from operation of the Proposed Development.
- The orientation of the EfW CHP Facility has been arranged so that the dominant noise sources face towards Magna Road, rather than the towards the Canford Heath area to the south.
- The air-cooled condenser (ID10) will be surrounded by cladding which achieves R_w of 24 dB on 4 sides.
- The Exhaust Steam pipe between the turbine hall (ID09) and the air-cooled condenser (ID10) will be treated acoustically to achieve at least 10 dB(A) in mitigation.
- Wherever possible, the processing of materials is contained within the building envelope and openings are kept to a minimum.

6 UNCERTAINTY

BS 4142 requires the potential uncertainty in measurements and calculations to be taken into account when considering the findings of an assessment. In addition to the source-term sound levels supplied for the assessment, the following elements of uncertainty are associated with the assessment:

- the supplied reference sound levels for the sound generating plant are understood to be a $L_{Aeq,T}$ dB sound levels measured at a reference distance of 1 m;
- the sound frequency spectrum has been normalised to the broadband source-term sound level data supplied by MVV Environment Limited;
- Numerical corrections have been made for the following:
    - where a noise source calculation includes data of sound reduction index, a safety margin of 5 dB has been included as per the EA guidance;
    - an acoustic feature correction for tonality in the calculation of the BS 4142 rating sound levels has been assumed to be +3 dB during the daytime and night-time assessment periods; and

- a +3dB correction has been applied to the specific sound levels to compensate for potential uncertainty within the source data provided in the sound model.

- the background sound levels have been derived based on the sample obtained during the baseline sound survey period; and
- the rounding of integer values, as required by BS 4142, has been used in the derivation of the background sound levels and calculations, to avoid an impression of false precision to decimal places.

The outdoor propagation calculations are based on ISO 9613-2 1996. This states that calculations are made with attention restricted to downwind conditions of propagation. Other limitations include other meteorological and non-material limitations such as winds speeds being limited between 1-5 ms-1. It is also noted in ISO 9613-2 1996 that the estimated errors for octave-band sound pressure levels, calculated under the same conditions as the broadband calculation, may be somewhat larger than the errors for A-weighted broadband sources. Between 0-100 m and 100-1000 m the estimated accuracy is displayed in Table 19.

Table 19 Estimations of Uncertainty In ISO 9613-2

Notes: h – mean height of source and receiver;
d – distance between source and receiver; and
estimates made from situations where there are no effects due to reflection or attenuation due to screening.

Height	Distance	
	0 < d < 100 m	100m < d < 1000 m
0 < h < 5 m	+/-3 dB	+/-3 dB
5m < h < 30 m	+/-1 dB	+/-3 dB

7 CONCLUSIONS AND NEXT STEPS

A noise assessment of the proposed Canford Energy from Waste Combined Heat and Power Facility at Canford Resource Park. The assessment was undertaken following the principles of BS 4142:2014-A1:2019 and further guidance provided by the Environmental Agency.

The assessment consisted of noise monitoring of existing sound levels in the local area and the development of a noise model. Monitoring was undertaken in the vicinity of identified noise sensitive receptors. The model was built using SoundPlan 8.2 software by RWDI using information provided by MVV Environment Limited. The output of the model was used to generate rating noise levels which were compared to the background sound levels for use in the BS 4142 assessment.The exhaust steam pipe can operate in two modes, Normal and Bypass, which has been assessed separately.

The rating level assessment of normal mode indicates rating levels are predicted to fall below the background sound level by at least 1 dB. During night-time periods, the rating levels are predicted to exceed the background sound level by up to 11 dB at the worst affected receptor, R11. R17 is also predicted to exceed the background sound level during night-time periods by up to 9 dB.

The rating level assessment of bypass mode indicates rating levels are predicted to fall below the background sound level by at least 1 dB. During night-time periods, the rating levels are predicted to exceed the background sound level by up to 11 dB at the worst affected receptor, R11. R17 is also predicted to exceed the background sound level during night-time periods by up to 10 dB.

R17 represents the club house of a sports field, therefore it is deemed an appropriate assumption that this receptor is not noise sensitive during night-time periods.

After consideration of the context, it was deemed that the internal noise levels at the worst affected receptor, R11, from the proposed development would fall between 18-23 dB(A) and could be considered to be barely audible or not detectable.

8 REFERENCES

1. British Standards Institution. BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'. 2019.

2. Environment Agency (EA), 2021 (last updated 2022). Noise and Vibration Management: Environmental Permits.

3. Association of Noise Consultants (ANC), Institute of Acoustics (IOA), Chartered Institute of Environmental Health (CIEH), ProPG: Planning & Noise, 2017.