POWERFUEL

Portland energy recovery facility

Environmental statement
Technical appendices

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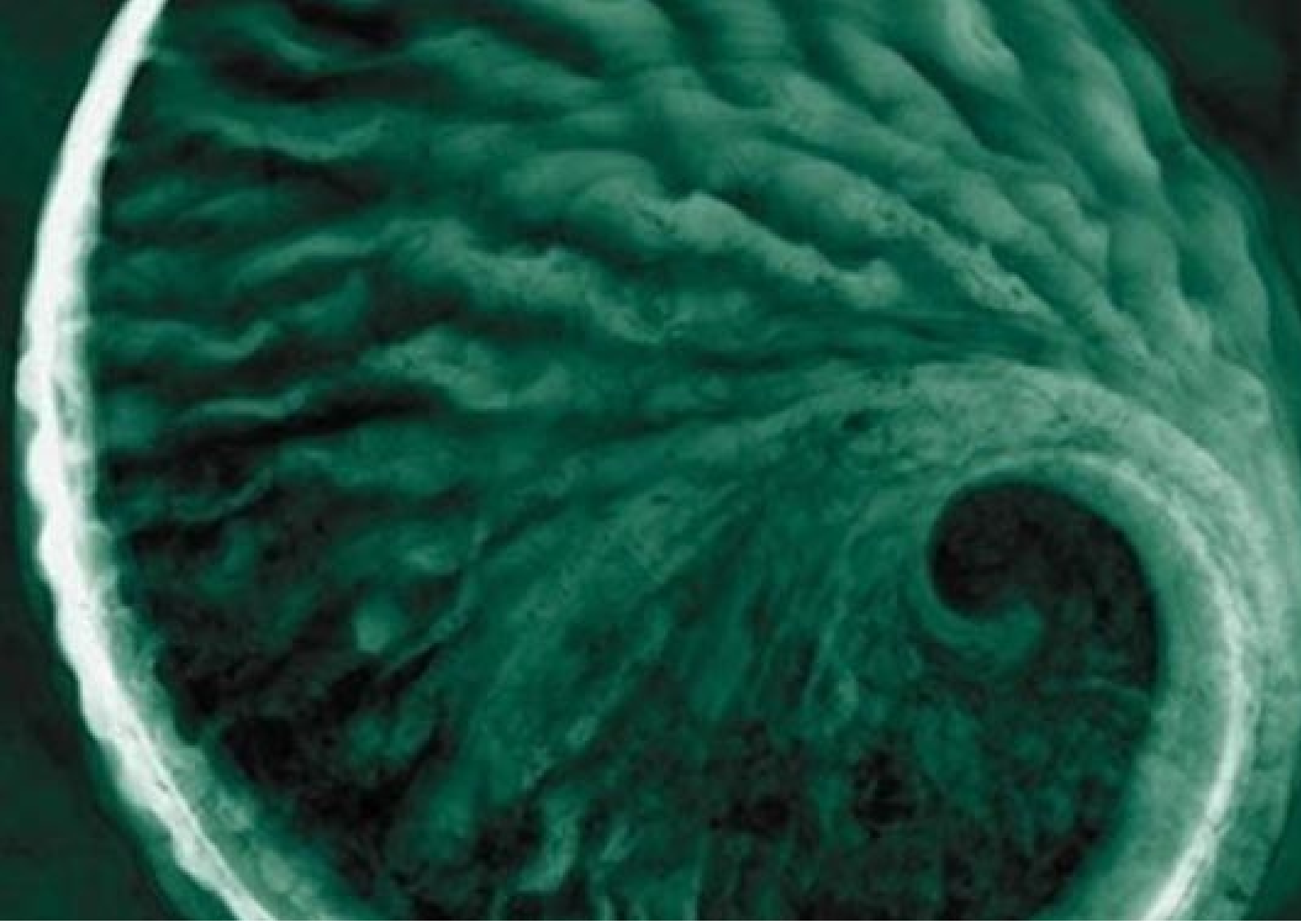
Health risk assessment and health impact assessment



Health Impact Assessment

Portland Energy Recovery Facility

26 August 2020

Project No.: 0552187

The business of sustainability

ERM

Signature Page

26 August 2020

Health Impact Assessment

Portland Energy Recovery Facility

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1. INTRODUCTION

1.1 Background

Powerfuel Portland Ltd. proposes to develop an Energy Recovery Facility (ERF) on the Isle of Portland, Dorset. Environmental Resource Management (ERM) has been commissioned to undertake a Health Impact Assessment (HIA) of the Proposed Project. There is no statutory requirement to carry out a HIA for the Proposed Project. However, the amended Environmental Impact Assessment (EIA) Directive (2014/52/EU) includes requirements to consider direct and indirect significant effects of projects on 'population and human health'.

The aim in undertaking this work is to provide all interested parties with an evaluation of the Proposed Project's implications for health. The Environmental Statement (ES) for the Proposed Project has been used to inform this HIA.

1.2 Defining Health and Health Impact Assessment

1.2.1 What is 'Health'?

Health, or more importantly what constitutes good health, is difficult to define and measure in all of its aspects for a population, not least because perceptions regarding health and expectations of good health vary. Any definition of health applied in a HIA will influence the overall content and focus of the assessment.

Following best practice, this HIA applies the World Health Organization's (WHO) definition, which states that health is;

"a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity"[1]

1.2.2 Health Determinants

As a consequence of adopting the WHO definition, the basis of this HIA is a broad socio-economic model of health. For any individual, health is determined by a multitude of factors. There are individual factors that relate to age and genetics, which cannot be changed. Next, there are lifestyle factors, such as levels of physical activity, alcohol consumption, tobacco smoking, etc. Beyond these matters, a multitude of external factors play a significant part in determining health. These reflect the wider environment and encompass many aspects of the socio-economic context in which members of a community live and work.

A common way of summarising these factors is illustrated as a model of the so-called 'determinants of health'. The core determinants are specific to an individual, whilst the outer determinants are a function of the socio-economic status of an individual. For example, social and community networks are also considered to be important for a person's health and wellbeing. If these networks are strong, evidence suggests that health is improved. Isolated individuals, on the other hand, typically experience poorer health.

Determinants of health are generally well understood and can be defined with some confidence, although no list can be completely comprehensive, especially where the definition of health includes wellbeing, as in this HIA.

A health determinant can be any factor which has the potential to influence the health of an individual. Health determinants are categorised in Section 2.10. For the sake of this assessment, the following categories of determinants have been used as follows.

[1] World Health Organization, (1948), Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946.

- Physical Environment – the physical characteristics and conditions of an area.
- Living Environment – conditions of the area where people live as well as the relation and sense of living they associate with the area.
- Social Capital – represents the degree of social cohesion which exists in communities. It refers to the processes between people which establish networks, norms, and social trust, and facilitate co-ordination and co-operation for mutual benefit.[2]
- Economic effect – the status and conditions of an area in terms of economic status and opportunities available.

The physical environment (eg air quality) is one determinant that has some part to play in the health of populations, but is only one influence. Good housing, access to medical services, transport and being employed in a low stress job are also important.

In conducting an HIA, the effect of the Proposed Project under consideration on these determinants has to be considered. This is done by defining health 'pathways'. A health pathway can be described as any activity that influences a known determinant of health. These pathways are discussed further in Section 3.

1.3 Aims and Objectives

The aims and objectives of this HIA are:

- to determine the potential health impacts of the Proposed Project on local receptors;
- to assess the nature and extent of these health impacts;
- to identify ways to maximise positive and minimise negative health impacts; and
- to inform the planning process and respond to health issues raised through this process.

1.4 Scope and Structure of this report

The remainder of this report is structured as follows:

- Section 2: Methodology for undertaking the HIA;
- Section 3: Project profile;
- Section 4: Community profile;
- Section 5: Stakeholder engagement;
- Section 6: Literature review;
- Section 7: Impact assessment; and
- Section 8: Recommendations.

[2] World Health Organisation 1998. Health Promotion Glossary. Retrieved from: https://bit.ly/3g5e1Yf

2. METHOD FOR UNDERTAKING THE HIA

2.1 Models for undertaking the HIA

There is an extensive and growing body of knowledge and guidance on HIA. However, no statutory guidance exists and different HIA employ slightly different methods to meet individual project requirements.

According to the Gothenburg consensus (a consensus paper developed by amongst others the WHO, the Nordic School of Public Health and the European Commission, which is designed to provide a common understanding and approach to undertaking HIA), HIA is:

"a combination of procedures, methods and tools by which a policy, programme or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population"[3]

This HIA also takes into consideration the following guidance:

- A Short Guide to Health Impact Assessment: Informing Healthy Decisions, commissioned by NHS Executive London, August 2000;
- An Easy Guide To Health Impact Assessments For Local Authorities, Chimeme Egbutah And Keith Churchill, October 2002;
- Introducing health impact assessment (HIA): Informing the decision-making process, Health Development Agency, 2002; and
- Guidance on HIA: WHO, 2006.

2.2 Determining the need for a HIA: Screening

A stand-alone HIA screening exercise was not required, as the need for the HIA was highlighted in Dorset Council's Waste Planning Authority and Public Health Dorset response to the EIA Scoping Report for the Portland Energy Recovery Facility submitted in January 2020. Therefore, it was determined that a HIA would be undertaken in accordance with the advice provided by the Council.

2.3 Scoping

An EIA Scoping Report was issued to Dorset Council on 10 January 2020 and the Council's scoping opinion was received on 24 February 2020. Responses on the EIA Scoping Report were received from Dorset Council's Waste Planning Authority and Public Health Dorset, and are annexed to this report. The scoping process identified the following health effect to be considered in the EIA:

- Potential impact of the proposed development on both physical and mental health;
- Potential impact on health inequalities and potentially vulnerable populations e.g. the populations of HMP Verne and HMP Portland; and
- Effects on health post-construction.

However, it is recognised that the wider HIA will need to address effects both during and post-construction.

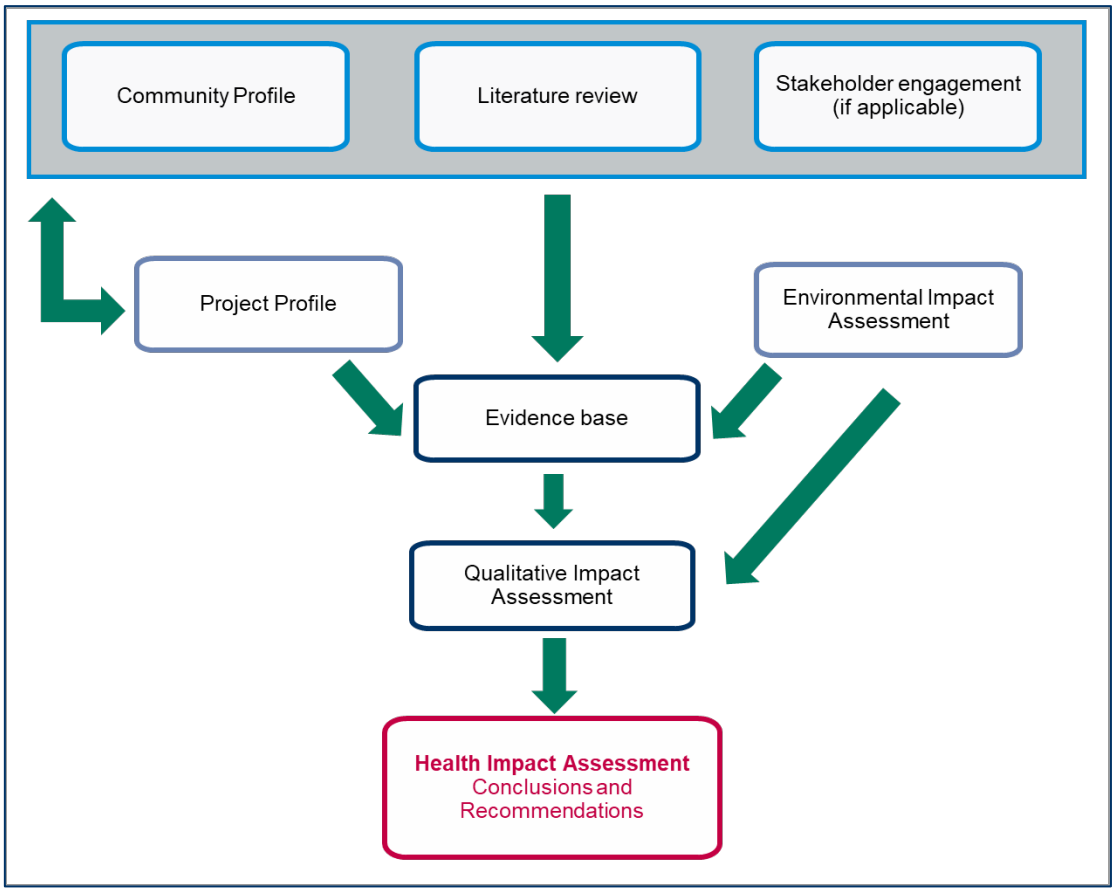
[3] World Health Organization (1999) Health impact assessment: Main concepts and suggested approach. Copenhagen: World Health Organization.

2.4 The Assessment

The method applied in this HIA follows established best practice, drawing upon available data to inform the assessment of potential impacts to health and wellbeing. It comprises the following key steps and is illustrated in Figure 2.1 below:

- the compilation of an evidence base, comprising a literature review, a community profile and a limited stakeholder engagement;
- the construction of a 'project profile';
- analysis of potential health impacts; and
- the conclusions on effects resulting from this process.

Figure 2.1 HIA Method



2.5 Community Profile

The community profile has been informed by a number of data sets, including national statistics such as the National Census 2011 and the Indices of Multiple Deprivation 2019, and the UK business register and employment survey (BRES).

The combination of statistics and available survey information develops a picture of the existing community profile, including specific areas of sensitivities, susceptibilities and inequalities. This is used to identify sections of the community who may experience potential impacts of the project in a differential or disproportionate manner, in addition to generalised impacts which may be experienced by the community as a whole.

2.6 Human Health Risk Assessment

A Human Health Risk Assessment (HHRA) was undertaken as part of the overall HIA and is presented as a separate technical appendices in this report (see Appendix B). The HHRA quantifies the risk of additional mortality and morbidity in the local population due to exposure to emissions to air from the facility. The HHRA considers lifetime cancer risk and non-cancer health outcomes such as myocardial infarction, cardiovascular disease etc. The high degree of public scrutiny of the project is reflected in the proposed method, which includes source-pathway-receptor modelling for carcinogenic risk. An introduction to the assessments is given below and Appendix B provides more detail around the method, approach and results of the assessment. The conclusions of this assessment will be drawn upon in the Section 6 of this report.

2.6.1 Assessment of human health effects of SO_2, NO_2, PM_{10} and $PM_{2.5}$

This assessment investigates the human health effects resulting from exposure to some of the substances emitted from the proposed ERF and road traffic. It does so by adapting the quantification method used by the Department of Health's Committee on the Medical Effect of Air Pollutants (COMEAP) and the Clean Air for Europe (CAFE) programme. These methods are as set out in the 1998 COMEAP report [4] and the CAFE report [5]. The assessment is based upon health response data from the 2009 COMEAP report[6] . Exposure to increased concentrations of pollutants such as particulate matter (PM), nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) is associated with effects on the human body including the respiratory system, brain and cardiovascular system, leading to increased morbidity and changes in mortality through mechanisms that are not yet fully understood.

It is likely that air pollution affects human health both in the short term and the long term. Short term effects are probably caused by air pollution having a marginal effect on an individual who is already vulnerable, either transiently or permanently. Long-term effects may be due to the marginal effect of air pollution in contributing to the progression of chronic diseases that have other causes.

The methods developed by COMEAP and CAFE can be used to predict the health effects associated with developments such as this facility which will result in increased exposure to air pollutants.

2.6.2 Lifetime Health Risks

The emissions from the proposed ERF plant will contain a number of substances that cannot be evaluated in terms of their effects on human health simply by reference to ambient air quality standards. Health effects occur through exposure routes other than purely inhalation and are cumulative over a lifetime. As such, an assessment needs to be made of the overall human exposure to the substances by the local population and then the risk that this exposure causes.

The assessment presented here considers the impact of certain substances released by the EfW plant on the health of the local population. These substances are those that are 'persistent' in the environment and have several pathways from the point of release to the human receptor. These are generically referred to as 'Contaminants of Potential Concern' (COPCs). The COPCs of interest are dioxins/furans and some metals.

The exposure scenarios used here represent a highly conservative situation in which all exposure assumptions are chosen to represent a worst case and should be treated as an extreme view of the risks to health. The possibility of all high-end exposure assumptions accumulating in one individual is, for practical purposes, never realised. Therefore, intakes presented here should be regarded as an

[4] Committee on the Medical Effects of Air Pollutants (COMEAP) (1998) Quantification of the Effects of Air Pollution on Health in the United Kingdom Department of Health, The Stationery Office, London.

[5] AEA Technology (2005) Methodology for the Cost Benefit Analysis for CAFE. Volume 2: Health Impact Assessment Available at http://europa.eu.int/comm/environment/air/cafe/

[6] COMEAP (2009) Long Term Exposure to Air Pollution: Effect on Mortality.

extreme upper estimate of the actual exposure that would be experienced by the real population in the locality.

2.7 Literature Review

A literature review has been undertaken to collect evidence on the potential health impacts associated with the Proposed Project. This was based on literature regarding health effects associated with the various elements of the Proposed Project and included a review of completed HIAs on waste management facilities, waste management policies and position papers prepared by relevant groups and authorities. The effects on health of the following topics were considered:

- air quality;
- incineration and public health;
- transport;
- noise;
- visual environment;
- socio-economics; and
- social capital.

The literature review is not a systematic review of all the available literature on these topics, but is based on literature that is nationally or internationally recognised, peer reviewed and which reflects the consensus view. It is not intended to be a selective view of the evidence in the sense of taking a particular stance on a topic. All of the literature included in the review is publicly available. The literature review has also considered other published HIAs (except those undertaken previously by ERM to ensure independence) on similar or related projects or policies.

2.8 Stakeholder Engagement

Engagement with stakeholders will be undertaken on the basis of the assessment findings, reflecting the ability of stakeholders to contribute in the current context of Covid-19. Feedback from stakeholders will be considered during the development and operation of the Proposed Project.

2.9 Project Profile

The project profile investigates the various stages and processes involved during the construction and operation of the Proposed Project. It defines the Proposed Project's footprint, the extent of activities that may result in potential health outcomes, and the influence they may have upon a range of determinants of health. In this way, the project profile identifies the potential health pathways.

Decommissioning of the Proposed Project may have an impact upon several attributes of health, but is beyond the scope of this assessment. The exact identity and nature of any such impacts can only be identified accurately nearer to the time of such a decommissioning, when appropriate plans and local context are apparent.

Once activities and their associated impacts have been outlined, they can be applied to the community profile. This will determine how such pathways might act on the relative susceptibilities and vulnerabilities of communities, using the HIA evidence base to identify a range of possible socio-economic, physical, mental and community health outcomes.

The purpose of the project profile is to identify relevant features associated with the Proposed Project that are potential influences on the determinants of health.

The potential of these determinants to be influenced by the Proposed Project has been considered by the HIA team, using the available evidence base and expert judgement.

2.9.1 Function of Project Profile

The purpose of the project profile is to identify features associated with the Proposed Development which may potentially influence health[7]. The aim of the project profile is not to describe in detail the Proposed Development, but to identify key features for consideration and assessment within the HIA.

The profile outlines potential health effects by identifying aspects of the project which may have a health effect through a determinant of health and then outlining the 'health pathway' affected. This allows for identification of the 'health determinant' affected and therefore an indication of the 'health outcome', as well as the community or communities that are likely to be affected.

The Proposed Development has been described in considerable detail within the planning application and the ES. It is not the aim of the project profile to replicate or reassess the findings of the EIA, but rather to take relevant information and data for consideration in this HIA.

2.9.2 Health Pathways

The Proposed Development may exert an influence on health determinants via 'health pathways', which arise from consequences of its features. Any judgement on the capacity of the Proposed Development to influence health pathways has to consider both the levels of exposure in the absence of the Proposed Development and the potential for a change in exposure as a result of the Proposed Development.

Examples of health pathways include:

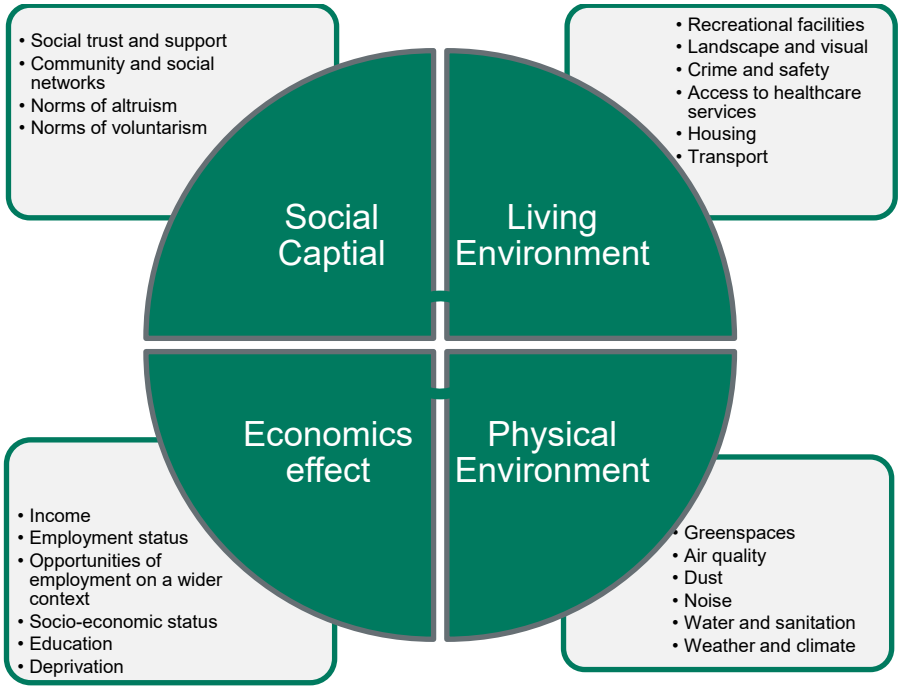
- changes to traffic flows which can impact on community connectivity and risks of accidents;
- employment opportunities, with implications for improved socio-economic status, reductions in unemployment and the potential for local procurement policies and skills development; and
- changes to the visual landscape with implications for the communities sense of place and wellbeing.

2.10 Health Determinants

A health determinant can be any factor which has the potential to influence the health of an individual. Health determinants have been categorised into Social Capital, Living Environment, Physical Environment and Socio-economics and cover the factors shown in Figure 2.2.

[7] World Health Organization's (WHO) definition states that health is "a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity

Figure 2.2 Health Determinants



2.10.1 Health Outcomes

Once health pathways and their related health determinants have been identified, the potential impacts of the Proposed Development can be evaluated in relation to health outcomes.

The definition of health is a broad one and whilst the most serious outcomes may be recorded in the health system or be recognisable in hospital outpatient or primary health care activity, many others will be more subtle and therefore not result contact with healthcare or other services. These outcomes could be described as 'sub-clinical' and may also relate to the wellbeing of some parts of the community.

2.10.2 Receptor

The receptor states which group(s) of people are most likely to be impacted by the health outcome that has been identified. Receptors can be people that live or work close to the site or along proposed transport corridors, or who use facilities close to the site such as schools.

In addition to receptors, vulnerable groups will be identified. Vulnerable receptors are those individuals who will be unduly affected by the Proposed Development and include children, the elderly, the disabled and people of low socio-economic status.

2.11 Analysis

The analysis stage investigates and appraises potential outcomes and benefits, incorporating environmental and health data to identify populations at risk. It assesses the maximum theoretical impacts with a view to developing measures that reduce or avoid negative impacts/inequalities and enhance opportunities to improve health.

This has been achieved by identifying activities with identifiable health pathways and outcomes and applying them in the context of the community profile to assess exposure and sensitivity.

Potential impacts were identified and assessed based on the findings of the ES and the evidence base, including the findings of the stakeholder engagement process. The analysis provides a qualitative professional judgment as to the likelihood, magnitude of the potential health outcomes.

2.12 Recommendations

This section aims to identify means of avoiding or minimising negative impacts on a community's health and wellbeing and to promote and maximise any benefits associated with the Proposed Project. Thus, recommendations are developed to avoid, minimise, reduce, remedy or compensate for the negative impacts identified, and to create or enhance health benefits.

Recommendations (sometimes referred to as mitigation) are also developed during the EIA process and many of these will have benefits for health. For the reader's convenience, mitigation measures that will influence health impacts, as identified in the ES, are presented in this report.

2.13 Constraints and Limitations of the HIA

The HIA has drawn upon data sets which are publicly available. These data sets are primarily based on the former borough of Weymouth & Portland, more localised ward-level data is not available, but nonetheless they do provide robust data with which to inform the analysis of potential impacts.

3. PROJECT PROFILE

3.1 The Proposed Development

This section provides a description of the Proposed Project, from the perspective of its implication on determinants of health.

3.1.1 Site Location

The site (redline boundary) is shown in Figure 3.1 and Figure 3.2. It lies on the north eastern coast of the Isle of Portland, Dorset within Portland Port. It encompasses approximately 6.29 hectares (ha), 2.14 ha main site for the ERF building and 4.15 ha of cable routes in the electricity substation off Lerret Road and to the berths at Queen Pier and Coaling Pier. The site is approximately 600 m east of the villages of Fortuneswell and Castletown.

The main part of the site is largely covered with hardstanding and has been vacant for several years, although there is a weighbridge towards the western point. It is relatively flat and approximately 5 m above Ordnance datum (AOD). As the site lies within the port, it is not currently publicly accessible. Vehicular access is from the west, through the main Portland harbour complex, via Castletown, Castle Road, Lerret Road and the A354.

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

Figure 3.1 Map of Site and Surrounding Area

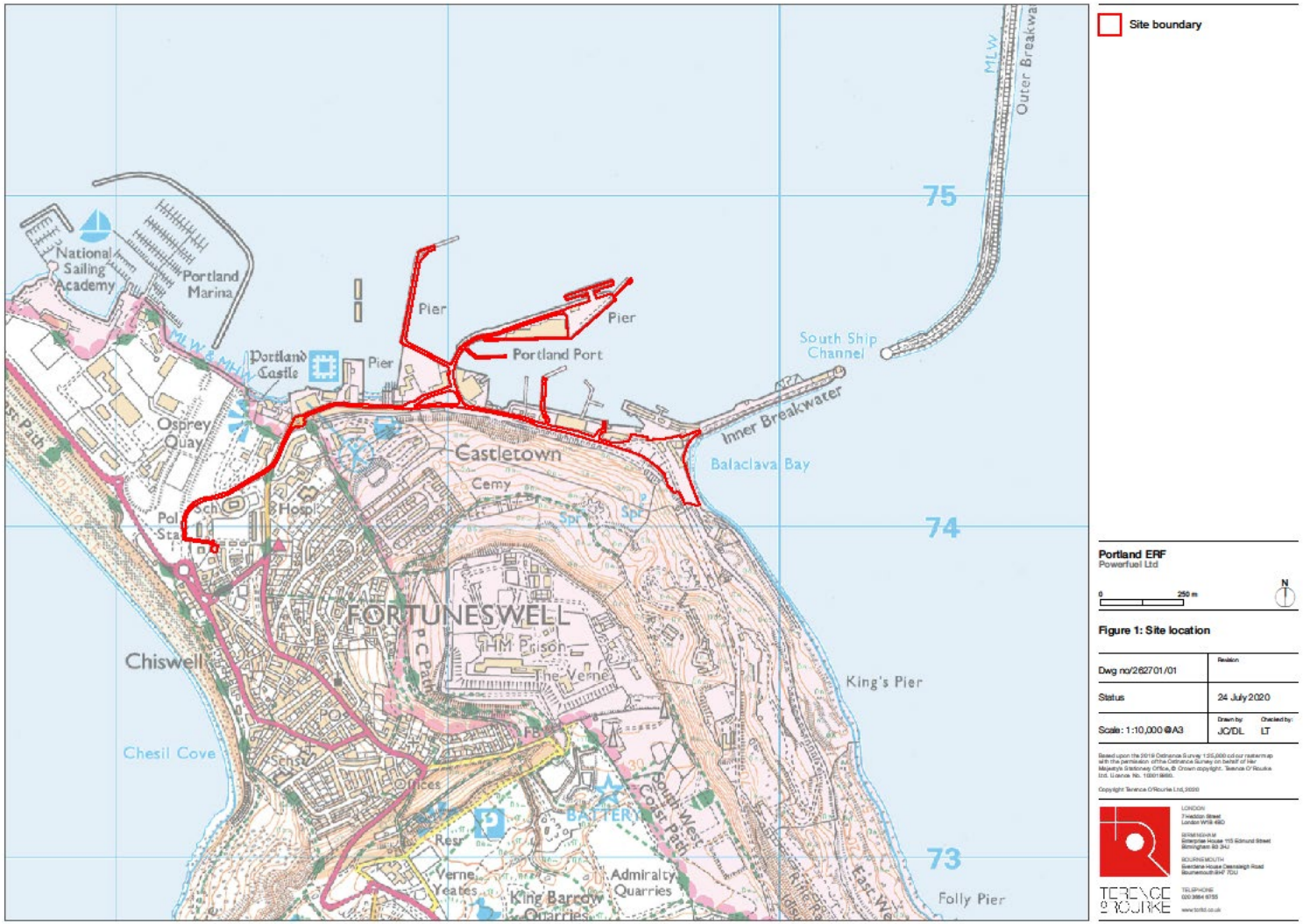


Figure 3.2 Site Location Plan

3.1.2 The Proposed Project

This section provides a brief description of the application site and surrounding area, outlines the development proposals and provides construction and post-construction information. More detailed information can be found in Chapter 2 of the ES.

The proposed plant consists of the following: waste reception, fuel delivery, boiler, flue gas treatment, flue stack, residue handling systems, steam turbine, heat take-off for district heating, primary substation and ancillary equipment. It has been designed to treat 183,000 tonnes of refuse derived fuel (RDF) per year, with a 10% design tolerance to treat up to 202,000 tonnes should this be necessary in response to changes in calorific value, in order to maintain the efficiency of the plant. It should be noted that, for this reason, while the nominal capacity is 183,000 tonnes per year, the EIA has been based on a maximum throughput of 202,000 tonnes per year.

The waste reception area will comprise areas for baled RDF and loose RDF. The area for bales will be sized to store a full cargo delivered by sea. Fuel will be moved from the waste pit into the main boiler bunker by a waste feed crane and grab, which will also feed the boiler feed hopper with waste from the bunker. The boiler will consist of a grate, furnace (primary combustion chamber), auxiliary burners fuelled by a fuel oil such as kerosene and a high temperature secondary combustion zone. The 80 m high stack will be situated approximately 10 m to the north of the building and will be painted battleship grey to minimise visibility. The height of the stack was determined following emissions modelling. The stack will have an outside diameter of approximately 2 m. It has been structurally designed to meet all predicted climatic conditions and will be suitably protected from lightning strike. Steam will be delivered to a steam turbine that generates approximately 18.1 MW of electricity. Approximately 15.2 MW of this will be available for export to the local grid, with the remainder used within the plant. Heat will be recovered from the flue gases by means of a water tube boiler integral with the furnace

The ERF will export power to the national grid under conditions imposed by an export agreement. The cable route to the electricity substation will run from the transformer compound, through the port along Main Road and out of the port along Castletown and Lerret Road. It will then run through the car park of the Victoria Park workshops and connect to the electricity substation. The process will be overseen by SSE, who will adopt the cables in due course. Cables will also be provided to the berths at Queens Pier and Coaling Pier to allow the provision of power to moored ships. Up to 12 MW of power will be available for berthed ships, depending on requirements, although the maximum demand is only likely to be reached when a large cruise ship is docked.

Emissions from the stack will be continuously monitored using a continuous emission monitoring system (CEMS) for the following pollutants:

- Particulates;
- Sulphur dioxide;
- Hydrogen chloride;
- Carbon monoxide;
- Nitrogen oxides;
- Ammonia; and
- Volatile organic compounds (VOCs), expressed as total organic carbon.

3.1.2.1 Hours of Operation

The ERF will operate 24 hours a day, seven days a week, with deliveries at any time, although there will be periods of annual maintenance when RDF processing is reduced. It is estimated that the facility will operate for up to 8,000 hours per year.

It is envisaged that between 30 and 35 staff will be employed directly on site and the ERF will operate in a three-shift pattern of eight-hour shifts. The assessments have been based on the appropriate worst-case assumption of staffing numbers. Working hours, shift patterns and rotas will be set to meet the needs of the plant and will be regularly reviewed with members of each team to ensure optimum working conditions are maintained.

The standard working hours for construction activities will be from 07:00 to 19:00 Mondays to Fridays and 08:00 to 14:00 on Saturdays. There will be no noisy working outside these hours (including Sundays and Bank Holidays), other than special works (such as concrete pours, which need to be continuous), which will be subject to prior agreement with Dorset Council.

3.1.2.2 Movements

The plant will require an average of 544 tonnes of RDF per day for continuous operation, when processing 22.7 tonnes per hour, although this will vary according to the calorific content of the RDF up to an estimated 606 tonnes per day. In order to provide a worst-case estimate of vehicle deliveries, it has been assumed that the RDF would arrive loose in a covered walking floor HGV wagon carrying 24 tonnes per vehicle.

If all the waste fuel was delivered by road, 25 deliveries of RDF would need to occur per day, with a further 10 HGVs removing ash and one HGV providing consumables, giving a total of 36 HGV trips each way (72 HGV movements in total) if all of the RDF was delivered by road.

To allow for variations in the total amount of RDF required per day, and therefore ensure a realistic worst-case assessment, the EIA has been based on a total of 40 HGV trips each way (80 HGV movements in total). There will also be an estimated 19 staff vehicle trips each way per day (38 vehicle movements in total).

It is envisaged that RDF delivered to the site by sea will be transported in ships with a 2,500-tonne payload. If all the waste was delivered by sea, in the worst-case assessment scenario of potential shipping impacts, 81 deliveries by ship would be required per year. The exact routes of the shipping deliveries will depend on the source of the RDF, but it is envisaged at this stage that a proportion of the existing RDF deliveries passing through the English Channel will be diverted to the proposed ERF.

3.1.2.3 Site Access

All vehicles will access the site through the main vehicular entrance to Portland Port, from Castletown. Access will be controlled via the Port's existing gatehouse. Vehicles will use the Port's existing road system to reach the site via the Castletown and Dock Road one-way system and Main Road.

A one-way system for HGVs will operate within the site. HGVs delivering RDF will enter the site from Main Road in the north, pass through the weighbridge, pass along Canteen Road and through a raised arm barrier that will be used to prevent unauthorised access, and travel southwards between the ERF and office buildings to the new road adjacent to Balaclava Road. Once unloaded, all RDF delivery vehicles will exit the building onto Incline Road through a further set of roller shutter doors on the building's western elevation. They will leave the site using Incline Road, passing through the weighbridge again on the way out.

HGVs delivering process materials or removing residues will circulate clockwise on the one-way system around the ERF building onto Incline Road and then turn right into the service yard to the west of the building. On arrival, the gated access will be opened by a site operative and the vehicle will manoeuvre to the appropriate silo or collection point. Vehicles will pass through the service yard and exit back onto Incline Road at the yard's northern end. Prior to leaving the port, all delivery and collection vehicles will be re-weighed at the weighbridge.

Deliveries of RDF by ship will be offloaded at the berth on the Inner Breakwater, to the north east of the site, and brought into the site by HGV along Inner Breakwater Road and Old Depot Road, joining

the main flow of traffic on Main Road and then entering the site. The HGVs will then follow the same delivery protocol as those bringing RDF in by land, before recirculating back around to the Inner Breakwater to reload.

3.1.2.4 Construction Activities

The total site preparation and construction programme is expected to last for approximately 30 months (early to mid-2021 to late 2023), with 24 months of construction and six months for cold and hot commissioning.

The 24-month construction period will consist of site preparation (including set-up of contractor's compound, preparing lay-down areas and site security), civil works (including site levelling, foundations, drainage and underground utilities and services), delivery and installation of large plant items (including boiler, steam turbine and air cooled condensers), construction of building structure, installation of plant and equipment, building fabric construction, and external and soft hard finishes.

The six-month commissioning period will include testing and commissioning of systems (cold testing), setting to work and commissioning of complete process (hot testing) and a plant proving test. It is anticipated that any excavation arisings that cannot be re-used on the site will be transferred to another location within the port to minimise construction traffic movements. Following the construction of the principal plant and building frames, there will be several months of mechanical and electrical installation, which typically includes small-scale ductwork, piping and wiring, as well as large-scale plant items.

3.1.2.5 Security

Where the building does not form the site boundary, a boundary fence for the ERF will provide perimeter security. This will be a 2.4 m high palisade fence and will extend around the outer perimeter of the site to prevent unauthorised access to the facilities. The fence will merge into the building and the exposed building will have Armco protective barriers.

Vehicle access points into the building will be electrically operated and will remain closed except during vehicle access. Pedestrian access will have automatic closing mechanisms and, if on the site perimeter, access control. Vehicle access into the site boundary will be controlled by electrically operated barriers. Vehicle egress will be controlled with traffic management systems, in addition to electrically operated barriers.

Supervised CCTV will monitor the site perimeter and entrances. Black infra-red will be used for night-time vision to avoid interference with wildlife.

3.1.2.6 Employment

The number of people employed on site at any one time will vary considerably but, based on experience of similar projects elsewhere, it is estimated that up to 300 people will be employed on site during the 30-month construction process. During operation, between 30 and 35 full time equivalent (FTE) staff will be employed directly on site. Local employment will be prioritised wherever possible.

3.1.2.7 Landscaping

Small areas of landscape planting will be created around the weighbridge and parking area in the north west of the site, to the north of the main ERF building, to the north, east and south of the administration building, and around the parking area in the north east of the site. These will incorporate the proposed landscaping to the north of the buildings and the north eastern car park, which will comprise of stone-filled gabion sides. The landscape planting will create a range of habitats, including:

- Bare sand / shingle / pebble / boulder habitat, planted with native maritime species;
- open mosaic habitat; and

- gabions filled with Portland stone and planting substrate.

3.2 The Project Profile

A summary of the features of the Proposed Development and their possible influence on health determinants is presented in Table 3.1. At this stage of the assessment, no conclusions are drawn on the likely impacts.

Table 3.1 Project Profile and Health Pathways

Project Feature	Health Pathway	Health Determinant	Potential Health Outcome or Impact
Construction			
On site construction activities	Dust from construction activity Noise from on-site vehicles, equipment and activities Emissions from construction equipment	Physical Environment Living Environment	Nuisance and annoyance due to dust deposition Decreased satisfaction with area Decreased wellbeing Decreased quality of life Increased respiratory diseases short and long term Increased cardio-vascular diseases
Delivery of construction material	Decreased air quality from road traffic emissions and on site vehicles. HGV movements on roads	Physical Environment Living Environment	Increased respiratory diseases short and long term Increased cardio-vascular diseases Accidents and injury Death due to accidents
Site Safety	Trespass onto site	Living Environment	Accidents and injury Death due to accidents

Visual impacts	Visual intrusion upon landscape, from construction activities	Living Environment	Decreased wellbeing Decreased satisfaction with area Stress/anxiety
Workforce	Employment opportunities Demand for materials and capital equipment	Economic effect Social Capital	Procurement of goods and services from local area Increased income to employees Employment
Presence of the Proposed Project	Changes to perception of place / desirability of place Saleability of housing	Social capital Living Environment	Mental health/stress Quality of life Economic issues
Operation			
Delivery of waste	HGV movements	Living Environment	Annoyance and sleep disturbance Increased risk of accidents and injury Death due to accidents
Workforce	Employment opportunities both direct and indirect Procurement of goods Worker movements to site	Economic effect Social capital	Improved incomes for those in employment Improved quality of life Long term health benefits associated with being employed
Presence of The Proposed Project	Reduction in housing value Noise from facility	Living environment Social capital	Mental health/stress Economic issues

	Change to quality of life Control over own environment		Annoyance and sleep disturbance Increase/decrease quality of life
Visual Impacts	Lighting regime Visual intrusion upon landscape	Living environment	Annoyance and sleep disturbance Decreased wellbeing Decreased satisfaction with area Stress/anxiety
Site Safety	Emergency accidents (i.e. boiler blows up) Trespass onto site	Living environment	Stress/anxiety Accidents and injury Death due to accidents
Emissions to air	Increased air quality due to stack emissions and traffic movements	Physical Environment Living Environment	Increased incidence of respiratory/cardiovascular disease Chronic effects through ingested or inhaled pollutants

4. COMMUNITY PROFILE

4.1 Overview

Assessing the profile of the community is an important component of a HIA, as it helps in developing an understanding of how those communities may be susceptible to potential health impacts and benefits arising from the Proposed Project. There is evidence to suggest that community characteristics such as ethnicity, deprivation and social and demographic structures can influence how susceptible a population is to external changes. Analysing the profile of a community can also help identify sensitive people and vulnerable communities that may be present and how the potential impacts from the Proposed Project may affect them disproportionately.

The community profile is also useful in highlighting 'hot spot' areas of high inequality which may be more susceptible to health impacts and benefits. Mapping the areas where there is existing poor health is therefore a crucial component of the community profile.

4.2 Population

4.2.1 Population density

The area of Weymouth and Portland where the Proposed Project is located had a total population of approximately 65,865, according to ONS 2018 population estimates[8]. Off this, an estimated 19% lived on the Isle of Portland. In the wider county area of Dorset, the population was estimated at 426,516 for 2018. Therefore, Weymouth and Portland account for about 15% of the total. The population density[9] for the area is 1, 511 inhabitants per km^2. This is much higher than the national average of 259 inhabitants per km^2 an$_d$ the county of Dorset, which has a relatively low population density of 291 inhabitants per km^2. The population density is highest around Westham, Melcombe Regis, Radipole and Wyke Regis[10].

4.2.2 Age

In Weymouth and Portland, the highest proportion of the population is aged 25 to 49 (27%), followed by 65+ (25%), and 50 to 64 year olds (22%). In Dorset, the highest proportion of the population is 65+ (29%), followed by 25 to 49 year olds (25%) and 50 to 64 year olds (22%).

The proportion of residents within the area in the age groups between 0-44 years is statistically lower than the national average, reflecting an overall older demographic than the UK as a whole, but still younger than Dorset as a whole. The median age of residents in the Weymouth and Portland area is 44 years old, which is lower than the average for Dorset, at 47 years, but still higher than the national average of 40 years.

Furthermore, the proportion of young people (16-24) in 2018 was 9% (5,815). This proportion is falling within the Weymouth and Portland area faster than in Dorset, with a 27.1% decrease between 1991 and 2018in Weymouth and Portland, compared to 10.8% in Dorset. This is a greater proportion than in England as whole, which had a change of only 3.4% over the same period.

The population aged 25 to 49 has also seen a significant decrease in Weymouth and Portland, of 16.1%, which is more than double than that for Dorset, which saw a 7.6% decrease. By contrast, in England as a whole there was increase of 8.6% for the same age group. Of the total population, 38,461 were aged between 16 to 64, which is deemed as the 'Working Age Population'.

[8] ONS Population estimates - local authority based by single year of age, NOMIS Official Labour Market Statistics: https://bit.ly/2CoH0IT

[9] AdminStat 2017. Map, analysis and statistics about the resident population. Retrieved from: https://bit.ly/3l9tzhc

[10] Public Health Dorset 2016. Appendix R – Weymouth & Portland Locality Overview. Retreived from: https://bit.ly/3aLOfXX

4.2.3 Gender

The Weymouth and Portland area has a slightly higher proportion of females than males. The full breakdown, as well as comparators to wider area of Dorset Council, and England, can be seen in Table 4.1.

Table 4.1 Breakdown of Gender

	Weymouth & Portland (%)	Dorset Council (%)	England (%)
All Males	49.6	48.9	49.4
All Females	50.4	51.1	50.6

Source: ONS Population estimates - local authority based by single year of age, NOMIS Official Labour Market Statistics: https://bit.ly/2CoH0IT

4.2.4 Ethnicity

The majority of the population of Weymouth and Portland self-identify as White British, with around 2.5% of the population identifying as belonging to an ethnic minority group. This is a much smaller proportion that for the population of England as a whole, where ethnic minorities represent around 15% of the population.

4.2.5 Religion

The majority of the population of Weymouth and Portland identify as Christian (61.0%), which is in keeping with the population of England as a whole. The proportion of those identifying as having no religion is higher than the national average, at just under 30%. Conversely, the proportion of the locality's population whose religion is either Buddhist, Hindu, Jewish, Muslim or Sikh is lower than the national average, as shown in Table 4.2.

Table 4.2 Breakdown of Religions

Religion	Weymouth & Portland (%)	England (%)
Christian	61.0	59.8
Buddhist	0.4	0.5
Hindu	0.1	1.5
Jewish	0.1	0.5
Muslim	0.5	5
Sikh	0.1	0.8
Other religion	0.7	0.4
No religion	29.3	24.7
Not stated	7.9	7.2

4.3 Education, Skills and Training

The total population of Weymouth and Portland aged 16 and over was 54,306 people and the breakdown of qualification level per proportion of population aged 16-64, is set out in Table 4.3. Residents in the area have significantly lower levels of attainment of Level 4 and beyond qualifications than the national average, and above average for Level 1 and Level 2 qualifications.

Table 4.3 Qualification Level in Weymouth & Portland, 2019

Qualification Level	Weymouth and Portland	Dorset	England
No qualifications	7.6%	4.5%	7.5%
Level 1 qualifications	16.7%	13.4%	10.1%
Level 2 qualifications	17.3%	15.1%	15.9%
Level 3 qualifications	21.4%	21%	17.1%
Level 4 qualifications and above	27.7%	36.4%	40%
Other qualifications	2.5%	5.3%	6.7%
Total			

Source: NOMIS, 201911

4.4 Employment and Economic activity

4.4.1 Economic activity and labour supply

The Annual Population Survey for 2019 provides data on Economic Activity Rate, which refers to those people who are economically active, expressed as a percentage of the population. According to the survey, 81.2% of Weymouth and Portland's population aged 16-64 were economically active. The rate since 2004 has seen some volatility. Between 2004 and 2009, the level of economic activity decreased, with the lowest point being in 2009 at 67.1%. The level then increased through until 2014. Between 2012 and 2014, Weymouth and Portland had its highest economic activity rate in since 2004, ranging between 82.7% and 84.6%.

In terms of Employment Rate[12], in 2019, there were 78.6% of the population in employment. This rate is higher than in Dorset and England, but lower than the rate for the South West Region (79.2%). Weymouth and Portland had the lowest employment rate in 2009 (61.2%) and 2016 (62.2%). In terms of unemployment Rate[13], in 2019, 3.2% (900 people) of Weymouth and Portland's population aged 16-25 were unemployed. This is the same rate as the South West region as a whole, higher than Dorset (2.6%) but lower than England (4.0%). Weymouth and Portland have seen a decrease in their unemployment rate since 2004 (5.3%) with the highest unemployment rate being 12.5% in 2013. Unemployment is highest in Melcombe Regis and Weymouth East (an area within the Weymouth and Portland locality).

Table 4.4 presents the economic activity, employment rates and unemployment rates for Weymouth and Portland, as well as Dorset and England as comparable geographies for 2019.

[11] Information was updated from 2011 to 2019 data. Comparable information regarding apprenticeships was not publicly available so total is less than 100%

[12] The number of people in employment expressed as a percentage of all people aged 16-64

[13] The number of people unemployed expressed as a percentage of all people aged 16-64

Table 4.4 Economically Active and Employment in Weymouth & Portland, Dorset and England

2019	Weymouth & Portland	Dorset	England
Economic activity rate (%)	81.2	78.3	79.2
Employment rate (%)	78.6	76.5	76.0
Unemployment rate (%)	3.2%	2.6%	4.0%

Source: ONS Annual Population Survey 2019, NOMIS Official Labour Market Statistics: https://bit.ly/2XVO6vX

4.4.2 Employment by occupation type

The Business Register and Employment Survey (BRES) presents the employment figures by industrial sector. These data are workplace-based rather than residence-based. They describe the jobs in the area, rather than the jobs being held by residents of the area. Table 4.5 presents the breakdown of employment by industrial sector for Weymouth and Portland and the comparable areas.

In Weymouth and Portland, there is a dependency on the Accommodation & Food services, Health and Retail sectors for the majority (52.8%) of employment. This is higher than in the comparable areas, where these sectors account for 36.6% of employment in Dorset, 34.2% in the South West region and 29.6% in England. The Education sector is also important for Weymouth and Portland, as well as the wider areas, accounting for 8.7-9.7% of employment. During the recent COVID-19 crisis, Weymouth and Portland may have been hit disproportionately hard, due to the dependence on the Accommodation & Food services and Retail sectors.

Table 4.5 Employment by Industrial Sector (%) 2018

Industry	Weymouth and Portland	Dorset	South West	England
1 : Agriculture, forestry & fishing (A)	0.1	2.1	1.0	0.6
2 : Mining, quarrying & utilities (B,D and E)	1.1	1.0	1.5	1.2
3 : Manufacturing (C)	4.4	10.2	8.5	8.0
4 : Construction (F)	4.4	6.6	5.3	4.6
5 : Motor trades (Part G)	0.8	1.8	2.1	1.8
6 : Wholesale (Part G)	1.2	3.6	3.9	4.2
7 : Retail (Part G)	13.9	10.2	9.7	9.4
8 : Transport & storage (incl. postal) (H)	2.8	2.4	3.9	4.9
9 : Accommodation & food services (I)	22.2	11.4	9.7	7.5
10 : Information & communication (J)	1.2	2.4	3.4	4.4
11 : Financial & insurance (K)	0.8	0.9	2.8	3.5
12 : Property (L)	1.2	1.8	1.8	1.7
13 : Professional, scientific & technical (M)	5.6	7.8	7.2	9.0
14 : Business administration & support services (N)	2.8	3.6	6.6	9.2
15 : Public administration & defence (O)	5.0	4.8	4.4	4.0
16 : Education (P)	9.7	9.0	8.7	8.9
17 : Health (Q)	16.7	15.0	14.8	12.7
18 : Arts, entertainment, recreation & other services (R,S,T and U)	6.9	6.0	4.6	4.5

Source: ONS Business Register and Employment Survey 2018, https://bit.ly/3apL0Fp

A person's occupation as described relates to their main job and is derived from either their job title or details of the activities involved in their job. Employment by occupation type in Weymouth and Portland and the comparable areas is presented in Table 4.6. The data are residence-based, and so they show the occupation types held by people who live in the areas in question, not the occupation job types that are physically located in the area.

Table 4.6 Employment by Occupation (%) 2019

Occupation	Weymouth and Portland	Dorset	England
1. Managers, directors and senior officials	14.7	15.2	11.7
2. Professional occupations	23.9	19.9	21.5
3. Associate professional and technical occupations	8.9	13.9	14.7
4. Administrative and secretarial occupations	4.8	9.1	9.6
5. Skilled trades occupations	13.1	14.1	9.9
6. Caring, leisure and other service occupations	10.5	11.8	8.9
7. Sales and customer service occupations	5.5	3.8	7.0
8. Process plant and machine operatives	5.5	3.7	6.2
9. Elementary occupations	13.1	8.5	10.2

Source: ONS Annual Population Survey 2019, NOMIS Official Labour Market Statistics: https://bit.ly/2XVO6vX

This distribution is important, as employment and economic activity can have a significant impact on health. For example, people working in routine occupations were more than twice as likely to report a disability compared with those working in higher managerial and professional occupations both for males (27.1%, compared with 13.3%) and females (30.3%, compared with 15.0%)[14].

4.4.3 Earnings/income

The Office of National Statistics surveys annual hours and earnings. Table 4.7 presents the average gross earnings for full-time employees between 2012 to 2019. The data set indicates that whilst there has been an incremental increase in average annual gross earnings at the UK, England regional and Dorset levels, there remains fluctuation in earnings in the Weymouth and Portland area. Drops in annual earnings, relative to the previous year, are evident in 2015 and 2017, the last year for which information is available at the local level.

Table 4.7 Average Annual Gross Earnings (£)

	2012	2013	2014	2015	2016	2017	2018	2019
Weymouth & Portland	25,216	26,298	28,176	26,456	27,755	27,180	-	-
Dorset	27,381	27,759	30,287	28,674	29,236	30,042	32,088	32,989
South West Region	29,058	30,016	30,163	30,591	31,177	31,645	32,848	33,543
England	33,529	33,967	34,214	34,231	35,053	36,076	37,313	38,206
United Kingdom	32,814	33,283	33,516	33,644	34,447	35,398	36,593	37,428

Source: ONS – Annual survey of hours and earnings

[14] https://www.dorsetsvision.nhs.uk/wp-content/uploads/2017/11/CSR-EIA.pdf

According to the ONS Annual Survey of Hours and Earnings, gross weekly full-time earnings for residents were £502.50 and for people working in the area, but not necessarily living there, the gross weekly full time earnings were £479.90. In comparison, the median gross weekly earnings for full time employees in the UK for the same time period were £585.

4.4.4 Local businesses

In 2019, the ONS published UK business statistics including activity, size and location for 2019. There was a total of 2,160 businesses in Weymouth and Portland. The breakdown per sector is shown in Table 4.8 and the business size bands are given in Table 4.9.

Table 4.8 Business in Weymouth and Portland by Sector

Sector	Total	Percentage
Wholesale, retail and repair	375	17.36%
Construction	295	13.66%
Accommodation and food services	295	13.66%
Professional, scientific and technical activities	225	10.42%
Human health and social work activities	160	7.41%
Administrative and support service activities	130	6.02%
Manufacturing	100	4.63%
Arts, entertainment and recreation	95	4.40%
Transportation and storage	80	3.70%
Information and communications	75	3.47%
Real estate activities	65	3.01%
Agriculture, forestry and fishing	55	2.55%
Education	50	2.31%
Financial and insurance activities	30	1.39%
Public administration and defence; compulsory social security	15	0.69%
Water, sewerage and waste management	10	0.46%
Total businesses	**2,160**	**-**

Source: UK Business, Activity, Size and Location (2019), ONS

Table 4.9 Business Size Bands

Size Band	Total	Percentage
Micro (0 to 9 employees)	1,795	83.10%
Small (10 to 49 employees)	305	14.10%
Medium (50 to 249 employees)	50	2.30%
Large (250+ employees)	10	0.50%
Total businesses	**2,160**	**-**

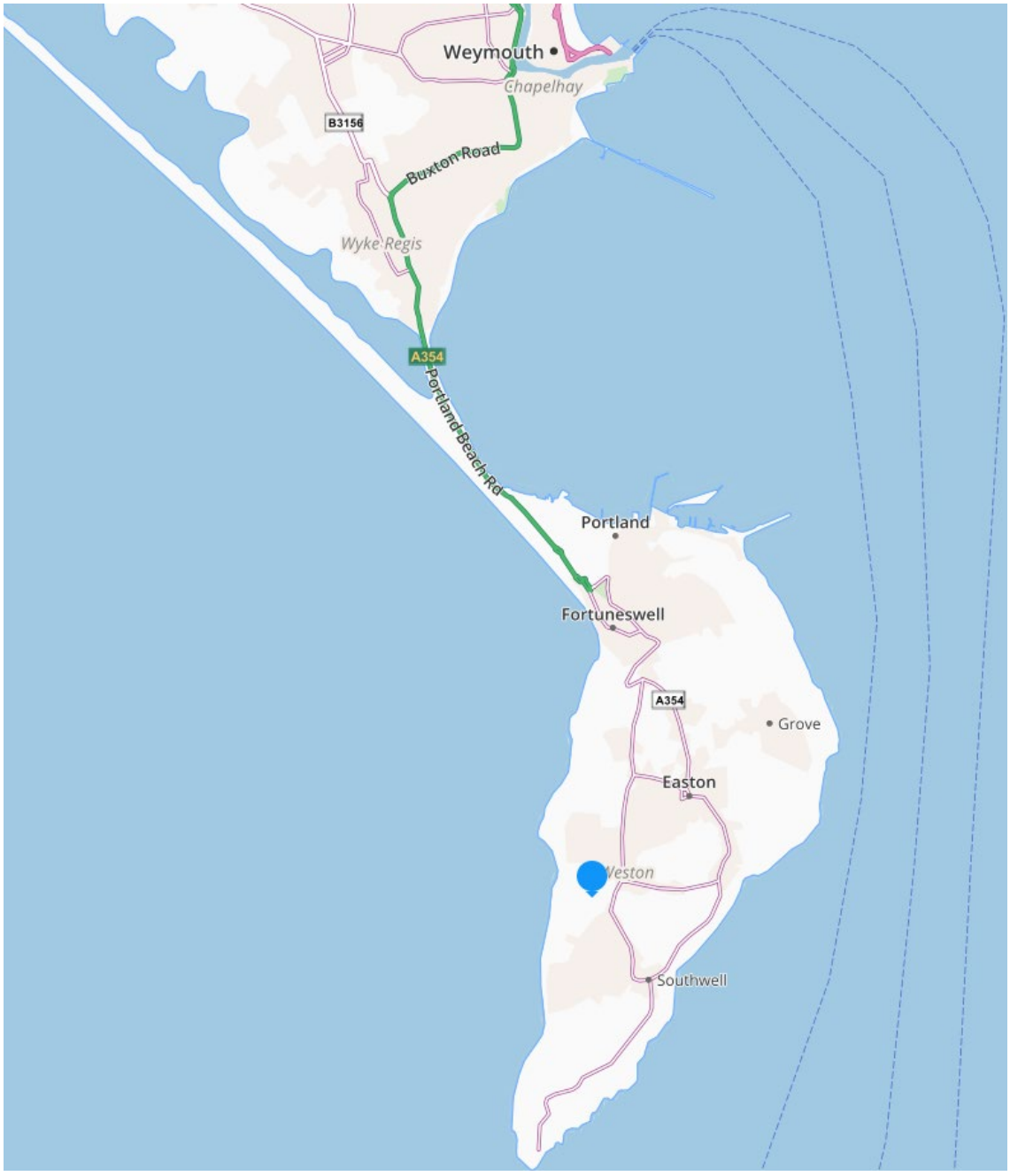
Source: UK Business, Activity, Size and Location (2019), ONS

4.5 Transport

4.5.1 Access and connectivity

The only road access to Portland is via the A354 (see Figure 4.1). This crosses Ferry Bridge and connects to Weymouth and the wider road network at the A35 trunk road in Dorchester. It runs from Easton, splitting into a northbound section through Chiswell and a southbound section through Fortuneswell, then along Chesil Beach and across a bridge to the mainland in Wyke Regis. Formerly, a branch line railway, connecting to the South West Main Line near Weymouth railway station, also crossed to the island. The corridor is now a cycle path connecting Fortuneswell with Weymouth and a wider network of traffic-free cycle paths. There is a short airstrip and heliport in Osprey Quay, just north of Fortuneswell.

Figure 4.1 Connectivity Map of Weymouth and Portland



Source: Michelin. Viamichilen maps: Accessed 18 August 2020. Retrieved from: https://bit.ly/34bibeM

4.5.2 Car ownership

The level of car ownership in the Weymouth and Portland area is approximately 75%, with only a quarter of the population having no car or van ownership in their household. The majority (45%) have access to one car or van and roughly a quarter (24.7%) have no car or van access in the household.[15] This is slightly above the average for the wider South West region, where 18% have no car or van ownership. However, it is similar to the national average, where 26% of households have no cars or vans in household.

4.5.3 Public transport

With regard to the availability of public transport, FirstGroup runs local buses with services to Weymouth. Weymouth is the hub for south Dorset bus routes, with services to Dorchester and local villages. Weymouth is connected to towns and villages along the Jurassic Coast by the Jurassic Coast Bus service, which runs for 142 kilometres (88 miles) from Exeter to Poole, through Sidford, Beer, Seaton, Lyme Regis, Charmouth, Bridport, Abbotsbury, Weymouth, Wool, and Wareham. Bus services are provided by FirstGroup and South West Coaches on Portland. There are regular buses (generally half-hourly in the summer, hourly in winter) from Weymouth to Portland Bill, as well as the towns and villages on Portland. The main service is Route 1 running between Weymouth and Southwell, with two services per hour calling at the stops approximately 1km from the site, adjacent to the Victoria Square Roundabout on the A354 Portland Beach Road.

The nearest train station is Weymouth. Trains run directly from Weymouth to London, Southampton and Bristol, and ferries to the French port of St Mal and the Channel Islands of Guernsey and Jersey. There are three taxi companies serving the area.

4.6 Housing

4.6.1 Housing tenure

There were 31,979 households in Weymouth and Portland according to 2016/17 Council Records. 3.2% of all housing is second homes, and 0.8% of these are classed as being long term empty homes[16]. The breakdown of tenure types was approximately 27,570 for Private Sector, 4,330 for Private Registered Provider and 10 for Other Public Sector. In 2016-2017, 160 dwellings were social housing lettings.

4.6.2 Housing type

The proportion of housing by type in the Weymouth and Portland area are shown in Table 4.10.

[15] Dorset Insight 2011. Area Profile for Weymouth and Portland. Retrieved from: https://bit.ly/31efql0

[16] *2016/2017 Council Tax Records*

Table 4.10 Proportion of housing by type for Weymouth and Portland

Housing Type	Percentage
Detached	22.9%
Semi-Detached	21.2%
Terraced	30.6%
Flats/Maisonettes	24.4%
Mobile Homes/Caravans	1.0%

Source: 2011 Census. Office for National Statistics

4.6.3 House Prices

According to Land Registry records, average house prices in Weymouth and Portland are lower than those in Dorset and the South West region for all property types (Table 4.11). In 2019, the overall average house price in Weymouth and Portland was 61% of the county average and 67% of the regional average. House prices in Weymouth and Portland are, on average, 11 times higher than average wage levels. Overall, the affordability of housing is a major issue for the local population. Around 25% of households across the 'housing market area' cannot afford housing at current market prices/rents without the need for some form of subsidy.

Table 4.11 Average house prices 2019

Area	Detached	Semi-detached	Terraced	Flat / maisonette	Overall average
Weymouth and Portland	£371,413	£252,498	£192,342	£139,750	£222,881
Dorset	£434,297	£281,525	£227,312	£175,740	£295,339
South West	£396,401	£259,501	£211,769	£166,089	£255,222
England	£373,308	£230,119	£197,729	£222,274	£244,882

Source: HM Land Registry 2019. UK House Price Index, data downloads May 2019. Retrieved from: https://bit.ly/3ameGDw

4.7 Crime

According to Dorset Police Crime Data, the area of Weymouth and Portland experiences more crime compared with surrounding areas and with the wider Dorset area, adjusted for population size. The total number of crime incidents per 1,000 people was 69.4 for Weymouth and Portland in 2015/16. In comparison, the incident rate was 40.8 for the Dorset DCC area. For England and Wales, the incident rate is 67.8 crimes per 1000 people.

A breakdown of the types of crime, again per 1,000 people, along with a comparison for other portions of the population, can be seen in Table 4.12. This shows that the most common form of crime is violence against a person, followed by theft and then criminal damage. This is in keeping with trends for surrounding areas, which have also been included in the table.

Table 4.12 Types of crime per 1,000 pop for Weymouth & Portland

Main Crime Groups	Weymouth & Portland	West Dorset	East Dorset	Dorset County	South West Region
Burglary Other	3	4	3	4	3
Criminal Damage	12	7	4	7	8
Drug Offences	4	2	1	2	2
Dwelling Burglary	2	1	1	1	2
Other Offences	1	0	0	0	
Possession of Weapons	1	0	0	0	0
Public Order	3	1	1	1	3
Robbery	0	0	0	0	0
Sexual Offences	2	1	1	1	2
Theft	15	10	7	10	
Theft from Vehicle	2	2	2	2	
Theft of Vehicle	1	1	0	1	
Violence Against the Person	24	10	7	11	15

Source: Dorset Police Crime Data, 2015/16

4.8 Health

4.8.1 Overall health indicators

The majority of residents of Weymouth and Portland self-rated their health as either ‘very good’ (42.3%) or ‘good’ (36.7%). A full breakdown and comparison to other regions is provided in Table 4.13. Whilst the level of self-identification of very good health is discernibly lower than the national average, the aggregate of those with good and very good self-rated health in the area is broadly consistent with the national average, mirroring a broad consistency at the sub-optimal levels of ‘fair’, ‘bad’ and ‘very bad’ rating of health.

Table 4.13 Self-rated health for individuals in Weymouth and Portland

Quality of health	Weymouth and Portland	South West	England
Very good	42.30%	46.90%	47.20%
Good	36.70%	34.60%	34.20%
Fair	15.00%	13.40%	13.10%
Bad	4.50%	4.00%	4.20%
Very bad	1.40%	1.10%	1.20%

Source: ONS 2011 Census Data

The average life expectancy at birth in Weymouth and Portland is 78.5 years for men and 83.4 for women[17]. This is in keeping with the national average, although slightly lower for men. There is an inequality of life expectancy in the area, with life expectancy being 8.6 years lower for men and 5.2 years lower for women in the most deprived areas than in the least deprived areas. Infant mortality for the Weymouth and Portland area is 2.6 per 1,000 live births which is lower than the national average of 3.9.

4.8.2 Deprivation

The 2019 indices of multiple deprivation provide an indication of the quality of life experienced by the population. The indices measure deprivation against several criteria in lower super output areas (LSOA) and Local Authorities across the country, with 1 being the most deprived and 32,844 the least deprived.

Dorset and Bournemouth, Christchurch & Poole Local Authorities

Local authority districts include lower-tier non-metropolitan districts, London boroughs, unitary authorities and metropolitan districts. At the time of publication, there were 317 local authority districts in England. Using the IMD rank of average summary measure, Dorset local authority ranked 208 in 2015 and 197 in 2019, out of 317, demonstrating an increase in deprivation relative to the other local authorities over that period. Bournemouth, Christchurch & Poole ranked 168 in 2015 and 166 in 2019, out of 317 local authorities, also demonstrating an increase in deprivation relative to other local authorities. The following table (Table 4.14) presents a range of metrics which summarising the average rank for the Indices of Deprivation 2019 at a local authority district level.

Table 4.14 Ranking of the Local Authorities in the 2019 indices of multiple deprivation

	Bournemouth, Christchurch & Poole (E06000058)	Dorset (E06000059)
Overall IMD rank	14,821	13,227
Income	15,899	13,014
Employment	16,279	14,178
Education, skills and training	15,924	16,143
Health and disability	16,022	12,132
Crime	15,058	7,835
Barriers to housing and services	16,742	19,157
Living environment	14,413	13,530

Source: MHCLG English Indices of Deprivation 2019, Local Authority District Summaries: https://bit.ly/31MWcIn

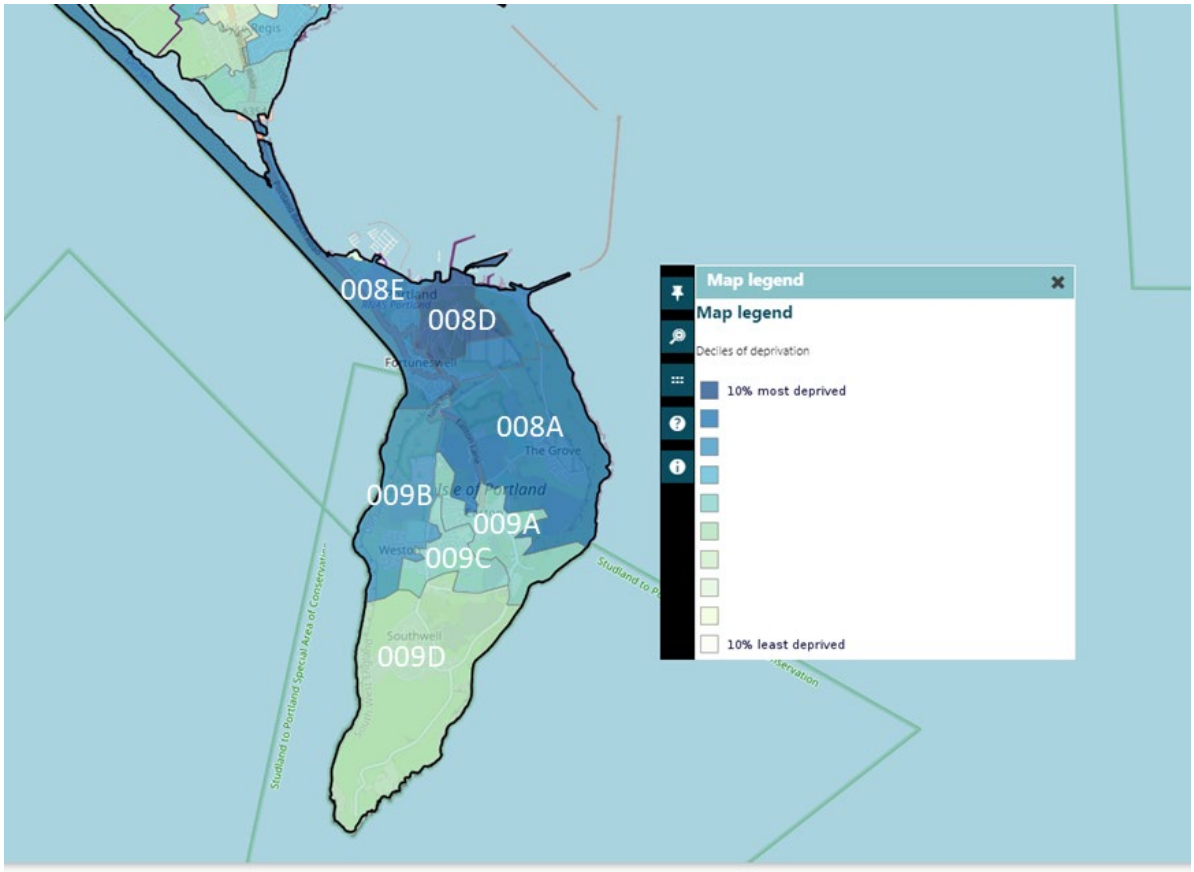
Weymouth and Portland

There are 219 LSOAs in Dorset local authority district (E06000059). Portland as a whole is covered by LSOAs Weymouth and Portland 008A, 008D, 008E and 009A-D, with the site falling within LSOA Weymouth and Portland 008E. Figure 4.2 presents a map taken from the Indices of Deprivation 2019 explorer[18] illustrating the overall IMD rank of the Weymouth and Portland area. The darkest colours show the areas that are within the most deprived 10% and 25% of LSOAs in the country.

[17] https://psnc.org.uk/dorset-lpc/wp-content/uploads/sites/15/2017/07/Health-Profiles-2017-WP.pdf

[18] MHCLG Indices of Deprivation 2019 explorer: https://bit.ly/3ix54II

Figure 4.2 Overall IMD Rank



Source: MHCLG Indices of Deprivation 2019 explorer: https://bit.ly/3ix54II

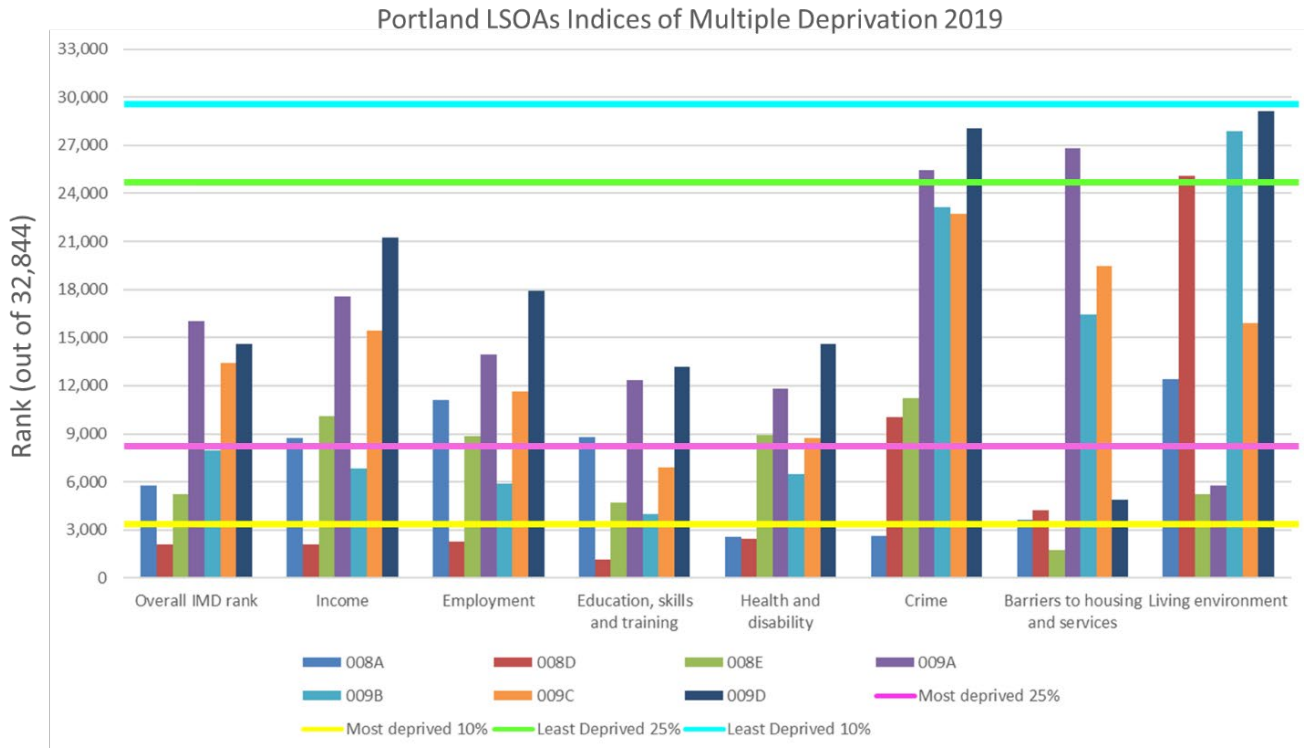
The north of Portland tends to experience higher deprivation than the south, with the four northernmost lower super output areas (LSOAs) ranked within the most deprived 25% of LSOAs in the country. The most deprived LSOA in Portland is ranked within the most deprived 10% of LSOAs in the country for income, employment, education, skills and training, and health and disability (Table 4.15 and Figure 4.3). This relates to approximately 20% of children in the area living in low income families. On the other hand, there are some LSOAs that rank in the least deprived 25% for Living Environment, Crime and Barriers to housing and services, this includes 009D, 009B and 008D.

Table 4.15 Ranking of the LSOAs in the 2019 indices of multiple deprivation

	008A	008D	008E	009A	009B	009C	009D
Overall IMD rank	5,796*	2,073**	5,255*	15,997	7,975*	13,414	14,590
Income	8,729	2,098**	10,116	17,550	6,843*	15,424	21,250
Employment	11,080	2,248**	8,859	13,969	5,896*	11,636	17,951
Education, skills and training	8,799	1,125**	4,700*	12,322	4,019*	6,915*	13,172
Health and disability	2,556**	2,475**	8,939	11,801	6,499*	8,733	14,590
Crime	2,627**	10,020	11,214	25,437	23,127	22,714	28,058
Barriers to housing and services	3,650*	4,219*	1,742**	26,791	16,453	19,471	4,891*
Living environment	12,402	25,084	5,255*	5,793*	27,898	15,877	29,098

*Ranked in the most deprived 25% of LSOAs in the country
**Ranked in the most deprived 10% of LSOAs in the country

Figure 4.3 Ranking of the LSOAs in the 2019 indices of multiple deprivation



Source: MHCLG English Indices of Deprivation 2019: https://bit.ly/31MWcIn

The IMD produces a 'Health Summary' for areas (see Figure 4.4), reflecting a range of indicators for which it collates data and provides a comparator of the local area with the national average. The health summary for Weymouth and Portland is set out below.

Key headlines from the health summary are as follows.

- Under 'Our Communities', there is a variable picture of general health which shows Weymouth and Portland to be in line with the national average for deprivation and children in low income families. GCSE achievement is significantly lower than the national average.
- Children's and Young People's Health is broadly consistent at the local and national area across the range of indicators.
- There is more variance under Adults' Health and Lifestyle, with a key indicator being that excess weight in adults being significantly worse than England average. Smoking prevalence is also worse than the national average.
- Under Disease and Poor Health, the area is significantly worse than the national average for hospital stays for self-harm, recorded diabetes and new sexually transmitted infections.
- Life expectancy and cause of death shows indicators to be broadly in keeping with the national average, with the exception of male life expectancy at birth and suicide rate being significantly worse than the national average.

Figure 4.4 IMD Health Summary

E07000053

Health summary for Weymouth and Portland

The chart below shows how the health of people in this area compares with the rest of England. This area's result for each indicator is shown as a circle. The average rate for England is shown by the black line, which is always at the centre of the chart. The range of results for all local areas in England is shown as a grey bar. A red circle means that this area is significantly worse than England for that indicator; however, a green circle may still indicate an important public health problem.

- Significantly worse than England average
- Not significantly different from England average
- Significantly better than England average
- Not compared

Regional average[€] | England average | England worst | 25th percentile | 75th percentile | England best

Domain		Indicator	Period	Local count	Local value	Eng value	Eng worst	England range	Eng best
Our communities	1	Deprivation score (IMD 2015)	2015	n/a	23.6	21.8	42.0		5.0
	2	Children in low income families (under 16s)	2014	2,185	20.3	20.1	39.2		6.6
	3	Statutory homelessness	2015/16	10	0.3	0.9			
	4	GCSEs achieved	2015/16	309	47.5	57.8	44.8		78.7
	5	Violent crime (violence offences)	2015/16	n/a	11.4	17.2	36.7		4.5
	6	Long term unemployment	2016	81	2.1 ^A20	3.7 ^A20	13.8		0.4
Children's and young people's health	7	Smoking status at time of delivery	2015/16	76	11.7	10.6 $^$	26.0		1.8
	8	Breastfeeding initiation	2014/15	487	72.9	74.3	47.2		92.9
	9	Obese children (Year 6)	2015/16	97	17.0	19.8	28.5		9.4
	10	Admission episodes for alcohol-specific conditions (under 18s)†	2013/14 - 15/16	12	32.6	37.4	121.3		10.5
	11	Under 18 conceptions	2015	27	24.5	20.8	43.8		5.4
Adults' health and lifestyle	12	Smoking prevalence in adults	2016	n/a	20.4	15.5	25.7		4.9
	13	Percentage of physically active adults	2015	n/a	59.0	57.0	44.8		69.8
	14	Excess weight in adults	2013 - 15	n/a	70.1	64.8	76.2		46.5
Disease and poor health	15	Cancer diagnosed at early stage	2015	178	54.1	52.4	39.0		63.1
	16	Hospital stays for self-harm†	2015/16	223	377.0	196.5	635.3		55.7
	17	Hospital stays for alcohol-related harm†	2015/16	393	593.8	647	1,163		374
	18	Recorded diabetes	2014/15	4,099	6.6	6.4	9.2		3.3
	19	Incidence of TB	2013 - 15	9	4.6	12.0	85.6		0.0
	20	New sexually transmitted infections (STI)	2016	676	1716.7	795	3,288		223
	21	Hip fractures in people aged 65 and over†	2015/16	108	694.4	589	820		312
Life expectancy and causes of death	22	Life expectancy at birth (Male)	2013 - 15	n/a	78.5	79.5	74.3		83.4
	23	Life expectancy at birth (Female)	2013 - 15	n/a	83.4	83.1	79.4		86.7
	24	Infant mortality	2013 - 15	5	2.6	3.9	8.2		0.8
	25	Killed and seriously injured on roads	2013 - 15	81	41.5	38.5	103.7		10.4
	26	Suicide rate	2013 - 15	28	17.2	10.1	17.4		5.6
	27	Smoking related deaths	2013 - 15	n/a	n/a	283.5			
	28	Under 75 mortality rate: cardiovascular	2013 - 15	140	69.3	74.6	137.6		43.1
	29	Under 75 mortality rate: cancer	2013 - 15	294	146.1	138.8	194.8		98.6
	30	Excess winter deaths	Aug 2012 - Jul 2015	106	14.9	19.6	36.0		6.9

Indicator notes

1 Index of Multiple Deprivation (IMD) 2015 2 % children (under 16) in low income families 3 Eligible homeless people not in priority need, crude rate per 1,000 households 4 5 A*-C including English & Maths, % pupils at end of key stage 4 resident in local authority 5 Recorded violence against the person crimes, crude rate per 1,000 population 6 Crude rate per 1,000 population aged 16-64 7 % of women who smoke at time of delivery 8 % of all mothers who breastfeed their babies in the first 48hrs after delivery 9 % school children in Year 6 (age 10-11) 10 Persons under 18 admitted to hospital due to alcohol-specific conditions, crude rate per 100,000 population 11 Under-18 conception rate per 1,000 females aged 15 to 17 (crude rate) 12 Current smokers (aged 18 and over), Annual Population Survey 13 % adults (aged 16 and over) achieving at least 150 mins physical activity per week, Active People Survey 14 % adults (aged 16 and over) classified as overweight or obese, Active People Survey 15 Experimental statistics - % of cancers diagnosed at stage 1 or 2 16 Directly age sex standardised rate per 100,000 population 17 Admissions involving an alcohol-related primary diagnosis or an alcohol-related external cause (narrow definition), directly age standardised rate per 100,000 population 18 % people (aged 17 and over) on GP registers with a recorded diagnosis of diabetes 19 Crude rate per 100,000 population 20 All new diagnoses (excluding chlamydia under age 25), crude rate per 100,000 population aged 15 to 64 21 Directly age-sex standardised rate of emergency admissions, per 100,000 population aged 65 and over 22, 23 The average number of years a person would expect to live based on contemporary mortality rates 24 Rate of deaths in infants aged under 1 year per 1,000 live births 25 Rate per 100,000 population 26 Directly age standardised mortality rate from suicide and injury of undetermined intent per 100,000 population (aged 10 and over) 27 Directly age standardised rate per 100,000 population aged 35 and over 28 Directly age standardised rate per 100,000 population aged under 75 29 Directly age standardised rate per 100,000 population aged under 75 30 Ratio of excess winter deaths (observed winter deaths minus expected deaths based on non-winter deaths) to average non-winter deaths (three years)

† Indicator has had methodological changes so is not directly comparable with previously released values. € "Regional" refers to the former government regions.
^A20 Value based on an average of monthly counts $^ There is a data quality issue with this value

If 25% or more of areas have no data then the England range is not displayed.

Please send any enquiries to healthprofiles@phe.gov.uk

Source: Public Health England 2017. Weymouth and Portland District Health Profile. Retrieved from: https://bit.ly/34dt3ZE

4.8.3 Global Burden of Disease

The global burden of disease is an indicator of the impact of a health problem on a given population which helps to predict future health needs. Public Health Dorset's Weymouth and Portland locality profile[19] shows that the top causes of total disability adjusted life years in the Dorset County Council area are as follows.

- Cancers & benign tumours (20%). This is significantly higher than expected for new cancer cases for the Weymouth and Portland Locality compared to England overall.
- Cardiovascular diseases (CVD) (16%). Weymouth and Portland has significantly higher than expected a level of emergency admissions for CVD, compared with the England average.
- Musculoskeletal disorders (MSK) (12%). Again, this is significantly higher than the England average, as one in five people in Weymouth and Portland have a limiting long term illness or disability, which is used as a proxy measure of the impact of MSK.
- Neurological disorders (9%). Around half of these are accounted for by Alzheimers and dementias. Three GP practices within Weymouth and Portland have recorded significantly higher than average levels of dementia, but there is variance within the area.
- Mental Health (6%).
- Chronic respiratory disease (6%). Emergency admissions for chronic obstructive pulmonary disease are significantly lower than the England average.

A study into the global burden of disease in the Weymouth and Portland area for 2020 reported in its key findings that adult depression was significantly higher than the national average for all GP practices within Weymouth and Portland, as was the prevalence of hypertension (high blood pressure).

4.8.4 Respiratory Health

The percentage of the population with Asthma for the area of Dorset is 6.9%[20] This is broadly in line with neighbouring NHS Clinical Commissioning Group areas in the South West region, but is above the average for England, which is 6.0%. Hospital admissions for asthma for children aged 0 to 9 are better than the national average, and for young people (aged 10 to 18) and adults (aged 19 and over), the rate is in line with that for England.

Smoking is a key risk factor in developing chronic respiratory disease. Four GP surgeries in the Weymouth and Portland area report smoking prevalence that is significantly higher than the England average. However, across Weymouth and Portland, smoking prevalence has declined in recent years, in line with national trends.

4.8.5 Road traffic

The number of people per 100,000 people killed and seriously injured on roads in Weymouth and Portland is lower than the surrounding areas, at 41 people per 100,000, but still higher than the national rate, which is 38.5[21].

[19] Public health Dorset 2020. Locality profiles narrative 2020 template: Weymouth and Portland Locality. Retrieved from: https://bit.ly/3jcMGFE

[20] Public Health England, 2018/19. Retrieved at: https://bit.ly/3hbUPt7

[21] Public Health England

4.9 Healthcare Access & Facilities

4.9.1 Healthcare facilities

Healthcare facilities comprise hospitals, clinics, GP surgeries, outpatient care centres, and specialised care centres and provision for physical and mental health and wellbeing. The range of facilities which serve a local area can and do vary significantly, but accessibility to healthcare is recognised as an imperative.

There are six GP facilities within the Weymouth and Portland Locality, following the 2019 closure of the Abbotsbury Road Surgery. The wider Weymouth area is served by five hospitals. The area has a significantly worse performance for hospital and A&E attendances in under 5s (adjusted per 1000 population) and under 15 age groups than the England average. Childhood Immunisation Rates are significantly below the national target level of 95% in all GP practices across Weymouth and Portland.

The proportion of residents that live in in communal establishments[22] is 2.7%, approximately 1,794 individuals[23]. 11.6% of the population report providing unpaid care; 2.8% providing more than 50 hours of unpaid care per work[24]. Around half (52%) of those providing unpaid care nationally said that their health has been affected because of the demands of providing care.

4.9.2 Healthcare access

The NHS Dorset services 'Need for Change' report published in 2016[25] highlighted that within Dorset, there was a need for significant change to healthcare services within the area, and that there were inequalities in access to and delivery of healthcare within the region.

Within the Weymouth and Portland locality, the area of Weymouth was considered to be significantly above average in comparison to the wider Dorset area for a range of criteria used to judge the adequacy of healthcare facilities, including against access, affordability and deliverability. However, the areas of Portland and Westhaven, within the locality, were significantly worse with respect to these three criteria in comparison to both the area of Weymouth, but also the wider Dorset area.

4.10 Physical Environment

The site lies within a regionally important geological and geomorphological site (RIGGS), which covers the whole of the Isle of Portland. There are no national or international environmental designations within the site itself, but several in close proximity (Figure 4.5**).**

The cliffs to the immediate south west of the site form part of the Isle of Portland to Studland Cliffs Special Area of Conservation (SAC) and Isle of Portland Site of Special Scientific Interest (SSSI). There are several other designated nature conservation sites within 2 km of the site. These include the Nicodemus Heights SSSI 590 m to the south, Chesil and The Fleet SAC and SSSI and Chesil Beach and Stennis Ledges Marine Conservation Zone (MCZ) 1.3 km to the west, and Studland to Portland SAC 1.5 km to the south west. There are also several locally designated sites of nature conservation interest (SNCI) to the south and south west of the site (Figure 4.5). The cliffs to the west and south of the site are designated as land of local landscape importance. The nearest nationally designated landscape is the Dorset Area of Outstanding Natural Beauty, 7.3 km to the north.

The Dorset and East Devon Coast World Heritage Site (WHS) wraps around most of the Isle of Portland, but excludes the area of coast in the vicinity of the site (Figure 4.5). Chesil Beach to the north west of the island is also locally designated as heritage coast. There are several scheduled monuments in the vicinity of the site to the south west, including a battery 135 m away, The Verne

[22] Communal establishments include hospitals, care homes, prisons, defence bases, boarding schools and student halls of residents.

[23] ONS 2011 Weymouth and Portland Local Authopirtuy Local Area Report. Retrieved from: https://bit.ly/2PZWJRK

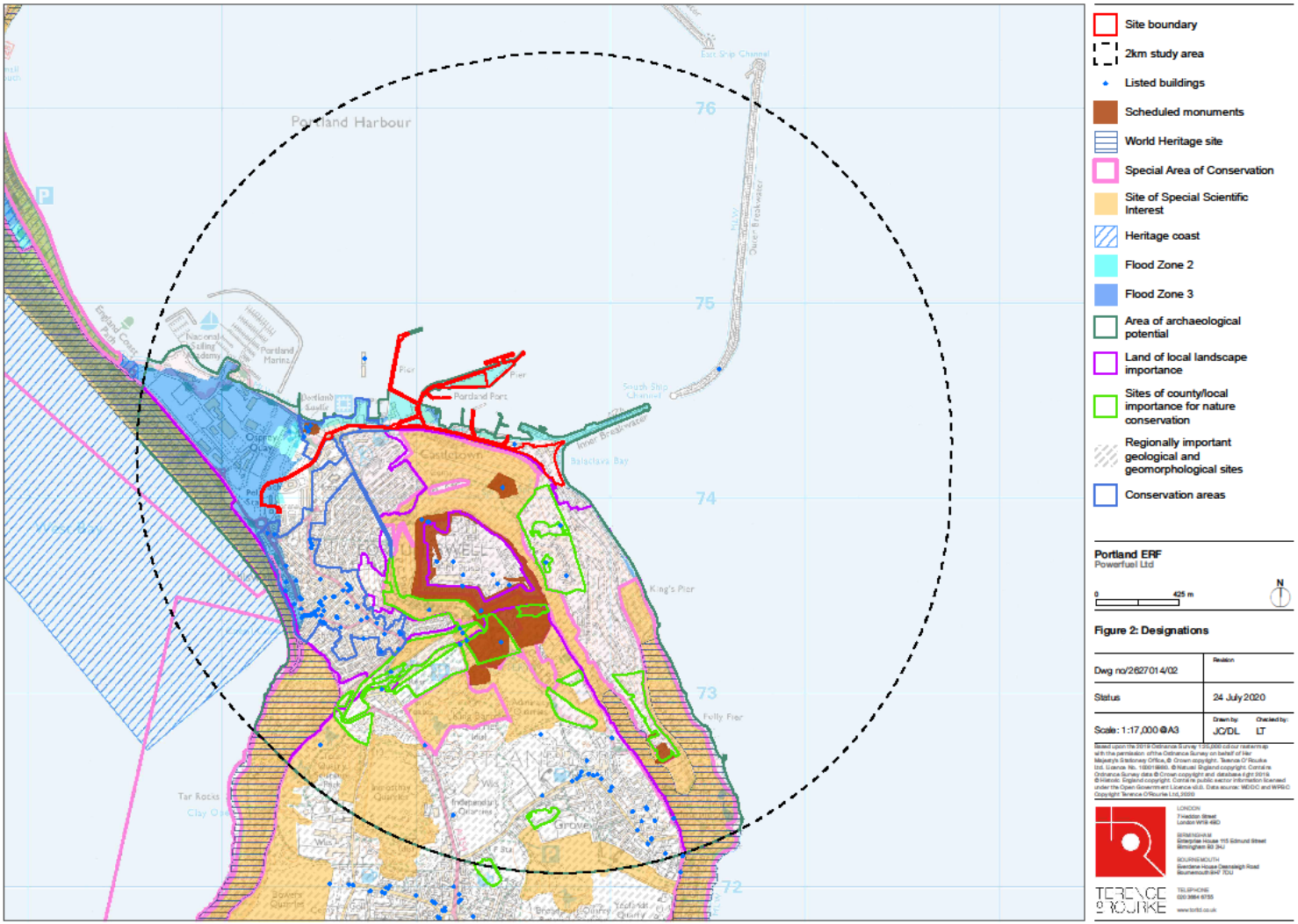
[24] Dorset Insight 2011. Area Profile for Weymouth and Portland. Retrieved from: https://bit.ly/3kTMeOb

[25] NHS Dorset Clinical Commissioning Group 2016. Improving Dorset's healthcare. Retrieved from: https://bit.ly/321JYf8

Citadel 340 m away, RAF Portland Rotor early warning radar station 570 m away and a heavy anti-aircraft battery 930 m away. Portland Castle scheduled monument is approximately 990 m to the north west.

The nearest listed buildings / structures to the site are the grade II listed breakwater adjacent to the north eastern boundary, Dockyard Offices to the north west, East Weare batteries to the south west and other batteries to the south. There are several other listed buildings / structures in the vicinity, including a cluster at the prison. Underhill conservation area is approximately 600m to the west of the site and contains a large number of grade II listed buildings.

Figure 4.5 Designations on the Isle of Portland



4.11 Summary

The community profile provides the baseline data against which the analysis of potential impacts from the project will be undertaken. It demonstrates broad alignment with the national picture on many factors, including employment structure and economic activity, home ownership and car and van ownership. Self-rated health is also broadly in line with the national average.

However, the area has a higher proportion of older people and higher population density compared to the national average, as well as high levels of deprivation. The area is also below the national average for overall education attainment and qualification achievement.

There are a number of specific health indicators where the Weymouth and Portland area performs notably worse than the national average. Rates of diabetes, hypertension and incidence of certain cancers are significantly above what is expected of the national average, as are hospital stays for self-harm and hospital admissions for heart attacks. Hospital admissions for injuries for under 5s and under 15s are also significantly higher.

Disparities exist within the Weymouth and Portland locality, and Weymouth and Portland includes some of the most deprived areas within the UK. Therefore, significant variance in health outcomes between these areas occur that might not be evident in available figures for area as a whole.

These factors informed the determination of potential impacts and proposed mitigation, subsequently identified in Section 6.

5. LITERATURE REVIEW

5.1 Introduction

This section summarises the information contained within the literature review, which forms the evidence base for research relating to changes in health determinants and consequent health effects.

Evidence of how health can be impacted by different determinants and pathways is described below under the following headings:

- air quality;
- employment and socio-economics;
- noise;
- social capital;
- traffic and transport;
- visual environment; and
- waste disposal facilities and public health.

5.2 Air Quality

Exposure to outdoor air pollution is associated with both acute (short-term) and chronic (long-term) health effects. The short-term effects of poor air quality include an exacerbation of asthma symptoms, coughing, wheezing and shortness of breath26. Long-term effects include stroke, lung cancer, respiratory conditions and cardiovascular disease. Air pollution can impact human health across the entire lifespan of an individual, including the foetus, and there is emerging evidence associating air pollution with impacting early childhood development. A strong body of epidemiological evidence provides a case for the association between long-term exposure to man-made air pollution with cardiovascular morbidity and a reduction in life expectancy – an annual effect equivalent to 28,000 to 36,000 deaths.

Air pollution is a mix of both natural and man-made particles and gases; major components are particulate matter (PM) and nitrogen dioxide (NO2). The WHO annual mean guideline limit for concentration of fine particulate matter is 10 µg/m^3.

The risk of adverse health effects is higher for more vulnerable demographics, which includes the elderly, children, pregnant women, and those with existing cardiovascular or respiratory disease. The risk of adverse health effects is also higher for those more socio-economically disadvantaged groups, who are more likely to live, work or learn near busy roads.

Sources of PM are primarily combustion and construction activities, including traffic. Dust emissions and subsequent deposition arising from construction activities can cause annoyance. Dust can also irritate the eyes and aggravate pre-existing respiratory problems, such as asthma.

5.3 Employment and socioeconomics

There is a direct link between being in ‘good’ work and positive health outcomes. Good work is defined as ‘having a safe and secure job with good working hours and conditions, supportive management and opportunities for training and development’. There is evidence that those in good work have better quality of life and health outcomes, and are protected against social exclusion. Employment and income are regarded as key determinants of health through influencing where an

[26] Public Health England 2018. Health Matters: Air pollution – sources, impacts and actions. Retrieved from: https://bit.ly/3aHqh08

individual lives, the education they receive, their access to healthcare and their lifestyle and behaviour patterns.

Increased employment opportunities can have a positive influence on health through increasing social contact, involvement in a collective effort or activity and by forming social relationships. All of these contribute to wellbeing. In addition, those in insecure employment are likely to suffer from poorer mental health than those in secure employment.

Ethnic minorities, young people and the disabled generally face the highest levels of unemployment. These groups are likely to be found in more insecure employment and be poorly paid. Unemployment is consistently related to negative health outcomes, primarily through increased likelihood of poverty, stress, unhealthy behaviours and implication for future employment. These can thus lead to increased risk of mortality and morbidity, including poor mental health and health-harming behaviours.

Employment and income together contribute to a person's socio-economic status. There is a broad summary of evidence showing inequalities in socio-economic status reflecting health inequalities; a higher level of deprivation correlates to poorer health outcomes. In broad terms, the greater the income, the better the health of a person. However, this relationship is not strictly linear. Above a certain threshold, higher income is less strongly related to improved health across a population.

5.4 Noise

Noise has the potential to affect health in a variety of ways. This includes direct damage to the ear (auditory) as a result of excessive noise levels, but also non auditory effects including cognitive responses such as distraction and disturbance. These in turn can contribute to sleep disturbance, changes in social behaviour, interference with daily activities and loss of productivity, annoyance and mental health impacts. Non-cognitive responses beyond auditory damage include hypertension and other health impacts related to loss of sleep and increased stress. There is also an association with quality of life, with evidence suggesting that those living in quiet locations have a better quality of life. It has been shown that noise levels that are sufficiently high can induce cardiovascular effects at the population level, including acute myocardial infarction.

Noise is defined as 'any unwanted sound' and can arise from multiple sources, including traffic, construction and industry activities. The presence of some noise is inevitable and unavoidable, but adverse health impacts occur when this is excessive in volume and duration. WHO guiding principles recommends road traffic levels are kept below 53 decibels Lden and night noise exposure is kept below 43 dB Lnight.[27]

Guidelines for specific environments recognise the risk that industrial environments can have in contributing to hearing impairment for those exposed for prolonged periods of time. Therefore, guideline recommendations for industrial, commercial shopping and traffic areas, both indoor and outdoor are 70 dB, recommended exposure maximum 24 hours.

5.5 Social capital

Social capital is understood as 'social connections and the benefits they generate'. These benefits can operate at an individual, community or regional level, and include support networks, civic engagement and trust, cooperative norms, lower crime levels and higher levels of life satisfaction and mental health. Social capital is often considered to be an indicator of general well-being, with these factors associated with an increase in overall well-being of an individual. Social capital is also understood to have an influence on mental health and behaviour. There is an identified association between social capital and health behaviours; those with less social capital are more likely to adopt unhealthy behaviours such as smoking, drinking, physical inactivity, poor diet. Healthier behaviours are identified in individuals with higher levels of social capital.

[27] World Health Organisation. Environment and health: Noise. Retrieved from: https://bit.ly/3iObHXm

The body of research linking social capital and health is more tentative than other health determinants and pathways, and there is no consensus that particular social capital indicators are linked to particular health outcomes. Nonetheless, it is considered that social capital is an important community level 'asset' and will be considered as such within the assessment.

5.6 Traffic and transport

Transport plays a vital role in promoting health and wellbeing. It does this directly by providing communities with access to a range of services and amenities required to treat ill-health and to manage and promote healthy living. It also does so indirectly through allowing individuals to maintain social and familial networks and through providing access to employment.

Transport can have negative health impacts, due to the risk of accident causing injury or death. Transport emissions can lead to air pollution, resulting in respiratory and cardiovascular problems, as outlined in Section 6.2. Traffic movements can also result in noise pollution. The heath impacts of noise are outlined in Section 6.4. Traffic, in particular congestion and excess traffic, can lead to increased stress, frustration or aggression. It can in turn lead to increased likelihood of a crash or accident. The presence of excessive traffic can affect perceptions of neighbourhood quality. In particular, the presence of HGVs, which can cause anxiety regarding road safety.

5.7 Visual environment

People attach considerable importance to the quality of their surroundings. Quality of place is linked to positive health outcomes and there is extensive evidence linking a positive visual environment, including presence of green space, and better physical and mental wellbeing. There are a number of pathways linking landscape and health outcomes. Green space has been shown to have a beneficial impact in reducing stress and anxiety levels. The beneficial impacts of green space have been found to decline as proximity decreases.

The prosperity of an area, including house prices, can be influenced by the visual image of the place; the quality of landscape, and any presence of industry. The visual presence of industry can also lead to feelings of dissatisfaction amongst residents, as well as stress, anxiety and concern.

5.8 Waste disposal facilities and public health

Public concern regarding health impacts of waste disposal facilities has mainly focused on concerns around the impact of incineration on air quality and the risk this may pose to nearby residents. The literature indicates that modern, well-regulated and well-managed waste incinerators only make a very small contribution to local concentrations of air pollutants[28]. There is also currently no evidence directly linking waste disposal facilities to negative health effects[29]. Nonetheless, there is a need to be aware of, and responsive to, concerns and anxiety which may exist amongst the public and communicate with regard to this issue.

[28] Public Health England 2019. Municipal waste incinerators emissions: impact on health. Retrieved from: https://bit.ly/2Q9kKpn

[29] Public Health England 2019. PHE statement on modern municipal waste incinerators (MWIs) study. Retrieved from: https://bit.ly/2E6nVvR

6. IMPACT ASSESSMENT

Health effects are described under the following headings that reflect health determinants and health pathways:

- Air quality;
- Noise;
- Traffic & transport;
- Landscape and visual effects;
- Local economy;
- Social capital; and
- Accidents and trespass.

6.1 Air Quality

Health pathway: dust, construction traffic and activities, RDF delivery traffic.

Health determinant: living environment.

Receptors: residents in the local area.

Vulnerable groups: those with respiratory related conditions.

6.1.1 Baseline Summary

The Air Quality Chapter of the ES used information 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. Trends in the national monitoring dataset have shown that, in general 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.

On the Isle of Portland there are two NO_2 monitoring 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, i.e. metals, dioxins and furans, dioxin-like PCBs and polycyclic aromatic hydrocarbons. In these instances, the maximum concentration from national monitoring datasets for sites in a similar setting has been used as the baseline concentration.

As set out in ES Chapter 2, it is expected that the proposed development would generate an additional 72 two-way HGV movements and 46 two-way car movements (staff) per day during operation, 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.

6.1.2 Potential Impacts during Construction

During construction, the potential for a significant increase in dust will be mitigated through the framework construction environmental management plan (CEMP) that forms technical appendix C and therefore it is not predicted to have any significant adverse effects on health or amenity.

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).

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 of 100 HGVs or 500 LDVs. As a result, the effect is deemed to be negligible and no further assessment is required.

The risk of adverse health effects from increased emissions is higher for vulnerable groups of the population, such as those with chronic respiratory diseases and asthma. Due to the percentage of the population with asthma being above the national average and the prevalence of smoking being significantly higher than national trends, the worsening air quality during construction could pose potential negative health risks on nearby residential receptors. However, it is unlikely that this will result in any discernible permanent health effects due to the temporary and intermittent nature of the construction phase. The predicted increase in airborne concentrations will also be small and confined to a relatively small area.

6.1.3 Potential Impacts during Operation

The Air Quality Chapter has not specified individual human sensitive receptors, but the assessment identifies the maximum predicted process contribution and Predicted Environmental Concentration (PEC) for residential areas.

During operation, the Air Quality assessment concluded the magnitude of change associated with the ERF has been deemed negligible at all areas of relevant exposure and no significant effects are predicted for all pollutants. 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. Both the number of HGVs and cars will be well below the IAQM screening criteria of 100 HGVs or 500 LDVs. Therefore, the Air Quality assessment concluded 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.

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. In the Boot Hill area of Weymouth, the process contribution from the ERF will be minor and well below any level described as negligible. Therefore, there ise no potential for process emissions to combine with traffic emissions and cause a greater effect in this area.

In summary, the ES predicts the significance of effects on air quality at human receptors to be negligible. The potential change from traffic emissions during operation are both described as negligible. Therefore, there is not anticipated to be any overall net changes in emissions within the local area once the Proposed Project is operational and it is not likely that any measurable change in health outcomes would occur for local communities.

The Human Health Risk Assessment (HHRA) has concluded that the health effects associated with emissions of NO_2, SO_2, PM_{10} and $PM_{2.5}$ from the ERF are shown to be very small and could reasonably be described as negligible, especially in comparison to the health effects associated with the existing exposure to atmospheric pollutants and the existing background events for the effects considered. Furthermore, these impacts are considered only in the context of the increase in $PM_{2.5}$, PM_{10}, NO_2 and SO_2 arising from the operation of the ERF and associated HGV traffic. What is not considered here is the off-set that will be achieved with the provision of shore to ship power provision in Portland. The update of shore to ship power will greatly reduce the emissions of $PM_{2.5}$, PM_{10}, NO_2

and SO_2 arising from shipping emissions, as ships will no longer need continually to run engines to provide power.

Moreover, it is important to recognise that the ERF is treating and disposing of large quantity of waste which must be dealt with by some means. This would very likely be landfill which is also associated with emissions to air and road traffic. Therefore, the assessment of health effects does not take place against a 'zero effect' alternative. All options have some implications for health. The assessment also concluded that the risk to health due to emissions from the ERF plant are negligible, in terms of both carcinogenic and non-carcinogenic risks.

6.2 Noise and Vibration

Health pathway: construction traffic and RDF deliveries, construction activities.

Health determinant: living environment.

Receptors: residents in the local area.

Vulnerable groups: elderly, young and shift workers.

6.2.1 Baseline Summary

Due to the noise assessment being undertaken during the Covid-19 lockdown period, it has prevented a baseline survey from being undertaken. Consequently, the assessment is taken from baseline survey data collected around the port as part of on-going environmental monitoring. For construction and operational traffic movements on public roads, the impacts are assessed on the affected routes on the Isle of Portland, the A354 across the causeway and on Buxton Road.

The Noise Assessment has identified the following as Noise Sensitive Receptors (NSRs) for the environmental impact assessment:

- Dwellings to the west of the site, on Beel Close, Leet Close, East Weare Road and Ayton Drive;
- Her Majesty's Prison (HMP) The Verne;
- Dwellings and businesses on Castletown;
- Portland Castle;
- Portland Harbour moorings; and
- Outside of the defined study area on the north west side of the harbour at Wyke Regis, Southlands and Rodwell.

6.2.2 Potential Impacts during Construction

Noise

Activities including breaking and removal of hard standings, piling and the use of excavators, tower cranes, and mobile crane could cause a general increase in noise in the area during construction. Due to the large distances to most of the receptors, there is a degree of uncertainty about the predictions, but they are all sufficiently below the potential significance threshold to provide confidence that there would be no significant effect of construction site noise.

For traffic operating on the public highway, the maximum number of additional movements is expected to be up to 74 two-way HGV movements per day. The greatest impact of these would be where dwellings are very close to the road, particularly along Castletown. The noise assessment concluded additional road traffic during construction would lead to a temporary increase in noise, but the duration and magnitude of impact are predicted to be such that the effect is assessed as a not significant change.

Construction noise is unlikely to cause annoyance for residents in nearby properties as the nearest residential properties are over 500m away. The noise assessment concluded that the construction noise levels at all receptors will be below the existing background noise levels and therefore unlikely to pose significant health impacts. Also, auditory health effects such as loss of hearing will not be a problem, as noise levels will not reach sufficiently high levels.

Vibration

Groundborne vibration during construction of the proposed scheme may potentially arise due to the use of compaction plant and/or rollers for reinstatement of fill, roads and hardstandings. Consideration of nonvibratory compaction techniques will be required if vibratory compaction should cause disturbance at commercial buildings in the port. No dwellings are sufficiently close to the site that vibration is likely to be a problem. Connection works in the highways may require plant similar to that used during routine utilities repairs and maintenance. Vibration effects could be mitigated, should this be necessary, by the use of non-vibratory plant. The Vibration assessment concluded that with these mitigations in place, it is expected that no significant effect of vibration would remain. However, minor vibration effects will impact sensitive receptors in close proximity to the site during specific activities such as site clearance, earthworks and access road construction.

6.2.3 Potential Impacts during Operation

The Noise assessment concluded that noise from the proposed development may from time to time be audible at some locations, but at a level that is below the assessment criteria, including the night time level. Therefore, operation of the plant is assessed as a not significant effect. Additional road traffic caused by operation of the development, primarily HGV movements, would lead to a maximum increase in traffic noise of around 1.6dBL$_{Aeq}$. This level of change is well below a level that would be assessed as a significant change. Some RDF is likely to arrive by ship and be unloaded at the harbour. There is expected to be a relatively small number of such deliveries and noise levels would be of similar level and character to existing ship movements at the port. Therefore, these activities are expected not to cause any significant effect from noise.

Consistent heightened noise levels can affect the health of local people, with impacts including stress, annoyance and a decreased sense of wellbeing. For this reason, the facility will be designed and include any mitigation to ensure that overall noise levels from operation of the whole development comply the required noise limits at sensitive receptors.

6.3 Traffic & Transport

Health pathway: construction traffic and RDF deliveries.

Health determinant: traffic and transport.

Receptors: residents in close proximity to HGV route, pedestrians, cyclists.

Vulnerable groups: elderly and children.

6.3.1 Baseline Summary

The island is joined to the mainland by Chesil Beach and the A354 passes down the Portland end of the beach and then over the Fleet Lagoon by bridge to the mainland. Vehicular access to the site is from the west, through the main Portland Port complex, via Castletown, Castle Road, Lerret Road and the A354. As the site lies within the port, it is not currently publicly accessible.

The only access to the port from the public highway is at the eastern end of Castletown, which carries all traffic to and from the port. The road is bordered by residential properties, a hotel and port-related employment buildings and has on-street parking. There is a continuous footway along the southern side of the road and an intermittent footway along the northern side.

Vehicles will use the port's existing road system to reach the site via the Castletown and Dock Road one-way system and Main Road. A one-way system for HGVs will operate within the site. Twenty-eight car parking spaces will be provided in the north east of the site for use by employees and maintenance contractors, which will be accessed from Canteen Road.

In order to service the plant, 25 deliveries of RDF would need to occur per day, with a further 10 HGVs removing ash and one HGV providing consumables. The assessment was based on a worst-case assumption that the proposed development will not generate more than 80 two-way HGV trips per day (40 in each direction). The HGVs (80 trips) will travel along the Weymouth Relief Road and Portland Beach Road. As a one-way system is in operation for HGVs through Weymouth, 50% of the HGVs (40 trips) will travel along Weymouth Way via Chickerell Road and 50% (40 trips) will travel along Weymouth Way via the A354 Buxton Road. It is estimated that 90% of the HGVs (72 trips) will use the A35 eastbound and 10% (eight trips) will use the A35 westbound.

Personal injury accident data were obtained as part of the Traffic and Transport assessment for the key junctions and links in the study area for the five-year period from 01.02.15 to 31.01.2020. The Traffic and Transport Chapter states a total of 48 incidents occurred during this period, two of which were fatal, 14 of which were classified as serious and 32 of which were classified as slight. Only one of the incidents involved a HGV; a fatal accident occurred when a cyclist lost control while travelling along the pavement and fell off the kerb under a HGV. No trends have been identified in the accident data relating to highway infrastructure or safety issues. Therefore, it can be concluded that there are no existing highways issues that would affect the site or require mitigation

The closest bus stops to the development are adjacent to the Victoria Square Roundabout on the A354 Portland Beach Road, approximately 1 km from the site. First Bus's service 1 runs between Weymouth and Southwell, with two services per hour calling at these stops. The first service arrives just after 05:00, while the last service leaves after 23:00.

6.3.2 Potential Impacts during Construction

Construction traffic will include the movement of workers and delivery vehicles. The number of daily deliveries required has been estimated in the Traffic and Transport Chapter based on experience of similar projects elsewhere and the main construction activities. The potential typical maximum number of daily deliveries each way is likely to be experienced during piling operations, when 37 trips are anticipated each way. In order to ensure a worst-case, the assessment has been based on up to 80 two-way movements. In addition, construction staff will generate traffic movements on the local road network. It is estimated that up to 300 people will be employed on site at peak times during the construction process.

Vulnerable groups in society will be affected most by the increase in traffic levels. Those such as young children and the elderly may experience negative health impacts. The elderly may experience annoyance from increased noise, whereas young children are at higher risk of road accidents and health impacts associated with potential air pollution. However, it is not anticipated that the likelihood of Road Traffic Accidents (RTAs) will increase or these impacts will be significant due to the transport chapter concluding only low percentage increases (just over 2%) in traffic associated with construction.

6.3.3 Potential Impacts during Operation

As stated above, in order to service the plant, 25 deliveries of RDF would need to occur per day, with a further 10 HGVs removing ash and one HGV providing consumables. The assessment was based on a worst-case assumption that the proposed development will not generate more than 80 two-way HGV trips per day (40 in each direction). Both total vehicle flows and HGV flows are predicted to increase by less than 2.5% as a result of the proposed development on all road links modelled, even in the worst case scenario of 100% of deliveries to the site being made by road. As a result, negligible effects that will not be significant are predicted on severance, driver and pedestrian delay, and pedestrian amenity on all road links.

Given that no issues were identified with the existing road network, and the negligible increases in traffic predicted as a result of the proposed development, no highway safety issues are predicted to be generated by the proposals. Therefore, it is considered that there will be a negligible effect on accidents and safety that is predicted not be significant.

As part of the Traffic and Transport assessment, a framework travel plan has been developed to establish the principles for minimising single occupancy car use by employees accessing the site. A full travel plan will be completed upon occupation of the proposed development. The framework travel plan sets out a number of measures to promote more sustainable alternatives to the car, including walking, cycling, public transport and car sharing. These include the provision of travel information packs to employees, a green travel noticeboard / website and the potential for a bicycle user group. Sufficient secure, covered cycle parking will be provided for staff, together with shower and changing facilities. The low percentage increases in traffic associated with the operation of the Proposed Project means that the potential for increased collisions is negligible, and therefore the risk to health is low and not excepted to be significant.

6.4 Landscape and Visual Effects

Health pathway: construction activity, facility building.

Health determinant: Physical environment, living environment.

Receptors: Local residents.

Vulnerable groups: those near construction activities**.**

6.4.1 Baseline Summary

The site lies on the north eastern coast of the Isle of Portland, situated within Portland Port and is within a key employment site and the Portland Northern Arc. There are also cable routes to the electricity substation off Lerret Road and to the berths at Queens Pier and Coaling Pier. The site can be characterised as industrial land, with existing operational port development to the north and north west of the site and movement of shipping, including cargo vessels, fishing vessels and cruise ships. The site is bordered by steep cliffs to the south west designated as land of national and international ecological importance, which support various habitats; though there are no ecological designations on site.

The site lies within a regionally important geological and geomorphological site (RIGGS), which covers the whole of the Isle of Portland. However, it does not lie within the AONB, the Heritage Coast or the Dorset and East Devon Coast World Heritage Site. Also, it is relatively flat and is approximately 5 m above Ordnance datum (AOD). The nearest residential areas are the villages of Fortuneswell and Castletown, approximately 600m east, as well as the Osprey quay developments.

6.4.2 Potential Impacts during Construction

Visual disturbances during construction include:

- Infrastructure provision – connection to services / trenching operations of cable routes to the electricity substation off Lerret Road and to the berths at Queens Pier and Coaling Pier;
- The erection of temporary protective and security fencing;
- Site compounds and contractors' car parking;
- Site excavation and the movement of spoil for the construction of the building and waste bunker;
- Site level changes, mainly involving foundations and creation of new road infrastructure;
- Introduction of cranes and large machinery and their associated movement and noise, both to and from the site and around the site;

- Temporary lighting and signage associated with construction works; and
- Changes to the surrounding roads due to the movement of additional heavy machinery during construction.

The ES reports that construction of the Proposed Project is likely to have a slight adverse effect on the character of the site and negligible to slight effects on the character of surrounding areas. Direct impacts on the character of an area could affect people's health by reducing the amenity value of the landscape, as well as acting as a reminder of the perceived negative health impacts from the construction processes. The Landscape and Visual assessment report that construction activities may cause moderate visual effects on views from the Port and harbour walls, as well as public rights of way S3/68, S3/70, S3/72 and S3/81. Furthermore, it concluded there will be slight to moderate effect on views from Sandsfoot Castle but all other effects will be slight or negligible during construction. Visual disturbances can affect quality of life and cause community disturbance, anxiety and concern. However, this impact is not predicted to lead to significant negative health effects.

6.4.3 Potential Impacts during Operation

Permanent visual changes can become a focus of concern and anxiety as there is a strong link between the visual environment and people's mental and physical health. Once completed, the Proposed Project would lead to permanent effects on a number of landscape character areas. The potential visibility of the ERF is largely contained and relatively few residential areas are afforded views. Visibility is predominantly within the immediate vicinity of the site and where the orientation of the residential roads aligns with the site. The remaining visual splay is across Chesil Beach, Portland Harbour, Weymouth Bay and areas that are elevated from the South Dorset Ridgeway or along the coastline from the South West Coast Path.

The Landscape and visual chapter reports that a small number of the visual effects are expected to be significant, from Portland Port and harbour walls, public rights of way S3/68, S3/70, S3/72 and S3/81, Sandsfoot Castle Park and Garden, and Northe Fort. However, it is unlikely that the changes to the landscape would lead to significant negative health effects. In addition, there are no significant landscape or seascape character effects predicted, visual effects will be felt only within the immediate site vicinity, and the highest degree of effect predicted is moderate.

6.5 Local Economy

Health pathway: employment and supply chain opportunities.

Health determinant: Economic effect.

Receptors: business owners, residents of Portland and Weymouth.

Vulnerable groups: business owners, those with low-economic status.

6.5.1 Baseline Summary

In 2019, there were 78.6% of the Weymouth and Portland population in employment. This rate is higher than in Dorset and England, but lower than the rate for the South West Region (79.2%). The unemployment rate was 3.2% (900 people). This is the same rate as the South West region as a whole, higher than Dorset (2.6%) but lower than England (4.0%). Unemployment is highest in Melcombe Regis and Weymouth East (an area within the Weymouth and Portland locality).

Of the total population, 38,461 were aged between 16 to 64, which is deemed as the 'Working Age Population'. In Weymouth and Portland, there is a dependency on the Accommodation & Food services, Health and Retail sectors for the majority (52.8%) of employment. The Education sector is also important for Weymouth and Portland, as well as the wider areas, accounting for 8.7-9.7% of employment. The economy of the area suffered badly following the defence cuts of the 1990s, and local economic assessments that have been undertaken since highlight poor performances in terms of competitiveness, business start-ups, and representation of knowledge intensive businesses,

creating challenges with increasing the economic activity. Weymouth and Portland has higher proportions of residents are working in professional, director and management occupations than comparator areas. There are also significantly higher proportions of the population in elementary occupations and skilled trades. Furthermore, there are fewer associate professional/technical occupations and almost half as many administrative and secretarial occupations as in comparator areas.

6.5.2 Potential Impacts during Construction

Construction will result in an increase in the number of direct and indirect employment opportunities in the area. It is estimated that up to 300 staff will be employed on the site at peak times. The economic impact assessment estimated the amount of employment supported both directly and indirectly, based on United Kingdom Input-Output Analytical Tables (ONS, 2020). Using the employment effect estimates for each of the relevant SICs contributing to overall construction, gives a total of 276 direct FTE jobs across the Level 1 and 2 areas[30], 19 more direct jobs across the remainder of the UK and a further 272 indirect job across the UK (some of these may also be within Level 1 and 2 areas). In all, a total of 566 direct and indirect FTE jobs are expected to be either created or supported across the UK. An additional 38 (approximately) should also be supported via testing and commissioning, but the whereabouts of these is not yet known.

These opportunities would mean an increase in employment and associated income in the area, which will in-turn lead to health benefits associated with wellbeing. However, employment (both direct and indirect) associated benefits with the construction phase will be of a temporary nature and will therefore only bring transient health benefits to those who find employment. Health benefits will be greater if this employment is taken up by individuals who are currently unemployed. Re-employment and the associated benefits will be influenced by the level of construction that is occurring in the region. Overall, these associated health benefits are unlikely to be considerable as they will be temporary.

Furthermore, the economic assessment concluded that economic activity will be generated through the associated demand for materials, capital equipment and services. Some of the investment associated with the ERF will take place locally, while other investment will be directed towards suppliers located further afield, in some cases in continental Europe. The capital expenditure expected to be incurred in building and commissioning the ERF is estimated at £95m. Local sectors likely to receive considerable demand boosts include construction, civil engineering and site management, while sourcing of specialist equipment such as turbines and boiler-related technology is expected to largely come from Italy and/or Germany. This investment in the area could raise the income and living standards of local people, thus improving their health and wellbeing during the construction period, however due to these benefits being temporary and dependent on the level of local procurement, they are not likely to be significant.

6.5.3 Potential Impacts during Operation

The ERF is expected to create at least 30 directly employed FTE permanent jobs including manager and directors; professional occupations; skilled traces; process, plan and machine operatives and administration and sectorial occupation types. Salaries will be competitive, with senior positions likely to be remunerated in the range of £70k and mid-level positions paid in the region of £40k per annum. Process, operative and administrative roles are likely to be pitched at around £25k per annum.

The economic impact assessment concluded, after the actions of leakage, displacement and the multiplier, the results are that a minimum of 17.6 net additional jobs are created in Level 1 area, a minimum of 20.25 net additional jobs are created in Area Level 2 (note the Level 1 and Level 2 area jobs are not cumulative), and an estimated 80 net additional indirect jobs are created across the UK as a whole (the indirect jobs *are* cumulative and it is also likely that some of these would be located in

[30] Level 1 area is Weymouth and Portland' Level 2 area is Dorset, Bournemouth, Christchurch and Poole

Dorset). The original minimum 30 gross direct jobs that are created in Portland ultimately lead to the generation of some 110 net additional jobs in all.

Again, the greatest community level health benefits will be felt if these positions are filled by previously unemployed people. Health benefits such as delayed mortality, decreased illness and improved wellbeing will be experienced by those employed during the operation phase. Unlike in the construction period, these benefits will be permanent.

Furthermore, the Proposed Project has a minimum design life of 25 years, during which an ongoing and fully scheduled maintenance plan will be put into place to promote the continuing safe, effective and continued operation of the plant. The annual maintenance spend is anticipated to be £4m, which will include £3m to be spent mostly in the Level 3 area (UK) and £1m to be spent on boiler/turbine and generator maintenance. This latter spend is expected to be lodged with the successful supplier of the plant, at this stage expected to be an overseas provider.

Beyond plant maintenance, transport costs are likely to be significant and most likely road haulage contracts will be awarded to local hauliers. Employment will also be supported at the Port through loading, unloading and storage activities. The workload associated with that handling is expected to contribute hundreds of thousands of pounds into the local economy alone through business for both the Port and their stevedores.

Business Rates payable to Dorset Council (which would not be payable without the plant) are expected to create around £600,000 of additional income. This revenue may be invested in the local area on services such as education, transport links or directly on health care. Therefore, there is the possibility that income generation resulting from the Proposed Project may improve health and wellbeing across Weymouth and Portland, and the wider Dorset area.

6.6 Social Capital

Health pathway: community disruption and changes to living environment.

Health determinant: social capital.

Receptors: residents of Portland.

Vulnerable groups: elderly, children and those with low socio-economic status.

6.6.1 Baseline Summary

The area has a high density of population, relative to the national average. The composition of the population in Weymouth and Portland, as well as the comparable areas, is notably ageing. There are also less young people moving to rural areas, creating a disproportionate demographic for Weymouth and Portland.

Whilst, the area had a relatively high level of economic activity and employment rates in 2019, both economic activity and employment has seen volatility since 2004. Projections within the local plans and economic strategies reviewed as part of the economic impact assessment suggest further decline in the working age population, creating the potential for a constrained labour market when considered against the scale of future labour requirements.

In general, residents in the area self-identify as having good or very good health and have access to social, healthcare and leisure facilities. Crime data have been summarised in the baseline section for Accidents and Trespass.

6.6.2 Potential Impacts during Construction

Construction activities are unlikely to significantly impact upon social networks, trust and support in the local communities on the Isle of Portland. As outlined above, while noise and visual effects associated with construction activities can reduce people's pleasure of living in an area, the existing landscape character is predominantly industrial meaning the magnitude of change is lessened.

However, stress and annoyance from changes to traffic flows and the fear of perceived health effects associated with any increased construction activity can make individuals more susceptible to mental health issues.

Construction workers are also unlikely to impact the social capital of local communities, with workers mostly remaining within the site boundaries and a proportion of the work force being sourced locally. There will not be any construction camps erected in the locality, meaning potential associated feelings of mistrust, fear of crime and decreased health, which can arise with such camps, are unlikely to manifest in local communities.

Once construction ends, the amount of on-site staff reduces significantly, associated noise and visual effects will also lessen. Any potential effects on social capital and subsequent health impacts during construction will therefore be temporary and not likely to be significant.

6.6.3 Potential Impacts during Operation

The operational phase of the Proposed Project is also unlikely to affect social capital in communities close to the site. Increased numbers of people in the area can often disturb the social capital of existing communities, with people feeling less safe, which can reduce community interaction and worsen health. While the facility will employ approximately 30-35 people, some of which may be from outside the local area, this does not represent a significant influx of people to an area that is already predominantly industrial.

Up to 80 HGV journeys per day are expected to be completed to and from the site once it is operational. The perceived increase in journey times arising from the presence of HGVs could deter people from making journeys and reduce social participation levels, however the Traffic and Transport chapter has concluded that the increase is less than 2.5%, representing a negligible increase in local traffic. Therefore, the predicted effects are not likely to be significant in terms of severance, driver and pedestrian delay, and pedestrian amenity on all road networks.

6.7 Accidents and Trespass

Health pathway: trespassing on site.

Health determinant: Living environment, safety.

Receptors: residents on the Isle of Portland.

Vulnerable groups: younger and older people.

6.7.1 Baseline Summary

According to Dorset Police Crime Data, the area of Weymouth and Portland experiences higher crime rates than surrounding areas, and compared with the wider Dorset area, adjusted for population size. The total number of crime incidents per 1,000 people was 69.4 for Weymouth and Portland in 2015/16. In comparison, for the Dorset DCC area, this number was 40.8, and for England and Wales it is 67.8. The most common form of crime is violence against a person, followed by theft and then criminal damage. This is in keeping with trends for surrounding areas.

In terms of Crime deprivation, the majority of LSOAs on the Isle of Portland experience low levels of deprivation, with two ranked in the least deprived 25%in the country. However, the north eastern side of the Isle, 008A, is ranked in the most deprived 25% in the country.

6.7.2 Potential Impacts during Construction

Access to the site during construction would be restricted for people not working on the project, meaning the likelihood of an incident occurring involving a member of the public is low. This will be enforced using the existing gatehouse at the entrance of Portland Port. In addition, the construction site will be surrounded by 2.4 m high timber hoardings.

The likelihood of accidents involving workers on-site during construction is low, given the relatively short construction period and the nature of the works being undertaken. While the severity of an accident cannot be predicted, the implementation of on-site health and safety procedures will reduce the chance of any such accident occurring. The health impact of such incidents will be limited to the individual or individual concerned and will therefore not affect the population health of the local community, with the additional pressure on health services being negligible.

6.7.3 Potential Impacts during Operation

The likelihood of trespass incidents or accidents occurring during operation of the Proposed Project is unlikely with the facility being manned 24 hours a day by site staff and the wider Port not publicly accessible. Where the building does not form the site boundary, a boundary fence for the ERF will provide perimeter security. Raw materials will be delivered directly to the waste pit or into an area for short-term storage on site, limiting the chance of harmful chemicals impacting the health of the local community from vandalism.

7. RECOMMENDATIONS

7.1 Mitigation Measures from the ES

A number of mitigation measures have been generated as a result of the EIA and supporting environmental studies and are reported in the ES and stand alone environmental reports. These measures have been taken into account when undertaking the assessment of potential health impacts and are reported here to assist the reader.

Key mitigation measures relevant to health from the ES and other environmental reports are described below.

7.1.1 Noise

The contractor undertaking construction will follow the principles and processes set out in the outline CEMP and will use Best Practicable Means to reduce noise impact on the local community. These include:

- avoid unnecessary revving of engines and switch off equipment when not required;
- keep internal haul routes well maintained;
- use rubber linings in, for example, chutes and dumpers to reduce impact noise;
- minimize drop height of materials;
- start up plant and vehicles sequentially, rather than all together;
- use of broadband reversing alarms rather than conventional beepers;
- specification and substitution: ensuring that the quietest practicable plant is used;
- enclosing significant sources of noise where practicable;
- using plant only in accordance with the manufacturer's instructions;
- siting equipment away from noise sensitive areas; and
- carrying out regular and effective maintenance.

Also, consideration of non-vibratory compaction techniques will be required if vibratory compaction should cause disturbance at commercial buildings in the port. The facility will be designed and include any mitigation to ensure that overall noise levels from operation of the whole development comply the required noise limits at sensitive receptor. More details on this are provided in Chapter 2 of the ES. Monitoring during commissioning of the plant can be undertaken to ensure that noise limits are achieved.

7.1.2 Visual Effects

The large-scale of the ERF buildings means that it is not possible to provide screening on-site or off-site that would effectively screen the mass of the buildings and stack. Instead, the architectural strategy has been to produce a building that will be of quality design and detailing and that, when viewed in the landscape, will contribute and respond to the Portland landscape. The orientation of the building, height and location of the stack, and the massing and materials have been carefully considered to ensure that the visual impacts are minimised and that the building responds to the port setting and does not conflict with the backdrop of the Portland cliffs. The colour and materials of the building have been chosen to echo the local context, ensuring that the building is non-reflective and when viewed from the AONB will merge with the backdrop of Portland.

7.2 HIA Recommendations

The HIA has identified a number of potential impacts to health and wellbeing, in particular, associated with the construction phase of the Proposed Project. Mitigation identified within the ES will contribute to the reduced potential for such impacts and in addition, a series of further recommendations are set out below to further minimise residual impacts to health and wellbeing..

7.2.1 Construction Recommendations

The following measures specific to construction should be adopted.

- To allay any potential concerns about the impact of additional traffic movements, associated with construction of the Proposed Plant, it may be beneficial to communicate the findings of the Air Quality assessment, undertaken as part of the EIA, and the Human Health Risk Assessment.
- The Construction Environmental Management Plan (CEMP) and specific measures identified above should be the subject to early and ongoing dialogue with the Council, key stakeholders and the broader community, to ensure they have full visibility of what is being proposed and can input accordingly.
- The recommendations of this HIA and mitigation set out in the ES, should be clearly communicated to the construction contractor and embedded in the CEMP.
- Adherence to the CEMP should be closely monitored and the subject of ongoing engagement with the Council and community.
- Communication with local residents will be critical to ensuring they are fully briefed in advance of any scheduled activity and an active dialogue and dissemination of information regarding construction activities is recommended throughout the construction period. This should seek to use existing community communication channels and be augmented by information on the developer or project specific website.
- To reduce potential disruption to local residents, reduce potential emissions to air and to enhance the safety and wellbeing of, in particular, vulnerable, local residents, a Traffic Management Plan (TMP) should be developed. The TMP should be the subject of engagement with the Council and key stakeholders such as public transport operators in the area, as well as the broader community. This should make provision for clear scheduling of traffic movements which can be communicated with residents, in accordance with the constraints set out in the project profile. The TMP should also include appropriate standards or training around road safety, required for the breadth of the supply chain/contractors.
- A community complaints procedure should be implemented and communicated to all stakeholders, including the steps that will be taken once a complaint is received and the timescale in which a response and resolution can be expected.
- To maximise the socio-economic opportunities, and associated benefits to health and wellbeing, local procurement of services and goods for construction activity, should be considered where possible and appropriate.

7.2.2 Operation Recommendations

The following measures specific to operation should be adopted throughout the operational lifetime of the Proposed Project.

- The TMP should be extended and refined to cover the operational phase of the Proposed Project and adjusted accordingly to reflect traffic movements anticipated during this period.
- Engagement and communication with stakeholders, in particular, the Council and community, will remain critical and there should be an ongoing provision of contact points and complaints procedure to address issues or concerns from local residents.

- As with the construction phase, to maximise the socio-economic opportunities, and associated benefits to health and wellbeing, local procurement of services and goods, should be considered where possible and appropriate.

APPENDIX A SCOPING RESPONSE JANUARY 2020

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Date: 24 February 2020
Ref: SCO/2020/0699
Officer: Emma Macdonald
[redacted]
[redacted]

Dear Lauren

Scoping Opinion of Dorset Council to determine the scope of an Environmental Statement to accompany a planning application for an energy recovery facility at Portland Port.

Pursuant to Regulation 15 of the Town and County Planning (Environmental Impact Assessment) Regulations 2017.

On 10 January 2020, Dorset Council received an EIA scoping request submitted on behalf of Powerfuel Portland Limited (the applicants) pursuant to Regulation 15 of the Town and Country Planning (Enviromental Impacts Assessments) Regulations 2017, hereafter referred to as '*the EIA regulations'*.

An EIA Scoping Report entitled: Portland Energy Recovery Facility (ERF) EIA Scoping Report Powerfuel Portland dated January 2020 was received with the request (hereafter referred to as 'the Scoping Report'.

The applicant intends to seek planning permission for an Energy Recovery Facility (ERF) on a site situated within Portland Port.

Regulation 15 enables a person who is minded to make an EIA application to ask the relevant planning authority to state in writing their opinion as to the information to be provided in the required Environmental Statement (ES).

This letter provides Dorset Council's scoping opinion. It should not be construed as implying that the planning authority agrees with all the information or comments provided by the applicant in the Scoping Report and is issued without prejudice to the determinisation of the proposed application.

Background

The EIA Regulations states that an 'environmental statement' is a statement which includes at least:

(a) a description of the proposed development comprising information on the site, design, size and other relevant features of the development;

(b) a description of the likely significant effects of the proposed development on the environment;

(c) a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
(d) a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main for the option chosen, taking into account the effects of the development on the environment;

(e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d); and

(f) any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

The Applicant is advised to refer to Schedule 4 to the EIA Regulations 2017.

An environmental statement must –

(a) where a scoping opinion or direction has been issued in accordance with regulation 15 or 16, be based on the most recent scoping opinion or direction issued (so far as the proposed development remains materially the same as the proposed development which was subject to that opinion or direction);

(b) include the information reasonably required for reaching a reasoned conclusion on the significant effects of the development on the environment, taking into account current knowledge and methods of assessment; and

(c) be prepared, taking into account the results of any relevant UK environmental assessment, which are reasonably available to the person preparing the environmental statement, with a view to avoiding duplication of assessment.

In order to ensure the completeness and quality of the environmental statement –

(a) the developer must ensure that the environmental statement is prepared by competent experts; and

(b) the environmental statement must be accompanied by a statement from the developer outlining the relevant expertise or qualifications of such experts.

Scoping Opinion of Dorset Council

Before adopting a scoping opinion, a planning authority is required to take into account:

i. any information provided by the applicant about the proposed development;

ii. the specific characteristics of the particular development;

iii. the specific characteristics of development of the type concerned; and

iv. the environmental features likely to be significantly affected by the development.

Dorset Council has carefully considered the applicant's Scoping Report and has additionally taken into account:

i. the EIA Regulations;

ii. the nature and scale of the development;

iii. the nature of the receiving environment;

iv. current best practice in the preparation of environmental statements; and

v. any comments received from statutory consultees and others*.

*It should be noted that representations have been received from members of the public during the consultation on the scope of the ES. Where representations have related to the scope of the ES they have been considered during the preparation of this opinion. However, concerns have also been raised about the merits of the proposal itself. The WPA recommends that the applicant fully considers the comments made and ensures that the concerns raised are addressed within any planning application.

The Site

The site comprises previously developed land (brownfield land). The land has previously been occupied by Port related buildings, all of which have now been demolished, with only residual concrete hardstanding remaining in-situ.

Flood Zone 2 lies adjacent to the site to the north and east. To the southwest of the site lies the Isle of Portland SSSI and Isle of Portland to Studland Cliffs SAC. Approximately 200m southwest of the site lies Battery Scheduled Monument and situated within this is East Weare Batteries a discussed gun emplacement Grade II Listed Building. The Dockyard Offices Grade II Listed Building is situated to the west of the site. Further from the site, along 'Main Road' the sites access road are other Grade II listed buildings and Underhill Conservation Area. Public footpath S3/72 lies approximately 330m from the site to the southwest.

The closest residential properties are at the Verne and Fortuneswell approximately 500m from the site. In addition, residential properties are situated approximately 750m from the site in Castletown. Vehicles accessing the facility would pass by these properties when accessing the site.

Other nearby environmentally designated sites include the Dorset Areas of Outstanding Natural Beauty and the Dorset and East Devon World Heritage Site.

Scope of the Environmental Statement

Comment on each required element of the proposed environmental statement described in the Scoping Report is set out below. Where considered necessary this includes identification of further information which should be included in the proposed environmental statement. Additionally, where considered necessary, other potentially significant effects of the development are identified together with information required about them in the proposed environmental statement.

Site Description (Section 2)

A thorough description of the proposed site is provided in the Scoping Report. Reference is made to the settlement of Fortuneswell, however it is considered that reference should also be made to the settlement of Castletown particularly given traffic accessing the proposed site would go through this area passing residential properties.

The description explains the need for underground cables and pipelines for the grid connection and CHP network and that a separate application will be required for the grid connection to the existing substation off Lerret Road. The ES should include further details and a plan showing the location of the substation

and the route of the cables and pipeline both within the currently proposed ERF redline site and beyond. If no decision has been made to routing, a series of realistic options should be presented so that the cumulative impacts can be assessed as confirmed in paragraph 17.3 of the scoping report. The same applies to the cable connection from the plant to the appropriate berth at the port.

As a general point, Public Health Dorset have noticed that the scoping document refers at to an 'expected' and 'envisaged' throughput of 180,00 tonnes of waste per annum before stating in paragraph 15.9 that 'the proposed development will treat 180,000 tonnes of waste a year.' It is my understanding that 180, 000 tonnes is the maximum annual capacity of the proposed development. However, this should be clarified within the description of development. If 180,000tpa is not the maximum capacity the ES should include an assessment of the likely significant effects of operation based on the maximum capacity of the proposed development.

As required, the Scoping Report also includes a plan showing the location of the designations referred to within the description. It is recommended that photographs of the site and its immediate surroundings should also be included within introductory section of the ES. Additional detail would then be expected to be included within topic sections of the ES.

It is important that the proposed ES clearly identifies and describes any relevant likely future changes to the current environmental baseline that would take place in the absence of the proposed development i.e. any relevant future baseline scenario(s). This should include the further implementation of development that have previously been granted planning permission on this site (e.g. changes to landscape character and views, traffic, noise, ecology, air quality etc).

The Proposed Development (Section 3)

A fairly detailed description of the proposed development is set out in the Scoping Report. As required, this includes details of the site design, size and other relevant features of the development. The ES should also include detailed plans, drawings, illustrations and sections at appropriate scales based on Ordinance Survey base mapping and OS level datum for ground levels and heights of buildings and other structures.

The information on the proposed development in the ES should include the following:

a. contour plans and cross sections showing the existing levels and topography of the site and the proposed buildings and other structures;
b. site layout plans for the existing site and proposed development;
c. proposed site landscaping and habitat creation proposed including methodologies for their creation and management;
d. details of the amount of waste proposed to be managed and residue from the treatment process;
e. Traffic generation
f. Details of emissions from the operation of the proposed facility including noise, dust, emission to air from the facility, traffic and water and light pollution.

Description of Reasonable Alternatives Studied by the Developer

The Scoping Report refers to alternatives at Section 17. However, it is noted that the summary (Section 18) of the Scoping Report sets out a list of what each chapter of the ES will contain, and this includes a description of the alternatives considered for each topic area as required.

The description of reasonable alternatives should, as appropriate, consider development location, design, technology, size and scale. The ES will need to identify and describe in adequate detail the

alternatives considered and the main reasons for the choice of the selected options, including a comparison of the environmental effects of the options.

Data required to identify and assess Significant Effects on the Environment

The ES should include:

i. A description of those aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, land, soil, water, air, climate, material assets, cultural heritage and landscape and the interrelationship between the above factors; and

ii. A description of the likely significant effects of the development on the environment, which should cover direct impacts and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects of the development, resulting from –

- the construction and exitance of the development;
- the use of natural resources, in particular land, soil, water and biodiversity;
- the emissions of pollutants (including noise, vibration, light and water pollutants), the creation of nuisances and the disposal and recovery of waste;
- risk to human health, cultural heritage or the environment;
- the impact of the project on climate and its vulnerability to climate change;
- the cumulation of effects with other existing and/or approved projects.

iii. A description of the forecasting methods or evidence used to identify and assess the significant effects on the environment, and

iv. A description of the 'mitigation' measures envisaged to avoid, prevent or reduce likely significant effects on the environment.

Topic Specific Sections of the Environmental Statement

Comment on each topic area identified in sections 5 to 16 of the Scoping Report is provided below. These comments are provided on the basis that Dorset Council accepts the proposed scope of the ES, as set out in the Scoping Report, subject to the amendments and additions referred to in these comments.

To ensure that the ES is readily readable and understood, a consistent approach and common format as suggested in section 18 is welcomed and should be adopted throughout the environmental topic chapters. Methodologies should be outlined for each area of the assessment and should, as a minimum, clearly define;

- The study area;
- Potential impacts for assessment;
- The temporal scope of assessment;
- Sources of baseline information;
- Survey methodologies;
- Approaches and criteria for classifying potential environmental impacts;
- And standards, legislation or guidance followed; and
- Any gaps or limitations to the study.

Data should be comprehensive, relevant and up to date. All assumptions used to inform the assessment should be fully explained and justified and, wherever practical, impact assessments should be undertaken having regard to relevant policy and/or regulatory frameworks.

Any proposed mitigation measures should be considered in the following order of preference: avoidance, reduction, compensation and remediation. Only mitigation measures which are a firm commitment or are likely to be secured should be taken into account as part of the assessment.

Air quality and climate (Section 5)

In general terms the Waste Planning Authority (WPA) welcomes the consideration of air quality issues in relation to both traffic generated by the proposals and emissions from the stack within the Environmental Statement. The methodology proposed for the air quality assessment – *Land-Use Planning & Development Control: Planning for Air Quality (2017)* – is considered appropriate, however Dorset Council has more up-to-date data than that given in the EIA scoping report. This can be obtained by contacting Dorset Council's Environmental Heath Department.

Table 5.2 combines air quality impacts on the population and on the natural heritage/natural environment. This approach risks confusing impacts on the natural environment with impacts on human health as such it will be difficult to assess impacts of pollution (vehicle and stack emissions) on the habitat and species interest features of the SACs and underlying SSSIs. A clear division should be made to the assessment of air quality impacts on the population and of impacts on the natural environment. Air quality/emissions impacts on the natural environment would be better included within Section 12 and table 12.2 rather than Section 5, which seems mostly to deal with air quality impacts on human receptors.

In terms of the geographical scope of the traffic related air-quality assessment, this should be expanded to ensure a wider consideration of potential impacts on air quality across Dorset's wider transport network. For example, there are a number of other areas of concern that might be adversely affected by the additional movements i.e. AQMA within Chideock on the A35 and the A35/A354 Stadium Roundabout in Dorchester. It is recommended that the 'worst case' scenario should be used in the wider considerations.

The scoping report acknowledges poor air quality within the Boot Hill area of Weymouth. Consideration should be given to a traffic management plan for this area to reduce the proposals impact on congestion.

As recommended by Highways England, an assessment of traffic impacts should consider the operation of the Strategic Road Network (SRN) in line with NPPG and DfT Circular 02/2013 *The Strategic Road Network and the Delivery of Sustainable Development*. Where the proposals would result in a severe impact, mitigation should be provided in line with current policy.

The scope of the transport impacts focuses on a worst-case scenario of all waste being delivered by road. However, as waste may arrive at the site by sea consideration of impacts should be extended to include ship movements and associated Sulphur Dioxide ($SO_{2)}$. Consideration should be given to an appropriate level of movements of waste by ship or ideally a range of alternative options.

The traffic related effects of the proposed development should also be assessed cumulatively with other schemes and we would expect the applicant to agree an appropriate list of schemes including committed development in the area, with the WPA.

The process emissions air quality assessment is again welcomed. However, the scope of the assessment of air quality and sensitive receptors should be discussed and agreed with the council's Environmental Health Officer (EHO). In particular, this should include staff and inmates at H M Prison, The Verne which forms a collection of buildings within 500m of the site.

Paragraph 5.11 of the scoping opinion refers to localised effects on temperature and moisture content of air surrounding the stack stating that '…*these effects… normalise within a short distance'*. As a result, this issue is scoped out. DWT is concerned that no evidence is provided to clarify what this distance might be. The ES should provide further evidence of why this topic has been scoped out, justify this, and cross reference to where the issue of effects on micro-climatic conditions will be addressed.

It is noted that the issue of odour from the operation has been scoped out of the ES. It would be beneficial to understand if the unloading of the RDF would have the potential to be odorous including a description of operating practices. Is there enough enclosed storage space built into the development if RDF were to be brought into the facility by ship? Storage of the incinerator bottom ash should also be considered in this regard. This could be dealt with outside the ES.

In terms of the carbon balance assessment, the WPA welcomes the comparisons proposed regarding carbon emissions from the proposed ERF with potential alternative methods of manging the RDF. Specific reference should be made to a comparison regarding the carbon emissions of the proposal and the existing management of equivalent waste arising in Dorset. In addition to the alternatives proposed, the applicant should also consider the alternative of developing a site for the management of RDF within each site allocated for similar uses in the Bournemouth, Christchurch, Poole and Dorset Waste Plan (2019) i.e. Insets 7 to 10. Additionally, as the source of the RDF is yet unknown, the impact from a range of geographical sources should be considered including the need to import RDF from outside Dorset.

The carbon balance assessment includes the potential heat exported from the ERF. Unless a specific heat customer has been identified, the carbon balance assessment should also consider the impact of the proposal without the utilisation of the heat as this may not be guaranteed.

Similarly, if the location for the management of the incinerator bottom ash is not yet known, consideration of a range of options should be included in the carbon balance assessment including the landfilling of this material.

The Construction Environmental Management Plan proposes to address dust management. Dorset Council's EHO has requested more information on measures proposed to minimise effects from dust. It is agreed that the issue of dust is unlikely to be significant in EIA terms, subject to proven best practice construction measures, and can be scoped out of the ES. The EHO has also recommended that information regarding hours of operation and proposals to deal with unexpected contamination should also form part of the submission.

The Environment Agency have provided a general response to the scoping report regarding environmental permitting in their letter dated 10th February 2020. The WPA recommend the applicant reviews this advice, which can be found on our website.

Community, social and economic effects (Section 6)

In general, the WPA agrees with the methodology identified for considering the impact of the proposals on the community and socio-economic effects.

Effects on health post construction are to be included within the ES. The methodology for this assessment should be agreed with the planning authority in terms of relevant sensitive receptors, which is likely to include Portland, Wyke, Weymouth and Preston.

The preparation of a Health Impact Assessment (HIA) is also been specifically welcomed by Public Health Dorset. We would strongly encourage the applicant to share details of the scope and methodology of the HIA with Public Health Dorset who will be able to provide feedback on the approach. Public Health Dorset would expect any HIA to include consideration of the potential impact of the proposed development on both physical and mental health.The World Health Organisation (WHO) defines health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' giving parity to both physical and mental wellbeing as components of health. The HIA should also include consideration of the potential impact of the proposed development on health inequalities and on potentially vulnerable populations e.g. the populations of HMP Verne and HMP Portland. The Institute of Environmental Management's 'Health in Environmental Impact Assessment: A Primer for a Proportionate Approach' sets out five principles for coverage of population health in EIA which the applicant is encouraged to consider.

It is noted that impacts on tourism are scoped out of the ES. However, it is considered that the potential for impact on tourism is wider than explained in paragraph 6.15. Impacts may not be limited to the facility's immediate environment, wider consideration should be given to Portland, the South West Coast Path, Osprey Quay, the World Heritage Site, the AONB, the Heritage Coast and the Portland Quarries Nature Park. The potential impacts of air quality and traffic, such as congestion on tourism should also be considered. It is agreed that this issue is not likely to be significant and can be dealt with outside the ES but within the planning application and cross referenced to relevant sections of the ES. The assessment of impacts on tourism under this heading should also cross reference other sections related to the assets.

Cultural heritage (Section 7)

The potential effects on setting of historic assets is scoped into the ES, this is agreed.

In terms of the baseline, Dorset Council's Conservation officer requires reference to be made to the AONB Costal Marine and Character Area to the east of Portland. This also needs to be considered when assessing significance and impact. It is also recommended that there should also be an assessment of key protected wreck sites as heritage assets given the sites coastal location – although it appears that there are none in the immediate locality.

Listed buildings (designated heritage assets) should be separated from the undesignated heritage assets (other monuments and historic structures). Being of different historic status, impact on significance is likely to be different. The undesignated heritage assets should take in key areas indicated on the Dorset Explorer such as Royal Naval Sites – seaplane base etc. It its recommended that the baseline should be agreed with Dorset Council's Conservation officer.

The acknowledgement that appropriate viewpoints should be agreed with Dorset Council's conservation officer is welcomed. In terms of process of assessment, the Council's Conservation Officer has recommended that the conservation guidance checklist is employed in terms of assessment, surveys and reporting. See full response for further advice and recommendations regarding mitigation and avoidance of heritage sites and assets.

The Jurassic coast trust should also be consulted in order to seek guidance on how to fully assess impacts on the World Heritage Site.

The ES should refer to the relevant management framework for the Dorset and East Devon World Heritage Site. This is currently being revised, with a new framework, called the Jurassic Coast Partnership Plan, available in May 2020. If the EIA is undertaken before this time, the existing Management Plan (2014-19) should be used. The policies within that document remain valid until such time as the new Partnership Plan is published.

The A354 is the only access route and includes impressive views of the eastern side of Chesil Beach. In this context the conditions on that road will play a part in how people experience the WHS, which is relevant to its setting. The assessment of traffic and transport impacts should pick up on this connection and cross references should be provided within the Cultural Heritage section.

Historic England has raised the potential that the proposal has to impact on the significance of sensitive designated heritage assets via a change in setting. The assessment of setting should be undertaken in accordance with Historic England's published guidance (HE 2017 [rev] *Good Practice Advice in Planning, Note 3, The Setting of Heritage Assets*) and be informed by an appropriate Landscape and Visual Impacts Assessment.

Impact on archaeological remains has been scoped out of this topic area. Dorset Council's Conservation Officer is concerned that the scope has omitted the wider setting of archaeology in regard to potential earthworks, wartime evidence and above ground undesignated monument archaeology. Given that the setting of heritage assets has been scoped into the ES, it is considered that these issues can be addressed within this section of the ES and impact on archaeology can be scoped out as proposed. Advice from Dorset Council's Senior Archaeologist agrees that this approach will ensure impacts on setting is fully considered. Impact on significance should also be considered in regard to the assets' evidential, historic and communal values.

Table 7.2 of the Scoping Report provides details of the magnitude of scale of effect. Dorset Council's Conservation Officer considers that the impacts of scheduled monuments and listed buildings to be underestimated, particularly given the sites costal location. So long as this matter is given appropriate consideration in the Environmental Statement, then an appropriate decision can be made thereafter.

Dorset Council's Conservation Officer has provided a further response setting out the relevant policy context, baseline and methodology for assessment this should be referred to before undertaking the assessment of cultural heritage. This response can be found on Dorset Council's website.

Ground conditions (Section 8)

The WPA agrees with the proposed scope of the ES in respect of Ground Conditions and the assessment methodology proposed. However, the ES should make clear the distinction and/or links between effects to ground conditions and effects to hydrology and hydrogeology.

It is noted that a site investigation was undertaken in 2009, and this is likely to still be relevant. An updated conceptual site model is proposed which demonstrates good practice. Dorset Council's EHO has recommended that particular regard should be given to the discharge of surface water to the sea due to contaminants identified within the 2009 site investigation. Details of the interceptor should be submitted (if known at this time).

The potential for human health effects from contact with ground gasses post-construction has been scoped out of the ES. Advice from the EHO is that this issue must be considered in the EIA due to potential chronic effects for employees. It may be helpful to discuss this issue with the EHO directly to ensure the matter is adequately addressed. Table 8.2 should be amended to reflect this change to the effects to be included within the scope of the ES.

The Environment Agency have provided the following response regarding contaminated land:

> *'If historic use of the site may have caused contamination then National Planning Policy Framework (NPPF) states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to, or being put at risk from unacceptable levels of water pollution. Government policy also states that planning policies and decisions should ensure that adequate site investigation information, prepared by a competent person, is presented.*
>
> *Further guidance on what should be contained in the assessment and issues associated with groundwater protection can be found in our Groundwater Protection which can be found at: https://www.gov.uk/government/collections/groundwater-protection'*

Land use and land take (Section 9)

It is agreed that this topic is scoped out of the ES.

Any impacts of loss of allocated employment land (to waste management uses) should be considered within the planning application, outside the scope of the EIA.

Landscape and visual effects (Section 10)

The WPA generally agrees with the assessment methodology proposed.

Reference in the scoping report baseline to the Limestone Peninsula landscape character type is welcomed. The EIA should also consider and refer to the following:

- Weymouth & Portland District Landscape Character Assessment February 2013 https://www.dorsetcouncil.gov.uk/planning-buildings-land/planning-policy/west-dorset-and-weymouth-portland/other-planning-documents/pdfs/sg/landscape-character-assessment.pdf
- Dorset Coast Landscape & Seascape Character Assessment 2010 http://www.cscope.eu/_files/MSP_Dorset/Land-and_Seascape_Character_Assessment.pdf
- The Dorset Area of Outstanding Natural Beauty Management Plan 2019-2024 https://www.dorsetaonb.org.uk/wp-content/uploads/2019/04/DAONB_Managmentplan.pdf

Formal Landscape and Visual Impact Assessment (LVIA) of the proposed development will be required in line with the *3rd Generation for Landscape and Visual Impact Assessment*, produced by the Landscape Institute and Institute of Enviromental Management & Assessment to consider the special qualities of the Dorset AONB (as set out in the AONB Management Plan) and assess any effects from the proposed development.

In undertaking the assessment, representative viewpoint locations and the methodology for photography and photomontages will need to be agreed with Dorset Council's landscape architect prior to LVIA being undertaken – I understand that discussions have already begun which is welcomed. In addition, it is advised that the AONB Team be involved in these discussions to agree the most significant viewpoints from the AONB. The Jurassic Coast Trust should also be consulted in order to seek guidance on how to fully assess impacts on the World Heritage Site.

The AONB team have advised that a combination of panoramic and single frame images should be provided within the ES, the detail of which should be discussed and agreed with the Council's Landscape architect and AONB Team as appropriate.

In terms of distant views, advice from the AONB team has highlighted the importance of assessing the significance of any 'increased lighting' from the site. In addition, an assessment of views from the seaward aspect (with reference the AONB Management Plan 2019-2024 Policy C1.h) should be undertaken.

The ES should consider the Dorset AONB Landscape Character Assessment, the Dorset Coast Landscape and Seascape Character Assessment September 2010 and the relevant management framework for the Dorset and East Devon World Heritage Site. This is currently being revised, with a new framework, called the Jurassic Coast Partnership Plan, available in May 2020. If the EIA is undertaken before this time, the existing Management Plan (2014-19) should be used. The policies within that document retain valid until such time as the new Partnership Plan is published.

The A354 is the only access route and includes impressive views of the eastern side of Chesil Beach. In this context the conditions on that road will play a part of how people experience the WHS, which is relevant to its setting. The assessment of traffic and transport impacts should pick up on this connection and cross references should be provided within the Landscape and Visual effects section.

In addition, we would expect the visual effects of the proposed louvres attached to the ERF building and the alternative solution of not using the louvres to be explored in the visual study of the site.

Major accidents / disasters (Section 11)

It is agreed that this topic is scoped out of the ES. However, the planning application should provide details of other regulatory regime permits or licences that are required to manage pollution and health and safety from the development of a waste management facility. Cross references to other sections of the ES may also be appropriate in this regard, such as flood risk.

Natural heritage (Section 12)

Dorset Council's Natural Environment Team have been consulted on the scope of the EIA and are generally satisfied with the methodology outlined to assess the impacts of emissions on sensitive ecological receptors.

However, it is considered that greater weight should be given to the impact of local climatic/wind conditions on the impact zone for deposition of pollutants around the stack area, to ensure that the impacts of nutrient deposition are fully understood. This is of particular importance as the underlying SSSI unit (33-Verne Common) directly adjacent to the application area is in unfavourable declining condition due to scrub incursion and additional nutrient deposition has the potential to add to the existing problem. The cumulative impact with the large warehouse application to the south of the ERF should also be considered in this assessment (see Section 17 for details).

The ES should also include an assessment, based on field survey, of the bryophyte and lichen interest of this unit and any others within the predicted impact zone, to inform the assessment of nutrification impacts and any possible mitigation. Dorset Council's ecologist has explained that *'The open scrub-boulder scree areas on the undercliffs especially on East Weare have no equal anywhere on the South Coast and are perhaps unique with a combination of Oceanic, Southern Oceanic and Mediterranean-Atlantic bryophytes and lichens not known elsewhere in Britain.'* Great weight should be given to the importance of this habitat, a listed feature of the SAC, in the pollutant modelling in the ES.

The impact on human population of road traffic emissions during and post construction are identified in table 5.2, but the impact on SAC/SSSI sites (in particular Chesil and the Fleet SAC and SSSI and Chesil Beach and the Fleet SPA) from road traffic emissions are not identified here or in section 5. This issue should be scoped into the natural heritage section of the ES. The assessment should consider worst case scenarios of all imports of waste materials and exports of residue via road versus a realistic proportion of movements via the sea, as well as additional vehicle movements by employees. Impacts of disturbance from increased traffic on Little Tern (a qualifying feature of Chesil Beach and the Fleet SPA) also need assessing as part of this ES. In-combination effects should also be included to ensure the impacts of this application can be fully understood.

It is noted that the natural heritage assessment will be undertaken in accordance with the Chartered Institute of Ecology and Environmental Management (2018) *Guidelines for Ecology Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Costal and Marine*. Dorset Wildlife Trust (DWT) in their response to the scoping report have provided a detailed list of information that should be provided within the Ecological Impact Assessment. The WPA agrees that the issues listed should be fully addressed.

The proposal will need to comply with the mitigation hierarchy and the applicant should ensure that the Environmental Statement provides enough information to assess impacts and provide mitigation/calculate compensation as required.

The applicant should also be mindful that the proposals will require consideration under the Conservation of Habitats and Species Regulations, as informed by recent case law ECJ ruling Holohan and Others (C 461/17), which may require assessment of how non-designated habitats surrounding the designated sites are functionally linked to the designated sites. Sufficient information must be provided to enable the authority to carry out screening and if necessary appropriate assessment.

Natural England has been consulted on the scope of the ES. The following issues have been raised and the waste planning authority are in agreement with the recommendations included. The applicant is advised to review the full response that can be found on our website which also includes some general advice:

- *In accordance with ECJ ruling Holohan and Others (C 461/17), the land surrounding the Special Area of Conservation (SAC) adjacent to the access road and the red line boundary that is of high ecological quality or function is likely to be performing a role in maintaining favourable conservation status of the SAC. Impacts to these areas should be considered as if they are functionally linked land under the Habitat Regulations 2017. For example, sites designated as Sites of Nature Conservation Importance.*
- *Portland Port is a high-quality marine environment with species assemblages akin to those of the Fleet. Little Terns are a breeding feature of Chesil Beach and the Fleet Special Protection Area (SPA) regularly use Portland Port for foraging. For the purposes of the ES, Portland Port should be deemed as Functionally Linked Land to Chesil and the Fleet SAC and Chesil Beach and the Fleet SPA.*
- *The internationally designated site adjacent to the redline boundary, in part notified for its exceptionally rare and sensitive lower plants (terricolous and saxicolous lichens and bryophytes). Lower Plants are highly vulnerable to air quality changes. The designated site directly adjacent to the application area is deemed as unfavourable declining due to lack of management and excessive scrub cover. For the purposes of a Habitat Regulations Assessment and Appropriate Assessment, should any of the air quality thresholds be exceeded for an adverse impact on the designated site, simply surveying the site and concluding that the designated site communities*

are absent is unlikely to be a robust justification to conclude no adverse impact on integrity while the site is in unfavourable condition. This is because the ability for the site once restored to support the designated feature in the future may be further reduced in such an instance. If any air quality critical loads are exceeded through the assessment process on the designated site for a given feature, consideration for the ability for the given area to support that feature (directly or indirectly) in the future following restoration should be considered as the baseline rather than the presence/absence of the feature itself at the point of survey. This does not negate the need to survey the distribution of the features within the designated site but is an additional consideration to be included in the ES.

- *The importation of material exclusively by sea in a worst-case scenario is likely to need consideration for the impact of ships on marine nature conservation sites. For example, the likelihood of ships anchoring in the marine designated sites while waiting to dock within designated sites should be considered in the ES.*
- *Within close proximity to the application redline boundary and the air quality receptors from transport along the causeway are a number of exceptionally rare and some endemic species of invertebrates. Many of these are not listed as notified features but should be considered as features of local distinctiveness of the Sites of Special Scientific Interest and typical species of the international sites in this location. Knowledge of these species distribution through a data search and survey for their likely distribution if appropriate within the zone of influence for air quality impacts is advised. Potential impacts to any of these species which are vulnerable to stochastic extinction is likely to be considered as 'significant' under paragraph 175 of the National Planning Policy Framework.*
- *There is a risk that ships and HGV's may leak from the cargo areas into the marine environment or onto roads and there is a risk of leachate leaking from the facility storage area into the port. Although water quality from facility drainage will be assessed in the ES this should be extended to include the likelihood of leaks from transport to and from the site within the zone of influence.*
- *The in-combination impacts of the development should be assessed with other plans or projects whereby an appreciable effect could occur in-combination. It is unlikely to be appropriate to set a threshold for determination of what is included in such an assessment at 150 dwellings or 1ha of commercial. It is thought that each dwelling on average may contribute 7 additional movements of traffic per day. In an unconstrained environment this may dissipate a short distance from the development and such thresholds may be appropriate elsewhere. On Portland however there is only one way on and off the island by road which runs directly adjacent to a number of international, national and local designated nature conservation sites. Consequently, it may be found that small developments have a disproportionate cumulative effect in this highly constrained environment by designated sites. Natural England advise that these thresholds are not used in the Environmental Statement.*

Paragraph 12.17 of the scoping report sets out the proposed methodology for assessing impacts on designated sites as a result of the proposed development. DWT have recommended that the scope of this should include effects upon designated sites and their associated features (international, national and local designations) as a result of air quality, noise/disturbance, water quality and lighting impacts.

Note that DWT has requested that a lighting assessment should be undertaken to consider impacts both on terrestrial and marine designated sites and across all associated taxa. The Waste Planning Authorities agrees that consideration to lighting is needed, however it is not considered necessary for inclusion within the ES.

DWT have also recommended that an assessment of the impacts upon visitors to the local natural environment and the visitor economy as a result of the development. The WPA is of the opinion that the issue of tourism can be dealt with outside the ES (see section 6).

Noise and vibration (Section 13)

Based on the information detailed in the scoping report and a representation received from Dorset Council's Environmental Health Officer, it is considered that noise and vibration exposure levels would not have a significant effect on any sensitive receptors in ES terms. Accordingly, this topic is scoped out of the ES.

However, please note that a noise assessment will be required to support any planning application, and this should conform to BS4142:2014. The assessment should also assess vehicle noise. Agreement should be sought with the WPA, prior to submission of a planning application, regarding the sensitive receptors that will be considered as part of this assessment. The assessment should identify appropriate noise limits at the facility and traffic generated and assess whether the development is likely to be capable of operating within them. The Health and Safety Executive should be consulted on this also.

Traffic and transport (Section 14)

The WPA agrees with the assessment methodology proposed which will include the preparation of a Transport Assessment the scope of which will be determined in consultation with Dorset Council.

Highways England (HE) have set out a series of general aspects that should be considered as part of the Environmental Statement in their response dated 14th January 2020. In addition, HE has provided the following specific considerations regarding the proposals at Portland Port. DC agree that these aspects should be included within the assessment:

- *The A35/A354 Stadium Roundabout junction forms part of the SRN and experiences congestion particularly at park times. As assessment of traffic impacts should therefore consider the operation of the SRN in line with NPPG and DfT Circular 02/2013 The Strategic Road Network and the Delivery of Sustainable Development. Where the proposals would result in a severe impact, mitigation will be required in line with current policy.*
- *The effects of the proposed development should be assessed cumulatively with other schemes and we would expect the applicants to agree an appropriate list of schemes including committed development in the area, with the relevant local planning authority.*

In addition, paragraph 14.9 should be expanded to ensure consideration is given to Wyke Regis Infant School and Nursery and All Saints Church of England School both of which are situated on the route to the site.

Public Heath Dorset consider that details of the source of the RDF should be provided to allow a full assessment of the impacts of vehicle movements generated by waste transport on air quality and population health and wellbeing. If the source of the RDF is as yet unknown, the impact on the Council's roads needs to be fully addressed on the basis of worst-case scenario.

In addition, details of the location of facilities for processing the incinerator bottom ash should be included and the impacts of vehicle movements associated included within the assessment. Again, if the location of management is unknown, a series of options should be considered including an assessment of worst-case scenario.

The ES should identify any necessary appropriate mitigation and how it will be provided in line with current guidance.

The scoping report includes details of increased traffic generation during and post-construction. It is considered that vehicle movements by employees associated with the facility should be included.

It is noted that the issue of increased ship traffic into Portland Port post construction has been scoped out. Given the location of the site and the potential that exists for material to be imported to the site via the sea it is considered that possible impacts, post construction, should be considered. Details should be provided on the possible level of movements of waste by ship or a range of alternative options. This should be compared with the port's capacity and current average ship movements to establish the increase in movements. This issue of capacity and impact on Portland Port from increased ship traffic could be undertaken outside the scope of the ES. If there are any concerns regarding capacity for berthing at Portland Port, contingency options should be addressed. It should be noted that the ecological impacts of movement of waste via ships should be included in the ES (see section 5).

The ES should clearly detail that impacts of increased ship traffic has been scoped out of the ES and the reasons for doing so. Cross reference to the relevant section of the ES that deal with air quality impacts from traffic, both during construction and post construction, would also be helpful.

Waste and natural resources (Section 15)

Paragraph 15.5 of the Scoping Report should reflect the position set out in the Bournemouth, Christchurch, Poole and Dorset Waste Plan (2019) in terms of the allocations for the provision of new facilities for the management of residual waste to meet the needs of the Plan area.

Note that proposals for waste facilities will be expected to make use of sustainable construction practises including measures to reduce the use of primary materials, water and energy demands. This should be dealt with within the planning statement and/or the Construction, Environmental Management Plan.

Water environment (Section 16)

DC's Flood Risk Management Team (FRM) have been consulted on the scope of the EIA. FRM note the scoping report acknowledges the requirement for a surface water management strategy and states that *the introduction of a new surface water drainage system will affect runoff rates from the site*. It also confirms that the site is currently impermeable and *the proposed surface water drainage system will discharge into the sea.* However, sub-section 16.8 of the report clarify that a *flood risk assessment will be submitted in support of the planning application to address flooding and drainage and not be included within the EIA*.

It is considered that a conceptual strategy of surface water management will need to be included within the planning application to address flood risk and potential contamination. FRM will need to be assured that a viable and deliverable scheme of surface water management is to be incorporated within the proposed development prior to recommending appropriate planning conditions in respect of detailed design & maintenance considerations. It is agreed that this issue can be dealt with outside the ES but within planning application.

Dorset Council's EHO has also advised that the position of discharge into the sea should be carefully considered due to bathing waters and leisure activities within the vicinity of the site.

The Environmental Agency have provided the following response with regards to flood risk:

'We note that site specific flood risk has been scoped out of the Environment Statement. We have no objection to this given the site is shown in the low risk zone. However, we note that the application will be supported by a site specific flood risk assessment to demonstrate that the site is located outside of the current and future tidal flood zones.'

Further advice on the production of a FRA can be found on our website at: https://www.gov.uk/planning-applications-assessing-flood-risk and https://www.gov.uk/guidance/flood-risk-and-coastal-change#Site-Specific-Flood-Risk-Assessment-checklist-section

The pollution of the water environment during and post construction has been included within the scope of the EIA. This is agreed with and should include potential effects on Marine Conservation Zones, as well as the marine environment generally. DWT considers that the indirect effects of the proposal should also be included within the scope of the EIA as follows:

'Portland Harbour, whilst not statutorily designated, is a Sensitive Marine Area and thus habitat of national significance; it is unique in England for its deep sheltered mud habitats supporting sea pens. Indirect effects should also be considered in the assessment; for example, breeding little terns (an associated feature of Chesil Beach and the Fleet SPA) are known to forage within Portland Harbour, and any potential pollution of this resource might indirectly affect the integrity of the SPA.'

Reference should also be made to the storage and handling of the residue from the treatment process (bottom ash). Although it is likely that this issue can be scoped out, consideration should be given to the potential for impacts and details of regulatory regimes that would manage pollution.

Cumulative effects and alternatives (Section 17)

Cumulative effects - The full range of projects to be considered cumulatively with the proposed development should be agreed in advance with the WPA.

Paragraph 17.2 of the scoping report explains the scope of the cumulative effect's assessment. To ensure that the assessment is proportionate the scoping report proposes that only large-scale developments should be included. The scoping report explains that these are developments of over 150 dwellings or more than 1ha of non-residential development, in line with the thresholds in section 10(b) of Schedule 2 of the EIA Regulations. This is considered to be an appropriate starting point for consideration of cumulative impacts. However, there may be other developments locally that do not meet this threshold but are likely to be important considerations, particularly in the context of the Isle of Portland. Where other developments are flagged up by consultees, these need to be built into the assessment.

Natural England do not consider the thresholds suggested to be appropriate given that there is only one way on and off Portland which runs directly adjacent to international, national and local designated nature conservation sites. Consequently, it may be that small developments have a disproportionate cumulative effect. Given this, a methodology that takes account the traffic generation of all likely development, if necessary, by the use of appropriate, justified assumptions.

Dorset Councils Landscape Architect, the Dorset AONB Team and DWT have highlighted a large-scale warehousing development that is planned for a site to the immediate south-east of the site (WP/19/00514/SCRE). There is also a proposal for 98 dwellings at Royal Manor Arts College, Weston

Road to the south of the site (WP/19/00919/OUT). The cumulative effects of these development should be considered.

The ES need not necessarily include a specific topic on the assessment of cumulative impacts, rather, cumulative effects should be considered where relevant in each topic specific chapters of the ES.

Alternatives – it is likely that alternatives will be considered for each topic area rather than forming a separate chapter of the ES. As such, alternatives have also been referred to in this letter within the topic sections as necessary.

Non-technical Summary

The Environmental Statement must be accompanied by a separate Non-technical Summary of its content. This should be drafted in plain English and present an accurate and balanced account of the key findings of the ES

Final Notes

This letter provides Dorset Council's Opinion as to the information to be provided within the ES. This letter also includes recommendations for engagement on scope with other relevant bodies.

Professional judgement and experience has been used in order to come to this Opinion. However, it should be noted that when considering the ES, this Authority will not be precluded from requiring additional information from the applicant required to consider the application.

Yours sincerely

Emma Macdonald
Minerals and Waste Planning

Emma Macdonald

From: Rupert T Lloyd
Sent: 11 February 2020 12:25
To: Emma Macdonald
Subject: SCO/2020/0699 - Land at Portland Port

Hi Emma,

I've set out some comments below on behalf of Public Health Dorset.

Please let me know if you have any questions, or if you would like me to submit these online.

Best wishes,

Rupert

We have reviewed the request for an EIA scoping opinion and would like to submit the following points for consideration in your response to the applicant.

We will be grateful if you would notify Public Health Dorset of any future applications relating to the proposed development at phplanning@dorsetcc.gov.uk.

We also recommend consulting Dorset Clinical Commissioning Group (CCG) and Dorset Healthcare University NHS Foundation Trust (DHUFT) on any future application relating to the proposed development because of the presence of healthcare facilities within the vicinity of the site.

Health Impact Assessment (HIA)

- We welcome the applicant's intention to undertake an HIA as part of the EIA. We encourage the applicant to share details of the scope and methodology of the HIA with us and we will be happy to provide feedback on the proposed approach.
- Any Health Impact Assessment should include consideration of the potential impact of the proposed development on both physical and mental health.The World Health Organisation (WHO) defines health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' giving parity to both physical and mental wellbeing as components of health.
- This should include consideration of the potential impact of the proposed development on health inequalities and on potentially vulnerable populations e.g. the populations of HMP Verne and HMP Portland.
- The IEMA's 'Health in Environmental Impact Assessment: A Primer for a Proportionate Approach' sets out five principles for coverage of population health in EIA which the applicant may wish to consider.

Air Quality

We support the inclusion in any future EIA of the points raised by Dorset Council's Environmental Protection team in their letter to you dated 21/01/20. In particular, we would emphasis and/or add the following:

- It is important that consideration is given to the wider potential impacts of the proposed development on air quality across Dorset's wider transportation network beyond the vicinity of the site and the A354.
- Details of the sources of the RDF should be provided to allow full assessment of the impacts of vehicle movements generated by waste transport on air quality and population health and wellbeing.
- The scoping document refers at various points to an 'expected' and 'envisaged' throughput of 180,00 tonnes of waste per annum before stating in paragraph 15.9 that 'the proposed development will treat 180,000

tonnes of waste a year.' Is 180, 000 tonnes the maximum annual capacity of the proposed development and, if not, should the EIA be based on the maximum capacity of the proposed development?

Best wishes,

Rupert Lloyd

APPENDIX B HUMAN HEALTH RISK ASSESSMENT

Human Health Risk Assessment

Portland Energy Recovery Facility

25 August 2020

Project No.: 0552187

The business of sustainability

ERM

Document details	
Document title	Human Health Risk Assessment
Document subtitle	Portland Energy Recovery Facility
Project No.	0552187
Date	25 August 2020
Version	2.0
Author	Chris HazellMarshall
Client Name	Powerfuel Portland Ltd

Document history

				ERM approval to issue		
Version	Revision	Author	Reviewed by	Name	Date	Comments
Final	02	Chris HazellMarshall		Simon Aumônier	25 August 2020	
Draft	01	Chris HazellMarshall		Simon Aumônier	19 August 2020	

Signature Page

25 August 2020

Human Health Risk Assessment

Portland Energy Recovery Facility

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1. OVERALL HEALTH CONTEXT

1.1 The Alternatives

Waste management arrangements are intended to separate and collect for recovery as much useful waste material as possible, including recyclable and compostable components. However, Government believes that for the foreseeable future there will always be some residual waste that requires management after levels of recycling and composting have been maximised.

For this material, there are essentially only two treatment options: recovery; and disposal to landfill. In the case of landfill, there is little value recovered. The deposited waste materials will remain in situ for many years, with some materials effectively never degraded and assimilated safely into the environment. Landfill sites generate leachate, which has to be managed long after the site is closed. Landfilled waste also generates landfill gas, a mix of carbon dioxide, methane and various volatile organic compounds. Landfill gas is odorous, hazardous to health and contributes to global warming, with methane being a powerful greenhouse gas. Some landfill gas can be captured and used for heating or to generate electricity, noting that the collection system is not 100% effective. The combustion of landfill gas, whether flaring for controlled disposal, or in an engine for energy recovery produces emissions, particularly of sulphur dioxide and nitrogen dioxide. These emissions are typically unabated.

By contrast, recovery, in a energy recovery facility (ERF) such as that proposed at Portland, serves several purposes and is designed to derive the maximum value from those waste materials that are left after the maximum usable fraction has been removed.

Firstly, heat energy is released which can be used to generate electricity, off-setting fossil fuel generation. Where there are localised users, this heat can also be used for district or industrial heating, off-setting fossil fuel use. The biomass proportion of the residual waste is defined as a renewable fuel meaning that less fossil fuels are needed.

Secondly, combustion renders the waste biologically inert, with the result that no methane is released, and volatile organic compounds and odours are destroyed.

Thirdly, further useful products are recovered in the form of ferrous and non-ferrous metals extracted from bottom ash, and the ash itself which can be used as a secondary aggregate. In both cases, recovery off-sets the consumption of virgin raw materials that would otherwise be needed and reduces the total energy used to create new raw materials.

In the specific case of the Portland ERF, there is also the added benefit that the ERF plant is specifically designed to provide shore to ship power. When ships are in port they must operate their diesel engines to produce power to keep on-board systems operating. In the case of large cruise liners, this energy demand can be substantial. The electricity generated by the ERF plant will be used to provide shore to ship power, where the ships use this electricity instead of running their engines. This means that the ERF will substantially off-set emissions from ships using Portland.

1.2 Regulation of ERF Plants

Burning residual waste produces combustion gases. A modern ERF plant has a combustion chamber that is finely controlled to ensure optimum combustion and destruction of harmful substances. The ERF is fitted with a series of abatement plant to clean the flue gases. The plant is also designed specifically to avoid the creation of dioxins. This requires the rapid cooling of exhaust gases so that there is no time for de novo synthesis to occur. In fact, treatment in the plant is sufficiently effective that there is an overall net reduction in dioxins.

However, no emissions control system can be completely effective and trace amounts of some substances remain in the flue gases that are emitted to air. The flue stack of the plant is designed to ensure that the impacts of these emissions are not significant. Firstly the ERF must use Best Available Technology (BAT) and meet emission limits as set out in the European Best available

technique Reference Notes (Bref Notes). I n December 2019, new emission standards for new and existing plants came into force in the UK. These tighten further already very strict emission limits, and ensure that plants use BAT.

Furthermore, the plant must also be designed so that there are no significant effects when compared to ambient air quality standards. This requires a series of studies specific to the plant that take into account the location of the plant, terrain, meteorology, and plant-specific design parameters including stack height and stack emission parameters. This process is regulated by the Planning Authority (either national or local) and the Environment Agency and is also scrutinised by Public Health England and Natural England.

1.3 National Context

A comprehensive Air Quality Impact Assessment and Human Health Risk Assessment is required in support of both the Planning Permission and the Environmental Permit for the proposed facility. In order to be meaningful, the risks to health due to the emissions from the ERF need to be considered in context. As mentioned above, residual wastes are inevitable and must be managed appropriately, and the ERF offers many advantages over landfilling. In addition, the contribution of the ERF to the exposure of people to potentially harmful substances would be only a very small fraction of their overall exposure. For example, the Environment Agency states that UK ERF plants contribute 0.05% to total UK emissions of fine particulates, and 1.1% to total UK emissions of oxides of nitrogen. This compares to other contributions: to total emissions of fine particles from traffic of 5.4% and from wood burning of 34.3%; and to total emissions of oxides of nitrogen from traffic of 33.5% and wood burning of 0.6%.

The risks associated with emissions from the UK's ERF plants, such as that proposed at Portland, have been discussed by a range of authorities. Public Health England, the Environment Agency for England and the UK Government (through Defra) jointly state: "*modern, well-managed incinerators make only a small contribution to local concentrations of air pollutants… while it is possible that such small additions could have an impact on health, such effects, if they exist, are likely to be very small and not detectable*". They also state "*well run and regulated modern Municipal Waste Incinerators are not a significant risk to public health*".

There are 48 operational ERF plants in the UK. Some of these have been operational since the 1960s and have been continually upgraded to meet new emission standards. Others are very new plants, with the Javelin Park facility on the Gloucester fringe becoming operational in January 2020. These plants have made a strong contribution to reducing the disposal of waste to landfill, in line with the requirements of the Landfill Directive, UK policy and regulation and the recommendations of bodies such as the Committee on Climate Change in its 2019 Net Zero report. As a result, not only have emissions of methane been reduced, but valuable secondary materials recovered, also reducing emissions of greenhouse gases, and a valuable contribution made to the UK's energy and renewable energy needs and targets.

1.4 Particulate Matter

1.4.1 History and Context

Particulate matter is emitted from combustion processes. Most familiar is 'smoke' created when burning, for example from an open fire or a barbeque. Much attention has been paid to the potential health effects of particulate matter. Historically, attention has been paid to 'black smoke', and more recently the focus has been on specific size fractions. In the regulatory context, the focus has been on PM_{10}, which are particles of a diameter of <10µm, and $PM_{2.5}$, which are particles with a diameter <2.5µm. PM_{10} and $PM_{2.5}$ have been of particular interest as they are the size fractions capable of penetrating the upper respiratory tract (PM_{10}), and alveolar level of the lungs ($PM_{2.5}$).

More recently, attention has also turned to the smaller size fractions, commonly termed 'ultra-fine' particulates. These particles in the sub-2.5µm range are often classified into PM_1 or even $PM_{0.1}$. At this size range, the distinction between a 'particle' and a 'molecule' begins to become blurred. Unlike the larger PM_{10} and $PM_{2.5}$, PM_1 and $PM_{0.1}$ can be generated as secondary pollutants in the atmosphere due to the agglomeration of other pollutants. The interest in PM_1 and $PM_{0.1}$ arises from the fact that particles at this size range are capable of passing the air/blood barrier in the lungs and can therefore, potentially, affect more of the body than just the lungs. In addition, there is evidence that these ultrafine particles also affect the wider body by causing inflammation.

1.4.2 Context of ERF emissions

The ERF plant is equipped with bag filters that remove particulate matter from the exhaust gases. These filters have a very high efficiency, removing over 99.9% of all of the particulate matter from the exhaust flow. Furthermore, the filters are also highly efficient in removing very small particles due to 'agglomeration' effects (a useful analogy is 'running blindfold through a forest without running into a tree'). In the national context, ERFs are a very minor source of ultrafine particles.

Table 1.1 sets out the emissions of $PM_{0.1}$, PM_1, $PM_{2.5}$ and PM_{10} from ERF plants, based on the latest 2018 data. In 2018, over 11 million tonnes of wastes were treated by the 42 ERF plants operating in the UK. For comparative purposes, the UK's total emissions from ERF plants are set out along with emissions for some other common activities [1].

Table 1.1 ERF contribution to PM_1 and $PM_{0.1}$

Activity	Emissions (tonnes per year)				Emissions (as percentage of the total)			
	$PM_{0.1}$	**PM_1**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{0.1}$**	**PM_1**	**$PM_{2.5}$**	**PM_{10}**
Total	13047	46889	87247	96474	#	#	#	#
Waste incineration	16	73	84	84	0.12%	0.16%	0.10%	0.09%
Road transport	3129	4798	11983	18586	24%	10%	14%	19%
Domestic combustion	5037	21118	46791	47864	39%	45%	54%	50%
Bonfire night	145	526	1288	1386	1.1%	1.1%	1.5%	1.4%

Of note is that for PM0.1, for example, ERF plants contribute just 0.12% of the total emissions. Bonfire night alone results in emissions of 10 times more PM0.1 than released by all of the ERF plants in a whole year.

[1] National Atmospheric Emissions Inventory (NAEI) accessed August 2020 https://naei.beis.gov.uk/data/data-selector-results?q=135861

2. ASSESSMENT OF HUMAN HEALTH EFFECTS OF SO_2, NO_2, PM_{10} AND $PM_{2.5}$

2.1 Introduction

This report investigates the human health effects resulting from exposure to some of the substances emitted from the proposed ERF and road traffic. It does so by adapting the quantification methodology used by the Department of Health's Committee on the Medical Effect of Air Pollutants (COMEAP) and the Clean Air for Europe (CAFE) programme. These methods are as set out in the 1998 COMEAP report [1] and the CAFE report [2]. The assessment is based upon health response data from the 2009 COMEAP report[3] . Exposure to increased concentrations of pollutants such as particulate matter (PM), nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) is associated with effects on the human body including the respiratory system, brain and cardiovascular system, leading to increased morbidity and changes in mortality through mechanisms that are not yet fully understood.

It is likely that air pollution affects human health both in the short term and the long term. Short term effects are probably caused by air pollution having a marginal effect on an individual who is already vulnerable, either transiently or permanently. Long term effects may be due to the marginal effect of air pollution in contributing to the progression of chronic diseases that have other causes.

The methods developed by COMEAP and CAFE can be used to predict the health effects associated with developments such as this facility which will result in increased exposure to air pollutants.

2.2 Methodology

2.2.1 Background

Concentration-response functions for the effect of air pollution on health have been proposed based on a review of the available literature. The methodology used in this assessment combines the use of an exposure-response coefficient with details of the specific population affected and the predicted impact from the emissions of the pollution source. The approach to quantifying acute health effects for those pollutants where epidemiology has identified an association is encapsulated by the following linear equation:

$$\Delta E = \beta \times \Delta C \times P \times E,$$

where: $(\Delta)E$ = (change in) background rate of events;
β = exposure-response coefficient;
ΔC = change in concentration of pollutant;
P = population exposed.

2.3 Approach

The exposure-response coefficients used in this assessment are based upon data published by COMEAP. In a series of reports, COMEAP has drawn together a wide range of evidence from which to derive these factors. The epidemiological evidence from which these factors are derived is garnered from a large number of long term studies. As such, older data remain valid and informative for a long period of time and are rarely updated. The COMEAP reports reflect this, in that two reports from 2006 and 2009 contain the majority of the factors used, and subsequent reports have focused on specific topics and present factors only for specific issues.

[1] Committee on the Medical Effects of Air Pollutants (COMEAP) (1998) Quantification of the Effects of Air Pollution on Health in the United Kingdom Department of Health, The Stationery Office, London.

[2] AEA Technology (2005) Methodology for the Cost Benefit Analysis for CAFE. Volume 2: Health Impact Assessment Available at http://europa.eu.int/comm/environment/air/cafe/

[3] COMEAP (2009) Long Term Exposure to Air Pollution: Effect on Mortality.

PM_{10} and $PM_{2.5}$

Health effects associated with PM_{10} and considered in this report include:

- Cardiovascular mortality;
- Cardiovascular admissions;
- Cardiac admissions;
- Ischaemic heart disease admissions;
- Dysrhythmias;
- Heart failure admissions;
- Cerebrovascular admissions; and
- Mortality.

The linear equation in Section 2.2 is used for all of the health effects with the exception of mortality. For mortality, the CAFE methodology adopts the relationship between mortality and long-term exposure to fine particulate matter ($PM_{2.5}$) arising from a cohort study by the American Cancer Society [1]. It also takes the view that the results should be expressed in terms of life years lost, rather than numbers of deaths. This represents the current consensus view of the subject and is also consistent with the view of COMEAP, as set out in its report on the quantification of the long term effects on mortality [2].

In adopting this approach, a different method is required to the equation outlined above for acute effects that instead uses 'life tables'. Miller and Hurley [3] recognise that quantitative health impact assessments of chronic mortality, where the impacts are expected to be observed over a number of years, are complicated by the link between death rates and surviving populations. They have therefore developed a series of spreadsheets to predict the change in mortality based on the life table approach. A similar approach has been adopted in this assessment.

The calculation is carried out by determining the population affected by emissions from the ERF, and based on the life expectancy of men and women, calculating a baseline life expectancy for the population. For every microgram of $PM_{2.5}$ impact as a result of emissions from ERF, there is an associated risk that it will cause a decrease in life expectancy, or loss of life. Thus, the total emissions of $PM_{2.5}$ over the surrounding area of the ERF can be used to calculate what the estimated life years lost will be in terms of the total population exposed.

In June 2009, COMEAP published a second report on the 'Long-term Exposure to Air Pollution: Effect on Mortality'. The updated report summarises the new findings of a significant amount of research that has been undertaken since the publication of the 2001 report. It recommends coefficients which, when used in conjunction with methods developed for the Department of Health and the European Commission by the Institute of Occupational Medicine, will allow the calculation of the potential impact on mortality and life expectancy of specified reductions in concentrations of air pollutants. Although the coefficients have not changed since the previous 2001 report [4], the evidence base regarding the effects of long-term exposure to air pollutants has strengthened since it was published.

The dispersion model outputs for particulate matter are treated as being either PM_{10} or $PM_{2.5}$. In practice, almost all of the PM emitted will be in the size fraction 2.5 µm and less, because the fabric filter used will remove almost all of the particles with a larger diameter, whilst being least efficient at

[1] Pope CA, Burnett RT, Thun MJ, Calle EE, Kreswki D, Ito K, Thurston GD (2002) Lung cancer, cardiopulmonary mortality and long-term exposure to fine particulate pollution. Journal of the American Medical Association 287 1132-1141.

[2] COMEAP (2007) Long term Exposure to Air Pollution - Effects on Mortality. Draft report issued for comment July 2007.

[3] Miller B, and Hurley J: Life table methods for quantitative impact assessments in chronic mortality. Journal of Epidemiology and Community Health.2003; 57: 200-206.

[4] http://www.advisorybodies.doh.gov.uk/comeap/finallongtermeffectsmort2009.htm

around 1 µm. Incidentally, particles of size 0.1 µm and less will be very efficiently removed by the filter through inertial impaction processes.

Nitrogen Dioxide

Health effects associated with nitrogen dioxide and considered in this report include:

- Cardiovascular mortality;
- Cardiac admissions;
- Ischaemic heart disease admissions;
- Heart failure admissions;
- Cerebrovascular admissions; and
- Mortality.

The implications of exposure to NO_2 for respiratory hospital admissions can be considered through the use of the relationship cited by COMEAP (2006), which it took as a 0.038% increase in the rate of the health effect for every 1 µg m^{-3} rise in NO_2 concentrations.

Acute mortality and respiratory hospital admissions from NO_2 should be considered as an alternative to those data used for particulate matter and not in addition. This is because NO_2 may be acting as a marker for a particulate matter effect. Indeed, NO_2 concentrations may be a better marker for locally-emitted particulate matter and its association with health impact in the original epidemiological studies than are the actual PM_{10} concentrations observed, since the latter consist partly of the regional contribution. Likewise mortality and respiratory hospital admissions associated with SO_2 should not be added, as there may be some synergistic effects, ie the observed associations are not independent of each other.

Sulphur Dioxide

Health effects associated with sulphur dioxide and considered in this report include:

- Cardiovascular mortality;
- Cardiovascular admissions;
- Cardiac admissions;
- Ischaemic heart disease admissions;
- Heart failure admissions;
- Cerebrovascular admissions; and
- Mortality.

The implications of exposure to SO_2 could be considered through the use of the relationship used by COMEAP to estimate respiratory hospital admissions, which it took as a 0.05% increase in the rate of respiratory hospital admissions for every 1 µg m^{-3} rise in SO_2 concentrations, and for mortality a 0.06% increase using the linear equation presented previously.

2.3.2 Summary of Concentration-Response Coefficients

Coefficients for health outcomes used in this study and applied to the increased exposure to air pollution are shown in Table 2.1.

Table 2.1 Increases in Health Outcomes from Exposure to an Additional 1 µg m-3

Pollutant	Outcome	Factor used in assessment	Source
PM_{10}	All Mortality	0.0015	COMEAP (2018)
PM_{10}	Cardiovascular mortality	0.0009	COMEAP (2006)
PM_{10}	Cardiovascular admissions	0.0003	COMEAP (2006)
PM_{10}	Cardiac admissions	0.0009	COMEAP (2006)
PM_{10}	Ischaemic heart disease admissions	0.0008	COMEAP (2006)
PM_{10}	Dysrhythmias	0.0008	COMEAP (2006)
PM_{10}	Heart failure admissions	0.0014	COMEAP (2006)
PM_{10}	Cerebrovascular admissions	0.0004	COMEAP (2006)
$PM_{2.5}$	All Mortality	0.006	COMEAP (2018)
$PM_{2.5}$	Cardiopulmonary mortality	0.009	COMEAP (2009)
$PM_{2.5}$	Lung cancer mortality	0.008	COMEAP (2009)
$PM_{2.5}$	Cardiovascular mortality	0.0014	COMEAP (2006)
NO_2	All Mortality	0.00095	COMEAP (2018)
NO_2	Cardiovascular mortality	0.001	COMEAP (2006)
NO_2	Cardiac admissions	0.0013	COMEAP (2006)
NO_2	Ischaemic heart disease admissions	0.0006	COMEAP (2006)
NO_2	Heart failure admissions	0.0013	COMEAP (2006)
NO_2	Cerebrovascular admissions	0.0004	COMEAP (2006)
SO_2	Cardiovascular mortality	0.0008	COMEAP (2006)
SO_2	Cardiovascular admissions	0.0006	COMEAP (2006)
SO_2	Cardiac admissions	0.0024	COMEAP (2006)
SO_2	Ischaemic heart disease admissions	0.0012	COMEAP (2006)
SO_2	Heart failure admissions	0.0009	COMEAP (2006)
SO_2	Cerebrovascular admissions	0.0003	COMEAP (2006)

Sources: COMEAP (2018) Association of long term average concentrations of nitrogen dioxide with mortality; COMEAP (2016) Long term exposure to air pollution and chronic bronchitis; COMEAP (2009) Long-Term Exposure to Air Pollution: Effect on Mortality

2.3.3 COMEAP (2006) Cardiovascular Disease and Air Pollution Approach

Input data and their application

The essential data inputs for air pollution and health effects are:

- Dispersion modelling outputs from the modelling of the ERF and additional road traffic for PM_{10}, SO_2 and NO_2, expressed as annual mean ground level average concentrations (µg m^{-3}) in a spatial output for use with the GIS software ArcGIS;
- Population data, at the 'super output area level', based on the 2011 census; and
- Background rates of all relevant health outcomes (national and local).

The exposed population is defined by the boundaries of the dispersion modelling. Those who fall outside of the dispersion model domain are considered to be unexposed although in reality there will be a gradient of exposure down to zero.

The numbers of exposed people were counted within 10 exposure 'bands,' using GIS software.

The number of people at each exposure level is determined using population density data at the super output area level. This method assumes for pragmatic reasons that there is an equal distribution of people within each super output area and the number of people in each area determined on a pro rata basis.

Once the number of exposed people is known, it is possible to calculate the health effect from exposure to the additional pollutants arising from the operation of the ERF.

Box 2.1 Ship emissions

One of the key reasons for the siting of the proposed ERF is the provision of shore to ship power for vessels in the Portland harbour. Currently, it is not possible to provide power due to limitations in the capacity of the transmission network to Portland. As a result, ships in the harbour use their own engines to generate power. As this power is based on the use of the ships' diesel engines, emissions are inherently high and are not abated. The provision of shore to ship power will greatly reduce the emissions from ships 'hotelling' in the harbour, particularly cruise ships which require a significant amount of power while docked .

This assessment focusses only on the increases in exposure due to emissions from the ERF and road traffic, and does not consider the positive impacts on air quality and health due to the reduction in emissions from vessels in port. Emissions from ships delivering RDF to the proposed development have not been modelled because of the negligible number of vessel movements, the fact that impacts would be limited to the short period they would be in the dock while material was being unloaded and the small amount of power needed to maintain supply to the ship during berthing.

Outputs

Results are expressed as numerical estimates for the morbidity outcomes described above over a 30 year period (estimated life of plant) and also in life years lost.

2.4 The Context

The background statistics that were used to calculate the results were based on national data from various sources. National statistics for disease rates and life expectancy were used for this assessment and are presented in Table 2.2. The diseases assessed are those for which there are risk factors and baseline data available.

Table 2.2 Background Rates of Disease

Outcome	Description	Factor
All mortality	2018 crude deaths/1000 population for Dorset	12.5
Lung cancer mortality	Lung cancer mortality	0.547
Cardiovascular mortality	Under 75 mortality rate for all CV disease (2016-2018)	0.56
Cardiovascular admissions	Prevalence of cardiovascular disease (CVD), coronary heart disease (CHD), and stroke (CBVD) by nation and region, United Kingdom 2017	61.62

Outcome	Description	Factor
Ischaemic heart disease admissions	Prevalence of cardiovascular disease (CVD), coronary heart disease (CHD), and stroke (CBVD) by nation and region, United Kingdom 2017	18.15
Heart failure admissions	Total number of in-patient incidents in 2017/2018 = 208757, population 66.27 million	3.150098

2.5 Results

The study area used has a total population of 32,028. The distribution of the population is shown in Figure 2.1. The Air Quality Impact assessment identified the impacts of the emissions from the ERF and from the additional HGV traffic generated by the operation of the ERF plant. From these results, contour plots are generated and overlain on the population data. From these data, the additional exposure of the population in the study area is calculated. The exposure data is then combined with the number of baseline health outcomes and the risk factors for each pollutant used to calculate the additional health outcomes as a result of the operation of the ERF.

Figure 2.1 Population distribution

2.5.1 Additive Effects

The results for each pollutant are presented separately because of the high likelihood that the health effects estimated for each pollutant are not independent of each other. Adding the health effects together will result in an overestimate of the any health effects.

2.5.2 Years of life lost through exposure to $PM_{2.5}$

Application of the method results in an estimate of 0.64 years of life lost per year, distributed across the whole of the exposed population of 32,028. The measure of life years lost would not be equally distributed throughout the exposed population. Statistically, those in the highest exposure group would be most susceptible to a reduction in life years. However, leaving this qualification aside, the result averaged over the exposed population gives a reduction of approximately 10 minutes per person per year, or 5 hours if continually exposed throughout the 30 year lifetime of the plant.

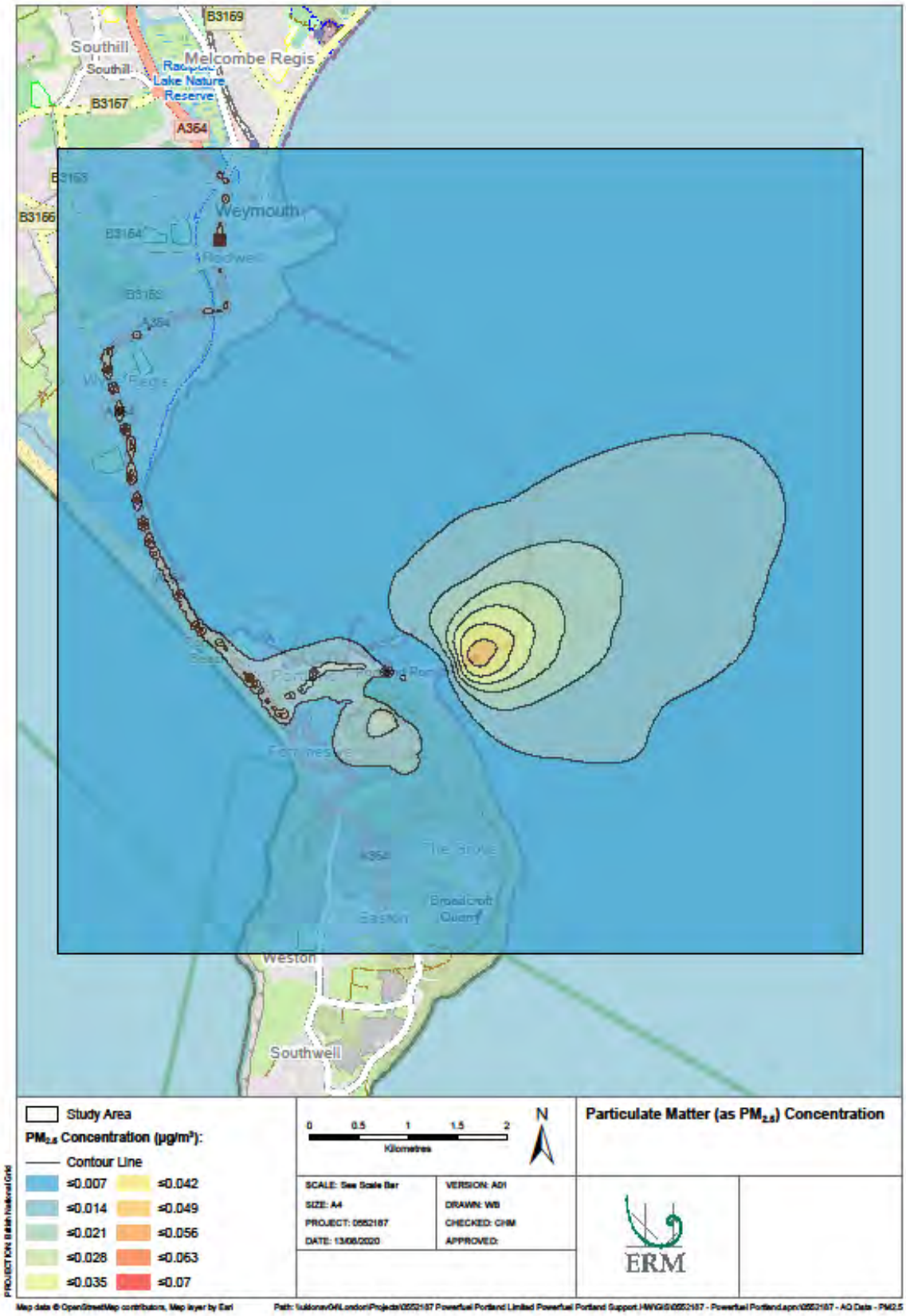
To put this figure into context, it can be compared with the reduction in life expectancy currently experienced as a result of existing air pollution. Public Health England (2014) calculate that 327 years of life are lost per year in the total population of Weymouth and Portland due to existing air quality[1]. For further context, people who have regularly smoked throughout their adult life lose approximately 4 years of life, compared to people who have never smoked[2].

Figure 2.2 shows the impact contour plots of PM2.5 combining plant emissions and traffic emissions.

[1] Public Health England (2014) Estimating Local Mortality Burdens Associated with Particulate Air Pollution https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/332854/PHE_CRCE_010.pdf

[2] ScienceDaily (August 31, 2013), Smokers Who Survive To 70 Still Lose Four Years Of Life, Citing Article In The European Society Of Cardiology Journal

Figure 2.2 PM2.5



2.5.3 Particulate Matter (PM_{10})

Figure 2.3 shows the impact contour plots of PM_{10} combining plant emissions and traffic emissions.

Figure 2.3 PM_{10}

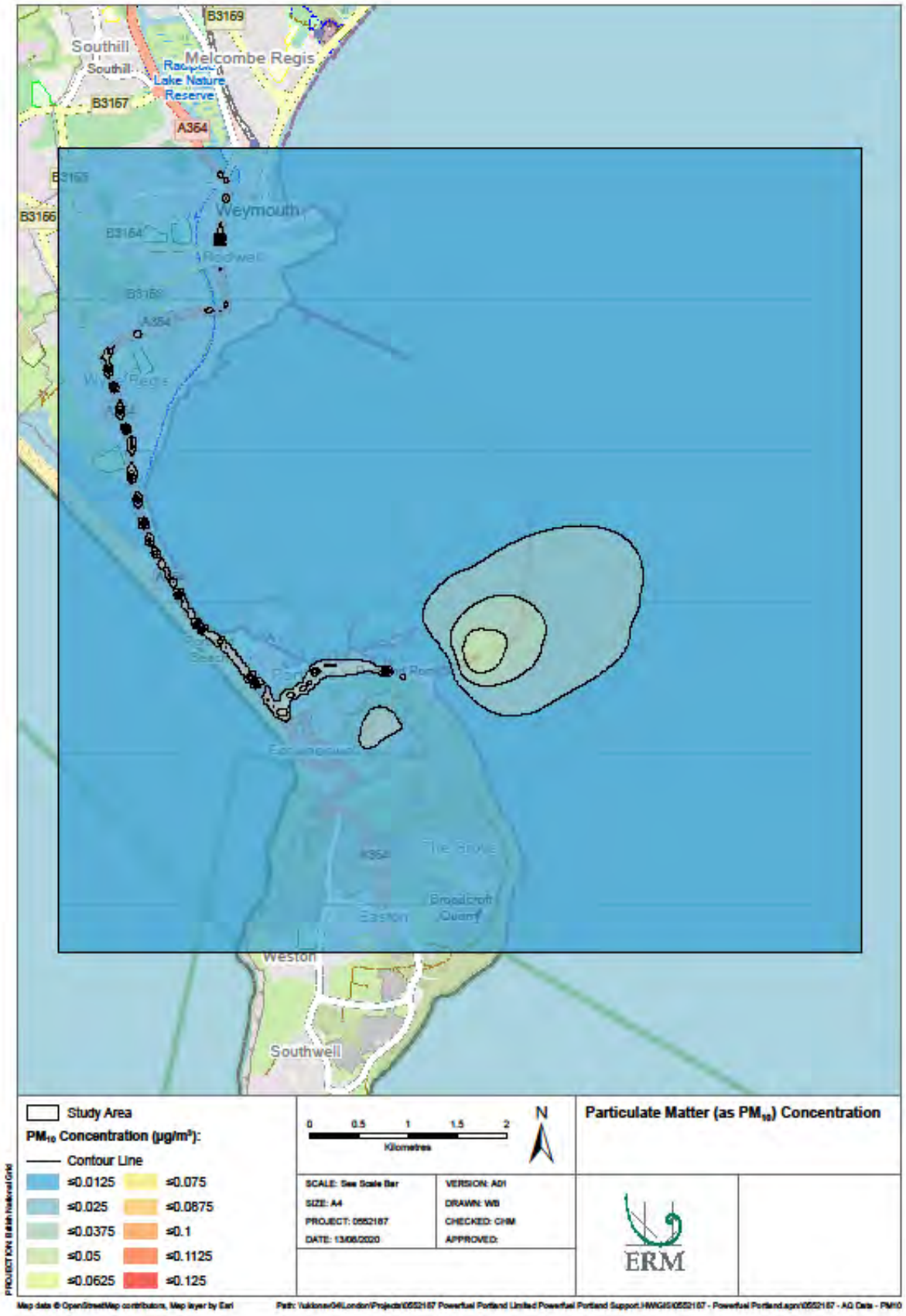


Table 2.3 Estimate of health effects from an increased exposure to PM_{10}

Outcome	Per annum	Per 30 years of operation	Number of years operation for 1 additional case
All mortality	0.0041	0.12	246
Cardiovascular mortality	0.00011	0.0033	9136
Cardiovascular admissions	0.0040	0.12	249
Ischaemic heart disease admissions	0.0032	0.095	317
Heart failure admissions	0.00096	0.029	1044

The increased exposure to PM_{10} will have an insignificant effect on the health of the local population. During the estimated 30 year operating period, there will not be expected to be a single additional case for any of the health indicators. Indeed, the ERF would have to operate for 246 years to generate sufficient pollution for one additional mortality case to arise.

To put these figures into context, for example, there are 18 cases of cardiovascular mortality in the Study Area each year compared to an additional 0.00011 cases due to the operation of the ERF.

2.5.4 Nitrogen Dioxide (NO_2)

Figure 2.4 shows the impact contour plots of NO_2 combining plant emissions and traffic emissions.

Figure 2.4 NO_2

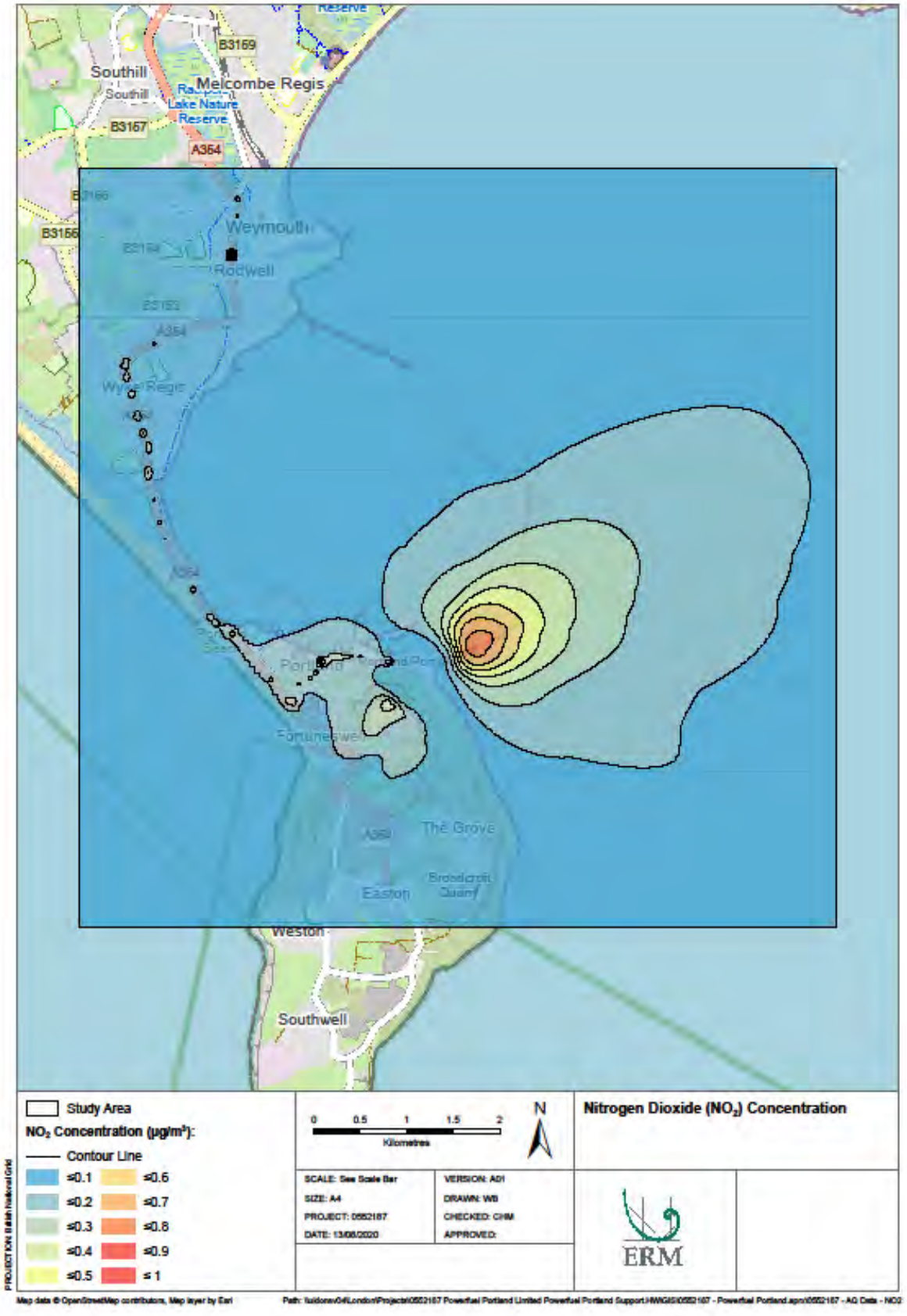


Table 2.4 Estimate of health effects from an increased exposure to NO_2

Outcome	Per annum	Per 30 years of operation	Number of years operation for 1 additional case
All Mortality	0.022	0.67	45
Cardiovascular mortality	0.0011	0.03	948
Ischaemic heart disease admissions	0.021	0.62	49
Heart failure admissions	0.0077	0.23	130
Cerebrovascular admissions	0.0062	0.19	160

To put these figures into context, they can be compared to the total number of Ischaemic Heart Disease (Coronary Heart Disease) primary diagnoses. In the Study Area, there are 581 cases of Ischaemic Heart Disease each year, compared to an additional 0.021 cases due to the operation of the ERF.

2.5.5 Sulphur Dioxide (SO_2)

Figure 2.5 shows the impact contour plots of SO_2 combining plant emissions and traffic emissions.

Figure 2.5 SO_2

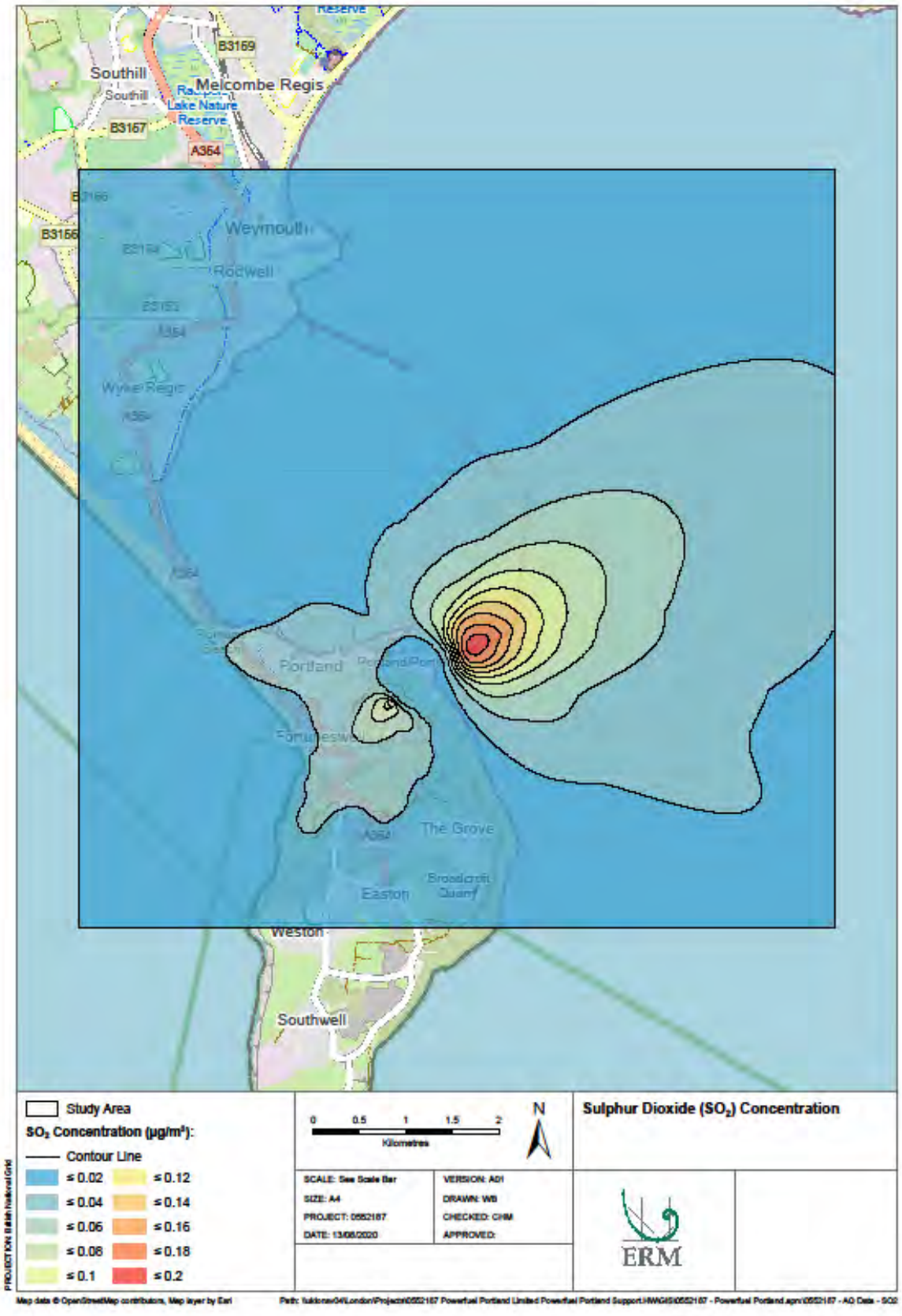


Table 2.5 Estimate of health effects from an increased exposure to SO_2

Outcome	Per annum	Per 30 years of operation	Number of years operation for 1 additional case
Cardiovascular mortality	0.00018	0.0053	5696
Cardiovascular admissions	0.014	0.43	69
Ischeamic heart disease admissions	0.0085	0.256	117
Heart failure admissions	0.0011	0.033	900
Cerebrovascular admissions	0.00097	0.029	1027

The increased exposure to SO_2 will have an insignificant effect on the health of the local population. During the estimated 30 year operating period, there will not be an additional case for any of the health outcomes considered. Again, to put these figures into context, there are 581 cases of Ischaemic Heart Disease in the Study Area each year compared to an additional 0.0085 cases due to the operation of the ERF.

2.6 Conclusions

The health effects associated with emissions of NO_2, SO_2, PM_{10} and $PM_{2.5}$ from the ERF are shown to be very small and could reasonably be described as negligible, especially in comparison to the health effects associated with the existing exposure to atmospheric pollutants and the existing background events for the effects considered.

Furthermore, these impacts are considered only in the context of the increase in $PM_{2.5}$, PM_{10}, NO_2 and SO_2 arising from the operation of the ERF and associated HGV traffic. What is not considered here is the off-set that will be achieved with the provision of shore to ship power provision in Portland. The update of shore to ship power will greatly reduce the emissions of $PM_{2.5}$, PM_{10}, NO_2 and SO_2 arising from shipping emissions, as ships will no longer need continually to run engines to provide power.

Moreover, it is important to recognise that the ERF is treating and disposing of large quantity of waste which must be dealt with by some means. This would very likely be landfill, which is also associated with emissions to air and road traffic. Therefore, the assessment of health effects does not take place against a ‘zero effect’ alternative. All options have some implications for health.

3. LIFETIME HEALTH RISKS

3.1 Scope of the Assessment

The emissions from the proposed ERF plant will contain a number of substances that cannot be evaluated in terms of their effects on human health simply by reference to ambient air quality standards. Health effects occur through exposure routes other than purely inhalation and are cumulative over a lifetime. As such, an assessment needs to be made of the overall human exposure to the substances by the local population and then the risk that this exposure causes.

The assessment presented here considers the impact of certain substances released by the ERF plant on the health of the local population. These substances are those that are 'persistent' in the environment and have several pathways from the point of release to the human receptor. These are generically referred to as 'Contaminants of Potential Concern' (COPCs). The COPCs of interest are dioxins/furans and some metals.

The exposure scenarios used here represent a highly conservative situation in which all exposure assumptions are chosen to represent a worst case and should be treated as an extreme view of the risks to health. The possibility of all high end exposure assumptions accumulating in one individual is, for practical purposes, never realised. Therefore, intakes presented here should be regarded as an extreme upper estimate of the actual exposure that would be experienced by the real population in the locality.

3.2 Approach to the Assessment

The risk assessment process for dioxins/furans and metals is based on the application of the US EPA Human Health Risk Assessment Protocol (HHRAP) 1. This protocol has been assembled into a commercially available model developed by Lakes Environmental, Industrial Risk Assessment Program (IRAP-h, Version 5.1).

The approach seeks to quantify the *hazard* faced by the receptor, the *exposure* of the receptor to the COPC identified as being a potential hazard and then to assess the *risk* of the exposure, as follows.

- **Quantification of the exposure**: an exposure evaluation determines the dose and intake of key indicator chemicals for an exposed person. The dose is defined as the amount of a substance contacting body boundaries (in the case of inhalation, the lungs) and intake is the amount of the substance absorbed into the body. The dose is therefore dependant on:
  - Location of the exposed individual and duration of exposure;
  - Exposure rate;
  - Emission rate from the source.
- **Risk characterisation**: following the above steps, the risk is characterised by examining the toxicity of the COPCs to which the individual has been exposed, and evaluating the significance of the calculated dose in the context of probabilistic risk.

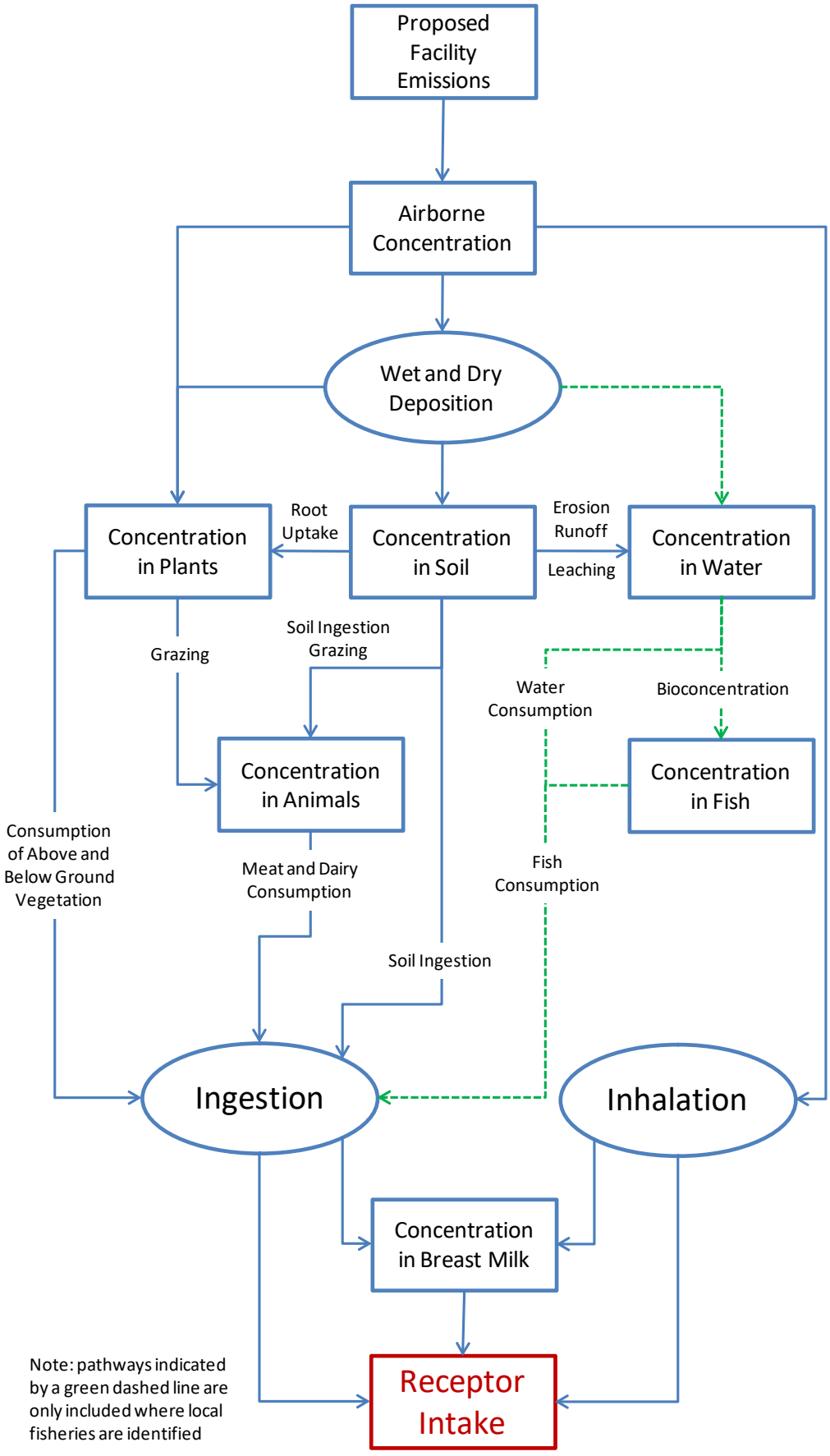
The risk of developing cancer due to exposure to the COPCs is then calculated across the lifetime of an exposed person.

3.2.1 Potential Exposure Pathways

All of the possible exposure pathways included in the IRAP model are shown in Figure 3.1. However, in this case several of these pathways are not applicable.

1 US EPA Office of Solid Waste (September 2005) Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities

Figure 3.1 All Possible Exposure Pathways for Receptors



There are two primary exposure 'routes' where humans may come into contact with COCPs: direct inhalation; and indirectly through ingestion of vegetation, and animals and animal products that become contaminated through the food chain. Given the local context, two exposure scenarios have been assessed for local residents, as follows.

- **Scenario 1** is a person who lives within the study area, and undertakes recreational activities such as gardening. This means that exposure is via inhalation, dermal contact with soil and some incidental ingestion of soil. However, this person does not cultivate food at home, and does not consume locally grown food, for example fruit and vegetables, eggs, chickens or meat.
- **Scenario 2** is a person who lives within the study area, and undertakes recreational activities such as gardening. This person does cultivate food at home, and does consume locally grown food, including fruit and vegetables, eggs and chickens. However, this person does not consume locally farmed larger animals such as pigs or cattle. This means that exposure is via inhalation, dermal contact with soil, incidental ingestion of soil and via intake through food grown at the property.

In scenario 2 the total intake will be greater, as this person is also exposed via the food chain due to consuming locally grown produce.

The following exposures are assumed to be negligible:

- Dermal contact with soil, given the sporadic nature of exposure and the very low dermal uptake rate;
- Contact with contaminated water when swimming and through consumption of locally caught fish due to the sporadic nature of exposure, and the fact that in the marine environment sea water is continually circulated away from the port so accumulation does not occur;
- Drinking water, as all properties are assumed to be on mains water or drawn from a borehole (contamination pathway would only be via surface water, which does not occur); and
- There is no significant livestock rearing in the study area, and therefore consumption of locally grown beef and pork is not considered.

3.2.2 Compounds of Potential Concern (COPCs)

The COCPs that have been included for this assessment are those that are permitted emissions and which are included in the EPA HHRAP COPC database for the assessment of long term health effects. Therefore, the following have been considered as COPCs for the proposed ERF:

- Dioxins and Furans (note that the worst case assumption is made that all emissions are as the most hazardous TCDD congener);
- Antimony (Sb);
- Arsenic (As);
- Cadmium (Cd);
- Chromium (Cr), trivalent and hexavalent;
- Lead (Pb);
- Mercury (Hg);
- Nickel (Ni); and
- Thallium (Tl).

3.2.3 Emission Concentrations for the COPCs

The emission concentrations and impacts for dioxins/furans and metals are reported in the air quality impact assessment (Technical Appendix D).

Box 3.1 Metals emissions

In Technical Appendix D an explanation is provided on the method for deriving emission concentrations for metals, using the methodology set out by the Environment Agency. In Technical Appendix D the 'maximum' emissions have been used in the assessment. However, in this assessment the 'mean' emissions are used to calculate the metals emissions.

This approach is appropriate in order to accurately reflect the long term assessment scenarios and avoid overstating impacts through the combination of multiple worst case assumptions.

Table 3.1 Emission Rates Used in the IRAP Model

COCP	Emission (g/s)
Dioxins	2.34×10^{-9}
Antimony	1.43×10^{-3}
Arsenic	4.69×10^{-4}
Cadmium	7.81×10^{-4}
Chromium III	1.07×10^{-3}
Chromium VI	1.31×10^{-5}
Lead	2.54×10^{-3}
Mercury	7.81×10^{-4}
Nickel	7.99×10^{-4}
Thallium	7.81×10^{-4}

In terms of mercury, the worst case assumption is made that there are no losses to the global cycle, and all mercury is available for deposition from the vapour phase.

The general term dioxins denotes a family of compounds, with each compound composed of two benzene rings interconnected with two oxygen atoms. There are 75 individual dioxins, with each distinguished by the position of chlorine or other halogen atoms positioned on the benzene rings. Furans are similar in structure to dioxins, but have a carbon bond instead of one of the two oxygen atoms connecting the two benzene rings. There are 135 individual furan compounds. Each individual furan or dioxin compound is referred to as a congener and each has a different toxicity and physical properties with regard to its atmospheric behaviour. In this case, the assumption is made that all dioxins are emitted as 2,3,7,8 TCDD, the most hazardous cogener. This represents the worst case approach. This approach was used in this case as uptake into the food chain, and accumulation in larger farmed animals is not a consideration and this exposure rate dominates exposure.

Deposition to soils for the IRAP model has been calculated from the air quality modelling results. This calculation requires particle size and deposition rate. Particle size distribution was derived from Jones and Harrison (2016) [1], and identified particle mode at 0.1µm and deposition velocity was derived from Gronholm et al. (2007) [2], with a deposition velocity of 0.4cm/s.

3.2.4 Input Parameters for the IRAP Model

As discussed in Section 3.2.1, two exposure scenarios have been considered. These are essentially the same, with the exception that one scenario includes consumption of locally grown vegetables, poultry and eggs.

The receptor types can also be divided into adults and children. Children are important receptors because they tend to ingest soil and dusts directly and have lower body weights, so that the effect of the same dose is greater in the child than in the adult. However, a child's exposure is less significant for cancer outcomes given the shorter exposure time in childhood compared to whole lifetime exposure.

The IRAP model contains a database of physical and chemical parameters for each of 206 COPCs. This database is based on default values provided by the HHRAP and all default values have been used for this assessment.

3.2.5 Site and Site-Specific Parameters

The IRAP health risk assessment model requires information relating to the location and its surroundings. The parameters required include the following.

- The fraction of animal feed (grain and forage for poultry) grown on contaminated soils and quantity of animal feed and soil consumed by poultry is considered.
- The interception fraction for above ground vegetation, forage and silage and length of vegetation exposure to deposition. The yield/standing crop biomass is also required.
- Input data for assessing the risks associated with exposure to breast milk, including:
  - body weight of infant;
  - exposure duration;
  - proportion of ingested COPC stored in fat;
  - proportion of mother's weight that is fat;
  - fraction of fat in breast milk;
  - fraction of ingested contaminant that is absorbed; and
  - half-life of dioxins in adults and ingestion rate of breast milk.
- Other physical parameters (e.g. soil dry bulk density, density of air, soil mixing zone depth).

For all of these parameters, the IRAP/EPA HHRAP default values have been used. Other site-specific parameters are also required which are not provided by the IRAP model. These parameters were specified for the proposed ERF plant location as follows:

- Annual average evapotranspiration rate of 55 cm a^{-1} (assumed to be 70% of total precipitation);
- Annual average precipitation of 78.5 cm a^{-1} (based on 2004 meteorological data);
- Annual average irrigation of 0 cm a^{-1};

[1] Jones A. Harrison R. (2016) Emission of ultrafine particles from the incineration of municipal solid waste: A review Atmospheric Environment Vol. 140

[2] Gronholm T. Aalto P, Hiltunen V et al (2007) Measurement of aerosol particle dry deposition velocity using the relaxed eddy accumulation technique Tellus Vol 59, Issue 3

- Annual average runoff of 7.8 cm a^{-1} (assumed to be 10% of total precipitation); and
- A time period over which deposition occurs of 30 years.

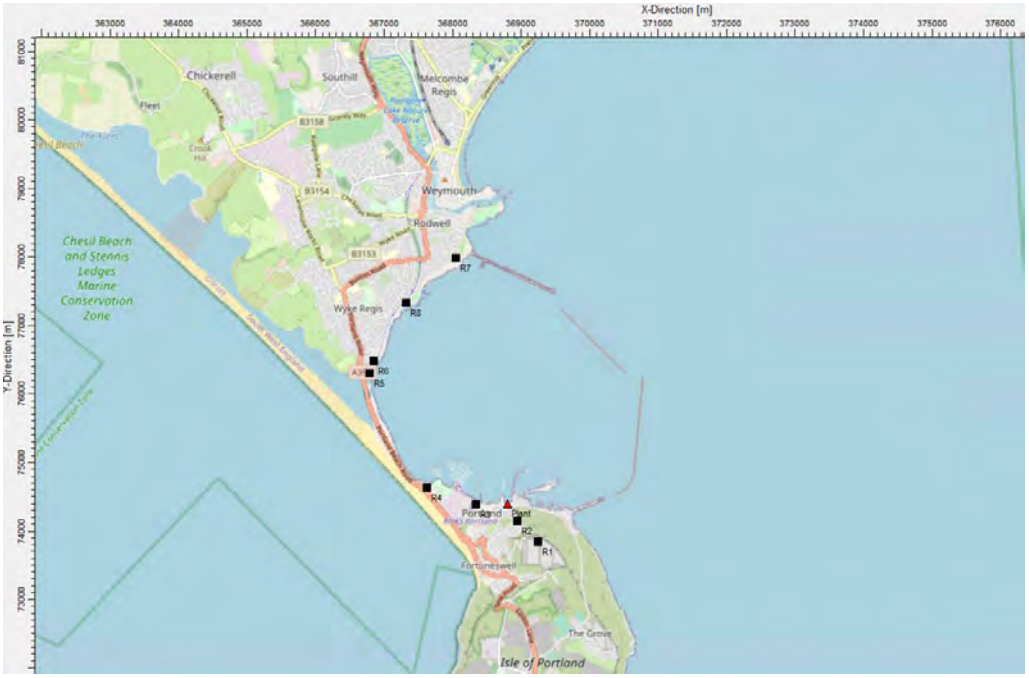
3.2.6 Receptors

In addition to the two exposure scenarios described, eight representative receptor locations have been identified. These are set out in Table 3.2 and Figure 3.2.

Table 3.2 Receptors

ID	Location	X	Y	Notes
R1	Fortuneswell, Portland	369250	73840	Highest terrestrial value anywhere receptor present
R2	East Weare Road, Portland	368923	74138	
R3	Castletown, Portland	368374	74358	
R4	Property on Hamm Beach Road, Portland	367638	74598	
R5	Smallmouth Close, Weymouth	366775	76295	
R6	Dowman Place, Weymouth	366853	76462	
R7	Redcliffe View, Rodwell	368089	77993	
R8	Old Castle Road, Weymouth	367310	77299	

Figure 3.2 Receptors



3.2.7 Assessment of Non-carcinogenic and Carcinogenic Risk

Non-carcinogenic Risk

The non-carcinogenic effect of the emissions on human health can be assessed in terms of the Hazard Quotient (HQ). For ingestion, the HQ is calculated as the Average Daily Dose (ADD) divided by the reference dose (RfD). For example, the HQ for ingestion exposure for cadmium (Cd) is calculated as follows:

$$HQ_{Ing,\,Cd} = \frac{ADD_{Ing,\,Cd}}{RfD_{Ing,\,Cd}}$$

Where:

$$ADD_{Ing,\,Cd} = \frac{I_{Ing,\,Cd} \bullet ED \bullet EF}{AT \bullet 365}$$

Where: $ADD_{Ing,\,Cd}$ = ingestion dose for cadmium; ED is the exposure duration (dependent on the receptor type); EF is the exposure frequency (350 days per year); and AT is the averaging time (equal to ED for non-carcinogenic effects and 70 years for carcinogenic risks).

For inhalation, the HQ is calculated as the exposure concentration divided by the reference concentration (RfC). For example, the HQ for inhalation exposure for cadmium (Cd) is calculated as follows:

$$HQ_{Inh,\,Cd} = \frac{EC_{Cd} * 0.001}{RfC_{Inh,\,Cd}}$$

Where:

$$EC_{Cd} = \frac{C_a \bullet ED \bullet EF}{AT \bullet 365}$$

Where: EC_{Cd} is the exposure concentration (µg m 3), $RfC_{Inh,\,Cd}$ is the reference concentration for cadmium (mg m^3) and Ca is the concentration of cadmium in air.

The Reference Dose and Reference Concentration for each COPC and exposure pathway is provided in Section 4.7. The RfDs and RfCs are set conservatively, that is they are protective of health and doses at or greater than the RfD or RfC indicate the potential for effect, rather than clear and certain indication of an effect. For example, should the maximum daily intake for the new source, in this case the proposed ERF plant, be equal to the RfD, then the HQ would be equal to 1.0 and this would indicate the potential for a health effect. On the other hand, a hazard quotient of less than unity (1.0) implies that such an exposure would not create an adverse non-carcinogenic health effect.

The Hazard Index (HI) is the sum of the individual COPC/pathway HQs and assumes that there are no synergistic or antagonist health effects arising from the release. The smaller the HI, the less risk to human health is implied.

The risk of interest in this context is the extra lifetime risk associated with the total dose resulting from exposure to the proposed ERF plant emissions. For each COPC, the US EPA has calculated a carcinogenic slope factor (CSF). These are calculated for ingestion exposure whereas for inhalation exposure, a unit risk factor (URF) has been adopted. Where the CSF or URF is zero, this indicates that the COPC is non-carcinogenic via that exposure route. The IRAP model uses these values to calculate a cancer risk for each pollutant and for each pathway for exposure, so that the results can be expressed in a high degree of detail.

The risk associated with the ingestion exposure (food, water and soil) of cadmium is calculated as follows:

$$Risk_{Ing,\,Cd} = ADD_{Ing,\,Cd} \bullet CSF_{Ing,\,Cd}$$

Where $ADD_{Ing, Cd}$ is the sum of the average daily dose from all ingestion exposure routes.

The risk associated with the inhalation of cadmium is calculated as follows:

$$Risk_{Inh, Cd} = EC_{Cd} \bullet URF_{Inh, Cd}$$

3.2.8 Defining Significance

In order to quantify the risks, the following significance thresholds are used:

- For non-carcinogenic risks the threshold is 1.0. Where a value less than 1.0 is predicted, then health risk is insignificant.
- For the purposes of this study, guidelines on cancer risk from the World Health Organisation have been used. The WHO sets two thresholds:
  - A risk of 1 in 100,000 lifetime risk is considered 'maximum tolerable risk'; and
  - A risk of 1 in 1,000,000 lifetime risk is considered 'acceptable risk' at which no further improvements to safety need to be made.

3.3 Assessment of Non-Carcinogenic Effects

3.3.1 Summary of Non carcinogenic Effects

The Hazard Index (HI) calculated by IRAP for emissions from the ERF plant for each of the nine receptors (adult and child) is presented in Table 3.3.

Table 3.3 Non-Cancer Risk

Scenario	Receptor	Exposures	R1	R2	R3	R4	R5	R6	R7	R8
Significance Threshold						**1.0**				
1	Adult	No home grown produce, assume no soil ingestion	$5.14X10^{-4}$	$1.71X10^{-4}$	$2.02X10^{-4}$	$1.20X10^{-4}$	$4.35X10^{-5}$	$4.09X10^{-5}$	$3.58X10^{-5}$	$4.35X10^{-5}$
1	Child	No home grown produce, assume some soil ingestion	$8.81X10^{-4}$	$2.94X10^{-4}$	$3.46X10^{-4}$	$2.05X10^{-4}$	$5.51X10^{-5}$	$7.09X10^{-5}$	$3.58X10^{-5}$	$7.52X10^{-5}$
2	Adult	Home grown produce – fruit and vegetables, chicken, eggs (no home grown milk, beef or pork)	$1.13X10^{-2}$	$3.79X10^{-3}$	$4.64X10^{-3}$	$2.63X10^{-3}$	$9.77X10^{-4}$	$9.27X10^{-4}$	$8.03X10^{-4}$	$9.81X10^{-4}$
2	Child	Home grown produce – fruit and vegetables, chicken, eggs (no home grown milk, beef or pork)	$2.67X10^{-2}$	$8.97X10^{-3}$	$1.05X10^{-2}$	$6.22X10^{-3}$	$2.31X10^{-3}$	$2.19X10^{-3}$	$1.89X10^{-3}$	$2.31X10^{-3}$

The HIs are substantially below the significance threshold of 1.0 and therefore the conclusion is reached that there will not be significant effects at any receptors.

3.4 Assessment of Carcinogenic Effects

The total lifetime cancer risk calculated by IRAP for emissions from the ERF plant for each of the receptors is presented in Table 3.4.

Table 3.4 Results – Cancer Risk

Scenario	Receptor	Exposures	R1	R2	R3	R4	R5	R6	R7	R8
Significance Threshold		1.0X10-6 (1 in 1,000,000 lifetime risk)								
1	Adult	No home grown produce, assume no soil ingestion	$3.11X10^{-8}$	$1.03X10^{-8}$	$1.22X10^{-8}$	$7.29X10^{-9}$	$2.63X10^{-9}$	$2.48X10^{-9}$	$2.17X10^{-9}$	$2.63X10^{-9}$
1	Child	No home grown produce, assume some soil ingestion	$6.26X10^{-9}$	$2.08X10^{-9}$	$2.46X10^{-9}$	$1.46X10^{-9}$	$5.29E^{-10}$	$4.98E^{-10}$	$4.36E^{-10}$	$5.29E^{-10}$
2	Adult	Home grown produce – fruit and vegetables, chicken, eggs (no home grown milk, beef or pork)	$4.84X10^{-8}$	$1.61X10^{-8}$	$1.64X10^{-8}$	$1.13X10^{-8}$	$4.11X10^{-9}$	$3.87X10^{-9}$	$3.38X10^{-9}$	$4.11X10^{-9}$
2	Child	Home grown produce – fruit and vegetables, chicken, eggs (no home grown milk, beef or pork)	$8.71X10^{-9}$	$2.90X10^{-9}$	$2.82X10^{-9}$	$2.03X10^{-9}$	$7.41E^{-10}$	$6.99E^{-10}$	$6.10E^{-10}$	$7.42E^{-10}$

The risk of cancer in all receptors are substantially below the 1 in 1 million threshold of significance set by the WHO. On this basis, there is negligible risk of cancer due to emissions form the ERF plant.

3.5 Summary and Conclusions

The assessment considered the potential impacts of emissions on human health. Eight representative receptor locations were identified in Portland and Weymouth, including the location where the highest impacts on a terrestrial location are predicted to arise.

Two exposure scenarios were considered. One considered a resident living close to the plant, and not growing any food at home. A second scenario was also considered where the resident is eating fruit, vegetables, chicken and eggs reared on their property. Consideration was also made of the relative difference in exposure of adults and children.

The assessment is worst case, insomuch as the assumption is made that the residents are exposed for 350 days per year, for a 70 year lifetime. However, in order to reflect a more realistic case, the 'average' emissions of metals is used rather than the 'maximum' that was used in the air quality impact assessment.

The assessment concluded that the risk to health due to emissions from the ERF plant are negligible, in terms of both carcinogenic and non-carcinogenic risks.

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