Portland energy recovery facility

Environmental statement
Addendum
Appendices

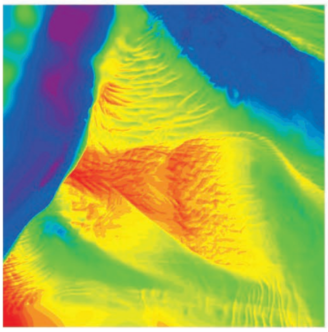
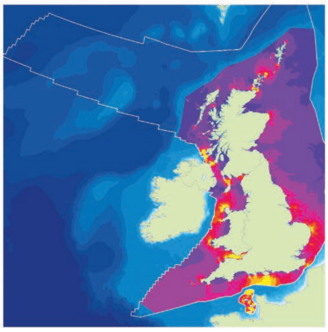
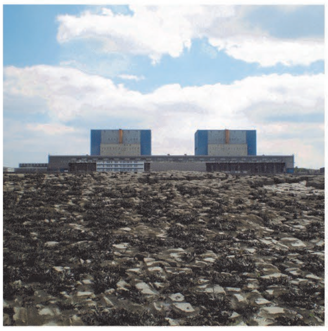
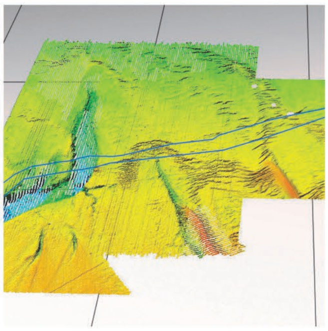
9 : 3

Potential marine impacts of the proposed Portland ERF

Powerfuel Portland Ltd

Potential Marine Impacts of the Proposed Portland Energy Recovery Facility (ERF)

June 2021

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1 Introduction

This note has been prepared by ABP Marine Environmental Research Ltd (ABPmer) on behalf of Powerfuel Portland Ltd (Powerfuel) in relation to potential marine impacts of the proposed Portland Energy Recovery Facility (ERF).

During public consultation on the planning application and accompanying Environmental Statement (ES) stakeholders have made a number of representations raising concerns about potential impacts on the marine environment as a result of emissions to air and to water during construction and operation of the facility. This includes representations about potential impacts to nearby nature conservation sites.

The request for additional information and clarification from Dorset Council dated 30 April 2021 also identifies two points relevant to matters considered in this note:

- 10. Additional information as required by Natural England and other ecological stakeholders to address the outstanding issues raised in respect of nationally/internationally designated sites raised through the initial consultation. This should include consideration of legal points which have been raised in respect of the robustness of the Shadow Habitats Regulations Assessment (HRA).

- 21. Further consideration and information in respect of relevant air quality related issues raised through representations on the first consultation as appropriate.

The information below addresses stakeholder representations about potential marine impacts and informs the above Points 10 and 21 from the Council's letter. It draws on information contained within the ES, and further contextual analysis undertaken by ABPmer.

ABPmer is an established marine environmental consultancy based in Southampton. They regularly undertake marine environmental impact assessments requiring the modelling and assessment of marine water and sediment quality, including the assessment of potential impacts to designated nature conservation sites. They are also a trusted advisor to marine regulators within the UK including the Marine Management Organisation, Natural Resources Wales and Marine Scotland and frequently provide advice on marine water and sediment quality assessments.

2 Emissions to Air

2.1 Assessment of potential impacts

Chapter 4 of the ES provides an assessment of the potential impacts to air quality associated with construction and operation of the ERF. This includes consideration in relation to Air Quality Assessment Levels (AQAL) for the protection of human health and in relation to critical levels and critical loads for the protection of designated nature conservation sites. Additional operational air quality assessment has subsequently been undertaken in response to Dorset Council's letter.

Effects on air quality during construction have been assessed as not significant as the estimated change in vehicle movements compared to the baseline will be negligible (s4.54 to 4.55 of ES).

Effects on air quality during operation have been assessed using an Atmospheric Dispersion Modelling System (ADMS) 5.2 air dispersion model. All modelling has been conducted on a conservative basis (ES s4.48).

The assessment against the AQALs concluded that there are no significant risks to human health as a result of air emissions during the operational phase of the project either on its own or cumulatively with other plans or projects (ES, s 4.100). This conclusion has not been altered by the additional assessment.

The assessment has followed the IAQM's (2019) good practice guidance '*A guide to the assessment of air quality impacts on designated nature conservation sites*' in relation to risks to designated site features from pollutants such as NO_x, SO_2, and ammonia.

Based on this guidance, the effects of such air emissions on local, national and internationally designated sites has been assessed as insignificant taking account of worst-case emissions from the project alone and cumulatively/in-combination with other projects and plans (ES s4.99; 4.100). This conclusion has not been altered by the additional assessment.

2.2 Stakeholder representations

Stakeholder representations have been made in relation to potential impact pathways by which air emissions may affect designated nature conservation sites and protected features within those sites. This includes representations about impacts of NOx and ammonia inputs to the local marine environment on seagrass (a feature of the Chesil Beach and the Fleet Special Areas of Conservation (SAC), Special Protection Area (SPA) and Ramsar[1]) and possible consequential impacts to bird species such as Mute Swan and Little Tern that are dependent on such features. Concerns have also been raised about risks to priority species such as long and short-snouted seahorses, which, while not designated features of the SAC or Ramsar site, are dependent on seagrass habitats.

There have also been more general representations about risks to features associated with the Isle of Portland to Studland Cliffs SAC and the Chesil Beach and the Fleet SAC, SPA and Ramsar and to local Marine Conservation Zones (Purbeck Coast, South Dorset, South of Portland and Chesil Beach and Stennis Ledges).

Concerns have also been raised about risks of ocean acidification as a result of SO2 and CO_2 emissions.

Stakeholder representations have also identified potential risks to fish and shellfish associated with deposition of persistent contaminants such as mercury and dioxins within Portland Harbour and associated impacts of such pollution on the reputation of the local seafood industry and related local tourism sector.

2.3 Analysis

The assessment presented in the ES and updated assessment has followed good practice guidance and adopted a conservative approach in assessing potential impacts, including those protected within designated nature conservation sites.

The assessment demonstrates that emissions from the development during both construction and operation, do not exceed relevant AQALs for the protection of human health, and generally emissions

1 Wetlands of international importance, designated under The Convention on Wetlands (Ramsar, Iran, 1971).

do not exceed critical levels or critical loads from ecologically important pollutants such as NO_x, SO_2, and ammonia air quality standards either alone or in combination with other plans or projects[2].

The critical levels and critical loads are precautionary and have been designed to provide high levels of protection to ecological features including those features protected within designated nature conservation sites.

2.3.1 SO_2 and CO_2

Stakeholder representations have commented on risks associated with ocean acidification as a result of SO_2 and CO_2 emissions to air.

Seawater has a high buffering capacity and no localised changes in pH would be expected as a result of deposition of SO_2 or CO_2 into the marine environment. Elsewhere, the buffering capacity of seawater has been widely harnessed as part of flue gas desulphurisation processes for major coal fired power stations with no localised effects on pH. These processes have involved much larger quantities of SO_2 being released into seawater with no diminution in pH.

Anthropogenic releases of CO_2 are recognised as contributing to ocean acidification at a global scale. The contribution of CO_2 from the ERF is negligible in a global context. Other treatment/disposal options for the waste give rise to higher levels of greenhouse gas emissions over time, and the "ES Carbon Assessment" submitted as part of the application compares the greenhouse gas emissions of the proposed ERF to alternative scenarios.

The contribution to ocean acidification as a result of emissions from the ERF is assessed as negligible.

2.3.2 NOx, and Ammonia

The assessment of critical levels and critical loads has demonstrated that emissions of NOx and ammonia will not pose a direct risk to ecological features. Stakeholder representations have also highlighted potential risks as a result of deposition of nitrogen (NOx and ammonia) within the local marine environment.

In considering the potential risks, it is important that the changes in concentrations of air pollutants such as NOx are seen in context, relative to concentrations of nitrogen in marine waters. The baseline concentrations of NO_2 and ammonia in air are 22µg m^{-3} and <1µg m^{-3} respectively (ES, Table 4.5). The process contribution from the ERF plume to ground level concentrations of NO_2 and ammonia is very small (< 1µg m^{-3} for NO_2 and negligible for ammonia). In contrast background concentrations of nitrogen (NO_{3-} ; NO_{2-} ; NH_3) in seawater (primarily as NO_{3-}) are many orders of magnitude greater. For example, sampling by Environment Agency in Weymouth Bay (SW-50034657) indicates that winter total nitrogen concentration in the period 2010 to 2017 was between 0.1 and 0.15mg l^{-1} (equivalent to between 100 to 150 mg m^{-3}) roughly 4 orders of magnitude greater than concentrations in air[3].

On this basis it is inconceivable that the small process contribution from the ERF will materially contribute to nutrient concentrations in adjacent marine waters and thus will contribute negligibly to any eutrophication. There is thus no risk to marine features such as seagrass that would potentially be

[2] The updated air quality assessment indicates some localised exceedances of critical levels of NOx and ammonia (NH_3) along the A354 across the SAC/Ramsar. The lower end of the critical load range for N is exceeded with or without the project. The impacts of these localised exceedances on the Annex 1 habitats of Chesil Beach are covered under the updated HRA.

[3] Environment Agency Data Viewer - https://environment.data.gov.uk/water-quality/view/sampling-point/SW-50034657?_all=true

sensitive to increases in dissolved nitrogen. Consequently, there is no risk to the seagrass feature associated with the Chesil Beach and the Fleet SAC, SPA and Ramsar sites, nor is there any risk to features such as Mute Swan or Little Tern that are, to some extent, dependent on seagrass habitat. Similarly, there are no significant risks to features associated with the Portland to Studland Cliffs SAC or to local Marine Conservation Zones (Purbeck Coast, South Dorset, South of Portland and Chesil Beach and Stennis Ledges).

2.3.3 Mercury

The air quality assessment presented in the ES has demonstrated that concentrations of mercury at ground level will not exceed relevant AQALs for the protection of human health. Stakeholder representations have, however, questioned whether emissions of mercury might pose risks to fish and shellfish within Portland Harbour and whether this might pose consequential risks to human consumption.

Some data on seawater concentrations of mercury in Portland Harbour is available from Environment Agency monitoring (Portland Harbour 1 - SW-50044494) covering the period 2000 – 2010[4]. Over this period, the great majority of the 94 recorded values for dissolved mercury were <0.01 µg l^{-1}, with a few values recorded as 0.01 µg l^{-1} and single values recorded as 0.03 and 0.06 µg l^{-1}. This compares to a marine Environmental Quality Standard of 0.05 µg l^{-1} as an annual average (AA-EQS) and 0.07 µg l^{-1} as a Maximum Allowable Concentration (MAC) as established by the EU Priority Substances Directive 2008/105/EC.

To estimate the potential contribution that deposition from air emissions from the proposed ERF might make to concentrations of mercury in seawater, a simple model has been developed and applied:

- A model boundary of 5 x 5 km has been established (Figure 1) – this uses the same model boundaries as the human health impact assessment and captures the main area of the sea where impact from the ERF would be experienced (and thus might deposit within the marine environment), the area of the sea in the modelling domain has been calculated as approximately 4,000 hectares;
- An annual worst-case potential loading for mercury has been calculated assuming that all modelled ground concentrations of mercury are deposited within the marine environment;
- The background concentration of mercury in seawater has been taken as 0.005 µg l^{-1} (50% of the < 0.01 µg l^{-1} value typically recorded[5]);
- The volume of seawater within the modelling domain (4,000 hectares) has been estimated assuming an average water depth is 5 m (5 m is likely to be conservative over the domain of the model);
- A daily tidal exchange volume of 0.1 (the proportion of water that is exchanged with the 5 x 5 km box on each tide) has been assumed based on Dyer (1979). This value is based on an average exchange rate coefficient for partially mixed estuaries and is therefore likely to be conservative for more open coastal waters, including areas within Portland Harbour.

4 EA Data Viewer - https://environment.data.gov.uk/water-quality/view/sampling-point/SW-50044494?_all=true

5 Assuming a mean value of 50% of the detection limit is an accepted method where recorded values are below the limit of detection. The assumption has little bearing on the overall analysis as background concentrations are well below the saline EQS.

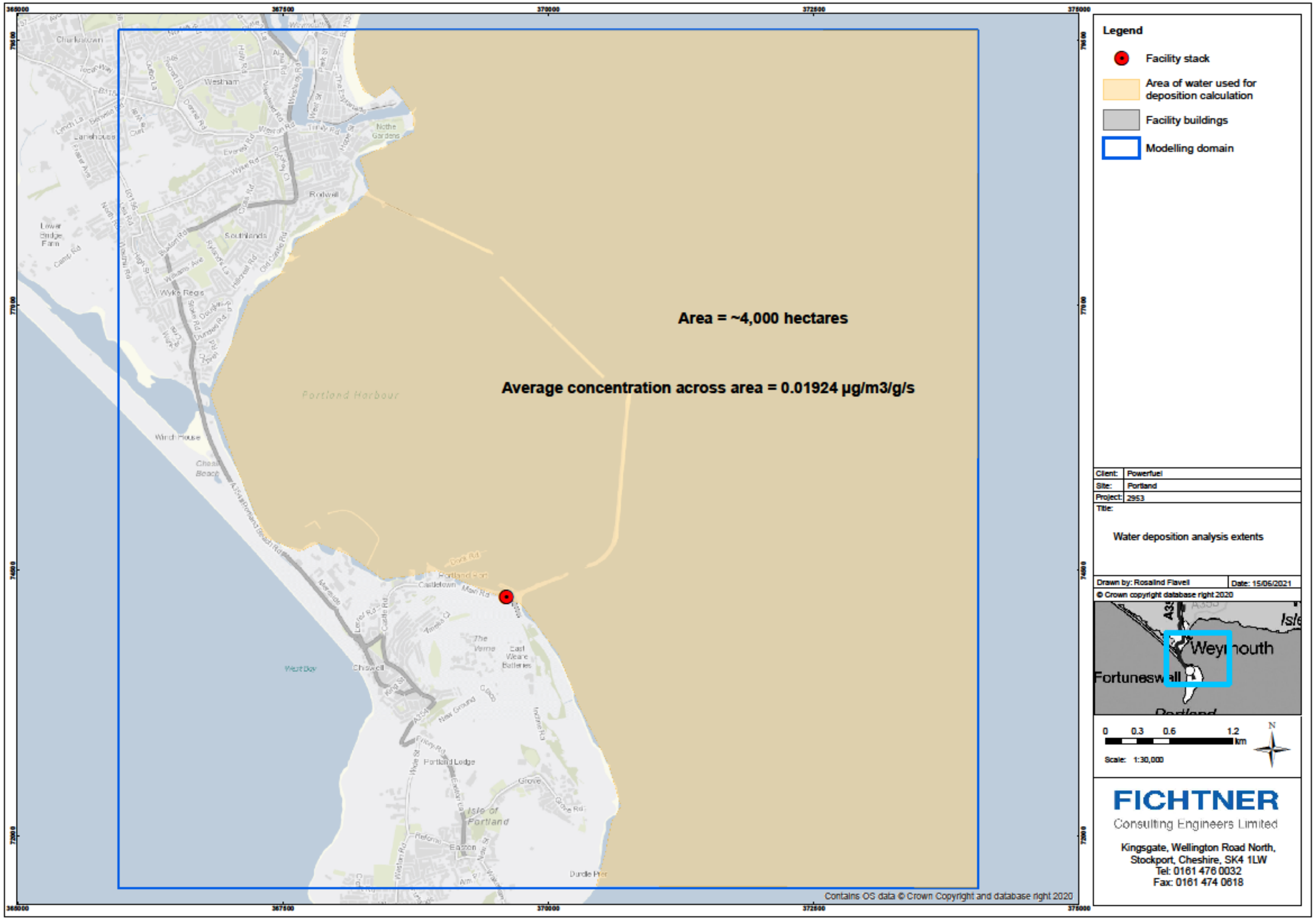

Figure 1. Study area showing model boundary

Based on the above:

- The daily average worst-case potential input of mercury into the 4,000-hectare area of sea surrounding Portland Harbour is 1,720 mg day^{-1} (approximately one-fifth of a teaspoon over an area of $40km^2$ of sea)
- Based on a daily average tidal exchange of 10% from the model domain and using a simple box model, it is estimated that the background concentration of mercury might increase from 0.005 µg l^{-1} to 0.00508 µg l^{-1} within approximately one month and then remain at this level thereafter (i.e. an increase in background concentration of less than 2%) (Figure 2).

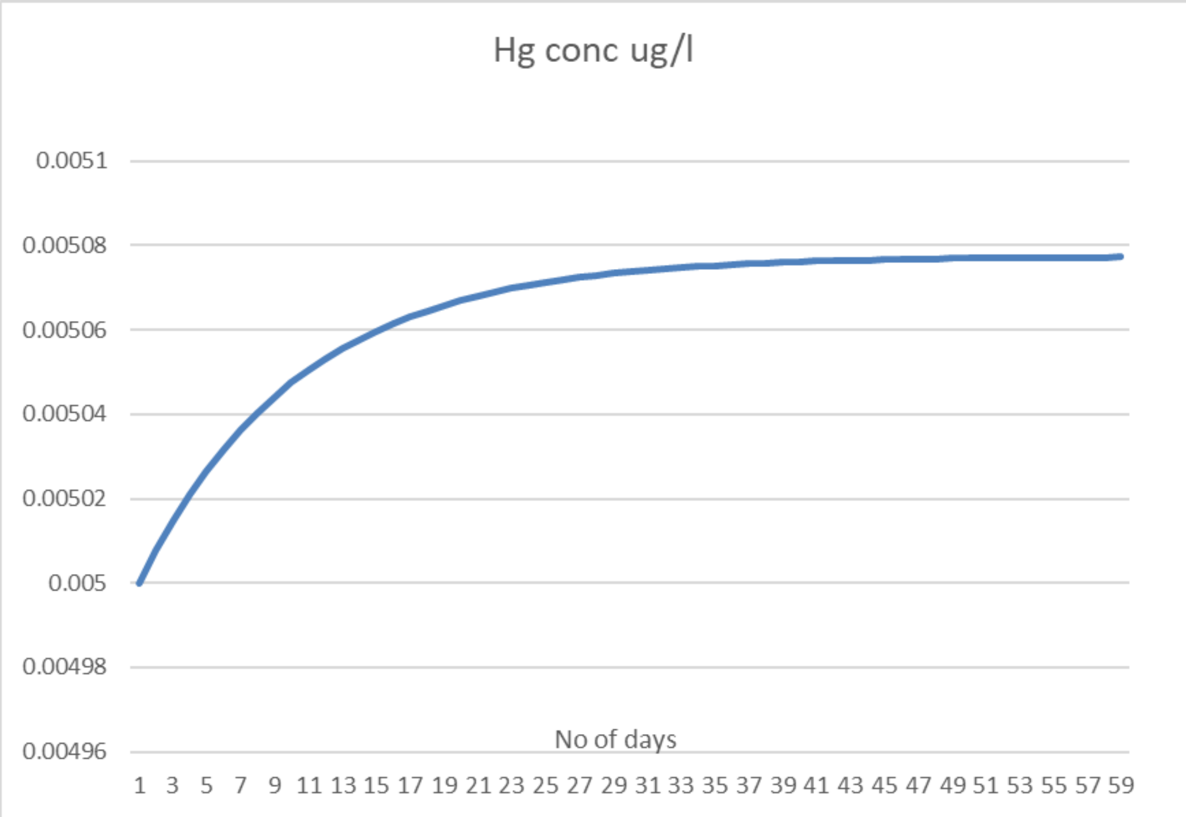

Figure 2. Estimated change in ambient mercury concentration over time based on worst-case aerial deposition and 10% daily tidal exchange

On this basis, it can be seen that the potential worst-case aerial deposition of mercury is estimated to increase the background concentration of dissolved mercury by less than 2% and ambient concentrations of dissolved mercury will remain at around 10% of the saline EQS value as established by the European Union. On this basis, the marginal increase in ambient concentration as a result of worst-case aerial deposition of mercury is assessed as not significant.

Within the marine environment, some mercury will adsorb to organic particles and sediment within the water column and may deposit within local marine sediments.

In order to assess the potential risk of accumulation of mercury within local sediments, a simple model has been developed and applied using the same boundaries as the water quality assessment above:

- The area of the sea in the modelling domain has been calculated as approximately 4,000 hectares;
- An annual worst-case potential loading for mercury has been calculated assuming that all modelled ground concentrations of mercury are deposited within model domain (approximately 627 g Hg yr^{-1});
- The mass of sediment within the model domain has been calculated, assuming an area of 4000 hectares and a depth of 10 cm, with sediment comprising medium sand (with a dry weight of 1.4 tonnes m^{-3}) (Parsmo, 2020)

The model estimates that deposition of this amount of mercury within the model domain would increase the sediment concentration of mercury by 112 ng kg^{-1} sediment (dry weight) per year. This equates to 0.09% of the Interim Sediment Quality Guideline (ISQG) designed to protect sea life (0.13 mg kg^{-1} dry weight sediment) (CCME, 1999).

Based on the above there are no significant risks to any of the local designated sites or to shellfish or fish populations associated with mercury emissions either in terms of risk to marine water quality standards or as a result of sediment contamination. Nor are there risks associated with human consumption of local fish or shellfish.

2.3.4 Dioxins

The air quality assessment presented in the ES has demonstrated that concentrations of dioxins at ground level will not exceed relevant AQALs for the protection of human health.

Within the marine environment, dioxins will strongly adsorb to organic particles and sediment within the water column and may deposit within local marine sediments. Dissolved concentrations in the water column will be negligible. In order to assess the potential risk of accumulation of dioxins within local sediments, a simple model has been developed and applied using the same boundaries as the water quality assessment above:

- The area of the sea in the modelling domain has been calculated as approximately 4,000 hectares;
- An annual worst-case potential loading for dioxins has been calculated assuming that all emissions of dioxins are deposited within model domain (approximately 73 mg dioxins yr^{-1});
- The mass of sediment within the model domain has been calculated, assuming an area of 4,000 hectares and a depth of 10 cm, with sediment comprising medium sand (with a dry weight of 1.4 tonnes m^{-3}).

The model estimates that deposition of this amount of dioxin within the model domain would increase the sediment concentration of dioxin by 0.013 ng kg^{-1} sediment (dry weight) per year. This equates to 1.5% of the Interim Sediment Quality Guideline (ISQG) designed to protect sea life (0.85 ng kg^{-1} dry weight sediment) (CCME, 2001). This is a highly conservative estimate as it assumes that all dioxin emitted to air will deposit locally whereas in reality only a small proportion will be deposited.

Based on the above there are no significant risks to any of the local designated sites or to shellfish or fish populations associated with dioxin emissions as a result of sediment contamination. Nor are there risks associated with human consumption of local fish or shellfish. Consequently, there should be no rational basis to anticipate a negative impact on fish and shellfish related businesses and employment. We are aware for example of other edge of water locations which host similar energy from waste facilities to the proposed ERF (including for example a much larger EfW plant at Copenhagen Harbour where fishing is an active pursuit.)

3 Emissions to Water

3.1 Assessment of potential impacts

Chapter 8 of the ES assesses potential impacts to ground conditions and water quality.

During construction, it is recognised (ES s8.56) that there is potential for contamination of marine waters through sediment run-off, spillages from vehicles/plant and concrete wash-waters as well as discharges from construction activities. There is also potential for contaminated run-off from stockpile areas. To mitigate potential construction impacts a framework Construction Environmental - Management Plans (CEMP) has been developed that will be agreed with the Environment Agency and Dorset Council. Proposed measures are set out in ES section 8.74 and 8.75. with these measures in place the effects on marine water quality are assessed as negligible (ES s8.76).

During operation, as agreed with Wessex Water subject to detailed design and permitting, it is proposed that all process effluent and foul water generated on site will be discharged to the sewer system. Clean surface water run-off from buildings will be discharged to sea. All surface water run-off from roads and hardstanding will be passed through an oil bypass separator prior to discharge. In addition, sustainable drainage systems in the form of a swale have been incorporated within the landscaping areas (ES s8.66). In consequence, the ES (s 8.67) assesses changes to marine water as neutral/insignificant. On this basis there are no significant risks to any of the local designated sites.

3.2 Stakeholder representations

Stakeholder representations have raised concerns about potential risks to the marine environment as result of thermal pollution from aquatic discharges and water quality risks associated with spillage/leakage of incinerator bottom ash (IBA) during loading of ships. Risks to people from sea bathing have also been raised.

3.3 Analysis

As noted above, there are no planned process effluent or foul water discharges direct to the marine environment during operation of the ERF. All such discharges will be made to sewer. These will be treated at Weymouth wastewater treatment works (WwTW) and discharged to the sea one kilometre offshore, west of Portland Harbour. The process and foul water effluent from the ERF will be a minor component of the overall discharge from the WWTW. On this basis there will be no significant risks to the marine environment or to any local designated sites from process effluent or foul water discharges from the plant. Nor will there be risks to people associated with sea bathing.

The handling of IBA will be subject to conditions in the Environmental Permit issued by Environment Agency governing the operation of the ERF. This will ensure that risks to the environment, including the marine environment are adequately managed. Any mitigation and monitoring requirements will be incorporated within the site's Environmental Management System. This will ensure that risks to any local designated sites or the wider marine environment associated with spillages or leakages of IBA can be effectively managed. On this basis, taking account of the mitigation measures that will be applied, the risks to the marine environment from this pathway are assessed as insignificant.

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