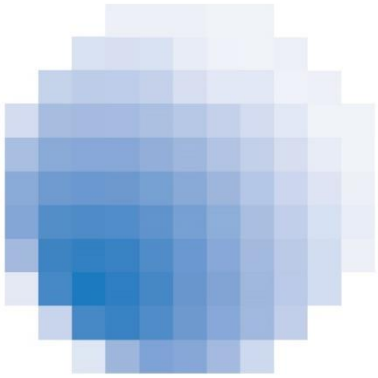

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Power Consulting Midlands Ltd.

Biomass Power Station

Woodham Road, Barry, Wales

Environmental Noise Impact Assessment

14 July 2017

PROJECT:	Power Consulting Midlands Ltd. Barry Biomass Power Station Woodham Road, Barry, Wales
	Environmental Noise Impact Assessment
CLIENT:	Power Consulting Midlands Ltd 14 Prime Enterprise Park Prime Park Derby DE1 3QB
DOCUMENT REFERENCE:	P1714-REP02-Rev A-SJF
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DATE:	14 July 2017

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NON-TECHNICAL SUMMARY

Biomass UK No.2 Ltd (the 'Applicant' or the 'Operator') is making a New Bespoke Installation Permit Application for the proposed operation of a renewable energy generation facility that incorporates Advanced Thermal Treatment (ATT, gasification) at their site on Woodham Road, Barry.

The proposed installation is located on land at Woodham Road, Barry, CF63 4JE (OS Grid Reference ST 12610 67683).

The proposed development is a renewable energy generation facility which has been designed to recover energy from pre-prepared mixed waste wood feedstocks using gasification. The gasification facility is an Advanced Thermal Treatment (ATT) process that will produce a combustible synthesis gas, which is then used to raise steam and generate electricity, through steam cycle turbine generation.

The ATT plant is designed to process shredded mixed waste wood feedstocks to produce heat, in order to generate steam in a conventional tube boiler for subsequent utilisation in a steam turbine, for the production of renewable electricity (with an export capacity up to 10MWe).

In terms of the basic, proposed plant operation, shredded mixed waste wood will be delivered directly into the Fuel Reception Building, during daytime hours only, via electrically operated fast roller shutter doors. When required by the plant, the shredded wood will be discharged onto the feedstock conveyor system, which will deliver the waste into the gasification building.

The gasifier is independently fed with the fuel feedstocks from the Fuel Reception Building via a feedstock feed system. The feeding system comprises a material screen and metal separator to remove any oversize materials and metals from the feedstock. A chain conveyor will transport the waste wood into the gasifier metering bins.

The gasification line will have a dedicated baghouse (bag filter system) designed with sufficient capacity to remove all submicron dust particles.

An air cooled condenser circuit is employed to cool the exhaust steam from the turbine exit back to liquid state (condensate), so that it can be re-used by the boiler.

As part of the Permit Application, it is necessary to provide a comprehensive acoustic assessment, which, among other things, provides full details of the anticipated environmental noise output of the complete, proposed installation, as arising from all individual plant and processes individually quantified, all as occurring at all noise sensitive receptors (NSRs) within the vicinity of the plant, as compared to the measured, pre-existing daytime and night time noise climate in each case, and taking full account of the effects of all proposed, clearly defined noise mitigation measures, such as the use of acoustically enclosed plant, stack silencers, uprated building envelope wall constructions and acoustic cladding *et al*.

Furthermore, Natural Resource Wales (NRW) have raised a series of specific queries in relation to the proposed scheme ("Schedule 5 request", as tabled May 2017), which this report seeks to address.

Accordingly, therefore, the environmental noise emissions from the proposed development, as arising from all plant and processes (excluding emergency-only plant such as fire pumps), has been assessed and reported herein, as modelled using proprietary CadnaA 3D acoustic software.

This environmental noise impact assessment, which supersedes the earlier Entran acoustic assessment, considers the calculated environmental noise impact as arising during daytime and night time periods, including weekends, to all identified NSRs.

It is the conclusion of the environmental noise modelling exercise that the total, aggregate environmental noise arising from the proposed operation of the installation will not be adverse at any NSR, during either daytime or night time periods, all as assessed in accordance with British Standard BS4142:2014 'Methods for rating and assessing industrial and commercial sound', all as required by Environment Agency information requirements for Permit Applications that include computer modelling or spreadsheet calculations, as in this case.

Of the various plant noise sources, the acoustic assessment and noise models incorporate, and quantify, a site-wide noise mitigation plan, all as based on adopting Best Available Techniques (BAT). Accordingly, a specific, comprehensive inventory of noise mitigation measures forms a key part of the assessment; these measures specifically include the bespoke, proprietary acoustic enclosure of many plant items, custom-designed high acoustic performance splitter silencer to ID Fan main stack and suchlike.

Please refer to the main report and appendices for further information.

1.0 INTRODUCTION

This document has been prepared on behalf Power Consulting Midlands Ltd (PCML) by Sol Acoustics Ltd (Sol).

Biomass UK No.2 Ltd (the 'Applicant' or the 'Operator') is making a New Bespoke Installation Permit Application for the proposed operation of a renewable energy generation facility that incorporates Advanced Thermal Treatment (ATT, gasification) at their site on Woodham Road, Barry.

The proposed development is located on land at Woodham Road, Barry, CF63 4JE (OS Grid Reference ST 12610 67683).

The proposed installation is a renewable energy generation facility which has been designed to recover energy from pre-prepared mixed waste wood feedstocks using gasification.

The gasification facility is an Advanced Thermal Treatment (ATT) process that will produce a combustible synthesis gas, which is then used to raise steam and generate electricity, through steam cycle turbine generation.

Natural Resources Wales (NRW) is the Regulator for operational environmental noise as arising from the new installation.

As part of the Permit Application, it is necessary to provide a comprehensive acoustic assessment, which, among other things, provides full details of the anticipated environmental noise output of the complete, proposed installation, as arising from all individual plant and processes individually quantified, all as occurring at all noise sensitive receptors (NSRs) within the vicinity of the plant, as compared to the measured, pre-existing daytime and night time noise climate in each case, and taking full account of the effects of all clearly defined, proposed noise mitigation measures, such as the use of acoustically enclosed plant, stack silencers, uprated building envelope wall constructions and acoustic cladding *et al.*

Furthermore, NRW have raised a series of specific queries in relation to the proposed scheme ("Schedule 5 request", as tabled May 2017), which this report, appendices and accompanying submitted information (e.g. environmental noise modelling files) seeks to address.

This environmental noise impact assessment, which supersedes the earlier issued Entran acoustic assessment, considers the calculated environmental noise impact as arising during daytime and night time periods, including weekends, to all identified NSRs.

In essence, the acoustic design process and mitigation strategy followed herein is as follows:

- The pre-existing residual noise climate at all noise sensitive receptors (NSRs) has been established through detailed, long term environmental noise monitoring at multiple locations, including during weekdays and weekends, excluding known times of site construction activities. The detailed background noise data obtained from the noise surveys forms the basis of the acoustic assessment, Noise Plan and mitigation strategy for the site.

- The complete site environmental noise sources, in their entirety and specifically including all mobile plant and delivery vehicles as well as fixed mechanical plant and site building envelope (walls, roofs, doors etc.), form the basis of highly detailed computer 3D environmental noise models, as built using proprietary "CadnaA" software. (The various CadnaA computer model files form part of this submission).

- The CadnaA computer models specifically encompass daytime and night time periods, in order to separately assess the site noise impacts at such times. (Clearly, the night time site noise assessment requirements are more onerous than for daytime periods, as due to the lower pre-existing residual and background noise levels at NSRs, as measured at such times).

- The noise models provide a detailed inventory of all the site noise sources and processes, as based on noise source data obtained direct from respective plant manufacturers and/or direct, dedicated noise surveys of similar plant and installations by Sol in many instances, and with proposed noise mitigation measures applied, all as ranked in order of their acoustic significance for each of the three identified NSRs.

- The various proposed noise mitigation measures are all specifically as based on adopting Best Available Techniques (BAT).

- A specific, comprehensive inventory of noise mitigation measures, as described herein forms a key part of the assessment; these measures specifically include the bespoke, proprietary acoustic enclosure of many plant items, custom-designed high acoustic performance splitter silencer to ID Fan main stack and suchlike, as well as prohibiting site night time deliveries and certain, specific plant operations such as “soot blowing” during night time periods.

- The total, aggregate environmental noise as arising from the proposed operation of the installation will be very extensively and appropriately mitigated such that it shall not be adverse at any NSR, as during either daytime or night time periods, all as assessed in accordance with British Standard BS4142:2014 *‘Methods for rating and assessing industrial and commercial sound*’.

The remainder of this acoustic report is structured as follows:

- Section 2 provides a basic description of the site and surrounding receptors, together with proposed daytime only and night time operations.

- Section 3 provides a summary explanation of the applicable Natural Resource Wales (NRW) guidance and basis of assessment in respect of environmental noise impact and its mitigation.

- Section 4 gives summary details of the background noise benchmarking surveys undertaken, in order to determine the pre-existing daytime and night time, weekday and weekend background noise climate at the NSRs.

- Section 5 provides a summary of the proprietary 3D acoustic models constructed, and acoustic calculations undertaken.

- Section 6 provides a BS4142 acoustic assessment, and summary description of all environmental noise mitigation to plant and processes.

- Section 7 provides a conclusion statement.

The various technical appendices associated with this report are as follows:

- Appendix A – Glossary of Acoustic Terms
- Appendix B – Noise Survey Details and Summary results
- Appendix C – Detailed Site Plan Annotated with all Modelled Site Noise Sources
- Appendix D – Environmental Noise Modelling Results
- Appendix E – Inventory of Noise Sources and Noise Mitigation
- Appendix F – Architectural Specifications and Building Elevations
- Appendix G – Building Noise Break-out Calculations
- Appendix H – Source, Receiver and Object Grid References
- Appendix I – Response to NRW Schedule 5 Request
- Appendix J – Details of Sol personnel and qualifications

2.0 DESCRIPTION OF SITE

2.1 General Overview of the Site and Surroundings

The proposed development site for the proposed Biomass Power Station is located off Woodham Road, Barry, Wales CF63 4JE (Grid Reference ST 12610 67683). The development is currently under construction.

The site is located in an industrial area with other pre-existing commercial premises in the immediate vicinity, as located directly to the north, east and west.

The nearest identified noise sensitive receptors (NSRs) are as shown on Figure 1, and are follows:

- Two-storey residential properties on Dock View Road c.250m to the north west of the development site boundary (“Position 1”).

- Three-storey residential proposed on Cei Dafdd c.370m to the west of the development site boundary (“Position 3”).

In addition to the above, it is understood that a planning application for a new build residential site has been considered on the current open land to the west of Cory Lane, c.177m to the west of the development site boundary (“Position 2”). As such, it is appropriate to consider the potential noise impact arising from the development on this potential future noise sensitive receptor.

Figure 1 shows a historic satellite image of the general site plan and extent of the site boundary relative to surrounding area, together with the location of the nearest (and pertinent) noise sensitive receptors (NSRs), and the location of the two environmental noise measurement positions.

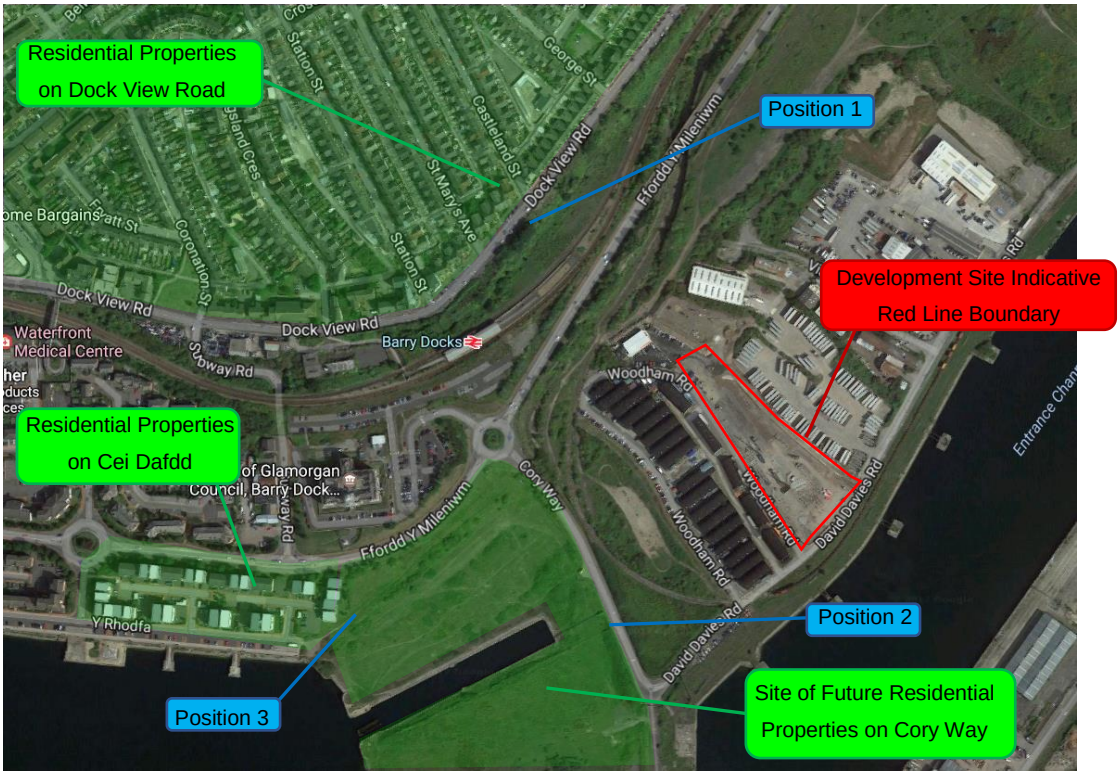


Figure 1: Barry Biomass Power station, Woodham Road, Barry

2.2 Characteristics of the Installation

Figure 2 shows the proposed site layout, including building references.

Figure 3 identifies the major site plant, buildings and processes.

2.2.1 Fixed Plant and Processes

The proposed Installation will comprise of the construction and operation of an Advanced Thermal Treatment (ATT) gasification line which will typically process 86,400 tonnes of shredded mixed waste wood feedstocks per annum.

The main features of the proposed Installation, as described in this document are as follows:

- *Fuel Reception Building:* For the delivery and reception of mixed waste wood feedstocks;
- *Waste Processing:* For the screening and sampling of the fuel feedstocks before being delivered to the gasification unit;
- *Fluidised Bed Gasification System:* Comprising a gasification line for the thermal conversion and combustion of syngas from the fuel feedstocks;
- *Steam Turbine Generator:* Comprising a steam turbine and generator for the conversion of steam into electricity within a steam turbine; and
- *Gas Cleaning and Pollution Abatement Plant:* Consisting of selective non-catalytic reduction (SNCR) and selective catalytic reduction (SCR) for the reduction of Nitrogen Oxides (NOx), sorbent injection for acid gas neutralisation and activated carbon powder injection for absorption and removal of heavy metals, dioxins, VOC and other harmful substances.

Appendix E provides an inventory of plant and processes.

Appendix F provides details of the proposed constructional, and acoustic specifications of the various key site buildings (these being germane to noise egress calculations from site buildings).

2.2.2 Site Deliveries and Collections

PCML have confirmed the following external HGV and mobile plant operations will be applicable to the proposed operation of the plant; these form the basis of all acoustic calculations, modelling and assessment:

- **Fuel Deliveries** - Deliveries of biomass fuel and urea prills can occur between 07:00 to 19:00 hours Monday to Saturday inclusive, and between 08:00 and 16:00 hours on Sunday. Up to 15 deliveries per day of biomass fuel could be expected and up to two deliveries of urea prills per week could be expected. The designated route for deliveries are shown in Figure 4.

- **Waste Collections** – Waste collections can occur between 07:00 and 19:00 hours Monday to Saturday inclusive, and between 08:00 and 16:00 hours on Sunday. Waste ash collections will occur once every ten days. Other waste collections such as removal of waste, and collections of rejected fuel also are expected at a frequency of approximately once per day. The designated route for waste collections is shown in Figure 5.

- **External site operations** – Limestone, hydrated lime and bed material shall be moved into the Main Processing building via a single forklift. It is understood that these operations are relatively infrequent and would be conducted during the daytime only: the limestone tank will require filling once per month, the bed material will be replenished up to 4 to 5 times per year and the hydrated lime will be stocked approximately twice a month. The designated route of these operations to the MPB are shown in Figure 5.

- **Other** – Light personnel vehicles are expected to be used by staff changing their shifts and visitors which could occur at any time. However, these minor movements are not considered as part of this noise impact assessment.

Figure 2: Proposed site plan

Figure 3: Major site plant, buildings and processes

Figure 4: Site delivery routes

Figure 5: Ash Collection and MPB access routes

3.0 BASIS OF ASSESSMENT

3.1 Basic Overview

Natural Resources Wales (NRW) is the regulating authority in terms of permissible environmental noise, and it requires a robust and informative environmental noise assessment to be conducted, in order to grant a Permit.

The actual information requirements are all as stated on the Environment Agency (EA) '*Information requirements for permit applications that included computer modelling or spreadsheet calculations'* (Version 4, April 2016). This report, appendices and modelling computer files submission seeks to address these various EA requirements, in addition to specific NRW Schedule 5 request as applicable to this project.

The objective and requirement is, of course, the limitation of environmental noise impact to noise sensitive receptors (NSRs), as arising from the aggregate operation of a given installation, with due consideration of site noise sources and processes - and specifically therefore, a clear demonstration of both the avoidance of significant impact from the operation of the plant, and also the clear utilisation of Best Available Techniques (BAT) for the mitigation and control of environmental noise, per specific plant noise source and/or process.

3.2 BS4142: 2014 Assessment

BS 4142: 2014: *Method for rating and assessing Industrial and commercial sound* (BS 4142) is specifically cited within applicable EA guidance. This Standard is intended to be used in order to assess the impact arising from noise of an industrial nature, which includes sound from fixed installations, which comprise mechanical and electrical plant and equipment.

The procedure contained in BS 4142 is to compare the measured, or in this case predicted noise level as arising from the source in question, with defined "penalty" applied where the noise is to contain 'specific sound features', to obtain the 'Rating Level', with the typical background noise level.

The Standard advises that where 'specific sound features' are present, a penalty of +3dB can be applied to the Specific Sound Level (i.e. the total, calculated, aggregate plant noise level at each NSR in this instance, daytime and night time), in order to obtain the Rating Level.

BS 4142 states that the significance of sound of an industrial and/or commercial nature depends upon both the margin by which the Rating Level exceeds the background sound level and the context in which the sound occurs. Typically, the greater this difference, the greater the resulting environmental noise impact:

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

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

It is thus the case that for a Rating Level which is less than +5dB above the typical background sound level, this is below the Standard defined "adverse impact", i.e. is sub adverse. (As reported in Section 6 of this report, the calculated and assessed night time Rating Level ranges from +2dB to +4dB above background sound level only depending on NSR location, and is between -1dB to -7dB *below* the typical daytime background sound level).

3.3 Utilisation of Best Available Techniques (BAT) for Noise Mitigation and Control

As previously reported, EA noise guidance requires that Best Available Techniques (BAT) for the mitigation of environmental noise impact are duly demonstrated and adopted.

Whilst there is no formal definition of BAT, it is ordinarily the case that the following key elements are required:

- Determination of acoustically significant environmental noise sources (e.g. a comprehensive and exhaustive inventory of all plant noise sources, whether fixed or mobile plant, processes etc., ranked in order of their individually and robustly calculated anticipated noise contribution to each noise sensitive receptor (NSR).

- Determination of achievable and practicable noise control and mitigation measures, per source/process, such that a comprehensive Noise Plan that is targeted, deliverable, adequate, appropriate and effective is achieved.

Appendix E provides full details and demonstration of BAT in noise control terms.

4.0 ENVIRONMENTAL NOISE SURVEY

4.1 Details of Investigation

In order to inform the assessment, an environmental noise survey have been conducted by Sol between 25th May and 5th June 2017. The purpose of this benchmarking environmental noise survey was to determine the prevailing, pre-existing background noise levels at the nearest noise sensitive premises to the proposed biomass power station.

The background noise survey consisted of three measurement positions, which are described below:

- **Noise Monitoring Position 1**: The microphone was positioned approximately 225m to the north west of the site boundary, and approximately 20m to the south of the existing residential premises on Dock View Road, at a height of approximately 2m above local ground level. The background noise levels measured at this position are considered to be representative of those expected at the boundary of the residential premises on Dock View Road.

- **Noise Monitoring Position 2**: The microphone was positioned approximately 190m to the west of the site boundary, at a height of approximately 3m above local ground level. The background noise levels measured at this position are considered to be representative of those expected at the boundary of the proposed future residential premises on Cory Way.

- **Noise Monitoring Position 3**: The microphone was positioned approximately 350m to the west of the site boundary, and approximately 30m to the east of the existing residential premises on Cei Daffd, at a height of approximately 3m above local ground level. The background noise levels measured at this position are considered to be representative of those expected at the residential premises on Cei Dafdd.

All noise monitoring equipment was Type 1 Precision Grade, and the complete measuring systems were field calibrated immediately prior to, and following each of the noise survey periods. (Full details of the noise monitoring systems are retained on file by Sol, including traceable calibration records; these are available for review if needed).

Meteorological data was recorded at Noise Monitoring Position 2 during the course of the noise survey. During the noise survey, the prevailing weather conditions remained favourable for the purposes of environmental noise assessment throughout the entire survey period, with only a light breeze (with a mean wind speeds of 4 m/s), limited periods of rain on 2nd, 4th and 5th June, and with temperatures ranging between 8 – 25°C.

Notwithstanding the weather conditions recorded, the microphone systems were entirely weatherproofed and fitted with all-weather environmental windshields, each with bird spike. Further survey details are provided in Appendix B.

4.2 Pre-Existing Background Noise Climate

Tables 1, 2, and 3 provide a summary of the typical overall, A-weighted noise levels measured at the various noise monitoring locations, in L_{Aeq} and L_{A90} terms, as during daytime and night time periods, including weekdays and weekends. Appendix B provides further information, including detailed noise time-history graphs for all the measured receptor daytime, night time, weekday and weekend background noise survey data.

It should be noted that noise levels measured during the known hours of construction for the Barry Power Station have been excluded from the ambient and background noise levels as reported in the tables below:

Measurement Position	Date	Daytime (07:00 - 23:00)		Night Time (23:00 – 07:00)	
		dB $L_{Aeq,16hour}$	dB $L_{A90,15min}$ (Typical)	dB $L_{Aeq,8hour}$	dB $L_{A90,15min}$ (Typical)
1	Thursday 25 May 2017	60	***50***	58	44
	Friday 26 May 2017	62	56	57	45
	Saturday 27 May 2017	62	55	53	36
	Sunday 28 May 2017	61	55	56	42
	Monday 29 May 2017	60	51	55	***38***
	Tuesday 30 May 2017	61	***50***	55	36
	Wednesday 31 May 2017	61	52	55	35
	Thursday 1 June 2017	61	52	55	36
	Friday 2 June 2017	61	***50***	55	***38***
	Saturday 3 June 2017	61	48	57	40
	Sunday 4 June 2017	62	***50***	55	42
	Monday 5 June 2017	66	54	63	49

Table 1: Summary of typical, measured broadband environmental noise levels at Position 1

Measurement Position	Date	Daytime (07:00 - 23:00)		Night Time (23:00 – 07:00)	
		dB $L_{Aeq,16hour}$	dB $L_{A90,15min}$ (Typical)	dB $L_{Aeq,8hour}$	dB $L_{A90,15min}$ (Typical)
2	Friday 26 May 2017	53	42	55	40
	Saturday 27 May 2017	56	47	47	***37***
	Sunday 28 May 2017	54	40	49	***37***
	Monday 29 May 2017	52	***45***	50	36
	Tuesday 30 May 2017	56	***45***	50	34
	Wednesday 31 May 2017	55	43	50	34
	Thursday 1 June 2017	54	46	49	34
	Friday 2 June 2017	54	46	52	39
	Saturday 3 June 2017	54	48	50	39
	Sunday 4 June 2017	53	***45***	51	***37***
	Monday 5 June 2017	60	49	56	46

Table 2: Summary of typical, measured broadband environmental noise levels at Position 2

Measurement Position	Date	Daytime (07:00 - 23:00)		Night Time (23:00 – 07:00)	
		dB $L_{Aeq,16hour}$	dB $L_{A90,15min}$ (Typical)	dB $L_{Aeq,8hour}$	dB $L_{A90,15min}$ (Typical)
3	Thursday 25 May 2017	52	47	50	39
	Friday 26 May 2017	52	47	51	41
	Saturday 27 May 2017	52	***44***	44	***32***
	Sunday 28 May 2017	50	43	48	38
	Monday 29 May 2017	49	41	44	***32***
	Tuesday 30 May 2017	51	43	43	30
	Wednesday 31 May 2017	49	41	42	30
	Thursday 1 June 2017	50	***44***	45	30
	Friday 2 June 2017	50	***44***	50	34
	Saturday 3 June 2017	51	46	50	36
	Sunday 4 June 2017	50	***44***	45	36
	Monday 5 June 2017	54	46	50	42

Table 3: Summary of typical, measured broadband environmental noise levels at Position 3

4.3 Summary Table of Typical, Measured Background Noise Levels

Table 4 presents a condensed summary the typical daytime and night time background noise levels at each of the three noise measurement positions; these typical background noise levels, as reported, form the basis of the BS4142: 2014 noise assessment provided herein:

Measurement Position	Associated Residential Premises	Assessment Period	Typical Measured Background Noise Level, dB $L_{A90,15min}$
1	Dock View Road	Daytime (07:00 – 23:00)	50
		Night time (23:00 – 07:00)	38
2	Cory Way	Daytime (07:00 – 23:00)	45
		Night time (23:00 – 07:00)	37
3	Cei Dafdd	Daytime (07:00 – 23:00)	44
		Night time (23:00 – 07:00)	32

Table 4: Summary of typical daytime and night time background noise levels

5.0 ENVIRONMENTAL NOISE MODEL

5.1 Methodology and Basis of 3D Environmental Models

In order to predict the likely noise levels impinging on noise sensitive receptors, proprietary 3D computer noise models were created using the DataKustik 'CadnaA' Noise Mapping software. The following assumptions have been made in the generation of the noise models:

(a) The noise model was set up to apply the noise prediction methodology set out in ISO 9613-2: *Acoustics – Attenuation of Sound propagation outdoors – Part 2: General Method of Calculation.*

(b) The model was set to include second order reflected noise from solid structures.

(c) The topography for the development site and the surrounding area, up to and including the nearest noise sensitive premises, has also been taken into consideration in the assessment. This is based upon 3rd party topographical information that has been obtained from emapsite.com.

(d) The noise level impact from noise sources located within buildings have been modelled by determining the level of noise radiated from the external building fabric of the building based upon the assessment methodology provided within British Standard 12354-4:2000: *Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 4: Transmission of indoor sound to the outside*. The total reverberant sound pressure level expected within each building has been determined based on the combined sound power level of all known noise sources expected within each space, the industrial building's room dimensions and based upon the anticipated reverberation time for each space. The sound power level per unit area for each external building element has then been determined by applying a "diffusivity term", as defined in BS 12354-4 and subtracting the calculated composite sound insulation performance of each building face. Specifically, the following reverberation times and diffusivity terms have been assumed:
   a. A reverberation time of 2.5 seconds and a diffusivity term of -3dB have been adopted for the Reception Building and the Main Processing Building Lean-to.
   b. A reverberation time of 2.5 seconds and a diffusivity term of -5dB have been adopted for the Main Processing Building (MPB).
   c. The anticipated reverberation time in the Turbine room has been calculated taking into consideration the specifically proposed sound absorption measures. A diffusivity terms of -3dB has been adopted.

(e) Emergency plant which would only ever be used in case of genuine emergency, and start-up plant, which would only be expected to operate very infrequently, are excluded from the scope of the various noise models.

Figure 6 below provides a three-dimensional view of the noise model used to inform the noise impact assessment.

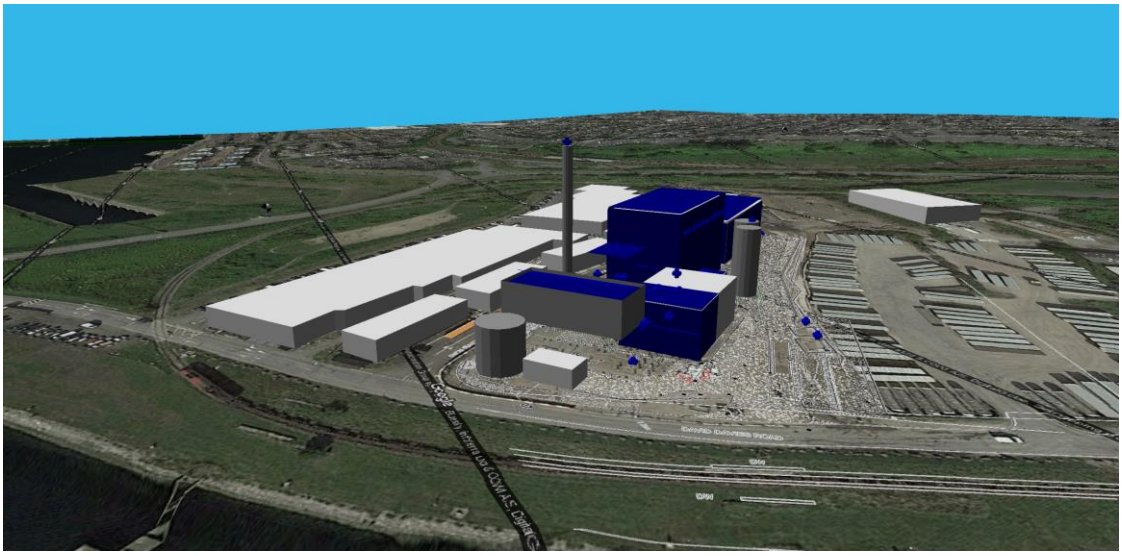


Figure 6: 3D View of the noise model for the proposed Biomass Power Station

Appendix C provides a detailed, fully annotated site plan to show the precise, modelled location of all discrete, external noise sources (e.g. ID Fan, specific conveyors etc.).

Appendix D provides full details of the 3D CadnaA environmental noise models, including detailed noise maps and comprehensive, ranked inventories of all site noise sources and processes, as ordered numerically from the most to least acoustically significant, per receptor, with proposed acoustic mitigation in place (e.g. bespoke, proprietary acoustic enclosure, duct silencers etc., as described herein).

Appendix E provides full details of noise source data, per item, and details of where the reported noise source data is derived from (e.g. vendor, specific Sol noise survey, Contractor's Acoustic Consultant etc.), together with corresponding noise control requirements and means to achieve the requirements (e.g. bespoke, proprietary acoustic enclosure to achieve a minimum insertion loss, as installed). All acoustic model information and acoustic assessments provided herein assumes and requires the full and satisfactory implementation of all the noise control measures stated in Appendix E, or equal and approved in writing.

Appendix F provides constructional specifications and building envelope acoustic performance (sound insulation data) as utilised by the CadnaA 3D models.

Appendix G provides details of spreadsheet based acoustic calculations of composite (compound) building sound insulation, taking various elements such as walls, doors etc. into account in order derive the calculated, resultant sound power level per building façade, as utilised by the CadnaA 3D models.

Appendix H provides full details of all building, noise source and receptor OS grid coordinates.

6.0 ENVIRONMENTAL NOISE IMPACT ASSESSMENT

6.1 BS4142: 2014 Assessment

Table 5 presents the predicted overall A-weighted, BS4142-defined 'Rating Level' at the identified residential noise sensitive receptors. In all cases, the at-receptor noise levels have been predicted at 4.5m above local ground level (in order to approximate the noise levels expected at first storey height for dwellings, bedrooms at night). Appendix D provides full details of 3D CadnaA noise maps.

It should be noted that, as previously reported, a "penalty" of +3dB has been applied to the calculated Specific Noise Levels, as arising at the noise sensitive receptors, in all cases, in order to allow for "readily distinctive" acoustic features, in order to determine the BS4142-defined Rating Level, for acoustic assessment purposes:

Noise Sensitive Receptors	Assessment Period	Predicted Rating Level, dB $L_{Ar,Tr}$ *	Typical Background Sound Level, dB L_{A90}	Rating Level sub. Background ±dB
Dock View Road	Daytime (07:00 – 23:00)	46	50	-4
	Night time (23:00 – 07:00)	41	38	+3
Cory Way	Daytime (07:00 – 23:00)	44	45	-1
	Night time (23:00 – 07:00)	41	37	+4
Cei Dafdd	Daytime (07:00 – 23:00)	36	44	-7
	Night time (23:00 – 07:00)	34	32	+2

Table 5: BS4142 summary assessment

The calculated and assessed *night time* Rating Level ranges from +2dB to +4dB above background sound level only depending on NSR location, and is thus below adverse impact as defined by BS4142.

In the case of daytime periods, the Rating Level is between -1dB to -7dB below the typical daytime background sound level, and is thus an indication of very low impact at such times.

6.2 Noise Mitigation Measures

Appendix E provides full details of all required noise mitigation measures. As previously reported, all acoustic model information and acoustic assessments provided herein assume and require the full and satisfactory implementation of all the noise control measures as stated in Appendix E, or equal and approved in writing.

Appendices F and G describe the various building envelope fabric acoustic enhancements required as part of the overall noise mitigation strategy, specifically to include acoustically uprated roller shutter doors (which furthermore must be actuated and kept closed at all times except for brief daytime only ingress/egress use) and specific acoustic louvre types and specifications.

The following should also be noted:

- All pneumatic blow-offs and solenoids et al, including Baghouse, Silos blow-downs, all to be fitted with Silvent pneumatic silencers or similar.

  http://www.silvent.com/en-uk/products/?group=1702-air-nozzles

- Roller shutter doors shall be kept closed at all times when not in used.

7.0 CONCLUSION

As part of the Permit Application for the Barry site, it is necessary to provide a comprehensive acoustic assessment, which, among other things, provides full details of the anticipated environmental noise output of the complete, proposed installation, as arising from all individual plant and processes individually quantified, all as occurring at all noise sensitive receptors (NSRs) within the vicinity of the plant, as compared to the measured, pre-existing daytime and night time noise climate in each case, and taking full account of the effects of all proposed, clearly defined noise mitigation measures, such as the use of acoustically enclosed plant, stack silencers, uprated building envelope wall constructions and acoustic cladding *et al*.

Furthermore, Natural Resource Wales (NRW) have raised a series of specific queries in relation to the proposed scheme ("Schedule 5 request", as tabled May 2017), which this report seeks to address.

Accordingly, therefore, the environmental noise emissions from the proposed development, as arising from all plant and processes (excluding emergency-only plant such as fire pumps), has been assessed and reported herein, as modelled using proprietary CadnaA 3D acoustic software.

This environmental noise impact assessment, which supersedes the earlier Entran acoustic assessment, considers the calculated environmental noise impact as arising during daytime and night time periods, including weekends, to all identified NSRs.

It is the conclusion of the environmental noise modelling exercise that the total, aggregate environmental noise arising from the proposed operation of the installation will not be adverse at any NSR, during either daytime or night time periods, all as based on the implementation of all detailed noise mitigation measures as described and quantified herein, and all as assessed in accordance with British Standard BS4142:2014 'Methods for rating and assessing industrial and commercial sound'.

Of the various plant noise sources, the acoustic assessment and noise models incorporate, and quantify, a site-wide noise mitigation plan, all as based on adopting Best Available Techniques (BAT). Accordingly, a specific, comprehensive inventory of noise mitigation measures forms a key part of this assessment; these measures specifically include the bespoke, proprietary acoustic enclosure of many plant items, custom-designed high acoustic performance splitter silencer to ID Fan main stack and suchlike.

In specific response to the NRW Schedule 5 request, please refer to Appendix I.

APPENDIX A
GLOSSARY OF ACOUSTIC TERMS

Term	Abbreviation	Description
Sound Pressure Level	L_{pA}	A measure of the sound pressure at a particular location. Typically expressed in dB(A) referenced to $2x10^{-5}$ Pascals.
Equivalent Continuous Sound Level	$L_{Aeq,T}$	The steady level of sound over a prescribed period of time which would contain the same total sound energy as the actual fluctuating noise under consideration in the same period of time.
Statistical Sound Levels	L_{A10} and L_{A90}	The level of noise exceeded for a percentage of the time period being sampled typically either 10% or 90%.
Background Sound Level	$L_{A90,T}$	The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time interval.
Maximum Sound Level	L_{Amax}	The maximum sound or noise level determined with instrumentation set to either a fast time weighting, L_{AFmax}, or a slow time weighting, L_{ASmax}.
Sound Power Level	L_{wA}	A measure of the total sound energy radiated from a source. Like sound pressure levels this is also expressed in dB(A), but instead it is referenced to 10^{-12} W.
Broadband		Over a wide range of frequencies.
Narrow-band		Acoustic Energy over a restricted range of frequencies. Used to ascertain the strength of audible tones, and to assist in identifying particular sources of noise in a complex sound environment.
Ambient Sound		Totally encompassing sound in a given situation at a given time usually composed of sound from many sources, near and far.
Specific Sound Level	$L_{eq,Tr}$	The Equivalent Continuous A-Weighted Sound Level at an assessment position produced by a specific sound over a given referred time interval, *Tr*
Rating Level	$L_{Ar,Tr}$	The Specific Sound Level plus any adjustment for the acoustic characteristic features of the noise (e.g. intermittency, tones etc.)
Residual Noise	$L_{Aeq,T}$	The ambient sound remaining at given position in a given situation when the specific sound source is suppressed to a degree such that it no longer contributes to the ambient sound.
Sound Reduction Index	*SRI*	The reduction in sound energy when transmitted through a panel or similar planar element, used typically in relation to single octave or one-third octave frequency band values.
Weighted Sound Reduction Index	R_w	The Sound Reduction Index expressed as a single figure.
Dynamic Insertion Loss	*DIL*	Reduction in acoustic energy resulting from the insertion of a noise control element (e.g. a silencer).

APPENDIX B

NOISE SURVEY DETAILS AND SUMMARY RESULTS

LOCATION

Barry, Wales

WEATHER CONDITIONS

Date	Daytime (07:00 - 23:00)		Night Time (23:00 – 07:00)	
	Wind Direction	Average Wind Speed, m/s	Wind Direction	Average Wind Speed, m/s
Friday 26 May 2017	S	2	E	2
Saturday 27 May 2017	NW	3	NW	1
Sunday 28 May 2017	SE	1	SE	1
Monday 29 May 2017	SE	2	NW	2
Tuesday 30 May 2017	NW	3	NW	1
Wednesday 31 May 2017	S	1	SW	1
Thursday 1 June 2017	S	2	N/A	0
Friday 2 June 2017	W	2	N	1
Saturday 3 June 2017	NW	2	NW	2
Sunday 4 June 2017	35	2	SW	3
Monday 5 June 2017	SW	4	NW	4

Weather conditions as recorded at noise monitoring position 2.

PERSONNEL PRESENT DURING MEASUREMENTS

Darren Clucas – Sol Acoustics

INSTRUMENTATION

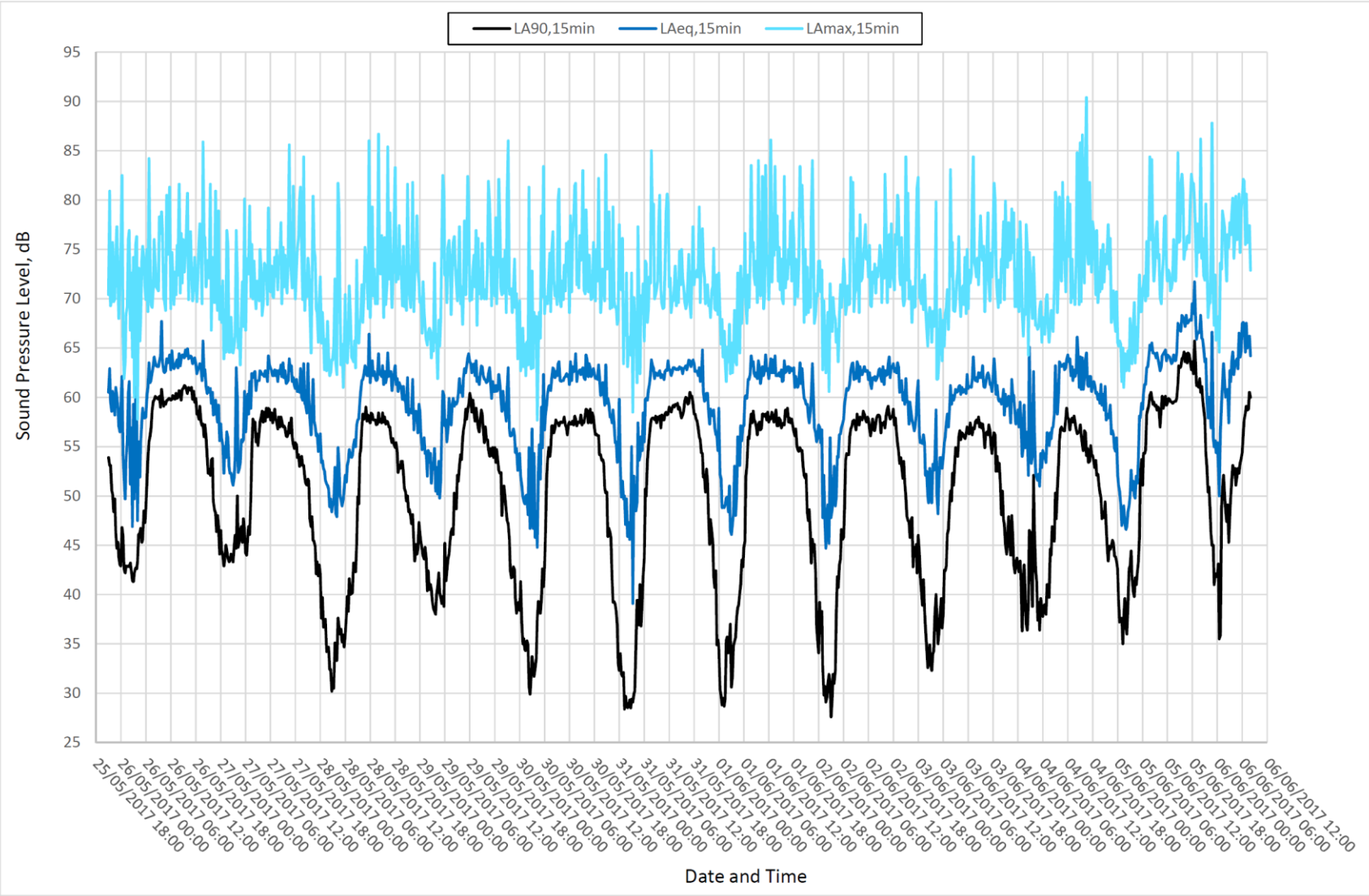
Noise Monitoring Position	Equipment Description	Manufacturer and Type	Serial Number
1	Sound Level Meter	01 dB CUBE	10694
	Pre-amplifier	01 dB PRE22	11118
	Microphone	GRAS 40CD	224223
	Calibrator	01 dB CAL 21	51030984
2	Sound Level Meter	01 dB DUO	10511
	Pre-amplifier	01 dB PRE22	10130
	Microphone	GRAS 40CD	136864
	Calibrator	01 dB CAL 21	51030984
3	Sound Level Meter	01 dB DUO	10500
	Pre-amplifier	01 dB PRE22	10127
	Microphone	GRAS 40CD	137006
	Calibrator	01 dB CAL 21	51030984

METHODOLOGY

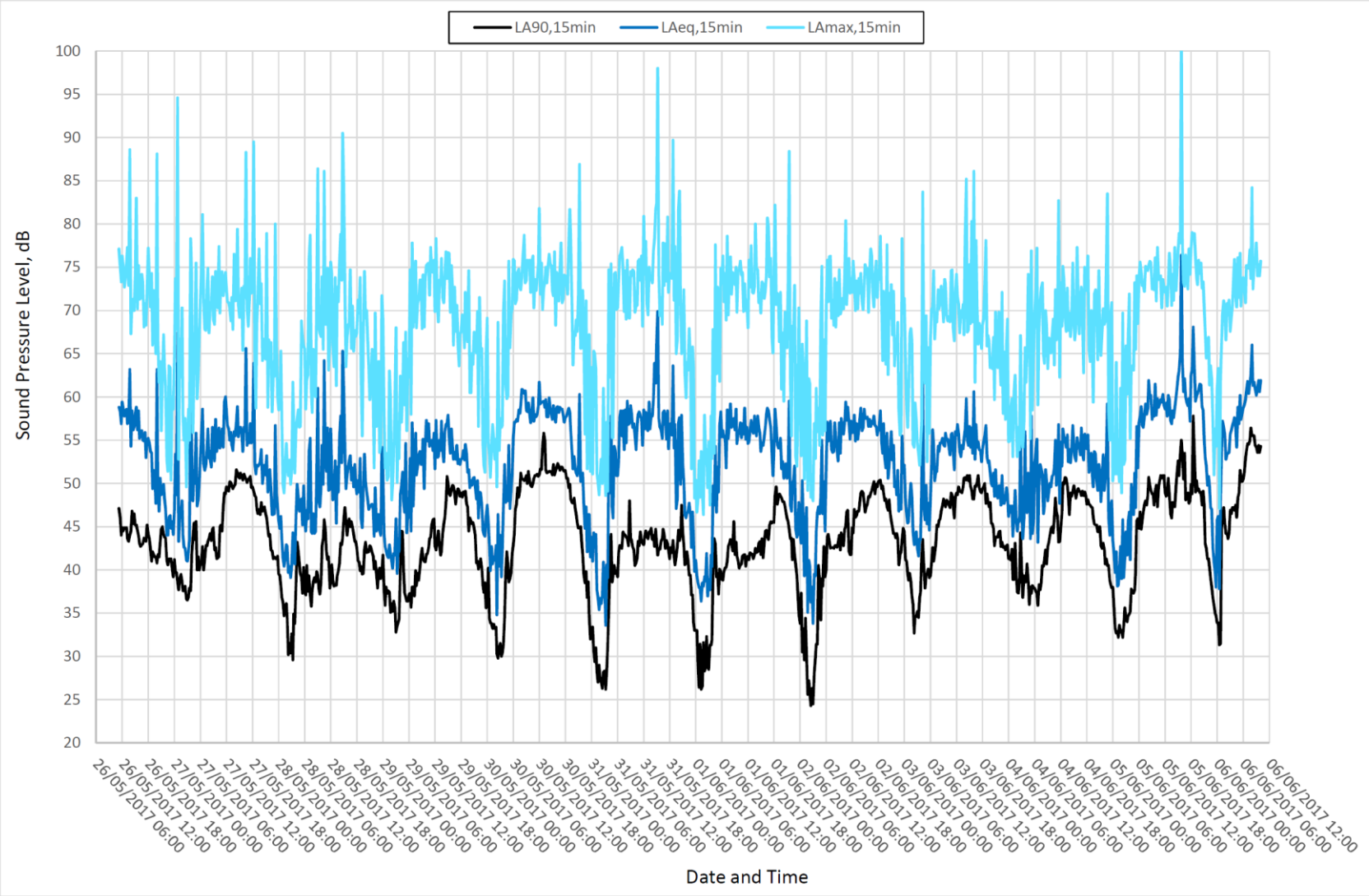
Before and after the measurements the full equipment signal chain were check calibrated to an accuracy of ±0.3dB using the Calibrator. The calibrator produces a sound pressure level of 94 dB re $2x10^{-5}$ Pa @ 1kHz.

MEASUREMENT RESULTS

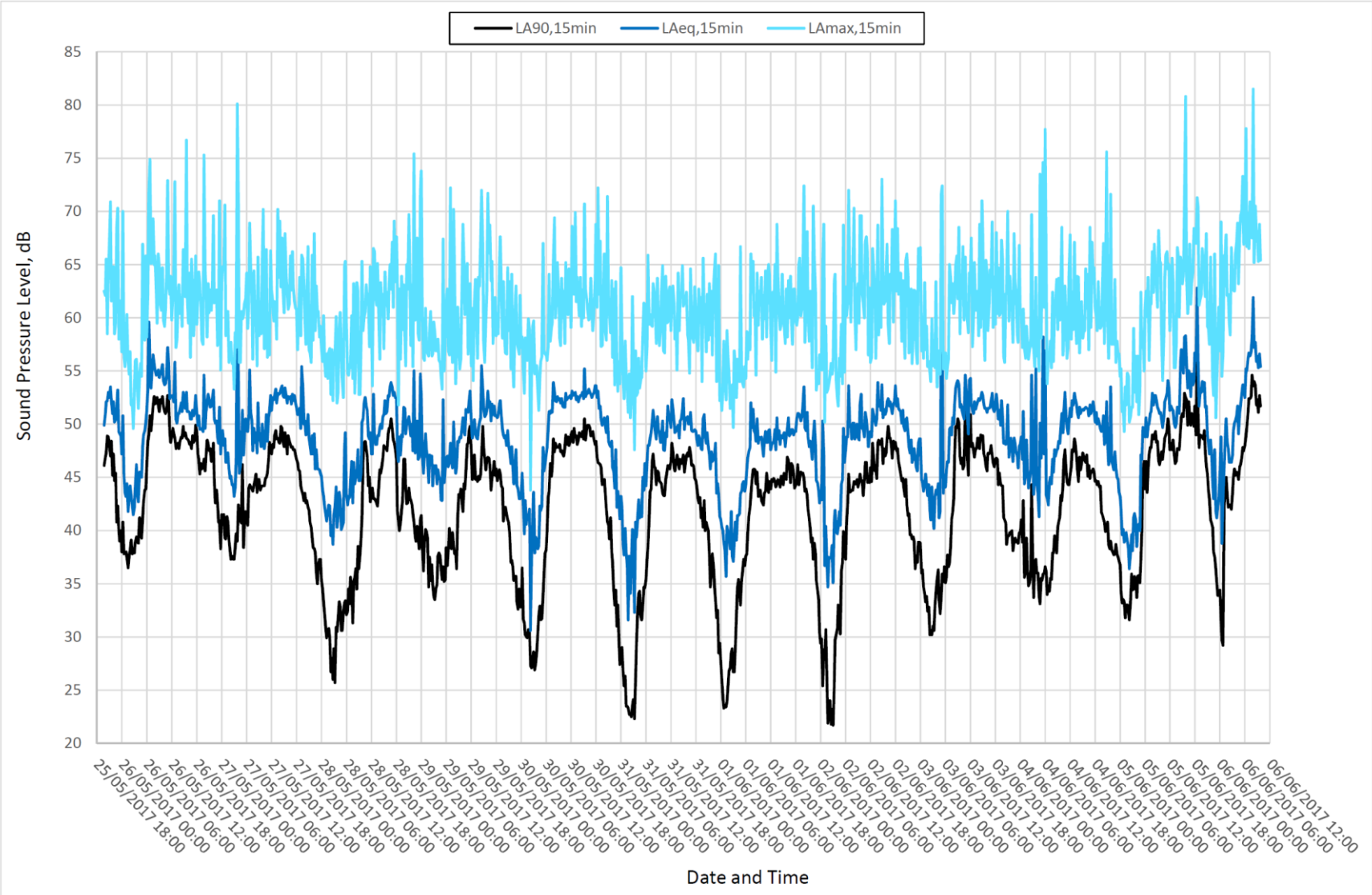
Graphs B1 to B3 summarise the results obtained at Monitoring Positions 1, 2 and 3.



Graph B1: Position 1, 25th May to 6th June 2017



Graph B2: Position 2, 25th May to 6th June 2017



Graph B3: Position 3, 25th May to 6th June 2017

APPENDIX C

SITE PLAN INDICATING IDENTIFIED NOISE SOURCES

Figure C1: Site plan indicating National Grid references x, y coordinates for all external noise sources

APPENDIX D
ENVIRONMENTAL NOISE MODELLING RESULTS

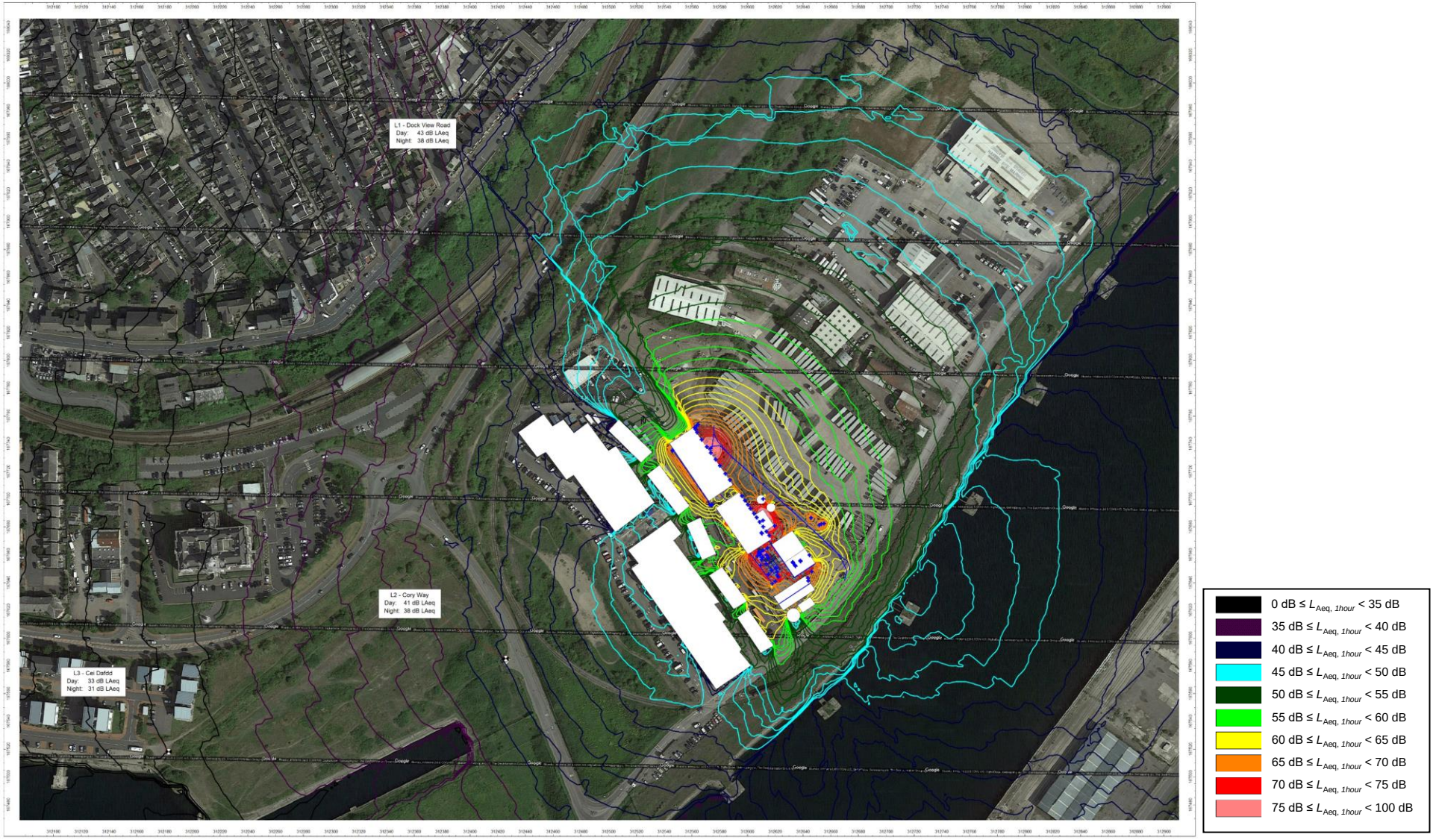


Figure D1: Predicted daytime $L_{Aeq,1hour}$ noise level impact from the Site at 4.5m above local ground level

Figure D2: Predicted night-time $L_{Aeq,15hour}$ noise level impact from the Site at 4.5m above local ground level

Receptor name: L1 - Dock View Road

Day time Partial Levels

Source Description	Day time dB $L_{Aeq,1hour}$
Lorry walking floor	39.6
MPB lean to - NW	29.4
Lorry transit	29.1
MPB Extract ventilation	27.0
MPB Extract ventilation	26.9
MPB Extract ventilation	26.8
Ash conditioner	26.4
Air blast cooler	25.4
Reception Building NE	25.3
MPB lean to - roof	25.2
MPB Extract ventilation	24.7
MPB Extract ventilation	24.6
MPB Extract ventilation	23.9
MPB Extract ventilation	23.8
Reception Building - SW	23.7
Main Processing Building - NE	23.2
ID Outlet	22.7
Collection chain bottom	22.7
MPB lean to - SE	22.7
Reception Building - NW	22.3
MPB Extract ventilation	22.0
MPB Extract ventilation	21.7
MPB Extract ventilation	21.6
MPB lean to - NE	21.2
Reactor	21.0
Push floor hydraulic pack drive	20.3
Reception Building - roof	20.1
DNO transformer	17.9
DNO transformer	17.9
DNO transformer	17.8
Main Processing Building - roof	17.5
ACC top VENDOR alt	17.5
Feed conveyor	17.4
Push floor hydraulic pack drive	17.2
Turbine Building NE	16.6
Turbine building roof	16.4
Main Processing Building - NW	15.7
Main Processing Building - SW	15.1
Reception Building - SE	14.9
Drag chain to MPB	14.1
Push floor power pack cooler	13.6
Push floor power pack cooler	13.6
ID inlet duct wall	13.3
Ash conditioner	13.0
ACC-bottom VENDOR alt	12.3
Reception building extract fan	12.0
Reception building extract fan	11.8
Reception building extract fan	11.6
Reception building extract fan	11.4
Reception building extract fan	11.3
Reception building extract fan	11.1
Reception building extract fan	11.1

Source Description	Day time dB $L_{Aeq,1hour}$
Reception building extract fan	11.0
ST room Vent outlet	10.9
ST room Vent outlet	10.9
ST room Vent outlet	10.8
ST room Vent outlet	10.8
Fuel Feed enclosure	9.2
Disc screen	9.0
APCR conditioner	8.9
Main Processing Building - SE	8.6
Baghouse filter	8.4
Recycle to silo rotary feeder	8.1
APCR convey blower (to recycle silo)	7.8
Flue gas recirculation duct (external	7.2
ACC steam header VENDOR	7.0
ID Discharge duct wall to silencer	6.8
Recycle Drum Rotary feeder	6.7
Conditioning drum drive	5.9
Deaerator outlet vent pipe	5.1
Blowdown tank and outlet	5.1
Collection chain top	4.8
Conditioning drum cooling pump	3.9
Baghouse screw conveyors	3.7
Pneumatic ash conveyor	3.0
ACC vacuum unit (VENDOR)	1.9
Powdered activated carbon (PAC)	1.4
External steam lines	1.4
External steam lines	1.3
External steam lines	0.4
Air blast cooler	0.0
ST bypass and desuperheater valve	0.0
Diesel transfer pump	0.0
Actuated steam relief	0.0
Steam relief vales	0.0
Baghouse gathering screw conveyors	-0.2
Scrubber screw conveyor	-0.3
Glycol/water circulation pump	-0.4
Baghouse gathering screw conveyors	-0.8
ID fan case and motor	-1.2
Turbine Building - SE	-1.7
Baghouse penthouse ventilation fans	-2.7
Hydrated lime rotary feeder	-2.8
Turbine Building - SW	-2.8
Spray scrubber	-2.9
Penthouse Hoist	-3.7
Conditioning drum	-4.1
Penthouse Hoist	-4.2
Conditioning drum blower	-4.3
Bulk Bag Hoist	-6.1
Baghouse penthouse ventilation fans	-6.2
APCR blower	-7.0
Fresh lime conveying blower	-7.2
Condensate pumps	-7.8

Receptor name: L1 - Dock View Road

Night time Partial Levels

Source Description	Night-time dB $L_{Aeq,15min}$
MPB lean to - NW	29.4
MPB Extract ventilation	27.0
MPB Extract ventilation	26.9
MPB Extract ventilation	26.8
Air blast cooler	25.4
MPB lean to - roof	25.2
MPB Extract ventilation	24.7
MPB Extract ventilation	24.6
MPB Extract ventilation	23.9
MPB Extract ventilation	23.8
Main Processing Building - NE	23.2
ID Outlet	22.7
Collection chain bottom	22.7
MPB lean to - SE	22.7
MPB Extract ventilation	22.0
MPB Extract ventilation	21.7
MPB Extract ventilation	21.6
MPB lean to - NE	21.2
Reactor	21.0
Push floor hydraulic pack drive	20.3
Reception Building - roof	20.1
DNO transformer	17.9
DNO transformer	17.9
DNO transformer	17.8
Main Processing Building - roof	17.5
ACC top VENDOR alt	17.5
Feed conveyor	17.4
Push floor hydraulic pack drive	17.2
Turbine Building NE	16.6
Turbine building roof	16.4
Main Processing Building - NW	15.7
Main Processing Building - SW	15.1
Drag chain to MPB	14.1
Push floor power pack cooler	13.6
Push floor power pack cooler	13.6
ID inlet duct wall	13.3
ACC-bottom VENDOR alt	12.3
Reception building extract fan	12.0
Reception building extract fan	11.8
Reception building extract fan	11.6
Reception building extract fan	11.4
Reception building extract fan	11.3
Reception building extract fan	11.1
Reception building extract fan	11.1
Reception building extract fan	11.0
ST room Vent outlet	10.9
ST room Vent outlet	10.9
ST room Vent outlet	10.8
ST room Vent outlet	10.8
Fuel Feed enclosure	9.2
Disc screen	9.0
Main Processing Building - SE	8.6

Source Description	Night-time dB $L_{Aeq,15min}$
Baghouse filter	8.4
Recycle to silo rotary feeder	8.1
APCR convey blower (to recycle silo)	7.8
Flue gas recirculation duct (external	7.2
ACC steam header VENDOR	7.0
ID Discharge duct wall to silencer	6.8
Recycle Drum Rotary feeder	6.7
Conditioning drum drive	5.9
Deaerator outlet vent pipe	5.1
Blowdown tank and outlet	5.1
Collection chain top	4.8
Conditioning drum cooling pump	3.9
Baghouse screw conveyors	3.7
Pneumatic ash conveyor	3.0
ACC vacuum unit (VENDOR)	1.9
Powdered activated carbon (PAC)	1.4
External steam lines	1.4
External steam lines	1.3
External steam lines	0.4
APCR conditioner	0.0
Air blast cooler	0.0
ST bypass and desuperheater valve	0.0
Diesel transfer pump	0.0
Ash conditioner	0.0
Actuated steam relief	0.0
Steam relief valves	0.0
Lorry walking floor	0.0
Reception Building - NW	0.0
Reception Building - NE	0.0
Reception Building - SE	0.0
Reception Building - SW	0.0
Baghouse gathering screw conveyors	-0.2
Scrubber screw conveyor	-0.3
Glycol/water circulation pump	-0.4
Baghouse gathering screw conveyors	-0.8
ID fan case and motor	-1.2
Turbine Building - SE	-1.7
Baghouse penthouse ventilation fans	-2.7
Hydrated lime rotary feeder	-2.8
Turbine Building - SW	-2.8
Spray scrubber	-2.9
Penthouse Hoist	-3.7
Conditioning drum	-4.1
Penthouse Hoist	-4.2
Conditioning drum blower	-4.3
Bulk Bag Hoist	-6.1
Baghouse penthouse ventilation fans	-6.2
APCR blower	-7.0
Fresh lime conveying blower	-7.2
Condensate pumps	-7.8
Lorry transit	-73.9
Ash conditioner	-74.6

Receptor name: L2 - Cory Way

Day time Partial Levels

Source Description	Day time dB $L_{Aeq,1hour}$
Ash conditioner	33.9
APCR conditioner	32.4
Reception Building - SW	32.1
ID Outlet	27.8
Recycle Drum Rotary feeder	26.8
ACC top VENDOR alt	26.2
Main Processing Building - SW	26.1
ACC-bottom VENDOR alt	26.0
Feed conveyor	25.0
Baghouse filter	23.7
Scrubber screw conveyor	23.3
External steam lines	23.1
External steam lines	23.1
External steam lines	23.1
ACC vacuum unit (VENDOR)	22.7
Drag chain to MPB	22.5
ID inlet duct wall	22.2
Powdered activated carbon (PAC)	21.8
Baghouse screw conveyors	21.8
Conditioning drum drive	21.7
Reception Building - SE	21.7
APCR convey blower (to recycle	21.5
ID fan case and motor	21.0
Turbine building roof	21.0
Main Processing Building - roof	20.4
Conditioning drum cooling pump	19.7
Baghouse gathering screw	19.7
Baghouse gathering screw	19.6
ID Discharge duct wall to silencer	19.3
Disc screen	19.3
Recycle to silo rotary feeder	19.3
Fuel Feed enclosure	19.1
Main Processing Building - NW	19.1
Glycol/water circulation pump	19.0
Reception Building - roof	18.9
Flue gas recirculation duct (external	18.7
Main Processing Building - SE	18.4
Hydrated lime rotary feeder	17.6
Spray scrubber	17.0
Pneumatic ash conveyor	17.0
Collection chain top	16.8
Lorry walking floor	16.6
APCR blower	16.4
ACC steam header VENDOR	15.9
MPB lean to - NE	15.5
Baghouse penthouse ventilation	14.3
Baghouse penthouse ventilation	14.2
Reception Building - NW	14.0
Conditioning drum blower	13.7
Bulk Bag Hoist	13.5
Penthouse Hoist	13.5
Penthouse Hoist	13.5

Source Description	Day time dB $L_{Aeq,1hour}$
MPB lean to - NW	13.3
Main Processing Building - NE	12.9
Ash conditioner	12.8
Lorry transit	12.8
Collection chain bottom	12.7
ST room Vent outlet	12.7
ST room Vent outlet	12.7
ST room Vent outlet	12.7
Fresh lime conveying blower	12.6
ST room Vent outlet	12.6
MPB lean to - SE	12.1
Conditioning drum	11.7
Deaerator outlet vent pipe	11.5
Blowdown tank and outlet	11.5
Turbine Building - SW	11.0
MPB lean to - roof	10.9
Reception Building NE	10.2
Condensate pumps	9.0
MPB Extract ventilation	7.7
MPB Extract ventilation	7.2
MPB Extract ventilation	6.1
Turbine Building - SE	6.0
Air blast cooler	5.8
MPB Extract ventilation	5.8
MPB Extract ventilation	5.5
MPB Extract ventilation	5.3
MPB Extract ventilation	5.3
MPB Extract ventilation	5.1
MPB Extract ventilation	5.1
MPB Extract ventilation	5.1
DNO transformer	2.1
DNO transformer	1.8
DNO transformer	1.5
Reactor	0.8
Turbine Building NE	0.5
Air blast cooler	0.0
ST bypass and desuperheater valve	0.0
Diesel transfer pump	0.0
Actuated steam relief	0.0
Steam relief valves	0.0
Reception building extract fan	-4.0
Push floor hydraulic pack drive	-4.9
Reception building extract fan	-6.5
Reception building extract fan	-7.1
Reception building extract fan	-7.6
Push floor hydraulic pack drive	-7.9
Reception building extract fan	-8.0
Reception building extract fan	-8.2
Reception building extract fan	-8.3
Reception building extract fan	-8.3
Push floor power pack cooler	-11.9
Push floor power pack cooler	-11.9

Receptor name: L2 - Cory Way

Night time Partial Levels

Source Description	Night-time dB $L_{Aeq,15min}$
ID Outlet	27.8
Recycle Drum Rotary feeder	26.8
ACC top VENDOR alt	26.2
Main Processing Building - SW	26.1
ACC-bottom VENDOR alt	26.0
Feed conveyor	25.0
Baghouse filter	23.7
Scrubber screw conveyor	23.3
External steam lines	23.1
External steam lines	23.1
External steam lines	23.1
ACC vacuum unit (VENDOR)	22.7
Drag chain to MPB	22.5
ID inlet duct wall	22.2
Powdered activated carbon (PAC)	21.8
Baghouse screw conveyors	21.8
Conditioning drum drive	21.7
APCR convey blower (to recycle	21.5
ID fan case and motor	21.0
Turbine building roof	21.0
Main Processing Building - roof	20.4
Conditioning drum cooling pump	19.7
Baghouse gathering screw	19.7
Baghouse gathering screw	19.6
ID Discharge duct wall to silencer	19.3
Disc screen	19.3
Recycle to silo rotary feeder	19.3
Fuel Feed enclosure	19.1
Main Processing Building - NW	19.1
Glycol/water circulation pump	19.0
Reception Building - roof	18.9
Flue gas recirculation duct (external	18.7
Main Processing Building - SE	18.4
Hydrated lime rotary feeder	17.6
Spray scrubber	17.0
Pneumatic ash conveyor	17.0
Collection chain top	16.8
APCR blower	16.4
ACC steam header VENDOR	15.9
MPB lean to - NE	15.5
Baghouse penthouse ventilation	14.3
Baghouse penthouse ventilation	14.2
Conditioning drum blower	13.7
Bulk Bag Hoist	13.5
Penthouse Hoist	13.5
Penthouse Hoist	13.5
MPB lean to - NW	13.3
Main Processing Building - NE	12.9
Collection chain bottom	12.7
ST room Vent outlet	12.7
ST room Vent outlet	12.7
ST room Vent outlet	12.7

Source Description	Night-time dB $L_{Aeq,15min}$
Fresh lime conveying blower	12.6
ST room Vent outlet	12.6
MPB lean to - SE	12.1
Conditioning drum	11.7
Deaerator outlet vent pipe	11.5
Blowdown tank and outlet	11.5
Turbine Building - SW	11.0
MPB lean to - roof	10.9
Condensate pumps	9.0
MPB Extract ventilation	7.7
MPB Extract ventilation	7.2
MPB Extract ventilation	6.1
Turbine Building - SE	6.0
Air blast cooler	5.8
MPB Extract ventilation	5.8
MPB Extract ventilation	5.5
MPB Extract ventilation	5.3
MPB Extract ventilation	5.3
MPB Extract ventilation	5.1
MPB Extract ventilation	5.1
MPB Extract ventilation	5.1
DNO transformer	2.1
DNO transformer	1.8
DNO transformer	1.5
Reactor	0.8
Turbine Building NE	0.5
Ash conditioner	0.0
APCR conditioner	0.0
Reception Building - SW	0.0
Reception Building - SE	0.0
Lorry walking floor	0.0
Reception Building - NW	0.0
Ash conditioner	0.0
Lorry transit	0.0
Reception Building NE	0.0
Air blast cooler	0.0
ST bypass and desuperheater valve	0.0
Diesel transfer pump	0.0
Actuated steam relief	0.0
Steam relief valves	0.0
Reception building extract fan	-4.0
Push floor hydraulic pack drive	-4.9
Reception building extract fan	-6.5
Reception building extract fan	-7.1
Reception building extract fan	-7.6
Push floor hydraulic pack drive	-7.9
Reception building extract fan	-8.0
Reception building extract fan	-8.2
Reception building extract fan	-8.3
Reception building extract fan	-8.3
Push floor power pack cooler	-11.9
Push floor power pack cooler	-11.9

Receptor name: L3 - Cei Dafdd

Day time Partial Levels

Source Description	Day time dB $L_{Aeq,1hour}$
APCR conditioner	24.2
Reception Building - SW	24.1
Ash conditioner	23.5
ID Outlet	21.3
ACC top VENDOR alt	20.2
ACC-bottom VENDOR alt	18.9
Main Processing Building - SW	18.6
Recycle Drum Rotary feeder	16.5
Feed conveyor	16.1
Baghouse Filter	16.1
ACC vacuum unit (VENDOR)	15.5
ID inlet duct wall	14.9
Drag chain to MPB	14.8
Baghouse screw conveyors	14.3
Turbine building roof	14.0
Powdered activated carbon (PAC)	13.6
Conditioning drum drive	13.6
Main Processing Building - NW	13.6
External steam lines	13.5
External steam lines	13.5
External steam lines	13.5
Baghouse gathering screw	13.5
Scrubber screw conveyor	13.3
Reception Building - NW	13.3
Baghouse gathering screw	13.2
Main Processing Building - roof	13.2
ID fan case and motor	13.0
ID Discharge duct wall to silencer	12.1
Reception Building - roof	11.7
Glycol/water circulation pump	11.6
Conditioning drum cooling pump	11.6
Flue gas recirculation duct (external	11.4
Recycle to silo rotary feeder	11.1
Reception Building - SE	11.1
Hydrated lime rotary feeder	11.0
Disc screen	10.8
Fuel Feed enclosure	10.4
Collection chain bottom	10.3
Main Processing Building - SE	9.8
Spray scrubber	9.6
Lorry transit	9.4
MPB lean to - NE	9.3
APCR convey blower (to recycle	9.2
Pneumatic ash conveyor	8.9
Ash conditioner	8.6
Collection chain top	8.4
Lorry walking floor	8.4
APCR blower	8.2
MPB lean to - NW	7.8
Main Processing Building - NE	7.4
ACC steam header VENDOR	7.1
Baghouse penthouse ventilation	6.1

Source Description	Day time dB $L_{Aeq,1hour}$
Baghouse penthouse ventilation	6.0
Fresh lime conveying blower	5.8
Bulk Bag Hoist	5.5
Penthouse Hoist	5.5
Penthouse Hoist	5.5
Conditioning drum blower	5.5
ST room Vent outlet	5.3
ST room Vent outlet	5.3
ST room Vent outlet	5.3
ST room Vent outlet	5.2
Condensate pumps	4.5
MPB lean to - roof	4.3
Reception Building NE	4.0
MPB lean to - SE	4.0
Conditioning drum	3.6
MPB Extract ventilation	3.2
Turbine Building - SW	3.1
Deaerator outlet vent pipe	2.2
Blowdown tank and outlet	2.2
MPB Extract ventilation	0.9
Air blast cooler	0.0
ST bypass and desuperheater valve	0.0
Diesel transfer pump	0.0
Actuated steam relief	0.0
Steam relief valves	0.0
MPB Extract ventilation	-0.1
MPB Extract ventilation	-0.2
Air blast cooler	-0.3
Turbine Building - SE	-0.6
MPB Extract ventilation	-0.7
MPB Extract ventilation	-1.1
MPB Extract ventilation	-1.1
MPB Extract ventilation	-1.3
MPB Extract ventilation	-1.4
MPB Extract ventilation	-1.4
Reactor	-4.5
Turbine Building NE	-6.0
DNO transformer	-6.1
DNO transformer	-6.4
DNO transformer	-6.4
Reception building extract fan	-11.1
Push floor hydraulic pack drive	-11.3
Reception building extract fan	-13.6
Reception building extract fan	-13.6
Push floor hydraulic pack drive	-14.2
Reception building extract fan	-14.5
Reception building extract fan	-14.9
Reception building extract fan	-14.9
Reception building extract fan	-15.1
Reception building extract fan	-15.2
Push floor power pack cooler	-16.0
Push floor power pack cooler	-17.1

Receptor name: L3 - Cei Dafdd

Night time Partial Levels

Source Description	Night-time dB $L_{Aeq,15min}$
ID Outlet	21.3
ACC top VENDOR alt	20.2
ACC-bottom VENDOR alt	18.9
Main Processing Building - SW	18.6
Recycle Drum Rotary feeder	16.5
Feed conveyor	16.1
Baghouse Filter	16.1
ACC vacuum unit (VENDOR)	15.5
ID inlet duct wall	14.9
Drag chain to MPB	14.8
Baghouse screw conveyors	14.3
Turbine building roof	14.0
Powdered activated carbon (PAC)	13.6
Conditioning drum drive	13.6
Main Processing Building - NW	13.6
External steam lines	13.5
External steam lines	13.5
External steam lines	13.5
Baghouse gathering screw	13.5
Scrubber screw conveyor	13.3
Baghouse gathering screw	13.2
Main Processing Building - roof	13.2
ID fan case and motor	13.0
ID Discharge duct wall to silencer	12.1
Reception Building - roof	11.7
Glycol/water circulation pump	11.6
Conditioning drum cooling pump	11.6
Flue gas recirculation duct (external	11.4
Recycle to silo rotary feeder	11.1
Hydrated lime rotary feeder	11.0
Disc screen	10.8
Fuel Feed enclosure	10.4
Collection chain bottom	10.3
Main Processing Building - SE	9.8
Spray scrubber	9.6
MPB lean to - NE	9.3
APCR convey blower (to recycle	9.2
Pneumatic ash conveyor	8.9
Collection chain top	8.4
APCR blower	8.2
MPB lean to - NW	7.8
Main Processing Building - NE	7.4
ACC steam header VENDOR	7.1
Baghouse penthouse ventilation	6.1
Baghouse penthouse ventilation	6.0
Fresh lime conveying blower	5.8
Bulk Bag Hoist	5.5
Penthouse Hoist	5.5
Penthouse Hoist	5.5
Conditioning drum blower	5.5
ST room Vent outlet	5.3
ST room Vent outlet	5.3

Source Description	Night-time dB $L_{Aeq,15min}$
ST room Vent outlet	5.3
ST room Vent outlet	5.2
Condensate pumps	4.5
MPB lean to - roof	4.3
MPB lean to - SE	4.0
Conditioning drum	3.6
MPB Extract ventilation	3.2
Turbine Building - SW	3.1
Deaerator outlet vent pipe	2.2
Blowdown tank and outlet	2.2
MPB Extract ventilation	0.9
APCR conditioner	0.0
Reception Building - SW	0.0
Ash conditioner	0.0
Reception Building - NW	0.0
Reception Building - SE	0.0
Lorry transit	0.0
Ash conditioner	0.0
Lorry walking floor	0.0
Reception Building NE	0.0
Air blast cooler	0.0
ST bypass and desuperheater valve	0.0
Diesel transfer pump	0.0
Actuated steam relief	0.0
Steam relief valves	0.0
MPB Extract ventilation	-0.1
MPB Extract ventilation	-0.2
Air blast cooler	-0.3
Turbine Building - SE	-0.6
MPB Extract ventilation	-0.7
MPB Extract ventilation	-1.1
MPB Extract ventilation	-1.1
MPB Extract ventilation	-1.3
MPB Extract ventilation	-1.4
MPB Extract ventilation	-1.4
Reactor	-4.5
Turbine Building NE	-6.0
DNO transformer	-6.1
DNO transformer	-6.4
DNO transformer	-6.4
Reception building extract fan	-11.1
Push floor hydraulic pack drive	-11.3
Reception building extract fan	-13.6
Reception building extract fan	-13.6
Push floor hydraulic pack drive	-14.2
Reception building extract fan	-14.5
Reception building extract fan	-14.9
Reception building extract fan	-14.9
Reception building extract fan	-15.1
Reception building extract fan	-15.2
Push floor power pack cooler	-16.0
Push floor power pack cooler	-17.1

APPENDIX E

NOISE SOURCE SCHEDULE and CORRESPONDING BAT NOISE CONTROL MEASURES

Equipment name	Component	Data origin	Overall Sound Power Level (LwA)	Lw 31 Hz	Lw 63 Hz	Lw 125 Hz	Lw 250 Hz	Lw 500 Hz	Lw 1 kHz	Lw 2 kHz	Lw 4 kHz	Lw 8 kHz	Number of sources	Source: Area (A) Line (L) Point (P)	Measurement surface area at 1m from equipment (m^2)	Average Sound Pressure Level on Measurement Surface (LpA)	Comments on origin of noise data	Intermittent, startup or emergency only	Noise Mitigation
Reception Building																			
Hitachi ZW220 Loading Shovel		Sol Measurement	102	104	106	97	95	96	97	96	92	88	1	P	15	90			Source standard noise reduction kit. Attenuated and smart reversing alarms must be fitted.
Roller shutter doors																			18dB R'w required, refer Appendix F
Main Process Building																			
Drag chain conveyor (FFE to MPB)	Top drive	Contractor's Acoustic Consultant's Estimate	83	86	87	85	82	79	78	76	70	63	1	P	10	73	Contractor's Consultant estimate of LpA 73dB at 1m from top drive based on measured values of similar conveyor. Inside MPB.		No further mitigation required as inside MPB.
Fuel metering bin, side of hopper		Sol Measurement	91	97	92	91	89	87	86	83	82	80	2	P	15	80			
Fuel metering plug screw conveyor		Sol Measurement	96	92	92	89	90	91	90	91	87	83	2	P	30	82			Full proprietary and templated fitting, custom manufactured acoustic enclosures to all external conveyors in their entirety, to achieve maximum possible attenuation not less than 10dB overall, above and beyond that provided by previously proposed profile metal cladding enclosure system. Max. LpA of 65-70dB at 1m when processing material
Diesel burner		Contractor's Acoustic Consultant's Estimate	90	83	83	88	88	85	85	83	80	78	3	P	30	75	Contractor's Consultant estimates 75dBA at 1m. These are shown for start up only.	Startup	Not duty plant, very rarely used
Gasifier casing		Sol Measurement	97	97	99	95	93	93	92	88	87	83	1	A	400	71			
Bed recycle vibrating screen		Sol Measurement	82	68	68	68	70	75	76	77	75	68	1	P	120	97			Full bespoke, proprietary acoustic enclosure required, to include acoustic tunnels and attenuation of all product chutes et al, must achieve at least 30-35dB overall attenuation as constructed.

Equipment name	Component	Data origin	Overall Sound Power Level (LwA)	Lw 31 Hz	Lw 63 Hz	Lw 125 Hz	Lw 250 Hz	Lw 500 Hz	Lw 1 kHz	Lw 2 kHz	Lw 4 kHz	Lw 8 kHz	Number of sources	Source: Area (A) Line (L) Point (P)	Measurement surface area at 1m from equipment (m^2)	Average Sound Pressure Level on Measurement Surface (LpA)	Comments on origin of noise data	Intermittent, startup or emergency only	Noise Mitigation
Magnetic belt separator		Contractor's Acoustic Consultant's Estimate	88	81	81	86	86	83	83	81	78	76	1	P	20	75	Contractor's Consultant estimates 75 dB at 1m. Small drive 1.5kW.		
Bed reinjection bucket elevator and drive		Sol Measurement	98	97	101	97	94	95	92	92	88	80	1	P	200	75	Contractor's Consultant estimate of Lp 75dBA at 1m.		Full proprietary and templated fitting, custom manufactured acoustic enclosures to all external conveyors in their entirety, to achieve maximum possible attenuation not less than 10dB overall, above and beyond that provided by previously proposed profile metal cladding enclosure system. Max. LpA of 65-70dB at 1m when processing material
SNCR urea tank mixing		Contractor's Acoustic Consultant's Estimate	92	85	85	90	90	87	87	85	82	80	2	P	15	80	Contractor's Consultant estimate 80dBA at 1m. Ground floor near tankage.		
Atomizing air fan (underbed burner)		Contractor's Acoustic Consultant's Estimate	101	94	94	99	99	96	96	94	91	89	1	P	40	85	Contractor's Consultant estimate based on Lp 85dBA at 1m.	Startup	Not duty plant, very rarely used
Noise from sootblowers breaking out of gasifier casing		Sol Measurement	100	94	90	87	90	86	86	89	93	97	1	P	6	92		Intermittent, does not operate at night.	No night time operation of any soot blowers
UFA system	Inlet aperture	Vendor	70		87	77	70	64	61	60	60	62	1	P	1	70			Provide inlet attenuator to achieve 70dB(A) at 1m at full commissioned fan speed.
UFA system	Fan case	Vendor	85		102	92	85	79	76	75	75	77	1	P	31	70	Noise breakout from fan casing taken from Rotamil data sheet.		Full proprietary acoustic enclosure to encompass fan and motor etc complete with attenuated ventilation for motor cooling to achieve 70dB at 1m from any enclosure surface.
UFA system	Discharge duct wall	Vendor	87		104	94	87	81	78	77	77	79	1	L	50	70	Noise breakout from fan casing taken from Rotamil data sheet.		100mm thick high density acoustic cladding with outer metal skin fitted to ductwork outside of acoustic enclosure; duct radiated noise to not exceed 70dB(A) at 1m.
OFA system	Inlet aperture	Vendor	77		94	84	77	71	68	67	67	69	1	P	5	70			Provide inlet attenuator to achieve 70dB(A) at 1m at full commissioned fan speed.

Equipment name	Component	Data origin	Overall Sound Power Level (LwA)	Lw 31 Hz	Lw 63 Hz	Lw 125 Hz	Lw 250 Hz	Lw 500 Hz	Lw 1 kHz	Lw 2 kHz	Lw 4 kHz	Lw 8 kHz	Number of sources	Source: Area (A) Line (L) Point (P)	Measurement surface area at 1m from equipment (m^2)	Average Sound Pressure Level on Measurement Surface (LpA)	Comments on origin of noise data	Intermittent, startup or emergency only	Noise Mitigation
OFA system	Inlet duct wall	Vendor	85		102	92	85	79	76	75	75	77	1	L	30	70			Intervening ductwork between fan enclosure and inlet attenuator (if any) to be 100mm thick acoustic cladding with outer metal skin fitted, max. 70dB(A) @ 1m
OFA system	Fan case	Vendor	88		105	95	88	82	79	78	78	80	1	P	60	70	Noise breakout from fan casing taken from Rotamil data sheet.		Full proprietary acoustic enclosure to encompass fan and motor etc complete with attenuated ventilation for motor cooling to achieve 70dB at 1m from any enclosure surface.
OFA system	Discharge duct wall	Vendor	88		105	95	88	82	79	78	78	80	1	L	60	70	Noise breakout from fan casing taken from Rotamil data sheet.		100mm thick high density acoustic cladding with outer metal skin fitted to ductwork outside of acoustic enclosure; duct radiated noise to not exceed 70dB(A) at 1m.
Boiler	Wall	Sol Measurement	101	104	105	101	104	98	94	90	87	78	1	A	360	75			
Multiclone		Contractor's Acoustic Consultant's Estimate	95	88	88	93	93	90	90	88	85	83	1	P	100	75	Contractor's Consultant's estimate LpA 75dB at 1m.		
Economizer		Sol measurement	97	99	99	95	94	93	93	90	86	81	1	P	150	75			
Boiler feed water pumps		Sol measurement	95	83	90	95	93	89	87	91	86	80	2	P	9	86			Make provision for full proprietary acoustic enclosure to achieve limit of LpA 60dBA at 1m from any surface.
Boiler water jacketed ash chain conveyor		Sol measurement	98	95	94	92	92	93	92	93	89	86	1	L	50	82			100mm thick high density acoustic cladding with outer metal skin fitted to ductwork outside of acoustic enclosure; duct radiated noise to not exceed 70dB(A) at 1m (Including drive units, which may require acoustic hoods)
Two waves crusher		Vendor	83	76	76	81	81	78	78	76	73	71	1	P	20	70	Ash handling system documentation notes noise emission <70dBA. Assume this is LpA at 1m. 11kW drive.		
Multi-clone screw conveyors		Contractor's Acoustic Consultant's Estimate	87	80	80	85	85	82	82	80	77	75	1	L	50	70	Contractors Consultant estimate of LpA 70dB at 1m.		

Equipment name	Component	Data origin	Overall Sound Power Level (LwA)	Lw 31 Hz	Lw 63 Hz	Lw 125 Hz	Lw 250 Hz	Lw 500 Hz	Lw 1 kHz	Lw 2 kHz	Lw 4 kHz	Lw 8 kHz	Number of sources	Source: Area (A) Line (L) Point (P)	Measurement surface area at 1m from equipment (m^2)	Average Sound Pressure Level on Measurement Surface (LpA)	Comments on origin of noise data	Intermittent, startup or emergency only	Noise Mitigation
All louvres to be high performance, 600mm deep DOUBLE BANKED acoustic louvres, Allaway Acoustics type AL3015D or equal and approved		*Minimum acoustic louvres insertion loss, dB*			*7*	*8*	*13*	*19*	*33*	*39*	*37*	*30*							All louvres to be high performance, 600mm deep DOUBLE BANKED acoustic louvres, Allaway Acoustics type AL3015D or equal and approved Refer Appendix G (Others to check free area, ventilation and heat dissipation requirements. NB louvre free area c.25% only)
Main Process Building - lean-to																			
Roller shutter doors																			18dB R'w required, refer Appendix F
Air compressor		Contractor's Acoustic Consultant's Estimate	96	103	103	103	98	93	88	85	81	78	2	P	35	80	Contractor's Consultant estimate 80dBA at 1m		Packaged acoustically enclosed plant required; allowable noise level not to exceed 65dB(A) at 1m from any enclosure surface
Instrument air compressor		Contractor's Acoustic Consultant's Estimate	96	103	103	103	98	93	88	85	81	78	2	P	35	80	Contractor's Consultant estimate of 80dBA at 1m.		Packaged acoustically enclosed plant required; allowable noise level not to exceed 65dB(A) at 1m from any enclosure surface
Ancillary Building - Steam Turbine Room																			
Roller shutter doors																			18dB R'w required, refer Appendix F
All louvres to be high performance, 300mm deep DOUBLE BANKED acoustic louvres, Allaway Acoustics type AL1515D or equal and approved		*Minimum acoustic louvres insertion loss, dB*			*5*	*5*	*8*	*13*	*22*	*30*	*28*	*23*							All louvres to be high performance, 300mm deep DOUBLE BANKED acoustic louvres, Allaway Acoustics type AL1515D or equal and approved Refer Appendix G (Others to check free area, ventilation and heat dissipation requirements. NB louvre free area c.25% only)

Equipment name	Component	Data origin	Overall Sound Power Level (LwA)	Lw 31 Hz	Lw 63 Hz	Lw 125 Hz	Lw 250 Hz	Lw 500 Hz	Lw 1 kHz	Lw 2 kHz	Lw 4 kHz	Lw 8 kHz	Number of sources	Source: Area (A) Line (L) Point (P)	Measurement surface area at 1m from equipment (m^2)	Average Sound Pressure Level on Measurement Surface (LpA)	Comments on origin of noise data	Intermittent, startup or emergency only	Noise Mitigation
Gland steam condenser fan		Contractor's Acoustic Consultant's Estimate	98	80	80	80	80	85	88	92	92	90	1	P	20	85	Contractor's Consultant estimate of 85dB(A) at 1m.		Condenser fans to be fitted with straight through type attenuators to both inlet and outlet sides of each fan (will be necessary to obtain manufacturer approval of specific proposals). Each attenuator to provide at least 10dB as fitted insertion loss.
Steam Turbine and Generator		Vendor	109	95	97	99	100	101	102	102	103	101	1	P	250	85	Vendor data from TGM Kanis for the turboset.		
External																			
Disc screen		Sol Measurement	78	83	78	77	75	73	72	69	68	66	1	P	60	60			Bespoke templated acoustic enclosure complete with acoustic absorption to achieve 60dB(A) at 1m.
Flat bed conveyor to reject hopper		Sol Measurement	78	87	82	75	73	73	71	70	70	70	1	P	60	60			Bespoke templated acoustic enclosure complete with acoustic absorption to achieve 60dB(A) at 1m.
Collection chain conveyor (Reception Building to FFE)	Top drive	Contractor's Acoustic Consultant's Estimate	72	78	76	74	71	68	67	65	59	52	1	P	15	60	Contractor's Consultant estimate LpA 80dB at 1m from top drive based on measured values of similar conveyor.		Bespoke templated acoustic enclosure complete with acoustic absorption to achieve 60dB(A) at 1m.
Push floor hydraulic power pack drive		Vendor	76	59	59	74	74	71	71	69	66	64	2	P	40	60	(M) 2 x 9.2kW and 2 x 2.2kW motors. Saxlund advise LpA 75-78dB at 1m for 1 x 18.5kW and 1 x 2.2kW motor with no enclosure inc. cooler. Spectrum estimate LpA 75dB at 1m for 1 x 9.2kw and 1 x 2.2kW motor.		Requires a full proprietary, attenuated ventilated acoustic enclosure to achieve 60dB(A) at 1m from any enclosure surfaces.
Reception Building extract fan		Contractor's Acoustic Consultant's Estimate	70	77	77	77	72	66	64	61	54	47	8	P	15	58	Data sheet advises 47dBA at 3m.		
Push floor hydraulic power pack cooler		Vendor	72	65	65	70	70	67	67	65	62	60	2	P	15	60	(M) Saxlund advise LpA 73dB at 1m, at full load based on data from motor supplier.		Requires a full proprietary, attenuated ventilated acoustic enclosure to achieve 60dB(A) at 1m from any enclosure surfaces.

Equipment name	Component	Data origin	Overall Sound Power Level (LwA)	Lw 31 Hz	Lw 63 Hz	Lw 125 Hz	Lw 250 Hz	Lw 500 Hz	Lw 1 kHz	Lw 2 kHz	Lw 4 kHz	Lw 8 kHz	Number of sources	Source: Area (A) Line (L) Point (P)	Measurement surface area at 1m from equipment (m^2)	Average Sound Pressure Level on Measurement Surface (LpA)	Comments on origin of noise data	Intermittent, startup or emergency only	Noise Mitigation
Collection chain conveyor (Reception Building to FFE)	Bottom loop	Contractor's Acoustic Consultant's Estimate	75	81	79	77	74	71	70	68	62	55	1	P	150	53	Contractor's Consultant's estimate of LpA 58dB at 1m.		Full proprietary and templated fitting, custom manufactured acoustic enclosures to all external conveyors in their entirety, to achieve maximum possible attenuation not less than 5dB overall, above and beyond that provided by previously proposed profile metal cladding enclosure system. Max. LpA of 65-70dB at 1m when processing material
Collection chain conveyor (Reception Building to FFE)	Conveying line	Contractor's Acoustic Consultant's Estimate	82	75	75	80	80	77	77	75	72	70	1	L	500	55	Contractor's Consultant estimate based on LpA 60dB at 1m from conveyor casing. Based on measurements of similar equipment.		Full proprietary and templated fitting, custom manufactured acoustic enclosures to all external conveyors in their entirety, to achieve maximum possible attenuation not less than 5dB overall, above and beyond that provided by previously proposed profile metal cladding enclosure system. Max. LpA of 65-70dB at 1m when processing material
Drag chain conveyor (FFE to MPB)	Bottom loop	Contractor's Acoustic Consultant's Estimate	73	79	77	75	72	69	68	66	60	53	1	P	100	53	Contractor's Consultant's estimate LpA 73dB at 1m from top drive based on measured values of similar conveyor.		Full proprietary and templated fitting, custom manufactured acoustic enclosures to all external conveyors in their entirety, to achieve maximum possible attenuation not less than 20dB overall, above and beyond that provided by previously proposed profile metal cladding enclosure system. Max. LpA of 65-70dB at 1m when processing material
Drag chain conveyor (FFE to MPB)	Conveying line	Contractor's Acoustic Consultant's Estimate	76	69	69	74	74	71	71	69	66	64	1	L	140	55	Contractor's Consultant's estimate based on LpA 60dB at 1m from conveyor casing. Based on measurements of similar equipment.		Full proprietary and templated fitting, custom manufactured acoustic enclosures to all external conveyors in their entirety, to achieve maximum possible attenuation not less than 5dB overall, above and beyond that provided by previously proposed profile metal cladding enclosure system. Max. LpA of 65-70dB at 1m when processing material

Equipment name	Component	Data origin	Overall Sound Power Level (LwA)	Lw 31 Hz	Lw 63 Hz	Lw 125 Hz	Lw 250 Hz	Lw 500 Hz	Lw 1 kHz	Lw 2 kHz	Lw 4 kHz	Lw 8 kHz	Number of sources	Source: Area (A) Line (L) Point (P)	Measurement surface area at 1m from equipment (m^2)	Average Sound Pressure Level on Measurement Surface (LpA)	Comments on origin of noise data	Intermittent, startup or emergency only	Noise Mitigation
Diesel transfer pump		Contractor's Acoustic Consultant's Estimate	93	86	86	91	91	88	88	86	83	81	1	P	20	80	Contractor's Consultant's estimate of 80dBA at 1m. Diesel storage steel box with small pumps at the end. Extend the bund.	Only on start up.	Not duty plant, very rarely used
Deaerator outlet vent pipe	Outlet to atmosphere	Contractor's Acoustic Consultant's Estimate	73	55	55	55	55	60	63	67	67	65	1	P	20	60			Attenuator required; must limit emitted noise level to no higher than 60dB(A) at 1m from vent outlet.
Blowdown tank and outlet		Contractor's Acoustic Consultant's Estimate	73	55	55	55	55	60	63	67	67	65	1	P	20	60			Attenuator required; must limit emitted noise level to no higher than 60dB(A) at 1m from vent outlet.
Spray scrubber		Contractor's Acoustic Consultant's Estimate	80	73	73	78	78	75	75	73	70	68	1	P	300	55	Contractor's Consultant's estimate of 55dBA at 1m.		
Reactor (scrubber) feed screw conveyor		Contractor's Acoustic Consultant's Estimate	83	76	76	81	81	78	78	76	73	71	1	L	60	65	Contractor's Consultant's estimate of 70dBA at 1m.		Full proprietary and templated fitting, custom manufactured acoustic enclosure required, to achieve maximum practicable attenuation. Max. LpA of 65-70dB at 1m when processing material.
Powdered activated carbon (PAC) enclosure		Contractor's Acoustic Consultant's Estimate	82	75	75	80	80	77	77	75	72	70	1	P	150	60	Contractor's Consultant's estimate LpA 70dB at 1m from enclosure. Based on an estimated LpA 85dB inside enclosure. Assumes PAC conveying blower and drive, PAC storage bag shaker and volumetric feeder agitator all contained within enclosure.		Full acoustic enclosure in lieu of existing canopy/enclosure; to yield at least a further overall 10dB attenuation to give 60dB at 1m.
Fresh lime conveying blower		Vendor	75	68	68	73	73	70	70	68	65	63	1	P	30	60	(M) Outotec advise LpA 70dBA at 1m. Potentially tonal. 7.5kW drive.		Full acoustic enclosure required; noise level not to exceed 60dB(A) @ 1m
Recycled lime conditioning drum	Cooling water pump	Contractor's Acoustic Consultant's Estimate	80	73	73	78	78	75	75	73	70	68	1	A	300	55	Contractor's Consultant's estimate LpA 55dB at 1m.		.
Recycled lime conditioning drum	Drive	Contractor's Acoustic Consultant's Estimate	75	68	68	73	73	70	70	68	65	63	1	P	10	65	Contractor's Consultant's estimate LpA 80dB at 1m		Full acoustic enclosure required; noise level not to exceed 65dB(A) @ 1m

Equipment name	Component	Data origin	Overall Sound Power Level (LwA)	Lw 31 Hz	Lw 63 Hz	Lw 125 Hz	Lw 250 Hz	Lw 500 Hz	Lw 1 kHz	Lw 2 kHz	Lw 4 kHz	Lw 8 kHz	Number of sources	Source: Area (A) Line (L) Point (P)	Measurement surface area at 1m from equipment (m^2)	Average Sound Pressure Level on Measurement Surface (LpA)	Comments on origin of noise data	Intermittent, startup or emergency only	Noise Mitigation
Recycled lime conditioning drum	Blower	Vendor	74	67	67	72	72	69	69	67	64	62	1	P	10	64	(M) Outotec advise LpA 64dB at 1m. 1.5kW drive. At height of 6.5m.		See above, blower to be acoustically enclosed, min. 15-20dB overall attenuation required
Recycled lime conditioning drum	Drum	Contractor's Acoustic Consultant's Estimate	72	65	65	70	70	67	67	65	62	60	1	P	80	53	Contractor's Consultant's estimate LpA 75dB at 1m from drum.		Full acoustic enclosure required; noise level not to exceed 53dB(A) @ 1m.
Baghouse filter		Contractor's Acoustic Consultant's Estimate	82	89	89	89	84	79	74	71	67	64	1	A	300	57	(L) Estimate further 4dBA reduction to 57dBA at 1m - revised down as insulated. No inlet silencer for ID fan.		ID fan inlet attenuator required to provide c 10dB overall insertion loss.
Baghouse penthouse ventilation fans		Vendor	73	66	66	71	71	68	68	66	63	61	2	P	10	63	Outotec advise LpA 63dB at 1m.		
Baghouse gathering screw conveyors		Vendor	83	-5	76	81	81	78	78	76	73	71	2	L	70	65	Outotec advise LpA 75dB at 1m when empty.		Proprietary templated 50mm double skin acoustic cladding/ enclosure (incorporating any necessary access). Max. LpA of 65dB at 1m when processing material
Baghouse transfer screw conveyor		Sol measurement	82	85	84	83	81	80	77	72	70	66	1	L	70	64			Proprietary templated 50mm double skin acoustic cladding/ enclosure (incorporating any necessary access). Max. LpA of 64dB at 1m when processing material
Reagent recycle (APCR) conveying blower		Vendor	75	68	68	73	73	70	70	68	65	63	1	P	30	65	Outotec advise 80dBA at 1m. Enclosure shown on model, so assume that quoted noise level is at 1m from enclosure.		Full acoustic enclosure required; noise level not to exceed 65dB(A) @ 1m
Reagent recycle (APCR) conveying blower piping		Contractor's Acoustic Consultant's Estimate	81	74	74	79	79	76	76	74	71	69	1	L	120	60	Contractor's Consultant's estimate 65dBA at 1m from insulated piping.		Double skinned to high mass cladding with external metal skin to provide 60dB(A) at 1m.
Recycle to silo rotary feeder (EAD mode)		Vendor	85	78	78	83	83	80	80	78	75	73	1	P	10	75	Outotec advise LpA 85dB at 1m.		Allow for high specification acoustic cladding (75dB at 1m) with external metal skin.
Hydrated lime metering rotary feeder		Vendor	80	73	73	78	78	75	75	73	70	68	1	P	10	70			Not expected to be significant, however since Outotec advise LpA 85dB at 1m, make provision for noise control evaluation at pre-commissioning stages.
Bulk bag hoist		Vendor	72	65	65	70	70	67	67	65	62	60	1	P	6	64	Outotec advise LpA 68dB at 1m (64dBA at no load).	Intermittent	
Penthouse hoists		Vendor	72	65	65	70	70	67	67	65	62	60	2	P	6	64	Outotec advise LpA 68dB at 1m (64dBA at no load).	Intermittent	

Equipment name	Component	Data origin	Overall Sound Power Level (LwA)	Lw 31 Hz	Lw 63 Hz	Lw 125 Hz	Lw 250 Hz	Lw 500 Hz	Lw 1 kHz	Lw 2 kHz	Lw 4 kHz	Lw 8 kHz	Number of sources	Source: Area (A) Line (L) Point (P)	Measurement surface area at 1m from equipment (m^2)	Average Sound Pressure Level on Measurement Surface (LpA)	Comments on origin of noise data	Intermittent, startup or emergency only	Noise Mitigation
Pneumatic ash conveying system	Blower	Contractor's Acoustic Consultant's Estimate	74	67	67	72	72	69	69	67	64	62	1	P	20	61			
Ash conditioner		Contractor's Acoustic Consultant's Estimate	91	84	84	89	89	86	86	84	81	79	1	P	40	75	(M) Within silo walls. Spectrum estimate LpA 75dB at 1m from silo walls.	Doesn't operate at night.	No night time operation
ID fan system	Inlet duct wall	Vendor	81		101	93	84	69	50	38	24	10	1	P	60	63	Breakout calculation based on Rotamil vendor data for in-duct sound power level post attenuator. Outotec advise 6mm steel duct and 90mm insulation.		Insulation to be at least 100mm thick and to have a cladding of with at least 10kg/m2 (e.g. 1.3mm steel) or to have a 5kg/m2 polymeric barrier layer between the insulation and the outer sheet.
ID fan system	Fan case and motor	Contractor's Acoustic Consultant's Estimate	82	79	78	80	80	77	77	75	72	69	1	P	150	60	Contractor's Consultant estimate of 60dBA at 1m		Full bespoke acoustic enclosure, complete with attenuated motor cooling ventilation, Must achieve 60dB(A) @ 1m from all enclosure surfaces
ID fan system	Flue gas recirculation duct (external section only)	Vendor	79		101	92	79	67	60	50	30	11	1	L	80	60	Breakout calculation based on vendor data for ID fan post attenuator. Recirculation duct is 70m long (of which 25m is outside) and 0.7m dia. Noise from the main flow entering the recirculation duct is attenuated by acoustic lagging of the duct.		6mm steel duct and 90mm insulation advised by Outotec. Additional upgrade of polymeric layer at 5kg/m3 Must limit noise to 60dB(A) at 1m.
ID fan system	Stack outlet aperture	Vendor *Required flue attenuator acoustic insertion loss (dB)*	90		111 *11*	101 *21*	93 *30*	75 *41*	56 *50*	54 *43*	48 *37*	44 *28*	1	P	25	76	Calculated based on vendor data from Rotamil and TL of silencer including flow regenerated noise. Detailed calculation in ARC6804/16059 (Option 1).		High performance splitter attenuator required, to be installed upstream of stack, to have at least the as fitted insertion losses per octave frequency indicated
ACC	Fans	Vendor	93		101	96	93	91	88	83	76	68	1	P	900	57	For the "ultra low noise fans". Noise levels stated are for all 8 fans.		Total, whole machine sound power level for the complete ACC, as indicated within this table, must not be exceeded with all fans running at 100% speed. Required noise mitigation to be the fitment of 8 off “ultra low noise” fans as provided by the ACC manufacturer Spig, or equal and approved in writing

Equipment name	Component	Data origin	Overall Sound Power Level (LwA)	Lw 31 Hz	Lw 63 Hz	Lw 125 Hz	Lw 250 Hz	Lw 500 Hz	Lw 1 kHz	Lw 2 kHz	Lw 4 kHz	Lw 8 kHz	Number of sources	Source: Area (A) Line (L) Point (P)	Measurement surface area at 1m from equipment (m^2)	Average Sound Pressure Level on Measurement Surface (LpA)	Comments on origin of noise data	Intermittent, startup or emergency only	Noise Mitigation
ACC	Vacuum unit	Vendor	77	70	70	75	75	72	72	70	67	65	1	P	50	60			Full acoustic enclosure to meet the 60dBA at 1m from enclosure during steady state operation. Noise limit at 1m from outlet pipe after silencer will also have to be LpA 60dB(A) at 1m during steady state operation.
Condensate pumps		Vendor	79	72	72	77	77	74	74	72	69	67	1	P	75	60			Make provision for full proprietary acoustic enclosure to achieve limit of LpA 60dBA at 1m from any surface
External steam lines		Contractor's Acoustic Consultant's Estimate	87	65	70	70	70	75	77	82	82	80	3	L	150	60	(H) 52m long pipes x2 (AS1-001 and CS1-011) Spectrum estimate LpA 70dB at 1m with 50-200mm acoustic insulation.		Requires 100-200mm thick high spec mass loaded acoustic cladding complete with metal outer skin, as fitted to entire steam lines including flanges etc. Minimum 10dB as fitted overall attenuation required.
Auxiliary dry/ air blast cooler (night-time operation)		Vendor	85		91	92	86	82	80	75	72	66	1	P	170	63	Transtherm advise LwA 95dB per cooler at an ambient temperature of 20°C (typical summer night-time). One cooler operating alone with the other in standby under normal operation.		All unit's fans to be fitted with straight through type attenuators to both inlet and outlet sides of each fan (will be necessary to obtain manufacturer approval of specific proposals). Each attenuator to provide at least 10dB as fitted insertion loss.
Glycol/water circulation pump		Vendor	79	72	72	77	77	74	74	72	69	67	1	P	75	60	Transtherm advise LpA 76dB at 1m per pump set. Normal operation involves two pumps operating and one in standby for each cooler. Pump set approx. 75m^2 measurement area. Near aux dry coolers. On the west of site. Only one cooler operating alone under normal operation.		Make provision for full proprietary acoustic enclosure to achieve limit of LpA 60dBA at 1m from any surface.
DNO transformer		Vendor	79	86	86	86	81	76	71	68	64	61	3	P	50	62			
Reactor		Vendor	82	89	89	89	84	79	74	71	67	64	1	P	50	65	Based on vendor advising LPA 80dB at 1m.		Proprietary acoustic enclosure to achieve 65dB(A) at 1m.
Turbine Bypass Pressure Relief System		Contractor's Acoustic Consultant's Estimate															Awaiting further details.	Intermittent	Turbine bypass valve shown in model surrounded by acoustic 'cowl'. Steam lines in are insulated with min. 140mm ProRox PS 960.

Equipment name	Component	Data origin	Overall Sound Power Level (LwA)	Lw 31 Hz	Lw 63 Hz	Lw 125 Hz	Lw 250 Hz	Lw 500 Hz	Lw 1 kHz	Lw 2 kHz	Lw 4 kHz	Lw 8 kHz	Number of sources	Source: Area (A) Line (L) Point (P)	Measurement surface area at 1m from equipment (m^2)	Average Sound Pressure Level on Measurement Surface (LpA)	Comments on origin of noise data	Intermittent, startup or emergency only	Noise Mitigation
PCV - 05 ST bypass and desuperheater valve		Contractor's Acoustic Consultant's Estimate	112	94	94	94	94	99	102	106	106	104	1	P	30	97	Contractor's Acoustic's Consultant estimate 97dB db(A)at 1m. 1500 inlet line	Emergency	Requires downstream silencer
Remote actuated steam relief valves to atmosphere		Contractor's Acoustic Consultant's Estimate	94	86	86	91	91	88	89	87	85	85	1	P	30	79	Contractor's Acoustic's Consultant estimates 79dBA 1m from outlet point with silencer applied.	Intermittent	High performance vent silencers to meet intermittent operation noise limit of 79dBA at 1m. Start up and turbine bypass flows.
Safety/Spring controlled Steam Relief Valves		Contractor's Acoustic Consultant's Estimate	105	98	98	103	103	100	100	98	95	93	2	P	30	90	Contractor's Acoustic's Consultant estimates 90 dB(A) at 1m from outlet point with silencer applied.	Emergency	High performance acoustic silencers required to meet emergency noise limit of LpA 90dB at 1m from outlet.
HGV moving floor/idling		Sol measurement	104	94	96	95	97	99	99	98	87	80	2	P	39	88	Daytime noise sources only.	2 events per 1hour period	No night time operation
HGV Unloading		Sol measurement	101	111	107	98	97	98	95	94	88	80	2/hour	P	14	90	Daytime noise sources only.		No night time operation

APPENDIX F

ARCHITECTURAL SPECIFICATIONS AND BUILDING ELEVATIONS

RECEPTION BUILDING

External Wall Construction

To be constructed with 350mm thick concrete push wall built up to a height of 5 meters. The cladding above the concrete push wall to be Euroclad “32/1000r” 0.7mm (or similar) trapezoidal profile single sheet external cladding fixed vertically with Colorcoat.

Acoustic Data:

Construction / Product	Octave Band Frequencies Sound Reduction Indices (dB)								Data Source
	63	125	250	500	1 k	2 k	4 k	8 k	
Euroclad 32/1000R 0.7 mm	9	13	16	22	22	25	32	32	Euroclad test data from Corus
350mm Concrete	41	46	54	61	67	72	87	87	Calculation using Insul acoustic software.

Roof Construction

To be construction with Kingspan “1000rw” trapezoidal insulated roof panels with 60mm core thickness with Kingspan “xl forte” finish in gull grey (RAL 240 80 05). There will be rooflights to at least 10% of the reception roof area with Kingspan day-lite trapezoidal “KS1000 dltr” 1.6 rooflights 1m x 6m each with 24mm thickness as shown on roof plan.

Acoustic Data:

Construction / Product	Octave Band Frequencies Sound Reduction Indices (dB)								Data Source
	63	125	250	500	1 k	2 k	4 k	8 k	
Kingspan 1000Rw 60mm core	13	17	32	43	48	54	60	60	Kingspan Acoustic Performance Guide dated June 2005
Kingspan KS1000 DLTR Rooflights	13	9	12	17	22	24	19	22	Peutz test report ref. A 2400-2E-RA 2

External Doors

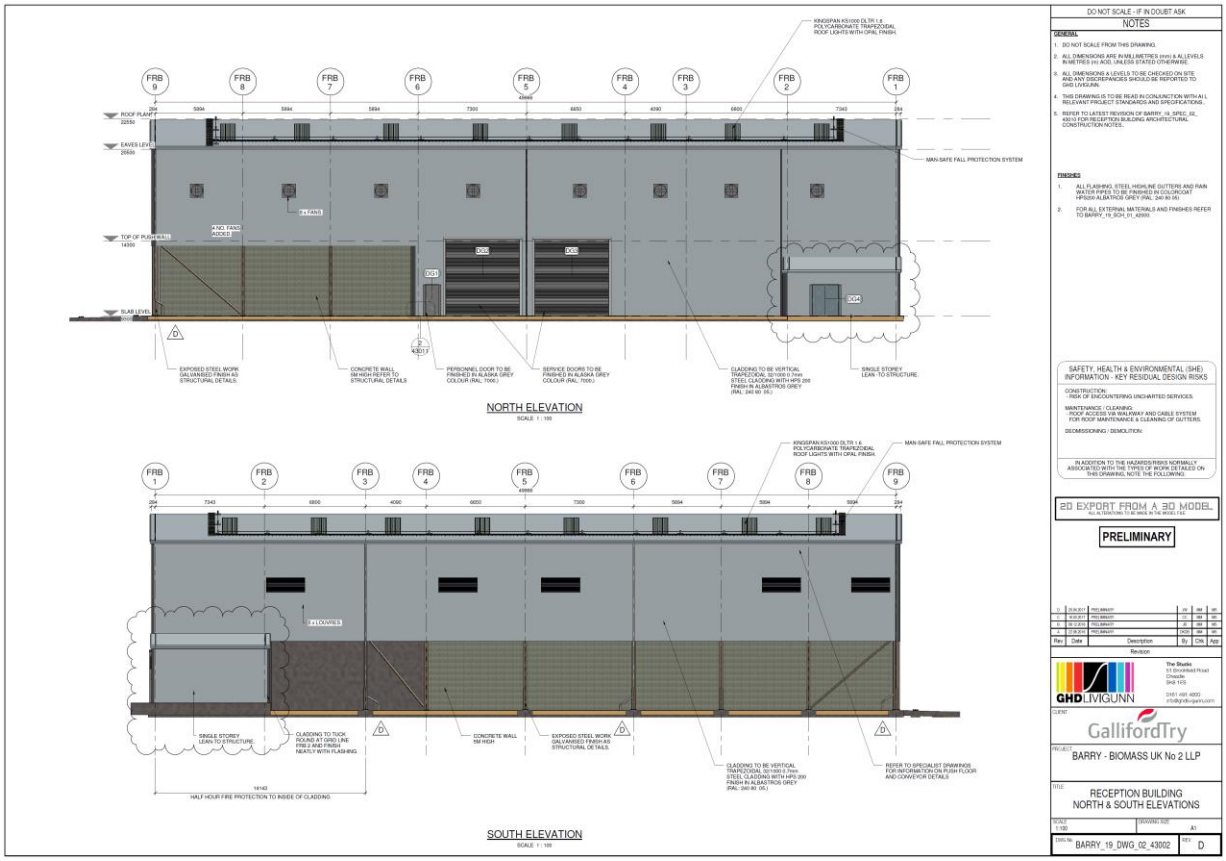
External personnel doors to be metal doors and frames fitted with associated ironmongery with corrosion protection.

Acoustic Data:

Construction / Product	Octave Band Frequencies Sound Reduction Indices (dB)								Data Source
	63	125	250	500	1 k	2 k	4 k	8 k	
Booths 29H 45mm Metal Door	18	24	25	28	30	29	34	34	Booth Industries Product Datasheet PD04

The 2 no. roller shutter service doors are to be Ascot Doors Ltd (or similar) electric drive roller shutter doors approx. 5.0m wide x 5.15m high with a plastisol finish (c.18dB R'w or better).

There will be 1no. manually operated maintenance roller shutter door to the conveyor belt walkway approx. 0.75m wide x 2.235m high with a plastisol finish.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SOUTH ELEVATION
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RECEPTION BUILDING
NORTH & SOUTH ELEVATIONS
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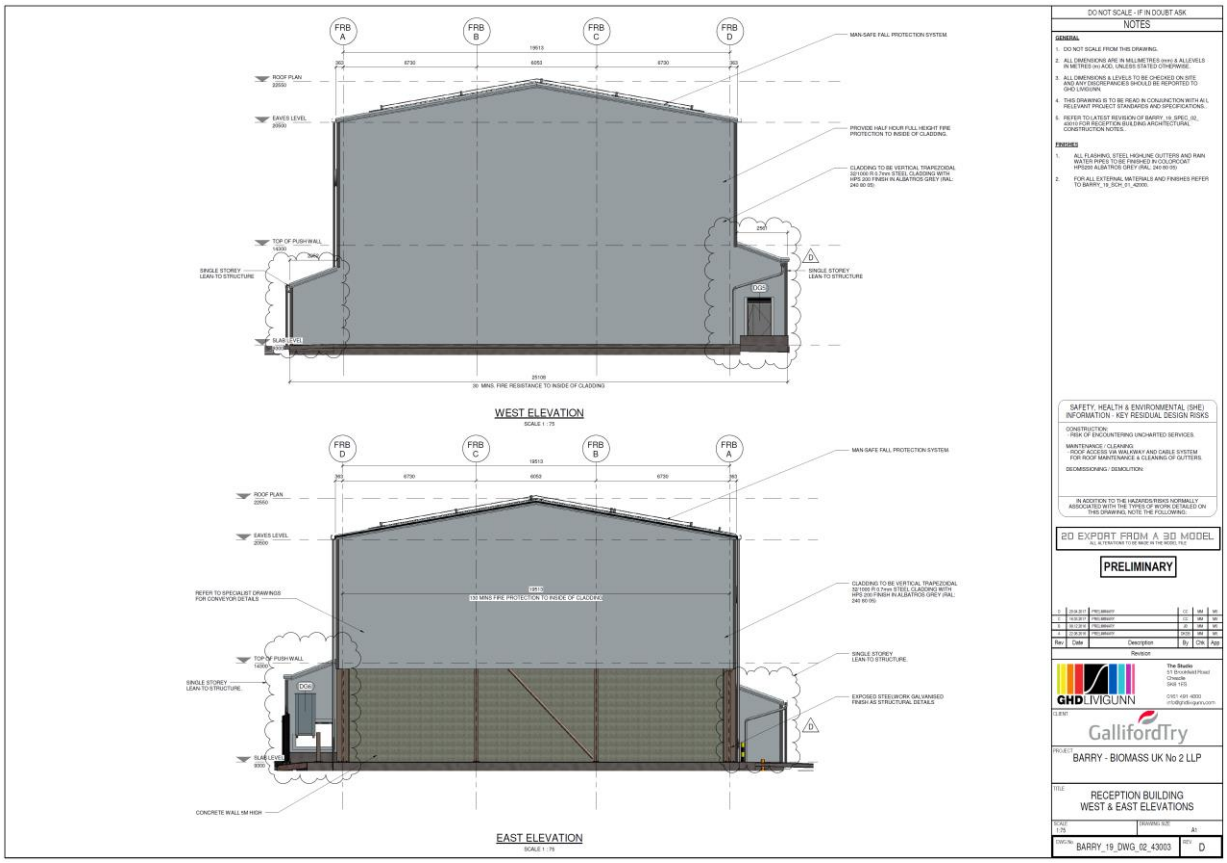
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EAST ELEVATION
NOTES
PRELIMINARY
BARRY - BIOMASS UK No 2 LLP
RECEPTION BUILDING
WEST & EAST ELEVATIONS
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MAIN PROCESS BUILDING & LEAN TO

External Wall Construction

To be constructed with TATA “Trisobuild FW30V” (or similar) built up vertical cladding system with 173mm overall thickness with 32/1000r 0.7mm trapezoidal profile, external cladding on 140mm spacer brackets, with 140mm glasswool insulation (nominal density of 24kg/m^3) over a 19/1000 0.4mm steel liner sheet. TATA “Trisobuild” cladding panels to be laid vertically with Colorcoat “HPS200” ultra finish.

Acoustic data:

Construction / Product	Octave Band Frequencies Sound Reduction Indices (dB)								Data Source
	63	125	250	500	1 k	2 k	4 k	8 k	
Trisobuild FW30V	13	13	32	39	50	50	50	50	Predicted SRI values from TATA Steel Data Sheet (enclosed)

Roof Construction

To be TATA “Trisomet 333” trapezoidal insulated roof panels, 60mm core thickness, with Colorcoat “HPS200” ultra finish.

Acoustic data:

Construction / Product	Octave Band Frequencies Sound Reduction Indices (dB)								Data Source
	63	125	250	500	1 k	2 k	4 k	8 k	
Trisomet 333	16	20	23	21	25	38	50	50	Predicted SRI values from TATA Steel Data Sheet (enclosed)

New roof covering to low level lean-to building is to be provided with Sika “Sarnafil” (or similar) single ply roofing membrane mechanically fixed onto 150mm thick Rockwool “Hardrock” multi-fix DD insulation on vapour control layer installed above TATA Steel “Roofdek D60” fixed onto roof purlins.

Acoustic Data:

Construction / Product	Octave Band Frequencies Sound Reduction Indices (dB)							Data Source
	125	250	500	1 k	2 k	4 k	8 k	
TATA RoofDek D60	19	28	26	50	64	82	19	Predicted SRI values from TATA Steel Data Sheet (enclosed)

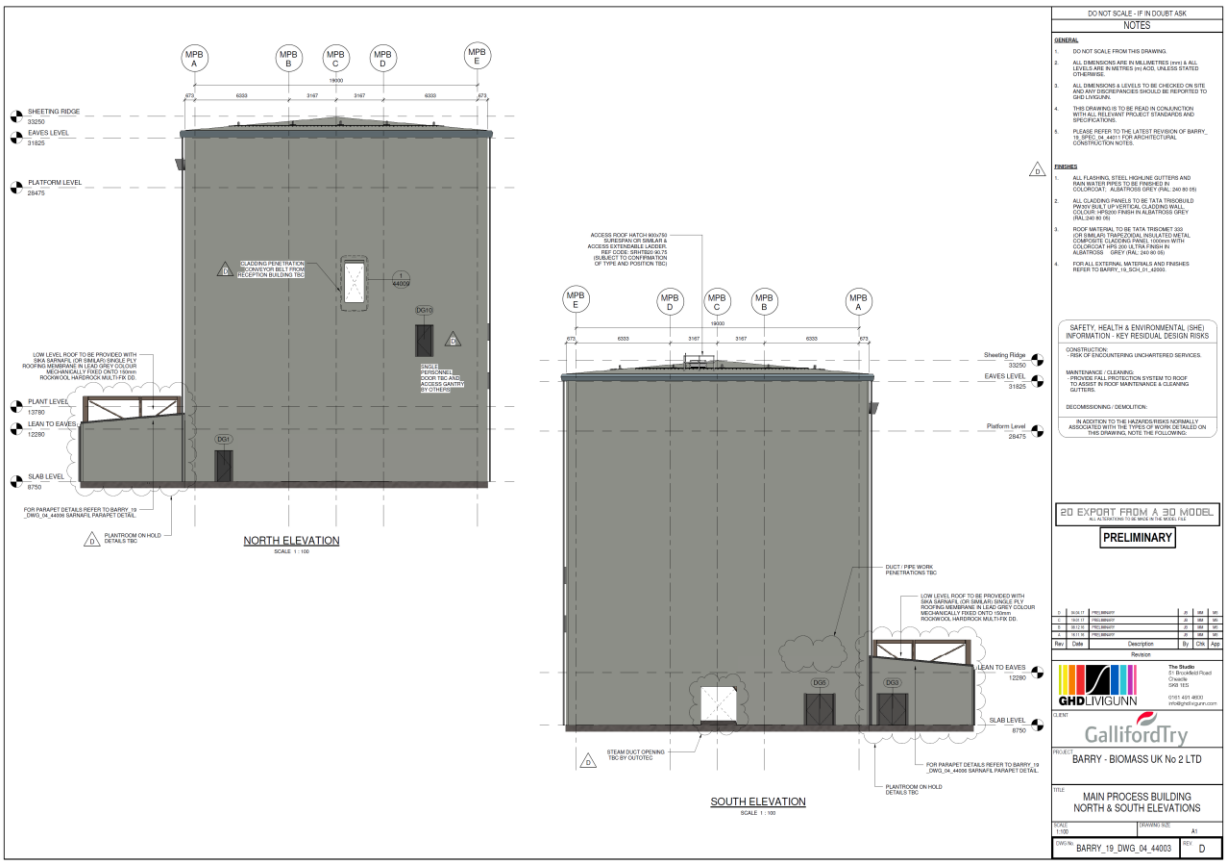
External Doors

External personnel doors will be metal doors and frames and fitted with associated ironmongery with corrosion protection.

Acoustic Data:

Construction / Product	Octave Band Frequencies Sound Reduction Indices (dB)								Data Source
	63	125	250	500	1 k	2 k	4 k	8 k	
Booths 29H 45mm Metal Door	18	24	25	28	30	29	34	34	Booth Industries Product Datasheet PD04

The roller shutter service doors are to be Ascot Doors Ltd (or similar) electric drive roller shutter doors with a plastisol finish (c.18dB R'w or better).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SOUTH ELEVATION
SCALE 1 : 100
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FINISHES
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2D EXPORT FROM A 3D MODEL
PRELIMINARY
GHD LIVIGUNN
GallifordTry
BARRY - BIOMASS UK No 2 LTD
MAIN PROCESS BUILDING
NORTH & SOUTH ELEVATIONS
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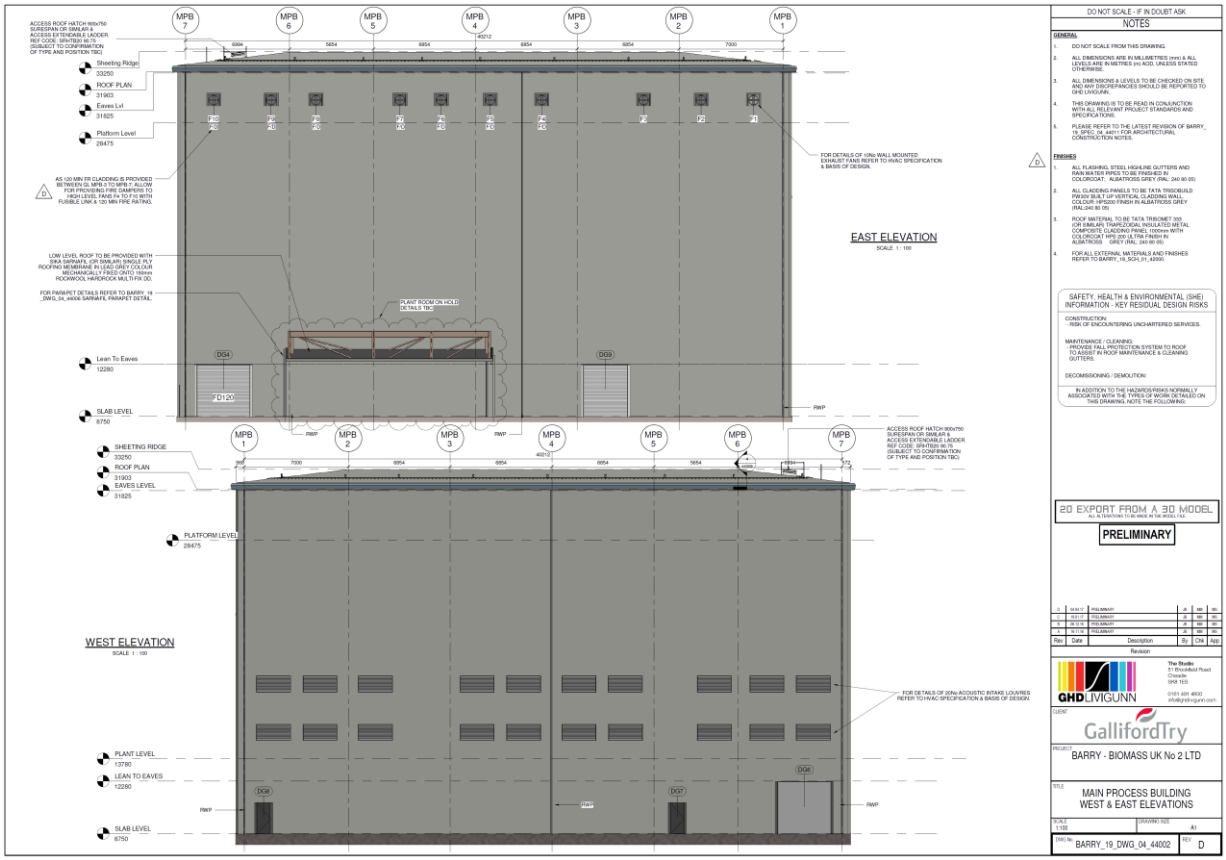
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2D EXPORT FROM A 3D MODEL
PRELIMINARY
GHD LIVIGUNN
GallifordTry
BARRY - BIOMASS UK No 2 LTD
MAIN PROCESS BUILDING
WEST & EAST ELEVATIONS
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TURBINE BUILDING

External Wall Construction

To be constructed with Euroclad “Elite System 51” (or similar) built up vertical cladding system, 173mm overall thickness, with 32/1000r 0.7mm trapezoidal profile external cladding, on 140mm spacer bars with 140mm insulation on Proctor “Premier 500” vapour control membrane, over 19/1000 0.4mm steel liner sheet. Elite System 51 cladding panels to be laid vertically with Colorcoat HPS200 finish.

Acoustic data:

Construction / Product	Octave Band Frequencies Sound Reduction Indices (dB)								Data Source
	63	125	250	500	1 k	2 k	4 k	8 k	
Euroclad Elite system 51	12	16	31	39	44	51	54	62	Euroclad test data from Sound Research Laboratories

Roof Construction

To be constructed with Sika “Sarnafil” (or similar) single ply roofing membrane in lead grey colour, mechanically fixed onto 155mm - 255mm thick tapered Rockwool “Hardrock” multi-fix DD insulation on vapour control layer installed above TATA Steel “Roofdek D60” fixed onto steel beams.

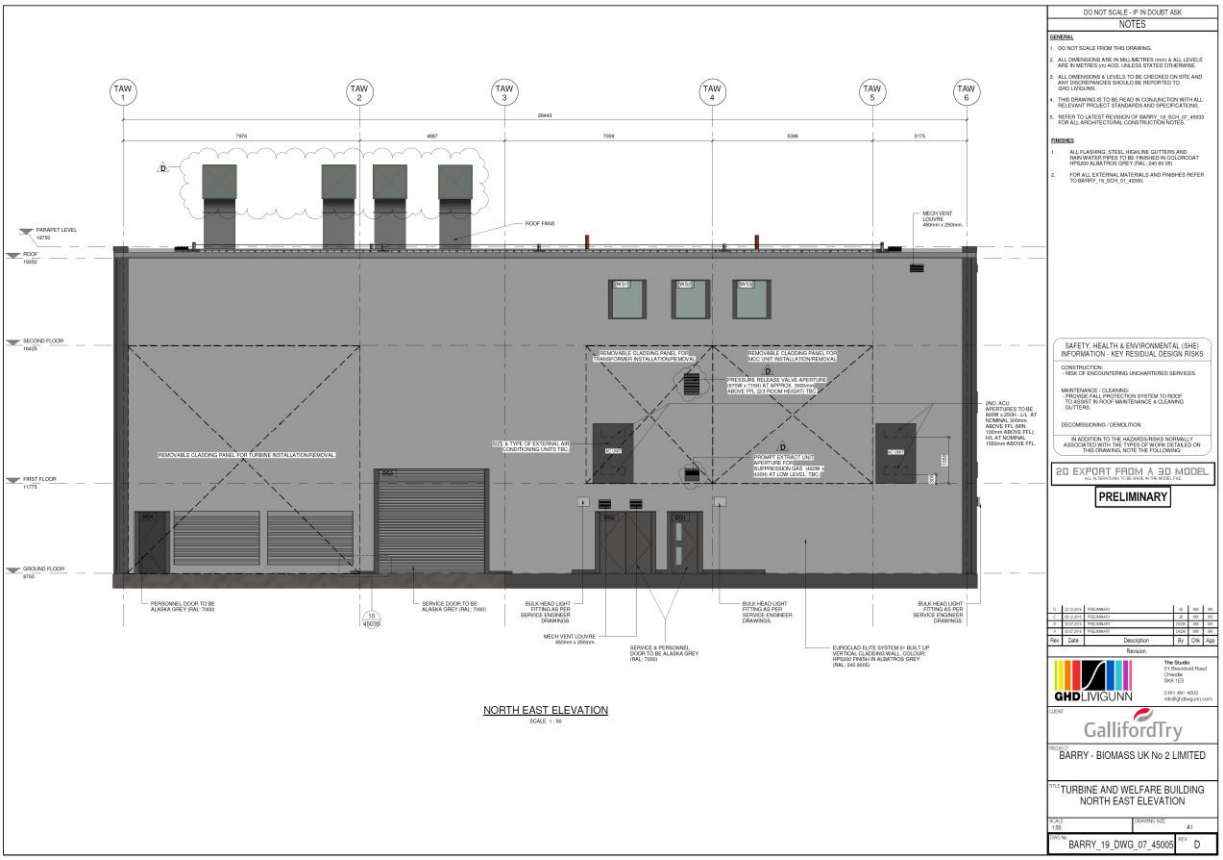
75mm thick Rockwool “RW3” acoustic insulation with white tissue facing to at least 50% of the Turbine Hall ceiling & fixed directly to underside of Roofdek D60. The rockwool is assumed to be equivalent to a ‘Class B’ absorber.

Acoustic Data:

Construction / Product	Octave Band Frequencies Sound Reduction Indices (dB)							Data Source
	125	250	500	1 k	2 k	4 k	8 k	
TATA RoofDek D60	19	28	26	50	64	82	19	Predicted SRI values from TATA Steel Data Sheet

External Doors

The roller shutter service door to Turbine Hall will be an Ascot Doors Ltd (or similar) insulated electric drive roller shutter door approx. 3.6m wide x 3.6m high and suitably rated acoustically (c.18dB R’w or better).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GHD LIVIGUNN
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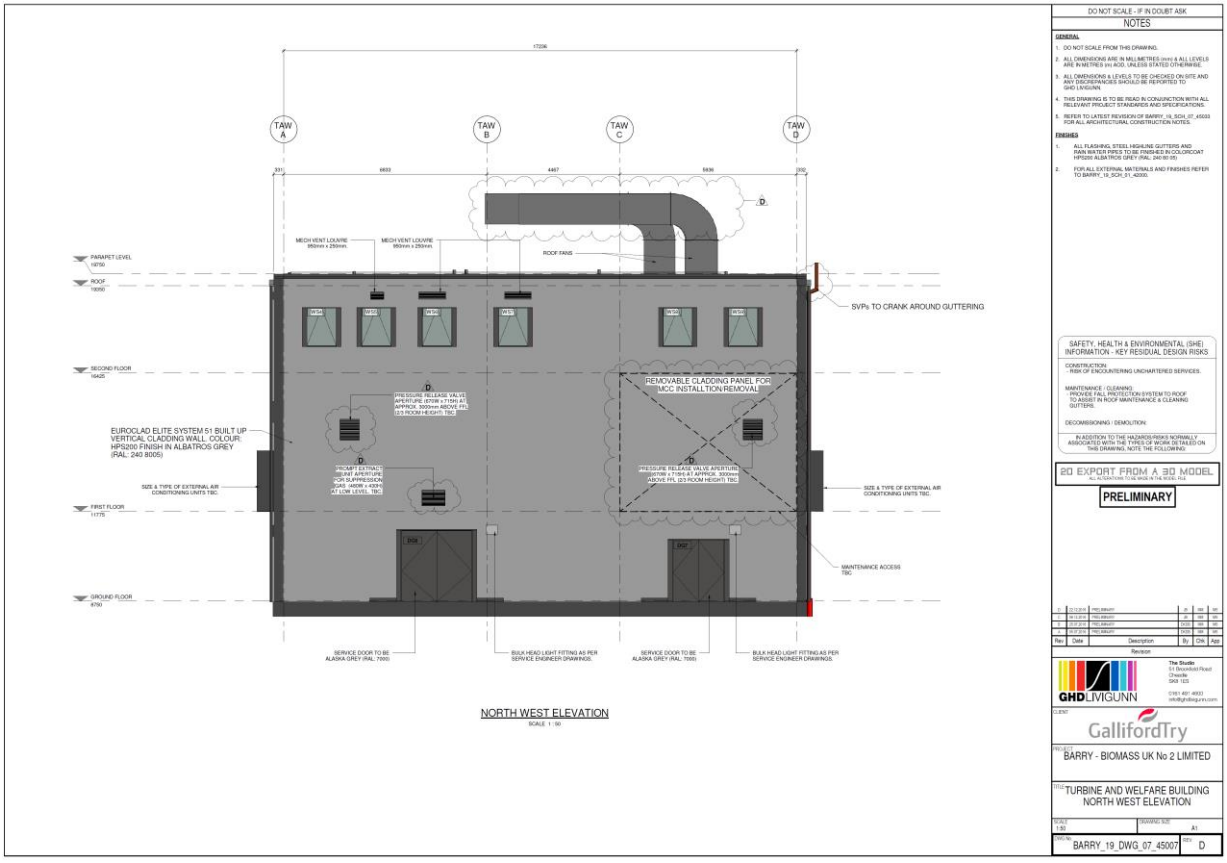
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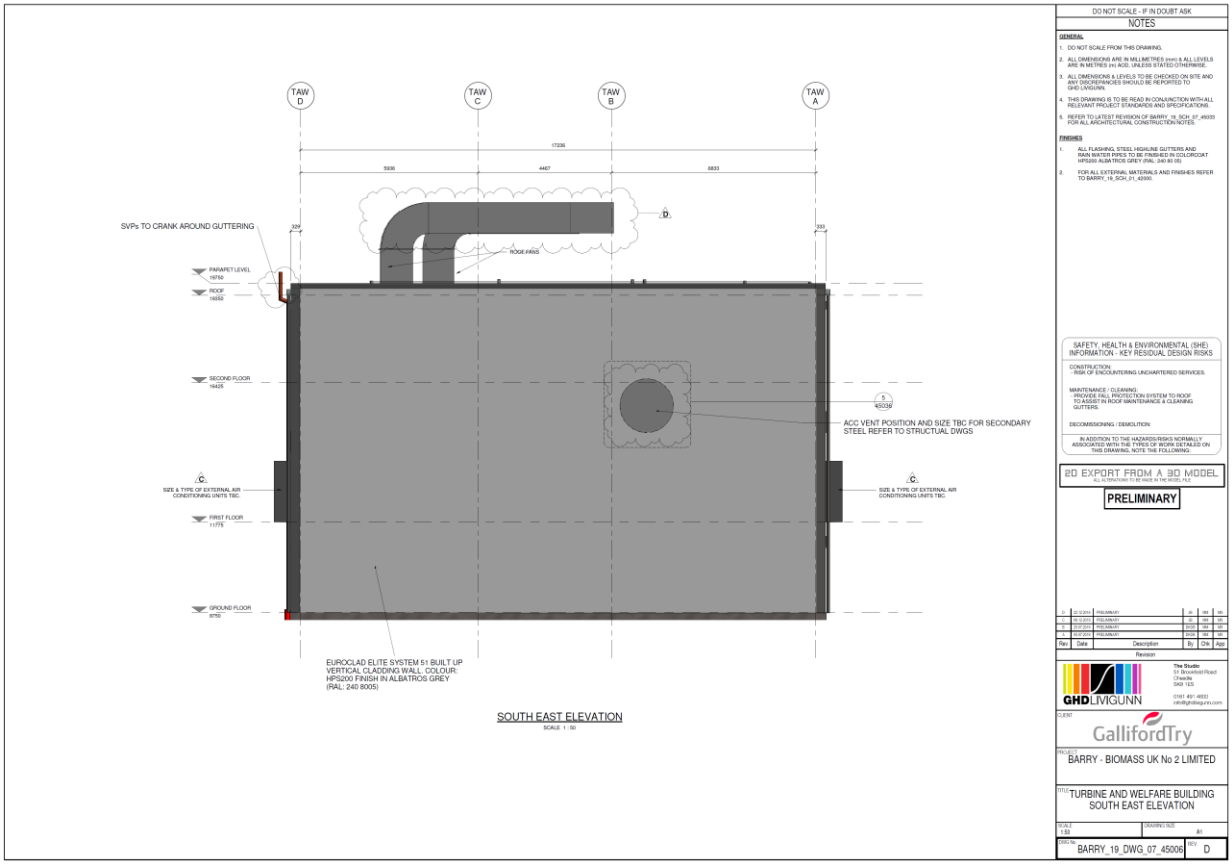
TAW D
TAW C
TAW B
TAW A
SVPs TO CRANK AROUND GUTTERING
PARAPET LEVEL
ROOF
SECOND FLOOR
FIRST FLOOR
GROUND FLOOR
RIDGE FANS
ACC VENT POSITION AND SIZE TBC FOR SECONDARY STEEL REFER TO STRUCTUAL DWGS
SIZE & TYPE OF EXTERNAL AIR CONDITIONING UNITS TBC.
EUROCLAD ELITE SYSTEM 51 BUILT UP VERTICAL CLADDING WALL, COLOUR: HPS200 FINISH IN ALBATROS GREY (RAL: 240 8005)
SOUTH EAST ELEVATION
SCALE 1 : 50
DO NOT SCALE - IF IN DOUBT ASK
NOTES
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FINISHES
SAFETY, HEALTH & ENVIRONMENTAL (SHE) INFORMATION - KEY RESIDUAL DESIGN RISKS
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GallifordTry
BARRY - BIOMASS UK No 2 LIMITED
TURBINE AND WELFARE BUILDING SOUTH EAST ELEVATION
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APPENDIX G

BUILDING NOISE BREAK-OUT CALCULATIONS

Project Barry Biomass
Project Ref. P1714
Building Ref. Reception Building

BUILDING INFO

Length (m) 50
Width (m) 20
Height (m) 11
Volume (m3) 10600
Surface Area (m2) 3190
Diffusivity term Cd (BS 12354) -3

COMPOSITE SRI CALCULATIONS

Building Façade	Total Area	Element	Area	Octave Band Frequencies								Construction
				63	125	250	500	1 k	2 k	4 k	8 k	
North west façade	265	Upper Wall	265	9	13	16	22	22	25	32	32	Euroclad 32/1000R 0.7 mm
		Lower Wall	0	41	46	54	61	67	72	87	87	350mm Concrete
		Door	0	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	0	0	0	0	0	0	0	0	0	NONE
		Roller Shutter	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**9**	**13**	**16**	**22**	**22**	**25**	**32**	**32**	
North East façade	530	Upper Wall	476.43	9	13	16	22	22	25	32	32	Euroclad 32/1000R 0.7 mm
		Lower Wall	50	41	46	54	61	67	72	87	87	350mm Concrete
		Door	3.57	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	0	0	0	0	0	0	0	0	0	NONE
		Roller Shutter	0	14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
	Composite SRI			**9**	**14**	**17**	**22**	**23**	**26**	**33**	**33**	
South East façade	265	Upper Wall	265	9	13	16	22	22	25	32	32	Euroclad 32/1000R 0.7 mm
		Lower Wall	0	41	46	54	61	67	72	87	87	350mm Concrete
		Door	0	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	0	0	0	0	0	0	0	0	0	NONE
		Roller Shutter	0	14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
	Composite SRI			**9**	**13**	**16**	**22**	**22**	**25**	**32**	**32**	
South West façade	530	Upper Wall	518	9	13	16	22	22	25	32	32	Euroclad 32/1000R 0.7 mm
		Lower Wall	0	41	46	54	61	67	72	87	87	350mm Concrete
		Door	0	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	12	0	0	0	0	0	0	0	0	Weather Louvre
		Roller Shutter	0	14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
	Composite SRI			**8**	**12**	**13**	**15**	**15**	**16**	**16**	**16**	
Roof	800	Roof	720	8	17	32	43	48	54	60	60	Kingspan 1000Rw 60mm core
		Rooflights	80	13	9	12	17	22	24	19	22	Kingspan KS1000 DLTR
	Composite SRI			**8**	**15**	**22**	**27**	**32**	**34**	**29**	**32**	

Project Barry Biomass
Project Ref. P1714
Building Ref. Reception Building

BUILDING INFO

Length (m) 50
Width (m) 20
Height (m) 11

Volume (m3) 10600
Surface Area (m2) 3190
Diffusivity term Cd (BS 12354) -3

SOURCE SOUND POWER LEVELS

Source	Octave Band Sound Power Level (dB Lw)							
	63	125	250	500	1 k	2 k	4 k	8 k
Hitachi ZW220 Loading Shovel	106	97	95	96	97	96	92	88
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0

Project Barry Biomass
Project Ref. P1714
Building Ref. Reception Building

BUILDING INFO

Length (m)	50	Volume (m3)	10600
Width (m)	20	Surface Area (m2)	3190
Height (m)	11	Diffusivity term Cd (BS 12354)	-3

REVERBERATION TIME

	Octave Band Frequencies							
	63	125	250	500	1 k	2 k	4 k	8 k
Reverberation Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

REVERBERANT SOUND PRESSURE LEVEL WITHIN BUILDING

	Sound Pressure Level (dB) @ Octave Band Frequencies								dBA
	63	125	250	500	1 k	2 k	4 k	8 k	
Reverberant SPL	84	74	73	74	74	74	69	66	79

	Sound Pressure Level (dB) @ Octave Band Frequencies								dBA
	63	125	250	500	1 k	2 k	4 k	8 k	
SPL(rev) + Cd	81	71	70	71	71	71	66	63	76

Project Barry Biomass
Project Ref. P1714
Building Ref. Main Process Building

BUILDING INFO

Length (m) 41 Volume (m3) 18860
Width (m) 20 Surface Area (m2) 4446
Height (m) 23 Diffusivity term Cd (BS 12354) -5

COMPOSITE SRI CALCULATIONS

Building Façade	Total Area	Element	Area	Octave Band Frequencies								Construction
				63	125	250	500	1 k	2 k	4 k	8 k	
North west façade	460	Wall	453	13	13	32	39	50	50	50	50	TATA Trisobuild FW30V
		Roller Shutter	0	0	0	0	0	0	0	0	0	NONE
		Door	7	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	0	0	0	0	0	0	0	0	0	NONE
		Window	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**13**	**14**	**32**	**38**	**46**	**45**	**48**	**48**	
North East façade	943	Wall	902	13	13	32	39	50	50	50	50	TATA Trisobuild FW30V
		Roller Shutter	21	14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
		Door	0	0	0	0	0	0	0	0	0	NONE
		Louvres	20	7	8	13	19	33	39	37	30	Allaway Acoustics AL3015D
		Window	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**12**	**13**	**27**	**32**	**32**	**36**	**36**	**35**	
South East façade	460	Wall	450	13	13	32	39	50	50	50	50	TATA Trisobuild FW30V
		Roller Shutter	11	14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
		Door	0	0	0	0	0	0	0	0	0	NONE
		Louvres	0	0	0	0	0	0	0	0	0	NONE
		Window	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**13**	**13**	**30**	**33**	**32**	**36**	**36**	**36**	
South West façade	943	Wall	889	13	13	32	39	50	50	50	50	TATA Trisobuild FW30V
		Roller Shutter	11	14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
		Door	4	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	40	7	8	13	19	33	39	37	30	Allaway Acoustics AL3015D
		Window	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**12**	**13**	**25**	**31**	**34**	**38**	**38**	**37**	
Roof	820	Roof	820	16	20	23	21	25	38	50	50	TATA Trisomet 333
		Rooflights	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**16**	**20**	**23**	**21**	**25**	**38**	**50**	**50**	

Project Barry Biomass
Project Ref. P1714
Building Ref. Main Process Building

BUILDING INFO

Length (m)	41	Volume (m3)	18860
Width (m)	20	Surface Area (m2)	4446
Height (m)	23	Diffusivity term Cd (BS 12354)	-5

SOURCE SOUND POWER LEVELS

Source	Octave Band Sound Power Level (dB Lw)							
	63	125	250	500	1 k	2 k	4 k	8 k
Drag chain conveyor (FFE to MPB)	87	85	82	79	78	76	70	63
Fuel metering bin, side of hopper	92	91	89	87	86	83	82	80
Fuel metering bin, side of hopper	92	91	89	87	86	83	82	80
Fuel metering plug screw conveyor	92	89	90	91	90	91	87	83
Fuel metering plug screw conveyor	92	89	90	91	90	91	87	83
Gasifier casing	99	95	93	93	92	88	87	83
Bed recycle vibrating screen	68	68	70	75	76	77	75	68
Magnetic belt separator	81	86	86	83	83	81	78	76
Bed reinjection bucket elevator and drive	101	97	94	95	92	92	88	80
SNCR urea tank mixing	85	90	90	87	87	85	82	80
SNCR urea tank mixing	85	90	90	87	87	85	82	80
UFA system, inlet aperture	87	77	70	64	61	60	60	62
UFA system, fan case	102	92	85	79	76	75	75	77
UFA system, discharge ductwall	104	94	87	81	78	77	77	79
OFA system, inlet aperture	94	84	77	71	68	67	67	69
OFA system, inlet ductwall	102	92	85	79	76	75	75	77
OFA system, fan case	105	95	88	82	79	78	78	80
OFA system, Discharge ductwall	105	95	88	82	79	78	78	80
Boiler	105	101	104	98	94	90	87	78
Multiclone	88	93	93	90	90	88	85	83
Economizer	99	95	94	93	93	90	86	81
Boiler feed water pumps	90	95	93	89	87	91	86	80
Boiler feed water pumps	90	95	93	89	87	91	86	80
Boiler water jacketed ash chain conveyor	94	92	92	93	92	93	89	86
Two waves crusher	76	81	81	78	78	76	73	71
Multi-clone screw conveyors	80	85	85	82	82	80	77	75
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0

Project Barry Biomass
Project Ref. P1714
Building Ref. Main Process Building

BUILDING INFO

Length (m)	41	Volume (m3)	18860
Width (m)	20	Surface Area (m2)	4446
Height (m)	23	Diffusivity term Cd (BS 12354)	-5

REVERBERATION TIME

	Octave Band Frequencies							
	63	125	250	500	1 k	2 k	4 k	8 k
Reverberation Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

REVERBERANT SOUND PRESSURE LEVEL WITHIN BUILDING

	Sound Pressure Level (dB) @ Octave Band Frequencies								dBA
	63	125	250	500	1 k	2 k	4 k	8 k	
Reverberant SPL	88	82	82	79	77	77	73	69	83

	Sound Pressure Level (dB) @ Octave Band Frequencies								dBA
	63	125	250	500	1 k	2 k	4 k	8 k	
SPL(rev) + Cd	83	77	77	74	72	72	68	64	78

Project Barry Biomass
Project Ref. P1714
Building Ref. Lean To

BUILDING INFO

Length (m)	12	Volume (m3)	270
Width (m)	5	Surface Area (m2)	273
Height (m)	4.5	Diffusivity term Cd (BS 12354)	-3

COMPOSITE SRI CALCULATIONS

				Octave Band Frequencies								
Building Façade	**Total Area**	**Element**	**Area**	**63**	**125**	**250**	**500**	**1 k**	**2 k**	**4 k**	**8 k**	**Construction**
North west façade	22.5	Wall	23	13	13	32	39	50	50	50	50	TATA Trisobuild FW30V
		Roller Shutter	0	0	0	0	0	0	0	0	0	NONE
		Door	0	0	0	0	0	0	0	0	0	NONE
		Louvres	0	0	0	0	0	0	0	0	0	NONE
		Window	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**13**	**13**	**32**	**39**	**50**	**50**	**50**	**50**	
North East façade	54	Wall	54	13	13	32	39	50	50	50	50	TATA Trisobuild FW30V
		Roller Shutter	0	0	0	0	0	0	0	0	0	NONE
		Door	0	0	0	0	0	0	0	0	0	NONE
		Louvres	0	0	0	0	0	0	0	0	0	NONE
		Window	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**13**	**13**	**32**	**39**	**50**	**50**	**50**	**50**	
South East façade	22.5	Wall	19	13	13	32	39	50	50	50	50	TATA Trisobuild FW30V
		Roller Shutter	4	14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
		Door	0	0	0	0	0	0	0	0	0	NONE
		Louvres	0	0	0	0	0	0	0	0	0	NONE
		Window	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**13**	**14**	**24**	**26**	**23**	**27**	**27**	**27**	
South West façade	54	Wall	0	0	0	0	0	0	0	0	0	NONE
		Roller Shutter	0	0	0	0	0	0	0	0	0	NONE
		Door	0	0	0	0	0	0	0	0	0	NONE
		Louvres	0	0	0	0	0	0	0	0	0	NONE
		Window	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	
Roof	60	Roof	60	16	19	28	26	50	50	50	50	Roofdek D60
		Rooflights	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**16**	**19**	**28**	**26**	**50**	**50**	**50**	**50**	

Project Barry Biomass
Project Ref. P1714
Building Ref. Lean To

BUILDING INFO

Length (m)	12	Volume (m3)	270
Width (m)	5	Surface Area (m2)	273
Height (m)	4.5	Diffusivity term Cd (BS 12354)	-3

SOURCE SOUND POWER LEVELS

	Octave Band Sound Power Level (dB Lw)							
Source	**63**	**125**	**250**	**500**	**1 k**	**2 k**	**4 k**	**8 k**
Compressed air compressor	106	106	101	96	91	88	84	81
Instrument air compressor	106	106	101	96	91	88	84	81
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0

Project Barry Biomass
Project Ref. P1714
Building Ref. Lean To

BUILDING INFO

Length (m)	12	Volume (m3)	270
Width (m)	5	Surface Area (m2)	273
Height (m)	4.5	Diffusivity term Cd (BS 12354)	-3

REVERBERATION TIME

	Octave Band Frequencies							
	63	125	250	500	1 k	2 k	4 k	8 k
Reverberation Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

REVERBERANT SOUND PRESSURE LEVEL WITHIN BUILDING

	Sound Pressure Level (dB) @ Octave Band Frequencies								dBA
	63	125	250	500	1 k	2 k	4 k	8 k	
Reverberant SPL	103	103	98	93	88	85	81	78	95

	Sound Pressure Level (dB) @ Octave Band Frequencies								dBA
	63	125	250	500	1 k	2 k	4 k	8 k	
SPL(rev) + Cd	100	100	95	90	85	82	78	75	92

Project Barry Biomass
Project Ref. P1714
Building Ref. Turbine Building

BUILDING DIMENSIONS

Length (m) 12.7
Width (m) 20
Height (m) 24

Volume (m3) 6096
Surface Area (m2) 2077.6
Diffusivity term Cd (BS 12354) -3

COMPOSITE SRI CALCULATIONS

Building Façade	Total Area	Element	Area	Octave Band Frequencies								Construction
				63	125	250	500	1 k	2 k	4 k	8 k	
North west façade	480	Wall	0	0	0	0	0	0	0	0	0	
		Roller Shutter	0	0	0	0	0	0	0	0	0	
		Door	0	0	0	0	0	0	0	0	0	
		Louvres	0	0	0	0	0	0	0	0	0	
		Window	0	0	0	0	0	0	0	0	0	
	Composite SRI			**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	
North East façade	304.8	Wall	277.22	12	16	31	39	44	51	54	62	Euroclad Elite system 51
		Roller Shutter	13.6	14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
		Door	1.8	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	12.18	5	5	8	13	22	30	28	23	Allaway 300 full chevron AL 1515D
		Window	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**11**	**14**	**21**	**26**	**28**	**32**	**32**	**31**	
South East façade	480	Wall	480	12	16	31	39	44	51	54	62	Euroclad Elite system 51
		Roller Shutter	0	0	0	0	0	0	0	0	0	NONE
		Door	0	0	0	0	0	0	0	0	0	NONE
		Louvres	0	0	0	0	0	0	0	0	0	NONE
		Window	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**12**	**16**	**31**	**39**	**44**	**51**	**54**	**62**	
South West façade	304.8	Wall	303	12	16	31	39	44	51	54	62	Euroclad Elite system 51
		Roller Shutter	0	0	0	0	0	0	0	0	0	NONE
		Door	2	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	0	0	0	0	0	0	0	0	0	NO DATA
		Window	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**12**	**16**	**30**	**35**	**36**	**37**	**37**	**37**	
Roof	254	Roof	254	0	19	8	26	50	64	82	82	TATA RoofDek D60
		Rooflights	0	0	0	0	0	0	0	0	0	NONE
	Composite SRI			**14**	**19**	**8**	**26**	**50**	**64**	**82**	**82**	

Project Barry Biomass
Project Ref. P1714
Building Ref. Turbine Building

BUILDING DIMENSIONS

Length (m) 12.7
Width (m) 20
Height (m) 24

Volume (m3) 6096
Surface Area (m2) 2077.6
Diffusivity term Cd (BS 12354) -3

SOURCE SOUND POWER LEVELS

Source	Octave Band Sound Power Level (dB Lw)							
	63	125	250	500	1 k	2 k	4 k	8 k
Gland steam condenser fan	80	80	80	85	88	92	92	90
Steam Turbine and Generator	97	99	100	101	102	102	103	101
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0

Project Barry Biomass
Project Ref. P1714
Building Ref. Turbine Building

BUILDING DIMENSIONS

Length (m) 12.7
Width (m) 20
Height (m) 24

Volume (m3) 6096
Surface Area (m2) 2077.6
Diffusivity term Cd (BS 12354) -3

REVERBERATION TIME

	Octave Band Frequencies							
	63	125	250	500	1 k	2 k	4 k	8 k
Reverberation Time (s)	2.7	1.8	1.6	1.4	1.4	1.4	1.8	2.2

REVERBERANT SOUND PRESSURE LEVEL WITHIN BUILDING

	Sound Pressure Level (dB) @ Octave Band Frequencies								dBA
	63	125	250	500	1 k	2 k	4 k	8 k	
Reverberant SPL	78	78	78	79	80	80	82	81	88

	Sound Pressure Level (dB) @ Octave Band Frequencies								dBA
	63	125	250	500	1 k	2 k	4 k	8 k	
SPL(rev) + Cd	75	75	75	76	77	77	79	78	85

APPENDIX H

SOURCE, RECEIVER AND OBJECT GRID REFERENCES

Point Sources

Name	Coordinates		
	x(m)	y(m)	z(m)
ID Outlet	312617.78	167639.19	50.69
ACC vacuum unit (VENDOR)	312643.65	167643.28	16.04
ID fan case and motor	312622.36	167643.88	13.21
ID inlet duct wall	312621.41	167645.34	21.22
ID Discharge duct wall to silencer	312619.98	167640.87	15.20
DNO transformer	312651.81	167681.45	10.82
Reception building extract fan	312587.38	167713.96	16.83
Push floor hydraulic pack drive	312561.99	167751.75	11.39
Air blast cooler	312611.16	167684.68	14.56
Baghouse penthouse ventilation fans	312614.92	167657.66	25.35
APCR conditioner	312609.99	167662.20	23.41
Ash conditioner	312611.39	167700.35	27.54
Air blast cooler	312612.58	167685.42	14.56
Condensate pumps	312643.75	167641.18	8.54
ST bypass and desuperheater valve	312638.24	167655.25	24.24
Glycol/water circulation pump	312646.30	167647.90	18.04
Diesel transfer pump	312619.66	167680.82	10.40
Deaerator outlet vent pipe	312610.12	167675.88	35.81
Blowdown tank and outlet	312610.46	167675.31	35.81
Spray scrubber	312607.23	167659.17	11.40
Powdered activated carbon (PAC) enclosure	312615.10	167646.01	14.26
Fresh lime conveying blower	312609.50	167652.47	11.34
Conditioning drum drive	312608.51	167660.77	15.40
Conditioning drum	312608.50	167661.33	15.41
MPB Extract ventilation	312615.60	167674.01	27.11
MPB Extract ventilation	312613.62	167676.79	27.14
MPB Extract ventilation	312611.27	167680.27	27.17
MPB Extract ventilation	312608.90	167683.72	27.20
MPB Extract ventilation	312606.70	167686.86	27.24
MPB Extract ventilation	312595.94	167702.45	27.39
MPB Extract ventilation	312598.26	167699.14	27.36
MPB Extract ventilation	312600.36	167696.12	27.33
MPB Extract ventilation	312602.12	167693.38	27.30
MPB Extract ventilation	312604.60	167689.86	27.27
Recycle Drum Rotary feeder	312611.07	167658.07	15.37
Bulk Bag Hoist	312617.32	167648.85	15.27
Penthouse Hoist	312620.52	167650.56	15.27
Penthouse Hoist	312620.54	167650.10	15.26
Reception building extract fan	312584.15	167718.46	16.86
Reception building extract fan	312580.14	167724.28	16.92
Reception building extract fan	312577.01	167728.83	16.98
Reception building extract fan	312573.71	167733.39	17.06
Reception building extract fan	312570.68	167737.78	17.15
Reception building extract fan	312567.01	167743.05	17.25
Push floor power pack cooler	312563.36	167753.17	10.38
Push floor power pack cooler	312564.40	167753.84	10.37
Collection chain top	312572.81	167696.31	20.85
Collection chain bottom	312546.03	167735.32	10.47
Flat bed conveyor	312574.22	167695.73	20.84
Disc screen	312574.45	167696.39	20.84
APCR blower	312611.16	167663.20	22.40
Hydrated lime rotary feeder	312613.58	167653.50	11.32
Pneumatic ash conveyor	312613.81	167659.69	16.37
Ash conditioner	312610.02	167656.34	16.36
ST room Vent outlet	312632.58	167654.73	19.74

Name	Coordinates		
	x(m)	y(m)	z(m)
ST room Vent outlet	312633.03	167654.09	19.74
ST room Vent outlet	312634.14	167652.54	19.74
ST room Vent outlet	312634.57	167651.90	19.74
DNO transformer	312655.19	167682.56	10.80
DNO transformer	312653.21	167682.20	10.81
Reactor	312645.76	167686.67	10.90
Actuated steam relief	312638.05	167655.90	19.74
Steam relief valves	312644.78	167659.89	13.10
Conditioning drum blower	312609.31	167660.09	15.40
Lorry walking floor	312573.41	167736.66	15.09
Reception building extract fan	312563.65	167748.22	17.34
Baghouse penthouse ventilation fans	312621.53	167647.61	25.24
Push floor hydraulic pack drive	312562.48	167750.63	11.38
Conditioning drum cooling pump	312608.29	167662.17	15.42
Recycle to silo rotary feeder	312614.34	167664.88	15.38

Line Sources

ACC steam header VENDOR

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312622.83	167624.77	25.00	8.06
312645.24	167639.65	25.00	8.02

Flue gas recirculation duct

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312601.83	167661.27	13.24	8.44
312616.97	167640.75	13.01	8.21

Drag chain to MPB

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312580.39	167703.54	16.00	8.83
312585.06	167699.30	23.00	8.77

Baghouse screw conveyors

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312612.77	167660.17	12.38	8.38
312620.03	167649.86	12.26	8.26

APCR convey blower (to recycle silo)

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312610.78	167662.50	19.00	8.40
312615.91	167665.73	19.00	8.37
312615.92	167665.71	5.00	8.37

External steam lines x 3

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312615.53	167670.05	14.39	8.39
312633.71	167643.84	14.13	8.13
312648.85	167653.69	14.04	8.04

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312615.51	167670.02	14.39	8.39
312633.69	167643.80	14.13	8.13
312648.82	167653.66	14.04	8.04

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312615.49	167669.99	14.39	8.39
312633.67	167643.78	14.13	8.13
312648.81	167653.63	14.04	8.04

Scrubber screw conveyor

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312614.11	167661.21	12.37	8.37
312608.89	167657.83	12.38	8.38

Lorry transit

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312669.97	167641.84	8.74	7.74
312671.54	167648.48	8.78	7.78
312669.71	167652.93	8.94	7.94
312668.68	167654.76	9.00	8.00
312668.55	167654.99	9.00	8.00
312667.69	167656.52	9.00	8.00
312665.34	167660.71	9.00	8.00
312664.25	167661.75	9.00	8.00
312659.30	167666.47	9.00	8.00
312651.88	167673.55	9.09	8.09
312633.05	167690.68	9.32	8.32
312624.40	167698.55	9.44	8.44
312608.07	167713.40	9.59	8.59
312601.59	167719.24	9.65	8.65
312594.86	167725.29	9.76	8.76
312591.26	167728.25	9.82	8.82
312589.04	167730.07	9.85	8.85
312580.12	167739.89	10.00	9.00
312578.64	167741.52	10.04	9.04
312575.84	167747.46	10.13	9.13
312575.84	167751.33	10.15	9.15
312575.84	167753.22	10.16	9.16
312575.81	167751.35	10.15	9.15
312575.75	167747.72	10.13	9.13
312575.23	167743.53	10.11	9.11
312574.53	167738.11	10.08	9.08
312572.04	167735.82	10.11	9.11
312575.32	167738.28	10.07	9.07
312580.30	167738.46	9.99	8.99
312586.06	167733.13	9.90	8.90
312591.51	167728.20	9.81	8.81
312601.42	167719.25	9.65	8.65
312603.36	167717.49	9.63	8.63
312624.83	167698.37	9.43	8.43
312628.57	167695.03	9.38	8.38
312633.30	167690.61	9.32	8.32
312659.24	167666.33	9.00	8.00
312664.24	167661.65	9.00	8.00
312665.44	167660.52	9.00	8.00
312668.78	167657.89	9.00	8.00
312669.72	167657.15	9.00	8.00
312670.32	167656.67	9.00	8.00
312672.08	167655.28	8.93	7.93
312673.61	167651.00	8.81	7.81
312673.65	167649.16	8.75	7.75

Feed conveyor

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312546.27	167735.57	10.00	9.47
312573.62	167696.02	23.00	8.85

Baghouse gathering screw conveyors

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312616.58	167658.89	10.34	8.34
312623.49	167649.21	10.24	8.24

Baghouse gathering screw conveyors

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312612.32	167656.18	10.35	8.35
312619.23	167646.49	10.24	8.24

Area Sources

Main Processing Building - roof

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312577.31	167693.73	32.81	8.81
312600.42	167660.37	32.44	8.44
312617.23	167671.40	32.38	8.38
312593.90	167705.09	32.72	8.72

Baghouse Filter

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312610.22	167654.72	25.35	8.35
312616.98	167644.83	25.24	8.24
312625.82	167650.63	25.23	8.23
312618.92	167660.35	25.33	8.33

Reception Building - roof

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312560.78	167751.56	23.41	9.41
312589.46	167710.57	22.79	8.79
312572.15	167698.92	22.87	8.87
312543.85	167740.28	23.53	9.53

ACC top

Coordinates			
x (m)	y (m)	z (m)	Ground (m)
312619.05	167629.79	23.12	8.12
312625.79	167619.83	23.01	8.01
312648.63	167634.99	22.98	7.98
312641.69	167644.82	23.07	8.07

Turbine Building - roof

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312626.71	167654.42	19.23	8.23
312633.79	167644.06	19.13	8.13
312648.78	167654.02	19.04	8.04
312641.32	167664.47	19.15	8.15

ACC-bottom

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312625.77	167619.75	16.01	8.01
312618.85	167629.80	16.12	8.12
312641.70	167644.89	16.07	8.07
312648.73	167635.00	15.98	7.98

MPB lean to - roof

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312605.28	167688.76	13.56	8.56
312611.10	167692.59	13.52	8.52
312618.83	167681.35	13.41	8.41
312613.10	167677.40	13.44	8.44

Vertical Area Sources

Main Processing Building – NW

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312593.92	167705.23	32.72	8.72
312577.17	167693.75	32.81	8.81

Main Processing Building -SW

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312577.17	167693.75	32.81	8.81
312600.40	167660.24	32.44	8.44

Main Processing Building – SE

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312600.39	167660.24	32.44	8.44
312617.37	167671.38	32.38	8.38

Main Processing Building – NE

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312617.37	167671.38	32.38	8.38
312593.92	167705.23	32.72	8.72

Reception Building - NW

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312543.71	167740.30	22.79	9.54
312560.81	167751.70	22.66	9.41

Reception Building - NE

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312560.81	167751.70	22.66	9.41
312589.60	167710.54	22.04	8.79

Reception Building - SE

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312589.60	167710.54	22.04	8.79
312572.13	167698.78	22.12	8.87

Reception Building - SW

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312572.13	167698.78	22.12	8.87
312543.71	167740.30	22.79	9.54

Turbine Building - SW

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312626.57	167654.44	19.24	8.24
312633.76	167643.92	19.13	8.13

Turbine Building – SE

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312633.76	167643.92	19.13	8.13
312648.92	167653.99	19.04	8.04

Turbine Building - NE

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312648.92	167653.99	19.04	8.04
312641.34	167664.48	19.15	8.15

MPB lean to – NW

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312605.22	167688.83	13.56	8.56
312611.12	167692.73	13.52	8.52

MPB lean to - NE

Coordinates			
x (m)	y (m)	z (m)	Ground (m)
312611.12	167692.73	13.52	8.52
312618.97	167681.32	13.41	8.41

MPB lean to – SE

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312618.97	167681.32	13.41	8.41
312613.19	167677.35	13.44	8.44

Receivers

Name	Height		Coordinates		
	(m)		x (m)	y (m)	z (m)
L1 - Dock View Road	4.50	r	312436.75	167991.93	37.50
L2 - Cory Way	4.50	r	312425.84	167585.40	12.50
L3 - Cei Dafdd	4.00	r	312182.88	167518.19	11.47

Barriers

ACC cladding

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312641.71	167644.97	24.07	8.07
312618.79	167629.80	24.12	8.12
312625.75	167619.69	24.01	8.01
312648.79	167635.00	23.98	7.98
312641.71	167644.98	24.07	8.07

Buildings

Main Processing Building

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312577.24	167693.74	31.81	8.81
312600.40	167660.30	31.81	8.44
312617.30	167671.39	31.81	8.38
312593.91	167705.16	31.81	8.72

Turbine Building

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312626.64	167654.43	19.24	8.24
312633.77	167643.99	19.24	8.13
312648.85	167654.01	19.24	8.04
312641.33	167664.48	19.24	8.15

MPB lean to

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312605.25	167688.80	13.56	8.56
312611.11	167692.66	13.56	8.52
312618.90	167681.34	13.56	8.41
312613.17	167677.37	13.56	8.44

Pumphouse

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312636.00	167623.75	11.96	7.96
312639.77	167618.35	11.96	7.82
312648.86	167624.42	11.96	7.82
312645.03	167629.79	11.96	7.96

Reception Building

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312560.79	167751.63	22.66	9.41
312589.53	167710.56	22.66	8.79
312572.14	167698.85	22.66	8.87
312543.78	167740.29	22.66	9.54

Welfare

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312617.47	167667.57	19.37	8.37
312626.63	167654.45	19.37	8.24
312641.32	167664.48	19.37	8.15
312632.30	167677.53	19.37	8.28

Buildings

Off-site buildings

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312507.32	167757.73	15.25	10.25
312499.91	167749.59	15.25	10.20
312523.27	167726.36	15.25	9.61
312531.21	167734.24	15.25	9.64

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312527.52	167717.83	14.45	9.45
312550.15	167688.45	14.45	8.90
312558.23	167695.20	14.45	8.93
312536.65	167724.84	14.45	9.47

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312556.02	167682.25	13.82	8.82
312567.26	167656.20	13.82	8.56
312577.45	167660.72	13.82	8.57
312566.07	167686.92	13.82	8.82

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312590.00	167620.89	13.19	8.19
312572.41	167645.24	13.19	8.44
312581.58	167651.40	13.19	8.47
312599.84	167626.73	13.19	8.19

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312618.87	167594.68	12.70	7.70
312600.59	167620.62	12.70	8.14
312592.50	167614.74	12.70	8.12
312609.52	167589.32	12.70	7.71

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312602.61	167580.20	12.65	7.65
312594.62	167590.07	12.65	7.83
312595.67	167592.17	12.65	7.86
312582.23	167611.92	12.65	8.11
312584.54	167613.81	12.65	8.13
312576.14	167624.52	12.65	8.24
312579.71	167625.99	12.65	8.25
312546.72	167670.32	12.65	8.75
312552.61	167675.36	12.65	8.78
312544.62	167685.45	12.65	8.90
312513.95	167663.39	12.65	8.77
312521.51	167653.94	12.65	8.67
312516.26	167650.15	12.65	8.64
312577.46	167563.11	12.65	7.52

Coordinates			
x(m)	y(m)	z(m)	Ground(m)
312532.96	167697.82	14.10	9.10
312505.17	167738.58	14.10	9.95
312499.74	167735.14	14.10	9.94
312484.92	167755.39	14.10	10.47
312474.99	167747.84	14.10	10.40
312467.32	167757.64	14.10	10.67
312459.54	167752.70	14.10	10.62
312453.03	167761.52	14.10	10.83
312434.77	167748.27	14.10	10.89
312448.36	167730.42	14.10	10.38
312454.78	167734.01	14.10	10.30
312469.46	167714.25	14.10	9.76
312474.71	167717.33	14.10	9.79
312504.88	167676.31	14.10	8.91

Cylinders

Name	M.	ID	Absorption	Centre		Radius	Height	
				X (m)	y(m)	(m)	(m)	
Fire Water Tank			0.01	312633.22	167616.42	5.09	10.00	r
Ash Silos			0.01	312609.88	167699.84	3.39	18.50	r
Ash Silos			0.01	312617.00	167694.09	3.34	18.50	r
Chimney Stack			0.01	312617.74	167639.36	1.19	42.00	r

APPENDIX I

RESPONSE TO NRW SCHEDULE 5 REQUEST

Note: NRW original comments are provided in *blue*.

Sol Acoustics' responses are provided in red.

Noise Modelling and Impact Assessment

The noise impact assessment is described in the following reports:

- *Barry Biomass Energy Plant Barry. Noise Assessment (received by NRW on 25th October 2016); and*
- *Barry Biomass Energy Plant Barry. Noise Assessment (received by NRW on 8th March 2017)*

  This report supersedes previously issued noise assessment reports as issued by others.

In NRW's opinion these assessments do not:

- *Confirm the exact nature, location and specification of all noise sources included in the impact assessment;*
  A site plan is provided in this report (Appendix C) which confirms the location of all noise sources used to inform the noise impact assessment. Specific National grid references are provided in Appendix H for each identified noise source.

- *Include valid justification for exclusion of any potential noise sources from the impact assessment (including those listed in the noise impact assessment reports but having no associated power level spectra data);*
  A more substantial list of noise sources is included within this assessment. A detailed list of all identified noise sources, along with the anticipated noise impact is provided in Appendix E. Emergency and very infrequently used start-up plant has been excluded from the current assessment. Noise sources, such as internal and external HGV movements, which will not operate during the night-time period have been excluded from the night time noise impact assessment.

- *Make clear - where internal noise sources have been used in building reverberant sound level calculations used in the impact assessment modelling - which sources have been included. Where any potential contributing sources have been excluded, the reports do not provide justification for this;*
  Noise break-out calculations for each building are provided within Appendix G. These calculations present the predicted reverberant noise level expected within each building based upon the known noise sources within each space and the anticipated reverberation time expected within each space.

- *Please also Include details of all building material specifications as they relate to sound absorption/noise reduction*
  Details of the currently proposed architectural specifications pertinent to the noise impact assessment for each building are described in Appendix F along with the anticipate sound reduction, and where appropriate the sound absorption performance expected from the proposed building material.

The assessments also do not:

- *Provide details of the methodology used to complete the survey of background noise levels. Only the results obtained from the survey are included; and*
  Details of a revised and more extensive environmental noise survey are presented within the report, with further information presented in Appendix B.

- *Include a complete BS4142:2014 'Methods for rating and assessing industrial and commercial sound' assessment of the impact of the proposed installation on local receptors.*
  A full BS 4142: 2014 assessment is presented within this noise impact assessment.

Please therefore submit a full and complete noise impact assessment which considers suitable receptor locations likely to be impacted by the proposed installation. This assessment should address all the points raised in the following paragraphs

- *Final confirmation of the sound reduction properties of all cladding materials used in the construction should be provided and, if different from those stated in previously submitted noise impact assessment reports referenced above, confirm that the reverberant noise calculations of the building elements included in the modelling and hence noise emissions to the surrounding environment are based on these final material specifications.*
  Details of the currently proposed architectural specifications pertinent to the noise impact assessment for each building are described in Appendix F along with the anticipate sound reduction, and where appropriate, the sound absorption performance expected from the proposed building material.

- *In addition, confirmation of all final plant specifications as they relate to noise should be provided including confirmation of what plant has been used in reverberant noise calculations and the justification for any omissions, whether contributing to reverberant noise or as discrete external noise sources:*
  Noise break-out calculation, including reverberant noise calculations are presented in Appendix G. These calculations have been based upon the sound power noise level expected for each identified noise source.

- *Details of the methodology used to complete the survey of background noise levels which enabled the calculation of the results given in Table 3.1 of the Noise Assessment report received by NRW on 8th March 2017. And justification as to why the background survey data is still valid if it was not completed recently;*
  The methodology and full results of a revised and more substantial environmental noise survey as conducted by Sol Acoustics in May/June 2017 are presented within this report. The results and findings of this noise survey are considered to supersede all previously used noise data by others.

- *Location of louvres and roller shutter doors on both the Boiler House and Steam Turbine building, as these are not indicated on any of the plans submitted;*
  The location of all louvres and roller shutters are presented in the building elevations as shown in Appendix F along with the required acoustic specifications.

- *Details of the sound reduction index spectra for the louvres and roller shutter doors on the Boiler House and Steam Turbine building. Clarification of how or if these elements have been considered in the calculation of the combined sound power levels for the building facades;*
  Details of the currently proposed architectural specifications pertinent to the noise impact assessment for each building are described in Appendix F, along with the anticipated sound reduction, and where appropriate, the sound absorption performance expected from the proposed building materials.

- *Drawing 'Barry_01_DWG_01_20100' appears to show internal conveyors at the North-West end of the reception building (the conveyors are unlabelled), however, there is no indication of any noise source associated with this area within the submitted modelling QSI format file or Noise Assessment reports.*
  The proposed fuel feed conveyor is external to the Reception Building. The location of the fuel feed conveyor is presented in Appendix C. The associated noise levels are presented within Appendix E.

- *Please confirm the specifications of any noise producing plant or activities within the reception building and, if present, provide justification as to why these noise sources have been excluded from consideration in the Noise Assessment reports;*
  A loading shovel is proposed to operate within the Reception Building to load the push floor. The machinery operating the push floor is located external to the Reception Building. The loading shovel will only operate during the daytime period (07:00-23:00). Measured noise data for a loading shovel is included within this assessment.

- *While indicated as a noise source, the fuel chip conveyor between the Reception Hall and main process building does not appear to have been included in the supplied modelling and no spectrum is included in the Noise Assessment reports. Please provide justification as to why this noise source has been excluded from consideration in the Noise Assessment reports;*
  This noise source has been considered in this assessment.

- *It is not clear from the Drawing 'Barry_01_DWG_01_20100' whether fuel material is delivered from the Reception Hall to the fuel chip conveyor via an external covered conveyor along the South West façade of the building or directly via the South-East façade of the building. Transfer of wood chip from the Reception Hall to the fuel chip conveyor has not been included as a noise source in the Noise Assessment. Please clarify the method for transferring wood chip to fuel chip conveyor and provide justification for excluding this as a possible external noise source;*
  Fuel is delivered from the reception building to the Main Processing Building via an external conveyor to the south west of the Reception Building. The noise impact from this noise source has been included in this assessment.

- *Sound power spectra for Turbine bypass and de-superheater and Firewater pumps are not included in the steam turbine sources listed in Appendix B of the Noise Assessment reports. Please provide justification as to why these have been excluded from consideration in the Noise Assessment reports;*
  The noise impact from these two noise sources are included within this assessment.

- *Items labelled 08 and 10 on Drawing 'Barry_01_DWG_01_20100' indicate the presence of air blast coolers with an associated diesel generator immediately adjacent to the North-East wall of the main process building. However, these items have not be included as exterior noise sources in the submitted modelling QSI format file or Noise Assessment reports. Please provide justification as to why these have been excluded from consideration in the submitted Noise Assessment reports;*
  The air blast coolers are external and included within this assessment. Note that only one air blast cooler is expected to operate at any time.

- *No details regarding the estimated frequency of fuel material delivery have been provided in the noise impact assessment report, within the daily operating hours. Please ensure that the correct delivery frequency and range of daily operating hours are included as parameters in the noise model.*
  A description of all anticipated HGV movements is provided in Section 2.2 of this report.

  Please provide justification as to why noise sources associated with fuel deliveries by HGV traffic on site and any mechanical shovel loading operations within the Reception Building have been excluded from consideration in the submitted Noise Assessment reports;
  Noise from HGV traffic on site has been included in the assessment based upon information provided by PCML and as summarised in Section 2.2 of this report.

- *A complete assessment of the impact of the proposed installation on local sensitive receptors that takes into account the above points and follows the methodology set out in BS4142:2014 'Methods for rating and assessing industrial and commercial sound.'*
  A full BS 4142: 2014 noise impact assessment has been presented in this report.

APPENDIX J

DETAILS AND PROFESSIONAL QUALIFICATIONS OF CONTRIBUTING SOL STAFF

Company Details

Name of Organisation:	Sol Acoustics Limited
Status:	Private Limited Company
Address:	4 Adams Court Adams Hill Knutsford WA16 6BA
Telephone Number:	01565 632535
E-Mail:	info@solacoustics.co.uk
Nature of Business:	Acoustic Consultancy
Directors:	Simon Ferenczi Darren Clucas
Company Registration Number:	4218702

Key Technical Personnel & Qualifications

Simon Ferenczi	Institute of Acoustics Diploma (with additional modules), MIOA
Darren Clucas	BSc(Hons), Institute of Acoustics Diploma, AMIOA
Brian Horner	BSc(Hons), MIOA
Mark Greenhalgh	BSc(Hons), MIOA
Jamie Ross	BEng(Hons), MSc, AMIOA

Company Accreditations

Sol Acoustics is a member of The Association of Noise Consultants (ANC) and is qualified to perform sound insulation testing under the ANC's accredited testing scheme to demonstrate compliance with the requirements of Approved Document E of the Building Regulations.