Portland energy recovery facility

Environmental statement

4 Air quality

4 Air quality

Introduction

4.1 Fichtner Consulting Engineers Ltd was appointed to undertake the assessment of the potential effects of the proposed development on air quality. The main focus of the assessment is the process emissions from the operation of the proposed ERF; however, the emissions associated with the import and export of materials during the construction (traffic) and operational (traffic and shipping) phases have also been assessed. This chapter is supported by technical appendix D: Air quality, which comprises: appendix D1: Baseline analysis, appendix D2: Emissions modelling and appendix D3: Roads emissions modelling.

4.2 The data sources and references used in the assessment are shown in table 4.1. The potential for effects on human health as a result of inhalation and ingestion of pollutants that accumulate in the environment is assessed in chapter 6 of the ES.

APIS website: www.apis.ac.uk
Defra, 2019, Clean Air Strategy 2019
Defra, 2018, Local Air Quality Management – Technical Guidance (TG)16
Defra, 2018, National Atmospheric Emissions Inventory: Air Pollution Inventories for England, Scotland, Wales and Northern Ireland: 1990-2016
Defra, 2007, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland
Environment Agency, 2016, Air Emissions Risk Assessment for your Environmental Permit
Environment Agency, 2016, Guidance on assessing group 3 metals stack emissions from incinerators – V.4
Environment Agency, 2013, AQTAG 17 – Guidance on in combination assessments for aerial emissions from Environmental Permitting Regulations (EPR) permits
Environment Agency, 2012, Operational Instruction 67_12: Detailed assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation
Environment Agency, 2012, Operational Instruction 66_12: Simple assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation
Environment Agency, 2003, Horizontal Guidance Note IPPC H1 Integrated Pollution Prevention and Control (IPPC) Environmental Assessment and Appraisal of BAT
Environmental Protection UK (EPUK) and Institute of Air Quality Management, 2017, Land-Use Planning & Development Control: Planning for Air Quality
Expert Panel on Air Quality Standards (EPAQS), 2006, Guidelines for Halogens and Hydrogen Halides in Ambient Air for Protecting Human Health against Acute Irritancy Effects
Institute of Air Quality Management, 2019, A guide to the assessment of air quality impacts on designated nature conservation sites
Natural England, 2018, Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations
Weymouth & Portland Borough Council, 2019, 2019 Air Quality Annual Status Report
Table 4.1: References and data sources

Legislation and policy

Ambient air quality legislation

4.3 European air quality legislation is consolidated under the Ambient Air Quality Directive (Directive 2008/50/EC), which came into force on 11 June 2008. This directive consolidates previous legislation that was designed to deal with specific pollutants in a consistent manner and provides Ambient Air Directive (AAD) limit values for sulphur dioxide (SO_2), nitrogen dioxide (NO_2), benzene, carbon monoxide, lead and particulate matter with a diameter of less than 10μm (PM_{10}) and a new AAD target value and limit value for fine particulates (those with a diameter of less than 2.5μm ($PM_{2.5}$)). The fourth daughter Directive, 2004/107/EC, was not included within the consolidation. It sets health-based target values for polycyclic aromatic hydrocarbons (PAHs), cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable. Directives 2008/50/EC and 2004/107/EC are transposed into UK law by the Air Quality Standards Regulations (2010) and subsequent amendments.

4.4 The UK government and the devolved administrations are required under the Environment Act (1995) to produce a national air quality strategy (AQS). This was last reviewed and published in 2007. The AQS sets out the UK's air quality objectives and recognises that action at national, regional and local level may be needed, depending on the scale and nature of the air quality problem. This includes additional targets and limits for 15-minute SO_2 and 1,3-butadiene and more stringent requirements for benzene and PAHs, known as AQS objectives. Environmental assessment levels (EALs) for other pollutants are presented on the gov.uk website as part of the Environment Agency's *Environmental Management Guidance (Air emissions risk assessment for your environmental permit)*, which was last updated on 2 August 2016 and is referred to here as the Air Emissions Guidance. AAD target and limit values, AQS objectives, and EALs are set at levels well below those at which significant adverse health effects have been observed in the general population and in particularly sensitive groups. For the remainder of this chapter these are collectively referred to as Air Quality Assessment Levels (AQALs).

4.5 The UK government published the *Clean Air Strategy* (CAS) in January 2019. This sets out the methods by which air pollution from all sectors will be reduced. The CAS has not introduced any new air quality limits.

4.6 When considering the impact against the AQALs, it is important to note that these apply at areas of relevant exposure. *Local Air Quality Management Technical Guidance (2016)*, referred to as LAQM.TG(16), outlines that the AQALs apply in the following locations:

- Annual mean – all locations where members of the public might be regularly exposed - i.e. building facades of residential properties, schools, hospitals, care homes etc
- 24-hour mean and 8-hour mean – all locations where the annual mean objective would apply, together with hotels and gardens of residential properties
- 1-hour mean – all locations where the annual mean, 24-hour and 8-hour mean apply, together with kerbside sites and any areas where members of the public might be reasonably expected to spend one hour or more
- 15-minute mean – all locations where members of the public might reasonably be exposed for a period of 15 minutes or more

4.7 The AQALs relevant to the proposed development are detailed in technical appendix D2: Emissions modelling and are summarised in tables 4.2 and 4.3.

Pollutant	AQAL (µg/m³)	Averaging period	Frequency of exceedance	Source
NO_2	200	1 hour	18 times per year (99.79th percentile)	AAD limit value
	40	Annual	-	AAD limit value
SO_2	266	15 minutes	35 times per year (99.9th percentile)	AQS objective
	350	1 hour	24 times per year (99.73rd percentile)	AAD limit value
	125	24 hours	3 times per year (99.18th percentile)	AAD limit value
Particulate matter (PM_{10})	50	24 hours	35 times per year (90.41st percentile)	AAD limit value
	40	Annual	-	AAD limit value
Particulate matter ($PM_{2.5}$)	25	Annual	-	AAD limit value
Carbon monoxide	10,000	8 hours, running	-	AAD limit value
	30,000	1 hour		Air Emissions Guidance
Hydrogen chloride	750	1 hour	-	Air Emissions Guidance
Hydrogen fluoride	160	1 hour	-	Air Emissions Guidance
	16	Annual	-	Air Emissions Guidance
Ammonia	2,500	1 hour	-	Air Emissions Guidance
	180	Annual	-	Air Emissions Guidance
Benzene	195	1-hour	-	Air Emissions Guidance
	5	Annual	-	AQS objective
1,3-butadiene	2.25	Annual, running	-	AQS objective
PCBs	6	1-hour	-	Air Emissions Guidance
	0.2	Annual	-	Air Emissions Guidance
PAHs – benzo(a)pyrene	0.00025	Annual	-	AQS objective

Table 4.2 Air quality assessment levels

Pollutant	AAD target: long-term (µg/m³)	Long-term Air Emissions Guidance (µg/m³)	Short-term Air Emissions Guidance (µg/m³)
Antimony	-	5	150
Arsenic	0.006	0.003	-
Cadmium	0.005	0.005	-
Chromium (II and III)	-	5	150
Chromium (VI)	-	0.0002	-
Cobalt	-	-	-
Copper	-	10	200
Lead	-	0.25	-
Manganese	-	0.15	1500
Mercury	-	0.25	7.5
Nickel	0.020	0.020	-
Thallium	-	-	-
Vanadium	-	5	1

Table 4.3 Air quality assessment levels for metals

4.8 Critical levels for the protection of sensitive ecosystems and habitats are also outlined within the Air Quality Standards Regulations for oxides of nitrogen (NO_x) and SO_2. Limits for ammonia and hydrogen fluoride are contained in the Air

Emissions Guidance. The critical levels relevant to this project are presented in table 4.4.

Pollutant	Concentration (µg/m^3)	Measured as	Source
NO_x (as NO_2)	75	Daily mean	Air Emissions Guidance
	30	Annual mean	AAD
SO_2	10	Annual mean for sensitive lichen communities and bryophytes and ecosystems where lichens and bryophytes are an important part of the ecosystem's integrity	Air Emissions Guidance
	20	Annual mean for all higher plants	AAD
Hydrogen fluoride	<5	Daily mean	Air Emissions Guidance
	<0.5	Weekly mean	Air Emissions Guidance
Ammonia	1	Annual mean for sensitive lichen communities and bryophytes and ecosystems where lichens and bryophytes are an important part of the ecosystem's integrity	Air Emissions Guidance
	3	Annual mean for all higher plants	Air Emissions Guidance

Table 4.4 Critical levels for the protection of ecosystems

4.9 In addition to the critical levels set out in the table above, the Air Pollution Information System (APIS) provides habitat-specific critical loads for nitrogen and acid deposition. Full details of the habitat specific critical loads can be found in technical appendix D2: Emissions modelling.

Industrial pollution regulation

4.10 Atmospheric emissions from industrial processes are controlled in England through the Environmental Permitting (England and Wales) Regulations (2010), and subsequent amendments. The proposed development will be regulated by the Environment Agency and so will need an environmental permit to operate. The environmental permit will include conditions to prevent fugitive emissions of dust and odour beyond the boundary of the installation. The environmental permit will also include limits on emissions to air.

4.11 The Industrial Emissions Directive (IED) (Directive 2010/75/EU) was adopted on 7th January 2013 and is the key European directive that covers almost all regulation of industrial processes in the EU. Within the IED, the requirements of the relevant sector reference document on Best Available Techniques (known as the BREF) become binding, as follows:

- Article 15, paragraph 2, of the IED requires that emission limit values are based on best available techniques, referred to as BAT
- Article 13 of the IED requires that the Commission develops BAT guidance documents, referred to as BREFs

4.12 The Waste Incineration BREF was published by the European Integrated Pollution Prevention and Control (IPPC) Bureau in December 2019. The BREF introduces BAT-AELs (BAT Associated Emission Levels), which are more stringent than those currently set out in the existing IED for some pollutants. The ERF will need to comply with the requirements for a new plant. For the remainder of this assessment, the anticipated emission limits, which are a combination of BAT-AELs and emission limits from the IED, are referred to as emission limit values (ELVs).

4.13 As part of the design process it has been identified that the local area is particularly sensitive to ammonia and nitrogen deposition impacts. The stack height analysis contained in appendix D2: Emissions modelling has been used to investigate the effect of not only stack height, but also more restrictive ammonia emissions. As a result, is it is proposed to apply for planning permission (and an environmental permit) with an ELV for ammonia of 8 mg/Nm^3, which is 80% of the BAT AEL for a new plant.

Local air quality management

4.14 Under Section 82 of the Environment Act (1995) (Part IV), local authorities are required to periodically review and assess air quality within their area of jurisdiction, under the system of local air quality management (LAQM). This review and assessment of air quality involves assessing present and likely future ambient pollutant concentrations against AQALs. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, then the local authority is required to declare an air quality management area (AQMA). For each AQMA, the local authority is required to produce an air quality action plan (AQAP), the objective of which is to reduce pollutant levels in pursuit of the relevant AQALs.

4.15 A review of the local area shows that the closest AQMA is at High Street East in Dorchester, located approximately 16 km north of the proposed development. At this distance it is unlikely that the proposed development would have a measurable impact on the AQMA and therefore the impact of the proposed development on AQMAs has been scoped out of the assessment. However, it is acknowledged that elevated NO_2 concentrations have been monitored in the Boot Hill area of Weymouth. As such, the impact of the proposed development on this area has been considered.

Planning policy

4.16 The National Planning Policy Framework (NPPF) published in July 2018 and updated in February and June 2019 notes that planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of AQMAs, Clean Air Zones and the cumulative impacts on air quality from individual sites in local areas. It also states that planning decisions should ensure that any new development in an AQMA is consistent with the local AQAP.

4.17 In terms of planning decisions and air quality, the NPPF in paragraphs 180 and 181 states:

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

Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

4.18 National Planning Practice Guidance (NPPG) Air Quality, published in March 2014 and last updated in November 2019, has been developed in order to support the NPPF. The guidance provides a concise outline as to how air quality should be considered in order to comply with the NPPF and states when air quality is considered relevant to a planning application, which includes when the proposals:

- Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads
- Introduce new point sources of air pollution. This could include furnaces, which require prior notification to local authorities; or extraction systems (including chimneys), which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area
- Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality
- Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations

4.19 Policy 13 of the adopted Bournemouth, Christchurch, Poole and Dorset Waste Plan (2019) states that proposals for waste management facilities will only be permitted where it is demonstrated that any potential adverse impacts on amenity arising from the operation of the facility and associated transport, including as a result of airborne emissions, can be satisfactorily avoided or mitigated to an acceptable level.

4.1 Policy ENV16 of the adopted West Dorset, Weymouth & Portland Local Plan 2015 states that development proposals will only be permitted provided that they do not generate unacceptable pollution or detrimental emissions, unless it can be demonstrated that the effects on amenity and living conditions, health and the natural environment can be mitigated to the appropriate standard.

Methodology

Baseline

4.20 Information on existing air quality in the vicinity of the site was obtained by collating the results of automatic monitoring carried out on behalf of Defra and monitoring undertaken by the former Weymouth & Portland Borough Council. The closest monitoring points to the site are approximately 1.2 km to the east and 2.7 km to the south west.

4.21 Background concentrations of air pollutants were obtained from a number of sources, including Defra, the National Environment Research Council Centre for Ecology and Hydrology, *Guidelines for Halogens and Hydrogen Halides in Ambient Air for Protecting Human Health against Acute Irritancy Effects* (EPAQS, 2006), the UK Eutrophying and Acidifying Atmospheric Pollutants project, the Rural Metals and UK Urban / Industrial Networks, the Toxic Organic Micro Pollutants Network and the PAH network. The references and data sources used in the study are set out in table 4.1.

Impact assessment

<u>Process emissions assessment</u>

4.22 This assessment has been undertaken using the ADMS 5.2 dispersion model, using five years of weather data (2014-2018) from the Portland meteorological station. Full details of the dispersion modelling methodology and inputs can be found in technical appendix D2: Emissions modelling. The model has been used to predict the ground level concentration of pollutants on a long- and short-term basis across a grid of points.

4.23 For the ERF to operate it will need to satisfy industrial permitting requirements set out and monitored by the Environment Agency. However, Environment Agency guidance has not been developed for conducting an assessment to accompany a planning application. Consequently, the EPUK and IAQM guidance document *Land-Use Planning & Development Control: Planning for Air Quality* (2017) has been developed for professionals operating within the planning system. It provides planning officers and developers with a means of reaching sound decisions, having regard to the air quality implications of development proposals. This guidance also states that it may be adapted using professional judgement. Therefore, where appropriate, Environment Agency guidance has been incorporated, which is considered appropriate given that the ERF will need to satisfy the industrial permitting requirements set out by the Agency.

4.24 The IAQM (2017) guidance includes the matrix shown in figure 4.1, which is used to describe the impact based on the change in concentration relative to the AQAL and the overall predicted concentration from the scheme (i.e. the future baseline plus the process contribution). The overall significance of effects is determined, in accordance with the guidance, using professional judgement and taking account of the impact descriptors. Only effects that are moderate or above (including slight to moderate) are considered to be significant in EIA terms.

4.25 It is intended that the change in concentration relative to the AQAL (the process contribution) is rounded to the nearest whole number. Therefore, any impact that is between 0.5% and 1.5% would be classified as a 1% change in concentration. An impact of less than 0.5% is described as negligible, irrespective of the total concentration.

4.26 The matrix is only designed to be used in relation to annual mean concentrations. The approach for assessing the impact of short-term emissions has been carried out in line with the EPUK and IAQM (2017) guidance. This does not take into account the background concentrations, as it is noted that background concentrations are less important in determining the severity of impact for short-term concentrations. Consequently, for short-term concentrations (i.e. those averaged over a period of an hour or less), the following descriptors of change are used to describe the impact:

- < 10% - negligible
- 10 - 20% - slight
- 20 - 50% - moderate
- > 50% - substantial

4.27 The guidance states that, in relation to the significance of short-term impacts:

> *"In most cases, the assessment of impact severity for a proposed development will be governed by the long-term exposure experienced by receptors and it will not be a necessity to define the significance of effects by reference to short-term impacts. The severity of the impact will be substantial when there is a risk that the relevant AQAL for short-term concentrations is approached through the presence of the new source, taking into account the contribution of other prominent local sources."*

4.28 Therefore, if a short-term impact cannot be screened out as negligible or insignificant, consideration will be given to the risk of exceeding the short-term AQAL when determining the significance of effect.

4.29 The EPUK and IAQM (2017) guidance does not provide any descriptors for averaging periods of between one hour and a year. Therefore, for these periods the Environment Agency's (2016) guidance *Air Emissions Risk Assessment for your Environmental Permit,* referred to as the Air Emissions Guidance, criteria have been used, which state that process contributions can be considered insignificant if:

- The long-term process contribution is <1% of the long-term environmental standard
- The short-term process contribution is <10% of the short-term environmental standard

4.30 Where an impact cannot be screened out as insignificant based on the outputs of the initial screening and modelling, the significance of the effect has been determined based on professional scientific judgement of the likelihood of emissions causing an exceedance of an AQAL. This is a standard approach that allows the risk and likelihood of the exceedance to be investigated and assessed in detail, following the first stage assessment.

4.31 In addition, the Environment Agency's (2016) *Guidance on assessing group 3 metals stack emissions from incinerators - V.4* was used to for assess the impact of emissions of metals relative to their respective AQALs. This states that, where the process contribution for any metal exceeds 1% of the long-term or 10% of the short-term environmental standard (in this case the AQAL), there is the potential for a significant effect. Where these standards are exceeded, the predicted environmental concentration (PEC) should be compared to the environmental standard. If the PEC is less than the environmental standard, it can be concluded that there is no risk of exceeding the AQAL and, as such, the effect is considered to be negligible and not significant.

4.32 In June 2019, the IAQM released the guidance document *A guide to the assessment of air quality impacts on designated nature conservation sites* (the IAQM (2019) guidance). This guidance draws on the Environment Agency's Air Emissions Guidance, which states that to screen out impacts as insignificant at European and UK statutory designated sites:

- The long-term process contribution must be less than 1% of the long-term environmental standard (i.e. the critical level or load); and
- The short-term process contribution must be less than 10% of the short-term environmental standard

4.33 If the above criteria are met, no further assessment is required. If the long-term process contribution exceeds 1% of the long-term environmental standard, the PEC must be calculated and compared to the standard. If the resulting PEC is less than 70% of the long-term environmental standard, the Air Emissions Guidance states that the emissions are insignificant and further assessment is not required. In accordance with the guidance, calculation of the PEC for short-term standards is not required.

4.34 The Air Emissions Guidance states further that to screen out impacts as insignificant at local nature sites:

- The long-term process contribution must be less than 100% of the long-term environmental standard; and
- The short-term process contribution must be less than 100% of the short-term environmental standard

4.35 In accordance with the Air Emissions Guidance, calculation of the PEC for local nature sites is not required. However, with regard to locally designated sites, the IAQM (2019) guidance states:

> *"For local wildlife sites and ancient woodlands, the Environment Agency uses less stringent criteria in its permitting decisions. Environment Agency policy for its permitting process is that if either the short-term or long-term PC is less than 100% of the critical level or load, they do not require further assessment to support a permit application. In ecological impact assessments of projects and plans, it is, however, normal practice to treat such sites in the same manner as SSSIs and European Sites, although the determination of the significance of an effect may be different. It is difficult to understand how the Environment Agency's approach can provide adequate protection."*

4.36 As such, it is considered appropriate to apply the screening criteria for SSSIs and European sites to locally designated sites to screen out the requirement for further consideration of the significance of effect for planning.

4.37 The air quality impact at the ecological sites has been quantified and compared to the critical levels and critical loads. Where the impact cannot be screened out as ‘not significant’ further discussion of the impact is contained in ES chapter 10 and the shadow appropriate assessment submitted in support of the planning application.

Traffic emissions

4.38 The EPUK IAQM document *Land-Use Planning & Development Control: Planning for Air Quality* (2017) states that an air quality assessment is required where a development would cause a significant change in light duty vehicles (LDVs) or heavy goods vehicles (HGVs). The indicative criteria to proceed to an assessment are:

- A change in LDV flows of:
    - More than 100 annual average daily traffic (AADT) within or adjacent to an AQMA; or
    - more than 500 AADT elsewhere
- A change in HGV flows of:
    - More than 25 AADT within or adjacent to an AQMA; or
    - more than 100 AADT elsewhere

4.39 The guidance does not clearly state the level of assessment that is required. However, if the change in LDV and HGV flows does not exceed the above criteria, the development is not expected to cause a significant change and the significance of effect is deemed to be negligible and further detailed analysis of the impact is not necessary. If the above criteria are not met, detailed modelling of road traffic emissions is required to determine the impact.

4.40 If needed, detailed modelling of construction and operational traffic emissions has been undertaken using the ADMS-Roads 5.0 model. Appropriate emissions factors were used from the Defra emissions factor toolkit version 9.0. Model verification has been carried out in accordance with Defra’s (2018) *Local Air Quality Management – Technical Guidance (TG)16.* Full details of the assumptions used in the modelling are provided in appendix D3: Road emissions. The assessment of the effects of traffic emissions has been undertaken using the matrix in figure 4.1, which is discussed in more detail in paragraph 4.24 above.

Shipping emissions

4.41 The impact of deliveries by sea has been assessed on a qualitative basis, based on the number of deliveries, routing and likely use of the engines in the port area.

Plume visibility

4.42 There is the potential for the ERF’s plume to be visible under certain circumstances, caused by water vapour in the exhaust gases condensing as the gases cool. The water vapour in the gases mixes with the ambient air as the plume disperses, so that it ceases to be visible once the vapour content is low enough. If the gases are hot and dry, or weather conditions promote rapid dispersion and slow cooling, the plume may not be visible at all.

4.43 ADMS 5.2 includes a plume visibility module, which models the dispersion and cooling of water vapour and predicts whether the plume will be visible, based on its liquid water content. This module has been used to quantify the number of visible plumes likely to occur during the operation of the ERF. The results of this have been fed into the landscape and visual effects assessment in ES chapter 9 and the full results are provided in technical appendix J4.

Limitations and uncertainties

4.44 The limitations of the assessment have been taken into account wherever possible. The assessment has been undertaken using standard methods outlined in guidance produced by the Environment Agency, EPUK and the IAQM. Standard assessment criteria, developed by nationally recognised institutions, minimise any uncertainty on the applicability of the approach used.

4.45 Baseline data have been collected from site-specific, local and national monitoring networks. Where site-specific monitoring is not available, worst case assumptions have been made. If impacts cannot be screened out as negligible irrespective of the baseline concentration, or insignificant when determining the significance of effect, the choice of background concentrations has been considered in greater detail.

4.46 The impact of process emissions from the ERF has been determined based on operation at the ELVs (and an ELV of 8 mg/Nm^3 for ammonia). For short-term impacts, it has been assumed that the ERF operates for the entire year at the short-term emissions limit, so that periods of operation coincide with the worst-case meteorological conditions for dispersion. In practice, the ERF will operate below the emissions limit values and will be offline for periods of maintenance.

4.47 The assessment has used five years of meteorological data to ensure variability between years is taken into account. It considered the predicted concentrations at the point of maximum impact and receptor locations. Where assumptions have been made, these are conservative but realistic.

4.48 The following conservative assumptions have been used in the assessment:

- The ERF operates at the long-term ELVs for the entire year or the short-term ELV for the entire averaging period, as appropriate
- The worst-case conversion of NO_x to NO_2 has been applied
- The entire dust emissions are assumed to consist of either PM_{10} or $PM_{2.5}$
- The entire volatile organic compound (VOC) emissions are assumed to consist of either benzene or 1,3-butadiene
- Cadmium is released at the combined ELV for cadmium and thallium
- No allowance has been made for the offset of emissions from ships that would be using shore power generated by the ERF rather than onboard generators

Baseline

4.49 As discussed above, baseline local and national monitoring data and national modelled background concentrations were obtained for a range of pollutants. Table 4.5 summarises the values for the annual baseline concentrations that have been used to evaluate the effects of the proposed ERF and a detailed review of the baseline conditions is provided in technical appendix D1: Baseline analysis.

Pollutant	Annual mean concentration	Unit	Source
NO_2	22.01	µg/m^3	Maximum mapped background concentration from across the modelling domain – Defra 2017 dataset.
SO_2	3.32	µg/m^3	Maximum mapped background concentration from across the modelling domain – Defra 2001 dataset.
PM_{10}	14.74	µg/m^3	Maximum mapped background concentration from across the modelling domain – Defra 2017 dataset.
$PM_{2.5}$	8.68	µg/m^3	Maximum mapped background concentration from across the modelling domain – Defra 2017 dataset.
Carbon monoxide	209	µg/m^3	Maximum mapped background concentration from across the modelling domain – Defra 2001 dataset.
Benzene	0.27	µg/m^3	Maximum mapped background concentration from across the modelling domain – Defra 2001 dataset
1,3-butadiene	0.09	µg/m^3	Maximum mapped background concentration from across the modelling domain – Defra 2001 dataset
Ammonia	0.82	µg/m^3	Maximum monitored concentration from Defra (CEH) 2014 dataset.
Hydrogen chloride	0.71	µg/m^3	Maximum monitored concentration across the UK 2011 to 2015
Hydrogen fluoride	2.35	µg/m^3	Maximum measured concentration from EPAQS report
Mercury	2.8	ng/m^3	Maximum annual concentration averaged across all urban background sites across the UK 2015 to 2019
Cadmium	0.57	ng/m^3	
Arsenic	1.10	ng/m^3	
Chromium	39.00	ng/m^3	Maximum annual concentration averaged across all urban background sites across the UK 2015 to 2019
Cobalt	0.92	ng/m^3	
Copper	33.00	ng/m^3	
Lead	9.80	ng/m^3	Maximum annual concentration averaged across all urban background sites across the UK 2015 to 2019 – excluding Chadwell St Mary and Sheffield Tinsley[1]
Manganese	36.00	ng/m^3	Maximum annual concentration averaged across all urban background sites across the UK 2015 to 2019
Nickel	2.70	ng/m^3	Maximum annual concentration averaged across all urban background sites across the UK 2015 to 2019 – excluding Sheffield Tinsley and Swansea[1]
Vanadium	1.70	ng/m^3	Maximum annual concentration averaged across all urban background sites across the UK 2015 to 2019
Dioxins and furans	32.99	fg/m^3	Maximum monitored concentration across all UK sites 2012 to 2016
Dioxin-like PCBs	128.98	pg/m^3	
PaHs	0.98	ng/m^3	Maximum annual concentration from an urban background sites across the UK 2015 to 2018

Table 4.5: Summary of baseline concentrations

4.50 Where representative local monitoring is not available, concentrations obtained from Defra mapped background datasets have been used as the baseline concentrations in the assessment. However, for some pollutants there are no

[1] Monitoring locations excluded because of their proximity to industrial processes that release elevated levels of metals.

mapped background datasets. In these instances, the maximum concentration from national monitoring datasets for sites in a similar setting to the proposed development has been used as the baseline concentration.

4.51 Trends in national the monitoring dataset have shown that generally pollutant concentrations have been decreasing and are projected to continue to decrease. However, this trend has not been seen in Weymouth, with concentrations of traffic related-emissions in the Boot Hill area increasing.

4.52 On the Isle of Portland there are two monitoring NO_2 diffusion tubes, one at a roadside and the other in a background location. Both are monitoring relatively low levels of pollution. The monitored background concentration is similar to the mapped background. Therefore, in lieu of local monitoring of pollutants, the Defra mapped background concentrations have 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.

Future baseline

4.53 Generally, in the UK atmospheric pollutant concentrations are either remaining constant or decreasing with time. However, as detailed in technical appendix D1: Baseline analysis, in the local area the monitored concentrations are fairly low and as such the decreases in background concentrations observed in the UK are not specifically demonstrated in the local area. While not a natural change, government projections indicate that atmospheric pollutant concentrations are likely to reduce in future as a result of national policies to reduce emissions over time. As such, it is likely that pollutant concentrations in the vicinity of the site may decrease slightly over time if the proposed development is not built. This decrease in baseline concentrations would also occur if the proposed development is built. However, there is considerable uncertainty as to how pollutant concentrations will change in the future. Therefore, as a conservative assumption, the concentrations identified in the baseline analysis have been assumed to be constant in future years.

Effects during construction

Emissions from construction traffic

4.54 During the construction period, the number of vehicles will depend on the works being undertaken. Technical appendix L2 sets out the levels of traffic during the construction phase. In terms of HGV movements, the maximum movements would occur during piling operations, which are likely to take place for between six and nine months. During this time, it is predicted that there would be a maximum of 37 deliveries (74 two-way movements).

4.55 Technical appendix L2 also sets out the expected staff numbers. A construction traffic management plan will need to be implemented to allow for the numbers of staff to be brought to the site, which will include the use of minibuses to transport staff to the site. As such, the number of LDVs will be able to be controlled. The number of vehicles (HGVs and LDVs) is likely to be less than the IAQM screening criteria set out in paragraph 4.38. As such, the proposed development is not expected to cause a significant change in vehicle movements during the construction period and the effect is deemed to be negligible and not significant.

Effects post-construction

Process emissions assessment – human receptors

4.56 The approach to the assessment is to evaluate the highest predicted process contribution to ground level concentrations. In addition, further analysis of dispersion contour plots has been undertaken to understand the spatial distribution of impacts. Therefore, individual human sensitive receptors have not been specified, but the assessment identifies the maximum predicted process contribution and PEC for residential areas.

4.57 The first stage analysis has shown that the annual mean impact is less than 0.5% of the AQAL and the short-term impact is less than 10% of the AQAL at the point of maximum impact except for the following:

- Annual mean NO_2 impacts
- Annual mean VOCs impacts
- Annual mean cadmium impact;
- 99.79th percentile of 1-hour NO_2 impacts assuming operation at the half-hourly ELV
- 99.73rd percentile of 1-hour mean SO_2 assuming operation at the half-hourly ELV
- 99.9th percentile of 15-minute mean SO_2 assuming operation at the half-hourly ELV

4.58 Therefore, the magnitude of change is described as negligible irrespective of the baseline concentration for the following pollutants:

- SO_2 (99.18th percentile of 24-hour mean only)
- PM_{10}
- $PM_{2.5}$
- Carbon monoxide
- Hydrogen chloride
- Hydrogen fluoride
- Ammonia

4.59 Full details of the initial modelling results for the above pollutants are set out in technical appendix D2: Emissions modelling, but no significant adverse effects are predicted as a result of emissions of these substances.

4.60 Where the magnitude of change at the point of maximum impact cannot be described as negligible irrespective of the baseline concentration, further analysis has been undertaken.

Annual mean NO_2

4.61 The above analysis does not account for any difference in the spatial distribution of impacts. Therefore, additional consideration has been made to the spatial distribution of the annual mean NO_2 impacts.

4.62 The point of maximum impact will be located in the sea to the north east of the proposed ERF. This is not an area of relevant exposure where the annual mean AQAL applies. Table 4.6 sets out the maximum impact on areas of land and at areas of residential properties. This is calculated as the maximum over the five years of weather data.

Area	Maximum process contribution		PEC	
	µg/m³	As % of AQAL	µg/m³	As % of AQAL
Maximum at any point	0.77	1.93%	22.79	56.98%
Land	0.76	1.91%	22.78	56.96%
Residential	0.39	0.97%	22.41	56.02%

Table 4.6: Annual mean NO_2

4.63 As shown, the peak impact will not occur on land and the impact at all residential properties will be less than 1% of the AQAL. Figure 4.2 shows the spatial distribution. At all residential areas, the impact will be less than 0.5% of the AQAL. The area where impacts will be between 0.5% and 1.5% of the AQAL is restricted to HMP The Verne. In this area, the baseline concentration is likely to be similar to the background concentration. The PEC will therefore be well below 75% of the AQAL. Therefore, the magnitude of change in annual mean NO_2 concentrations associated with the ERF will be negligible at all areas of relevant exposure and no significant effects are predicted.

4.64 It should be noted that no allowance has been made for the offset of emissions of from shipping that will use shore power provided by the ERF, which this development enables. These ships would otherwise be using on-vessel generators, with associated emissions.

Annual mean VOCs

4.65 For annual mean VOCs it is assumed that the entire VOC emissions consist of only benzene or 1,3-butidiene. Table 4.7 sets out the maximum impact on areas of land and at areas of residential properties. This is calculated as the maximum over the five years of weather data.

Area	Maximum process contribution		PEC	
	µg/m³	As % of AQAL	µg/m³	As % of AQAL
Benzene				
Maximum at any point	0.092	1.84%	0.36	7.24%
Land	0.091	1.82%	0.36	7.22%
Residential	0.05	0.92%	0.32	6.32%
1,3-butadiene				
Maximum at any point	0.092	4.08%	0.18	8.08%
Land	0.091	4.04%	0.18	8.04%
Residential	0.05	2.05%	0.14	6.05%

Table 4.7: Annual mean VOCs

4.66 As shown, the peak impact will not occur on land and the impact at all residential properties will be 0.92% of the AQAL if it is assumed that the entire VOC emissions consist of only benzene, and 2.05% of the AQAL if it is assumed that the entire VOC emissions consist of only 1,3-butadiene. Figures 4.3 and 4.4 show the spatial distribution of impacts. At all residential areas, the impact will be less than 5% of the AQAL. The PEC will be well below 75% of the AQAL. Therefore, the magnitude of change in annual mean VOC concentrations associated with the ERF will be negligible at all areas of relevant exposure and no significant effects are predicted.

Annual mean cadmium

4.67 For annual mean cadmium, the process contribution at the point of maximum impact will be 3.67% of the AQAL and the maximum process contribution at a receptor will be 1.84% of the AQAL. However, this assumes that the entire cadmium and thallium emissions consist of only cadmium. As detailed in technical appendix D2: Emissions modelling, monitoring from facilities processing a similar fuel has indicated that the average recorded concentration of cadmium and thallium is 8% of the limit.

4.68 Figure 4.5: Annual mean cadmium, shows the spatial distribution of emissions for the following scenarios:

- Worst-case – assumes emissions of cadmium at 100% of the ELV for cadmium and thallium
- Screening - assumes emissions of cadmium at 50% of the ELV for cadmium and thallium
- Typical - assumes emissions of cadmium at 8% of the ELV for cadmium and thallium

4.69 If it is assumed that the ERF would perform similarly to existing plants, the impact would be less than 0.5% of the AQAL at the point of maximum impact and at all areas of relevant exposure. Therefore, the magnitude of change in annual mean cadmium impacts associated with the ERF will be negligible at all areas of relevant exposure and no significant effects are predicted.

Short-term impacts

4.70 If it is assumed that the ERF operates at the half hourly ELVs set in the IED, the 1-hour NO_2, and 1-hour and 15-minute SO_2 impacts would exceed 10% of the relevant AQALs at the point of maximum impact. However, this assumes that the ERF operates at the half-hourly ELVs during the worst-case weather conditions for dispersion. This is a highly conservative assumption. In addition, the half-hourly ELV is that from the IED. The BREF introduces a lower daily limit for NO_x and SO_2. The IED half-hourly limit for NO_x is twice the daily limit, while the half-hourly limit for SO_2 is four times the daily limit. With the reduced ELVs set out in the BREF, the half-hourly limit is 3.3 times the daily ELV for NO_x, and 6.7 times the daily ELV for SO_2. Therefore, it is unlikely that peaks in short-term emissions would be this high, given that a lower daily ELV needs to be achieved.

4.71 The half-hourly ELV in the IED is twice the daily ELV for oxides of nitrogen and four times the daily ELV for sulphur dioxide. Table 4.8 sets out the short-term impact assuming operation at the IED ELVs and applying the ratios of twice the daily ELV for NO_x and four times the daily ELV for SO_2 to the reduced ELVs set in the BREF.

Area	Maximum process contribution assuming at IED half-hourly ELV		Maximum process contribution assuming at same ratio of half-hourly to daily ELV is applied to the BREF ELV	
	µg/m³	As % of AQAL	µg/m³	As % of AQAL
99.79th percentile of 1-hour NO_2				
Maximum at any point	27.94	13.97%	16.77	8.38%
Land	27.94	13.97%	16.77	8.38%
Residential	27.92	13.96%	16.75	8.38%
99.73rd percentile of 1-hour SO_2				
Maximum at any point	39.53	11.29%	23.72	6.78%
Land	39.53	11.29%	23.72	6.78%
Residential	39.53	11.29%	23.72	6.78%
99.9th percentile of 15-minute SO_2				
Maximum at any point	49.16	18.48%	29.50	11.09%
Land	49.16	18.48%	29.50	11.09%
Residential	46.94	17.65%	28.16	10.59%

Table 4.8: Short-term NO_2 and SO_2

4.72 As shown, if these same ratios are applied to the emissions from the ERF and it is assumed that the ERF operates at this level during the worst-case meteorological conditions for dispersion, the maximum 1-hour impact of NO_2 and SO_2 will be less than 10% of the AQAL. This impact will be negligible. The maximum impact of 15-minute SO_2 emissions is slightly above 10% of the AQAL for a small number of grid points and would be described as a slight adverse effect. This assumes that the worst-case emissions occur at the same time as the worst-case conditions for dispersion. The risk that 15-minute SO_2 impacts would be greater than 10% of the AQAL is minimal and the effect is deemed to be negligible. No significant effects are therefore predicted.

Heavy metals

4.73 The Environment Agency's metals screening guidance has been followed, as detailed in technical appendix D2: Emissions modelling. This has shown that, if it is assumed that the ERF will perform no worse than a currently permitted facility, the predicted process contribution will be below 1% of the annual mean AQAL and 10% of the 1-hour AQAL for all metals, with the exception of annual mean arsenic and nickel impacts. However, the PECs for arsenic and nickel will be well below 100% of the AQAL at 44.32% and 23.60% respectively. The impacts can therefore be screened out and the effect of process emissions of metals on human health is considered negligible and not significant.

Dioxins and furans

4.74 The potential for significant effects associated with emissions of dioxins and furans is assessed in detail in the human health risk assessment in technical appendix G, with the results summarised in ES chapter 6. The assessment concluded that there will be no significant adverse health effects as a result of emissions of these substances.

Emissions from post-construction traffic – human health

4.75 The proposed development has the benefit of being capable of receiving deliveries by either road or sea. The transport assessment has conservatively assumed that all deliveries will be by road to ensure that the greatest impact on the road network is accounted for. However, it is the intention that RDF would also be delivered by ship and offloaded at the 50t berth on the Inner Breakwater, to the north east of the site, and brought into the site by HGVs along the Inner Breakwater Road. As set out in ES chapter 2, it is expected that the proposed development would generate an additional 72 two-way HGV movements and 38 two-way car movements (staff) per day, if all the RDF is delivered by road. However, as a worst-case, it has been assumed that the impact would be 80 two-way HGV movements per day.

4.76 Both the number of HGVs and cars will be well below the IAQM screening criteria of 100 HGVs or 500 LDVs. Therefore, the proposed development is not expected to cause a significant change. As the effect is deemed to be negligible, further detailed analysis of the impact is not necessary.

4.77 However, it is noted that existing levels of traffic-related pollutants in the Boot Hill area of Weymouth are elevated. While the area is not designated as an AQMA, due to the concern raised by the local authority the number of vehicles predicted to travel through along the A354 through the Boot Hill area has been compared to the IAQM screening criteria within an AQMA. As set out in ES chapter 2, 50% of the HGV traffic (or 40 HGVs) would travel along the A354 through the Boot Hill area, which is part of Weymouth's one-way system for HGVs. This level slightly exceeds the IAQM screening criteria.

4.78 As such, a detailed analysis has been undertaken of the impact of vehicle movements associated with the proposed development, focusing on the Boot Hill area. Even if it is assumed that the fleet mix does not change over time, and therefore emissions do not reduce as a result of older vehicles being replaced by newer cleaner vehicles, the largest change predicted as a result of traffic associated with the proposed development will be 0.47% of the AQAL. As this is below the 0.5% threshold, the effect will be negligible and not significant. In the Boot Hill area of Weymouth, the process contribution from the ERF will be miniscule and well below any level described as negligible. There is therefore no potential for process emissions to combine with traffic emissions and cause a greater effect in this area.

4.79 A review of the process emissions dispersion modelling has shown that the area where the impact of process emissions will be greater than 0.5% of the AQAL is distanced from the road network. Therefore, there is negligible risk of any in-combination impacts with road traffic emissions changing the conclusions reached for process emissions and the effect remains negligible and not significant.

Post-construction process emissions – ecological receptors

4.80 The following sites of ecological importance have been considered in line with the Air Emissions Guidance:

- Special protection areas (SPAs), special areas of conservation (SACs) and Ramsar sites within 10 km of the proposed development
- Sites of special scientific interest (SSSIs) within 2 km of the proposed development
- National nature reserves (NNR), local nature reserves (LNRs), sites of nature conservation interest (SNCI) and ancient woodlands within 2 km of the proposed development

4.81 The locations of these sensitive ecological receptors are listed in table 4.9 and displayed in figure 4.6. A review of the citation and APIS website for each site has been undertaken to determine if lichens are an important part of the ecosystem's integrity, for the purposes of determining the relevant critical level for the habitat.

Site	Distance from the ERF at closest point (km)	Lichens identified as present
European and UK designated sites (within 10 km)		
Isle of Portland to Studland Cliffs SAC	0.07	Yes
Chesil and The Fleet SAC, SPA, Ramsar site	1.46	No
Crookhill Brick Pit SAC	7.44	No
UK designated sites (within 2 km)		
Isle of Portland SSSI	0.07	Yes
Nicodemus Heights SSSI	0.85	Yes
Chesil and The Fleet SSSI	1.46	No
Local sites (within 2 km)		
Verne to Grove SNCI	0.80	Yes
East Weare Camp SNCI	0.02	Yes
Verne Yeates LNR	0.86	Yes
King Barrow Quarries Dorset Wildlife Trust (DWT) reserve	1.20	Yes
Tout Quarries DWT reserve	1.74	Yes
Portland Heights SNCI	1.57	Yes
Grove Quarry SNCI	1.85	Yes
Osprey Quay Bunds SNCI	1.65	Yes
East Weare Rifle Range SNCI	1.25	Yes

Table 4.9: Sensitive ecological receptors

4.82 The Isle of Portland SSSI and Nicodemus Heights are components of the Isle of Portland to Studland Cliffs SAC. The Chesil and The Fleet is designated as a SAC, SPA, Ramsar and SSSI. Crookhill Brick Pit SAC is within 10 km of the site, but this has been identified as a site for great crested newts. While sensitive to air quality impacts, no critical loads have been set. Therefore, an assessment of the impact of air quality at Crookhill Brick Pit SAC has not been undertaken.

4.83 Each site (with the exception of Crookhill Brick Pit SAC) falls within the modelling domain and as such the impact has been calculated as the maximum of any grid point across the site. As a precautionary approach it has been assumed that lichens are present at the local sites as recommended by the project ecologist. Crookhill Brick Pit SAC is located outside the modelling domain. If the area where process contributions are not screened out as insignificant is restricted to within the modelling domain, the impact would be insignificant at this point too.

4.84 Reference should be made to technical appendix D2: Process emissions modelling for full details of these ecological sites, the habitats present at each site and the habitat-specific critical loads.

4.85 As detailed in technical appendix D2, the impact of process emissions will be less than 1% of the long-term and less than 10% of the short-term critical levels, and less than 1% of the critical loads at all European and UK designated sites, with the exception of:

- Annual mean NO_x impacts at Isle of Portland to Studland Cliffs SAC and SSSI (1.3%)
- Daily mean NO_x impacts at Isle of Portland to Studland Cliffs SAC and SSSI (15.3%)

- Annual mean ammonia impacts at Isle of Portland to Studland Cliffs SAC and SSSI and Nicodemus Heights SSSI (2.5% and 1.1% respectively)
- Nitrogen deposition impacts at calcareous grasslands and broadleaved deciduous woodland at the Isle of Portland to Studland Cliffs SAC and SSSI (1.1% and 2.7% respectively)
- Acid deposition impacts at calcareous grasslands at the Isle of Portland to Studland Cliffs SAC and SSSI and acid grassland at Chesil and The Fleet SAC and SSSI (1.0% and 1.3% respectively)

4.86 However, at all sites where the impact exceeds 1% of the long-term or 10% of the short-term critical level or load the PEC will be less than 70%. Further discussion of these impacts is provided in ES chapter 10 and the shadow appropriate assessment submitted in support of the planning application.

4.87 As detailed in technical appendix D2, the impact of process emissions will be less than 1% of the long-term and less than 10% of the short-term critical levels, and less than 1% of the critical loads at all locally designated sites, with the exception of:

- Annual mean and daily mean NO_x impacts at Verne Yeates SNCI (1.0% and 11.0% respectively)
- Annual mean ammonia impacts at all locally designated sites (ranging from 1.0% to 2.1%), with the exception of Grove Quarry and East Weare SNCIs
- Nitrogen and acid deposition impacts at coastal stable dune grassland and calcareous grassland at Osprey Quay Bunds SNCI (1.0% and 1.4% respectively)

4.88 However, at all sites where the impact exceeds 1% of the long-term or 10% of the short-term critical level or load, the PEC will be less than 70%. Further discussion of these impacts is provided in ES chapter 10.

Post-construction vehicle emissions – ecology

4.89 The Design Manual for Roads and Bridges (DMRB) considers any receptor within 200 m of a road source to be potentially affected by that operation. Natural England's (2018) guidance document *Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations* explains that it is widely accepted that imperceptible impacts are those that are less than 1% of the critical level or load, which is considered to be roughly equivalent to 1,000 AADT for cars and 200 AADT for HGVs. The guidance draws upon the DMRB and states that the initial screening is to determine if there are any sites within 200 m of a road impacted by the proposals.

4.90 Taking the worst-case assumption that all deliveries would be via road, the trip generation rate for the proposed development is well below the 200 HGV screening threshold. However, traffic will be routed along Main Road and Portland Beach Road, which both run adjacent to designated ecological sites. The process emissions modelling has shown that impacts will be restricted to the Portland area and, as such, there is no potential for significant in-combination effects on designated sites in Weymouth. The assessment of in-combination impacts with road traffic emissions has therefore focused on the

Isle of Portland (SSSI and SAC) and Chesil and The Fleet (SAC, SPA, Ramsar site and SSSI).

4.91 As detailed in technical appendix D2, when combining the impacts from process and traffic emissions, the total impact will be less than 1% of the relevant critical level and loads within 50 m of the edge of the designation closest to the road. This is conservative, as it assumes that all deliveries will via road. In reality, it is likely that some deliveries will arrive by sea. Further discussion of these impacts is provided in ES chapter 10 and the shadow appropriate assessment submitted in support of the planning application.

Post-construction shipping emissions

4.92 The proposed development has the benefit of being capable of receiving deliveries by either road or sea. As set out in ES chapter 2, if all the waste was to be received via sea there would be an additional 81 ships accessing the port on an annual basis. This equates to less than two ships a week.

4.93 The onboard engines would need to comply with the relevant standards for accessing the English Channel, which is classified as an Emission Control Area under the International Convention for the Prevention for the Pollution from Ships (MARPOL). This includes limits on the sulphur content of the fuel used and emissions of NO_x from the ship engines.

4.94 The onboard engines would only be used during the transportation and manoeuvring into the docks. It is likely that smaller auxiliary engines would be used when the ship is docked, as the power consumption when docked would be minimal. Material from the ship would be unloaded using a land-based crane system.

4.95 Ships would access the port area around Portland Breakwater Fort – i.e. away from any receptors sensitive to air pollution. The dock likely to be used for the unloading of material is the 50-tonne dock along Inner Breakwater Road. This is over 500 m from any residential properties, and over 300 m from the closest point of the Isle of Portland to Studland Cliffs SAC and SSSI. Impacts from the engines would be restricted to the area around the berth. Impacts would be limited to the short period they would be in the dock whilst material was being unloaded, and by the amount of power needed to maintain supply needed to the ship during berthing. It is not likely that the transportation of material via sea will have a significant air quality effect on either human health or at ecological receptors. The use of ships to deliver material would reduce the HGV movements on the local road network and as such would have a benefit on impacts away from the immediate port area.

Mitigation and monitoring

4.96 The ERF will require an environmental permit in order to operate, which will set out a list of conditions including ELVs. For the purpose of this EIA, it has been assumed that the ERF complies with the requirements of the environmental permit.

4.97 As explained, previously, the IED allows the relevant sector BREF to become binding as BAT guidance and all new plants will need to comply with the BAT conclusions and AELs. These are more stringent than the ELVs set in the IED. In addition, it is proposed to apply for a more stringent ELV for ammonia which is 80% of the BAT AEL.

4.98 No additional mitigation or monitoring is required beyond that imbedded into the design and required by legislation, which will be regulated by the Environment Agency under the environmental permit.

Residual effects

4.99 No significant residual air quality effects are predicted.

Cumulative effects

4.100 As set out in chapter 3, the potential for cumulative effects with other proposed and consented developments in the area has been examined. None of these will generate process emissions, so there is no potential for significant cumulative air quality effects post-construction. Traffic flows associated with these developments were included in the traffic modelling. Therefore, the potential cumulative effects from post-construction vehicle emissions are included in the modelling results and no significant cumulative effects are predicted.

Air quality – impact descriptors for individual receptors

Long term average concentration at receptor in assessment year	Change in concentration relative to air quality assessment level (AQAL)			
	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Note: The table is intended to be used by rounding the change in the percentage pollutant concentration to whole numbers, which then makes it clear which cell the impact falls within. Changes of 0% (i.e. less than 0.5%) will be described as negligible.

From: Environmental Protection UK and the Institute of Air Quality Management, 2017, Land-Use Planning & Development Control: Planning for Air Quality.

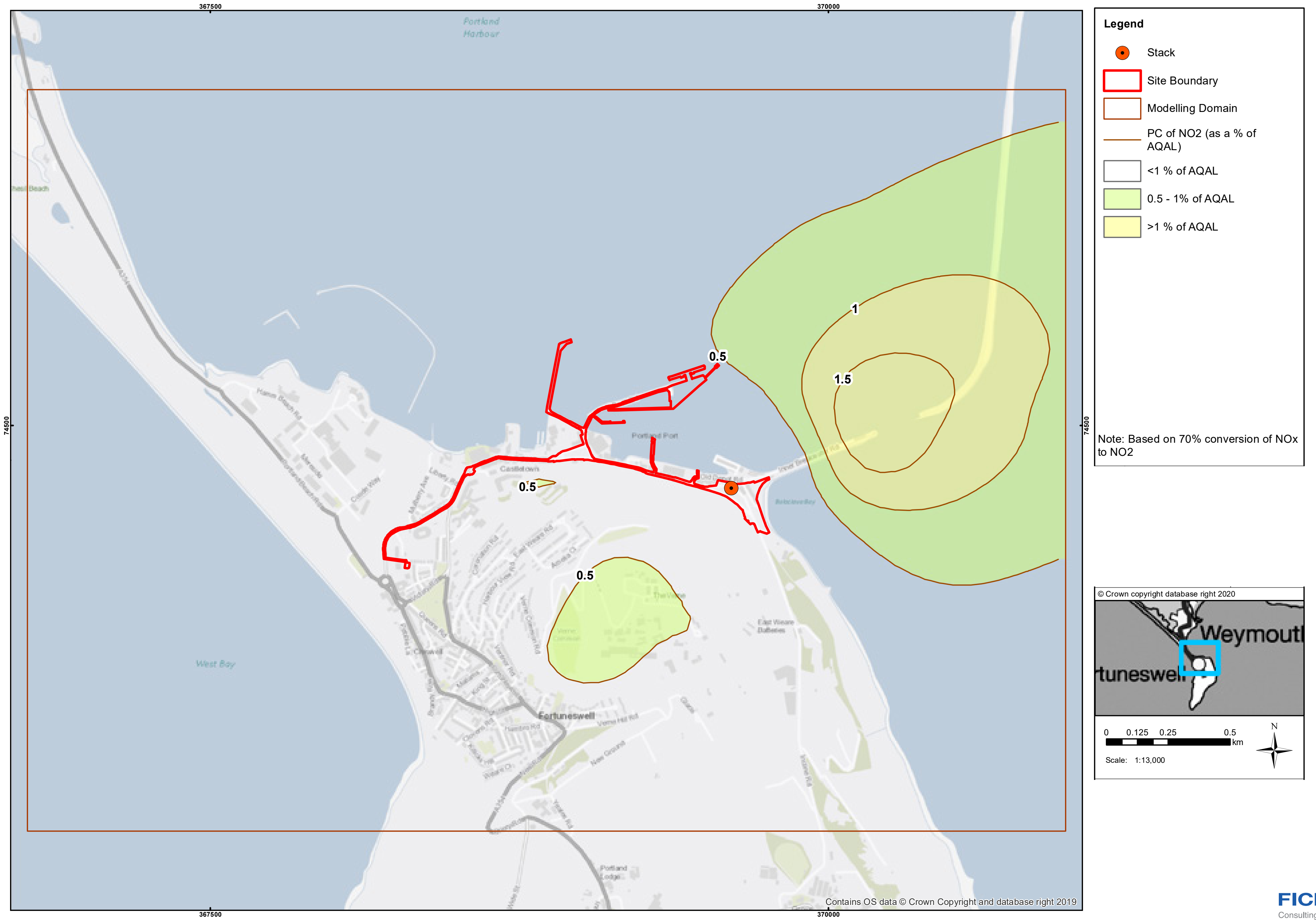

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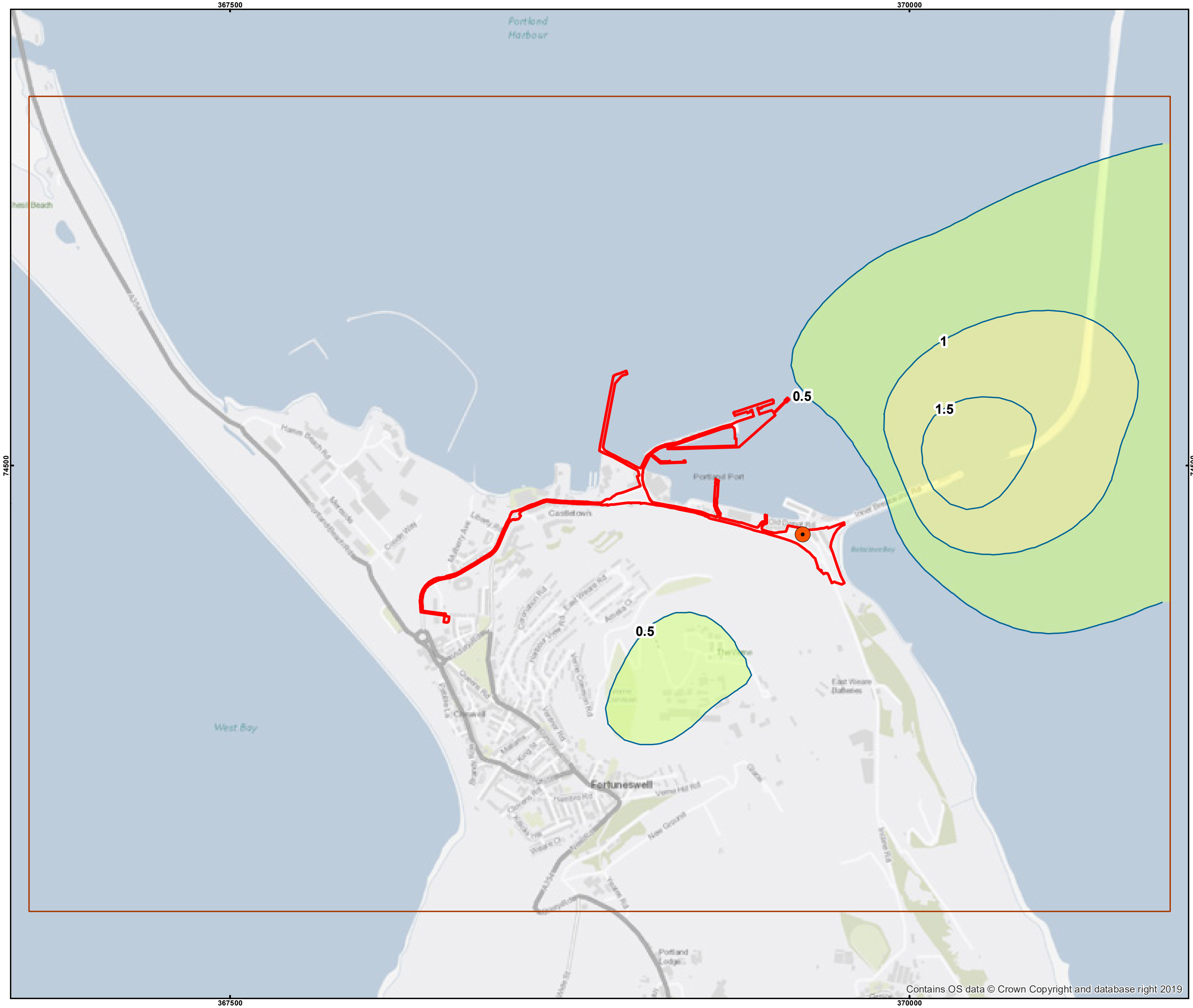
Figure 4.2 Annual mean nitrogen dioxide analysis

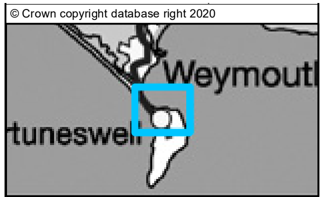
POWERFUEL



Legend

- Stack
- Site Boundary
- Modelling Domain
- Benzene as a % of AQAL
- <0.5 % of AQAL
- 0.5 - 1% of AQAL
- >1 % of AQAL

Note: Assumes 100% of VOCs emitted as benzene



0 0.125 0.25 0.5 km

Scale: 1:13,000

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Figure 4.3 Annual mean VOCs as benzene analysis

POWERFUEL

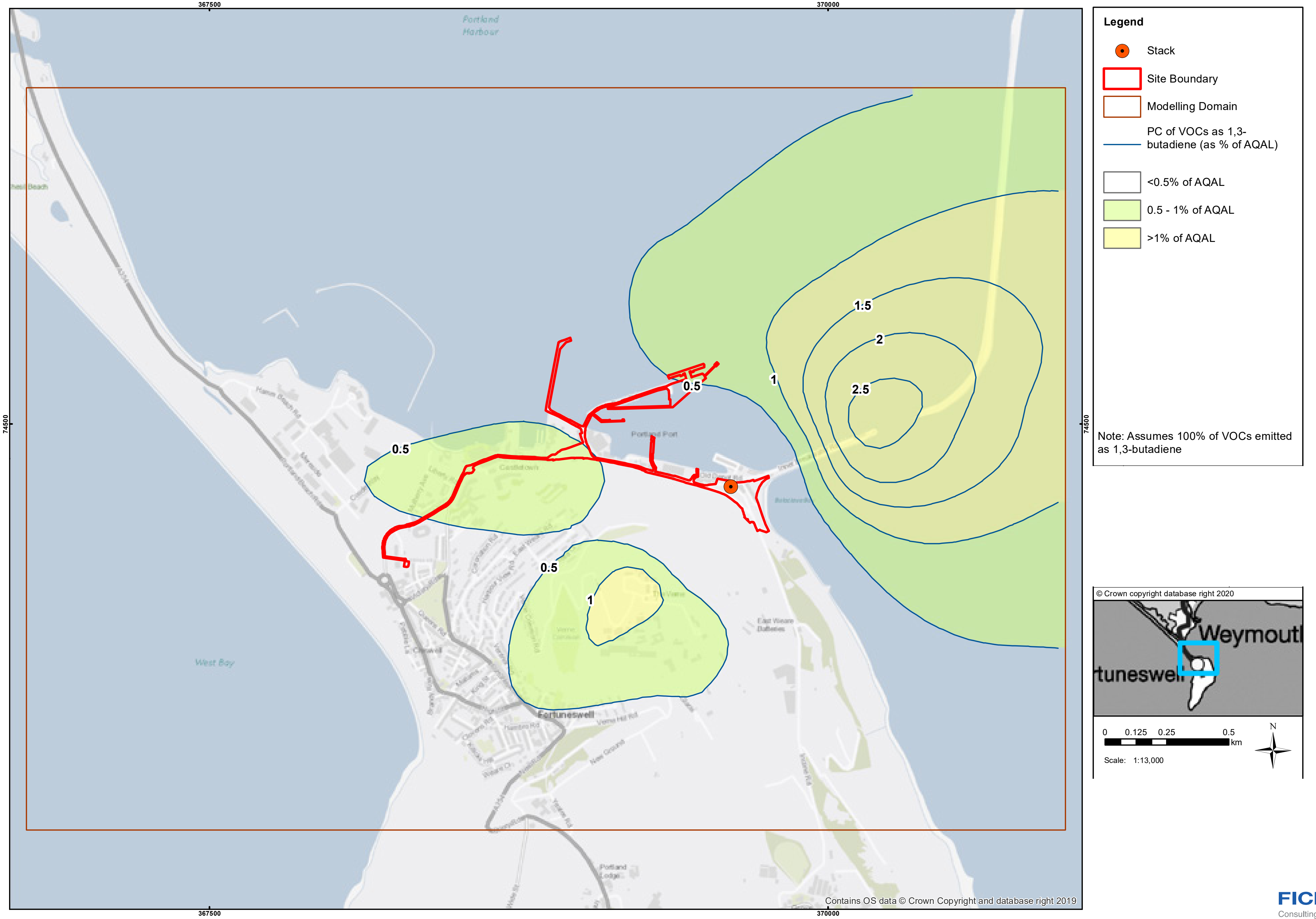

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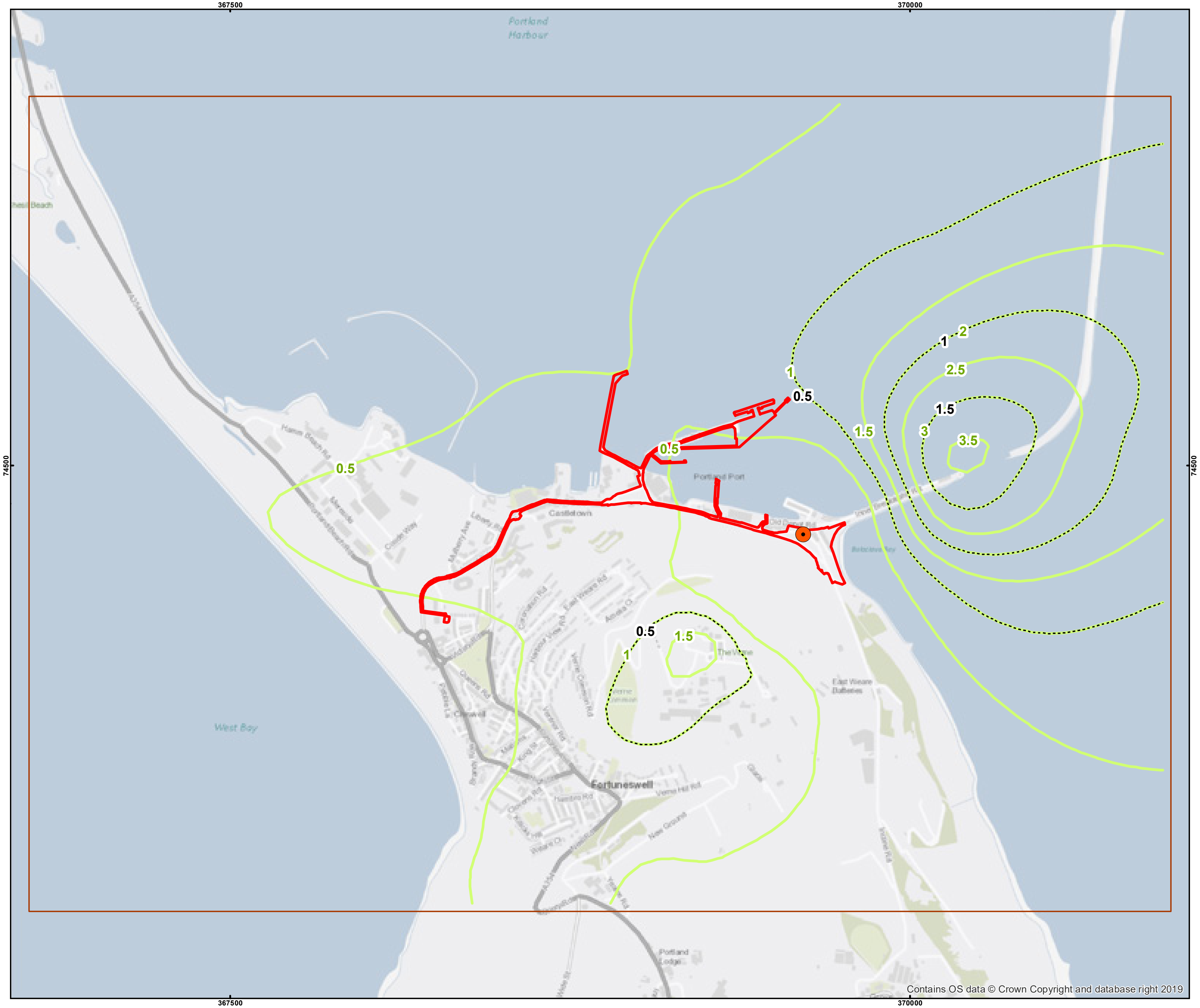
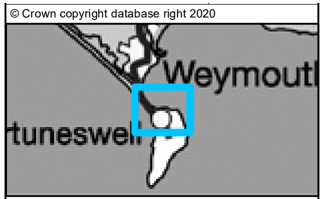
Figure 4.4 Annual mean VOCs as 1,3-butadiene analysis

POWERFUEL



Legend

- Stack
- Site Boundary
- Modelling Domain
- Typical (8% of ELV) Cadmium as a % of AQAL
- Worst case (50% of ELV) Cadmium as a % of AQAL
- Screening (100% of ELV) Cadmium as a % of AQAL



0 0.125 0.25 0.5 km

N

Scale: 1:13,000

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Figure 4.5 Annual mean cadmium analysis

POWERFUEL

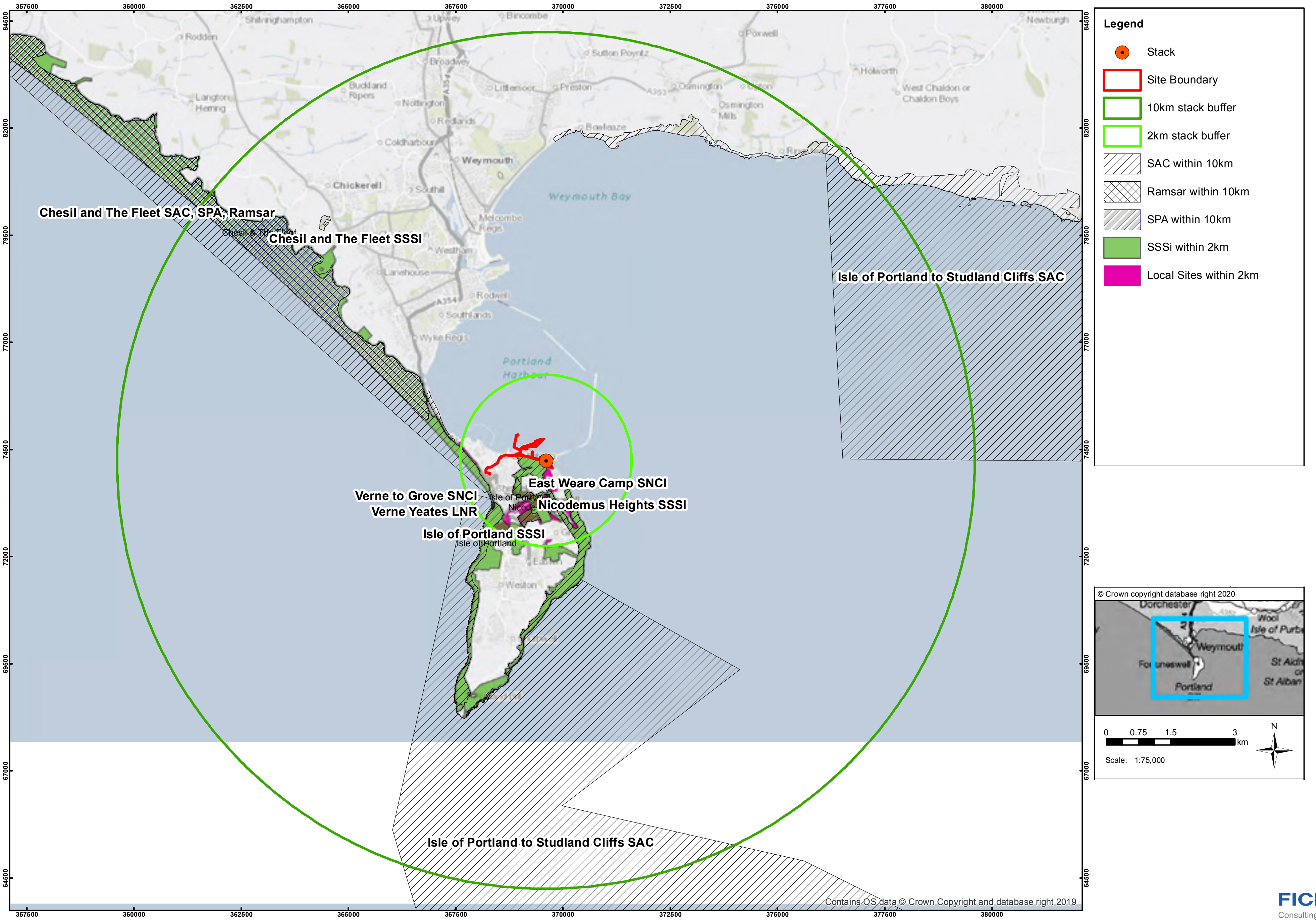

Figure 4.6a Locations of sensitive ecological receptors

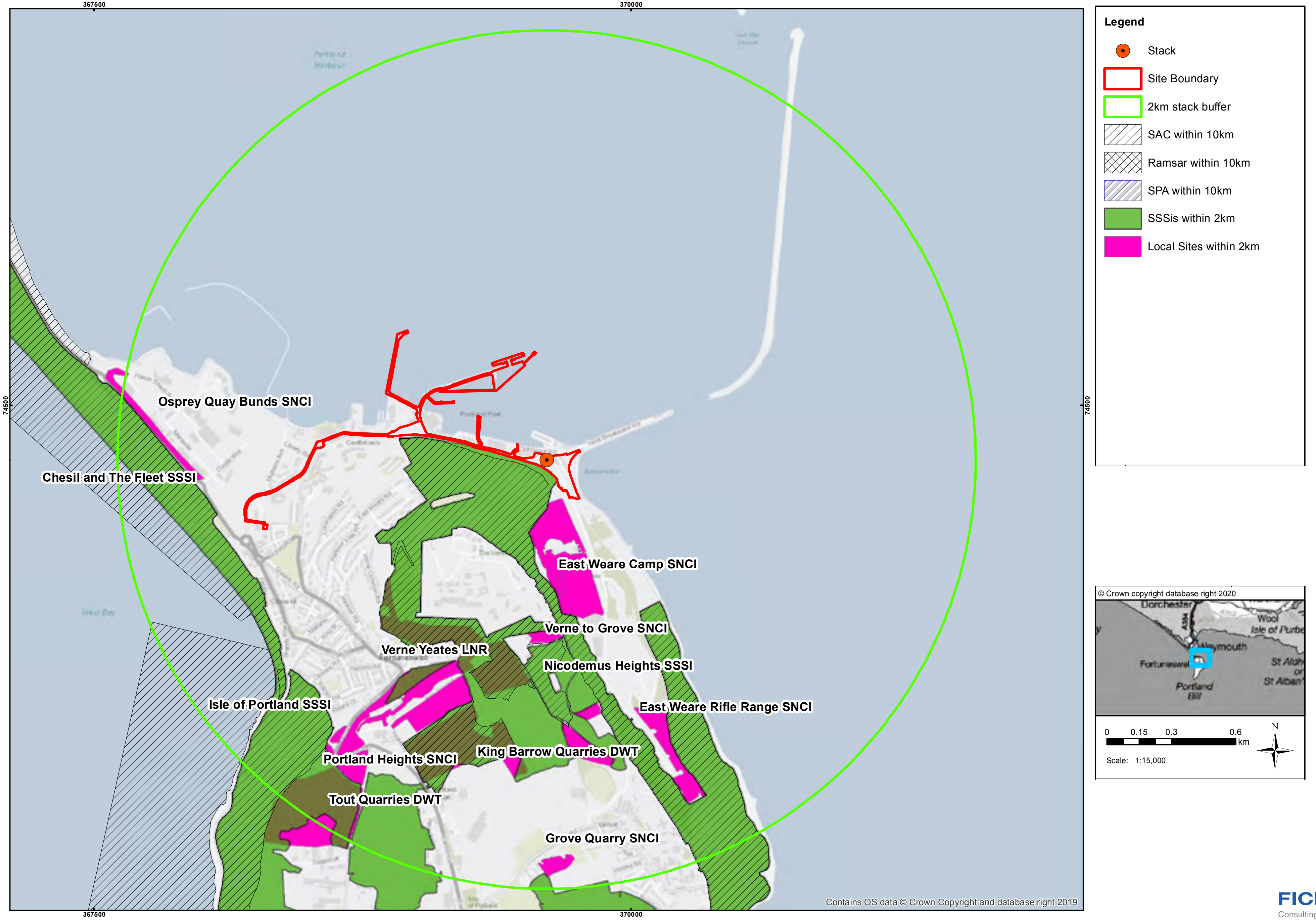

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Figure 4.6b Locations of sensitive ecological receptors within 2 km of the site

POWERFUEL