POWERFUEL

Portland energy recovery facility

BS4142 noise impact assessment

August 2021

Powerfuel Portland

Portland Energy Recovery Facility

BS4142 Noise Impact Assessment

AAc/267701/R03a

Issue 2 | 21 May 2021

Job number 267701-15

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Document verification

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Job title		Portland Energy Recovery Facility			**Job number** 267701-15
Document title		BS4142 Noise Impact Assessment			**File reference**
Document ref		AAc/267701/R03a			
Revision	**Date**	**Filename**	R03a-dh-2021-05-21.docx		
Issue 2	21 May 2021	**Description**	Minor corrections to first version		
			Prepared by	Checked by	Approved by
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		Filename			
		Description			
			Prepared by	**Checked by**	**Approved by**
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	**Checked by**	**Approved by**
		Name			
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Executive summary

This report responds to Environment Agency's letter reference EPR/AP3304SZ/A001 dated 20 April 2021 which requests further assessment of noise impact for the proposed Powerfuel Portland energy recovery facility (ERF). Specifically, a more detailed assessment was requested in line with British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*.

The site is located on the north end of the Isle of Portland, to the west of Balaclava Bay and in excess of 500m from the closest residential area, which is to the west of the site.

A baseline sound survey was undertaken by logging continuously from Friday 16 to Tuesday 20 April 2021. This was supplemented by short term measurements during the typically quiet periods of day and night at three further locations.

Noise impacts from the ERF were calculated using a 3D model developed with SoundPlan noise modelling software. The plant sound levels used in the model were taken from data from permitted facilities elsewhere.

The assessment shows the predicted rating sound levels from the ERF to be below the background levels at the locations assessed. In absolute terms the levels are also low, indicating that the effect of noise from operation of the ERF would be not significant.

1 Introduction

This report responds to Environment Agency's letter reference EPR/AP3304SZ/A001 dated 20 April 2021 which requests further noise impact assessment for the proposed Powerfuel Portland energy recovery facility (ERF). This report is supplementary to Arup's Noise Impact Assessment report reference AAc/267701-15/R01 dated 26 August 2020, giving a more detailed BS4142[1] assessment for operation of the ERF.

The previous assessment was undertaken during the Covid-19 lockdown period, which prevented a baseline survey from being undertaken at that time. Furthermore, it was likely that any survey undertaken during that period would be unrepresentative of more typical conditions due to the general reduction in economic and commercial activity. Consequently, that previous assessment used baseline survey data collected around the port as part of on-going environmental monitoring using an approach agreed with Dorset Council.

At the time of preparing this current report, the third national lockdown restrictions are partially lifted but, whilst national road traffic levels are generally back to pre-pandemic normal, it is possible that some activity may currently be below pre-pandemic normal. As required by EA, a baseline sound survey has therefore been undertaken in April 2021. Although the measured baseline levels could be lower than the pre-pandemic normal, this would lead to the assessment presented here being cautious i.e. a lower measured baseline would lead to a greater noise impact being reported for the ERF.

Appendix A provides a glossary of acoustic terminology used in this report.

2 The site, its location and noise sensitive receptors

Figure 1 shows the ERF installation boundary and Figures 2 and 3 show the boundary in the context of the wider area. The closest noise sensitive receptors are identified in Figure 2.

The site is bordered to the south west by Incline Road, which is a private road within the port that is actively used by port traffic, and a former railway embankment. Cliffs supporting grassland, scrub and woodland habitats lie to the south west of the embankment and rise steeply to approximately 125m AOD. Her Majesty's Prison The Verne is approximately 430m to the south west of the site at the top of the steep slope. The eastern site boundary is formed by the shingle shoreline and overland fuel pipes from Portland Bunkers, which are fuel bunkers in the nearby cliffs used for marine bunker fuel supply. Existing operational port development lies to the north and north west of the site.

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

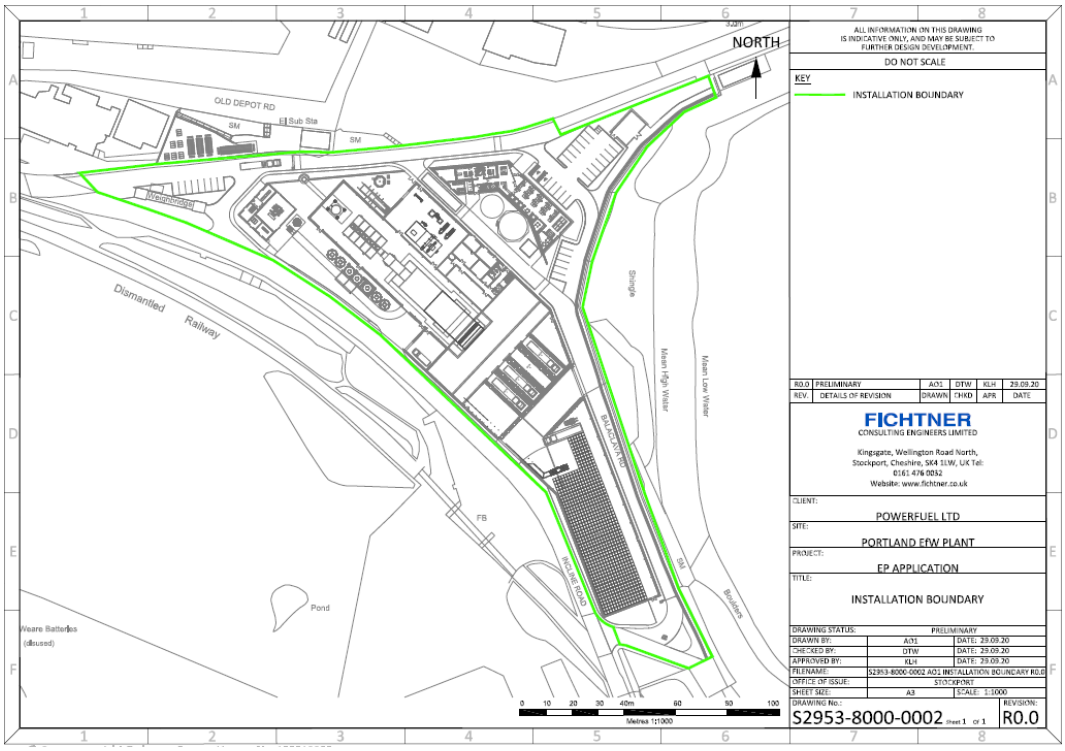

Figure 1 ERF installation boundary

Figure 2 ERF installation boundary and the nearest noise sensitive receptors

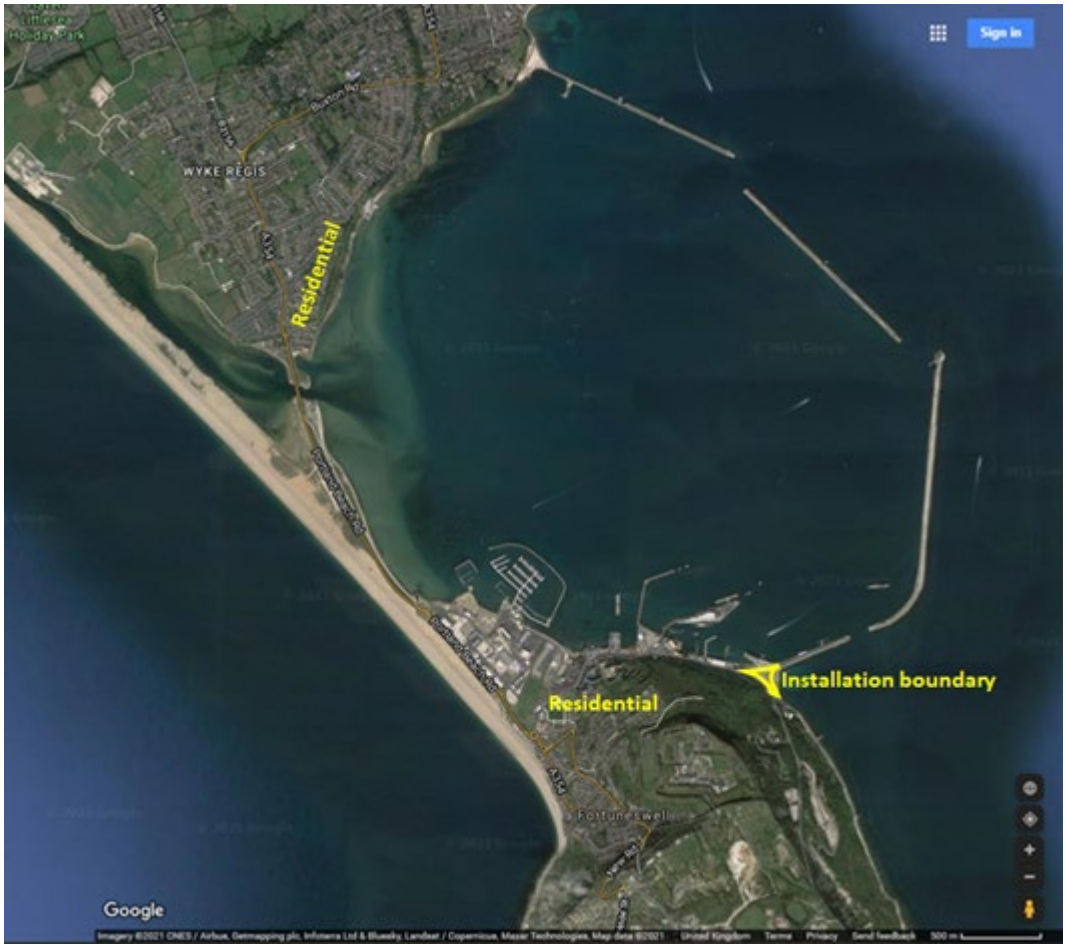

Figure 3 ERF installation boundary in the context of the wider area

2.1 Proposed site activities

The installation (see Figure 4 and Figure 5) is envisaged to comprise an ERF that will treat up to approximately 202,000 tonnes per annum of non-hazardous, residual waste material, with a nominal capacity of 183,000 tonnes per annum. Waste will be in the form of RDF (refuse derived fuel). It will be a mass burn facility, using boiler and moving grate technology with a high efficiency steam boiler and high efficiency turbine designed to generate up to 18.1MWe and export approximately 15.2MWe.

The building will enclose all elements of the RDF bale storage area in the fuel hall and waste bunker, tipping hall, cranes, conveyors, feed hopper, furnace, boiler, condenser units and turbine / generator.

The ERF will normally operate 24 hours a day, seven days a week. RDF for the facility will be delivered by ship in a baled format or by road lorry in a baled or loose format. The road traffic noise assessment has assumed the 'worst case' traffic noise impact based on all RDF arriving by road during daytime. The speed limit on site is 20mph. Deliveries by sea will be unloaded via an existing berth in the port, normally the berth closest to the site, then brought up to the site from the berth by road vehicle. Vehicles servicing the ERF will operate on roads already used by other vehicles related to the port activities.

Figure 4 Visualisation of proposed ERF viewed from north east

In addition to the activities within the installation boundary, the planning application also includes associated infrastructure, including the substations and facilities required to provide electricity for ships alongside at berth. These were included in the assessment reported in report reference AAc/267701-15/R01 and made little contribution to the overall sound levels at the noise sensitive receptors.

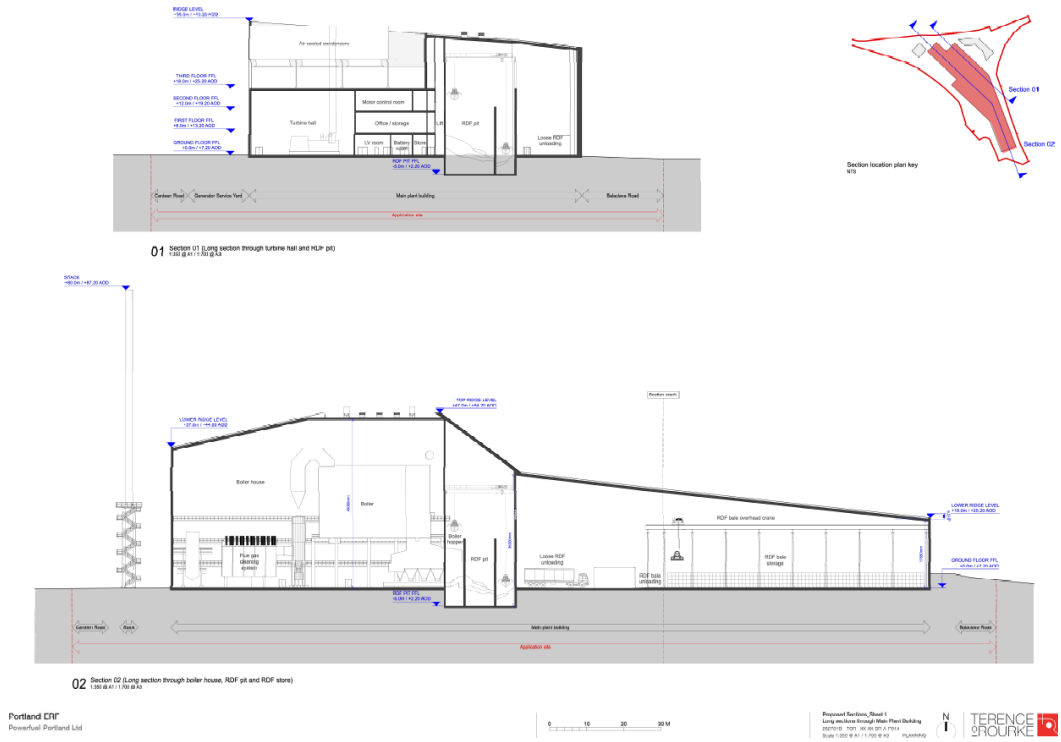

Figure 5 Long sections through the proposed ERF

2.2 Sensitive receptors

Assessment of noise from the site has been carried out for:

- Dwellings to the west of the site, on Beel Close, Leet Close, East Weare Road and Ayton Drive;
- Crabbers' Wharf holiday apartments;
- Her Majesty's Prison (HMP) The Verne;
- Dwellings and businesses on Castletown;
- Portland Harbour moorings; and
- Residences on the north west side of the harbour at Wyke Regis and surrounding area[2].

3 Baseline sound survey

Details of the sound survey are given in Appendix B. Monitoring locations are shown in Figure B1. A logging sound level meter was installed as close as possible to the closest residential properties (East Weare Road), at a location that was secure. The logger collected data from Friday 16 to Tuesday 20 April 2021 to capture noise levels during both weekdays and over a weekend.

Additional short-term measurements to supplement the logger data were made at East Weare Road (Location C) and at locations at residential areas across Portland Harbour. The latter were to enable noise impacts to be assessed at dwellings where sound propagation from the ERF would be across the water.

Baseline levels were not measured at dwellings and businesses on Castletown as these locations would be more screened from the ERF and already exposed to higher sound levels from the port. Control of the ERF to comply with levels at the closer receptors where baseline sound was measured will therefore ensure compliance at receptors on Castletown.

The baseline sound levels are summarised in Table 1. For the short duration measurements, the mean average was taken as the representative level. For the logger data, there are two peaks in the sound levels histogram (see Figure 9, Appendix B): the representative level is taken at the sound level corresponding to the highest count of the lower peak, before the counts begin to decrease (for day and for night).

[2] These locations are at such a distance from the site that the calculated levels can only be considered approximate but are considered since they have a direct line of sight to the site and the sound propagation path is almost entirely across water.

Table 1 Representative baseline sound levels (day 07.00-23.00; night 23.00-07.00)

Location	Representative receptors	Background level $dBL_{A90,15min}$	
		Day	Night
Logger	HMP The Verne, most exposed residences at East Weare Road, Leet Close, Beel Close	37	38
A	Wyke Regis (Castle Cove area)	39	31
B	Wyke Regis (south)	40	33
C	Residences at East Weare Road, Leet Close, Beel Close	36	34

The levels at night are consistent with the background sound levels estimated for the previous assessment (taken as $32dBL_{A90}$). The logger data indicate a higher background level than measurement Location C, which may be due to its location being closer to the port and more exposed to the port. Location C was also partially screened from the port by the houses and other buildings. The rear facades of these houses, that have a direct line of sight to the port, may be exposed to higher background sound levels than those measured.

The measured daytime levels are lower than those used previously, which were taken as $44dBL_{A90}$. Since it is assumed that the ERF would operate 24 hours a day, sound levels need to comply with the lower night time levels, which means this difference does not affect the assessment.

Daytime background levels at Locations A, B and C are higher than night time, which is more typical but is different to the logger data. This may reflect the greater dominance of sound from the port at the logger and the greater importance of other, closer sound sources (such as local road traffic), which are more active during the day at the residential locations.

4 Noise modelling

Noise impacts from the ERF were calculated using a 3D model developed with SoundPlan noise modelling software. This is a proprietary software package commonly used in environmental noise assessment and implements the calculation methodology described in ISO 9613-2[3]. This method allows the calculation of sound levels at distance from the source(s) and takes account of factors including geometrical spreading, air absorption, ground properties, screening effects of buildings and topography.

The main factors required for the assessment are given below and full details required by the Environment Agency[4] are in Appendix B and Appendix C.

[3] ISO 9613-2, Acoustics – Attenuation of sound during propagation outdoors, Part 2, General method of calculation, 1996.
[4] Environment Agency 2019. Noise impact assessments involving calculations or modelling. Noise impact assessments involving calculations or modelling - GOV.UK (www.gov.uk). Accessed 26 April 2021

4.1 Noise sources

Table 2 provides the assumed sound levels used in the noise model taken from data provided by the client team for permitted facilities elsewhere with some similar noise-producing elements.

Table 2 Representative sound levels for site plant

Plant	Sound power level (SWL) / Sound pressure level (SPL), dB(A)
RDF unloading, RDF pit, bale store, control room, boiler room (reverberant level)	85 (SPL)
Flue stack (top)	95 (SWL)
Turbine hall	95 (SPL)
Air cooled condenser	92 each of 3 fans (SWL)

Operation of the facility is expected to require up to 80 HGV movements per day on the public highway, which represents 40 HGVs at the ERF over the course of a day. Within the port, these will operate on existing roads already used by other vehicles relating to the port activities. Unloading of HGVs will be within the enclosed unloading hall.

4.2 Noise mitigation measures

The ERF will be designed to incorporate any mitigation to ensure that overall noise levels from operation of the whole development comply with the required noise limits at sensitive receptors. During commissioning, noise monitoring of the plant will be undertaken to ensure compliance with these noise limits.

The building envelope design and materials have been included in the calculated noise emission levels based on profiled steel sheet cladding with louvres to the lower 6m of the walls. Whilst plants of this type do operate without cladding in some locations, profiled steel is a standard design which provides reduced noise emissions compared to the more exposed basic design. Transmission loss data taken from Arup's database are shown in Table 3.

Table 3 Building envelope transmission loss data, dB

Material	Rating Rw, dB	Octave band centre frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Profiled metal	23	12	18	20	21	21	25	25	25
Louvred walls	14	5	7	11	12	13	14	12	9

The air cooled condensers (ACCs; No. 7 shown on Figure 4) are the main significant source but would be screened from the closest residential properties to the west (and HMP The Verne) by the ERF building. There will also be screening breaking the line of sight to all other noise sensitive receptors. The ACCs are therefore not a dominant noise source at the offsite noise sensitive receptors: the

modelling results showed the sources contributing most to the total noise level were the stack flue top for most receptors.

4.3 Modelling results

The model was used to calculate sound pressure levels at various receptors in addition to those for which the baseline was measured. These are summarised in Table 4, which presents the highest level calculated for each receptor.

A contingency of +3dB has been added to account for uncertainty in the calculations. This also provides an allowance for any tonality in the specific sound (i.e. that from the ERF). BS4142:2019 section 9.2 describes the subjective method of assessment which gives a penalty of 2dB for a tone which is just perceptible at the receptor to 4dB where it is clearly perceptible. Given the low predicted sound levels, 3dB is an appropriate overall allowance.

Table 4 Predicted rating sound levels from the ERF (with 3dB contingency/penalty)

Location	**Predicted ratimg sound level, dB$L_{Ar,Tr}$**
Ayton Drive	30
Castletown	34
Coronation Road	27
Crabbers' Wharf holiday apartments	36
East Weare Drive	33
HMP The Verne	39
Portland Hospital	27
Portland Marina (moorings)	34

5 Assessment

British Standard BS 4142 provides a methodology for rating and assessing the likely impacts of sound of an industrial or commercial nature on residential receptors. This includes sound from mobile plant and vehicles that are an intrinsic part of the overall sound emanating from the site.

The methodology is based on comparing the background sound level (measured as L_{A90}) at a receptor with the level of noise from the source being assessed, including penalties for characteristics such as tonality and impulsivity (known as the rating level $L_{Ar,Tr}$). The following advice is provided in BS4142 for determining the significance of impacts:

- Typically, the greater the difference between the background sound level and the rating level, the greater the magnitude of the impact;
- A difference of +10 dB or more between the rating level and the background level is likely to be an indication of a significant adverse impact, depending on the context;

- A difference of around +5dB between the rating level and the background level is likely to be an indication of an adverse impact, depending on the context;
- The lower the rating level is relative to the measured background level, the less likely it is that the source being assessed will have an adverse or a significant adverse impact. Where the rating level does not exceed the background level, this is an indication of the specific sound source having a low impact, depending on the context.

Table 5 compares the predicted rating sound levels with the measured baseline levels. Figure 6 compares spectra for the measured baseline background levels with the predicted specific sound level from the ERF.

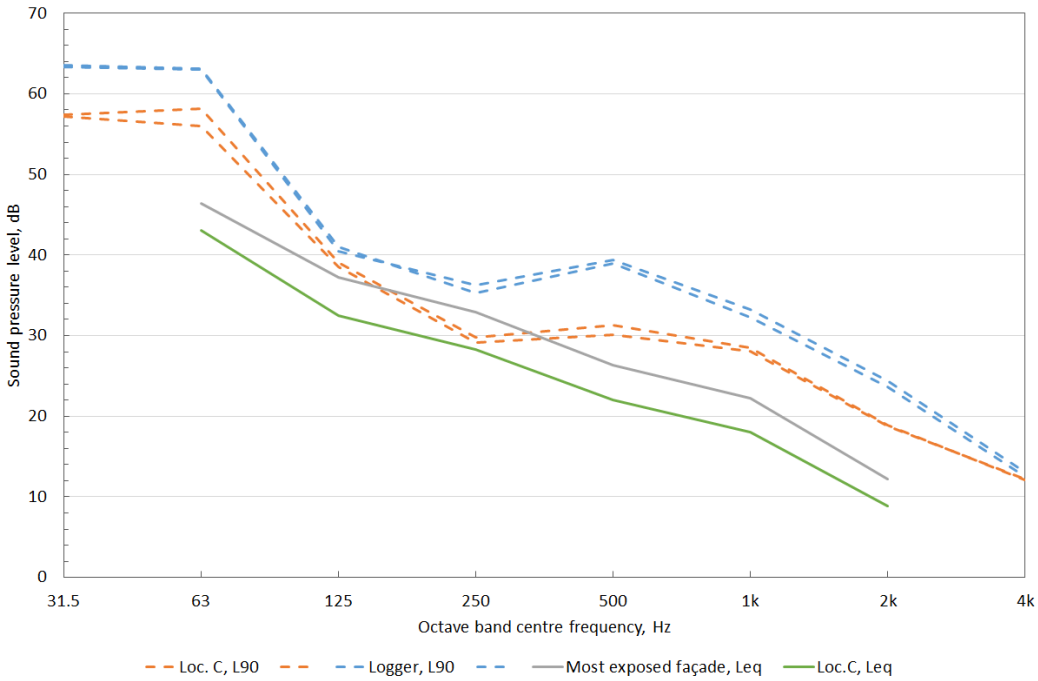

Figure 6 Comparison between measured background (L_{90}) at survey Location C and at the logger (broken lines) with the modelled specific sound level (L_{eq}) for the ERF (solid lines) in East Weare Road

Table 5 Summary of BS4142 assessment (day 07.00-23.00; night 23.00-07.00)

Receptor	**Baseline background sound level, dBL_{A90}**		**Predicted rating sound level, $dBL_{Ar,Tr}$**		**BS4142 Assessment ($dBL_{Ar,Tr} - dBL_{A90}$)**	
	Day	**Night**	**Day**	**Night**	**Day**	**Night**
Wyke Regis (Castle Cove area)	39	32	<30	<30	< -9	< -2
Wyke Regis (south)	40	33	<30	<30	< -10	< -3
Residences at East Weare Rd, Leet Cl, Beel Cl	36	34	33	33	-3	-1

The assessment shows the predicted rating levels to be below the background at the locations assessed, which are the closest noise sensitive receptors to the site. In absolute terms the levels are also low, indicating that the effect of the sound source would be not significant.

6 Conclusions

Responding to Environment Agency's letter reference EPR/AP3304SZ/A001 dated 20 April 2021, this report has presented a BS4142 noise impact assessment for the proposed Powerfuel Portland ERF.

At this stage in the development process, the analysis is necessarily made on representative plant and associated noise emissions and the installation is assumed to operate 24 hours, except for deliveries by road. The same predicted levels of sound from the ERF have therefore been applied to both the day and night assessment.

The predicted rating sound emissions from the proposed ERF do not exceed the measured background level at the assessed receptors, indicating that any effect of sound from the ERF would be not significant.

The baseline has been established during the period in which Covid 19 restrictions are being lifted. Some economic activity may have been lower than was typical prior to the pandemic. Any affect that this would have on the assessment would be to lead to a cautious assessment ie an over-prediction of impacts and effects.

Appendix A

Acoustic terminology

Background sound level, $L_{A90,T}$

A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting, F, and quoted to the nearest whole number of decibels.

Decibel (dB)

The ratio of sound pressures which we can hear is a ratio of 10^6:1 (one million: one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (L) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

dB(A)

The unit used to define a weighted sound pressure level, which correlates well with the subjective response to sound. The 'A' weighting follows the frequency response of the human ear, which is less sensitive to low and very high frequencies than it is to those in the range 500Hz to 4kHz.

In some statistical descriptors the 'A' weighting forms part of a subscript, such as L_{A10}, L_{A90}, and L_{Aeq} for the 'A' weighted equivalent continuous noise level.

Frequency

Frequency is the rate of repetition of a sound wave. The subjective equivalent in music is pitch. The unit of frequency is the hertz (Hz), which is identical to cycles per second. A 1000Hz is often denoted as 1kHz, e.g. 2kHz = 2000Hz. Human hearing ranges approximately from 20Hz to 20kHz. For design purposes, the octave bands between 63Hz to 8kHz are generally used. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. For more detailed analysis, each octave band may be split into three one-third octave bands or narrow frequency bands.

Maximum sound level

The maximum noise level identified during a measurement period. Experimental data has shown that the human ear does not generally register the full loudness of transient sound events of less than 125ms duration and fast time weighting (F) has an exponential time constant of 125ms which reflects the ear's response. Slow time weighting (S) has an exponential time constant of 1s and is used to allow more accurate estimation of the average sound level on a visual display.

The maximum level measured with fast time weighting is denoted as $L_{Amax,F}$. The maximum level measured with slow time weighting is denoted $L_{Amax,S}$.

Rating sound level, $L_{Ar,Tr}$

Specific sound level plus any adjustment for the characteristic features of the sound, specified over the reference time interval, Tr.

Sound pressure level, L

The sound power emitted by a source results in pressure fluctuations in the air, which are heard as sound.

The sound pressure level (L) is ten times the logarithm of the ratio of the measured sound pressure (detected by a microphone) to the reference level of $2x10^{-5}$Pa (the threshold of hearing).

Thus L (dB) = 10 log $(P1/P_{ref})^2$ where P_{ref}, the lowest pressure detectable by the ear, is 0.00002 pascals (i.e. $2x10^{-5}$ Pa).

The threshold of hearing is 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dBL_A and a change of 3dB is only just detectable. A change of 10dB is subjectively twice, or half, as loud.

Sound reduction index, R

The sound reduction index (or transmission loss) of a building element is a measure of the loss of sound through the material, ie its attenuation properties. It is a property of the component, unlike the sound level difference which is affected by the common area between the rooms and the acoustic of the receiving room. The weighted sound reduction index, Rw, is a single figure description of sound reduction index which is defined in BS EN ISO 717-1: 1997. The Rw is calculated from measurements in an acoustic laboratory. Sound insulation ratings derived from site (which are invariably lower than the laboratory figures) are referred to as the R'w rating.

Specific sound level, L_s

Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.

Statistical noise levels

For levels of noise that vary widely with time, it is necessary to employ an index which allows for this variation. The L_{p10} is the level exceeded for 10% of the time period under consideration. The L_{90} is the level exceeded for 90% of the time.

A weighted statistical noise levels are denoted L_{A10}, dBL_{A90} etc. The reference time period (T) is normally included, e.g. dB$L_{A10,\ 5min}$ or dB$L_{A90,\ 8hr}$.

Typical levels

Noise Level, dB(A)	Example
130	Threshold of pain
120	Jet aircraft take-off at 100m
110	Chain saw at 1m
100	Inside disco
90	Heavy lorries at 5m
80	Kerbside of busy street
70	Loud radio (in typical domestic room)
60	Office or restaurant
50	Domestic fan heater at 1m
40	Living room
30	Theatre

Appendix B

Baseline sound survey

B1 Measurement procedure

A baseline noise survey was undertaken from Friday 16 to Tuesday 20 April 2021 to quantify the existing noise climate in the vicinity of the proposed development.

B1.1 Measurement locations

The measurement locations were chosen to provide typical baseline noise levels at representative noise sensitive receptors around the proposed development at the closest residential area and at residences across the harbour from the site. Attended spot measurements were taken at three locations and unattended measurements were taken at one location as close as possible to the closest residential receptors, where the logger was secure.

Figure 7: Measurement locations

The measurement locations were as follows:

- Logger (unattended) – On the opposite side of the residential receptors to Location C and closer to the installation boundary

- Location A (attended) – Adjacent to the residential properties on Old Castle Road
- Location B (attended) – Adjacent to the residential properties on Smallmouth Close
- Location C (attended) – Adjacent to Leet Close and East Weare Road, some of the closest residential receptors to the proposed development


Logger location


Location A


Location B



Location C

B1.2 Survey methodology

The measurements were made with the microphone mounted using a tripod 1.2m – 1.5m above ground level under acoustically free field conditions (i.e. at least 3.5m from any acoustically reflecting surface other than the ground).

The measurement locations were chosen to provide typical ambient noise levels at representative noise sensitive receptors around the site of the proposed development.

The weather conditions during the survey were within the limits specified in BS7445-1:2003. The weather was dry and sunny during the day, with minimal cloud cover day and night. The wind was generally calm, but with the occasional gust of up to 3.0m/s.

B1.2.1 Attended survey methodology

The sound level meter was set to record noise levels over 15 minute periods during the daytime (07:00-23:00) and 5 minute periods during the night-time (23:00-07:00). For each noise measurement, the noise climate, wind speed and direction, and the measured noise levels were all recorded and noted. The meter was set to store the L_{A90} required for the BS4142 assessment and additionally the L_{Aeq}, L_{Amin}, L_{Amax} and L_{A10} and indices. Measurements were made with a fast (0.125s) time constant.

Attended noise surveys were carried out to establish the baseline noise levels at the measurement locations at the following times:

- Daytime between 13:52 and 17:52 on 19 April 2021
- Quietest night period between 01:44 and 03:17 on 20 April 2021

B1.2.2 Unattended survey methodology

Unattended measurements were taken using a noise logger set to record noise levels over five-minute intervals. The meter was set to store the L_{Aeq}, L_{A10}, L_{A90} and L_{Amax} indices. Measurements were made with a fast (0.125s) time constant.

The logger recorded measurements from 12:40 on 16 April 2021 to 11:41 on 20 April 2021.

B1.3 Measurement equipment

Measurements were carried out using equipment as detailed in Table B1. The sound level meters and microphones are Class 1, conforming to BS EN 61672-1: 2013. The calibration of the sound level meters, pre-amplifier and microphone chains were checked before and after use, to confirm that there was no significant drift in meter response at the calibrator frequency and level. All Arup's sound level meters are regularly calibrated and this calibration is traceable to international standards.

Measurement Equipment	Manufacturer	Type Number	Serial Number
Sound level meter (logger)	Rion	NL-52	00264533
Microphone (logger)	Rion	UC-59	09681
Pre-amplifier (logger)	Rion	NH-25	64658
Field calibrator (logger)	Rion	NC-74	34467730
Sound level meter (attended)	Rion	NL-52	00231670
Microphone (attended)	Rion	UC-59	12921
Pre-amplifier (attended)	Rion	NH-25	21614
Field calibrator (attended)	Rion	NC-74	34336007

Table B6: Measurement equipment used for the survey

B2 Measurement results

The following provides a time history graph of the logger data and a histogram of the occurrence of noise levels used to identify the representative background sound levels. The individual measurement data for the attended locations are tabulated.

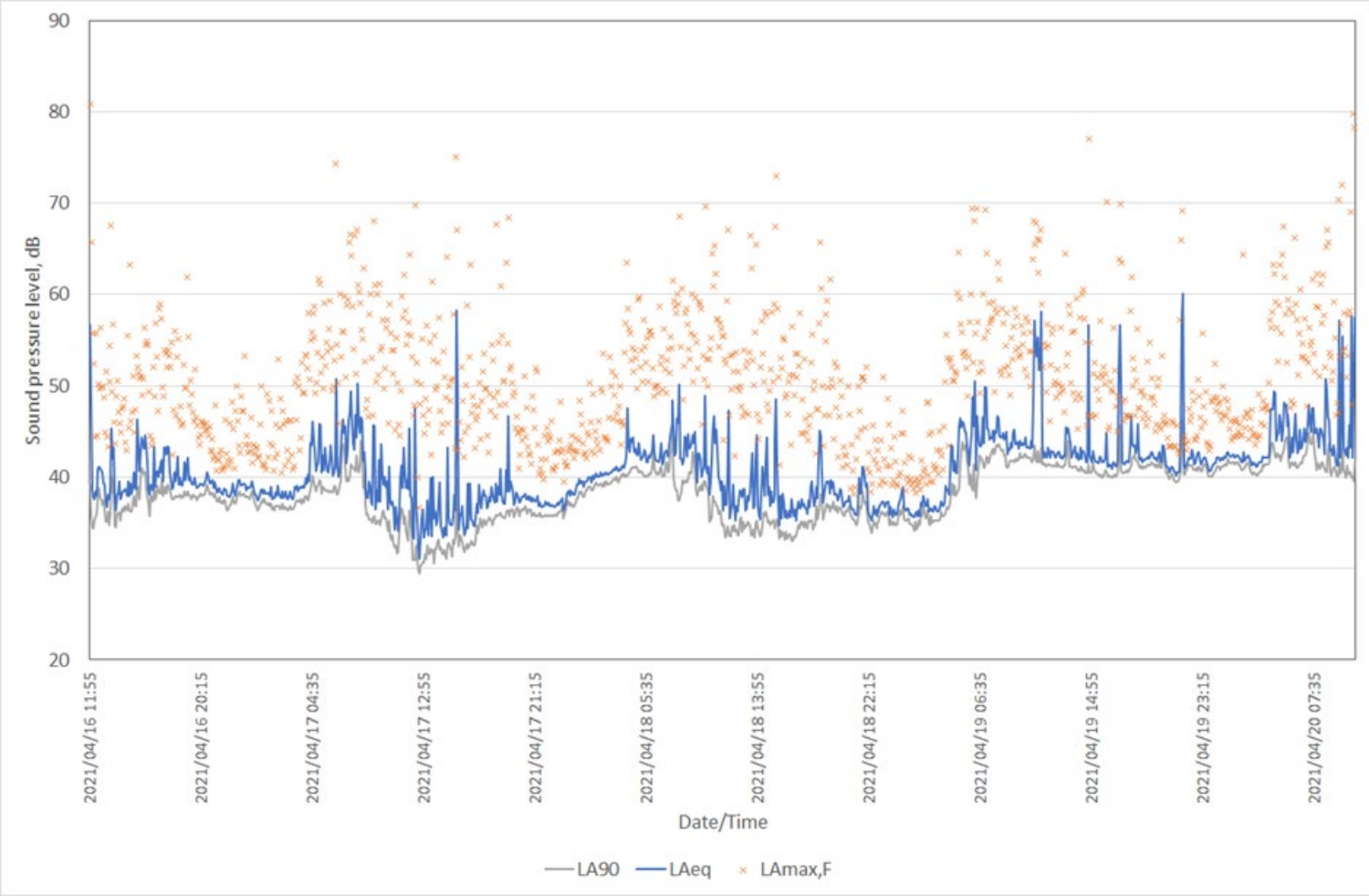

Figure 8: Unattended 5 minute measurement results

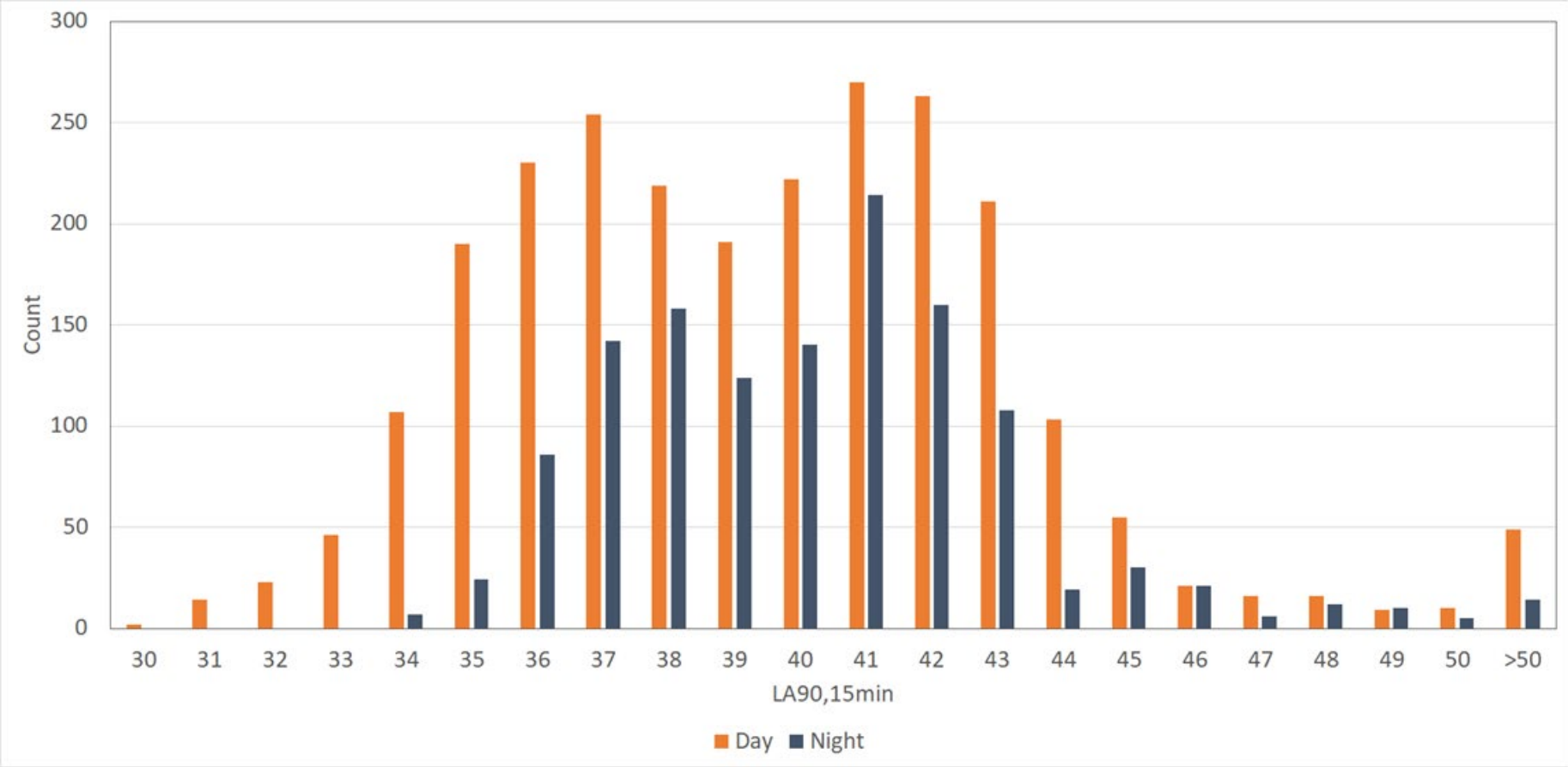

Figure 9: Histograms of day (07:00-23:00) and night (23:00-07:00) baseline background sound levels ($dBL_{A90,15min}$) at the logger

B2.1 Location A

Date/time	Duration (minutes)	Time period	Wind speed ms^{-1}	Wind direction (from)	dBL_{Aeq}	$dBL_{Amax,F}$	dBL_{A90}	Comments
2021/04/19 13:52:02	15	Day	0-1.5	East	48.9	74.4	38.0	Primary continuous noise source is low frequency noise from moored ships. Main other noise sources were people using the beach, and cars arriving and departing the car park.
2021/04/19 15:24:47	15	Day	0	N/A	46.0	62.4	38.9	
2021/04/19 16:54:51	15	Day	0	N/A	46.1	67.2	38.8	Primary continuous noise source is low frequency noise from moored ships. Main other noise sources were people using the beach, cars arriving and departing the car park, and a helicopter overflight.
2021/04/20 01:44:57	5	Night	0	N/A	32.6	44.6	31.0	Low frequency ship noise dominant. Noise from distant birds and from ropes hitting boat masts audible.
2021/04/20 02:37:48	5	Night	0	N/A	48.4	72.3	33.7	Low frequency ship noise dominant. Noise from distant birds and from ropes hitting boat masts audible. One close car pass-by.
2021/04/20 02:44:27	5	Night	0	N/A	33.0	44.6	31.5	Low frequency ship noise dominant. Noise from distant birds and from ropes hitting boat masts audible.

B2.2 Location B

Date/time	Duration (minutes)	Time period	Wind speed ms-1	Wind direction (from)	dBL$_{Aeq}$	dBL$_{Amax,F}$	dBL$_{A90}$	Comments
2021/04/19 14:20:58	15	Day	1-2	East	47.3	67.8	40.3	The dominant noise source was road traffic on the road to Portland. Low frequency noise from moored ships was also audible. The other main noise sources were people using the footpath.
2021/04/19 15:55:54	15	Day	2	East	56.3	89.8	40.2	
2021/04/19 17:26:59	15	Day	1-3	East	48.8	79.3	41	
2021/04/20 02:01:24	5	Night	1	East	34.4	44.9	32.5	Low frequency ship noise dominant. Other noise was mainly from occasional car pass-bys.
2021/04/20 03:00:34	5	Night	1	East	36.5	53.9	33.9	

B2.3 Location C

Date/time	Duration (minutes)	Time period	Wind speed ms-1	Wind direction (from)	dBL_{Aeq}	$dBL_{Amax,F}$	dBL_{A90}	Comments
2021/04/19 14:49:53	15	Day	0-1	East	42.8	67.3	35.9	The dominant noise source was low frequency noise from moored ships. Other main noise sources were occasional cars on the local roads, road traffic on Castle Road and occasional overflights from light aircraft.
2021/04/19 16:21:27	15	Day	0	N/A	44.6	66.2	35.8	The dominant noise source was low frequency noise from moored ships. Other main noise sources were occasional cars on the local roads, road traffic on Castle Road and noise from people in some of the gardens.
2021/04/19 17:52:36	15	Day	1-2	West	47.1	72.5	36.4	The dominant noise source was low frequency noise from moored ships. Other main noise sources were occasional cars on the local roads, road traffic on Castle Road, noise from people in some of the gardens (including a radio playing music), and a helicopter overflight.
2021/04/20 02:17:54	5	Night	0	N/A	36.3	45.3	35.1	The dominant noise source was the primarily low frequency noise from ships/the port.
2021/04/20 03:17:04	5	Night	0	N/A	35.3	50.8	34	

Appendix C

Noise modelling assumptions

C1 Noise model data

The noise modelling information required by EA is a very large quantity of data which it is impracticable to tabulate fully. It is therefore provided separately as zipped shape files, accessible with GIS, and with a brief summary below.

C1.1 Fixed and mobile plant

Geometry and location of substation plant are included in the industrial building and area source shapefiles. Input source data can be taken from Table 2.

C1.2 Noise emitting buildings

Geometry and location of the main site building are included in the industrial building and area source shapefiles, along with the floating screens shapefile, included to accurately bring in the sloped roofs of the main site building. Input source data can be taken from Table 2.

C1.3 Site traffic

Geometry and location of site roads are included in the road traffic shapefile. 80 heavy goods vehicle movements throughout the day on site, relating to the ERF operation, have been assumed, at 20 miles per hour. The resultant sound level at the receptors was calculated in SoundPlan.

C1.4 Buildings

Any off site buildings in Portland and the remainder of the site have been modelled, and their geometry, heights and locations can be found in the building shapefile.

C1.5 Receptors

Receptors locations were modelled with point receptors at each storey of the representative nearest noise sensitive receivers. The location of these receptors is provided in the receiver shapefile and can be cross referenced with the results below giving the highest octave band sound levels at each receptor.

Receptor	Location	Facade	Coordinates			Octave band sound pressure level, dB							dBA	Dominant source of sound at the receptor
			X	Y	Z	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz		
1 F4	Ayton Drive	8	368764.9	74294.2	36.5	44.2	35.8	30.6	24.5	20.2	9.0	-15.4	27.5	Stack flue top; Boiler room west; boiler room west
3 F4	Castletown	7	368887.6	74359.8	17.0	47.0	40.0	34.2	28.2	24.2	14.0	-7.7	31.2	Stack sides; Stack flue top; boiler room west louvre
4 F4	Coronation Road	11	368703.9	74079.9	48.1	41.3	32.8	27.8	21.4	16.9	5.2	-19.9	24.4	Stack flue top; Boiler room west; boiler room west
5 F4	Crabbers Wharf	6	368735.9	74413.5	15.9	47.1	41.6	35.9	29.7	25.5	14.4	-10.4	32.6	Stack sides; Turbine Room North Facade louvre; Stack flue top
7 F4	East Weare Drive	5	368989.9	74140.1	70.3	46.7	38.0	33.5	27.0	23.0	12.8	-6.8	30.1	Stack flue top; Boiler room west; boiler room west
9 F4	Jailhouse	4	369289.6	73880.5	160.9	51.8	43.3	38.1	33.4	30.9	22.5	7.5	36.3	Boiler room west; boiler room west; boiler room west
12 F4	Portland Hospital	10	368590.8	74157.3	32.5	41.0	32.5	27.2	20.9	16.4	4.7	-20.5	24.0	Stack flue top; Boiler room west; Boiler room roof
13 F1	Portland Marina	12	368441.9	74828.2	4.5	45.9	40.7	34.4	28.5	24.1	10.9	-19.2	31.4	Turbine Room North Facade louvre; Stack sides; Turbine Hall East Facade Louvre
14 F1	Ayton Drive	8	368764.9	74294.2	36.5	44.2	35.8	30.6	24.5	20.2	9.0	-15.4	27.5	Stack flue top; Boiler room west; boiler room west