

Portland  
energy recovery  
facility

Environmental statement  
Addendum  
Appendices

**Powerfuel Portland Limited**

# Portland ERF

## Modelling Results at Discrete Receptor Locations

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### 1 Background

The Environment Agency has noted that the air quality assessment provided as part of the Environmental Permit (EP) application did not include the identification of discrete human health receptors or results for these receptors.

The original assessment considered the maximum impact of emissions at all points across the modelling domain including the locations considered in this addendum note. The impact of process emissions was screened using the Environment Agency's Air Emissions Guidance. Where this impact could not be screened out as insignificant further analysis was carried out to determine the maximum impact at any grid point identified as being on land, and at any grid point within a residential area. This showed that for those pollutants for which the impact of process emissions could not be screened out as insignificant, the Predicted Environmental Concentration (PEC) was well below 70% of the Air Quality Assessment Level (AQAL) at all of the relevant grid points and so the total impact could be screened out as not significant.

To satisfy the Environment Agency's request, specific human health receptors have been identified. The impact of process emissions has been presented together with the calculated PEC. This has only been carried out for those pollutants for which the impact of process emissions could not be screened out as insignificant at the point of maximum impact, namely:

- Annual mean nitrogen dioxide impacts;
- Annual mean volatile organic compounds (VOCs) impacts;
- Annual mean cadmium impacts;
- 99.79<sup>th</sup> percentile of 1-hour nitrogen dioxide impacts assuming operation at the half-hourly emission limit value (ELV);
- 99.73<sup>rd</sup> percentile of 1-hour mean sulphur dioxide impacts assuming operation at the half-hourly ELV; and
- 99.9<sup>th</sup> percentile of 15-minute mean sulphur dioxide impacts assuming operation at the half-hourly ELV.

This note has been provided as an addendum to the documentation provided with the Environmental Permit application. All results are presented as the maximum predicted using 5-years of weather data as used in the original assessment.

## 2 Identified discrete receptors

The following table sets out the discrete receptors chosen for the purpose of this addendum. These are shown on Figure 1 at the end of this addendum. These have been chosen as representative receptors in each wind direction from the Portland Energy Recovery Facility (ERF).

Table 1: Human Sensitive Receptors

ID	Name	Location		Distance from the stack (km)
		X (m)	Y (m)	
R1	Castletown	368860	74360	0.81
R2	Coronation Road	368680	74060	1.01
R3	East Weare Road	368920	74120	0.76
R4	The Verne	369220	73880	0.59
R5	Tillycombe Road	369100	73340	1.08

Please note that these points were extracted from the gridded output file as they are already part of the grid, and as such these are not specified in the dispersion model as separate receptors.

## 3 Analysis

### 3.1 Annual mean nitrogen dioxide

As set out in the documentation provided to support the EP application, the annual mean nitrogen dioxide process contribution from the Facility is predicted to be 1.93% of the AQAL at the point of maximum impact and 0.97% at a residential area. Table 2 details the impact of annual mean nitrogen dioxide contributions from process emissions at the identified sensitive human receptor locations.

Table 2: Annual Mean Nitrogen Dioxide Impact at Identified Sensitive Receptors

Receptor	PC		PEC	
	$\mu\text{g}/\text{m}^3$	as % of AQAL	$\mu\text{g}/\text{m}^3$	as % of AQAL
R1	0.18	0.46%	22.20	55.51%
R2	0.13	0.33%	22.15	55.38%
R3	0.15	0.37%	22.17	55.42%
R4	0.39	0.97%	22.41	56.02%
R5	0.12	0.29%	22.14	55.34%

As shown the process contribution at all the identified sensitive receptors is less than 1% of the AQAL and can be screened out as insignificant.

### 3.2 Annual mean VOCs

As set out in the documentation provided to support the EP application, the annual mean VOC process contribution from the Facility is predicted to be 1.84% of the AQAL for benzene (or 4.08 % of the AQAL for 1,3-butadiene) at the point of maximum impact and 0.92% of the AQAL for benzene (or 2.05% of the AQAL for 1,3-butadiene) at a residential area. Table 3 and Table 4 details the impact of annual mean VOC contributions from process emissions at the identified sensitive human receptor locations.

Table 3: Annual Mean VOC Impact at Identified Sensitive Receptors - Benzene

Receptor	PC		PEC	
	$\mu\text{g}/\text{m}^3$	as % of AQAL	$\mu\text{g}/\text{m}^3$	as % of AQAL
R1	0.02	0.43%	0.29	5.83%
R2	0.02	0.31%	0.29	5.71%
R3	0.02	0.35%	0.29	5.75%
R4	0.05	0.92%	0.32	6.32%
R5	0.01	0.28%	0.28	5.68%

As shown the process contribution at all the identified sensitive receptors is less than 1% of the AQAL and can be screened out as insignificant.

Table 4: Annual Mean VOC Impact at Identified Sensitive Receptors – 1,3-Butadiene

Receptor	PC		PEC	
	$\mu\text{g}/\text{m}^3$	as % of AQAL	$\mu\text{g}/\text{m}^3$	as % of AQAL
R1	0.02	0.97%	0.11	4.97%
R2	0.02	0.69%	0.11	4.69%
R3	0.02	0.78%	0.11	4.78%
R4	0.05	<b>2.05%</b>	0.14	6.05%
R5	0.01	0.62%	0.10	4.62%

As shown the process contribution exceeds 1% of the AQAL at one receptor. However, the PEC is well below 70% of the AQAL. This also conservatively assumes that the entire VOC emissions consist of only benzene or 1,3-butadiene.

### 3.3 Annual mean cadmium

As set out in the documentation provided to support the EP application, the annual mean cadmium process contribution from the Facility is predicted to be 3.67% of the AQAL at the point of maximum impact and 1.84% at a residential area if it is assumed that cadmium is emitted at the combined ELV for cadmium and thallium (the screening scenario). Table 2 details the impact of annual mean cadmium contributions from process emissions at the identified sensitive human receptor locations for the “screening”, “worst-case” and “typical” scenarios as detailed in the air quality documentation provided to support the EP application.

Table 5: Annual Mean Cadmium Impact at Identified Sensitive Receptors

Receptor	PC – Screening	PC - % of AQAL		
	$\mu\text{g}/\text{m}^3$	Screening	Worst-case	Typical
R1	0.04	0.87%	0.43%	0.07%
R2	0.03	0.62%	0.31%	0.05%
R3	0.04	0.70%	0.35%	0.06%
R4	0.09	<b>1.84%</b>	0.92%	0.15%
R5	0.03	0.56%	0.28%	0.04%

As shown the process contribution at all the identified sensitive receptors is less than 1% of the AQAL for both the worst-case and typical emissions scenario and can be screened out as insignificant.

### 3.4 Short term impacts

As set out in the documentation provided to support the EP application, the 1-hour nitrogen dioxide and 1-hour and 15-minute sulphur dioxide concentrations from the Facility are predicted to exceed 10% of the AQAL if it is assumed that the Facility operates at the half-hourly emission limit value (ELV) set in the Industrial Emissions Directive (IED). The Waste Incineration BREF introduces a lower daily limit for oxides of nitrogen and sulphur dioxide. The IED half-hourly limit for oxides of nitrogen is 2 times the daily limit, whilst the half-hourly limit for sulphur dioxide is 4 times the daily limit. With the reduced ELVs in the Waste Incineration BREF the half-hourly limit is 3.3 times the daily ELV for oxides of nitrogen, and 6.7 times the daily ELV for sulphur dioxide. Therefore, it is unlikely that peaks in short term emissions would be this high given that a lower daily ELV needs to be achieved.

The half-hourly ELV in the IED is 2 times the daily ELV for oxides of nitrogen and 4 times the daily ELV for sulphur dioxide. If the same ratio were to be applied to the emissions from the Facility, the maximum process contribution from the Facility would be less than 10% of the AQAL for 1-hour nitrogen dioxide and sulphur dioxide. However, the maximum impact of 15-minute sulphur dioxide from the Facility would slightly exceed 10% of the AQAL.

Reference should be made to the contour plots provided with the EP application which shows the area where the impact cannot be screened out as insignificant for each pollutant. As shown, this is restricted to a small area over The Verne. For completeness the impact of short term nitrogen dioxide and sulphur dioxide emissions from the Facility are presented in the following tables. In addition, the impact as a percentage of the headroom has been calculated.

As shown at all the receptor locations the process contribution can be screened out as insignificant with the exception of impacts at The Verne. However, at The Verne the contribution is less than 20% of the headroom and as such the impact is not significant.

Table 6: 99.79%ile 1-hour Nitrogen Dioxide Impact at Identified Sensitive Receptors

Receptor	PC – IED half-hourly ELV			PC – BAT AEL with IED ratio applied		
	$\mu\text{g}/\text{m}^3$	as % of AQAL	as % of headroom	$\mu\text{g}/\text{m}^3$	as % of AQAL	as % of headroom
R1	11.69	5.84%	7.49%	5.84	2.92%	3.75%
R2	9.87	4.93%	6.33%	4.93	2.47%	3.16%
R3	12.79	6.39%	8.20%	6.39	3.20%	4.10%
R4	26.73	<b>13.37%</b>	17.14%	13.37	6.68%	8.57%
R5	9.17	4.59%	5.88%	4.59	2.29%	2.94%

Table 7: 99.73%ile 1-hour Sulphur Dioxide Impact at Identified Sensitive Receptors

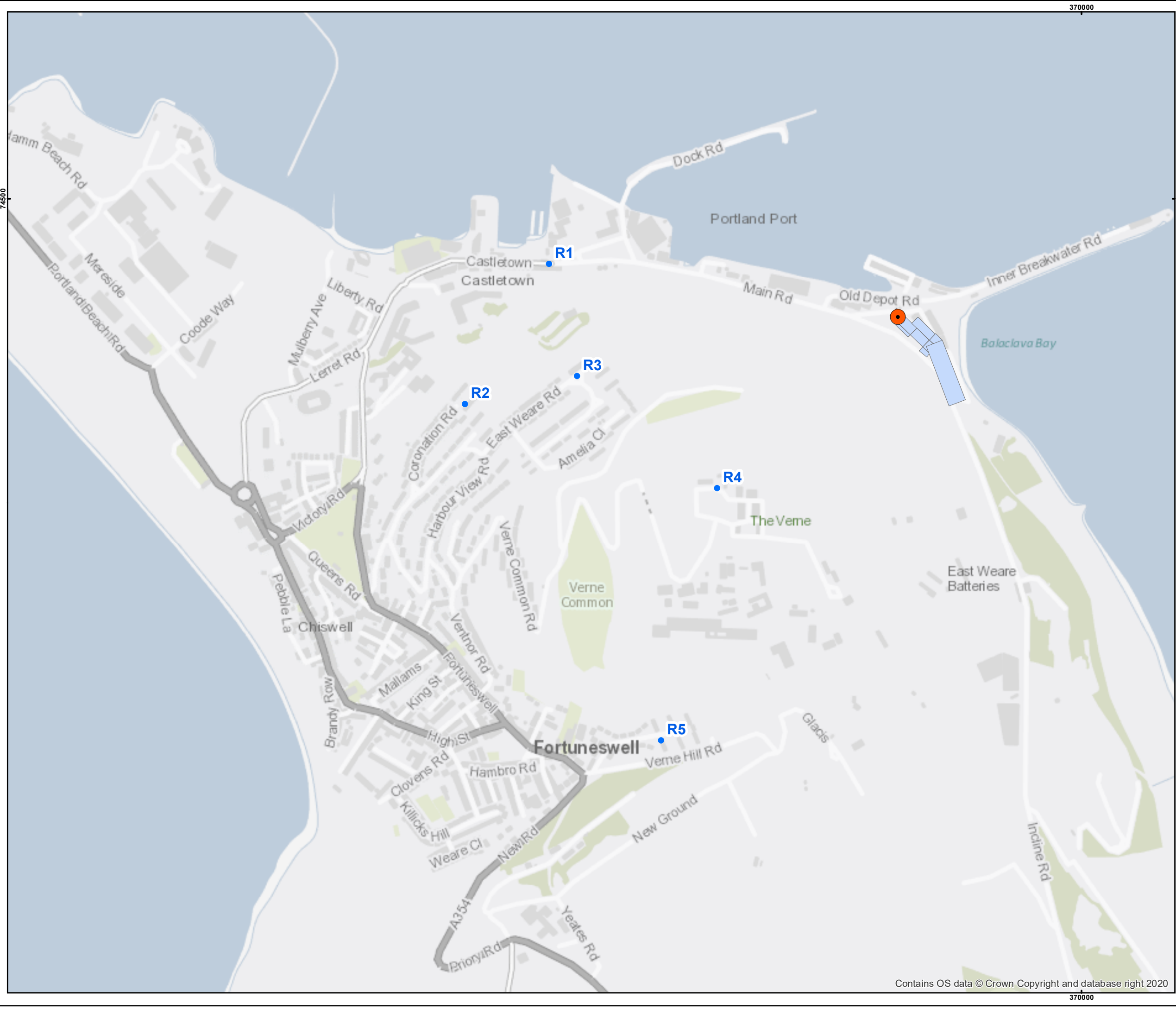
Receptor	PC – IED half-hourly ELV			PC – BAT AEL with IED ratio applied		
	$\mu\text{g}/\text{m}^3$	as % of AQAL	as % of headroom	$\mu\text{g}/\text{m}^3$	as % of AQAL	as % of headroom
R1	16.52	4.72%	4.81%	4.13	1.18%	1.20%
R2	13.99	4.00%	4.07%	3.50	1.00%	1.02%
R3	18.02	5.15%	5.25%	4.51	1.29%	1.31%
R4	38.05	<b>10.87%</b>	11.08%	9.51	2.72%	2.77%
R5	12.87	3.68%	3.75%	3.22	0.92%	0.94%

Table 8: 99.9%ile 15-minute Sulphur Dioxide Impact at Identified Sensitive Receptors

Receptor	PC – IED half-hourly ELV			PC – BAT AEL with IED ratio applied		
	$\mu\text{g}/\text{m}^3$	as % of AQAL	as % of headroom	$\mu\text{g}/\text{m}^3$	as % of AQAL	as % of headroom
R1	18.76	7.05%	7.23%	4.69	1.76%	1.81%
R2	16.47	6.19%	6.35%	4.12	1.55%	1.59%
R3	20.92	7.86%	8.07%	5.23	1.97%	2.02%
R4	45.86	<b>17.24%</b>	17.68%	11.47	4.31%	4.42%
R5	16.37	6.15%	6.31%	4.09	1.54%	1.58%

## 4 Conclusions

This addendum has been prepared to satisfy the request from the Environment Agency. This has shown that the conclusions set out in the Air Quality Analysis for EP Application as submitted with the EP application remain valid, i.e. that the Facility will not have a significant impact on human health.

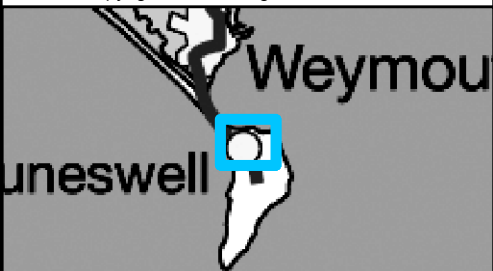


- Legend**
- Sensitive Receptor
  - Facility stack
  - Facility buildings

Client:	Powerfuel
Site:	Portland
Project:	2953
Title:	

Figure 1 - Discrete Sensitive Receptors

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