

Dr JOHN WEBB

COMMENTS AS AN INTERESTED PARTY

**Under the Town And Country (Inquiries Procedure) (England) Rules
2000**

Planning Appeal Reference: APP/D1265/W/23/3327692

APPEAL BY: Powerfuel Portland Limited

***PROJECT: Construction of an Energy Recovery
Facility (ERF) with ancillary buildings and works***

SITE: Land adjacent to Balaclava Bay at Portland

Port, Castletown, Portland, Dorset, DT5 1PP

SUMMARY

This objection responds to heightened scientific and public alarm at the increasing damage to shores, seas and oceans from human, especially industrial, activities.

I shall therefore address a vital yet seemingly neglected aspect of the proposed siting of a waste incinerator on Portland: the potential for harms to coastal and marine habitats by particulate emissions from the facility's chimney stack and - to a lesser extent - from freight vehicles' tyres and brakes.

INTRODUCTION

1. As an Interested Party I am taking part in this inquiry to present my own findings.
2. My interest is in moving the processing of waste towards the top of the Waste Hierarchy so that hardly any of those materials are sent for destruction. In other words, the aim should be for 'zero waste' via waste reduction and 'circular economies' of materials across all sectors.
3. I cannot offer to act as an expert witness to this inquiry since I am not offering first-hand testimony. Rather I am offering a digest of findings mainly from recent official, academic and scientific sources, i.e. based on published guidance and meta-research rather than on my personal research or experience.
4. My own relevant background includes being a director of the United Kingdom Against Incineration Network (UKWIN) (although I will not be representing UKWIN at these hearings and UKWIN is making separate submissions to this inquiry), a trustee of the Circularity Foundation (in a formative stage) and a long-standing Fellow of the Royal Geographical Society (FRGS).
5. My academic qualifications include a science degree (BSc) in Mathematics and Physics with Chemistry and Geology, a master's degree (MSc) in Ecology and Society and a doctorate (PhD) in methods of textual analysis of complex official documents.
6. I am a keen member of the Town & Country Planning Association, the Green Alliance network and other environmental networks.
7. My views and actions reflect a deep ecological concern about the impacts of climate change toward 2030, 2050 and far longer periods of time.

ABOUT THIS APPEAL

8. Firstly, I wish to express my thanks to the Planning Inspector for providing this opportunity to participate in this Portland Port planning inquiry.
9. My evidence demonstrates that in recent decades the Government's position has shifted, and is continuing to shift, further against environmental pollution and in favour of conserving materials by reduction, re-use, recycling and composting as far as practicable within a 'circular economy' of materials and of avoiding ecological damage.

10. Hence what may have been permitted as recently as a few years ago might well now be refused, without inconsistency, since the legislative framework and governmental objectives have evolved so rapidly.
11. I believe that the Appellant's proposal should be added to the long list of refused projects, and that saying 'No' to this inappropriate development would be the right and just outcome of this appeal inquiry.

FOCUS

12. My focus is on a single, site-specific issue: the effects of particulate emissions on coastal and marine environments around and to either side of the Portland peninsula. The proposed site's local context with almost 360° of coastlines around the Portland peninsula render the situation unique within the UK.
13. The local environments are not individually unique since broadly similar habitats are found in other coastal sites of the UK. It is the proximity of the coastal and marine habitats to the proposed site and the marine configuration of the Portland peninsula projecting southwards into the Channel that are unique.

THIS APPEAL

14. The Portland Port ERF proposal is not such that the environmental impacts of the scheme are, or can be made, entirely acceptable.
15. As indicated by my evidence to this inquiry, this is a case where adverse environmental impacts indicate that this proposal should definitely be refused.
16. I do not believe that the Appellant's proposal would be an acceptable use of the land given the impact of that use.¹

¹ DLUHC & MHCLG, 'Guidance: Waste', 15 Oct. 2015, para. 050, revised 16 Oct. 2014: "There exist a number of issues which are covered by other regulatory regimes and waste planning authorities should assume that these regimes will operate effectively. The focus of the planning system should be on whether the development itself is an acceptable use of the land and the impacts of those uses, rather than any control processes, health and safety issues or emissions themselves where these are subject to approval under other regimes. However, before granting planning permission they will need to be satisfied that these issues can or will be adequately addressed by taking the advice from the relevant regulatory body."

EVIDENCE

17. My submission presents an urgent and compelling case that operation of the Appellant's proposed facility would be harmful to wildlife habitats in the coastal and marine habitats around the site and would thus undermine national efforts to protect and improve biodiversity and to mitigate the effects of climate change.
18. In my view the proposal should furthermore be treated as one that goes against the Waste Hierarchy, the principles, objectives and legal requirements for a 'circular economy' of materials and the protection of vulnerable habitats.

SPECIES

19. My primary concern here is not for the adult forms of wildlife (macro-fauna and macro-flora). Rather it is focussed on the host habitats, such as reefs, wrecks and seagrass meadows and on the early and microscopic stages of seaborne and coastal life such as plankton, larvae and polyps. That is because the habitats and microfauna are easily overlooked but are essential for a healthy coastal and marine environment.
20. The habitats around the Portland peninsula are highly varied in water depth, geology, topography and wildlife. Large areas are already, or newly, protected; others are under consideration; while some have only general or voluntary forms of official protection.
21. The ecological assemblages of species vary widely across these habitats, at all levels of the 'water column' and on and in the seabeds. Since processes of surveying habitats, species and their inter-relations and of according official protection are ongoing in England, it would be prudent to take a precautionary approach to assessing actual and potential harms.
22. Besides, changes in the climate, and hence in local weather patterns, are now under way for decades and centuries to come. It would be prudent to make allowances for medium- and long-term resilience of all wildlife habitats in this area and provision for incoming and departing species.

PROTECTION

23. Several coastal and marine areas around the Portland peninsula have a protected status. Some of these are illustrated in the Joint Nature Conservation Committee (JNCC)'s Mapper for Marine Protected Areas.²

POST-EMISSION PROCESSES

24. The enclosed processes involved in incineration are outlined in the Appellant's proposal. Let's begin at the end and go onwards from there. The final stage of mass burn incineration is usually that of expelling waste gases from the chimney stack or stacks. Beyond that there could be further stages of heat recovery (such as 'district heating', DH) and/or some form of carbon capture (CC).³
25. Optional processes: District heating is referred to in the proposal. However it may have little effect upon particulate emissions. On the other hand, any form of carbon capture may significantly alter the nature of those emissions. I shall disregard carbon capture here since it is not guaranteed by the proposal. Any estimate of the nature and quantity of emissions would depend on the choices of technologies for district heating and for carbon capture, each of which is as yet unspecified in any detail in the proposal.
26. Stack emissions: The lightest byproducts of combustion are expelled at high speed (17.13 metres per second in the Appellant's case)⁴ from the top of the stack. They consist of air, steam, gases and particulate matter. Despite water-scrubbing and filtering, the gases and post-filtered particles may be variously inert, toxic and/or in nascent (highly reactive) states.
27. The immediate plume: In the first few meters above the stack top, on contact with the ambient atmosphere, an 'envelope' of water vapour forms around the fast-

² JNCC, undated/current, 'MPA Mapper' (included as Item 34 in the accompanying Extracts bundle).

³ i.e. with or without utilisation of the carbon dioxide (CO₂); then usually transportation and perhaps sequestration of the CO₂, for a minimum of 10,000 years: DESNZ & BEIS Guidance, 22 Jan. 2023, 'UK carbon capture, usage and storage' (included as Item 1 in the accompanying Extracts bundle).
also Wikipedia entry for 'Carbon capture and storage'.

⁴ Powerfuel Limited, 'Environmental Statement', chapter 3, Environmental Issues and Methodology, page 16, Table 7 'Source stack data', final row.

moving column. This first-stage plume expands rapidly towards equilibrium with the ambient pressure. Within its droplets, the hot gases, water, oxygen and particulates continue to react through transitioning states as the column expands.

28. The intermediate plume: The next stage of expansion and slowing of the column is accompanied by condensation and cooling of a greater proportion of the steam. The water droplets are a suitable host for physical and chemical reactions⁵ of the gaseous and particulate components. When the plume is visible, it takes the form of billowing 'clouds' expanding and bending into the wind's direction of travel.
29. The farther plume: As these 'clouds' expand and disperse, their heat and reactivity continue to decrease until they settle towards the ambient temperature, while continuing to spread and to travel high across the landscape and/or seascape.⁶
30. A plume from the stack would only be visible in some weather conditions. However the plume would be invisibly present at all times whenever the incinerator's furnace was operating including the starting-up and shutting-down phases of maintenance and response to incidents.⁷

PARTICULATES

31. The particulate and gaseous states of matter in stack emissions are not quite in distinct categories since "Some substances exist simultaneously in both gaseous and particulate phases."⁸ In terms of buoyancy within a plume, the finest particulates will tend to move in a manner more like that of the gases than that of the larger particles.

⁵ Powerfuel Limited, 'Environmental Statement', Appendix D2, 'Process Emissions Modelling', page 2, section 4.4 notes a specific reaction: that of nitric oxide (NO) with atmospheric oxygen to form nitrogen dioxide (NO₂). This includes an estimate of ground level NO_x emissions, yet without reference to sea level depositions in offshore areas.

⁶ Powerfuel Limited, 'Environmental Statement', Appendix D2, 'Process Emissions Modelling', page 29, section 6.2 'Operating below the design point': The Appellant's dispersion modelling assumes that the plant runs at its design capacity, below which the plume would lose buoyancy but the amount of pollutants would be decreased.

⁷ The presence of an invisible plume may be demonstrated by use of a thermal imaging camera to trace the trajectory of emitted gases and water vapour from a stack top to their distant cooling towards the ambient temperature of the atmosphere.

⁸ EA Guidance, updated 24 Sept. 2021, 'Monitoring stack emissions: guidance for selecting a monitoring approach', section on 'Targeting the substance to measure': "Examples of this are organic pollutants such as dioxins and furans, and inorganic pollutants such as mercury." (*included as Item 2 in the accompanying Extracts bundle*).

32. Depending on weather conditions and density of pollution emitted, any exceptional incident in the operation of an incinerator may result in an excess quantity and/or excess density of stack emissions and possibly a temporary, more-or-less localised 'touch-down' of the plume, perhaps including smoke, on a land or sea surface or even a severe 'knock-down' event in which heavy precipitation dumps escaped particulates and toxins out of the plume.
33. The Appellant's Environmental Assessment has a chapter about Sensitive Receptors which claims that the methodology would "ensure that all receptor locations are captured."⁹
34. The list appears to focus on receptors on land and along the coasts, but not the offshore areas of sensitive receptors.
35. The stack emissions data does include data about fine particulate matter (PM) in terms of concentrations by mass and release rates.¹⁰
36. Particulates are produced and modified in composition and quantity through the processes of combustion, filtering and scrubbing, and all of the processes from ejection from a stack to eventual dispersal and deposition.
37. The particulates expelled from a stack follow a related set of trajectories to those of the gaseous and aqueous plume. Essentially, the larger and heavier particles are deposited first below the plume; whereas the finest-grained particles remain in suspension indefinitely until they are dispersed into the atmosphere along with the gases and water vapour.
38. This may appear to be an orderly sequence of sorting whereby thermal uplift, wind and gravity serve to grade the particles in a predictable manner. However strong, variable and gusty winds can disrupt the gradation. So can precipitation and mists, by gathering particles around raindrops, snowflakes and hailstones and carrying them along and/or down to ground or water surface level.

⁹ Powerfuel Limited, 'Environmental Statement', Appendix D2, 'Process Emissions Modelling', pages 14-15: Table 6 'Ecological Sensitive Receptors'.

¹⁰ Powerfuel Limited, 'Environmental Statement', Appendix D2, 'Process Emissions Modelling', page 17, Table 8, 'Stack emissions data' on page 17, 4th row.

See also:

Fichtner, 'Annex A to Schedule 5 request – Modelling Uncertainty', 3 Dec. 2021, page 5, Table 8 Corrected: Stack Emissions Data, row 4.

39. An ERF is liable to maintenance incidents (involving shut-downs and restarts) and malfunctions would be bound to occur from time to time that would disrupt the smooth running of the plant.¹¹
40. During such episodes - typically for hours at a time - the stack emissions including particulate materials may be temporarily changed in nature and/or increased in quantity. On a precautionary basis, these contingencies need to be recognised and included in reckoning the balance of ecological harms.
41. Deposition: The particulate components variously accompany, and are carried by, the plume or fall away toward the land and water surfaces over which the plume is moving and spreading with air movement taking place most of the time on the highly exposed Portland peninsula.
42. Degrees of harmfulness: In general, the largest grains of particulate matter - some up to a human-visible size - may pose the least risk of harm to living organisms. The tiniest particles, down to microscopic granules and single molecules, are the most harmful since they can penetrate into the vital tissues of organisms including plankton, algae and delicate, composite organisms such as marine lichens and corals.¹²
43. The Environmental Statement assesses the impacts of chemical compounds on ecological receptors in respect of nitrogen deposition and of acidification.¹³ Its accompanying maps mark the estimated extents of deposition at sea and also protected coastal and marine areas (Special Areas of Conservation, SAC); but the impacts on marine habitats and species do not appear to be assessed in any detail.¹⁴

¹¹ Abnormal operating conditions are discussed in the Appellant's assessment for the EA including section 2.1 'Plant start-up and shutdown'.

¹² Deeper penetration of organisms by the finer sized particulates is recognised by the Appellant (in respect of harms to humans) in Powerfuel Limited, 'Environmental Statement', Appendix D2, 'Process Emissions Modelling', page 6, para.b.3.

¹³ Powerfuel Limited, 'Environmental Statement', Appendix D2, 'Process Emissions Modelling', page 40, section 8: specifically for compounds of nitrogen, sulphur and hydrogen chloride.

¹⁴ Powerfuel Limited, 'Environmental Statement', Appendix D2, 'Process Emissions Modelling', on pages 46 to 62, unnumbered.

EMISSIONS FROM TRANSPORT

44. The heavy goods vehicles (HGVs) that would carry material to and from the site are discussed in the proposal in terms of traffic rates and exhaust emissions. The latter would be initially from diesel fuel and later might well be from hydrogen fuel. These emissions are not commented upon here in my submission.¹⁵
45. Rather in respect of freight transport I focus exclusively on the particulate matter shed by the vehicles' tyres and brakes.
46. Both of these kinds of particles are released into the atmosphere and onto the ground around the designated roads and especially the ramps within the incinerator plant.
47. Within some 20-25 miles of the plant, the roads run north-to-south along the coast, across the causeway and along Castletown by the docks. As the particulates from HGVs would be blown and washed away from the roadway, they would arrive at a shore or water surface, whether along Chesil Beach, the Fleet, the Harbour/ Balaclava Bay and Weymouth Beach and then on eastwards past Kimmeridge Bay.

ON WATER SURFACES

48. Where particulate materials settle upon sea, channel and lagoon surfaces, or are picked up by waves and tides, several processes may occur depending on the particles' composition and the ambient conditions.
49. According to their buoyancy, particles may float or sink. Depending on their size and water turbulence, sinking particles may remain in suspense in the water column or sink to the sea bed.
50. Inert particles may remain intact or break up into smaller particles. In a sticky medium such as sea foam they may aggregate together into a layer of scum.
51. Some particles may dissolve either partially or completely or undergo swift or slow chemical reactions. Others may serve as a substrate for microscopic life or be incorporated into structures such as lining worm burrows in the sea bed.

¹⁵ Aside: I do not comment either on emissions from the proposed emergency standby diesel generator that is referred to in the EA's letter to the Appellant on 4th Nov. 2021 (ref. LIT 11958 V2) in page 1, para.3.

52. With so many mechanisms and contingencies at play, we may suppose that precise modelling of the marine 'journeys' and destinations of particulate emissions would be a hard and imprecise task. Rather it might be sufficient to predict and verify likely concentrations of particulate materials without necessarily identifying their sources, whether local or farther afield.

THE FLEET

53. The long, narrow lagoon of The Fleet lies immediately to landward of the Chesil Beach and would be especially exposed to particles from the tyres and brakes of HGVs serving the proposed facility, as noted in the section 'Emissions from Transport' above.
54. The Fleet and Portland Harbour, beside the ERF site, are so different from each other that despite their proximity they might be regarded as quite separate zones. This view would be a mistake since they are connected by a substantial channel, the Smallmouth Passage, that allows flows of water between them.¹⁶
55. This channel makes The Fleet tidal and brackish, including its shallow open waters, mudbanks and marshes. The passage makes the Fleet vulnerable to any disturbance arising on the harbour side of the isthmus, such as oil spills.
56. The Port Authority may be able to 'skim' the twice-daily flows by deploying a floating boom on the channel that is designed to contain any floating oil spills in the Harbour from entering and poisoning the Fleet lagoon.
57. Even when occasionally deployed, the boom would provide only temporary protection from floating particulates and no protection against toxins in solution or in suspension. For the duration of each rising tide, these would be accumulated and carried through the channel and held within The Fleet between tides. Residues would then be released by the falling tide and carried back into Portland Harbour to join the next tide's-worth of accumulated particles and toxins.
58. To protect The Fleet from both waterborne and transport derived particulate emissions, the proposed ERF should thus not be built anywhere on or near the Portland peninsula.

¹⁶ 'The Encyclopaedia of Portland History: Ferry Bridge' by Ashley Smith, undated (8th Oct, 2023).

TIDES AND COASTAL CURRENTS

59. The complex patterns of tide-induced currents (from the 1980s) are illustrated in a book by the veteran sailor Peter Bruce.¹⁷
60. In a rising tide, seawater flows onto the continental shelf and (in this case) crowds from west to east into the narrowing English Channel. Conversely in a falling tide, the main flow is from east to west. The Portland peninsula acts as a partial barrier to these flows, diverting the main current to the south away from the east-west coastline on either side.
61. This obstruction has the effect of making the tidal flow race around Portland Bill in each direction in turn. Whichever way the main tidal current is running, it curves around the Bill then northward beyond the Bill to form a large and often formidable gyre (whorl).
62. Further swift counter-flows may occur at various states of the tide, especially outside Portland Harbour, off Grove Point and to the east beyond Kimmeridge Bay. To the south-east of the Bill, the Shambles sandbank is shaped by a back-eddy from the main Race and causes turbulence at some states of the tide.
63. Thus even in calm weather, we may regard the waters around Portland as highly active every day and especially so during stormy weather, storm surges, spring tides and certain wind conditions. Any pollution that is introduced from a point source such as the proposed ERF would be rapidly and also gradually dispersed and then concentrated by a variety of natural mechanisms.

RECEPTORS

64. Among the most prominent receptors in the marine environments around Portland are the seabirds that feed on the shores and rocks; insects, sea worms and molluscs in the inter-tidal zone; the larger fishes that live in levels of the 'water column' and crustaceans, molluscs and worms below the tides, among the rocks and reefs and on and within the sea bed.

¹⁷ Peter Bruce, 'Inshore Along the Dorset Coast', Boldre Marine, Hampshire, 1989, available e.g. via AbeBooks online; Appendix I, unnumbered pages 116 to 121 (included as Items 3a, 3b and 3c in the accompanying Extracts bundle).
Note: there are several other editions.

65. Then there are the algae, varying in size from unicellular organisms to seaweed beds. Many of these produce oxygen and/or take up organic carbon.
66. There are sea sponges and corals. Many sponges and all corals are symbiotically associated with algae for providing oxygen and sugars for energy.
67. Also there are marine plants, notably the seagrasses on the sea beds, and marine lichens (associating a fungus and a photobiont).¹⁸
68. The local inventory of biota is shifting with the changing climate: northwards due to warming and in other ways due to changes in water flows, wind flows, mists and cloud cover (and hence daylight intensity).
69. From the above it's clear that the marine biota are highly interdependent within an extremely complex and variable set of ecosystems. Even if existing conservation zones could be fully protected, the traffic in nutrients and biota across all of the marine and coastal areas would ensure the spreading and cumulative effects of harms.
70. The local biota include some vulnerable species. Also there is an oyster nursery and a sea bass fishery in the Fleet.¹⁹ Chisel Beach and the Stennis Ledges are in a Marine Protected Area.²⁰
71. Since other witnesses are qualified to do so, I am not addressing potential impacts on local watersports, recreational fishing and commercial fishery for foodstuffs, notably for human, pet and agricultural consumption.²¹

¹⁸ ClientEarth, 2nd July 2021, 'How does seagrass help to fight climate change?' (*included as Item 31 in the accompanying Extracts bundle*).

¹⁹ CEFAS, Kieran Hyder *et al.*, 2018/2020. page 95, para. 3.8.9: 'Presence of European sea bass (*Dicentrarchus labrax*) and other species in proposed bass nursery areas' (*included as Item 4 in the accompanying Extracts bundle*)

and:

MAFF and the Welsh Office, undated, 'Bass', page 8: with map "The Fleet | All year | All tidal waters of the Fleet inside Ferry Bridge." (*included as Item 5 in the accompanying Extracts bundle*).

²⁰ Dorset Wildlife Trust and the Southern Inshore Fisheries and Conservation Authority (IFCA) with the support of Natural England and National Trust, undated, 'Dorset's Marine Protected Areas', 'Chesil Beach and Stennis Ledges', 'Habitats and species' (*included as Item 6 in the accompanying Extracts bundle*).

²¹ Several of these are listed by on Portland Tourism website (*included as Item 7 in the accompanying Extracts bundle*).

REGULATIONS AND GUIDANCE

72. The National Planning Policy Framework (NPPF) prescribes duties for local authorities to ensure “effective alignment of the terrestrial and marine planning regimes.” and also a set of principles for avoiding and minimising harms to biodiversity.²²
73. The National Planning Policy for Waste (NPPW) requires consideration to include “any adverse effect on a site of international importance for nature conservation or a site with a nationally recognised designation [*along with*] ecological networks and protected species”.²³
74. Defra has designated the Chesil Beach and the Stennis Ledges as a Marine Conservation Zone (MCZ).²⁴

²² DLUHC Policy paper: ‘National Planning Policy Framework’ (NPPF), updated 5th Sept. 2023: “170. In coastal areas, planning policies and decisions should take account of the UK

Marine Policy Statement and marine plans. Integrated Coastal Zone Management should be pursued across local authority and land/sea boundaries, to ensure effective alignment of the terrestrial and marine planning regimes.”

“180. When determining planning applications, local planning authorities should apply the following principles:

a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

b) development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. ...”

²³ DLUHC & MHCLG Policy paper: ‘National planning policy for waste’ (NPPW), 16th Oct. 2014.

²⁴ Defra: ‘Chesil Beach and Stennis Ledges - Marine Conservation Zone’ 31st May 2019, page 2: “MCZs protect typical, rare or declining habitats and species found in our seas.” (*included as Item 8a in the accompanying Extracts bundle*).

and also:

“The Chesil Beach and Stennis Ledges MCZ provides a wide range of seabed habitats that support a great variety of species. The rocky habitats are rich in plants and animals such as sponges, sea squirts, bivalve molluscs (such as mussels and native oysters), and also support commercially important crustaceans (such as lobsters and crabs).” (*included as Item 8b in the accompanying Extracts bundle*).

75. The Environment Act 2021 makes Biodiversity Net Gain (BNG) mandatory from early in 2024 onwards.²⁵
76. Whilst the requirements of BNG may not be retrospective in effect and thus might not apply to the Appellant's project, they embody the UK Government's intentions and could merit some weight in the Inspector's assessment of the planning balance in this case.
77. The Environment Act provides for a target for reduction of fine particulate matter. This is enshrined in The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 that includes the following: "The annual mean concentration target is that by the end of 31st December 2040 the annual mean level of PM_{2.5} in ambient air must be equal to or less than 10 µg/m³ ('the target level')." ²⁶
78. The Climate Change Committee has specifically warned of risks of shifts in the distribution of species due to the effects of climate changes and has advocated nature-based solutions including restoring coastal ecosystems.²⁷
79. In particular, two of four planning priorities were identified for action as follows: a. habitats and biodiversity; and b. the marine environment and fisheries.²⁸

²⁵ LGA-PAS, 'Biodiversity Net Gain for local authorities', 2nd October 2023, "The Environment Act 2021 makes biodiversity net gain mandatory for all but small sites and some exemptions from an as-yet unconfirmed date in January 2024 and for small sites from April 2024." (*included as Item 9 in the accompanying Extracts bundle*).

²⁶ Interim targets are included in the Environmental Improvement Plan, although these may relate only or primarily to human health impacts.

²⁷ Climate Change Committee (CCC), 'Adaptation and the nature emergency', 14th Sept. 2023, commissioned by the Welsh Government, page 11, Principles....: "Reduce other pressures on nature. Through reducing habitat loss, reversing degradation, minimising pollution, preventing unsustainable use, controlling pests and diseases, and working to eliminate invasive non-native species. Identify suitable nature-based solutions (NbS) to support climate and nature goals. NbS interventions can include: restoring coastal ecosystems and native vegetation in catchments to improve biodiversity and moderate peak flows; bringing nature into cities; and adapting agroforestry to build soil health in agricultural lands." and also page 7, (a) Risks to nature from climate change: "Distributional shifts in species. Climate change is driving many species to move away from the equator or upslope as they track their preferred ecological niche.† Warming seas will alter marine species' distributions as they move to waters with preferred temperatures – or, if they don't, could face extinction." (*included as Item 11 in the accompanying Extracts bundle*)

²⁸ Climate Change Committee, 12 Jan. 2018, '25-Year Environment Plan – a climate change perspective' in an introduction by Kathryn Brown, Head of the CCC's Adaptation Sub-Committee Secretariat (*included as Item 33 in the accompanying Extracts bundle*).

80. Taken together, these regulations and statements of guidance on the UK Government's intentions thus provide a sufficient basis, if the Inspector is so minded, to recognise the kinds of harms that the proposed operation's particulate emissions would inflict upon the coastal and marine habitats that surround the Portland peninsula.

AUTHORITIES AND AGENCIES

81. Portland Harbour Authority: The Harbour Authority's jurisdiction extends from the Nothe Fort headland at Weymouth to around the mid-point of the peninsula's coast, and into the bay.²⁹
82. Environment Agency for England: Much of the EA's interest in coastal matters is addressed towards communities at risk from flooding. The agency's remit extends to three miles from the coast. The agency's research includes "fisheries and biodiversity – protecting and managing aquatic species, including monitoring and diagnostic tools".³⁰
83. Natural England have a specific interest in establishing the new King Charles III England Coast Path along with a coastal margin that includes all land to seaward of the trail.³¹
84. The Marine Management Organisation: The MMO is responsible for managing fishing and marine non-licensable activities in England's marine protected areas (MPAs).³²
85. The MMO has designated two plan areas for the south coast of England as follows: "The South Inshore Plan Area covers an area of approximately 1,000 kilometres of coastline stretching from Dover in Kent to Dartmouth in Devon, out to 12 nautical miles taking in some 10,000 square kilometres of sea. ... The South

²⁹ Portland Port: 'Proposed Portland Harbour Fishery Order Nature Conservation Review', 7th August 2018, page 5, figure 1 (*included as Item 32 in the accompanying Extracts bundle*).

³⁰ EA, 29th Sept. 2023: 'Research at EA' (*included as Item 12 in the accompanying Extracts bundle*).

³¹ Guidance by Natural England & Defra, 'King Charles III England Coast Path: ...', 2014 & 2015 (*included as Item 13 in the accompanying Extracts bundle*).

³² MMO Guidance, 'Marine Protected Areas (MPAs)' 23 August 2023 (*included as Item 14 in the accompanying Extracts bundle*).

Offshore Plan Area includes the marine area from 12 nautical miles to the median line bordering international waters, a total of approximately 10,000 square kilometres.”³³

86. In an area to north-eastwards of Portland (i.e. down the prevailing wind), the MMO is managing marine non-licensable activity in Studland Bay Marine Conservation Zone (MCZ).³⁴
87. The MMO has a focus on certain species of wildlife that need protection, as follows: birds; cetaceans; seals; marine turtles; sharks, skate and fish; invertebrates and seahorses. All of these are resident in, or visitors to, the area around Portland.³⁵
88. The above agencies are just a few of the main national agencies that have their own specialised interests in the marine and coastal environments of England. Others for instance are concerned with contingencies around pollution, coastal erosion and flooding.
89. There is thus a plethora of relevant agencies, yet the Government of the United Kingdom is one authority to rule them all; even those that have nominal or limited

³³ MMO Consultation on ‘South Inshore and South Offshore marine plan areas’, April 2013, page 5 (*included as Item 15 in the accompanying Extracts bundle*), and also:

HMG, July 2018: ‘South Inshore and South Offshore Marine Plan’, in page 3, section 1, ‘The South Marine Plan’, 1.1 ‘Overall aims’, para.4: “Implementation of the plan’s objectives, through more informed decision-making, will help to ensure that we optimise use of the marine area’s natural capital, realising greater protection of vulnerable habitats and species, and natural defences against climate change and flooding, as well as improving the well-being of coastal communities and supporting a stronger marine economy.”;

also on page 20, in the table of policies,

“Objective 7: To support the reduction of the environmental, social and economic impacts of climate change, through encouraging the implementation of mitigation and adaptation measures that: • avoid proposals’ indirect contributions to greenhouse gas emissions • reduce vulnerability • improve resilience to climate and coastal change • consider habitats that provide related ecosystem services.”; and pages 28-35, chapter 3 on ‘Using and implementing the South Marine Plan for planning decisions’ (*included as Item 17 in the accompanying Extracts bundle*).

³⁴ MMO Guidance: ‘Guidance Managing marine non-licensable activity in Studland Bay Marine Conservation Zone’ updated 5th June 2023 (*included as Item 18 in the accompanying Extracts bundle*).

³⁵ MMO Guidance: ‘Marine species & wildlife: protection’ updated 13th June 2023 (*included as Item 19 in the accompanying Extracts bundle*).

independence to act within their remits. Hence this Inquiry has a vital role in considering the marine impacts of the Appellant's choice of site in this proposal.

HOW PARTICULATES ARE CONCENTRATED

90. Toxins from particulate emissions may be dispersed in various ways as noted above, so it is tempting to suppose that they would have 'gone away' beyond threat of causing harm. However there are also mechanisms that serve to gather, hold and concentrate such material, with renewed potential for harms to arise, and then perhaps to release them in concentrated and/or recombined chemical states.
91. The main processes of concentration and re-combination may be classified as physical (e.g. precipitation, winds and storms, water movements,³⁶ gravity, temperature, evaporation and sublimation), chemical (by interactions with oxygen, water, acids and alkalis in waters, soils and rocks) and biological (respiration and ingestion, especially via the the local 'food chains'). Typically the processes act together across these categories.
92. Sandy and muddy shorelines and tidal flats ('saltings') provide another prime situation for concentrating particulate matter, especially where there is a high tidal range, perhaps a relatively calm bay and occasions of spring tides and even higher tides.³⁷
93. Airborne particulate matter is deposited on the inter-tidal shore area. The advancing tide 'sweeps' the material up the beach, thus gathering it towards the current high-tide line and depositing it there around high tide and during the early ebb tide.
94. In sandy and muddy zones of shores, marshes, mudflats with creeks and shallow waters, and even on rocks, small biota including insects, crustaceans, shellfish and worms constitute food for wild birds. Thus there is a clear mechanism for concentration of particulates and toxins up the natural food chain in these areas.

³⁶ For instance, via Peter Bruce 'Inshore Along the Dorset Coast', Boldre Marine, Hampshire, 1989, page 98: "The Admiralty chart of 1863 describes the Portland Race as 'a periodical commotion of the sea which rages with great violence'." (*included as Item 20 in the accompanying Extracts bundle*)

³⁷ Wikipedia, 'Tide': "While tides are usually the largest source of short-term sea-level fluctuations, sea levels are also subject to change from thermal expansion, wind, and barometric pressure changes, resulting in storm surges, especially in shallow seas and near coasts." and "The changing distance separating the Moon and Earth also affects tide heights. ..." (*included as Item 21 in the accompanying Extracts bundle*).

95. Rock ledges that are regularly exposed have a similar concentrating effect whether temporary (from twice daily tides, around Portland) or during the spring tides (twice each lunar month).
96. A good example of concentration, storage and eventual release of particulate matter occurs at the rock pool called the Red Pool on the Butts shore ledge. At spring tides, the ledge is known to run red with decayed organic detritus from a previous spring tide.³⁸

COUNTER ARGUMENTS

97. Regarding particulate matter, the Appellant has claimed a net benefit due to the proposed ERF displacing emissions from on-vessel generators by supplying electrical power while cruise ships are docked in the harbour.³⁹
98. This claim assumes that current technology for ships and for energy from shore will remain unchanged for the operating lifetime of the facility. However already ships that are designed to be more sustainable both under way and in dock (along with upgrades to on-shore energy supplies) are entering regular service and many more are being retrofitted with more sustainable means of propulsion.⁴⁰

³⁸ Peter Bruce, 'Inshore Along the Dorset Coast', Boldre Marine, Hampshire, 1989 page 96 (*included as Item 22 in the accompanying Extracts bundle*).

³⁹ Powerfuel's ERF Proposal Summary FINAL: February 2023. Page 18, towards the end of section 5: "For particulate matter there is a net benefit associated with the Portland ERF, because the emissions [from] on-vessel generators which will not be released are higher than the controlled emissions from the project."

⁴⁰ For instance in then Wikipedia entry for 'Hurtigruten' about the Norwegian coastal routes and cruise lines, "Havila Kystruten AS is building four new vessels to serve the route, while Hurtigruten AS will be refitting seven of its vessels to meet the stricter emissions requirements. // The four new vessels from Havila will run on LNG and battery power. LNG will cut CO₂ emissions by 25 per cent, and the battery power will yield additional savings. ... The four new vessels from Havila will run on LNG and battery power. LNG will cut CO₂ emissions by 25 per cent, and the battery power will yield additional savings. ... The ships will be fitted with filters and LNG compatible engines in order to reduce emissions by 25%. The ships will also get hybrid motors, and battery packs." (*not up-to-date*) (*included as Item 23 in the accompanying Extracts bundle*)

99. Furthermore, the UK national grid for electrical energy is being decarbonised via a rapid, ongoing transition to renewable energy sources.⁴¹
100. The Appellant's coverage of transport related issues is largely focussed on local increases in HGV traffic and concerns about diesel exhaust emissions.⁴² This overlooks particulate emissions from the HGVs' tyres and brakes.
101. The Environmental Statement has addressed the potential issue of human health risks arising from stack emissions.⁴³ However that finding does not directly provide assurance as to ecological harms, although these are separately addressed as regards land-based receptors. It provides no direct assurance in regard to marine receptors.
102. I anticipate that the Appellant might argue that coastal and marine habitats near to the proposed site are within the remits of several environmental agencies and are thus outside of this Inquiry's remit except via these agencies' evidence to the inquiry.
103. The main focus of Environment Agency's evidence, for example, refers primarily to land based impacts in general and more specifically to human receptors. These concerns are usual and entirely understandable, but we cannot presume that a scarcity of reference to marine receptors proves that there would be no significant harms caused to the latter.
104. Besides, the EA has a limited responsibility for marine areas, since its remit ends three miles out from the coast, whereas dispersed particulates and toxins may cause harms wherever they are carried to and through in the seas and oceans.
105. The agencies that have a specifically marine-focussed remit, or a remit that includes coastal and marine areas, may well regard an inquiry about a land-based

⁴¹ National Grid ESO, 'Our Strategy', as part of "the transformation to a fully decarbonised electricity system by 2035...", undated (8th Oct. 2023) (*included as Item 24 in the accompanying Extracts bundle*).

⁴² Powerfuel Limited, Portland ERF, 'ES: Non-Technical Summary' e.g. on page NTS-20, para. NTS.109.

⁴³ e.g. in Powerfuel Limited, Portland ERF, 'ES: Non-Technical Summary' e.g. on page NTS-11, para. NTS.56: "A detailed health risk assessment was carried out to model the potential for adverse effects on human health as a result of breathing or ingesting substances emitted by the proposed ERF. [*including particulate matter*]... The assessment therefore concluded that there will be no significant adverse health effects" See also:

Powerfuel Limited, ERF FAQs, the answer given to "Are facilities lie this safe?".

planning application as being focussed on over-land air quality, human health and human activities.

106. The agencies with a remit that includes coastal and marine areas may tend to focus on wildlife that is primarily on land and around coasts, rather than focus on the details of land-originated impacts out at sea (as would be the case for a planning, permitting or licensing application for an offshore facility, in regard to its environmental impacts).⁴⁴
107. In view of these authorities' and agencies' overlapping responsibilities and the complexity of factors to consider, it is hardly surprising if each of them does not provide their own detailed commentary on the Appellant's proposal.
108. Indeed it might be remarkable if any one agency could manage to get a comprehensive and timely statement upon a single external proposal agreed across the varied remits and priorities of their colleagues in other agencies.
109. The Appellant has in effect claimed that the emission rates and emission-control features specified for the ERF would limit the quantity of particulate emissions to an acceptable level for respiration by human receptors.⁴⁵
110. Where this claim is extended to the ecological impacts of emissions, especially on the habitats of coastal and marine areas, it would need to be based on a somewhat different assessment, modelling tools and/or research studies specifically addressing those habitats in their local settings.⁴⁶

⁴⁴ e.g. as in the Oil & Gas Authority, Oct. 2018/Oct. 2019, 'Requirements for the planning of and consent to UKCS [*United Kingdom Continental Shelf*] Field Developments' (*included as Item 25 in the accompanying Extracts bundle*).

⁴⁵ e.g. in Powerfuel Limited, Portland ERF, 'ES: Non-Technical Summary' e.g. on page NTS-11, para. NTS.56: "All the risks were found to be substantially below the thresholds at which a significant health effect could occur."

⁴⁶ e.g. in Powerfuel Limited, Portland ERF, 'ES: Non-Technical Summary' e.g. on page NTS-6, para. NTS.35, 3rd bullet point: "... there will be no significant adverse effects on human health or sensitive ecological receptors."

and:

Powerfuel Limited, ERF FAQs, "Maximum off-site impacts are predicted to be negligible at all receptor locations."

111. The human health assessment was based on the total masses of particles in the emissions to the atmosphere, with the resulting densities measured in micrograms per cubic metre.⁴⁷
112. This basis of total mass is usual in such assessments, yet it misses the point that the levels of harm on receptors depend on many factors. These include the fineness of the particles and crucially the number of particles rather than their total mass.⁴⁸
113. Whereas larger particles will tend to trap finer particles by agglomeration, that would only apply if the fabric filters were becoming clogged with the larger particles.⁴⁹
114. At the other extreme, well-maintained fresh filters might have minor effectiveness for trapping the finest particulates.
115. The modelling of impacts at ecological receptors is limited to the designated sites listed in section 3.1 of the Process Emissions Modelling chapter of the Appellant's Environmental Statement.⁵⁰
116. It might appear that all the particulate emissions from the stack and from transport are dispersed to the atmosphere around the site of the incinerator and thence borne by wind and waters to the farthest reaches of land (including inland waters)

⁴⁷ Powerfuel Limited, Environmental Statement, Appendix D2, 'Process Emissions Modelling', especially section 2.1.3 'Particulate matter', section 3.1 'Sensitive ecological receptors'.

⁴⁸ Research findings on effects on marine biota are reviewed in Ventura *et al.* 2013, 'Atmosphere' 12(6), page 684, citing Liu *et al.*, for example noting on page 12: "... the presence of fine particulates with a diameter of approximately 1µm (PM1.0) in sea anemones, which are released from fossil fuel combustion into the air. These marine organisms are suspension/filter feeders and, therefore, can incorporate and accumulate suspended particles, including PM1.0 particles, in their bodies." (*included as Item 26 in the accompanying Extracts bundle*).

⁴⁹ A discussion of particle sizes, noting agglomeration after emission, appears for example in Air Quality Consultants, May 2020, 'Health Effects due to Emissions from Energy from Waste Plant in London' page 15, para. 3.21: "The available evidence on particle size distributions thus suggests that almost all PM emitted from such facilities is likely to be in the form of PM2.5 (and thus also PM10) (Buonanno et al. (2009)). Particle size distributions can change following release from stacks; for example smaller particles may coagulate together to form larger particles." (*included as Item 27 in the accompanying Extracts bundle*)

⁵⁰ Powerfuel Limited, Environmental Statement, Appendix D2, 'Process Emissions Modelling', page 40, chapter 8, 'Impact at ecological receptors' / 8.1 'Methodology' 8.1.2 'Deposition of emissions - Critical Loads'.

and sea to an extent that could no cause significant harm to any living receptors in coastal and marine areas.

117. The Appellant argues that in the balance of benefits and harms, verified carbon offsetting would be used to ensure an overall net benefit.⁵¹
118. However the stark fact of widespread harm from emitting toxic materials remains, as a result of the dispersion of toxins into coastal and marine habitats including marine conservation areas.
119. The finer particulates and the toxins dissolved or suspended from the larger particulates would be so finely dispersed as to potentially affect all sizes of marine (and land-based yet sea-visiting) fauna and flora including the microscopic life-forms on which biota higher up the 'food chain' ultimately depend.
120. Besides, every toxic substance that reaches the surface layers of the sea is liable to damage the plankton that live there and in the surface layers of the oceans worldwide. Phytoplankton absorb carbon dioxide that would otherwise accelerate climate change and they generate at least half of the oxygen on which other biota crucially depend. They form the beginning of the food chain for aquatic animals.⁵²
121. Plankton variously live at all levels of the 'water column'; on the surface (*'neuston'*), in the middle layers (*'meroplankton'*) or on/in the sea bed (*benthos*).
122. Plankton are vital in marine ecosystems, whether the tiny plankters stay in that form for their entire lives or develop into larger life-forms including "sea urchins, starfish, crustaceans, marine worms and most fish".⁵³
123. Intuitively, the finest particles might seem insignificant by being much smaller than the width of a human hair (say 50-70 microns in diameter). However the smallest plankton are just 2 to 5 microns in size and thus highly vulnerable to harm from microparticles in the water and toxins in solution or suspension.

⁵¹ Powerfuel Limited, Environmental Statement, Non Technical Summary, Sept. 2020, pages NTS-9 & NTS-10, para. NTS.48: "If the results of this [*carbon assessment*] show that the plant has released more greenhouse gas emissions than have been displaced through the export of electricity and heat and avoidance of landfill, then Powerfuel Portland Limited is committed to using verified carbon offsets to ensure that the operations are 'net zero' over the lifetime of the project."

⁵² Wikipedia entry for 'Plankton' (*included as Item 28 in the accompanying Extracts bundle*).

⁵³ Wikipedia entries for 'Plankton' and 'Nanophytoplankton' (*included as Item 29 in the accompanying Extracts bundle*).

124. The HGVs and other vehicles that would serve the proposed facility would be expected to comply with the latest and most stringent standards and practices for reducing their exhaust emissions.
125. However in regard to transport I only address the particulate debris ('dust') from tyres and brakes.⁵⁴
126. Since specialist, expert witnesses are taking part in this inquiry, the Inspector might well take note of my evidence but give it reduced weight in comparison to expert testimonies because I am not taking part as an expert witness.
127. However, I would welcome the opportunity to be questioned by the Inspector and by the Appellant's representatives and to put my questions in return to the latter. This is because I am keen for the evidence I'm presenting (from - in my view - credible sources) to be formally considered and tested.

IN CONCLUSION

128. Refusal of planning permission for an incinerator facility at Portland Port, Castletown, Dorset would avoid the harms that would be caused, including significant, long-term, adverse impacts on the coastal and marine environments, on the wildlife's resilience to climate change and on the capacity to host incoming species as the climate changes.
129. Refusal of permission for this facility would also help pave the way towards the UK enjoying the many benefits that can be gained from clean coasts and inshore waters.
130. I trust that the Inspector will arrive at a view of the planning balance on the Appellant's proposal that takes full and forward-thinking account of the urgent need to protect marine habitats and thus avert climate change.
131. Hence I respectfully urge you to refuse the appeal for planning permission for this appeal, on the basis of existing and intended local and national policy, objectives and guidance, and on the evidence before this inquiry.

Thank you.

⁵⁴ For instance, see Defra and Rebecca Pow MP, 27 May 2020, Press release, headline: 'Tyre particles are contaminating our rivers and ocean, study says / New report reveals tyres are a major source of microplastics found in the marine environment.' (*included as Item 30 in the accompanying Extracts bundle*).