POWERFUEL

Portland energy recovery facility

Environmental statement
ERRATUM VERSION

6

Community, health and economic effects

6 Community, health and economic effects

Introduction

6.1 This chapter analyses the community, health and economic effects arising from the proposed development. The assessment examines the effects of the proposals on the host community, including the health and wellbeing of the existing population, local businesses and the economy. It also examines issues associated with the public perception of energy recovery facilities (ERF).

6.2 The assessment has been informed by the economic impact assessment, human health risk assessment (HHRA) and health impact assessment (HIA) undertaken by ERM. These reports form technical appendices F (economics) and G (health) to the ES.

Legislation and policy

6.3 The following documents were examined for policies that relate to community, health and economic issues associated with waste management, and particularly ERFs:

- *National Planning Policy for Waste* (2014)
- National Planning Policy Framework (NPPF; 2019)
- National Planning Practice Guidance: Waste (NPPG; 2015)
- *Waste Management Plan for England* (2013)
- *Our Waste, Our Resources: A Strategy for England* (2018)
- Bournemouth, Christchurch, Poole and Dorset Waste Plan (adopted 2019)
- West Dorset, Weymouth & Portland Local Plan (adopted 2015)
- Portland Neighbourhood Plan Referendum Version (2020)

6.4 Paragraph 5 of the *National Planning Policy for Waste* states that local planning authorities should take account of the cumulative impact of existing and proposed waste disposal facilities on the wellbeing of the local community, including any significant adverse effects on environmental quality, social cohesion and inclusion, or economic potential. Paragraph 7 states that, when determining waste planning applications, waste planning authorities should consider the likely impact on the environment and amenity and the locational implications of any advice on health from the relevant health bodies.

6.5 The NPPF does not set out any specific waste policies, as national waste planning policy is contained in the above document. However, it states that, when determining applications for waste developments, authorities should have regard to the policies of the NPPF where relevant. The NPPF includes policies relating to promoting healthy and safe communities and achieving economic growth. The NPPG states that local planning authorities can ensure that waste is handled in a manner that protects human health and the environment by:

- Testing the suitability of proposed sites against criteria set out in the *National Planning Policy for Waste*
- Putting in place suitable planning conditions and adequate enforcement and monitoring

- Working closely with environmental health colleagues
- Consulting with Public Health England and the Environment Agency for advice on public health matters and pollution control

6.6 The *Waste Management Plan for England* and *Our Waste, Our Resources: A Strategy for England* do not contain any specific policies relating to the community, health and economic impacts of waste management. However, the former highlights the need to *"protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use"* and that waste should be managed *"in a way that guarantees a high level of protection of the environment and human health."*

6.7 Policy 13: Amenity and quality of life of the adopted Bournemouth, Christchurch, Poole and Dorset Waste Plan (2019) states that proposals for waste management facilities will be permitted where it is demonstrated that any potential adverse impacts on amenity arising from the operation of the facility and associated transport can be satisfactorily avoided or mitigated to an acceptable level. It states that at least the following factors should be addressed:

- Noise and vibration
- Airborne emissions, including dust
- Odour
- Litter and windblown materials
- Vermin, birds and pests
- Lighting and loss of light
- Loss of privacy
- Visual impact
- Site-related traffic impacts
- Stability of the land at and around the site, both above and below ground level

6.8 The adopted West Dorset, Weymouth & Portland Local Plan (2015) does not contain any policies relating specifically to waste management facilities. However, it does have a general policy on amenity (policy ENV16), which states that development proposals will only be permitted provided that they do not generate unacceptable pollution, vibration or detrimental emissions unless it can be demonstrated that the effects on living conditions, health and the natural environment can be mitigated to the appropriate standard. The local plan also identifies Portland Port as a key economic site and associated policies (ECON1 and ECON2) allow for the protection of such sites and the provision of employment.

6.9 The Portland Neighbourhood Plan Referendum Version (2020) also does not contain any policies relating specifically to waste management facilities. Policy Port/BE2 relates to existing employment sites, which includes the application site as part of Portland Port. The policy states that proposals that lead to the improvement, modernisation or upgrading of current employment sites will be welcomed and supported, subject to there being no significant adverse effects on the amenity of neighbours, visitor attractions and facilities, and the character of the area. Policy Port/BE6 relates to the Northern Arc, which includes Portland

Port and the application site, and states that a comprehensive strategic planning approach that will realise the economic and employment potential of the area, whilst aiming to improve its environmental quality, is supported.

6.10 In addition, local economic growth strategies are also relevant to the proposed development. The *Portland Economic Vision and Plan* (Portland Community Partnership, 2016) sets out the vision, objectives and proposed measures towards securing economic growth for Portland over a 15-year period. Relevant strategic objectives in the plan include SO1: Business transformation, which supports the growth and development of businesses and focuses on maritime, advanced engineering and renewable energy, SO2: Destination development, which supports the sustainable growth of the visitor economy, and SO3: Low carbon economy, which supports the development of a low carbon economy on the island.

6.11 The *Western Dorset Economic Growth Strategy* (Western Dorset Economic Growth Partnership, 2017) highlights the Weymouth and Portland areas as significant economic growth zones and identifies Portland Port as a strategically important port in the area. Dorset Local Enterprise's (2014) *Strategic Economic Plan: Transforming Dorset* states that the port is a gateway to domestic and international trade and a hub for shipping and the maritime services sector. It notes that the port provides scaled opportunities to invest in a selection of key projects in order to accelerate development across a range of different markets. The plan was subsequently refreshed in 2016 as the *Dorset Strategic Economic Vision*.

Methodology

Baseline

6.12 A desk-based study was undertaken by ERM to establish the community, health and economic baseline conditions in the vicinity of the site. The findings are summarised in this chapter and the full baselines are provided in technical appendices F1 and G. In addition, Terence O'Rourke Ltd undertook a literature review to examine the issues of public perception of waste management and the nature of the general public's concerns. The references and data sources used in the studies are set out in table 6.1.

Burnley, S. and Parfitt J., 2000, Public Attitudes to Waste and Waste Management
Cluttons Estates Ltd, 2005, Evaluation of property and land values in the vicinity of three Hampshire ERFs
Cruise Lines International Association, 2019, Environmental Technologies and Practices Report
Defra, 2019, Local Authority Collected Waste Statistics – Local Authority data
Defra, 2014, Energy from waste: A guide to the debate
Defra, 2013, Incineration of Municipal Solid Waste
Defra, 2004, Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes. Extended Summary
Dorset Local Enterprise Partnership, 2016, Economic Strategy for Dorset: Evidence base
Dorset Local Enterprise Partnership, 2014, Strategic Economic Plan: Transforming Dorset
Dorset Tourism Partnership, 2018, The Economic Impact of Dorset's Visitor Economy – Dorset and Districts
Environment Agency, 2009, Perceptions, attitudes and communication: their role in delivering effective environmental regulations for municipal waste incineration
Health Protection Agency, 2005, Municipal Solid Waste Incineration
Land Registry website: landregistry.data.gov.uk/app/standard-reports/report-design
MORI, 2002, Public attitudes towards recycling and waste management
National Atmospheric Emissions Inventory website: https://naei.beis.gov.uk/data/data-selector?view=air-pollutants
National Society for Clean Air, 2001, The public acceptability of incineration
Office for National Statistics, 2019, Annual Population Survey
Office for National Statistics, 2019, Annual Survey of Hours and Earnings
Office for National Statistics, 2018, Business Register and Employment Survey
Office for National Statistics, 2014, 2011 Census origin-destination statistics
Phillips, K.J.O., Longhurst, P.J. and Wagland, S.T., 2014, 'Assessing the perception and reality of arguments against thermal waste treatment plants in terms of property prices'. Waste Management, Volume 34, Issue 1, January 2014, pp219-225
Portland Community Partnership, 2016, Future Portland: Portland Economic Vision and Plan
Public Health England, 2019, PHE statement on modern municipal waste incinerators (MWIs) study
Public Health England, 2017, Weymouth and Portland Health Profile 2017
Public Health England, 2014, Estimating Local Mortality Burdens associated with Particulate Air Pollution
Tolvik Consulting, 2020, UK Energy from Waste Statistics – 2019
US Environmental Protection Agency, 2005, Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities
Western Dorset Economic Growth Partnership, 2017, Western Dorset Economic Growth Strategy
Table 6.1: References and data sources

6.13 Community, health and economic receptors in this study include the local community (employment rates, deprivation, qualifications), the local economy and general health. The sensitivity of receptors is determined by their performance relative to local, regional and national averages and their capacity to adjust to change, and is considered with reference to the guidance in figure 6.1.

6.14 The baseline study examined the current community, health and economic conditions on the Isle of Portland and in the former borough of Weymouth and Portland, depending on the scale at which information was available. Information from the county (including Dorset, Bournemouth, Christchurch and Poole), regional and national scales was also used for comparative purposes where appropriate.

Impact assessment

6.15 Prior to assessing the effect of the proposed development on the community, health and economic environment, it is important to identify what constitutes a

potential effect. In the context of this assessment, potential effects are related to the creation of employment, contribution to the local economy, and increased emissions, noise and traffic and associated potential for effects on health and wellbeing resulting from the proposed development. Impact magnitude is categorised with reference to figure 6.2.

6.16 Where possible, a quantitative assessment of the potential economic impacts was undertaken. Where this was not possible, impacts were examined qualitatively. The economic assessment has considered three main geographical levels: the former borough of Weymouth and Portland (level 1); Dorset, Bournemouth, Christchurch and Poole (level 2); and the rest of the UK (level 3). The quantitative economic effects of the proposed development were determined in accordance with government guidance, using the following four-step process:

- Determine the gross impacts of the proposed development
- Take into account aspects of additionality, including displacement (an estimate of the economic activity on the site that will be diverted from other businesses in the local area and region), leakage (the proportion of economic activity that benefits individuals and businesses beyond the 'target area', i.e. through in-commuting from outside the local area) and multiplier effects (these measure the economic impacts created through indirect and induced effects of subsequent rounds of direct expenditure in the local economy)
- Construct a plausible reference case – in this instance, a position of no development taking place on the site
- Subtract the reference case impacts from the assessment of the proposed development to account for deadweight (benefits that would have occurred anyway in the absence of the scheme). The difference between the two cases is the net additional impact of the proposed development

6.17 Full details of the assumptions used in the economic assessment are set out in technical appendix F2.

6.18 A detailed HHRA was carried out using the methodology used by the Department of Health's Committee on the Effect of Air Pollutants (COMEAP) and the Clean Air for Europe programme to estimate the health effects associated with exposure to air pollutants that can have both short-term and long-term effects. These include sulphur dioxide (SO_2), nitrogen dioxide (NO_2) and particulate matter. The assessment used dispersion modelling outputs from the ERF process emissions and traffic (set out in detail in ES chapter 4), population data and background rates of relevant health outcomes to calculate the health effects from exposure to the additional pollutants arising from the operation of the ERF to the population of Portland and Weymouth.

6.19 In addition, an assessment was carried out of the potential for lifetime health risks from substances that are persistent in the environment, referred to as 'contaminants of potential concern'. These include dioxins, furans and some metals. This assessment was undertaken using the Industrial Risk Assessment Program-Human Health, which is based on the US Environmental Protection Agency's (2005) *Human Health Risk Assessment Protocol for Hazardous Waste*

Combustion Facilities. The approach seeks to quantify the hazard faced by the receptor, the exposure of the receptor to the contaminant of potential concern 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 depends on the location of the exposed individual and duration of exposure, the exposure rate, and the emission rate from the source
- Risk characterisation: the risk is then characterised by examining the toxicity of the contaminants of potential concern 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 contaminants of potential concern is then calculated across the lifetime of an exposed person

6.20 The assessment examined the potential effects on human health at key receptors, where humans are likely to be exposed to the greatest impact from the proposed development. Full details of the assumptions and inputs used in the modelling are provided in technical appendix G.

6.21 The HIA compiled an evidence base looking at the community profile, evidence from published literature, and the results of the EIA and other supporting environmental studies. The evidence base was then used as the basis for assessing the likely health impacts of the proposed ERF.

Effect significance

6.22 The methodology used to assess significance in the human health risk assessment is explained in paragraph 6.158. Otherwise, the significance of effects has been determined using criteria developed from best practice techniques and expert knowledge. Significance has been derived from measures of receptor sensitivity and the magnitude of change, as shown in figures 6.1 and 6.2. The sensitivity and magnitude criteria were combined to determine the degree of effect using the matrix shown in figure 6.3, which was then used to determine whether the effect was significant. Effects that are moderate or above are considered to be significant.

Limitations and uncertainties

6.23 It was not always possible to assess the economic impacts at the Weymouth and Portland level because of lack of certainty regarding workers' locations prior to hiring and the fact that the supply chain has not yet been fully sourced.

6.24 Indirect economic multipliers have been determined based on evidence from the Office for National Statistics' (2020) input-output analytical tables. However, while direct expenditure can be linked geographically, because of the different supply chain relationships between firms in different sectors of the UK economy it is not possible to identify where in the UK knock-on multiplier effects will occur. In addition, the input-output tables do not include an estimate for induced multipliers. As a conservative position, therefore, an induced multiplier effect has not been included within the assessment.

6.25 The baseline data used in the assessment are from prior to 2020 and the ongoing COVID-19 pandemic. It is not known at present to what extent and for how long the restrictions associated with the pandemic will affect the area's economy as a whole post-2020.

6.26 The HHRA was based on the following conservative assumptions:

- Exposure to emissions was based on lifetime exposure (70 years), assuming that the ERF operates for 350 days per year, whereas in reality the proposed development will have an operational lifetime of 25-30 years
- The proposed development will operate continually at the European emission limits, i.e. at the maximum concentrations that it is expected it will be permitted to operate at, with the exception of emissions of metals. Here, the mean emissions were used to accurately reflect the long-term assessment scenarios and avoid overstating impacts through the combination of multiple worst-case assumptions

6.27 There were no major constraints in undertaking the HIA, although the community profile was largely produced at the former borough level of Weymouth and Portland, reflecting the restricted availability of statistics for smaller areas. In addition, the ongoing COVID-19 pandemic restricted the ability of stakeholders to contribute to the assessment.

Background – public perception

6.28 This section has been informed by a number of research and guidance publications, including the following:

- National Society for Clean Air (NSCA (now Environmental Protection UK), 2001) *The public acceptability of incineration*
- Defra (2004) *Review of environmental and health effects of waste management: municipal solid waste and similar wastes*
- Environment Agency (2009) *Perceptions, attitudes and communication: their role in delivering effective environmental regulation for municipal waste incineration*
- Defra (2013) *Incineration of municipal solid waste*
- Defra (2014) *Energy from waste: a guide to the debate*
- Public Health England (2019) *PHE statement on modern municipal waste incinerators (MWIs) study*

6.29 While some of these publications are relatively old, the issues identified in them relating to the public perception of waste continue to be raised today, so it is considered appropriate to include them.

Public perception of energy recovery from waste

6.30 Research conducted by the Open University in 2000 found several areas of misunderstanding about waste issues, including the following:

- Nature of local waste disposal and other industrial plants
- Cost of waste collection and disposal

- Amount of waste that can be recycled
- Sources and effects on public health of dioxins

6.31 Change is often opposed because it causes uncertainty and is perceived as threatening. The public's broad dislike of change extends to every kind of waste treatment and disposal facility, as well as to other types of development such as housing estates, roads and shopping centres. Support for, or opposition to, all types of waste facilities can be split into two types: support / opposition in principle, and site-specific support / opposition (NSCA, 2001). The roles of pressure groups, the importance of the increasing availability of scientific evidence (often via the internet) and the role of non-mainstream scientific thinking are also key in influencing public perception (Environment Agency, 2009).

6.32 The Environment Agency's report identifies the following three points that are significant factors in discontent and opposition to waste disposal through energy recovery:

- Perception of lack of public involvement in the process
- Distrust of expert opinions
- Doubts over expert opinions relating to 'scientific uncertainty'

6.33 Concerns and distrust of expert opinions can take many forms, including:

- The intuitive feeling that experts are wrong
- The existence of more than one expert opinion, resulting in the feeling that if the experts cannot agree then they obviously do not know the answer
- The perception that experts have vested interests and are therefore biased
- The perception that not all the relevant evidence has been considered, arising from the increased availability of information (such as on the internet)

6.34 The report concludes that consultation is key in alleviating issues surrounding energy recovery projects. It is recommended that this should be done at an early stage, and should involve local people and statutory consultees (often seen as guardians of public welfare).

6.35 Experience from public consultation undertaken by a number of local authorities has shown that the inclusion of informed debate in the consultation and discussion at strategic level has resulted in widespread acceptance of the need for energy recovery to form part of an integrated waste strategy. The NSCA report states that *"given factual background information about managing waste, and the alternatives available, most people reach similar conclusions to those of waste professionals in terms of what is theoretically the best way to deal with waste."*

6.36 However, the identification of sites for development of waste facilities leads to the support / opposition for a technology becoming a personal issue, rather than an 'in principle' opinion. Members of the public may oppose a site planned near their homes because it is perceived as a threat, even if they are not against

energy recovery as part of an overall waste strategy. The NSCA report highlights that the public's anxiety is fed by campaign groups and the media. Concerned residents often form local lobby groups, which become the focus of media attention that attracts more support for their cause.

6.37 To manage the issue of local lobby groups and influence from campaign groups, the Environment Agency (2009) advises that applicants should undertake regular and early consultation, and deal with concerns and evidence in an even-handed way such that no points are suppressed or disregarded without due consideration.

The basis of public concern

6.38 There is no such thing as an ideal site, so a degree of compromise will almost always be necessary. Site selection for ERFs is the key focus of the majority of objections. Siting facilities away from housing reduces the potential for impacts on residents and thus the extent of opposition. However, this can lead to conflicts with countryside objectives and nature conservation and landscape designations, and may increase the traffic impacts associated with delivering waste and removing residues. The NSCA notes that siting facilities in industrial areas appears to be preferable, but such sites are not always available and other occupants of industrial estates have been known to object.

6.39 In this context, it is important to note that the application site is the subject of extant consents for an energy plant that would have been fuelled by vegetable oils, a proportion of which would have comprised waste oils (application reference: 09/00646/FULES), and / or waste rubber crumb from end-of-life tyres (application reference: 13/00262/VOC). It should also be noted that the site is industrial land within the Portland Port complex that is identified as a key employment site in policy ECON2 of the adopted West Dorset, Weymouth & Portland Local Plan (2015).

6.40 The specific concerns often expressed about ERFs, as opposed to broad concerns regarding waste management as a whole, are summarised by the NSCA (2001) as follows:

- Emissions from the combustion process
- Health impacts
- Transport issues, including possible import of waste from other areas
- Conflict with materials recycling
- Local amenity issues
- Effects on property values
- Management and operational concerns, including odours
- Disposal of residues
- Outside company making a profit out of the community

6.41 There are no simple answers to these concerns, but all will be addressed during the planning and authorisation process. Each of these issues is considered in turn below.

Emissions from the combustion process

6.42 The main concern expressed about ERFs is generally in relation to emissions to air. The European Industrial Emissions Directive (2010/75/EU), which replaced the Waste Incineration Directive (2000/76/EC), sets limits on emissions from ERFs. These have recently been updated by new emissions limits set out in the Waste Incineration Best Available Techniques reference document (BREF). These limits are more stringent than those set out in the Industrial Emissions Directive.

6.43 The responsibility for enforcing these limits and the operating conditions of the facilities rests with the Environment Agency in England, under the terms of the Environmental Permitting Regulations 2016 (as amended). The regulation of ERFs is more comprehensive, and the limits tighter, than for most other industrial processes. ERF emissions have reduced substantially since the 1980s and most emissions are less than 10% of the level they were in 1990 (Defra, 2013).

6.44 Operational permits for ERFs include site-specific emissions limits that take local conditions into account. In addition to announced and unannounced inspection visits, many facilities have online links to their local authority or Environment Agency office, which enables constant monitoring of the plant's performance on certain parameters. Emissions from municipal solid waste ERFs are the most tightly controlled of all waste management processes.

6.45 Public concern in relation to ERFs often centres on dioxins and furans. These are widely present in the environment, albeit at very low concentrations, and are a family of approximately 200 chlorinated organic compounds that are toxic to varying degrees. Dioxins are usually referred to in terms of the equivalent concentration (TEQ) of the most toxic form: 2,3,7,8-tetrachlorodibenzo para dioxin (TCDD). Dioxins and furans are formed in all combustion processes where chlorine is present together with fuel and oxygen and a suitable catalyst. Sources include power plants, buses, cars, cigarettes, crematoria, garden bonfires and barbecues. It should be noted that ERFs are now specifically designed to avoid the creation of dioxins. The rapid cooling of exhaust gases ensures that there is no time for de novo synthesis of dioxins to occur.

6.46 Data from the National Atmospheric Emissions Inventory (2020) show that in 2018 all the municipal waste ERFs in the UK together produced 0.53 g TEQ of dioxins, equating to 0.3% of the UK's total annual emissions, while fireworks and bonfires on Bonfire Night alone produced 6.80 g TEQ. Travel in passenger cars produced 3.90 g TEQ of dioxins and burning fuel in residential properties produced 65.90 g TEQ. A number of other sources contribute to dioxin emissions, including accidental vehicle fires, small scale waste burning (for example on building sites), combustion of other wastes, and the iron and steel industry. There has been a 99.8% reduction in emissions of dioxins and furans from ERFs in the UK since 1990, following limits imposed in EC and EU directives, an increased understanding of the factors that lead to dioxin and furan emissions and the development of improved ways of stopping their formation and removing them from flue gases.

6.47 ERF stack gases also include other emissions that generate public concern, including particulates, metals and acid gases. The permitted emission limits of

these products are set at levels considered to protect public health. ERF plants are very small sources of these emissions when compared to sources such as road traffic. Defra (2013) states that emissions from an ERF typical of those currently operating in the UK (230,000 tonnes per year, around 12% larger than the proposed development) are approximately equivalent to:

- Oxides of nitrogen (NO_x) – emissions from a 7 km stretch of typical motorway
- Particulate matter – emissions from a 5 km stretch of typical motorway
- Dioxins and furans – emissions from accidental fires in a town the size of Milton Keynes
- Cadmium – one-twentieth of the emissions from a medium-sized UK coal-fired power station

6.48 Data from the National Atmospheric Emissions Inventory (2020) show that in 2018 all the municipal waste ERFs in the UK together produced 0.12% of the UK's emissions of particulate matter with a diameter of less than 0.1 µm, 0.16% of the country's emissions of particulate matter with a diameter of less than 1 µm, 0.10% of the emissions of particulate matter with a diameter of less than 2.5 µm and 0.09% of the emissions of particulate matter with a diameter of less than 10 µm. In comparison, Bonfire Night alone produced 1.1%, 1.1%, 1.5% and 1.4% of the emissions of the different sizes of particulate matter respectively.

6.49 Tolvik Consulting's (2020) *UK Energy from Waste Statistics – 2019* shows that, across all continuously monitored substances, on average emissions from 48 fully operational ERFs in the UK were 28.8% of the emissions limit value in 2019. Further details are provided in table 6.2.

Substance	Percentage of emission limit value
Continuously monitored emissions	
Hydrogen chloride	50%
SO_2	27%
NO_x	79%
Total organic carbon	5%
Carbon monoxide	14%
Particulates	11%
Ammonia	15%
Periodically monitored emissions (data only available from 42 ERFs)	
Hydrogen fluoride	7%
Dioxins and furans	13%
Heavy metals	15%
Cadmium and thallium metals	4%
Mercury and compounds	4%

Table 6.2: Summary of emissions levels from UK ERFs in 2019 (Tolvik Consulting, 2020)

6.50 Tolvik Consulting (2020) also investigated abnormal operations during 2019, for which information was available from 42 of the 48 fully operational ERFs in the UK. An aggregated total of 96 hours of abnormal operations was reported, down from 130 hours in 2018. ES chapter 4: Air quality contains further details of the strict limits for emissions set by the Industrial Emissions Directive.

Health impacts

6.51 ERFs emit a large number of different chemicals, the majority of which are already in the waste delivered to the plant. Humans are exposed to hundreds of

thousands of chemicals daily through diet and in the air. It should be noted that the key factor in determining risk to health is the amount and toxicity of chemicals, not the number. All chemicals are toxic if the exposure is high enough and long enough. However, a threshold exists for most chemicals below which health impacts can be considered negligible. When assessing exposure from an ERF, it is important to measure background levels already present in the air.

6.52 The 2004 Defra report found that the weight of evidence from health studies indicates present day practice for managing municipal solid waste has at most a minor effect on health, particularly when compared with other health risks associated with ordinary day-to-day living. The total number of hospital admissions per year attributable to emissions to air from all facilities managing municipal solid waste in the UK is estimated as five, compared with 300,000 related to traffic accidents.

6.53 Defra's (2014) *Energy from waste: A guide to the debate* states that the government is advised by Public Health England (PHE) on the impact on health of emissions to air from ERFs. PHE (2019) has reviewed research undertaken to examine the suggested links between emissions from municipal waste ERFs and effects on health, and states that *"modern, well run and regulated municipal waste incinerators are not a significant risk to public health."* PHE's view is that, while it is not possible to rule out adverse health effects from these facilities completely, *"any potential effect for people living close by is likely to be very small."* PHE adds that this view is based on detailed assessments of the effects of air pollutants on health and on the fact that these facilities *"make only a very small contribution to local concentrations of air pollutants."*

6.54 The potential for effects on health from the proposed ERF is discussed in more detail later in this chapter.

Transport issues, including possible import of waste from other areas

6.55 Concerns relating to the transport of waste include noise, dust and traffic congestion associated with lorries delivering to a site. These concerns are often greater in areas of poor road infrastructure or high existing congestion. Depending on the site, refuse collection vehicles may deliver directly to an ERF, or waste may be bulked and delivered in large container vehicles. A mixture of the two approaches is often adopted. The impact of transporting waste by road to a facility, and the subsequent removal of residues, should be compared with the transport impacts of alternative waste management scenarios.

6.56 The assessments of air quality and traffic and transport effects in ES chapters 4 and 11, and the stand alone noise assessment report submitted in support of the planning application, confirm that no significant effects are predicted as a result of the transport of RDF to, and the removal of residues from, the proposed development, even under the worst case scenario of 100% transport by road.

6.57 The NSCA report highlights that waste imports are another frequently expressed concern. Residents living close to a proposed ERF may fear that neighbouring local authorities will contract to send their waste to the plant and thus increase the number of lorry movements. Local residents may find disposal of their own

waste acceptable, or at least bearable, but resent the thought that waste from other areas may contribute to the provision of an ERF in their local area.

6.58 As discussed in chapter 12, the proposed development will be a merchant plant, so it is not pre-contracted to manage a specific authority's waste arisings. This means that it is not being built specifically to manage residual waste from Dorset, although it will be in a good position to do so because there are currently no operational landfill or energy recovery sites in Dorset. This means that almost all of the collected residual waste (51,344 tonnes sent to landfill and 109,984 tonnes sent for energy recovery in 2018/19) is being exported out of the county for treatment and disposal. Approximately 89,000 tonnes of RDF is produced at the Canford Magna mechanical biological treatment plant per year, which is currently exported to Europe for use as a fuel.

6.59 Several consultations by waste disposal authorities have found that people express a preference for small scale local facilities over larger facilities serving a wider area, or transporting waste over long distances. With a capacity of up to 202,000 tonnes per year, the proposed ERF is at the smaller end of the scale. Its capacity would rank it 30th out of the ERFs currently operational in the UK (Tolvik Consulting, 2020).

Conflict with material recycling

6.60 Many people fear that ERFs will discourage recycling, partly because the local authority will be tied into contracts that require fixed volumes of waste to be delivered to the ERF. It is important to note, however, that there are practical limits to recycling and not everything potentially recyclable can realistically be recycled. Furthermore, as a result of the commitment to increase recycling, most local authority waste management contracts do not guarantee minimum levels of throughput to such plants.

6.61 The revised Waste Framework Directive allows for deviation from the waste hierarchy where it can be clearly demonstrated that there is a better environmental outcome from doing so. For some waste streams, energy recovery is the best option, especially where it is not possible to prevent, re-use or recycle. Recycling levels in the UK have increased over time, but meeting the target for recycling 65% of municipal solid waste by 2035 set out in the government's (2018) *Our Waste, Our Resources: A Strategy for England* will still leave 35% of waste requiring an alternative form of management.

6.62 Another common concern is that the local authority will take the easy option of sending all waste to an ERF, rather than developing recycling. However, all local authorities have statutory and locally adopted recycling targets, together with financial incentives and penalties aimed at landfill diversion. These factors work together to address this issue.

6.63 Defra (2014) states that *"Experiences in Europe show that high rates of recycling, composting and energy from waste can and do exist."* The NSCA report notes that this is partly because some of the materials that are commonly recycled, such as metals and glass, are not combustible, while diverting wet organic wastes from kitchens and gardens for composting improves the calorific value of the remaining waste, despite reducing the mass.

6.64 Qualitative work undertaken by MORI in 2002 found that the recovery of energy from waste is felt to be more acceptable as part of a recycling-led strategy, where everything that can be recycled has been, because energy recovery is seen as preferable to landfill. Support for energy recovery is increased if people feel that the material to be burnt is controlled and strict operating guidelines are in place.

6.65 Data from Defra's local authority collected waste annual results tables show that the Dorset Waste Partnership had one of the highest rates of household waste recycling and composting in the country in 2018/19, at 59.6%, ranking it 10th out of 345 waste collection, disposal and unitary authorities. This indicates that recycling and composting are well established in the area. As discussed above, there are currently no operational landfill or energy recovery sites in Dorset, meaning that almost all of the collected residual waste is being exported out of the county for treatment and disposal.

Local amenity issues

6.66 The physical bulk of an ERF and its effect on a local area are often concerns for the public, although this applies to many forms of development. Modern facilities are usually designed by specialist architects, who take account of operational, locational and environmental considerations, and as a result the buildings are not necessarily unattractive.

6.67 Research by the Open University in 2000 found that 55% of people living close to municipal waste ERFs were not aware of the fact. Conversely, some people erroneously believed they lived near to a municipal waste ERF, when in fact they lived near a different type of waste management facility, a closed ERF or an industrial process.

6.68 Twenty-nine percent of those living near an ERF reported no negative effects, while 49% reported some negative effects. However, it should be noted that 34% of those who mistakenly believed that they lived near a municipal waste ERF also reported negative effects from the plant. The main negative impacts reported by people living near an ERF were smoke emissions (ERFs only produce steam, not smoke) and bad smells (18% of respondents each). Of those who were correctly aware of living near an ERF, 82% said that they were 'not at all' or 'not very' worried about its proximity. Overall, the Open University survey found that 88% of respondents were either not aware of or not worried about a nearby ERF.

6.69 The proposed development will be approximately 600 m from the nearest residential receptors, in Fortuneswell and Castletown, and will be within an operational port environment. A number of measures to minimise amenity effects from dust and odour releases have been incorporated into the building design and operational procedures. These include taking combustion air from the waste reception area to draw odours and dust into the boiler line, keeping the external doors to the waste reception area closed except for access and egress of vehicles and pedestrians, and regular dust and odour level checks in and around the ERF. Further details of these measures can be found in ES chapter 2.

6.70 A number of measures have been incorporated into the building design and operational procedures to minimise noise. These includes installing noisy plant items within the ERF building, the use of noise insulation if necessary, designing the air-cooled condensers to reduce noise, regular maintenance of vehicles and plant, and regular noise level checks. Further details of these measures can be found in ES chapter 2. The stand alone noise assessment report submitted in support of the planning application concluded that there will be no significant effects as a result of operational noise from the proposed development.

Property values / investment climate

6.71 Many people fear that property values and the investment climate will be damaged if an ERF is built nearby. Experience has shown that, as with many major waste management facilities or other types of development, property values can be affected while a project is being discussed and during the construction phase, but they recover once the plant is operating (NSCA, 2001). It should be noted that property values are influenced by many variables, including interest rates, confidence in the economy, local supply and demand factors and accessibility to amenities and facilities, and it is difficult to isolate the effect of one project.

6.72 A survey of property and land values before, during and after the construction stages of ERF projects in Hampshire undertaken by Cluttons (2005) supported the NSCA's conclusion. The study also showed that major investment decisions on industrial, commercial, residential and community facilities have not stalled as a result of plant development in the vicinity. Similarly, a study undertaken by Cranfield University (Phillips *et al,* 2014) did not find any significant negative effect on property prices at any distance within 5 km from a modern operational ERF.

6.73 The potential for effects on property prices from the proposed ERF is discussed in more detail later in this chapter.

Management and operational concerns, including odour

6.74 The public is often concerned about the perceived day-to-day operations of an ERF and that, where permitted, management standards of the facilities should be high. This was reflected in the study by MORI (2002), which found that people want strict operating guidelines for such facilities and are more likely to trust energy recovery in the hands of a local authority, rather than a private contractor. The requirement for the Environment Agency to oversee a plant's performance and emissions through the enforcement of the environmental permit condition does not necessarily reassure people fully that a plant will be safe.

6.75 A local liaison group will be established, which will meet on a regular basis to discuss the operation of the ERF and any potential issues or queries from members of the local community. It will provide a forum for community stakeholders to be informed and consulted regarding site operations and procedures. Liaison group members will include local residents and representatives from Portland Town Council, Dorset Council, the Environment Agency, and other stakeholders as appropriate.

6.76 The air quality assessment in chapter 4 was based on the conservative assumption that the proposed ERF will continually operate at the emissions limit values. In reality this is not likely to be the case; as discussed above, Tolvik Consulting (2020) found that on average emissions from 48 fully operational ERFs in the UK across all continuously monitored substances were 28.8% of the emissions limit values in 2019. However, even based on the conservative assumption, the air quality assessment concluded that there would be no significant effects on surrounding sensitive receptors as a result of emissions from the ERF.

6.77 Potential odours from prolonged storage of waste are sometimes a concern, but these can be easily addressed through technological means, good plant management and the imposition of conditions by the Environment Agency. Increased traffic congestion and noise are other concerns usually expressed by people when an ERF is proposed in their locality.

6.78 As discussed above, the traffic and transport assessment in chapter 11 concludes that there will be no significant increases in traffic congestion as a result of the proposed development. A range of measures to minimise operational noise and odour have been incorporated into the project design and operating procedures, which will ensure that there will be no significant effects as a result of noise or odour.

Disposal of residues

6.79 Combustion of waste in an ERF generally reduces the waste to around 10% of its original volume. It should be noted that not all waste that is delivered to a standard ERF is combusted. Mattresses, gas canisters and bicycle frames are among the materials occasionally removed from the waste before it is fed into the ERF, as they are too big and could damage the equipment, or would not burn. However, the proposed ERF will be fuelled by waste that has already been processed into RDF, so this issue will not arise. About 10% by volume and 25-30% by weight typically remains of waste that is combusted (NSCA, 2001).

6.80 The main residue from the combustion process is bottom ash, approximately 10% of which is ferrous metal that can be separated magnetically for recycling. Bottom ash can be disposed of to landfill or used as an aggregate substitute in road building or construction. Tests on processed ash from a number of UK ERFs show that the levels of dioxins are similar to those in urban soils (NSCA, 2001).

6.81 The other main residue is ash from the emissions clean-up process. This includes airborne ash particles that are removed from the exhaust gases and the spent lime, activated carbon and other reagents that are used to clean the gases. These are collectively called air pollution control residues (APCr). Disposal of the APCr is a tightly controlled process and APCr is classified as hazardous waste.

6.82 It is proposed that both the bottom ash and APCr from the ERF will be recycled. The bottom ash will be sent to a company in either London or Avonmouth to make aggregates suitable for construction projects, while the APCr will be sent to a company in Avonmouth to be used to create a carbon negative aggregate that will be used to make carbon negative building blocks.

Outside company making a profit out of the community

6.83 The final key concern identified by the NSCA report is resentment that an outside company is coming into the area to make a profit at the expense of the residents by charging large fees to handle their waste. The Environmental Protection Act 1990 effectively privatised waste management, requiring waste disposal authorities to form arm's length private sector companies (local authority waste disposal companies) to deal with waste. Successive changes have resulted in an almost entirely private sector-run waste management system.

6.84 Private waste management companies need to make profits to cover the cost of their investments and operations and to satisfy investors. However, the competitive nature of the bidding process for waste contracts means that developers are frequently required to take on the risks of the development. In order to win the contract, profit margins have to be as low as possible, while service quality is as high as possible. In the case of ERFs, a private sector company provides a service to the community that the local authority could not normally provide because of spending constraints and lack of specialist knowledge (NSCA, 2001).

6.85 It should also be noted that the proposed development will make a positive contribution to the area's economy through the creation of employment and additional spending, including the payment of business rates to Dorset Council. This is examined in more detail in the assessment of potential economic effects below.

Baseline

Local economy

Gross value added

6.86 Gross value added is a measure of economic value that expresses the difference between the value of goods and services produced and the cost of raw materials and other inputs used in their production. It is an indicator of the economic performance of an area. Dorset has a relatively low gross value added per head, meaning that its economy is less productive than other parts of the country. The Dorset Local Enterprise Partnership area generated £15 billion gross value added in 2013, 51% of which was generated in the former Dorset County Council area, 26% in Bournemouth and 23% in Poole (Dorset Local Enterprise Partnership, 2016).

6.87 The UK competitiveness index benchmarks the competitiveness of UK localities based on the development and sustainability of businesses and the economic welfare of individuals. Weymouth and Portland is the least competitive locality in the south west apart from Torbay, and is placed 308th out of 379 local authorities in the UK (Portland Community Partnership, 2016).

Jobs and businesses

6.88 There were 292 firms on Portland in 2015, excluding the self-employed, and major employers on the island include the public sector (Dorset Council,

education and health), HM Prison service, Sunseeker International, Albion Stone, TODS Defence Ltd, Drumgrange Ltd, Manor Marine (MPI Services (UK) Ltd), Portland Engineering Ltd and Agincare Group. There were 2,990 employees on the island, 61% of whom were full-time and 39% part-time (Dorset Local Enterprise Partnership, 2016).

Employment structure

6.89 The distribution of employment across different sectors is shown in table 6.3. In the former borough of Weymouth and Portland, the 'accommodation and food services', 'health' and 'retail' sectors account for the largest share of jobs (52.8%). This is higher than the figures for Dorset (36.6%), the South West (34.2%) and England as a whole (29.6%).

Sector	Weymouth and Portland	Dorset	South West	England
Agriculture, forestry and fishing	0.1%	2.1%	1.0%	0.6%
Mining, quarrying and utilities	1.1%	1.0%	1.5%	1.2%
Manufacturing	4.4%	10.2%	8.5%	8.0%
Construction	4.4%	6.6%	5.3%	4.6%
Motor trades	0.8%	1.8%	2.1%	1.8%
Wholesale	1.2%	3.6%	3.9%	4.2%
Retail	13.9%	10.2%	9.7%	9.4%
Transport and storage	2.8%	2.4%	3.9%	4.9%
Accommodation and food services	22.2%	11.4%	9.7%	7.5%
Information and communication	1.2%	2.4%	3.4%	4.4%
Financial and insurance	0.8%	0.9%	2.8%	3.5%
Property	1.2%	1.8%	1.8%	1.7%
Professional, scientific and technical	5.6%	7.8%	7.2%	9.0%
Business administration and support services	2.8%	3.6%	6.6%	9.2%
Public administration and defence	5.0%	4.8%	4.4%	4.0%
Education	9.7%	9.0%	8.7%	8.9%
Health	16.7%	15.0%	14.8%	12.7%
Arts, entertainment, recreation and other services	6.9%	6.0%	4.6%	4.5%

Table 6.3: Sectoral distribution of employment in 2018 (Business Register and Employment Survey)

Earnings

6.90 Data from the Annual Survey of Hours and Earnings for 2018 indicate that average weekly gross earnings in Weymouth and Portland (£502.50) are lower than the averages for Dorset (£537.10), the South West (£537.60) and England as a whole (£574,80). Trends between 2015 and 2018 show that earnings in Weymouth and Portland (2.2%) also increased less than in Dorset (5.6%), the South West (7.8%) and England as a whole (8.1%).

Labour market

6.91 In 2019, Weymouth and Portland's unemployment rate was 3.2%, above the Dorset average of 2.6%, but below the overall figure for England as a whole (4.0%).

6.92 The economic activity rate is the proportion of the working age population that is in the active labour force. Economic activity in Weymouth and Portland in 2019 (81.2%) was above the figures for Dorset (78.3%) and England (79.2%). The

economic activity rate in Weymouth and Portland has fluctuated over time, with particularly strong dips during the recession in 2008/09 (to 67.1%) and again in 2015/16 (to 67.5%). However, the rate has been steadily increasing since then.

Commuting

6.93 The 2014 origin-destination statistics produced by the Office for National Statistics, based on the 2011 Census, show travel to work flows from the Isle of Portland. This is split into two areas in the statistics, Weymouth and Portland 008, which covers the northern end of the island, and Weymouth and Portland 009, which covers the remainder. Just over 40% of the residents in both areas (41.1% and 45.1% respectively) work on the island. Of the remainder, 23.6% of residents of the north of the island and 22.3% of residents of the rest of the island travel to other parts of the former Weymouth and Portland borough for work, while 22.0% and 20.2% respectively travel to West Dorset. This indicates that the vast majority of the island's residents work relatively locally, but over half need to leave the island to work.

6.94 In terms of the wider Weymouth and Portland area, over three-quarters of people who work in the area also live there. Approximately 22% of the Weymouth and Portland workforce commute in from other areas, and over three-quarters of these come from other parts of Dorset.

Qualifications

6.95 Weymouth and Portland (27.7%) has a much lower proportion of residents with qualifications at degree level or above than Dorset (37.0%), the South West (39.2%) and England as a whole (40.0%). The former borough also has a correspondingly high level of residents with no qualifications (7.6%) compared to Dorset (4.5%) and the South West (5.3%), although only slightly higher than England as a whole (7.5%).

Community and health

Health and wellbeing

6.96 The former borough of Weymouth and Portland as a whole (table 6.4) had lower proportions of residents with very good general health at the time of the 2011 Census than the regional and national averages, and higher proportions of residents with bad or very bad health.

Quality of health	Weymouth and Portland	South West	England
Very good	42.3%	46.9%	47.2%
Good	36.7%	34.6%	34.2%
Fair	15.0%	13.4%	13.1%
Bad	4.5%	4.0%	4.2%
Very bad	1.4%	1.1%	1.2%

Table 6.4: Health status (2011 Census)

6.97 The average life expectancy at birth in Weymouth and Portland is 78.5 years for men and 83.4 years for women. This is generally in keeping with the national average, although slightly lower for men. There is an inequality of life expectancy in the area, with life expectancy 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 (PHE, 2017).

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

6.99 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 6.5).

	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

Table 6.5: Ranking of the LSOAs in the 2019 indices of multiple deprivation
*Ranked in the most deprived 25% of LSOAs in the country
**Ranked in the most deprived 10% of LSOAs in the country

House prices

6.100 According to Land Registry records, average house prices in the north of Portland are lower than those in the former borough of Weymouth and Portland for all types of property except flats, and lower than those in Dorset and the region as a whole for all property types (table 6.6). In 2019, the overall average house price in the north of Portland was 82% of the borough average, 61% of the county average and 67% of the regional average.

Area	Detached	Semi-detached	Terraced	Flat / maisonette	Overall average
North Portland*	£325,900	£183,654	£202,803	£124,591	£195,028
Weymouth and Portland	£351,162	£241,919	£196,528	£161,081	£237,902
Dorset	£438,438	£294,340	£244,991	£189,628	£322,106
South West	£413,459	£268,931	£235,324	£194,787	£291,524

Table 6.6: Average house prices in 2019
*Based on the area's postcode sector of DT5 1

Future baseline

6.101 In the absence of the proposed development, the site will remain in its current use. However, the community, health and economic baseline in the area will still change in the future. The adopted local plan states that provision will be made

for at least 17 ha of employment land in Weymouth and Portland, with several sites also allocated for housing development. PHE (2017) states that the key health priorities for the area are reducing inequalities, promoting healthy lifestyles and preventing ill health.

Effects during construction

Local economy

Spending and supply chain effects on existing and new businesses

6.102 During the construction and commissioning process, economic activity will be generated through the physical construction and assembly of the ERF and through the associated demand for materials, capital equipment and services. Some of this investment will take place locally, while other elements will be directed towards suppliers located further afield, including in mainland Europe.

6.103 The capital expenditure predicted to be incurred in building and commissioning the ERF is estimated at £95 million. While suppliers have not yet been confirmed, initial market reviews have taken place and negotiations are underway with selected suppliers. Based on the likely outcomes, the proportion of expenditure that will be allocated to different project elements, and the approximate geographical areas from which those are likely to be drawn, have been estimated (table 6.7).

Project element	Approximate spend	Likely location of spend
Project management	£950,000	Dorset (levels 1 and 2)
Civil work: technical engineering	£3,800,000	Dorset (levels 1 and 2)
Site management	£2,850,000	Dorset (levels 1 and 2)
Civil work: construction	£22,800,000	Dorset (levels 1 and 2)
Structural steel and burner	£3,800,000	UK (level 3)
Mechanical engineering	£11,400,000	Mainland Europe
Boiler	£32,300,000	Mainland Europe
Electrical instrumentation and control engineering	£5,700,000	Mainland Europe
Test and commissioning	£1,900,000	Dorset (levels 1 and 2), UK (level 3), mainland Europe
Mechanical and electrical construction / installation	£7,600,000	Mainland Europe
Procurement and logistics	£1,900,000	Mainland Europe
Total	**£95,000,000**	**--**

Table 6.7: Major components of project construction expenditure

6.104 Table 6.7 shows that it is too early to distinguish between levels 1 and 2. However, removing the activity expected to be brought in from beyond these areas allows adjustments to be made for expected leakage. This produces a gross spend of £30.4 million that is expected to be spent with suppliers in Dorset, Bournemouth, Christchurch and Poole (excluding the testing and commissioning element because the proportion of this that will be spent at the local level is not known). Table 6.8 summarises the total construction cost impacts at the local and national level, taking account of displacement and multipliers. Full details of the calculations are set out in technical appendix F2.

Project area	Total direct spend	Direct spend adjusted for local displacement[1]	Indirect spend[2]	Total spend[3]
Level 1	Not available	Not available	Not available	Not available
Levels 1 and 2	£30,400,000	£18,800,000	See cell below[4]	£18,800,000
Level 3	£3,800,000	£1,900,000	£8,700,000	£10,600,000
Total	**£34,200,000**	**£20,700,000**	**£8,700,000**	**£29,400,000**

Table 6.8: Summary of construction cost impacts
1. Spend adjusted for local displacement at 38% for levels 1 and 2.
2. Generated across the UK after application of ONS output multiplier and 75% UK displacement.
3. Middle two columns combined.
4. Indirect spend cannot be locally apportioned.

6.105 The benefit of the proposed ERF to existing and new businesses in the level 1 and 2 areas as a result of increased expenditure will be a change of small magnitude to a receptor of medium sensitivity, leading to a slight beneficial effect that will not be significant. At a national level, the sensitivity of the receptor is judged to be low and the magnitude will be negligible, leading to an overall negligible beneficial effect that will not be significant.

Employment generation

6.106 The gross direct construction employment generated or supported by the proposed development has been estimated using Office for National Statistics data (full details of the calculations are set out in technical appendix F2). This concluded that 276 direct full-time equivalent jobs will be created or supported across the level 1 and 2 areas, as follows:

- Project management: 12 jobs
- Civil work: engineering: 50 jobs
- Site management: 37 jobs
- Civil work: construction: 177 jobs

6.107 Nineteen direct full-time equivalent jobs will also be created or supported across the rest of the UK as a result of the structural steel and burner elements and a further 38 direct full-time equivalent jobs will be created or supported during commissioning. The location of the latter is not yet known and is likely to be partially beyond the scope of the study, in mainland Europe. In addition, a further 272 indirect full-time equivalent jobs will be created or supported across the UK, some of which are likely to be within levels 1 and 2. Examples of these include positions in hotels and catering to support visiting installation and commissioning engineers.

6.108 Table 6.9 adjusts the above gross estimates to net full-time equivalent jobs, taking account of leakage (already established through the separation of geographical areas), displacement and multipliers. Full details of the calculations are set out in technical appendix F2.

Area	Direct employment	Direct employment less displacement	Indirect employment	Indirect employment less displacement	Total net employment*
Level 1	Not available	Not available	Not available	Not available	Not available
Levels 1 and 2	276	171	See cell below	See cell below	171
Level 3	19	9	272	73	83
Total	**295**	**180**	**272**	**73**	**254**

Table 6.9: Summary of estimated net construction jobs
*Note that some totals do not sum because of the effects of rounding.

6.109 The benefit of increased employment during construction to residents of the level 1 and 2 areas will be a change of small magnitude to a receptor of medium sensitivity, leading to a slight beneficial effect that will not be significant. At a national level, the sensitivity of the receptor is judged to be low and the magnitude will be negligible, leading to an overall negligible beneficial effect that will not be significant.

Community and health

6.110 The HIA considers how a range of socio-economic, physical, mental and community health outcomes might be affected by activities associated with the construction of the proposed development. Health impacts associated with socio-economic issues centre on employment, income and housing. There will be a temporary increase in employment and associated income in the area during construction, which will in turn lead to health benefits associated with wellbeing. The investment in the area associated with capital expenditure on the project could raise the income and living standards of local people, thereby improving their health and wellbeing during the construction period.

6.111 Access to the site during construction will be restricted for people not working on the project, meaning that the likelihood of an incident involving a member of the public is low. In addition to access to the port itself being controlled via the main gatehouse at the port's entrance, the construction site will be surrounded by 2.4 m high timber hoardings. The likelihood of health effects arising from accidents during construction is low, given the relatively short construction period, the nature of the works being undertaken and the implementation of health and safety procedures. There will be no effects on the population health of the local community or on health services.

6.112 The HIA also examines the potential for social capital effects relating to social networks and quality of life. Construction activities are not likely to significantly affect social networks, trust and support in the local communities on the Isle of Portland. Workers will mostly remain within the site boundaries and a proportion of the workforce will be from the local area. There will not be any construction camps, so there will be no effects associated with the fear of crime and decreased health that can arise with such camps.

6.113 The potential health implications of air quality, noise, traffic and visual effects of the proposed development are also examined in the HIA. 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 to the ES and the HIA does not predict any significant adverse effects on health or amenity. As set out in ES chapter 4, no significant

adverse air quality effects are predicted as a result of construction traffic. It is therefore not likely that there will be any measurable change in health outcomes for local communities.

6.114 The stand alone noise report submitted in support of the planning application states that there will be no significant adverse effects as a result of increased construction noise, which will be below the background levels at all receptors. The HIA concludes that construction noise is unlikely to pose significant health effects. Groundborne vibration during construction may arise as a result of the use of compaction plant and / or rollers for the reinstatement of fill, roads and hardstandings. However, no dwellings are close enough to the site that vibration is likely to cause a problem. The installation of cabling in the highway will require plant similar to that used during routine utilities repairs and maintenance and non-vibratory plant can be used if required.

6.115 The HIA notes that vulnerable groups have the greatest potential to be affected by increased traffic levels, particularly the elderly and young children. However, the traffic and transport assessment in ES chapter 11 concludes that there will be no significant traffic increases as a result of construction vehicles accessing the site.

6.116 The potential landscape and visual effects of the proposal are examined in ES chapter 9. 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 process. The landscape assessment concludes that there will be a short-term slight adverse effect on the character of the site during construction, and slight or negligible effects on the characters of the surrounding areas, which will not be significant. Visual disturbances can affect quality of life and cause community disturbance, anxiety and concern. While a small number of potentially significant visual effects are predicted during construction from views close to the site, overall the HIA concludes that there will no significant health effects as a result.

Effects post-construction

Local economy

Spending and supply chain effects on existing and new businesses

6.117 The operation and maintenance of the plant will contribute to the local and national economies in several ways. The annual maintenance spend is anticipated to be approximately £4 million, which includes £3 million that will mostly be spent in the level 3 area (wider UK), and £1 million to be spent on boiler / turbine and generator maintenance, which is likely to be spent with an overseas provider.

6.118 Transporting the RDF to the plant will also provide an economic contribution. While it is not known at this stage what proportion of the RDF will be transported by road and by sea, both methods will bring about associated spending. If all of the RDF were to be transported by road, up to 40 HGV deliveries would be required each day. Under this scenario, RDF road transport needs alone would require 40 man days of work per day, with knock-on impacts for the local economy if local hauliers were used. If RDF is brought in by sea, employment

would also be supported at the port through loading and unloading activities. RDF brought in by ship will be unloaded and transported from the berth to the site by the existing stevedore at the port, Quest Underwater Services. Using ships carrying 2,500 tonnes each equates to an estimated 81 ship visits a year if all the RDF were to be transported by sea. This would have beneficial effects on employment and economic activity at the port, with associated benefits to the local economy.

6.119 In reality, it is likely that RDF will be transported by a combination of road and sea, so a smaller contribution to the local economy will be provided by each transport method. As an example, an illustrative split of 75% by road and 25% by sea is estimated to require 30 man days of work per day for the road haulage element and create additional jobs at the port, although it is not possible at this stage to quantify the latter. The workload associated with this would contribute hundreds of thousands of pounds into the local economy through business for local hauliers, the port and Quest. In addition, the transport of the incinerator bottom ash, either by sea to Greenwich or by road to Avonmouth, will create economic activity locally and further afield.

6.120 The proposed development will pay business rates to Dorset Council, which would not be available without the plant. It is estimated that these will create approximately £600,000 of additional income for the council.

6.121 Overall, the benefit of the proposed ERF to existing and new businesses in the level 1 and 2 areas as a result of increased expenditure post-construction will be a change of small magnitude to a receptor of medium sensitivity, leading to a slight beneficial effect that will not be significant. At a national level, the sensitivity of the receptor is judged to be low and the magnitude will be negligible, leading to an overall negligible beneficial effect that will not be significant.

Employment generation

6.122 The proposed development is expected to create between 30 and 35 full-time equivalent permanent jobs, so the assessment has been based on the worst-case assumption of 30 jobs being created. These are anticipated to break down into the following occupation types:

- Managers and directors: three
- Professional occupations: three
- Skilled trades: eight
- Process, plant and machine operatives: 12
- Administrative and secretarial: four

6.123 Other occupation types, such as associate professional and technical, personal service, sales and customer service, are not expected to be required directly in the operation of the plant. Taking account of leakage and displacement to estimate net job creation, a minimum of 17 net new direct jobs will benefit the level 1 area of Weymouth and Portland, with a further three net new direct jobs benefitting the wider level 2 area of Dorset, Bournemouth, Christchurch and Poole. Indirect job creation can only be calculated at the national scale, and it is estimated that a further 62 net indirect jobs will be created as a result of the proposed development. Some of these will be within the level 1 and 2 areas,

but the number will depend on supply chain links. Full details of the calculations and assumptions behind these estimates are set out in technical appendix F2.

6.124 Powerfuel Portland Limited is working with Weymouth College to develop an apprenticeship programme associated with the project, specifically for local young people. In addition to the jobs set out above, it is anticipated that the proposed ERF will offer two apprenticeship positions, ongoing during its operation. These are likely to be offered in skilled trades, such as electrician / engineer, and will follow the BTEC qualification route.

6.125 The sensitivity of the level 1 population to changes in employment is considered to be high. Combined with the small magnitude of change predicted as a result of increased job creation in the level 1 area post-construction, a moderate, significant beneficial effect is predicted. The sensitivity of the wider level 2 area is considered to be medium and, combined with the small change in employment, a slight beneficial effect that will not be significant is predicted in this wider area. Nationally, the increase in employment will be of negligible magnitude, leading to a negligible effect that will not be significant.

Power capacity and supply

6.126 The Isle of Portland's electricity supply is provided by SSE via a primary substation on the island fed from a bulk supply point at Chickerell on the mainland, which also serves nine other primary substations. SSE's forecasting data indicate that the bulk supply point will have just 15.97 MW of spare capacity by 2023/24, effectively constraining the island's electricity supply. This means that, while there is sufficient capacity within this system to meet reasonable domestic growth needs, for example as a result of the construction of additional dwellings on the island, significant increases in demand for power from existing or new industrial customers cannot be met through the use of the current infrastructure. It is estimated that providing an equivalent capacity upgrade to the 15.2 MW that can be supplied by the proposed ERF would cost between £20 million and £26 million.

6.127 Any new or upgraded demand for bulk supply from non-domestic consumers would need to be paid for by the new applicant(s) for the power, which could disincentivise investment on the island. Similarly, if power demand on Portland reaches the point where it exceeds the available supply, excess utility costs could mean that employment sites on the island become less competitive because of higher utility costs. This would have implications for competitiveness, lost investment and jobs.

6.128 The proposed ERF will therefore provide 15.2 MW of power on the island that would not otherwise be available without major investment and costs to businesses. The receptor for this element is defined as the next applicant for significant industrial power on Portland, combined with SSE, as the stakeholders on whom the burden of funding improved grid connections would fall. The impact is assessed as the at least £20 million opportunity cost of not going ahead with the scheme in the short to medium term. Overall, there will be a medium change to a receptor of medium sensitivity, leading to a moderate, significant beneficial effect.

Shore power

6.129 Until the COVID-19 pandemic, Portland Port had a solid and growing cruise business, with 41 cruise ship calls in 2019, 43 booked for 2020 and 45 booked for 2021. While most of this year's programme has been lost as a result of the pandemic, optimism is high for the future of cruising generally and bookings are being made for 2021. Both the cruise ship sector and Portland Port are expecting a swift recovery, reflecting the experiences post-September 11 2001 and post-2008 financial crash.

6.130 However, it is possible that the continued success of the cruise business at the port could be adversely affected in future if the port is unable to provide shore power. The use of on-board auxiliary diesel generators to power ship's services while in port is the primary source of air emissions from ports because these generators run on either heavy fuel oil or bunker fuel. This results in associated emissions of carbon dioxide (CO_2), NO_x, SO_2 and particulates. There is therefore an international and UK policy push towards the use of shore power in ports, which allows ships to connect to an onshore power source at the berth and switch off their auxiliary generators.

6.131 The cruise ship sector is also under pressure from its customers to make environmental improvements quickly. According to the Cruise Lines International Association (CLIA, 2019), around 30% of cruise ships (by tonnage) are already fitted with the ability to use shore power, with a further 17% planned for retrofitting and an additional 39% configured so that they could be fitted with shore power capacity in future. This indicates that demand for shore power will increase over time. The prohibitive costs associated with upgrading the island's electricity capacity mean that it would be difficult for Portland Port to provide shore power without the proposed development.

6.132 It is considered that, without the provision of shore power, cruise ships could gradually stop using the port over the period to 2050. The impact of this loss of business would be felt firstly by Portland Port and its suppliers, and also by coach trip and transport operators, in the form of lost income and, potentially, lost employment. However, the provision of shore power by the proposed development will enable Portland Port to retain and grow its cruise business, which will also benefit suppliers. While it is not possible to quantify this impact because of commercial sensitivity, overall a medium impact is predicted on a receptor of medium sensitivity, leading to a moderate, significant beneficial effect as a result of the ability to retain and grow the port's cruise business.

6.133 There is also the potential for an associated effect on the area's tourism-related businesses. In 2019, based on the approximately 54,000 cruise passengers coming through the port spending an average of £71 per head on day trips (CLIA, 2019), an estimated spend of £3.8 million would have been generated during the cruise season. The net effects of providing shore power on local cruise-related tourism spend and jobs have been estimated over the 25-year design life of the proposed ERF, taking account of leakage in spending to other areas and displacement of trips to other ports and multiplier effects. Full details of the calculations and associated assumptions are provided in technical appendix F2.

6.134 In summary, it is predicted that the loss of cruise business as a result of shore power not being provided would lead to an average decrease in spending in the Weymouth and Portland and wider Dorset area of £2.38 million per year, with an associated loss of 45 jobs in the retail, transport, accommodation and food service, travel agent and tour service and museums, entertainment and culture industries. The provision of shore power as a result of the proposed development would therefore safeguard this spending and the associated jobs.

6.135 In the context of the wider tourism sector in Dorset, where total day trip spending alone amounted to £912 million in 2018 (Dorset Tourism Partnership, 2018), the impact magnitude of safeguarding the above jobs and spending is considered to be small. Combined with the medium receptor sensitivity, this will lead to a slight beneficial effect that will not be significant.

Local energy supply

6.136 The proposed ERF will have the capability to supply district heating to local properties, subject to demand. Potential nearby buildings that would be suitable for district heating include Osprey Leisure Centre, Portland Hospital, HM Prison The Verne, HM Young Offenders' Institute Portland and the Ocean Views development. These are considered to be receptors of low sensitivity and the provision of district heating would be a small impact, leading to a slight beneficial effect that would not be significant.

Costs of waste management

6.137 As discussed in ES chapter 12, most of the local authority collected residual waste in Dorset (51,344 tonnes sent to landfill and 109,984 tonnes sent for energy recovery in 2018) is currently being exported out of the county for treatment and disposal. It is understood that Dorset Council currently pays approximately £130 per tonne to send waste to landfill, suggesting a combined bill of approximately £6.6 million in 2018 for Dorset Council and BCP Council. Around £94 per tonne of the landfill gate fee is currently landfill tax. If this waste was sent to the proposed ERF instead, with a gate fee pitched (for example) in the region of around £80 per tonne, this could save the councils approximately £2.5 million per year. Over the 25-year lifespan of the plant, this would add up to a net present value of approximately £43 million.

6.138 This saving is predicted to be a medium impact on a receptor of medium sensitivity, leading to a moderate, significant beneficial effect.

Costs of carbon emissions

6.139 As set out in ES chapter 5, the proposed development will lead to a reduction in carbon emissions and these have been monetised to determine the economic benefit associated with the reduction. The recovery of energy from waste is not part of the EU Emissions Trading System, so the non-traded price for carbon has been used. Based on a carbon price of £69.28 per tonne, the 21,900 tonnes of CO_2 equivalent (CO_2e) emissions saved per year by the proposed development operating at its nominal design capacity and only exporting heat to the grid (i.e. not taking account of the additional benefits associated with the provision of heat and / or shore power) equate to a cost reduction of £1.52

million per year. Full details of the methodology behind the assessment are set out in technical appendix F2.

6.140 Annual CO_2e emissions figures for local authorities published by BEIS in 2020 show that Dorset's population (level 2 area) of 772,000 people produced 3.06 million tonnes of CO_2e in 2018. This gives an average per head emissions figure of 4.0 tonnes. While figures for the level 1 area Weymouth and Portland are not available, applying the 4.0 tonnes per head figure to the area's population of 65,865 people gives an estimated CO_2e output of 263,460 tonnes per year. Using the carbon price of £69.28 per tonne gives an estimated cost for a year's worth of carbon produced in the area of £18.25 million. The minimum carbon savings associated with the proposed development equate to over 8% of this total value. This is considered to be a medium change to a receptor of high sensitivity, giving a substantial, significant beneficial effect at the level 1 area.

6.141 At the level 2 area, the 3.06 million tonnes of CO_2e produced would have an associated cost of around £212 million. The £1.52 million reduction as a result of the proposed development in this context will be a small change on a receptor of high sensitivity, leading to a moderate, significant beneficial effect.

6.142 At the national level, the UK produced around 344 million tonnes of CO_2e in 2018, with associated costs estimated at £24 billion. In this context, while the sensitivity of the receptor remains high because of the very high UK-wide carbon costs, the magnitude of change will be negligible and the effect will be negligible and not significant.

Re-use of previously developed land

6.143 The main 2.14 ha site has been vacant for several years following the demolition of the last remaining buildings in 2017. The proposed development will bring this previously developed land back into active use. The re-use of vacant brownfield land, and the associated investment, has the potential to increase business confidence in the area. As the immediate area is an industrial area within the confines of a working port, it is not considered likely to be affected by the negative image that is sometimes associated with waste management facilities, as discussed above in the public perception section. Overall, a small change is predicted on a receptor of low sensitivity, leading to a slight beneficial effect that will not be significant.

Community and health

Background

6.144 Defra's 2004 review of the environmental and health effects of waste management found that health effects in people living near waste management facilities were either generally not apparent, or the evidence was not consistent or convincing. Where investigations had been carried out but no health effects found, Defra undertook further investigations in response to public concerns. The review did not find a link between the current generation of ERFs and health effects. Adverse health effects were observed in populations living around older, more polluting ERFs and industrial areas. However, the current generation of ERFs results in a much lower level of exposure to pollutants.

6.145 The study considered cancers, respiratory diseases and birth defects, but no evidence was found for a link between the incidence of disease and the current generation of facilities. The government's independent expert advisory committee on the Carcinogenicity of Chemicals in Food, Consumer Products and the Environment concluded within the study that *"any potential risk of cancer due to residency (for periods in excess of ten years) near to municipal solid waste incinerators was exceedingly low and probably not measurable by the most modern techniques."*

6.146 To put the effects of managing municipal solid waste into context, Defra reported that its management accounts for less than 2.5% of almost all quantifiable emissions in the UK. The exceptions to this were emissions of methane (nearly 30% of total emissions) and cadmium (10% of the national total). Almost all of the cadmium and methane emitted to air from facilities managing municipal solid waste comes from landfill sites.

6.147 Defra also compared the hazards from municipal solid waste management with other health hazards. Fireworks resulted in over 1,000 hospital admissions in 2002. Traffic accidents result in over 3,000 deaths and over 300,000 hospital admissions every year. In comparison, managing municipal solid waste results in approximately five hospital admissions and one death brought forward per year. Defra concluded that, while the information on health and environmental effects of waste management is incomplete and not ideal, the weight of evidence from studies to date is that present-day practices for managing municipal solid waste have, at most, a minor effect on health and the environment.

6.148 PHE's (2019) *Statement on modern municipal waste incinerators (MWIs) study* reviews the findings of three papers published by the Small Area Health Statistics Unit at Imperial College London. It states that no evidence was found of an increased risk of infant mortality for children living close to municipal waste ERFs. No evidence was found of increased risk of congenital anomalies from exposure to stack emissions, but a small potential increase in the risk of congenital anomalies was recorded for children born within 10 km of municipal waste ERFs. However, PHE emphasises that this may well be down to not fully adjusting the study for factors such as other sources of pollution or deprivation, and states that a causal association between the increased risk of congenital anomalies for children born close to municipal waste ERFs has not been established. The statement concludes that *"PHE's risk assessment remains that modern, well run and regulated municipal waste incinerators are not a significant risk to public health."*

Human health risk assessment

Assessment of human health impacts of SO_2, NO_2 and particulate matter

6.149 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 would result in an overestimate of any health effects. The results of the assessment are summarised here and full details are set out in technical appendix G.

6.150 The modelling results predict that emissions of particulate matter with a diameter of less than 2.5 µm ($PM_{2.5}$) from the proposed development will result in an estimated 0.64 years of life lost per year, distributed across the whole of the exposed population. While those in the highest exposure group would be most susceptible to a reduction in life years, the results averaged across the whole exposed population give a reduction of approximately 10 minutes per person per year, or five hours if continually exposed throughout a 30-year lifetime for 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. PHE (2014) calculates that 327 years of life are lost per year in the total population of Weymouth and Portland due to the existing air quality.

6.151 The increased exposure to particulate matter with a diameter of less than 10 µm (PM_{10}) from the proposed development is not predicted to result in a single additional case for any of the health indicators considered (cardiovascular mortality, cardiovascular admissions, ischaemic heart disease admissions and heart failure admissions). The proposed ERF would need to operate for 246 years to generate sufficient pollution for one additional mortality case to arise.

6.152 Similarly, emissions of NO_2 associated with the proposed development are not predicted to lead to a single additional case for any of the health indicators considered for this pollutant (cardiovascular mortality, ischaemic heart disease admissions, heart failure emissions and cerebrovascular (stroke) admissions). As an example, the proposed development is predicted to lead to an additional 0.021 cases of ischaemic heart disease per year, compared to 581 cases per year currently occurring in the area.

6.153 The increased exposure to SO_2 is also not predicted to lead to an additional case of any of the health outcomes considered. As an example, the proposed development is predicted to lead to an additional 0.0085 cases of ischaemic heart disease per year, compared to 581 cases per year currently occurring in the area.

6.154 The health effects associated with emissions of NO_2, SO_2, PM_{10} and $PM_{2.5}$ from process emissions and transport associated with the proposed development will therefore be negligible and not significant, particularly in comparison to the health effects associated with the existing exposure to atmospheric pollutants and the existing background events. It should also be noted that this assessment has not taken account of the potential benefits associated with the reduction in ship emissions associated with the provision of shore power by the proposed development.

Lifetime health risks

6.155 The second element of the HHRA is the assessment of contaminants of potential concern that can accumulate in the environment. This means that inhalation is only one of the potential exposure routes to these substances and impacts cannot be evaluated in terms of their effects on human health by simple reference to ambient air quality standards. An assessment has therefore been made of the overall human exposure to the substances by the local population and the risk that this exposure causes. The following contaminants of potential concern were identified for the purposes of the assessment:

- Dioxins and furans
- Antimony
- Arsenic
- Cadmium
- Chromium (trivalent and hexavalent)
- Lead
- Mercury
- Nickel
- Thallium

6.156 There are two main exposure routes through which humans may come into contact with contaminants of potential concern: direct inhalation, and indirectly through ingestion of vegetation, animals and animal products that become contaminated through the food chain. Given the local context, the following two exposure scenarios have been assessed for local residents:

- Scenario 1: A person who lives in 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 other meat
- Scenario 2: A person who lives in the study area and undertakes recreational activities such as gardening. This person also cultivates food at home and consumes 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 of food grown at the property

6.157 In scenario 2, the total intake will be greater because the 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 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 the 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
- There is no significant livestock rearing in the area, so consumption of locally grown beef and pork is not considered

6.158 The results of the assessment are summarised here and set out in full in technical appendix G, together with the detailed modelling methodologies. In order to quantify the risks, the following significance thresholds have been used:

- For non-carcinogenic risks, a hazard index threshold of 1.0 is used. The smaller the hazard index, the less risk to human health. Where a value of less than 1.0 is predicted by the modelling, then the health risk is insignificant
- For carcinogenic risks, the assessment considers the risk of developing cancer over a lifetime. The World Health Organization sets two thresholds for cancer risk. A 1-in-100,000 lifetime risk is considered to be the maximum tolerable risk, while a 1-in-1,000,000 lifetime risk is considered to be an acceptable risk at which no further improvements in safety need to be made

6.159 The results of the assessment are set out in tables 6.10 and 6.11.

Receptor	Scenario 1		Scenario 2	
	Adult	Child	Adult	Child
R1: Fortuneswell, Portland	~~5.14×10^{-4}~~ 3.01×10^{-3}	~~8.81×10^{-4}~~ 3.28×10^{-3}	~~1.13×10^{-2}~~ 4.49×10^{-3}	~~2.67×10^{-2}~~ 6.75×10^{-3}
R2: East Weare Road, Portland	~~1.71×10^{-4}~~ 1.01×10^{-3}	~~2.94×10^{-4}~~ 1.10×10^{-3}	~~3.79×10^{-3}~~ 1.50×10^{-3}	~~8.97×10^{-3}~~ 2.26×10^{-3}
R3: Castletown, Portland	~~2.02×10^{-4}~~ 1.18×10^{-3}	~~3.46×10^{-4}~~ 1.29×10^{-3}	~~4.64×10^{-3}~~ 1.76×10^{-3}	~~1.05×10^{-3}~~ 2.64×10^{-3}
R4: Property on Hamm Beach Road, Portland	~~1.20×10^{-4}~~ 7.01×10^{-4}	~~2.05×10^{-4}~~ 7.64×10^{-4}	~~2.63×10^{-3}~~ 1.05×10^{-3}	~~6.22×10^{-3}~~ 1.57×10^{-3}
R5: Smallmouth Close, Weymouth	~~4.35×10^{-5}~~ 2.59×10^{-4}	~~5.51×10^{-5}~~ 2.82×10^{-4}	~~9.77×10^{-4}~~ 3.87×10^{-4}	~~2.31×10^{-3}~~ 5.81×10^{-4}
R6: Dowman Place, Weymouth	~~4.09×10^{-5}~~ 2.47×10^{-4}	~~7.09×10^{-5}~~ 2.69×10^{-4}	~~9.27×10^{-4}~~ 3.68×10^{-4}	~~2.19×10^{-3}~~ 5.52×10^{-4}
R7: Redcliffe View, Rodwell	~~3.58×10^{-5}~~ 2.14×10^{-4}	~~3.58×10^{-5}~~ 2.33×10^{-4}	~~8.03×10^{-4}~~ 3.19×10^{-4}	~~1.89×10^{-3}~~ 4.79×10^{-4}
R8: Old Castle Road	~~4.35×10^{-5}~~ 2.61×10^{-4}	~~7.52×10^{-5}~~ 2.84×10^{-4}	~~9.81×10^{-4}~~ 3.89×10^{-4}	~~2.31×10^{-3}~~ 5.84×10^{-4}

Table 6.10: Assessment of non-cancer risk to health (compared to significance threshold of 1.0)

Receptor	Scenario 1		Scenario 2	
	Adult	Child	Adult	Child
R1: Fortuneswell, Portland	~~3.11×10^{-8}~~ 1.61×10^{-7}	~~6.26×10^{-9}~~ 3.41×10^{-8}	~~4.84×10^{-8}~~ 2.32×10^{-7}	~~8.71×10^{-9}~~ 6.74×10^{-8}
R2: East Weare Road, Portland	~~1.03×10^{-8}~~ 5.39×10^{-8}	~~2.08×10^{-9}~~ 1.14×10^{-8}	~~1.61×10^{-8}~~ 7.75×10^{-8}	~~2.90×10^{-9}~~ 2.26×10^{-8}
R3: Castletown, Portland	~~1.22×10^{-8}~~ 6.31×10^{-8}	~~2.46×10^{-9}~~ 1.34×10^{-8}	~~1.64×10^{-8}~~ 9.08×10^{-8}	~~2.82×10^{-9}~~ 2.64×10^{-8}
R4: Property on Hamm Beach Road, Portland	~~7.29×10^{-9}~~ 3.75×10^{-8}	~~1.46×10^{-9}~~ 7.94×10^{-9}	~~1.13×10^{-8}~~ 5.39×10^{-8}	~~2.03×10^{-9}~~ 1.57×10^{-8}
R5: Smallmouth Close, Weymouth	~~2.63×10^{-9}~~ 1.39×10^{-8}	~~$5.29E^{-10}$~~ 2.94×10^{-9}	~~4.11×10^{-9}~~ 1.99×10^{-8}	~~$7.41E^{-10}$~~ 5.80×10^{-9}
R6: Dowman Place, Weymouth	~~2.48×10^{-9}~~ 1.32×10^{-8}	~~$4.98E^{-10}$~~ 2.79×10^{-9}	~~3.87×10^{-9}~~ 1.90×10^{-8}	~~$6.99E^{-10}$~~ 5.52×10^{-9}
R7: Redcliffe View, Rodwell	~~2.17×10^{-9}~~ 1.14×10^{-8}	~~$4.36E^{-10}$~~ 2.42×10^{-9}	~~3.38×10^{-9}~~ 1.65×10^{-8}	~~$6.10E^{-10}$~~ 4.79×10^{-9}
R8: Old Castle Road	~~2.63×10^{-9}~~ 1.39×10^{-8}	~~$5.29E^{-10}$~~ 2.95×10^{-9}	~~4.11×10^{-9}~~ 2.00×10^{-8}	~~$7.42E^{-10}$~~ 5.83×10^{-9}

Table 6.11: Assessment of cancer risk to health (compared to significance threshold of 1.0×10^{-6} – a 1-in-1,000,000 lifetime risk)

6.160 Tables 6.10 and 6.11 show that the risk of non-carcinogenic and carcinogenic effects will be substantially below the significance thresholds of 1.0 and 1-in-

1,000,000 respectively. The risks are therefore negligible and not significant and the proposed development will not result in significant adverse health effects.

Health impact assessment

6.161 The HIA also considers how a range of socio-economic, physical, mental and community health outcomes might be affected by activities associated with the operation of the proposed ERF. Post-construction, the proposed ERF will employ between 30 and 35 people and will also create a range of indirect employment, as discussed above. The greatest community level health and wellbeing benefits would be felt if these positions are filled by previously unemployed people. As discussed above, the local economy will also benefit from expenditure associated with the transport of RDF and materials to the site and business rates paid to Dorset Council. This revenue may be invested in the local area on services such as education, transport links or directly on healthcare. Therefore, there is the possibility that income generation from the proposed development may improve health and wellbeing across Portland, Weymouth and the wider Dorset area.

6.162 The operational phase of the proposed development is unlikely to affect social capital in communities close to the site. While the facility will employ 30-35 people, some of whom may be from outside the local area, this does not represent a significant influx of people to an area that is already predominantly industrial. 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 assessment in ES chapter 11 concludes that there will be a negligible increase in local traffic, so no significant health effects are predicted.

6.163 The likelihood of trespass incidents or accidents occurring during the operation of the proposed development is minimal, as the facility will be manned 24-hours a day by site staff and the wider port is not publicly accessible. Where the building does not form the site boundary, a boundary fence will provide perimeter security.

6.164 The potential health implications of operational emissions, noise, traffic and visual effects are also examined in the HIA. The air quality assessment in ES chapter 4 concludes that there will be no significant operational effects on air quality, either from process emissions or transport. Similarly, the HHRA discussed above concludes that there will be no adverse health effects associated with emissions from the proposed development.

6.165 The HIA notes that 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 to minimise noise levels and ensure that overall noise levels from operation of the proposed ERF comply with the required noise limits at sensitive receptors. The stand alone noise assessment submitted in support of the planning application concluded that there will be no significant effects as a result of noise post-construction.

6.166 The traffic and transport assessment in ES chapter 11 concludes that total vehicle and HGV flows will both increase by less than 2.5% as a result of the proposed development and there will be negligible effects on severance, driver

and pedestrian delay, pedestrian amenity, and accidents and safety. A framework travel plan has been developed to minimise single occupancy car use by staff. The low percentage increase in traffic associated with the proposed development means that the risk of increased collisions and associated risk to health is also low.

6.167 The HIA notes that 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. As discussed in ES chapter 9, the potential visibility of the ERF is largely contained and relatively few residential areas will have views of the plant. A small number of significant changes to views are predicted, from Portland port and breakwaters, public rights of way S3/68, S3/70, S3/72 and S3/81, Sandsfoot Castle Park and Garden and Nothe Fort. However, the HIA concludes that it is unlikely that the changes to the landscape and views would lead to significant negative health effects.

Property prices

6.168 In 2005, Cluttons researched the impacts of three operational ERFs on property prices in the surrounding areas, as part of a study into the potential impacts of a proposed ERF at Newhaven in East Sussex. The first facility considered was the Chineham ERF, which is located on the edge of the residential suburb of Chineham, approximately 3 miles north east of Basingstoke town centre. The facility is partly screened by mature trees and surrounded by fields on three sides, although it is adjacent to a large wastewater treatment works. The second facility was the Marchwood ERF, which was being commissioned at the time of the study. It is situated in the Marchwood Industrial Park, to the north of Marchwood village centre, close to large aggregate and concrete batching plants. The final facility considered was the Portsmouth ERF, which is located opposite an industrial estate in the Hilsea area. It is adjacent to a materials recovery facility and waste transfer station and there is a shopping centre and a secondary school nearby.

6.169 Average house prices in the areas surrounding all three ERFs, based on actual sales for different house types, rose significantly since late 1998 when the Hampshire, Portsmouth and Southampton Minerals and Waste Local Plan was adopted and during the planning application and construction phases of the facilities.

6.170 Values in Chineham continued to rise after the facility was commissioned in January 2003. At the time of the Cluttons study, a new residential development of 800 homes was under phased construction approximately 0.5 miles north of the Chineham plant. The plant's stack is clearly visible from this development. A number of major national house builders have constructed new schemes in the local area.

6.171 Marchwood has a small residential centre and a limited stock of property. At the time of the study, Bellwinch Homes had recently completed a new development of 26 three and four bedroom houses in Marchwood, 21 of which had been sold. The on-site sales office advised that market conditions had hindered sales, but no applicants expressed concern about the proximity of the ERF and the sales office did not believe this was an important factor. Planning consent was granted for the housing scheme after the ERF.

6.172 A number of new housing developments have taken place in the vicinity of the Portsmouth plant since the adoption of the waste local plan. The Drum Housing Association bought a nearby site for residential development in 2000 and a new leisure development, comprising a sports ground, health and fitness centre and bar, has been built near the plant.

6.173 It is clear from the above that the development of the ERFs has not had any noticeable or lasting detrimental effects on residential property prices at any of the locations during the planning process, construction or since commissioning. Values have continued to rise in line with other areas in their local markets. It has also not deterred investment in these areas by major national house builders.

6.174 Another examination of the potential effects of ERFs on residential property prices was undertaken by Cranfield University in 2014 (Phillips *et* al, 2014). This also considered the Marchwood and Chineham facilities, as well as an ERF in Kirklees. The latter is in an urban location, within a heavy industrial zone adjacent to a railway line. All the facilities had been in operation for at least seven years at the time of the study, which compared local property sale prices at five distance zones from 0-5 km from the sites before and after the facilities became operational. No significant negative effects were found on property prices at any distance within 5 km of the ERFs and the study concluded that the perceived negative effect of thermal processing of waste on local property values is negligible.

6.175 The findings of these studies suggest that the proposed ERF is not likely to have an adverse effect on property prices in the local area, particularly given its location within the industrial environment of the port.

Mitigation and monitoring

6.176 The HIA recommends the following mitigation measures are put in place during construction:

- To address any potential concerns about the impact of additional traffic movements associated with the construction of the proposed plant, it may be beneficial to communicate the findings of the air quality assessment and HHRA
- The framework CEMP should be 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 the 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 the 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 should be developed. This 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 in the HIA. The traffic management plan 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

6.177 In addition to the measures that are integral to the design and management of the plant, as set out in chapter 2, the HIA recommends that the following measures are put in place during operation of the plant:

- The traffic management plan 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 ongoing provision of contact points and a 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

6.178 As no significant adverse effects are predicted, no monitoring is required.

Residual effects

6.179 The significant residual effects are summarised in table 6.12.

Topic	Significant residual effect	Receptor sensitivity	Impact magnitude	Nature	Duration	Degree of effect	Level of certainty
Community, health and economic effects	Creation of employment in the Weymouth and Portland area post-construction	High	Small	Beneficial	Long-term	Moderate	Reasonable
	Reduction of the need for investment in power infrastructure	Medium	Medium	Beneficial	Medium-term	Moderate	Reasonable
	Benefits to Portland Port and supply chain businesses as a result of the provision of shore power	Medium	Medium	Beneficial	Long-term	Moderate	Reasonable
	Benefits through reduced costs to Dorset Council as a result of more cost-effective waste management	Medium	Medium	Beneficial	Long-term	Moderate	Uncertain
	Economic savings associated with reduced carbon emissions	High	Medium (level 1 area) Small (level 2 area)	Beneficial	Long-term	Substantial (level 1 area) Moderate (level 2 area)	Reasonable

Table 6.12: Significant residual effects

Cumulative effects

6.180 The construction and operation of the proposed and consented developments in the vicinity of the site will provide employment opportunities for new and existing residents and business opportunities for existing or incoming businesses, while the proposed ERF will contribute to the supporting infrastructure necessary for commercial and residential development. Overall, a small to medium change is predicted to a receptor of medium sensitivity, leading to a slight to moderate, significant, beneficial cumulative effect.

6.181 No potentially significant cumulative air quality, noise, landscape and visual or traffic and transport effects have been identified in the assessments, so there is no potential for significant cumulative community and health effects with the proposed development.