POWERFUEL

Portland energy recovery facility

Environmental statement
Technical appendices

Air quality

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Portland energy recovery facility

Environmental statement
Technical appendix D:
Air quality
(part 1 of 3)

Air quality
baseline analysis

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Appendix D.1 - Baseline Analysis

ENGINEERING CONSULTING

Document approval

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Contents

1 Introduction

This Appendix contains a review of the baseline air quality and defines appropriate baseline concentrations to describe the existing air quality conditions in the local area. The results of this analysis are drawn upon in the Environmental Statement (ES) air quality chapter, Appendix D.2 - Process Emissions Modelling, and Appendix D.3 – Road Traffic Emissions Modelling.

As part of this review, national modelling data, local authority and national monitoring networks have been considered. This has included all pollutants covered in the ES air quality chapter.

2 National modelling – mapped background data

In order to assist local authorities with their responsibilities under Local Air Quality Management, the Department for Environment Food and Rural Affairs (DEFRA) provides modelled background concentrations of pollutants across the UK on a 1 km by 1 km grid. This model is based on known pollution sources and background measurements and is used by local authorities in lieu of suitable monitoring data. Mapped background concentrations have been downloaded for the grid squares containing the application site and immediate surroundings. In addition, mapped atmospheric concentrations of ammonia are available from DEFRA via the National Environment Research Council (NERC) Centre for Ecology and Hydrology (CEH) throughout the UK on a 5 km by 5 km grid.

The mapped background data is calibrated against monitoring data. For instance, the 2017 mapped background concentrations are based on 2017 meteorological data and are calibrated against monitoring undertaken in 2017. As a conservative approach where mapped background data is used, the concentration for the year against which the data was validated has been used. This eliminates any potential uncertainties over anticipated trends in future background concentrations.

It is noted that concentrations will vary over the modelling domain area. Therefore, the maximum mapped background concentration from within 5 km of the application site has been calculated, as presented in Table 1, together with the concentration at the application site.

Table 1: Mapped Background Data

Pollutant	Annual mean concentration (µg/m³)		Dataset
	At application site	**Max within 5 km of application site**	
Nitrogen dioxide	22.01	22.01	DEFRA 2017 Dataset
Oxides of nitrogen	35.09	35.09	DEFRA 2017 Dataset
Sulphur dioxide	1.64	3.32	DEFRA 2001 Dataset
Particulate matter (as PM10)	11.54	14.74	DEFRA 2017 Dataset
Particulate matter (as PM2.5)	7.82	8.68	DEFRA 2017 Dataset
Carbon monoxide	180.0	209.0	DEFRA 2001 Dataset
Benzene	0.18	0.27	DEFRA 2001 Dataset
1,3-butadiene	0.07	0.09	DEFRA 2001 Dataset
Ammonia	0.56	0.82	DEFRA (CEH) 2014

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3 Local authority air quality review and assessment

3.1 Overview

Under Section 82 of the Environment Act (1995) (Part IV), local authorities are required to undertake an ongoing exercise to review air quality within their area of jurisdiction. The application site is located within the former Weymouth and Portland borough area with the former West Dorset District approximately 4 km away at its nearest point (both are now part of the Dorset unitary authority). Therefore, reference has been made to the review and assessment undertaken by both former authorities.

The closest Air Quality Management Area (AQMA) is located in Dorchester over 15 km to the north of the application site. The location of this AQMA is shown on Figure 2 of Annex A.

The former Weymouth and Portland Borough council had not declared any AQMAs. However, Dorset Council has raised concern over annual mean nitrogen dioxide levels within the Boot Hill area of Weymouth. This area is highlighted on Figure 2 of Annex A.

3.2 Review of monitoring data

Figure 3 of Annex A shows the location of the monitoring sites. As shown there is only one site in close proximity to the application site. However, there are a number of sites along roads where vehicles associated with the Proposed Development will travel, in particular in the Boot Hill area of Weymouth. A summary of the nitrogen dioxide monitoring data from the relevant sites is provided in the following table. Data from 2019 was not available at the time of writing this analysis and therefore 5 years of data from 2014 to 2018 have been reviewed.

Table 2:   Summary of Monitoring Sites – Annual Mean Nitrogen Dioxide

Site ID	2014	2015	2016	2017	2018	Maximum
Roadside classification sites						
Boot Hill	32.53	-	38.64	32.52	39.60	39.60
8	25.65	31.44	34.87	27.11	27.97	34.87
10	33.99	35.90	37.60	27.90	32.80	37.60
30	21.17	26.53	27.70	20.73	24.87	27.70
31	32.49	37.13	38.45	31.68	33.70	38.45
32	30.07	35.36	36.81	28.14	31.78	36.81
44	25.75	26.89	30.26	24.13	25.70	30.26
45	28.45	34.01	37.24	30.75	30.77	37.24
46	29.76	34.52	38.32	31.09	32.45	38.32
49	31.87	36.46	38.40	31.42	34.20	38.40
50	30.73	35.19	38.57	30.86	34.51	38.57
51	31.15	38.24	39.96	32.32	36.29	39.96
52	35.35	**43.82**	**46.36**	36.02	38.59	**46.36**

Site ID	2014	2015	2016	2017	2018	Maximum
58	-	-	-	27.30	31.20	31.20
Urban background classification sites						
4 - St Georges Estate Road	5.82	7.60	8.53	6.13	8.22	8.53

Source: Data sourced from Weymouth and Portland Borough Council 2019 Air Quality Status Report.

The monitoring from the urban background site (4 St Georges Estate Road) is broadly similar to the mapped background dataset.

Figure 1: Trend analysis – annual mean nitrogen dioxide
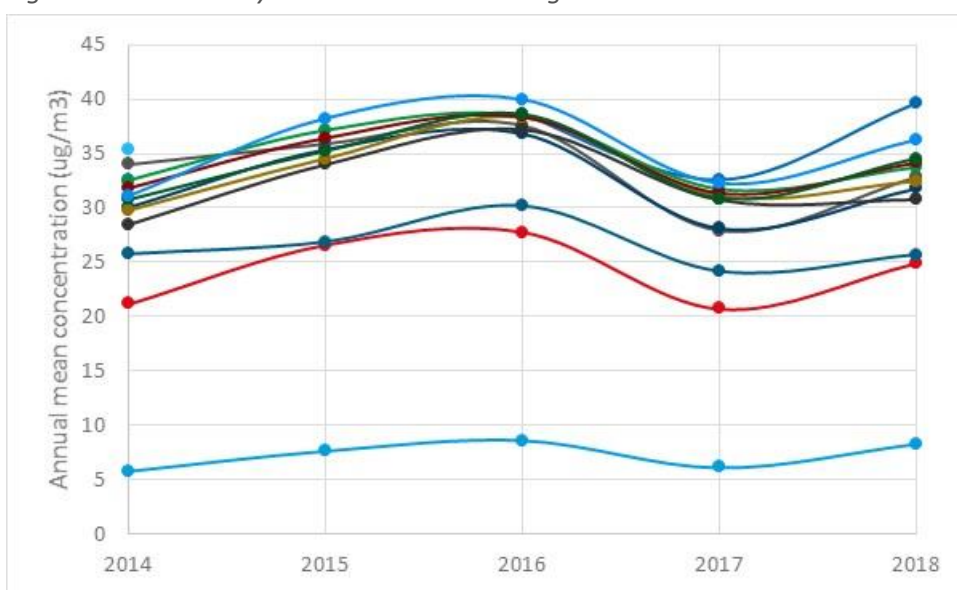
Source: Created from data in Weymouth and Portland Borough Council 2019 Air Quality Status Report.

The monitoring data shows that at all sites the concentrations monitored has generally been increasing over the last few years. The monitored concentration in 2017 was lower than the preceding years but in 2018 this increased again. This reduction in monitored concentration in 2017 occurred at all monitoring sites, suggesting that it was due to weather conditions rather than a change in emission levels.

There are two monitoring sites on the Isle of Portland, sites 4 and 58. Site 58 is located approximately 1.2 km to the east, whilst site 4 is approximately 2.7 km to the south-west of the site.

The local authority monitoring of particulate matter is undertaken at the continuous analyser at Boot Hill. This site is located 4.7 km to the north of the application site and is greatly influenced by the local road network and therefore are not representative of conditions at the application site or in the area where impacts of the Proposed Development will be greater than 0.5% of the AQAL. However, for completeness a summary of the monitoring from this site is provided in the following table.

Table 3:   Summary of Monitoring Sites – Particulate Matter (as PM$_{10}$) – Boot Hill

Parameter	2014	2015	2016	2017	2018	Maximum
Annual mean	30.02	-	18.87	17.74	21.17	30.02
days > 50 µg/m^3	-	-	0	0	0	0

Source: Data sourced from Weymouth and Portland Borough Council 2019 Air Quality Status Report.

4 National monitoring networks

4.1 AURN

The UK Automatic Urban and Rural Network (AURN) is a country-wide network of air quality monitoring stations operated on behalf of DEFRA. This includes automatic monitoring of oxides of nitrogen, nitrogen dioxide, sulphur dioxide, ozone, carbon monoxide and fine particulate matter. In addition, as part of their commitment, local authorities undertake monitoring of nitrogen dioxide, particulate matter, carbon monoxide and sulphur dioxide if deemed necessary.

The closest AURN monitoring station to the application site is located in Bournemouth over 20 km to the east of the application site. Whilst this is an urban background site and data from these sites are applicable for conditions over a few square kilometres it is unlikely that the concentration monitored here would be representative of conditions close to the application site and data from the AURN network has not been considered further in this analysis.

4.2 Hydrogen chloride

Hydrogen chloride was measured until the end of 2015 on behalf of DEFRA as part of the UK Eutrophying and Acidifying Atmospheric Pollutants (UKEAP) project. This consolidates the previous Acid Deposition Monitoring Network (ADMN), and National Ammonia Monitoring Network (NAMN). Monitoring of hydrogen chloride ceased at the end of 2015 and none of the historic sites were located within 10 km of the application site. Prior to the cessation of the monitoring concentrations were fairly constant.

The maximum annual average monitored within the UK between 2011 and 2015 was 0.71 µg/m³. In lieu of any recent representative monitoring this has been used as the baseline concentration for this assessment as a conservative estimate.

4.3 Hydrogen fluoride

Baseline concentrations of hydrogen fluoride are not measured locally or nationally, since these are not generally of concern in terms of local air quality. However, the EPAQS report 'Guidelines for halogens and hydrogen halides in ambient air for protecting human health against acute irritancy effects' contains some estimates of baseline levels, reporting that measured concentrations have been in the range of 0.036 µg/m³ to 2.35 µg/m³.

In lieu of any local monitoring, the maximum measured baseline hydrogen fluoride concentration has been used for the purpose of this assessment as a conservative estimate.

4.4 Ammonia

Ammonia is also measured as part of the UKEAP project at rural background locations. The closest currently operational ammonia monitoring station is located at Castle Cary approximately 58 km to the north of the application site. A summary of data from all UK monitoring sites is provided in the following table.

Table 4: UKEAP – Ammonia Monitoring

Site	Annual mean	Annual mean concentration (µg/m³)				
		2015	**2016**	**2017**	**2018**	**2019**
All	Minimum	0.06	0.08	0.04	0.11	0.09
	Maximum	7.74	14.16	8.43	8.14	9.34
	Average	1.63	1.81	1.63	1.81	1.67

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In lieu of any local representative monitoring, the maximum mapped background over the modelling domain as presented in Table 4 has been used for the purpose of this assessment. This is lower than the maximum monitored over the UK which is considered appropriate given that the application site is not close to any significant sources of ammonia such as intensive agriculture.

4.5 Volatile Organic Compounds

As part of the Automatic and Non-Automatic Hydrocarbon Network, benzene concentrations are measured at sites co-located with the AURN across the UK. In 2007, due to low monitored concentrations of 1,3-butadiene at non-automatic sites, DEFRA took the decision to cease non-automatic monitoring of 1,3-butadiene. The closest monitoring site is located in Southampton, an urban background site located approximately 82 km to the north-east of the application site, which is part of the Non-Automatic Hydrocarbon Network. Whilst this is an urban background site and data from these sites are applicable for conditions over a few square kilometres, it is unlikely that the concentration monitored here would be representative of conditions close to the application site. A summary of monitoring across all urban background sites in the UK provided in the following table.

Table 5: National Non-Automatic Network Monitoring – Benzene

Site	Quantity	AQAL	Annual mean concentration (µg/m³)				
			2015	**2016**	**2017**	**2018**	**2019**
All urban background sites	Average	5	0.63	0.59	0.55	0.52	-
NOTES: Data from 2019 not available at the time of writing this report							

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A review of the monitoring of benzene has shown that all monitored concentrations are well below the AQAL with concentrations reducing at urban background sites over the past few years. In lieu of any local monitoring of benzene or 1,3-butadiene, the maximum mapped background concentration within the modelling domain has been used as the baseline concentration for the purpose of this assessment.

4.6 Metals

Metals are measured as part of the Rural Metals and UK Urban/Industrial Networks (previously the Lead, Multi-Element and Industrial Metals Networks). The closest monitoring site is Yarner Wood, which is located approximately 91 km to the west of the application site and is classified as a rural background site. A summary of the monitoring from the network is provided in the following tables.

Table 6: Metals Monitoring Maximum of all Rural Background Sites

Substance	Annual mean concentration (ng/m³)						Max (as % of AQAL)
	AQAL	2015	2016	2017	2018	2019	
Cadmium	5	0.14	0.15	0.12	0.19	0.15	3.8%
Thallium	-	-	-	-	-	-	-
Mercury	250	-	-	-	-	-	-
Antimony	5,000	-	-	-	-	-	-
Arsenic	3	0.75	0.85	0.82	0.93	0.81	31.0%
Chromium	5,000	1.40	1.50	1.30	1.50	1.30	0.03%
Cobalt	-	0.05	0.05	0.10	0.12	0.06	-
Copper	10,000	3.70	4.70	4.50	4.50	4.70	0.05%
Lead	20	5.50	6.80	6.10	8.10	5.70	40.5%
Manganese	150	2.70	3.40	3.40	3.60	3.70	2.5%
Nickel	20	1.30	0.72	0.70	0.81	0.74	6.5%
Vanadium	5,000	0.60	0.64	0.75	1.00	0.96	0.02%

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Table 7: Metals Monitoring Maximum of all Background Sites – Urban and Rural

Substance	Annual mean concentration (ng/m³)						Max (as % of AQAL)
	AQAL	2015	2016	2017	2018	2019	
Cadmium	5	0.45	0.57	0.49	0.43	0.35	11.4%
Thallium	-	-	-	-	-	-	-
Mercury	250	2.50	2.50	2.70	2.80	-	1.1%
Antimony	5,000	-	-	-	-	-	-
Arsenic	3	1.00	1.00	1.10	1.00	1.00	36.7%
Chromium	5,000	29.00	31.00	34.00	39.00	25.00	0.78%
Cobalt	-	0.62	0.60	0.84	0.92	0.56	-
Copper	10,000	20.00	33.00	20.00	26.00	22.00	0.33%
Lead	20	9.80	8.60	7.90	8.40	7.60	49.0%
Manganese	150	28.00	30.00	35.00	36.00	26.00	24.0%
Nickel	20	1.90	2.70	1.70	2.20	1.80	13.5

Substance	Annual mean concentration (ng/m³)						Max (as % of AQAL)
	AQAL	2015	2016	2017	2018	2019	
Vanadium	5,000	1.50	1.40	1.30	1.70	1.50	0.03%
NOTES: Excludes data from Sheffield Tinsley and Swansea for nickel, and Sheffield Tinsley and Chadwell St Mary for lead – although these are background sites they are located close to industrial areas and as such have high levels of these pollutants far greater than that monitored at other background sites.							

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As shown, the concentrations monitored between 2015 and 2019 were significantly lower than the AQALs at all monitoring sites considered, when the background sites close to industrial processes with elevated metal releases are excluded.

The area surrounding the application site does not contain any industrial processes which would release significant quantities of metals and as such concentrations are expected to be similar to that monitored at urban background sites. Therefore, for the purpose of this assessment the maximum metal concentration across all background sites (excluding Sheffield Tinsley and Swansea for nickel and Sheffield Tinsley and Chadwell St Mary for lead) between 2015 and 2019 has been used as the baseline concentration within this assessment in lieu of any representative local monitoring.

4.7 Dioxins, furans and polychlorinated biphenyl (PCBs)

Dioxins, furans and PBCs are monitored on a quarterly basis at a number of urban and rural stations in the UK as part of the Toxic Organic Micro Pollutants (TOMPs) network. There are no monitoring locations within 10 km of the application site. The closest site is located in London.

 A summary of dioxin and furan and PCB concentrations from all monitoring sites across the UK is presented in Table 8 and Table 9. Note that monitoring data for dioxins and furans and PCBs is only available up to the end of 2016 from the UK-Air website.

Table 8:TOMPS – Dioxin and Furans Monitoring

Site	Annual mean concentration (fgTEQ/m³)				
	2012	2013	2014	2015	2016
Auchencorth Moss	0.13	0.86	0.01	0.01	0.13
Hazelrigg	8.75	2.02	2.61	5.27	4.59
High Muffles	4.32	0.6	1.07	0.54	2.73
London Nobel House	15.42	3.47	2.89	4.34	21.27
Manchester Law Courts	32.99	10.19	16.52	5.94	12.23
Weybourne	9.3	2.34	1.61	1.42	16.32

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Table 9:TOMPS – PCB Monitoring

Site	Annual mean concentration (pg/m³)				
	2012	**2013**	**2014**	**2015**	**2016**
Auchencorth Moss	10.43	10.46	23.23	24.27	25.32
Hazelrigg	28.75	28.74	25.84	41.68	52.58
High Muffles	13.74	13.76	26.11	33.43	37.76
London Nobel House	83.29	83.34	107.49	121.39	110.46
Manchester Law Courts	101.78	101.93	128.93	97.99	92.6
Weybourne	19.32	19.32	17	20.95	38.61

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As shown, the concentrations vary significantly between sites and years. As there are no monitoring sites located within close proximity of the application site or any mapped background datasets, the maximum monitored concentration has been used as the background concentration within this assessment (32.99 fg/TEQ/m³ for dioxins and furans and 128.93 pg/m³ for PCBs).

4.8 Polycyclic Aromatic Hydrocarbons (PAHs)

Polycyclic Aromatic Hydrocarbons (PAHs) are monitored at a number of stations in the UK as part of the PAH network. There are no monitoring locations within 10 km of the application site. The closest site is located at Chilbolton Observatory approximately 95 km to the north-east of the application site.

For the purpose of this assessment, benzo(a)pyrene is considered as this is the only PAH which an AQAL has been set. A summary of benzo(a)pyrene concentrations from all urban background monitoring sites within the UK is presented in Table 10.

Table 10: National Monitoring - Benzo(a)pyrene

Site Type	Quantity	AQAL (ng/m³)	Annual mean concentration (ng/m³)				
			2015	**2016**	**2017**	**2018**	**2019**
All Urban Background	Min	0.25	0.12	0.13	0.05	0.08	0.08
	Max		0.65	0.98	0.70	0.55	0.70
	Average		0.29	0.36	0.24	0.23	0.29

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In lieu of any local monitoring of PAHs or any mapped background datasets, the maximum of the UK average concentration from any urban background site has been used (0.98 ng/m³ – 2016).

5 Baseline conditions at ecological sites

The Air Pollution Information System (APIS) database sets out the baseline concentrations on a grid across the UK. Atmospheric concentrations of oxides of nitrogen and sulphur dioxide are provided on a 1km x 1km grid whilst ammonia concentrations, nitrogen deposition and sulphur deposition are provided on a 5 km x 5 km grid. Data is provided for the maximum across the ecological site.

Table 11: APIS data for Ecological Sites

Site	Concentration (µg/m³)		
	Oxides of nitrogen	**Sulphur dioxide**	**Ammonia**
Critical Level	30	10 / 20	1 / 3
Isle of Portland to Studland Cliffs	10.83	0.70	0.62
Chesil and The Fleet	11.79	0.89	0.62
Nicodemus Heights	10.83	0.70	0.62
Verne to Grove	10.83	0.70	0.62
East Weare Camp	10.83	0.70	0.62
Verne Yeates	10.83	0.70	0.62
King Barrow Quarries	10.83	0.70	0.62
Tout Quarries	9.07	0.64	0.62
Portland Heights	9.07	0.64	0.62
Grove Quarry	9.38	0.73	0.62
Osprey Quay Bunds	11.79	0.89	0.62
East Weare Rifle Range	10.25	0.61	0.62

Source: APIS

As shown the baseline data presented in APIS shows that concentrations are well below the Critical Levels.

Table 12: APIS data for Ecological Sites - Deposition

Site	Habitat type	N deposition	Acid N deposition	Acid S deposition
		kgN/ha/yr	**keqN/ha/yr**	**keqS/ha/yr**
Isle of Portland to Studland Cliffs	Grassland	8.128	0.581	0.111
Isle of Portland to Studland Cliffs	Woodland	13.622	0.973	0.141
Chesil and The Fleet	Grassland	8.128	0.581	0.111
Nicodemus Heights	Grassland	8.128	0.581	0.111
Verne to Grove	Grassland	8.128	0.581	0.111
East Weare Camp	Grassland	8.128	0.581	0.111

Site	Habitat type	N deposition	Acid N deposition	Acid S deposition
		kgN/ha/yr	keqN/ha/yr	keqS/ha/yr
Verne Yeates	Grassland	8.128	0.581	0.111
King Barrow Quarries	Grassland	8.128	0.581	0.111
Tout Quarries	Grassland	8.128	0.581	0.111
Portland Heights	Grassland	8.128	0.581	0.111
Grove Quarry	Grassland	8.128	0.581	0.111
Osprey Quay Bunds	Grassland	8.128	0.581	0.111
East Weare Rifle Range	Grassland	8.128	0.581	0.111

Source: APIS

The values presented in the preceding tables are grid square averaged values based provided as a rolling 3-year mean and are derived from a mixture of interpolation from measured data, and modelled data as set out in APIS. The APIS explains that the use of a 3-year mean has been demonstrated to be a suitable time period to smooth out some of the inter-annual variations in deposition which occur due to the natural variability in annual weather patterns.

6 Summary

The preceding sections have provided a review of the local and national monitoring data and national modelled background concentrations. Trends in national monitoring dataset have shown that generally traffic related pollutant concentrations have been decreasing and are projected to continue to. However, this trend has not been seen in the local data, with concentrations of traffic related emissions in the Boot Hill area increasing.

The analysis has shown the monitored concentrations at the background site on the Isle of Portland are similar to the mapped background concentrations. Therefore in lieu of local monitoring of pollutants the mapped background concentration has been used as the baseline concentrations for non-road vehicle exhaust pollutants. For some pollutants there are no mapped background datasets. In these instances, the maximum concentration from national monitoring datasets for sites in a similar setting has been used as the baseline concentration.

The assessment methodology for annual mean impacts is based on the contribution from the Proposed Development in relation to a future baseline. Where the annual mean contribution from the Proposed Development is less than 0.5% of the long term AQAL, the magnitude of change is described as negligible irrespective of the total concentration. The Predicted Environmental Concentration (PEC) will be calculated by adding the contribution from the Proposed Development to the baseline concentration presented in Table 13.

For road traffic related pollutants (nitrogen dioxide and particulate matter) baseline concentrations will be determined on a case-by-case basis if the change in impact is greater than 0.5% of the annual mean AQAL taking into consideration the likely impact from road traffic exhaust emissions.

*Table 13: Summary of Baseline Concentrations*

Pollutant	Concentration	Units	Justification
Nitrogen dioxide	22.01	µg/m³	Maximum mapped background concentration from across the modelling domain – DEFRA 2017 dataset. Noting that further analysis will be undertaken of the spatial distribution of emissions.
Sulphur dioxide	3.32	µg/m³	Maximum mapped background concentration from across the modelling domain – DEFRA 2001 dataset.
Particulate matter (as PM10)	14.74	µg/m³	Maximum mapped background concentration from across the modelling domain – DEFRA 2017 dataset.
Particulate matter (as PM2.5)	8.68	µg/m³	Maximum mapped background concentration from across the modelling domain – DEFRA 2017 dataset.
Carbon monoxide	209.0	µg/m³	Maximum mapped background concentration from across the modelling domain – DEFRA 2001 dataset.
Benzene	0.27	µg/m³	Maximum mapped background concentration from across the modelling domain – DEFRA 2001 dataset

Pollutant	Concentration	Units	Justification
1,3-butadiene	0.09	µg/m³	Maximum mapped background concentration from across the modelling domain – DEFRA 2001 dataset
Ammonia	0.82	µg/m³	Maximum mapped background concentration from across the modelling domain – DEFRA (CEH) 2014 dataset.
Hydrogen chloride	0.71	µg/m³	Maximum monitored concentration across the UK 2011 to 2015
Hydrogen fluoride	2.35	µg/m³	Maximum measured concentration from EPAQS report
Mercury	2.8	ng/m³	Maximum annual monitored concentration from UK background sites (2015 – 2019), excluding nickel from Sheffield Tinsley and Swansea, and lead from Sheffield Tinsley and Chadwell St Mary - although these are background sites they are located close to industrial areas and as such has high levels of these pollutants far greater than that monitored at other background sites.
Cadmium	0.57	ng/m³	
Arsenic	1.10	ng/m³	
Antimony	-	ng/m³	
Chromium	39.00	ng/m³	
Cobalt	0.92	ng/m³	
Copper	33.00	ng/m³	
Lead	9.80	ng/m³	
Manganese	36.00	ng/m³	
Nickel	2.70	ng/m³	
Vanadium	1.70	ng/m³	
Dioxins and Furans	32.99	fg/m³	Maximum monitored concentration across all UK sites (2012 – 2016)
Dioxin-like PCBs	128.98	pg/m³	
PaHs	0.98	ng/m³	Maximum monitored concentration from an urban background site between 2015 and 2019.

For the purpose of the assessment of the impact at ecological receptors the baseline concentrations set out in Section 5 have been used.
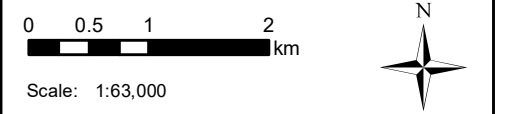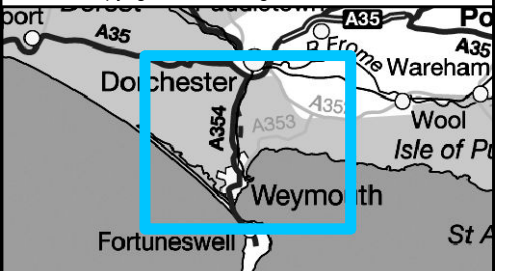
Annex

A Figures
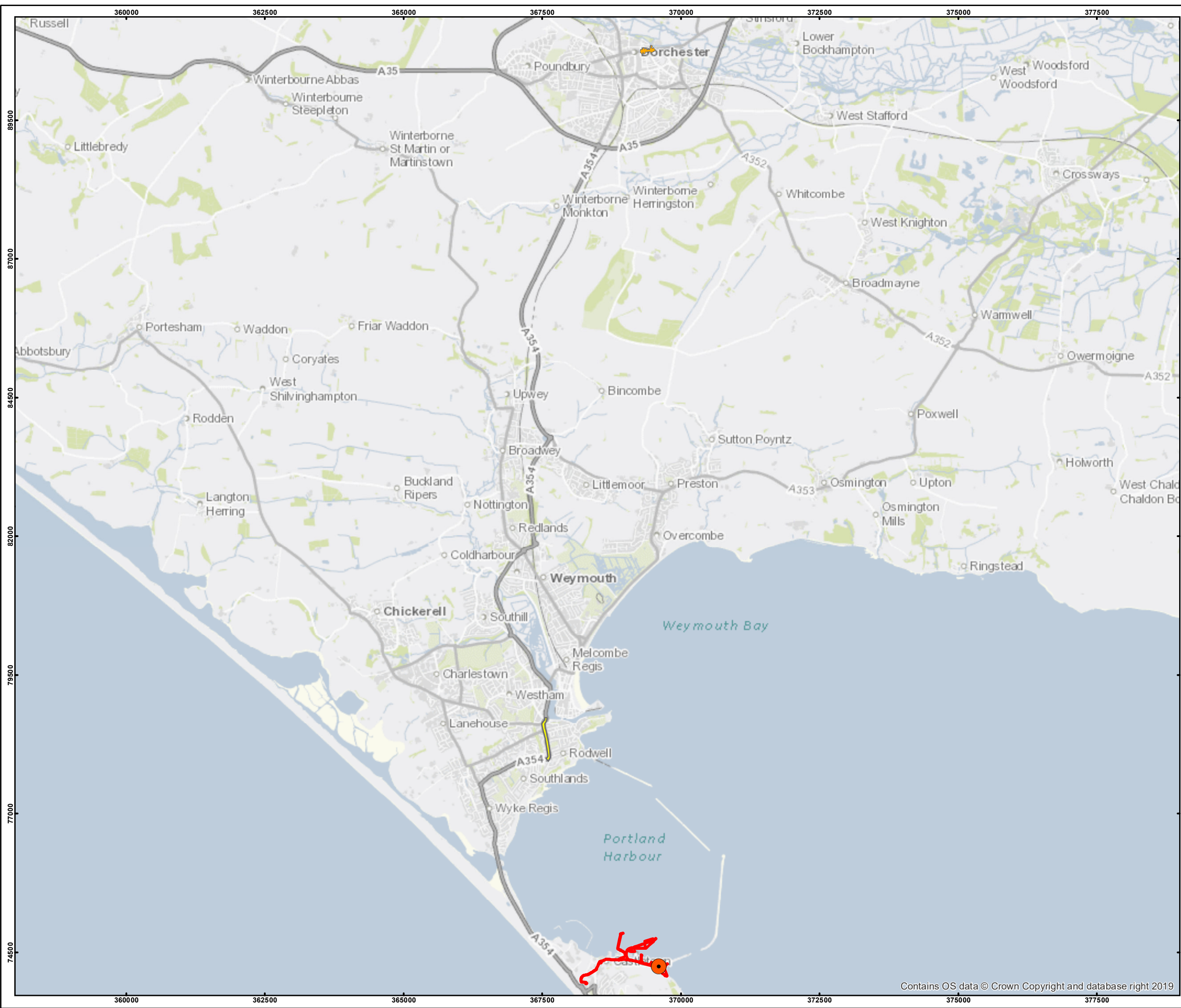
Legend

- Stack
- Site Boundary
- Dorchester AQMA
- Rodwell Road (Boot Hill)

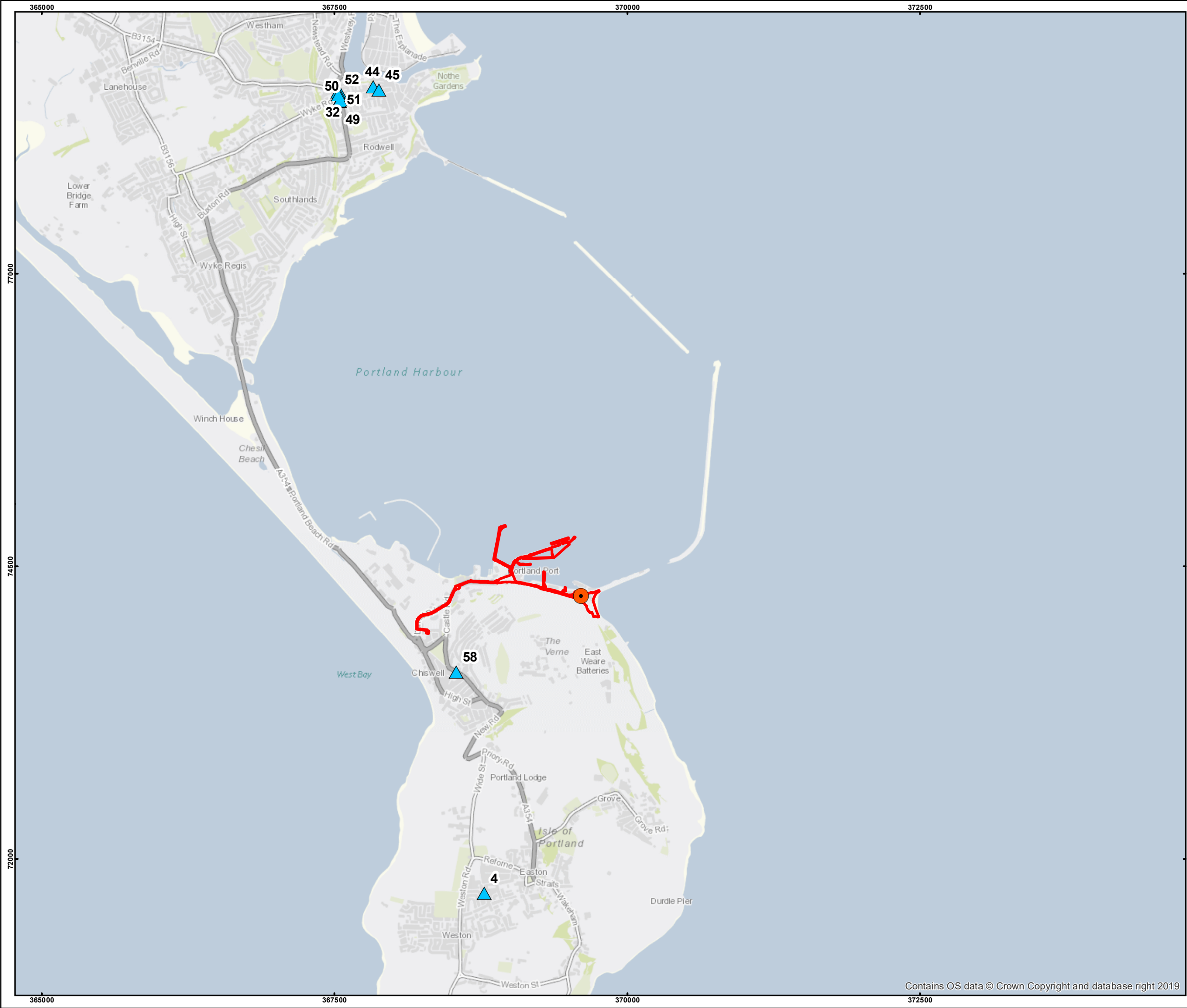| Client: | Powerfuel Ltd |
Site:	Portland EfW
Project:	2953
Title:	

Figure 2 - AQMAs

Drawn by: Hannah Lederer | Date: 31/07/2020

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0 0.5 1 2 km

Scale: 1:63,000

N

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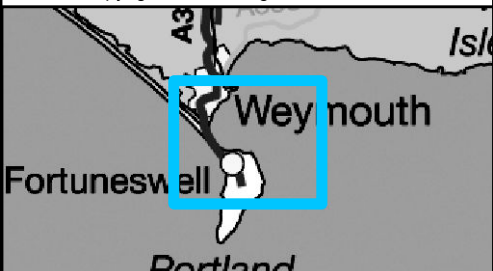Contains OS data © Crown Copyright and database right 2019

Legend

- **Stack** (orange dot symbol)
- **Site Boundary** (red rectangle outline)
- **Monitoring sites** (blue triangle)

Client:	Powerfuel Ltd
Site:	Portland EfW
Project:	2953
Title:	

Figure 3 - Local Monitoring Sites

Drawn by: Hannah Lederer	Date: 31/07/2020

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Scale: 1:30,000

0   0.3   0.6   1.2 km

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