Noise Impact Assessment

Tees Valley Bottom Ash Facility
Grangetown Prairie, Dorman Point
Prepared on behalf of Viridor Waste Limited
March 2023

On behalf of
Viridor Waste Limited

Date
March 2023

Project Number
1620013801

TEES VALLEY BOTTOM ASH (BA) FACILITY GRANGETOWN PRAIRIE, DORMAN POINT
NOISE IMPACT ASSESSMENT

RAMBOLL Bright ideas. Sustainable change.

GRANGETOWN PRAIRIE, DORMAN POINT
NOISE IMPACT ASSESSMENT

Project name	**Tees Valley BA**
Project no	**1620013801**
Recipient	**Viridor Waste Limited**
Document type	**Report**
Version	**04**
Date	**23/03/2023**
Prepared by	**David Harbon**
Checked by	**Craig Barson**
Approved by	**Tom Smith**
Description	**Noise Impact Assessment**
Document no	**1620013801-RAM-RP-00009**

Ramboll UK Limited
Registered in England & Wales
Company No: 03659970
Registered office:
240 Blackfriars Road
London
SE1 8NW

https://uk.ramboll.com

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. INTRODUCTION

1.1 Background

Ramboll UK Limited ('Ramboll') has been commissioned by Viridor Waste Limited (hereinafter referred to as the 'Applicant') to prepare a Noise Impact Assessment for the proposed development of a Bottom Ash (BA) Facility on site at Grangetown Prairie near Middlesbrough (hereafter referred to as the 'site'). The site is located in Grangetown Prairie, within the administrative authority of Redcar and Cleveland.

The development proposal comprises a BA Facility (hereinafter referred to as the 'proposed development') for which the Applicant intends to submit a planning application for outline planning permission (hereafter referred to as the 'application').

1.2 Objective and Scope of Works

This report considers the likely significant effects with respect to the noise associated with the construction and operation of the proposed development. The specific objectives of the chapter are to:

- Determine the prevailing background noise levels through baseline noise surveys;
- Predict outline construction noise levels at residential and non-residential receptors;
- Set plant noise limits, based on the measured background noise levels; and
- Predict the operational noise impact on residential and non-residential receptors.

1.3 Limitations and Constraints

In preparation of the report and performance of any other services, Ramboll has relied upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions in this report are valid only to the extent that the information provided to Ramboll was accurate, complete and available to Ramboll within the reporting schedule.

The key sources of information used to prepare this report are provided as footnotes within the document. Ramboll cannot accept liability for the accuracy or otherwise of any information derived from third party sources.

Ramboll's services are not intended as legal advice, nor an exhaustive review of site conditions and/or compliance. This report is intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party, unless formally agreed by Ramboll through that party entering into, at Ramboll's sole discretion, a written reliance agreement.

2. BACKGROUND

2.1 Site Context

The proposed BA Facility site lies within the area known as Grangetown Prairie, owned by the South Tees Development Corporation (STDC). The site forms part of 1,800 ha of land previously occupied by heavy industry and infrastructure that is subject to STDC's Regeneration Master Plan.

The proposed BA Facility site was formerly used for the production of iron and steel. Following the closure of the steel works and cessation of industrial activities, the building complex was cleared in the 1980s and the site is now vacant.

The site lies within the southwest corner of the STDC regeneration area, within the Grangetown Prairie Zone. It is located approximately 1.5 km from the River Tees to the north, around 6.5 km to the northeast of Middlesbrough and approximately 5 km south west of Redcar town centre. It is also located immediately adjacent to the eastern boundary of the proposed Tees Valley ERF site.

The proposed BA Facility site covers an area of around 4.74 ha, that is rectangular in shape and situated to the east of John Boyle Road (with the ERF site in between). To the east of the site lies Tees Dock Road, to the south runs the A66 and to the north is a railway line. Whilst the site does not currently have direct access to the public highway, it is expected that STDC will provide new road infrastructure to serve the site in the near future, as part of the Regeneration Master Plan.

A high voltage overhead cable and associated pylons are located adjacent to the northern site boundary running parallel to the site boundary. The Tees Valley Railway (TVR) Line is located immediately beyond this, running approximately parallel to the northern site boundary.

From a recent site walkover (2023), it was found that the majority of the site is being used as stockpiling, with just a small strip of remnant vegetation along the side of the haul road.

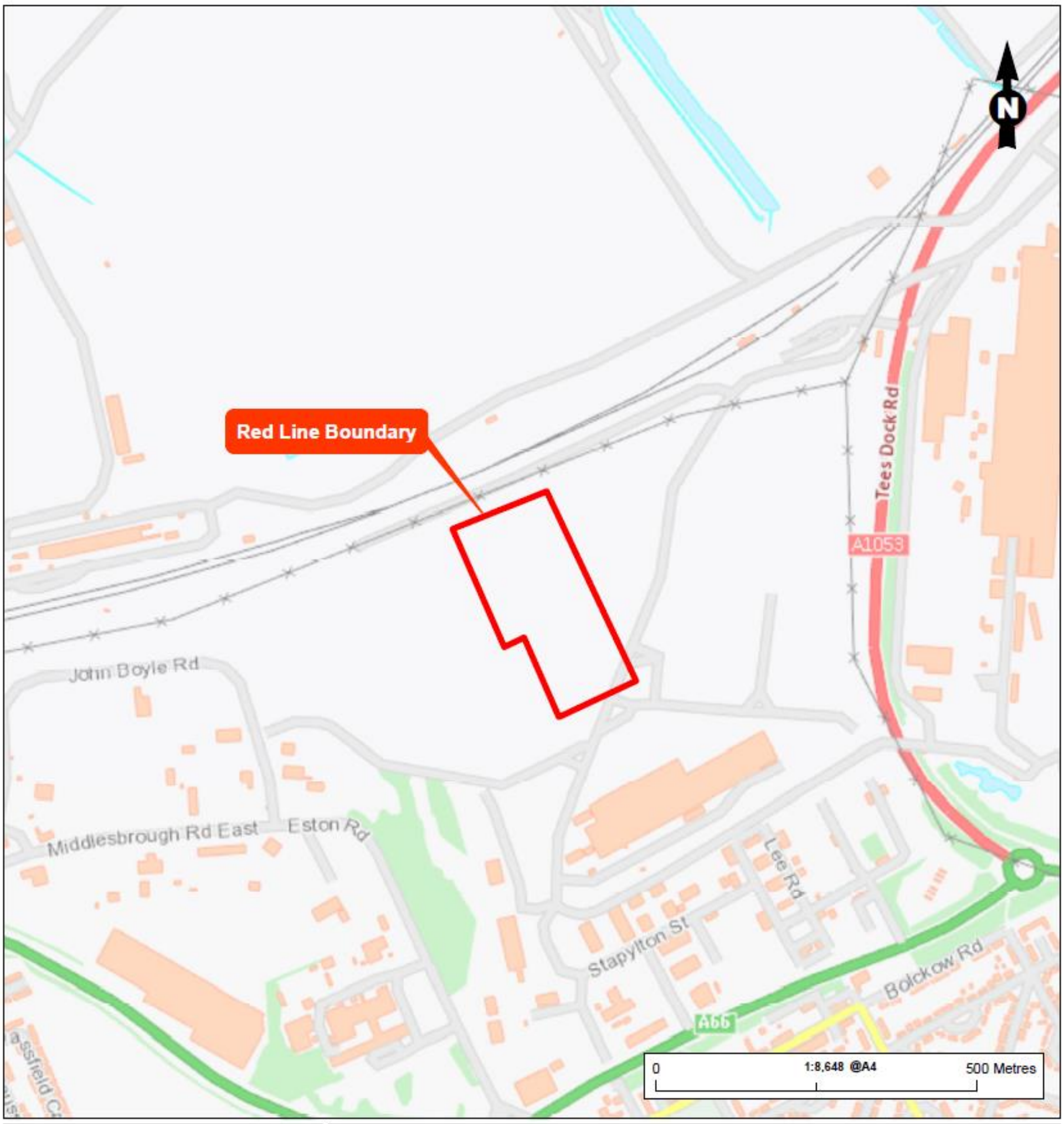


Figure 2.1 Site Location

2.2 The Proposed Development

The proposed development consists of a BA Facility, a BA processing plant, storage bays and ancillary buildings.

The proposed development is anticipated to receive the BA (approximately 100,000 tonnes per annum (tpa)) produced from the Tees Valley Energy Recovery Facility (ERF), which will be located directly adjacent (west) to the BA site once constructed (and subject to reserved matters approval). The process will involve the transfer, by covered conveyor, of the raw BA from the ERF to the raw BA hall at the proposed BA Facility site or by covered vehicles via an internal link, or by road.

In addition to the 100,000 tpa from the Tees Valley ERF, the proposed new BA Facility would be designed to accommodate up to 80,000 tpa from third party sources. BA from third party sites would be delivered to the BA Facility by road. The BA will be placed into storage bays for maturation over a 14-day period.

3. PLANNING POLICY CONTEXT

3.1 National Planning Policy Framework, 2021

No specific noise criteria are set out in the National Planning Policy Framework (NPPF) or in the Noise Policy Statement for England (NPSE) to which it refers. Regarding noise, the NPPF states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution.

Paragraph 185 of the NPPF states that:

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

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

To achieve these aims, the NPPF refers to the explanatory note to the NPSE.

3.2 Noise Policy Statement for England, 2010

The NPSE sets out the long-term vision of Government noise policy which is to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

The NPSE outlines the following three aims for the effective management and control of mental, neighbour and neighbourhood noise:

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

3.3 Planning Practice Guidance, Updated 2019

Planning Practice Guidance (PPG) is a web-based resource, which includes a section on noise. This resource provides guidance on how to determine the noise impact in terms of whether a significant adverse effect is likely to occur and/or whether a good standard of amenity can be achieved.

In line with the Noise Policy Statement for England, Planning Practice Guidance introduces the following concepts:

- Significant observed adverse effect level (SOAEL): This is the level of noise exposure above which significant adverse effects on health and quality of life occur;
- Lowest observed adverse effect level (LOAEL): this is the level of noise exposure above which adverse effects on health and quality of life can be detected; and
- No observed effect level (NOEL): this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

Table 3-1 summarises the noise exposure hierarchy, based on the likely average response.

Table 3-1 Noise Exposure Hierarchy

Perception	Examples of outcome	Increasing effect level	Action
Not noticeable	No effect	No Observed Effect	No specific measures
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	No specific measures required
Lowest Observed Adverse Effect Level			
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.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
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	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

3.4 Other Guidance

British Standard 5228: 2009+A1: 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2

BS 5228:2009[1] gives recommendations for basic methods of noise and vibration control relating to construction work. It also provides guidance concerning methods of predicting and measuring noise and vibration and assessing their impacts on those exposed to it. The prediction method considers the noise emission level of proposed plant, the separation distance between the source and the receiver and the effect of the intervening topography and structures.
Part 2 of the standard gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration.

[1] British Standards Institution, 2009 and 2014. British Standard 5228: 2009 +A1 2014 Code of practice for noise and vibration control on construction and open sites. BSI

The legislative background to vibration control is described and recommendations are given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities. The standard also provides guidance on measuring vibration and assessing its effects on the environment.

British Standard 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound

BS 4142:2014+A1:2019[2] provides a method for rating industrial and commercial sound and method for assessing resulting impacts upon people. The method is applicable to fixed plant installations, sound from industrial and manufacturing process and other associated activities.

The basis of BS 4142 is a comparison between the background noise level in the vicinity of residential locations and the rating level of the noise source under consideration. The relevant parameters in this instance are as follows:

- Background Level, $L_{A90,T}$: defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, and quoted to the nearest whole number of decibels;
- Specific Level, $L_{Aeq,T}$: the equivalent continuous 'A' weighted sound pressure level at the assessment location in the absence of the specific sound source under consideration, over a given time interval, T; and
- Rating Level, $L_{Ar,T}$: the specific sound level plus any adjustment made for the characteristic features of the noise.

Potential impacts are predicted from the difference between the representative background level at a noise sensitive receptor and the rating level from the noise source considered. The standard suggests that the greater the difference, the greater the magnitude of impact.

In determining the significance of the impact, BS 4142 requires a consideration of the context of the assessment i.e. the nature of the existing acoustic environment and the new noise source, and the sensitivity of the affected receptors.

[2] British Standards Institute, 2014 and 2019. British Standard BS 4142+A1:2019: Methods for rating and assessing industrial and commercial sound. BSI

4. METHODOLOGY AND SIGNIFICANCE CRITERIA

The following section outlines the methodology applied to identify and assess the potential noise impacts likely to result from the proposed development.

4.1 Receptor Locations

The receptors considered in this assessment are detailed in Table 4-1 and shown in Figure 4.1, along with the approximate red line boundary.

Table 4-1 Receptor Locations

Location	Description	Distance from site (m) at closest point
R1	Residential dwellings along Jones Road	905
R2	Residential dwellings along Bolckow Road	575
R3	Residential dwellings along Bolckow Road/Cresswell Road	675
R4	Non-residential receptors along John Boyle Road	360
R5	Teesworks Skills Academy (non-residential)	235

Figure 4.1 Receptor locations (Source: Google Earth)

4.2 Baseline Characterisation

A baseline noise survey was carried out at the nearest NSRs to quantify the prevailing ambient and background noise levels during daytime and night-time periods. The purpose of the baseline survey was to establish thresholds for construction noise effects and operational plant noise effects.

4.3 Construction Noise Assessment

Construction Noise

The construction works associated with the proposed development will involve the use of a variety of working methods which will change throughout the construction period. Therefore, noise levels from the works are likely to vary significantly over time as the type of construction activities change.

The exact working methodology and plant to be employed during construction has not been established at this stage in the design.

The significance criteria for construction noise levels at the residential receptors have been established by reference to ABC method described in BS 5228:2009+A1:2014. The thresholds are made relative to the pre-existing ambient noise levels at assessment locations, as shown in Table 4-2.

Table 4-2 BS5228 'ABC' Method for Construction Noise

Assessment period	Threshold values, $L_{Aeq,T}$ (dB)		
	Category A	**Category B**	**Category C**
Daytime (07:00 – 19:00) Saturday (07:00 – 13:00)	65	70	75
Evening (19:00 – 23:00)	55	60	65
Night-time (23:00-07:00)	45	50	55

A potential significant noise effect is indicated when the construction noise exceeds the threshold level for the category appropriate to the ambient noise level:

- Threshold values of Category A for construction noise should be used when the pre-existing ambient noise level, rounded to the nearest 5 dB, is less than those values shown under Category A;
- Threshold values of Category B should be used when pre-existing ambient noise level, rounded to the nearest 5 dB, is equal to values in Category A;
- Threshold values of Category C should be used when pre-existing ambient noise level, rounded to the nearest 5 dB, is more than values in Category A.

The ABC method is applicable for residential receptors R1 to R3.

For non-residential receptors at R4 and R5, the 5dB(A) change method of Annex E.3.3 of BS 5228:2009+A1:2014 has been used to determine likely significant effects. Using this method, noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for the daytime, evening and night-time periods, respectively.

Most audible construction works are assumed to occur during daytime periods. However, there may be construction activities which are outside of typical construction work patterns due to the nature of some activities such as concrete pours.

Construction Traffic Noise

Noise levels generated by construction traffic on the local highways have been compared to the guidance of DMRB[3] and LA 111[4]. The expected change in road traffic noise levels has been compared to the short-term criteria of LA 111.

Construction Vibration

Vibration levels from piling may be perceptible at distances up to 100m from the works. Of the receptors identified, the closest existing non-residential receptor (R5) is approximately 235m away from the western site boundary. Residential receptors are approximately 575-905m from the site boundary.

Therefore, no significant construction vibration effects are expected and no further assessment of construction vibration is provided in this report.

4.4 Operational Noise Assessment

Operational Noise Limits

Operational noise limits will be set based on the background noise levels measured during the baseline survey, as per the methodology used for setting plant noise limits in the outline planning application. In accordance with BS 4142:2014+A1:2019, the rating noise level limits will be set equal to the representative background noise levels, allowing for any penalties for acoustic characteristics of the noise.

Noise Emissions from Plant and Site Processes

Using the benchmarking measurement results and data provided by the engineering design team, a noise prediction model of the site has been built to predict noise emissions to the nearest receptor locations. The model uses the calculation method of ISO9613-2:1996 and allows for the effects of building massing, site topography, ground absorption and any screening.

4.5 Significance Criteria

Effects that are described as SOAEL are considered to be significant effects.

Construction Noise

Table 4-3 details the significance criteria for construction noise effects at residential receptors.

Table 4-3 Construction Noise Significance Criteria – Residential Receptors

Description	Magnitude of impact	Adverse effect level
Predicted construction noise levels are less than the baseline noise levels at receptor ($L_{Aeq,T}$)	Negligible	No Observed Adverse Effect Level (NOAEL)
Predicted construction noise levels are greater than or equal to the baseline noise levels at receptor ($L_{Aeq,T}$) and below the threshold value	Low	LOAEL
Predicted construction noise levels are equal to or up to 5 dB above the threshold value at receptor	Medium	SOAEL
Predicted construction noise levels are ≥5 dB above the threshold value at receptor	High	SOAEL

[3] Design Manual for Roads and Bridges, Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 7 Noise and Vibration (2011)
[4] Design Manual for Roads and Bridges – Sustainability & Environment Appraisal LA111 Noise and vibration Revision 1 (2020)

Table 4-4 details the significance criteria for construction noise effects at non-residential receptors.

Table 4-4 Construction Noise Significance Criteria - Non-Residential Receptors

Description	Magnitude of impact	Adverse effect level
< 0 dB change in noise level between total level and pre-existing ambient noise level	Negligible	NOAEL
0 - 5 dB change in noise level between total level and pre-existing ambient noise level	Low	LOAEL
6 - 10 dB change in noise level between total level and pre-existing ambient noise level	Medium	SOAEL
> 10 dB change in noise level between total level and pre-existing ambient noise level	High	SOAEL

Construction Traffic Noise Levels

The change in noise levels due to construction heavy goods vehicles (HGVs) have been assessed against the short-term criteria of LA 111[5], as shown in Table 4-5.

Table 4-5 Magnitude of Impact - Road Traffic Noise Changes (short term)

Change in Traffic Basic Noise Level $L_{A10,18h}$ dB	Magnitude of Impact	Adverse Effect Level
≥ 5.0	Substantial	SOAEL
3.0 to 4.9	Moderate	SOAEL
1.0 to 2.9	Slight	LOAEL
< 1.0	Negligible	NOAEL

Operational Noise – Residential receptors

Table 4-6 details the significance of effects for operational noise based on the numerical difference between predicted Rating Level and the prevailing Background Level at a receptor and the criteria from BS 4142:2014+A1:2019.

Table 4-6 Operational Noise Significance Criteria

Description	Magnitude of impact	Adverse effect level
Predicted Rating Level is 10 dB or more below the prevailing Background Level at the receptor.	No Effect	NOEL
Predicted Rating Level is between 10 dB and -0.1 dB below the prevailing Background Level at the receptor.	Negligible	NOAEL
Predicted Rating Level is between 0 dB and 4.9 dB above the prevailing Background Level at the receptor.	Low	LOAEL
Predicted Rating Level is between 5 dB and 9.9 dB above the prevailing Background Level at the receptor.	Medium	SOAEL
Predicted Rating Level is ≥10 dB or more above the prevailing Background Level at the receptor.	High	SOAEL

[5] Design Manual for Roads and Bridges – Sustainability & Environment Appraisal LA111 Noise and vibration Revision 1 (2020)

Operational Noise – Non-residential receptors

For industrial premises to the west of the site (R4), noise levels have been assessed to the worst affected window locations, which are assumed to be office type use. For R5, from looking at available planning documents (planning reference: R/2021/0879/FF), the rooms that will be most exposed to noise from the proposed development will be training rooms.

Guidance is given in BS 8233:2014 in reference to indoor ambient noise levels for office spaces and training rooms. The recommended guideline levels are detailed in Table 4-7.

Table 4-7 Indoor ambient noise levels in office spaces

Space	Design Range (dB $L_{Aeq,T}$)
Cellular/Executive Office Staff/meeting rooms Training room	35-40

For the purpose of this assessment, the significance criteria of Table 4-8 will apply.

Table 4-8 Non-residential receptor significance criteria

Description	Magnitude of impact	Adverse effect level
Below 35-40 dB $L_{Aeq,T}$ design range	Negligible	NOAEL
Within 35-40 dB $L_{Aeq,T}$ design range	Low	LOAEL
Exceeds 35-40 dB $L_{Aeq,T}$ design range	High	SOAEL

5. BASELINE NOISE SURVEY

5.1 Survey Methodology

Unattended noise monitors were installed at LT1, LT2 and LT3 between 22/01/2021 and 26/01/2021. This period was during a Covid-19 national lockdown. The purpose of the noise survey was to determine ambient noise levels for setting construction noise thresholds, and background noise levels for setting plant noise limits above which significant effects may occur. If road traffic flows were lower due to the restrictions, then the resultant ambient and background noise levels may have been lower. Therefore, the thresholds above which significant effects may occur could be deemed to be worst case as these were set against potentially lower ambient and background noise levels. For these reasons, it was deemed acceptable to complete the baseline noise survey during this period. The monitoring locations are shown along with the approximate red line boundary in Figure 5.1.

LT1 was installed at a height of 1.5m above local ground level (the microphone was above the wall adjacent to the A66), LT2 was installed at a height of 3m above local ground level, and LT3 was installed at a height of 1.5m above local ground level. All unattended monitoring positions were installed under free-field conditions.

Noise levels were monitored continuously over the survey period and averaged over 15-minute intervals.

The sound level meter calibration was checked upon installation and upon completion of the surveys. No significant drift in calibration was recorded.

Attended measurements of 15 minutes in duration were taken at two positions (as shown on Figure 5.1) on 25/01/2021 and 26/01/2021:

- ST1: representative of noise levels affecting the nearest noise sensitive receptors on Uvedale Road.
- ST2: to capture noise levels from the industrial estate along John Boyle Road.

Each measurement was taken at a height of 1.5m above local ground level and under free-field conditions.

Figure 5.1: Baseline Monitoring Locations

5.2 Weather

Start of unattended survey:
Friday 22/01/2021
Dry, sunny, ~5°C, wind speed (average) 5 m/s in an easterly direction, precipitation 0 mm.

Unattended survey:
Temperatures in the range of 1-6°C during daytime hours. Temperature dropped below 0°C during some night-time periods. Winds were in variable directions.

End of unattended survey:
Tuesday 26/01/2021
Dry, partly sunny, ~2°C, wind speed (average) 4 m/s in a northerly direction, no precipitation.

Attended survey:
Monday 25/01/2021
Dry, sunny, ~4°C, wind speed (average) 5 m/s in an easterly direction, precipitation 0 mm.

Tuesday 26/01/2021
Dry, sunny, ~2°C, wind speed (average) 4 m/s in a northerly direction, precipitation 0 mm.

5.3 Equipment

The following measurement equipment was used:

Unattended survey:
- 3 x 01dB FUSION Class 1 Sound Level Meter (serial numbers 12081, 11891 & 11403);
- 01dB CAL31 Sound Calibrator (serial number 3189091).

Attended survey

- Brüel & Kjær 2250 Class 1 Sound Analyser (serial number 3002075) and associated microphone 4189 (serial number 2839798).
- Brüel & Kjær 4231 Class 1 Calibrator (serial number 3004168).

Calibration certificates are available upon request.

5.4 Attended Noise Survey Results

A summary of the attended survey results is shown in Table 5-1.

Table 5-1 Summary of Attended Noise Survey Results

Measurement position	Measurement Period	Representative $L_{Aeq,T}$ (dB)	Highest L_{AFmax} (dB)	Lowest $L_{A90,15mins}$ (dB)
ST1 (Uvedale Road)	Daytime (07:00-23:00)	51	78	48
	Night-time (23:00-07:00)	40	62	38
ST2 (John Boyle Road)	Daytime (07:00-23:00)	60	81	47

The noise climate at ST1 was dominated by traffic noise from surrounding roads, plant noise coming from an industrial source to the north and barking dogs.

The noise climate at ST2 was dominated by site activity and traffic noise from the industrial park. Road traffic noise from surrounding roads was also audible.

5.5 Unattended Noise Survey Results

The unattended survey results for LT1-LT3 are shown in Figures 5.2 to 5.4. A summary of the results of attended and unattended measurements is provided in Appendix B.

The noise climate at LT1 was dominated by traffic movements along the A66. Traffic movements along Jones Road and pedestrian movements along the public footpath were also audible.

Typical daytime average noise levels ranged from 70-74 dB $L_{Aeq,16hour}$. Daytime background noise levels ranged from 48-53 dB $L_{A90, 16hour}$. Daytime maximum noise levels were dictated by individual vehicle movements along the A66.

Night-time average noise levels ranged from 64-69 dB $L_{Aeq,8hour}$. Night-time background noise levels ranged from 40-43 dB $L_{A90,8hour}$. Night-time maximum noise levels were expected to be dictated by traffic noise along the A66.

The noise climate at LT2 was dominated by traffic movements along the A66. Traffic along Bolckow Road was also audible.

Typical daytime average noise levels ranged from 53-57 dB $L_{Aeq,16hour}$. Daytime background noise levels ranged from 44-48 dB $L_{A90,16hour}$. Daytime maximum noise levels were dictated by individual vehicle movements along the A66.

Night-time average noise levels ranged from 49-52 dB $L_{Aeq,8hour}$. Night-time background noise levels ranged from 36-38 dB $L_{A90,8hour}$. Night-time maximum noise levels were expected to be dictated by traffic noise along A66.

The noise climate at LT3 was dominated by traffic along the A66. Traffic along Bolckow Road was also audible.

Typical daytime average noise levels ranged from 53-58 dB $L_{Aeq,16hour}$. Daytime background noise levels ranged from 48-51 dB $L_{A90,16hour}$. Daytime maximum noise levels were dictated by traffic along the A66 and Bolckow Road.

Night-time average noise levels ranged from 49-52 dB $L_{Aeq,8hour}$. Night-time background noise levels ranged from 42-45 dB $L_{A90,8hour}$. Night-time maximum noise levels were expected to be dictated by traffic along the A66 and Bolckow Road.

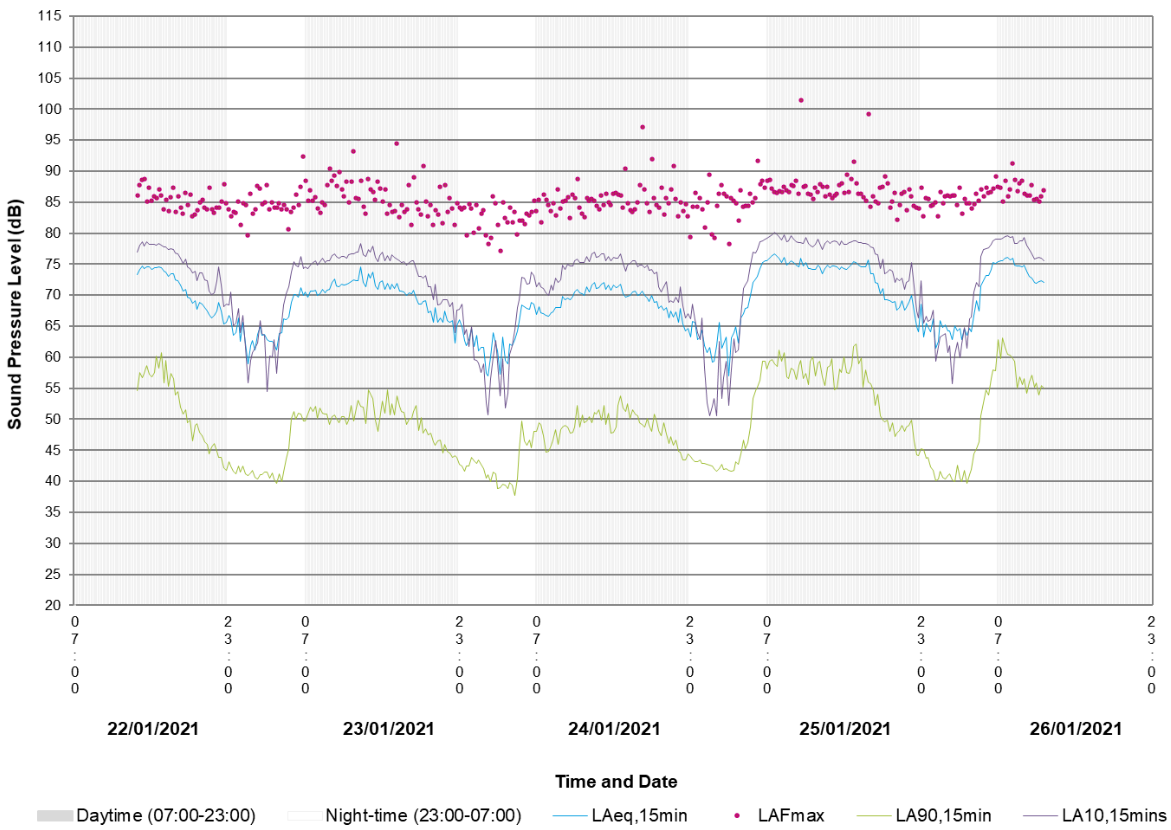


Figure 5.2 Unattended Survey Results at LT1

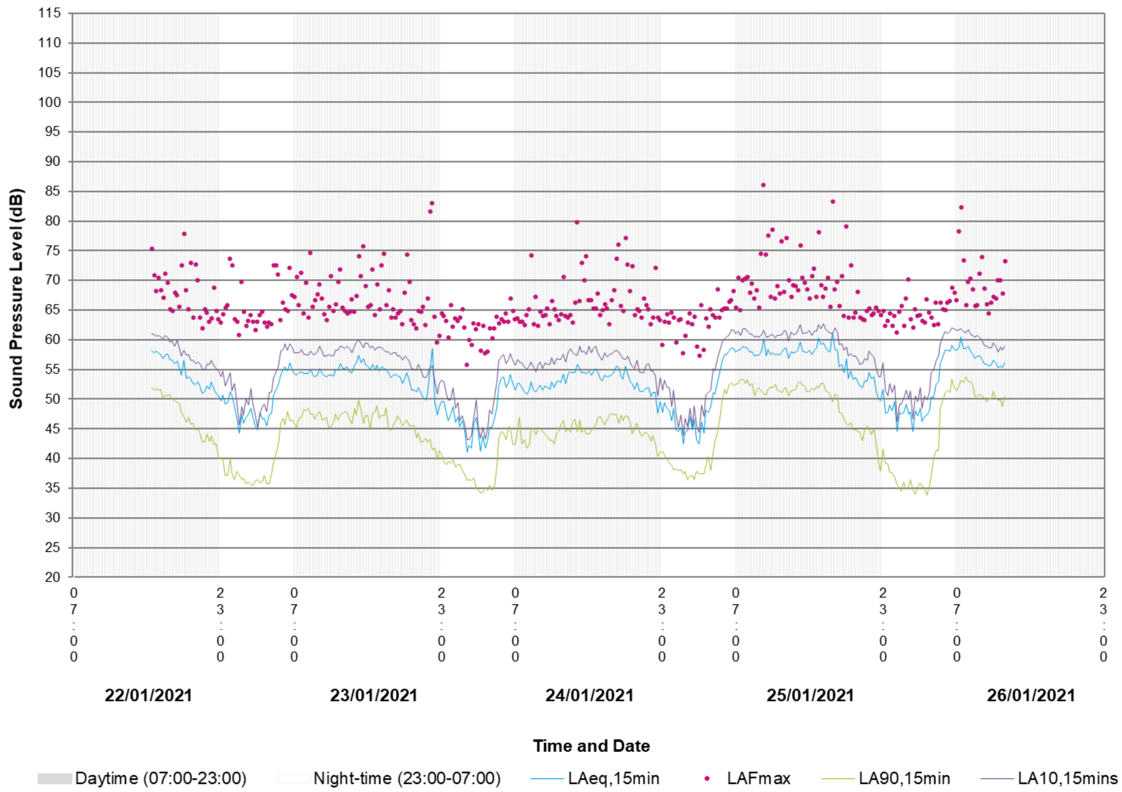


Figure 5.3 Unattended Survey Results at LT2

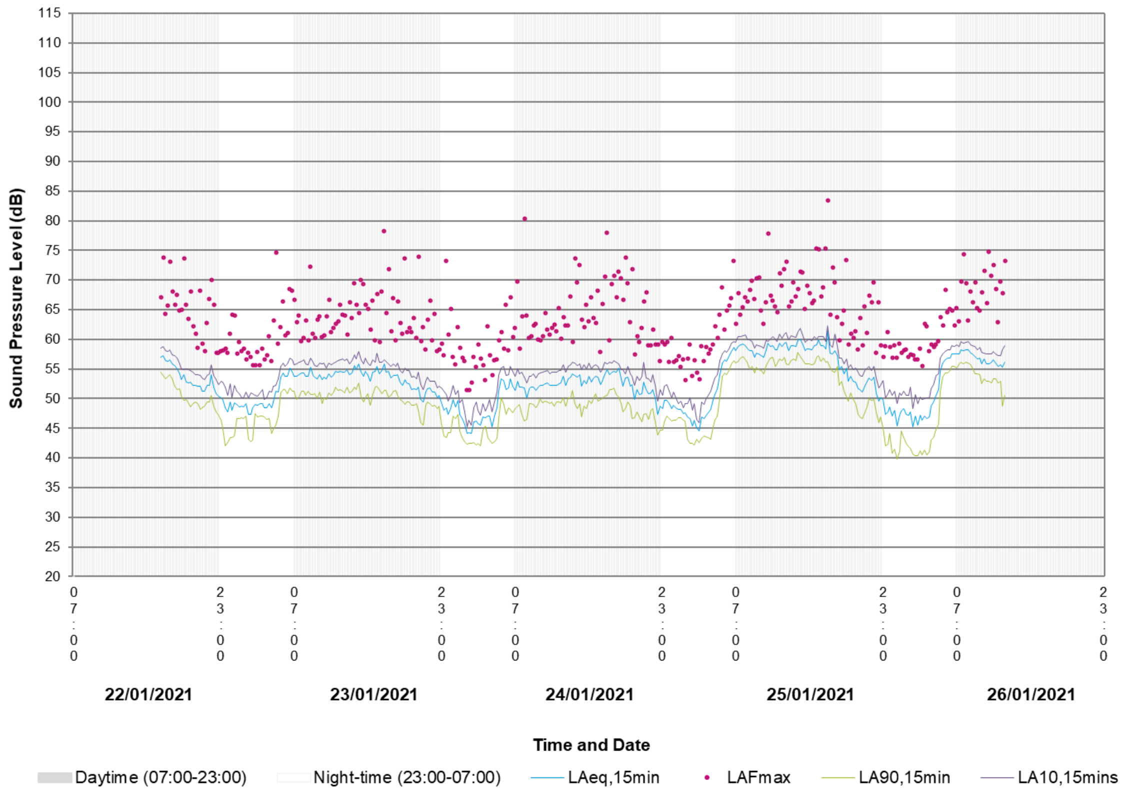


Figure 5.4 Unattended Survey Results at LT3

6. NOISE ASSESSMENT

6.1 Construction Noise Assessment

Construction Noise Emission Thresholds

The residential receptor thresholds are summarised in Table 6-1.

Table 6-1 Construction Noise Thresholds at R1-R3

NSR considered	Prevailing ambient noise level during daytime period, $L_{Aeq,T}$ (dB)	BS5228 noise emission category	Construction noise threshold at NSR, $L_{Aeq,T}$ (dB)
R1: Residential dwellings along Jones Road	72	C	75
R2: Residential dwellings along Bolckow Road	55	A	65
R3: Residential dwellings along Bolckow Road/Cresswell Road	55	A	65

The non-residential receptor threshold is detailed in Table 6-2.

Table 6-2 Construction Noise Threshold at R4

NSR considered	Prevailing ambient noise level during daytime period, $L_{Aeq,T}$ (dB)	Construction noise threshold at NSR, $L_{Aeq,T}$ (dB)
R4: Non-residential/office use	60	65
R5: Teesworks Skills Academy	60*	65

*Noise level from attended measurement location ST2 are deemed to be representative of the noise level at R5, as the R5 receptor was constructed in 2022, after the baseline noise survey in 2021.

Construction Noise Assessment

Residential receptors are approximately 575-905m from the site boundary. Therefore, due to the large distance between the site boundaries and the residential receptors, construction noise is not expected to give rise to significant effects at the residential receptors.

BS 5228:2009+A1:2014 also states that calculations performed for receptors over 300 m away from the source should be used with caution because of the increasing importance of meteorological effects.

The noisiest works on site could be piling works. Piling methodologies and techniques have not been confirmed at this stage. Percussive piling is typically the noisiest method.

As a worst case, if it is assumed that a percussive piling rig is placed at the southern site boundary, i.e. at the closest point to the residential receptors, and operates continuously throughout the working day, the highest predicted façade noise levels (included +3 dB façade reflection to BS 5228:2014+A1:2019) would be approximately 42-46 dB $L_{Aeq,T}$.

These noise levels would be significantly below the construction noise thresholds and existing ambient noise levels at the nearest residential receptors. The resulting effect level is NOAEL. Significant construction noise effects are not expected for residential receptors.

The noise levels at R4 (non-residential receptor) are predicted for the window location that is anticipated to experience the highest construction noise levels. The predicted levels are >10 dB below the existing ambient noise levels and therefore, the total noise level (pre-construction ambient plus site noise) will not exceed 65 dB $L_{Aeq,T}$. The resulting effect level is NOAEL.

The noise levels at R5 (Teesworks Skills Academy) are predicted for the window location that is anticipated to experience the highest construction noise levels (eastern elevation). The predicted level is 59 dB $L_{Aeq,T}$ which is 1 dB less than existing ambient noise level. Therefore, the total noise level (pre-construction ambient plus site noise) is not predicted to exceed 65 dB $L_{Aeq,T}$. The resulting effect level is NOAEL. Significant effects are therefore not expected for non-residential receptors.

Construction Traffic Assessment

It is understood that based on the construction of similar facilities, the construction of the proposed BA Facility is predicted to generate an average of 20 HGV movements each way per day (i.e. 40 movements in total) and up to 44 HGV movements each way per day (i.e. 88 movements in total) during periods of peak construction activity.

Road traffic flows would need to increase by 25% in order to result in a 1 dB change in road traffic noise level, in accordance with the Design Manual for Roads and Bridges[6]. A 1 dB increase would be deemed to be negligible in the short term, to LA 111[7]. It is not expected that the additional HGV movements would cause traffic flows to increase by 25%, for receptors R1-R4.

Therefore, the addition of the construction HGVs to the road network will give rise to a NOAEL. Significant effects are not expected.

For receptor R5, the construction HGVs would pass the Teesworks Skills Academy on Dorman Point Way, approximately 16m from the southern elevation of the Teesworks Skills Academy.

Based on 44-88 total HGV movements per day, the predicted average noise level over a 10-hour working day would be 46-50 dB $L_{Aeq,T}$. Therefore, the total noise level (pre-construction ambient plus site noise) will not exceed 65 dB $L_{Aeq,T}$. The resulting effect level is NOAEL. Significant effects are therefore not expected.

6.2 Operational Noise Assessment

Background Noise Levels

A statistical analysis of the measured background noise levels at monitoring positions LT1-LT3 was completed in accordance with BS 4142:2014+A1:2019. The analyses are provided in Appendix C. The background noise levels used for assessment are detailed in Tables 6.4-6.7.

Plant Noise Assessment

A 3D computer noise model was prepared to calculate the plant and activity noise emissions from the proposed facility at each NSR. Daytime and night-time levels were predicted at heights of 1.5m and 4m to represent ground floor and first floor levels, respectively.

---

[6] Design Manual for Roads and Bridges, Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 7 Noise and Vibration (2011)

[7] Design Manual for Roads and Bridges – Sustainability & Environment Appraisal LA 111 Noise and vibration Revision 1 (2020)

The noise model was done using the proprietary software Cadna-A. The software implements the common European methods of noise prediction. The noise predictions have been undertaken in accordance with ISO9613-2[8].

The planning application being submitted is outline. Therefore, the facility could come forward in any configuration within the set parameters. However, to inform the noise assessment, a number of reasonable worst case assumptions have been made.

The building/covered area heights are set to 16m in the model, and the area of these is 13,000sqm total. The buildings/covered areas have been set as open on most sides (as outlined in the table below), to allow the noise from each area to break-out to the nearest sensitive receptors.

The noisiest plant items i.e. the wheeled loader and the tipper, are largely uncovered and where they traverse through the covered area, this area is open on the southern elevation (nearest to the residential receptors).

The noise sources associated with the facility and assumptions are detailed in Table 6-3.

Table 6-3 Operational noise assessment input levels and assumptions

Area/Plant Item	Noise level	Reference/Comments
Conveyor	80 dB L_w	Measured from a vibratory table at another operational ERF facility. Conveyor at 8m height.
BA Building	80 dB L_{pA} internal noise level	Noise assumed to be as per the measured spectrum for the conveyor/vibratory table. Building open on eastern, southern and western elevations. Building at 16m height.
Covered area in south of site	Operational noise from wheeled loader and tipper (outlined below)	Open on northern and southern elevations. Covered area at 16m height.
Wheeled loader (30t)	120 dB L_w	BS 5228:2014+A1:2019 C9.27, 10mph, 30 one-way movements per hour (i.e. 2-minutes to collect BA, traverse site and drop-off sorted material)
Tipper	118 dB L_w	BS 5228:2014+A1:2019 C8.20, 10mph, 30 one-way movements per hour (i.e. 2-minutes to collect BA, traverse site and drop-off sorted material)
On Site HGVs (lorries)	99 dB L_{wA} moving point sources	Benchmarking measurements at an operational ERF. The lorry was travelling at 9mph on site. Measurement taken at 1.5m above hard ground, and 5m from the lorry noise source. 43 one-way HGV movements per day, averaged over 12-hour working day.

The assumed site layout is shown in Figure 6.1.

[8] International Standards Organisation, 1996. Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation. ISO

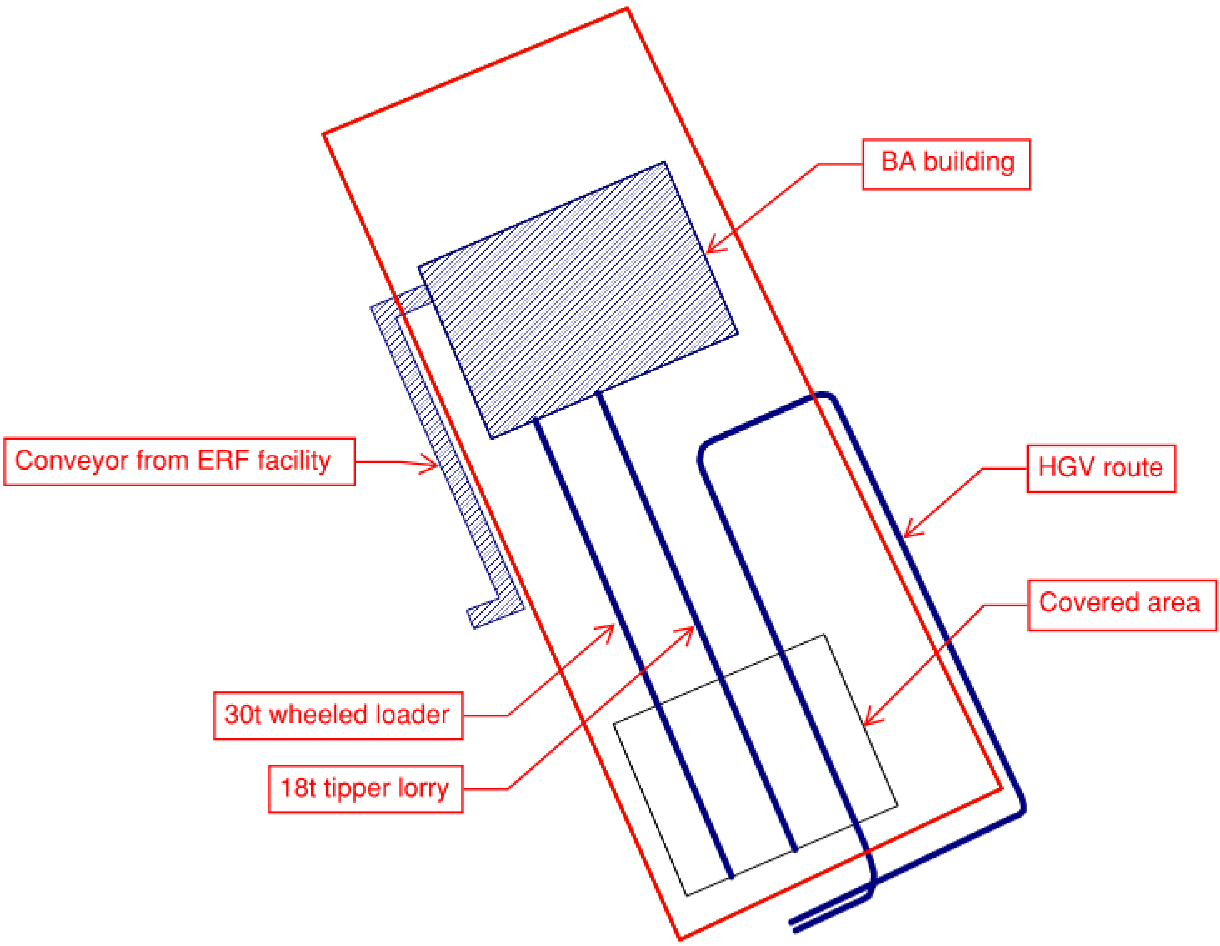


Figure 6.1 Assumed BA site layout

Whilst the exact site layout is likely to be different to the assumptions shown above, the layout has been assumed to provide minimal screening of noise from the wheeled loader, tipper and HGVs to the nearest sensitive receptors.

The number of HGVs accessing the site during evening and night-time periods have been input to the model as advised by the client.

Four key scenarios have been considered:

- Average hour 07:00-18:00 with only the BA Facility operating
- Average hour 07:00-18:00 with the BA and ERF facilities operating
- Night-time 06:00-07:00 with only the BA Facility operating
- Night-time 06:00-07:00 with the BA and ERF facilities operating

HGV, wheeled loader and tipper speeds were assumed to be 10mph. These are conservative assumptions as noise exposure will increase with lower HGV speeds.

Following BS 4142:2014+A1:2019, penalties should be added to the specific noise level at a receptor to account for acoustic features such as tonality, intermittency and impulsivity, if such features are discernible at the receptor.

Penalties for intermittency, impulsivity due to HGVs and sorting of BA, and other sound characteristics (where noise emissions are readily distinctive against the residual acoustic environment) have not been applied, as these noise sources are not expected to be readily audible at residential receptors due to the distance from the site. The ambient noise levels at the unattended monitoring locations were measured to typically be 22 dB, 9 dB and 5 dB over background noise levels, at monitoring positions LT1, LT2 and LT3, respectively.

Residential receptors

Background noise levels have been determined using the noise prediction model that is calibrated to road traffic noise sources and the transformer plant that is adjacent to the A66 (near to receptor location R3). This approach has been taken as it was not possible to measure the background noise levels at the façade locations of the residential receptors. As the dominant noise source was road traffic noise, this approach is deemed to be suitable and is equivalent to applying a distance correction to the receptor locations for road traffic noise sources.

Rating levels are at the receptor façade location and do not include a façade reflection.

The specific and rating noise levels are in terms of daytime 1-hour periods and night-time 15-minute periods.

The average weekday hour (07:00-18:00) noise model results with only the BA facility operating are detailed in Table 6-4.

Table 6-4 Operational noise assessment – Average hour 07:00-18:00 (BA only)

Receptor	Storey/ Height	Background Level, $L_{A90,T}$ (dB)	Predicted Specific Noise Level, $L_{Aeq,T}$ (dB)	Resulting Rating Level, $L_{Ar,T}$ (dB)	Excess of rating level over background level (dB)
R1	Ground floor/ 1.5m	36	24	24	-12
R1	First floor/ 4.0m	38	24	24	-14
R2	Ground floor/ 1.5m	43	24	24	-19
R2	First floor/ 4.0m	46	29	29	-17
R3	Ground floor/ 1.5m	47	25	25	-22
R3	First floor/ 4.0m	49	28	28	-21

For the average weekday hours of 07:00-18:00 with only the BA Facility operating, the resultant effect level is NOEL for all receptors.

The average weekday hour (07:00-18:00) noise model results with the BA and ERF facilities operating are detailed in Table 6-5.

Table 6-5 Operational noise assessment – Average hour 07:00-18:00 (BA and ERF)

Receptor	Storey/ Height	Background Level, $L_{A90,T}$ (dB)	Predicted Specific Noise Level, $L_{Aeq,T}$ (dB)	Resulting Rating Level, $L_{Ar,T}$ (dB)	Excess of rating level over background level (dB)
R1	Ground floor/ 1.5m	36	36	36	0
R1	First floor/ 4.0m	38	37	37	-1
R2	Ground floor/ 1.5m	43	29	29	-14
R2	First floor/ 4.0m	46	34	34	-12
R3	Ground floor/ 1.5m	47	29	29	-18
R3	First floor/ 4.0m	49	32	32	-17

For the average weekday hours of 07:00-18:00 with the BA and ERF facilities operating, the resultant effect levels are:

- NOEL
  - R2 ground and first floors
  - R3 ground and first floors
- NOAEL
  - R1 first floor
- LOAEL
  - R1 ground floor - $L_{A,r}$ +0dB over background

The noise emissions from the BA Facility would not contribute to the noise levels at the residential receptors during the daytime hours of 07:00-18:00.

The night-time (06:00-07:00) noise model results with only the BA Facility operating are detailed in Table 6-6.

Table 6-6 Operational noise assessment – Night-time 06:00-07:00 (BA only)

Receptor	Storey/ Height	Background Level, $L_{A90,T}$ (dB)	Predicted Specific Noise Level, $L_{Aeq,T}$ (dB)	Resulting Rating Level, $L_{Ar,T}$ (dB)	Excess of rating level over background level (dB)
R1	Ground floor/1.5m	32	24	24	-8
R1	First floor/4.0m	34	24	24	-10
R2	Ground floor/1.5m	34	24	24	-10
R2	First floor/4.0m	35	29	29	-6
R3	Ground floor/1.5m	42	25	25	-17
R3	First floor/4.0m	42	28	28	-14

For the night-time hours of 06:00-07:00 with only the BA Facility operating, the resultant effect levels are:

- NOEL
  - R1 first floor
  - R2 ground floor
  - R3 ground and first floors
- NOAEL
  - R1 ground floor
  - R2 first floor

The night-time (06:00-07:00) noise model results with the BA and ERF facilities operating are detailed in Table 6-7.

Table 6-7 Operational noise assessment – Night-time 06:00-07:00 (BA and ERF)

Receptor	Storey/ Height	Background Level, $L_{A90,T}$ (dB)	Predicted Specific Noise Level, $L_{Aeq,T}$ (dB)	Resulting Rating Level, $L_{Ar,T}$ (dB)	Excess of rating level over background level (dB)
R1	Ground floor/1.5m	32	36	36	+4
R1	First floor/4.0m	34	36	36	+2
R2	Ground floor/1.5m	34	27	27	-7
R2	First floor/4.0m	35	31	31	-4
R3	Ground floor/1.5m	42	28	28	-14
R3	First floor/4.0m	42	30	30	-12

For the night-time hours of 06:00-07:00, the resultant effect levels are:

- NOEL
  - R3 ground and first floors
- NOAEL
  - R2 ground and first floors
- LOAEL
  - R1 ground and first floors - $L_{A,r}$ up to +4dB over background

The noise emissions from the BA Facility between 06:00-07:00 would not cause any greater effects than predicted for the ERF facility.

Significant effects are not predicted due to operational noise from the facility. Noise contour plots for each of the assessment scenarios are provided in Appendix D.

Non-residential receptors

R4

The highest predicted operational noise level at the non-residential receptor R4 is 32 dB $L_{Aeq,T}$ for the operation of the BA Facility, alone. This level has been calculated to the southern elevation of Evergreen House, at an assumed window height of 5.5m (approximately 126m from the western site boundary at the nearest point).

Allowing for a minimum of 25 dB of attenuation of external noise levels through a glazed window, the resultant noise levels inside the building would be 7 dB $L_{Aeq,T}$.

Assuming that the building is office use behind the window at the assessment location, these noise levels would be below the BS 8233:2014 guideline internal noise levels for all office types and not audible against the existing noise levels in the room. Whilst an assessment has been made against internal noise levels for offices, it has not been possible to confirm the internal layout of the non-residential units.

If the window needed to open to provide ventilation to the office behind, allowing for 13 dB of attenuation through an open window, the resultant internal noise level would be 19 dB $L_{Aeq,T}$. This noise level would be within the BS 8233:2014 guideline levels for staff/meeting rooms, training rooms and executive offices and again, not likely to be audible against the existing noise levels in the room.

The operational noise of the BA Facility would not cause an increase in operational noise levels over the predicted noise emissions from the ERF facility. The highest predicted ERF operational noise levels at the non-residential receptor R4 are 51 dB $L_{Aeq,T}$ and 50 dB $L_{Aeq,T}$ during daytime and night-time periods. The internal noise levels with windows open and closed are predicted to be 37-38 dB $L_{Aeq,T}$ and 25-26 dB $L_{Aeq,T}$, respectively.

The predicted noise levels from the BA Facility are greater than 10 dB below the predicted operational noise levels for the ERF and therefore will not contribute to the noise levels at the non-residential receptors.

Therefore, the resultant internal noise levels in offices (if applicable) are expected to constitute a NOAEL. Significant effects are not predicted.

R5

The highest predicted operational noise level at the non-residential receptor R5 is 47 dB $L_{Aeq,T}$ for the operation of the BA Facility, alone, due to HGVs passing the southern elevation of the Teesworks Skills Academy on Dorman Point Way.

Allowing for a minimum of 25 dB of attenuation of external noise levels through a glazed window, the resultant noise levels inside the building would be 22 dB $L_{Aeq,T}$.

This noise level would be below the BS 8233:2014 guideline internal noise levels for training rooms (35-40 dB).

From review of the drawings for the Skills Academy (Redcar and Cleveland planning application reference R/2021/0879/FF) it is understood that the windows to the training rooms do not need to be openable. It is assumed that ventilation to these rooms is provided by alternate means to natural ventilation.. The Design and Access Statement of the same planning application (R/2021/0879/FF) also states under a heading entitled 'Noise':

'*The site is located within a heavily industrial area, consideration will be made to ensure the best internal conditions for the occupiers*.'

The operational noise of the BA Facility is not anticipated to cause an increase in operational noise levels over the predicted noise emissions generated from the ERF facility, except for at the southern elevation due to operational HGVs on Dorman Point Way. The highest predicted ERF operational noise level at R5 is 56 dB $L_{Aeq,T}$ during daytime peak hour periods (at the western elevation). Allowing for a minimum of 25 dB of attenuation of external noise levels through a glazed window, the resultant noise level inside the building would be approximately 31 dB $L_{Aeq,T}$.

Combining the levels from the western and southern elevations, the resultant internal noise level is expected to be 32 dB $L_{Aeq,T}$ with the windows closed. The overall internal noise level of 32 dB $L_{Aeq,T}$ is below the BS 8233:2014 guideline internal noise levels for training rooms.

Further to the above, the predicted noise level from the BA Facility is likely to cause a 1dB internal noise level increase over the noise contribution from the ERF, alone. However this is deemed to be a negligible change in noise level.

Therefore, the resultant internal noise levels in training rooms are expected to constitute a NOAEL with windows closed. Significant effects are therefore not predicted.

7. CONCLUSIONS

Significant effects are not expected during the construction and operational phases of the proposed Tees Valley BA Facility.

Whilst the proposed development could be brought forward in any configuration within the set parameters, it is expected that the site is suitable for the proposed development and it is expected that noise should not be a material risk to granting outline planning consent.

APPENDIX A
ACOUSTIC TERMINOLOGY

Term	**Definition**
$L_{eq,T}$ or Ambient noise	A noise level index called the equivalent continuous noise level over the time period T. Often described as the average.
$L_{90,T}$ or Background Noise Level	A noise level index defined as the noise level exceeded for 90% of the time over the time period T. L_{90} is used to describe the background noise.
Vibration	The periodic movements of structures transferred by ground and parts of the building, due to events such as train pass-by, piling, blasting or use of heavy machinery.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Rating Level ($L_{Ar,Tr}$)	To BS 4142:2014+A1:2019, the rating level is defined as the equivalent continuous A-weighted sound pressure level produced by the specific sound source over a given reference time interval, Tr plus any adjustment for the characteristic features of the sound (tonality, impulsivity, etc.).
NSR	A Noise Sensitive Receiver is any receiver that is classed as being sensitive to noise sources, (residential properties, churches, music studios etc.)

APPENDIX B
BASELINE NOISE SURVEY RESULTS

The results of the baseline attended measurements are shown in the table below.

Location of measurement	Start time	Duration, mm:ss	L_{AFmax} (dB)	$L_{Aeq,T}$ (dB)	$L_{A90,T}$ (dB)
Daytime (07:00-23:00)					
ST1 – Uvedale Road	25/01/2021 16:10	15:00	64	50	48
	25/01/2021 17:15	15:00	65	51	48
	25/01/2021 18:12	15:00	78	55	46
ST2 – John Boyle Road	25/01/2021 16:44	15:00	81	57	47
	25/01/2021 17:42	15:00	79	60	47
	26/01/2021 11:15	15:00	77	60	56
Night-time (23:00-07:00)					
ST1 – Uvedale Road	26/01/2021 01:28	15:00	62	40	38
	26/01/2021 01:47	15:00	59	40	39
	26/01/2021 02:06	15:00	55	40	38
	26/01/2021 02:22	15:00	49	39	37

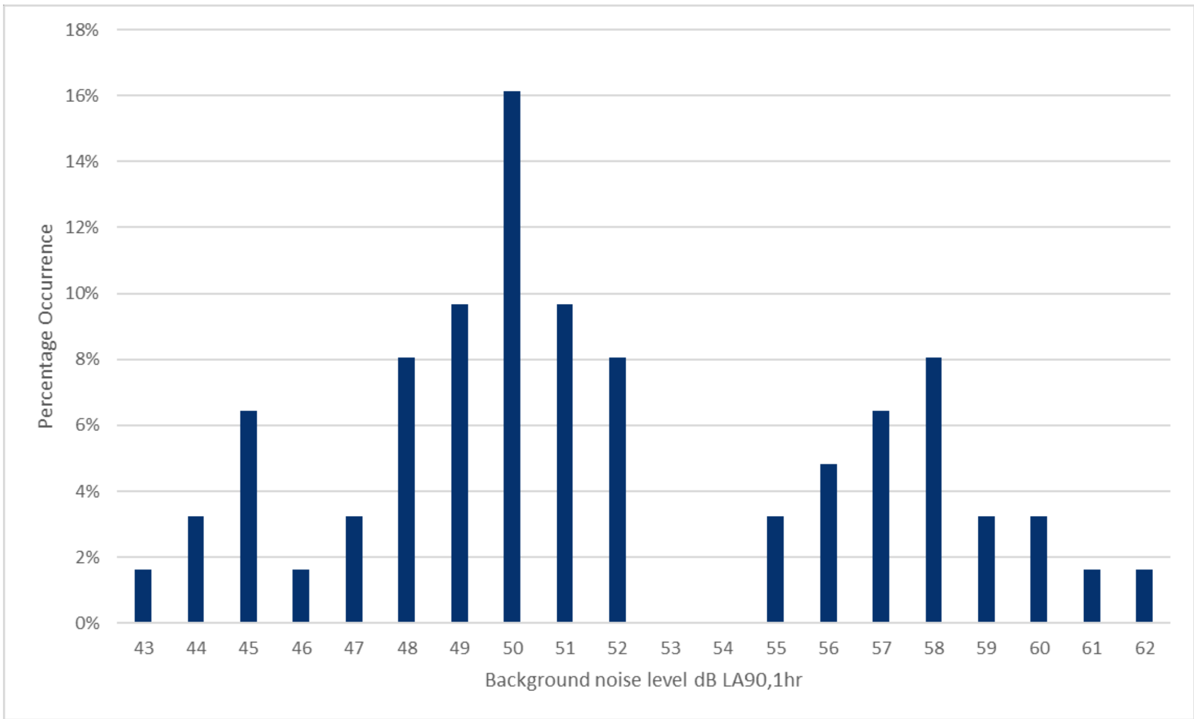
The results of the baseline unattended measurements are shown in the table below:

Location of measurement	Period	Highest L_{AFmax} (dB)	Average $L_{Aeq,T}$ (dB)	Typical $L_{A90,T}$ (dB)
Daytime Period (07:00-23:00)				
LT1 – Jones Road	22/01/2021 *	89	72	49
	23/01/2021	94	71	49
	24/02/2021	97	70	48
	25/01/2021	102	74	53
	26/01/2021 *	91	75	57
LT2 – South east of A66	22/01/2021 *	78	55	45
	23/01/2021	83	54	45
	24/01/2021	80	53	44
	25/01/2021	86	57	48
	26/01/2021 *	75	57	51
LT3 – Bolckow Road	22/01/2021 *	74	54	49
	23/01/2021	78	54	50
	24/01/2021	73	53	48
	25/01/2021	84	58	51
	26/01/2021 *	75	57	54
Night-time Period (23:00-07:00)				
LT1 – Jones Road	22/01/2021	92	66	41
	23/01/2021	86	64	40
	24/01/2021	92	69	43
	25/01/2021	89	69	41
LT2 – South east of A66	22/01/2021	74	51	37
	23/01/2021	67	49	36
	24/01/2021	86	52	38
	25/01/2021	70	53	36
LT3 – Bolckow Road	22/01/2021	75	51	45
	23/01/2021	73	49	43
	24/01/2021	73	52	44
	25/01/2021	68	52	42

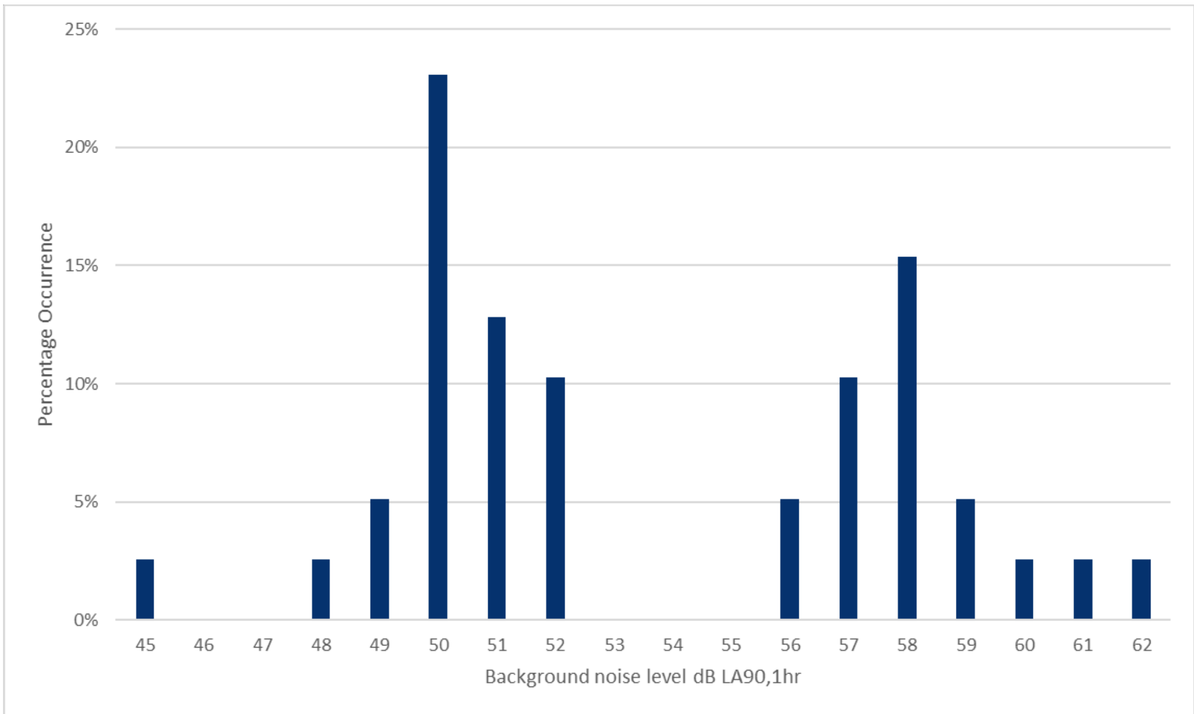
* Not full daytime measurements

APPENDIX C
BACKGROUND NOISE LEVEL STATISICAL ANALYSES

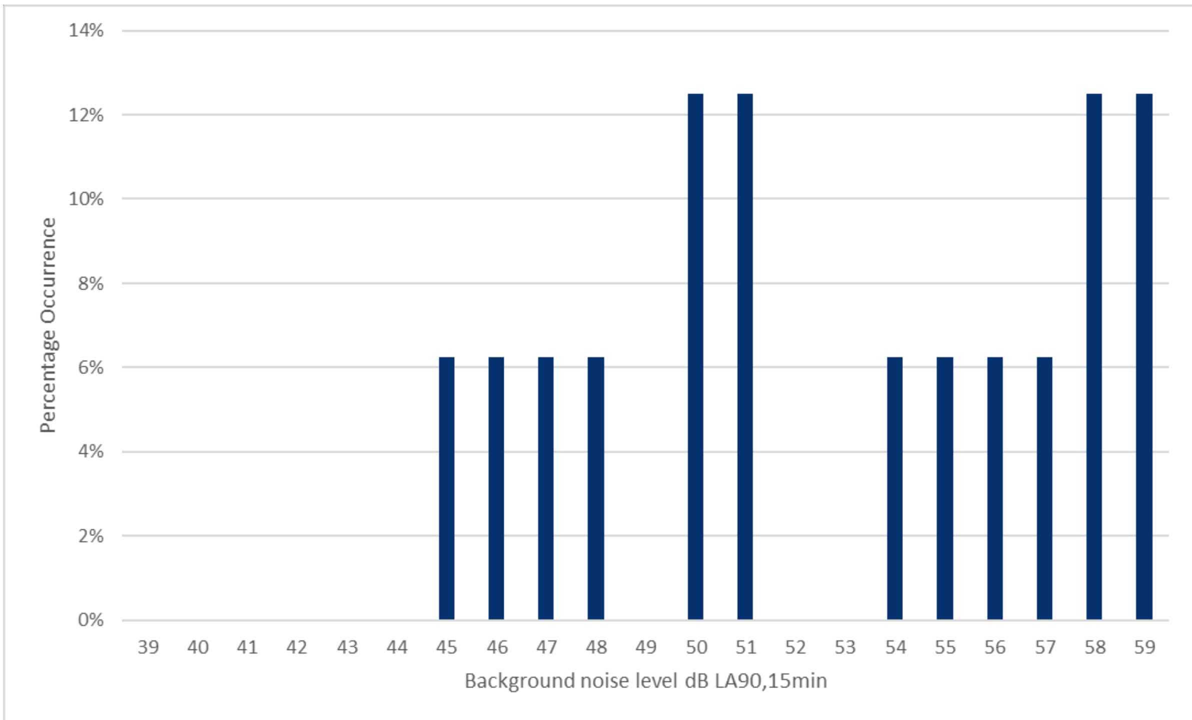
LT1 All daytime periods (07:00-23:00)



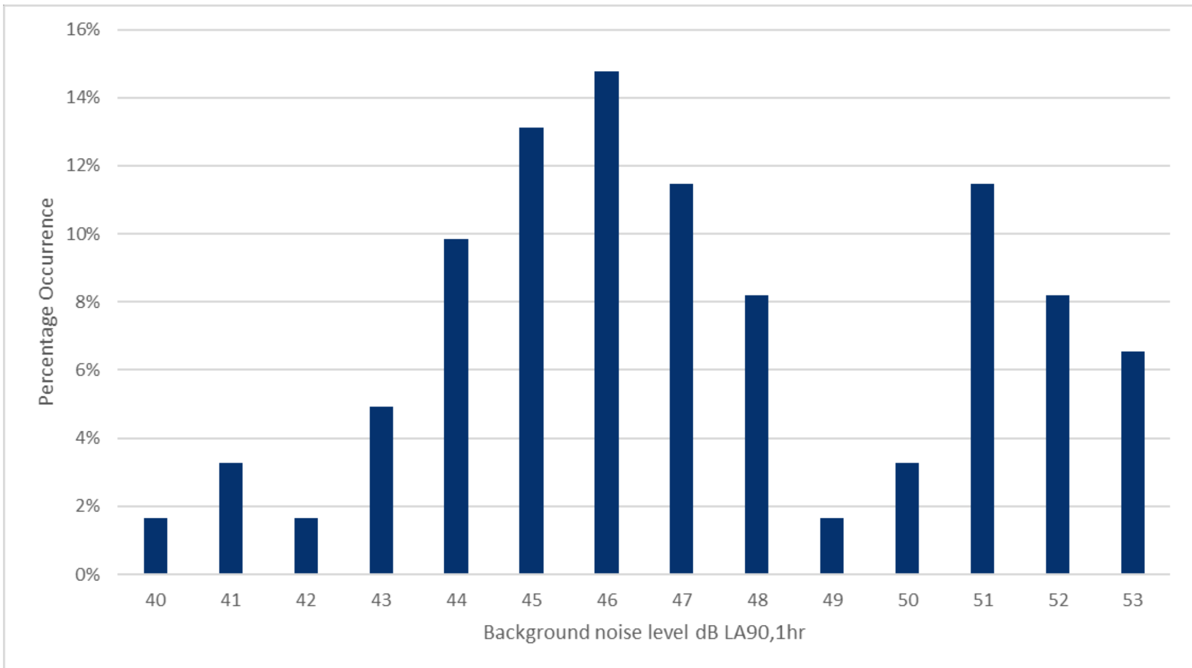
LT1 Daytime (07:00-18:00) for Average Hour assessment



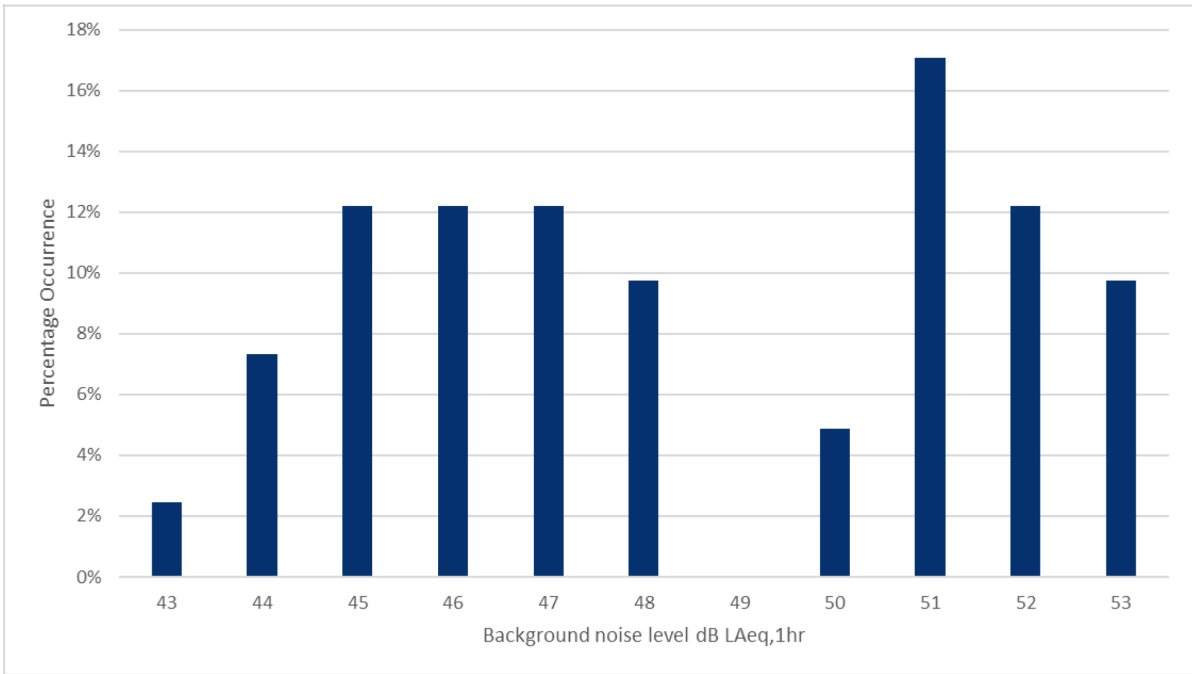
LT1 Night-time (06:00-07:00)



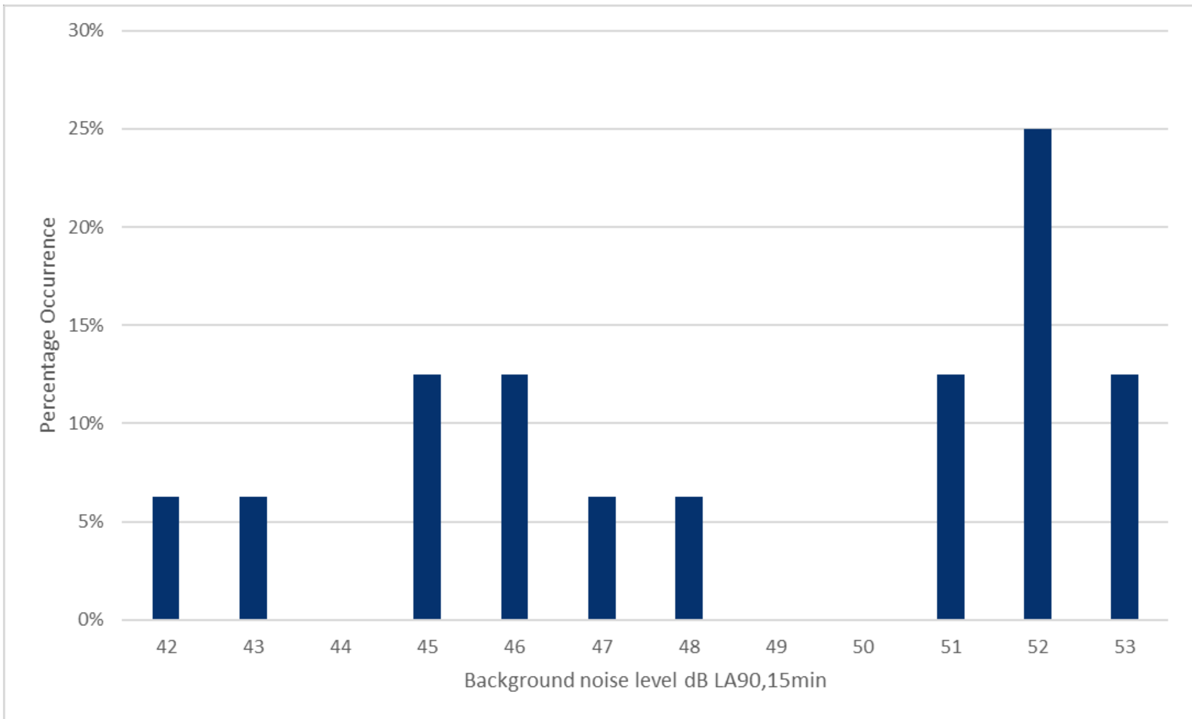
LT2 All daytime periods (07:00-23:00)



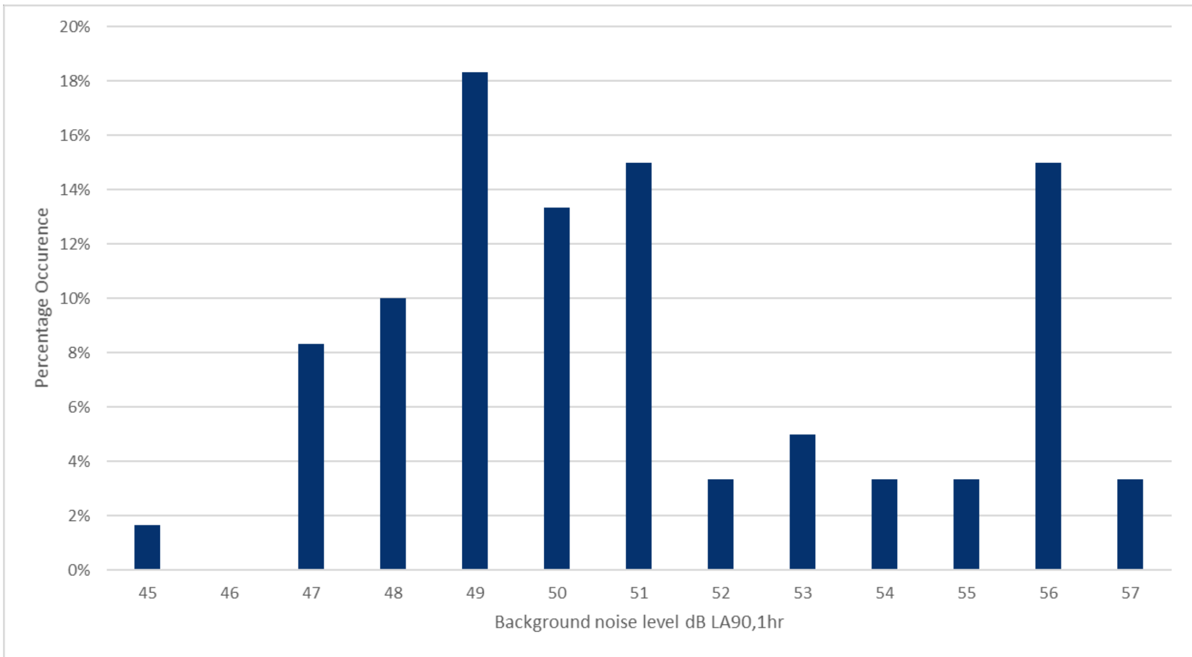
LT2 Daytime (07:00-18:00) for Average Hour assessment



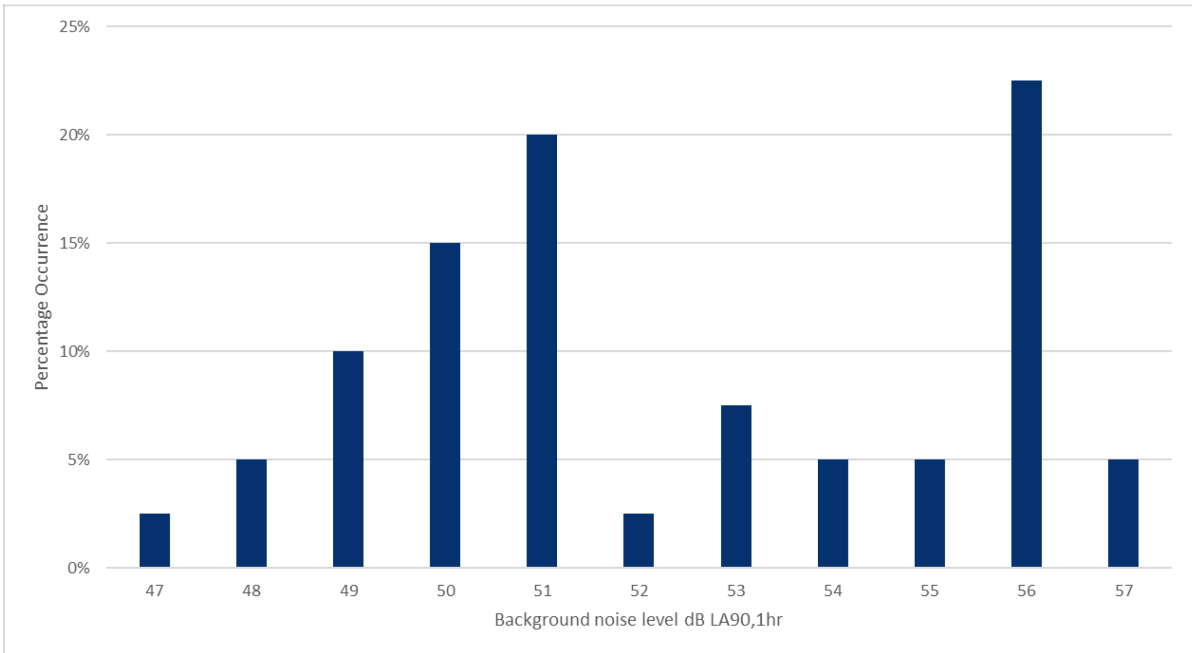
LT2 Night-time (06:00-07:00)



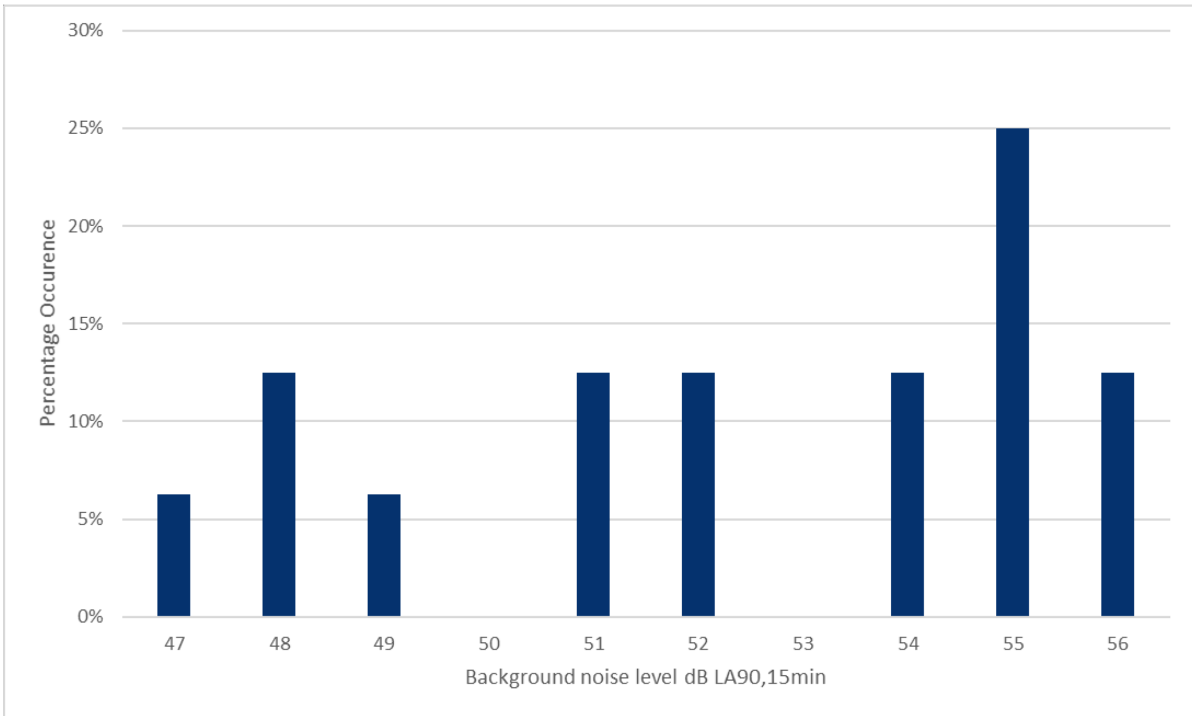
LT3 All daytime periods (07:00-23:00)



LT3 Daytime (07:00-18:00) for Average Hour assessment

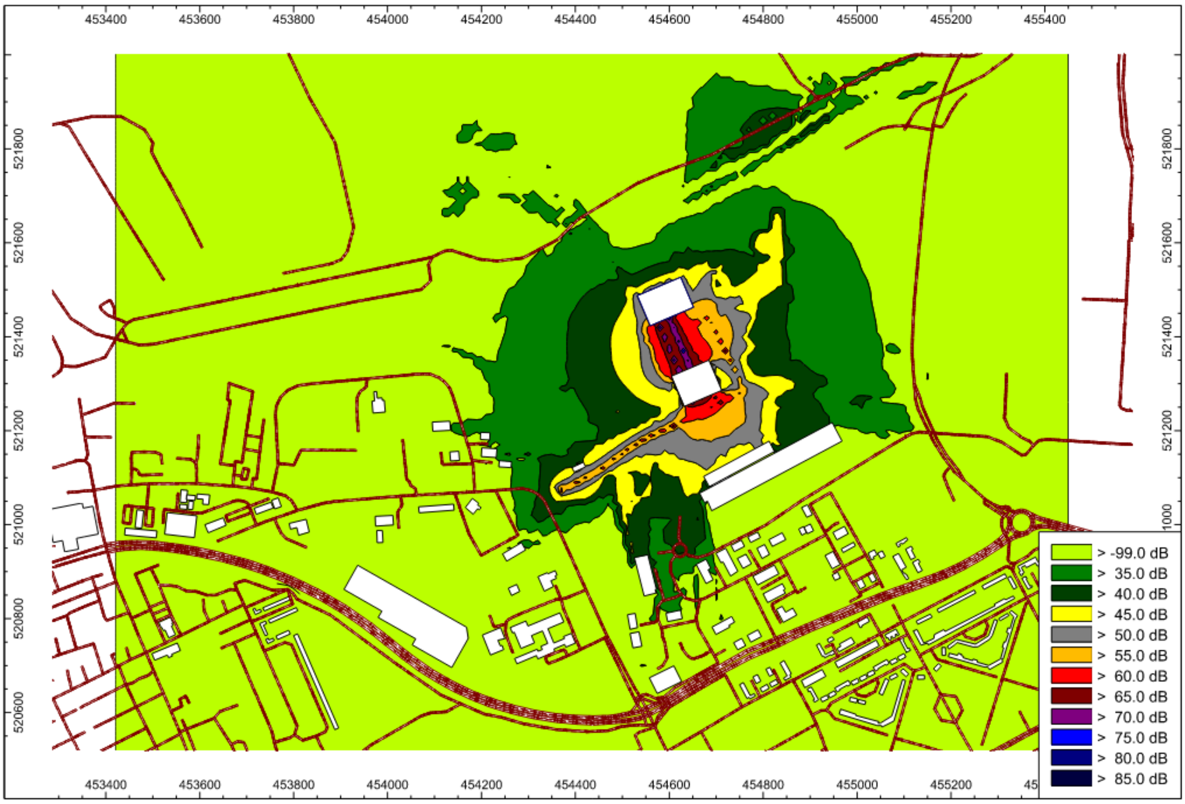


LT3 Night-time (06:00-07:00)



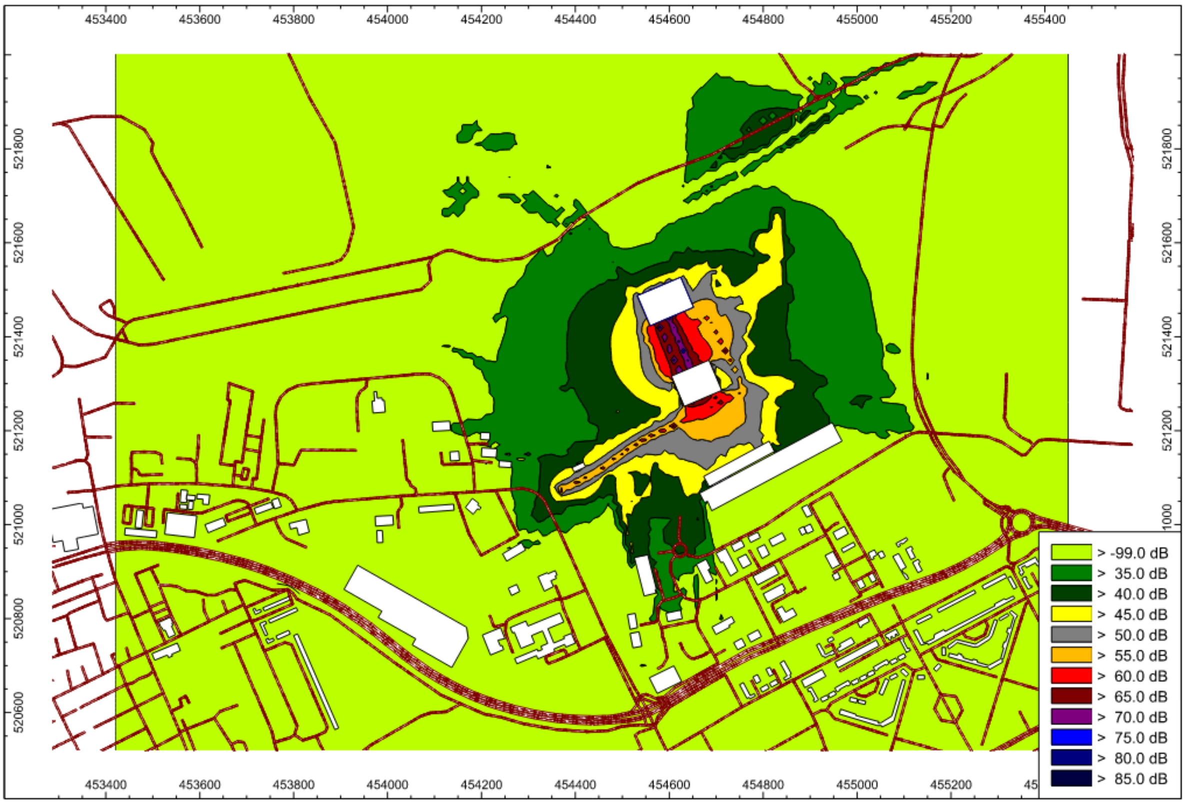
APPENDIX D
NOISE CONTOUR PLOTS

Average hour (07:00-18:00) 1.5m height



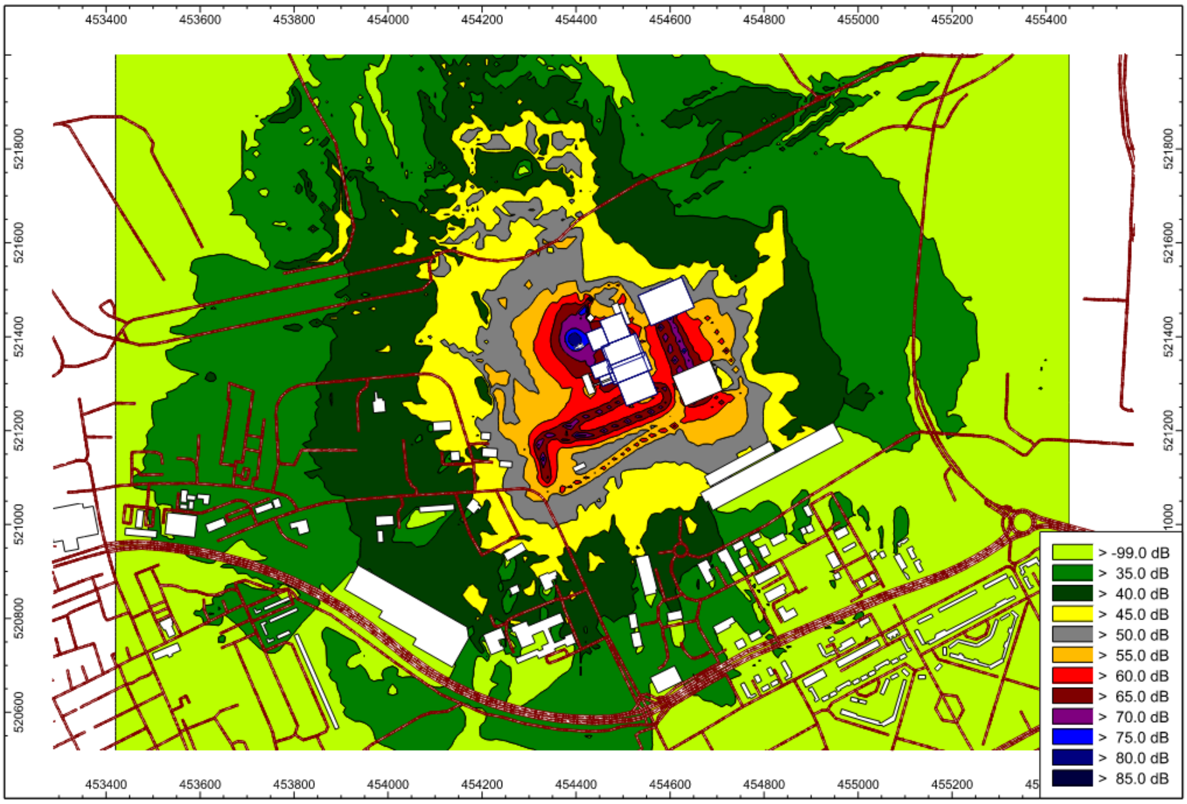
Average hour (07:00-18:00) 4.0m height

Night-time (06:00-07:00) 1.5m height

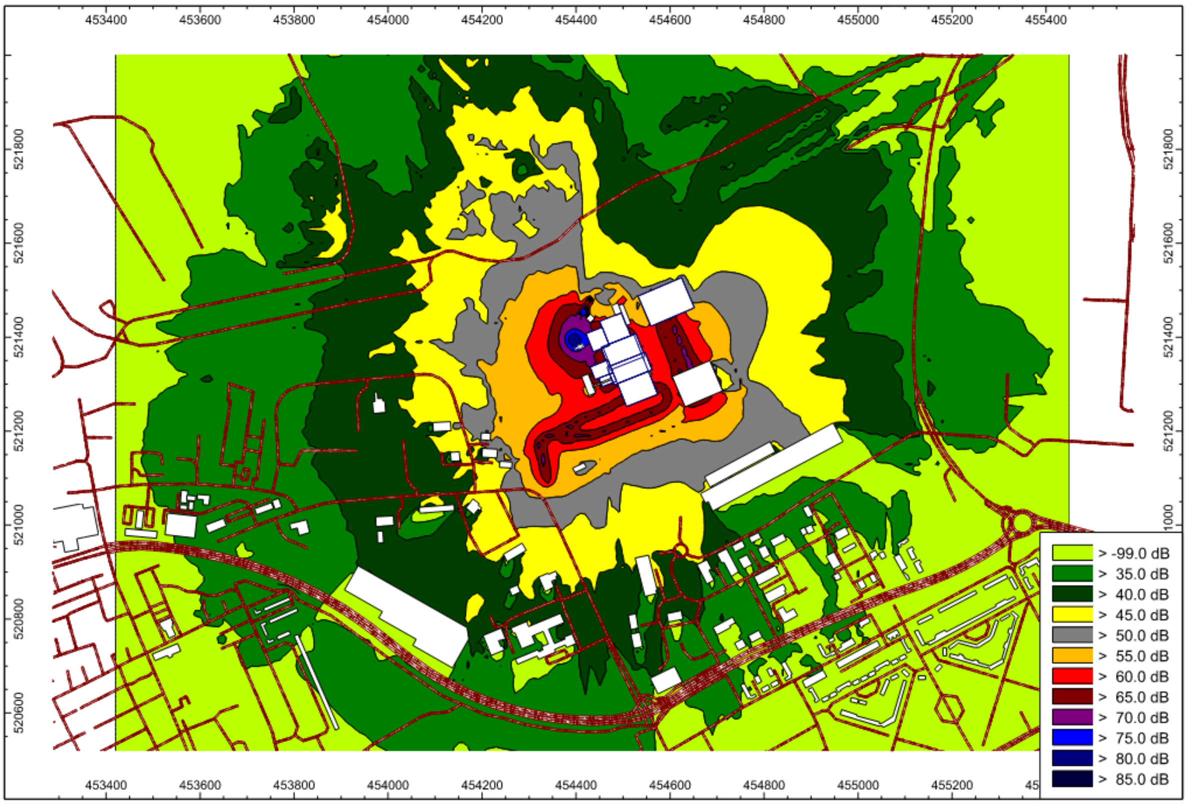


Night-time (06:00-07:00) 4.0m height

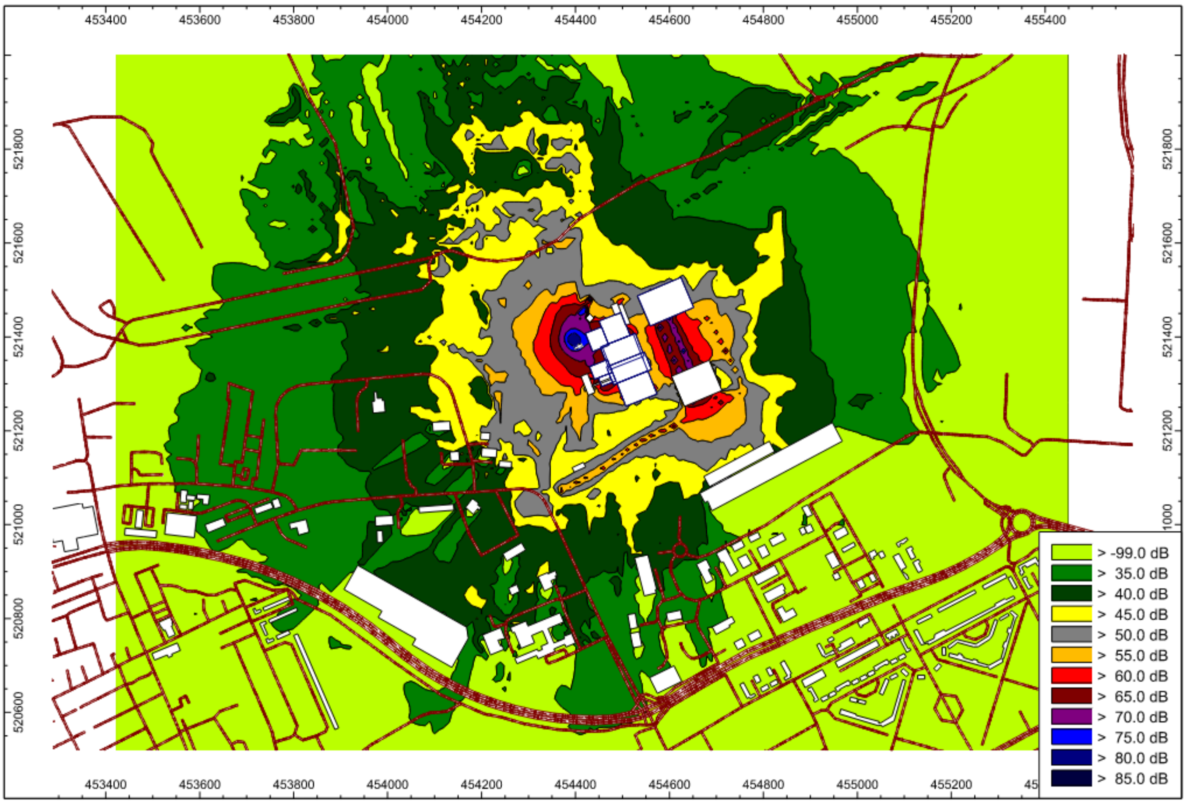
Average hour (07:00-18:00) 1.5m height with ERF



Average hour (07:00-18:00) 4.0m height with ERF



Night-time (06:00-07:00) 1.5m height with ERF



Night-time (06:00-07:00) 4.0m height with ERF