12 Air Quality

Introduction

12.1 This chapter provides a preliminary assessment of the potential air quality impacts associated with the OMSSD project. It describes existing local air quality at the OMSSD project site and surrounding area and assesses the likely effects during the construction and operational phases of the OMSSD project. It has been produced by Air Quality Consultants (AQC) Ltd.

12.2 The following effects of the OMSSD project have been considered:

- The air quality effects of the proposed construction works upon existing sensitive human health and ecological receptors;
- The air quality effects of the OMSSD project, in terms of operational road traffic, vessel movements and auxiliary generator emissions from vessels berthed at jetties, upon sensitive human health receptors; and
- The air quality effects of the project, in terms of operational road traffic, vessel movements and auxiliary generators upon ecological receptors, including Holehaven Creek Site of Special Scientific Interest (SSSI), Canvey Wick SSSI and Vange and Fobbing SSSI. The assessment will also consider the effects on Brick House Farm Marsh, Canvey Village Marsh, Northwick Farm and Sea Wall and West Canvey Marshes Local Wildlife Sites (LWSs), Thames Estuary and Marshes Ramsar and Special Protection Area (SPA), Benfleet and Southend Marshes SPA and Ramsar and South Thames Estuary and Marshes SSSI.

12.3 The main air pollutants of concern to human health are nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$). The main pollutants of concern related to construction activities are dust and PM_{10}. With respect to ecological habitats, the pollutants of concern are nitrogen oxide (NOx), SO_2 and ammonia (NH_3) concentrations and nutrient nitrogen and acid deposition fluxes.

12.4 This chapter describes existing local air quality conditions (base year 2019), and the predicted air quality in the future assuming that the OMSSD project does, or does not, proceed. The assessment of operational impacts focuses on 2024 which is the anticipated earliest year of completion of the OMSSD project. The assessment of construction dust impacts focuses on the anticipated duration of the works.

12.5 This chapter has been prepared taking into account all relevant local and national guidance and regulations, and follows the methodology described within the Scoping Report.

12.6 The assessment reported in this chapter is supported by further information contained in Appendix 12 provided within Volume 2 of this PEIR. Appendix 12 contains:

- Appendix 12.1 Summary of EPUK & IAQM Planning for Air Quality Guidance Document;

- Appendix 12.2 Professional Experience;
- Appendix 12.3 Description of Receptor Locations;
- Appendix 12.4 Construction Dust Assessment Procedure;
- Appendix 12.5 Modelling Methodology;
- Appendix 12.6 Baseline Dispersion Model Results;
- Appendix 12.7 Impact Assessment Model Results; and
- Appendix 12.8 Construction Mitigation.

Table numbering in the Appendices follows consecutively starting with Table 12.1 in Appendix 12.3.

Definition of the Study Area

12.7 The Oikos storage facility is an existing operational harbour facility located within a predominantly industrial landscape. Maritime access to the Oikos Facility is via the River Thames. The study area for the assessment has been identified using professional judgement, focussing on the areas where impacts from the OMSSD project are anticipated to be greatest.

12.8 The construction dust assessment considers the potential for impacts within 350 m of the OMSSD project boundary, within 50 m of roads used by construction vehicles within 500 m of the OMSSD project and ecological habitats (designated sites sensitive to fugitive dust) within 50 m of the OMSSD project boundary. The specific areas are considered within Construction Phase Impact Assessment, and shown in Figure 12.1.

12.9 The extent of the operational road traffic network included within the assessment has been determined by the Transport Assessment prepared by DTA and provided as Appendix 11.1 of this PEIR, and includes all roads along which the OMSSD project will lead to a potentially significant change in traffic flows. These roads are identified as follows:

- Haven Road;
- Roscommon Way;
- Canvey Road;
- Canvey Way (A130);
- A130 (north of South Benfleet); and
- A13 (west of South Benfleet).

12.10 The operational study area, as shown in Figure 12.2, also incorporates the locations where the emissions from auxiliary generators on vessels at berth will have the greatest impact, with particular focus on sensitive receptors at locations nearest to the two operational jetties at the Oikos Facility.

Assessment Methodology

Data and Information Sources

Assessment Criteria

Health Criteria

12.11 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations[320] and the Air Quality (England) (Amendment) Regulations[321], and provided in Table 12.1.

12.12 The UK-wide objectives for NO_2, SO_2 and PM_{10} were to have been achieved by 2005 and 2004 depending upon the specific pollutant, and continue to apply in all future years thereafter. The $PM_{2.5}$ objective was to be achieved by 2020. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 $\mu g/m^3$ [322]. Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour mean PM_{10} objective could be exceeded at roadside locations where the annual mean concentration is above 32 $\mu g/m^3$ [323] The predicted annual mean PM_{10} concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM_{10} objective. Where predicted annual mean concentrations are below 32 $\mu g/m^3$ it is unlikely that the 24-hour mean objective will be exceeded.

12.13 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance[324]. The annual mean objectives are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM_{10} and SO_2 is considered to apply at the same locations as the annual mean objectives, as well as in gardens of residential properties and at hotels. The 1-hour mean

[320] Air Quality (England) Regulations 2000

[321] Air Quality (England) (Amendment) Regulations 2002

[322] Defra (2018), Review & Assessment: Technical Guidance LAQM.TG16 February 2018 Version

[323] Defra (2018), Review & Assessment: Technical Guidance LAQM.TG16 February 2018 Version

[324] Defra (2018), Review & Assessment: Technical Guidance LAQM.TG16 February 2018 Version

objective for nitrogen dioxide and sulphur dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets. The 15-minute SO_2 objective applies at all locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.

12.14 EU Directive 2008/50/EC[325] on ambient air quality and cleaner air for Europe sets limit values for NO_2, SO_2, PM_{10} and $PM_{2.5}$, and is implemented in UK law through the Air Quality Standards Regulations[326,327]. The limit values are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one, with the exception of the 15-minute SO_2 objective which has not been set by the European Union (EU). In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded unless such studies have been audited and approved by Defra and DfT's Joint Air Quality Unit (JAQU).

12.15 The relevant air quality criteria for this assessment are provided in Table 12.1.

Table 12.1: Air Quality Criteria for Nitrogen Dioxide, Sulphur Dioxide, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 $\mu g/m^3$ not to be exceeded more than 18 times a year
	Annual Mean	40 $\mu g/m^3$
Fine Particles (PM_{10})	24-hour Mean	50 $\mu g/m^3$ not to be exceeded more than 35 times a year
	Annual Mean	40 $\mu g/m^3$ [a]
Fine Particles ($PM_{2.5}$)	Annual Mean [b]	25 $\mu g/m^3$
Sulphur Dioxide	24-hour Mean	125 $\mu g/m^3$ not to be exceeded more than 3 times a year
	1-hour Mean	350 $\mu g/m^3$ not to be exceeded more than 24 times a year
	15-minute Mean	266 $\mu g/m^3$ not to be exceeded more than 35 times a year

[a] A proxy value of 32 $\mu g/m^3$ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM_{10} objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM_{10} objective are possible [328].

[325] European Union Directive 2008/50/EC

[326] Air Quality Standards Regulations 2010

[327] All European legislation referred to in this Chapter is written into UK law and remains in place despite the departure of the UK from the European Union in January 2021.

[328] Defra (2018), Review & Assessment: Technical Guidance LAQM.TG16 February 2018 Version.

[b] The $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations[329] and there is no requirement for local authorities to meet it.

Vegetation and Ecosystems Criteria

12.16 Objectives for the protection of vegetation and ecosystems have been set by the UK Government within the Air Quality Standards Regulations. They are the same as the EU limit values. The limit values and objectives only apply:

- a) more than 20 km from an agglomeration (about 250,000 people); and
- b) more than 5 km from Part A industrial sources[330], motorways and built up areas of more than 5,000 people.

12.17 Critical levels and critical loads are the ambient concentrations and deposition fluxes below which significant harmful effects to sensitive ecosystems are unlikely to occur. Some of the critical levels are set at the same concentrations as the objectives, but do not have the same legal standing as they have not been written into UK law. Typically, the potential for exceedances of the critical levels and critical loads is considered in the context of the level of protection afforded to the ecological site as a whole. For example, the level of protection afforded to an internationally-designated site (such as a Ramsar or Special Protection Area) is significantly greater than that afforded to a local nature reserve; reflecting the relative sensitivity of the sites as well as their perceived ecological value. The critical levels relevant to this assessment are set out in Table 12.2, while the critical loads are provided in Table 12.3. The location of the designated sites referred to in Table 12.3 are shown on Figure 2.3.

Table 12.2: Vegetation and Ecosystem Critical Levels [a]

Pollutant	Time Period	Objective
Nitrogen Oxides (expressed as NO_2)	Annual Mean [a, b]	30 $\mu g/m^3$
	24-hour Mean [a, c]	75 $\mu g/m^3$
Ammonia	Annual Mean	3 $\mu g/m^3$ [d]
Sulphur Dioxide	Annual Mean [a, b]	20 $\mu g/m^3$

[a] The critical levels are defined by the World Health Organisation[331].

[b] Away from major sources (see paragraph 12.16), this critical level is set as an objective[332] and limit value[333].

[c] This critical level is not an objective and thus does not have the same legal standing.

[329] Air Quality Standards Regulations 2010

[330] Part A industrial installations are those activities that are identified within Schedule 1, Schedule 13 and Schedule 14 of the Environmental Permitting (England and Wales) Regulations. They include major industrial installations such as large energy, waste, manufacture, refinery, and agricultural sites.

[331] World Health Organisation (2000) Air Quality Guidelines for Europe; 2nd Edition. Available at: http://www.euro.who.int/__data/assets/pdf_file/0005/74732/E71922.pdf

[332] Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

[333] The European Parliament and the Council of the European Union (2008), Directive 2008/50/EC of the European Parliament and of the Council.

[d] This critical level is set for ecosystems where sensitive lichens and bryophytes are not an important part of the ecosystem integrity.

Table 12.3: Vegetation and Ecosystem Critical Loads

Ecological Site	Nutrient Nitrogen Deposition [b]		Acid Deposition	
	kgN/ha/yr	Habitat Type (and EUNIS Code [a])	'N_{max}' (keq/ha/yr) [c]	Habitat Type
Canvey Wick SSSI	No critical load has been set for this feature	Bombus Sylvarum (n/a) and Invertebrate assemblage (n/a)	No critical load has been set for this feature	Bombus Sylvarum and Invertebrate assemblage
Vange & Fobbing Marshes SSSI	No comparable habitat with established critical load estimate available	Vascular plant assemblage (n/a)	No comparable habitat with established critical load estimate available	Vascular plant assemblage
Holehaven Creek SSSI	20 – 30	Pioneer low-mid, mid-upper saltmarshes (A2.53, A2.54 and A2.55)	Habitat not sensitive to acidification	Limosa limosa islandica – Black-tailed Godwit
Thames Estuary and Marshes SPA and Ramsar	10 - 20	Dwarf shrub heath (F4.11)	1.389	Dwarf shrub heath
Langdon Ridge SSSI	15	Fen, marsh and swamp (D4.1)	2.048	Acid grassland
Pitsea Marsh SSSI	15	Fen, marsh and swamp (D4.1)	Habitat not sensitive to acidification	Habitat not sensitive to acidification
South Thames Estuary and Marshes SSSI	20 – 30	Pioneer low-mid, mid-upper saltmarshes (A2.53, A2.54 and A2.55)	0.733	Acid grassland
Benfleet and Southend Marshes SPA and Ramsar	20 – 30	Pioneer low-mid, mid-upper saltmarshes (A2.53, A2.54 and A2.55)	Habitat not sensitive to acidification	Charadrius hiaticula (Europe / Northern Africa – wintering) – Ringed plover
West Canvey Marshes LWS	20	Coastal and Floodplain Grazing Marsh (E2.2)	Habitat not sensitive to acidification	Habitat not sensitive to acidification
Canvey Village Marsh LWS	15	Fen, marsh and swamp (D4.1)	Habitat not sensitive to acidification	Habitat not sensitive to acidification
Northwick Farm and Sea Wall LWS	20	Coastal and Floodplain Grazing Marsh (E2.2)	Habitat not sensitive to acidification	Habitat not sensitive to acidification

Ecological Site	Nutrient Nitrogen Deposition [b]		Acid Deposition	
	kgN/ha/yr	Habitat Type (and EUNIS Code [a])	'N_{max}' (keq/ha/yr) [c]	Habitat Type
Brick House Farm Marsh LWS	15	Fen, marsh and swamp (D4.1)	Habitat not sensitive to acidification	Habitat not sensitive to acidification

a The European Nature Information System[334].

b Critical loads for nutrient nitrogen taken from APIS[335].

c Critical loads for acid deposition have been taken from APIS. Nmax is the value above which additional nitrogen deposition will lead to an exceedance. The value of Nmax used is the most stringent across the entire habitat and is not specific to the receptors assessed. For this assessment, and following the approach recommended by APIS for situations where the baseline flux exceeds the equivalent 'Nmin' value, the sum of nitrogen and sulphur deposition (in keq/ha/yr) has been compared directly against the Nmax[336].

Screening Criteria for Operational Assessments

Road Traffic

12.18 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)[337] recommend a screening approach[338] to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts.

12.19 This approach compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix 12.1) inside an AQMA are a change in flows of more than 25 Heavy Duty Vehicles (HDVs) or 100 Light Duty Vehicles (LDVs) per day; outside of an AQMA the thresholds are 100 HDVs or 500 LDVs. Where these criteria are exceeded, a detailed assessment is likely to be required, although the guidance[338] advises that *"the criteria provided are precautionary and should be treated as indicative"*, and *"it may be appropriate to amend them on the basis of professional judgement"*.

12.20 While these screening criteria are specifically intended to act as a trigger for a detailed assessment, they can also sometimes be used to identify the extent of the road network that requires assessment. Where the change in traffic on a given road link is less than the relevant screening threshold, it is unlikely that a significant impact would occur, and these links can be disregarded unless there are additional development-related emissions affecting receptors along the link.

[334] European Environment Agency (2021) The European Nature Information System

[335] APIS (2021) Air Pollution Information System

[336] APIS (2021) Air Pollution Information System

[337] The IAQM is the professional body for air quality practitioners in the UK.

[338] Moorcroft and Barrowcliffe et al. (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2

Vessel Movements

12.21 Defra has published guidance in Local Air Quality Management LAQM TG16[339] which provides screening criteria to determine whether emissions from shipping operations require quantitative assessment. A detailed assessment of vessel emissions is likely where:

- There are more than 5,000 large ship movements per year, with relevant exposure within 250 m of the shipping berths and main areas of manoeuvring; or
- There are more than 15,000 large ship movements per year, with relevant exposure within 1 km of the port/shipping area.

12.22 These criteria for ports are set out as best practice guidance in paragraph 7.20 of LAQM TG16[322].

Auxiliary Generators

12.23 Whilst berthed at jetties at the Oikos Facility, vessels operate auxiliary generators to supply power to the vessels systems. The generators are fuelled by marine diesel and will operate continuously whilst the vessels are berthed.

12.24 EPUK and the IAQM have developed an approach[340] to determine whether emissions from point sources, such as the auxiliary generators, have the potential for significant air quality impacts. The first step of the approach, as described in Appendix 12.1, is to screen the emissions and the emissions parameters to determine whether an assessment is necessary. Table 6.2 in the guidance[341] states that:

"Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable".

12.25 This screening approach requires professional judgement, and the experience of the consultants preparing the assessment is set out in Appendix 12.2.

[339] Defra (2018), Review & Assessment: Technical Guidance LAQM.TG16 February 2018 Version.

[340] Moorcroft and Barrowcliffe et al. (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2. Institute of Air Quality Management, London.

[341] Moorcroft and Barrowcliffe et al. (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2. Institute of Air Quality Management, London.

12.26 If it is determined that an assessment of the point source emissions is required, then there is a further stage of screening that can be applied to the model outputs. The approach is that any change in concentration smaller than 0.5% of the long-term environmental standard will be *negligible*, regardless of the existing air quality conditions. The guidance[342] also explains in paragraph 6.39 that:

"Where peak short term concentrations (those averaged over periods of an hour or less) from an elevated source are in the range 11-20% of the relevant Air Quality Assessment Level (AQAL), then their magnitude can be described as small, those in the range 21-50% medium and those above 51% as large. These are the maximum concentrations experienced in any year and the severity of this impact can be described as slight, moderate and substantial respectively, without the need to reference background or baseline concentrations. In most cases, the assessment of impact severity for a proposed development will be governed by the long-term exposure experienced by receptors and it will not be a necessity to define the significance of effects by reference to short-term impacts. The severity of the impact will be substantial when there is a risk that the relevant AQAL for short-term concentrations is approached through the presence of the new source, taking into account the contribution of other local sources".

Vegetation and Ecosystems

12.27 In terms of the potential for ecological impacts on local (as opposed to national or European) wildlife sites, the Environment Agency's Air Emissions Risk Assessment guidance[343] discounts as insignificant any impacts where the Process Contribution (PC) is less than 100% of the long-term or short-term environmental standard. For national or European sites, the Environment Agency's guidance explains that, regardless of the baseline environmental conditions, a process can be considered as insignificant if:

- the long-term (annual mean) process contribution is <1% of the long-term environmental standard; and
- the short-term (15-minute, 1-hour, 24-hour mean) process contribution is <10% of the short-term environmental standard.

12.28 It should be recognised that these criteria determine when an impact can be screened out as insignificant. They do not imply that impacts will necessarily be significant above one or both of these criteria, merely that there is a potential for significant impacts to occur that should be considered using a detailed assessment methodology, such as a detailed dispersion modelling study (as has been carried out for this OMSSD project in any event). The next step in the Environment Agency's screening process for long-term contributions is to add the PC to the local background concentration to calculate the Predicted Environmental Concentration (PEC). For short-term contributions the PC is compared against the short-

[342] Moorcroft and Barrowcliffe et al. (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2

[343] Environment Agency (2021) Air emissions risk assessment for your environmental permit

term environmental standard minus twice the long-term background concentration. The emissions are insignificant if:

- the long-term PEC is less than 70% of the long-term environmental standard; and
- the short-term PC is less than 20% of the short-term environmental standards minus twice the long-term background concentration.

12.29 However, the Environment Agency guidance[343] also advises that, where detailed dispersion modelling has been undertaken, no further action is required if resulting PECs do not exceed environmental standards.

12.30 It should also be noted that the previously mentioned EPUK and IAQM guidance does not apply to nature conservation sites, thus the use of the Environment Agency guidance is most appropriate for assessing impacts on ecosystems.

12.31 For the purposes of this preliminary assessment, wherever the detailed modelling shows that concentrations and fluxes are below the critical level or critical load, it is considered that there will be no significant impacts.

Existing Conditions

12.32 Existing sources of emissions and baseline air quality conditions within the study area have been defined using a number of approaches:

- industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register[344];
- local sources have been identified through examination of the Castle Point Borough Council's latest Air Quality Review and Assessment report[345];
- information on existing air quality has been obtained by collating the results of monitoring carried out by the nearby local authorities including Castle Point[346], Basildon[347], Rochford[348], and Thurrock[349];
- background concentrations have been defined using the latest version of Defra's background pollutant maps[350]. These cover the whole of the UK on a 1x1 km grid. The background annual mean NO_2 maps for 2019 have been calibrated against concurrent measurements from national monitoring sites[351]. The calibration factor

[344] Defra (2021) UK Pollutant Release and Transfer Register

[345] Castle Point Borough Council (2020) 2020 Air Quality Annual Status Report (ASR)

[346] Castle Point Borough Council (2020) 2020 Air Quality Annual Status Report (ASR)

[347] Basildon Council (2020) 2020 Air Quality Annual Status Report

[348] Rochford District Council (2020) 2020 Air Quality Annual Status Report (ASR)

[349] Thurrock Council (2019) 2019 Air Quality Annual Status Report (ASR)

[350] Defra (2021) Local Air Quality Management (LAQM) Support Website

[351] AQC (2020) Calibrating Defra's 2018-based Background NOx and NO2 Maps against 2019 Measurements

calculated has also been applied to future year backgrounds. Mapped background concentrations of PM_{10} and $PM_{2.5}$ have not been adjusted;

- background deposition fluxes and NH_3 concentrations to the designated ecological sites have been taken from the APIS website[352] and represent three-year averages for the period 2016-2018; and
- whether or not there are any exceedances of the annual mean EU limit value for NO_2 in the study area has been identified using the maps of roadside concentrations published by Defra[353,354]. These maps are used by the UK Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to EU data quality standards to report exceedances of the limit value to the EU. The national maps of roadside PM_{10} and $PM_{2.5}$ concentrations which are available for the years 2009 to 2019, show no exceedances of the limit values anywhere in the UK in 2019.

Determining Significance of Effects

Sensitivity of Receptors

Construction Dust

12.33 The guidance[355] followed when carrying out the construction dust assessment requires the number of receptors within certain distance bands (as shown in Figure 12.1) to be established in order to determine the sensitivity of the surrounding area, rather than focussing on impacts at individual receptors. It is, therefore, not necessary to set out specific receptors for the assessment of impacts during the earthworks and construction works.

12.34 Residential properties, hospitals and schools are classified as high sensitivity receptors, whilst places of work and parks are classified as medium sensitivity receptors for the construction dust risk assessment.

Operational Phase

12.35 Within this chapter, all receptors where the air quality objectives (as set out in Table 12.1) apply are considered to be of high sensitivity. Locations where the objectives do not apply must be considered not to be sensitive, therefore there are no medium or low sensitivity receptors within the context of this assessment. Operatives at the OMSSD Facility exposed to pollutants through their work are covered separately by occupational workplace exposure limits detailed within the Health and Safety at Work Regulations[356] for the protection of

[352] APIS (2021) Air Pollution Information System

[353] Defra (2020) 2020 NO_2 projections data (2018 reference year)

[354] Defra (2021) UK Ambient Air Quality Interactive Map

[355] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1

[356] Health and Safety Executive (2020) EH40/2005 Workplace Exposure Limits

workers' health. Therefore, the air quality objectives do not apply at places of work, and as such, the operatives have not been included as sensitive receptors.

12.36 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted at a number of locations within the study area. Human health receptors have been identified to represent worst-case exposure within the study area, being located on the façades of the residential properties closest to the roads used by road tankers, or close to the jetties where the vessels will berth.

12.37 When selecting roadside human health receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links. Attention has also been paid to selecting receptors at locations where the impacts of the auxiliary generator and shipping vessel emissions are likely to be greatest, to ensure that the combined effects of road traffic, shipping vessels and generator emissions are considered. Selected receptor locations are shown on Figure 12.3, and a description is provided in Appendix 12.3.

12.38 Selected receptors may be representative of air quality conditions at a number of properties; consideration has been given to how many sensitive locations each modelled receptor represents when considering the impacts of the OMSSD project and the overall significance of effects.

12.39 Specific ecological receptors have also been located at the boundaries of sensitive designated habitats adjacent to the affected road network, or close to the OMSSD Facility boundary. Receptors have been modelled at 1.5 m above ground level to be consistent with Defra's national modelling of ecosystem impacts. Selected ecological receptor locations are displayed on Figure 12.4, and a description is provided in Appendix 12.3.

12.40 In addition, ten transects of receptor points across the Vange and Fobbing Marshes SSSI, Canvey Wick SSSI, Brick House Farm Marsh LWS, Canvey Village Marshes LWS and West Canvey Marshes LWS have been included in the model. These transects have been selected at locations within the designated habitats closest to the affected road network. In the case of Canvey Wick SSSI, the transects cover both sides of Roscommon Way, starting at 1 m from the kerbside. For Vange and Fobbing Marshes SSSI, the transect points are located at the boundary of the site, which is 34 m from the edge of the A13. Transects at the Local Wildlife Sites cover, where necessary, both sides of the road, starting at 1 m from the edge. These results have been used to inform the Terrestrial Ecology preliminary impact assessment (Chapter 7). Selected transect receptor locations are displayed on Figure 12.5, and a description is provided in Appendix 12.3.

12.41 Concentrations of NO_2 and PM_{10} from the auxiliary generators used aboard vessels when berthed at the jetties have also been predicted across a 10 km x 10 km model domain, with the generator stacks in the centre, using nested Cartesian grids. These grids have a spacing of 5 m x 5 m within 200 m of the berthed vessels, 25 m x 25 m within 400 m, 50 m x 50 m within 1,000 m, 250 m x 250 m within 2,000 m, and 500 m x 500 m within 5,000 m. This receptor grid has been modelled at a height of 1.5 m above ground level, and covers the following ecological habitats:

- Pitsea Marsh SSSI;

- Benfleet and Southend Marshes SPA, Ramsar and SSSI;
- Thames Estuary and Marshes SPA and Ramsar;
- South Thames Estuary and Marshes SSSI;
- Holehaven SSSI;
- Canvey Wick SSSI;
- Northwick Farm and Sea Wall LWS;
- Brick House Farm Marsh LWS;
- West Canvey Marshes LWS; and
- Canvey Village Marsh LWS.

Magnitude of Impacts

Construction Dust Risk Assessment

12.42 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the IAQM[357] has been used. This follows a sequence of steps:

- Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required;
- Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation; and
- Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts.

12.43 Appendix 12.4 explains the approach to the construction dust risk assessment in more detail.

Operational Impacts – Road Traffic

12.44 Pollutant concentrations have been predicted using the ADMS-Roads dispersion model, with road traffic NOx, PM_{10} and $PM_{2.5}$ emissions derived using Defra's Emission Factor Toolkit (EFT) (v10.1)[358].

12.45 Road traffic NH_3 emissions for the modelling have been derived from the latest version of the Calculator for Road Emissions of Ammonia (CREAM)[359].

[357] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1

[358] Defra (2021) Local Air Quality Management (LAQM) Support Website

[359] Air Quality Consultants (2020) Calculator for Road Emissions of Ammonia (CREAM) V1A: https://www.aqconsultants.co.uk/resources

12.46 Details of the model inputs and the model verification are provided in Appendix 12.5.

12.47 Deposition fluxes have been calculated from the predicted concentrations of NO_2 outside of the model. For NH_3, deposition has been calculated within ADMS-Roads. The different approach has been taken for NH_3 because it deposits so rapidly that to ignore the depletion of this gas would introduce significant error. Details on the method for calculating the deposition are provided in Appendix 12.5.

Assessment Scenarios

12.48 NO_X, NO_2, NH_3, PM_{10} and $PM_{2.5}$ concentrations have been predicted for the following scenarios:

- base year 2019;
- the proposed year of opening (2024) without the OMSSD project; and
- 2024 with the OMSSD project.

Impact Description

12.49 The approach developed jointly by EPUK and the IAQM[360] has been used in describing the modelled impacts. The approach identifies impacts at individual receptors based on the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. Table 12.4 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from Table 6.3 presented in the guidance document[361]. For the assessment criterion the term Air Quality Assessment Level (AQAL) has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table 12.4: Air Quality Impact Descriptors for Individual Receptors for All Pollutants [a]

Long-Term Average Concentration At Receptor In Assessment Year [b]	Change in concentration relative to AQAL [c]				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial

[360] Moorcroft and Barrowcliffe et al. (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2

[361] Moorcroft and Barrowcliffe et al. (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2

110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

a Values are rounded to the nearest whole number.

b This is the "Without Scheme" concentration where there is a decrease in pollutant concentration and the "With Scheme" concentration where there is an increase.

c AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.

Uncertainty

12.50 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this preliminary assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.

12.51 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix 12.5). This can only be done for the road traffic model. Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2019) concentrations.

Assumptions

12.52 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this preliminary assessment include:

- that the OMSSD project is complete and fully operational in 2024. This will have overestimated the traffic emissions and hence the 2024 "With OMSSD project" concentrations. In reality, there will be a phased commissioning of the project, with full operation not expected until at least 2025;
- the five new road loading bays will be operated at maximum theoretical output to provide a worst-case assessment; and
- that the Shoeburyness Landwick meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix 12.5).

Operational Impacts - Additional Shipping Vessels

12.53 The additional fuel throughput of the OMSSD project will result in additional vessels operating on the River Thames. The first step in considering the impacts from vessel movements is to compare the anticipated annual movements (with and without the OMSSD project) against Defra's screening criteria detailed in paragraph 12.21. Where the annual vessel movements are substantially lower than the screening threshold, impacts can be screened out and there is no need to progress to a more detailed assessment.

Operational Impacts - Proposed Auxiliary Generators

12.54 Whilst berthed at Jetties 1 and 2, vessels use auxiliary generators as opposed to the main engines to power the vessel systems. Generators running on marine diesel oil have the potential to emit emissions of NO_2 and PM_{10}. The assumed specifications for these plant, upon which the assessment is based, are set out in Appendix 12.5.

Screening

12.55 The first step in considering the generator impacts has been to screen the pollutant emissions against the criteria set out in the EPUK/IAQM guidance, as described in paragraph 12.24. Where generator impacts cannot be screened out against these criteria, a further stage of screening is required, whereby the modelled contributions of the plant are compared to further screening criteria, as described in paragraph 12.26. Where impacts can be screened out there is no need to progress to a more detailed assessment. The following sections describe the approach to dispersion modelling of the plant emissions, which has been required for this project.

Emissions Data

12.56 The emissions data input into the model for the generators have been derived from auxiliary engine emissions factors used by the California Air Resources Board (CARB) and published by the United States Environmental Protection Agency[362], in combination with vessel information (such as number of generators and generator output) provided by Oikos. This data has been used, along with assumptions based upon the fuel composition, typical operating conditions and combustion chemistry. Further details of the emissions data used in this assessment are provided in Appendix 12.5.

Modelling Methodology

12.57 The impacts of emissions from the proposed auxiliary generators have been modelled using the ADMS-5 dispersion model developed by Cambridge Environmental Research Consultants[363]. ADMS-5 is a new generation model that incorporates a state-of-the-art understanding of the dispersion processes within the atmospheric boundary layer. The model input parameters are set out in Appendix 12.5. The air quality modelling has been carried out based on a number of necessary assumptions, detailed further in paragraph 12.65 below and in Appendices 12.5. Where possible a realistic worst-case approach has been adopted.

12.58 Deposition fluxes have been calculated from the predicted concentrations of NO_2 and added to the roadside increment and baseline fluxes. Details on the method for calculating the deposition rates are provided in Appendix 12.5.

[362] United States Environmental Protection Agency (2017) Shore Power Technology Assessment at U.S. Ports

[363] CERC (2021), http://www.cerc.co.uk/environmental-software/ADMS-model.html

Assessment Scenarios

12.59 NO_2 and PM_{10} concentrations as a result of emissions from the auxiliary generators have been predicted for the year 2024 for the following scenarios:

- without buildings; and
- with a shipping vessel at each jetty as a 'building'.

12.60 In order to allow for uncertainties in local and future year meteorological conditions, the dispersion model has been run using five years' of hour-by-hour meteorological data from Shoeburyness Landwick.

12.61 The maximum predicted concentration from any of these building and meteorological data scenarios has been used throughout this assessment. This sensitivity testing is considered necessary for building effects because ADMS-5 takes a relatively simplistic approach to modelling building downwash effects, thus additional uncertainty is introduced when using the buildings module, but it would not be appropriate to ignore the potential effects of the entrainment of the plume in downwash of air passing over the vessels at berth.

Impact Description

12.62 The modelled contribution of the auxiliary generators has been added to the 'with OMSSD project' concentrations determined in the road traffic dispersion modelling, and impacts described using the approach described in paragraph 12.49, taking account of the combined total change in concentration as a result of both road traffic and generator emissions.

Uncertainty

12.63 The point source dispersion model used in the assessment is dependent upon emission rates, flow rates, exhaust temperatures and other parameters for each source, all of which in reality are variable as the generators will operate at different loads at different times. The actual plant operational on future vessels will also not be known until the project is operational, and a log of vessels accessing the OMSSD Facility is kept, and thus could be different to that assumed for this preliminary assessment. The assessment has, however, addressed this by applying worst-case assumptions where necessary.

12.64 There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms. These uncertainties cannot be easily quantified, and it is not possible to verify the point-source model outputs. Sensitivity tests have also been applied to address specific uncertainties and to ensure a worst-case assessment.

Assumptions

12.65 The following assumptions have been made in carrying out the generator emissions modelling, with the assumptions generally seeking to reflect a realistic worst-case scenario:

- that the auxiliary generators operate continuously whilst the vessels are at berth;
- that each vessel is at berth for 36 hours;

- the generators operate at a constant load while the vessels are at berth;
- that each vessel has three auxiliary generators, each with an electrical output of 900 kW, equivalent to a total output of 2,700 kW, as an average;
- that whilst berthed, a hotelling factor of 67%[364] is representative;
- that the emission factors used by CARB[365] represent typical tanker vessels such as those visiting the Oikos Facility;
- that vessels berth perpendicular to the jetties, and the generator stacks are located at one end of the vessel (as opposed to in the middle);
- that emissions from each vessel exhaust via a 30 m stack with an exhaust velocity of 15 m/s; and
- that the Shoeburyness Landwick meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix 12.5.

Fugitive Emissions (VOCs)

12.66 During operation of the OMSSD project there is the potential for fugitive emissions from fuel vapours and in particular VOCs. The principal VOC of concern from fuel vapours is benzene (which is contained in gasoline, but is not found in diesel or kerosene). Benzene is of particular concern as it has a national air quality objective defined under the Air Quality (England) Regulations 2002 (as amended)[366]. The benzene objective (5 mg/m³ as an annual mean concentration) is much more stringent than environmental assessment levels for other VOCs (many of which are set out in EA guidance, but are not formal air quality objectives). Emissions of other VOCs are much less likely to lead to environmental impacts due to their higher environmental assessment levels (exposure limits).

12.67 Gasoline is listed in the HSE's 'Safety and Environmental Standards for Fuel Storage Sites' report[367] as having the potential to form a vapour cloud (i.e. has a high potential for vapour releases). Diesel and kerosene (aviation fuel) are listed as not likely to form a vapour cloud (i.e. have a low potential for vapour releases). Therefore, emissions would potentially only occur from the venting of storage tanks and during the filling of the storage tanks and tankers at the road loading bays when handling gasoline fuel. In order to prevent vapour releases, the gasoline tanks will be installed with internal floating decks; these comprise a deck which will float on, or just above, the surface of the fuel. The decks are equipped with a rubber seal around the outer edge which allow the deck to rise and fall with the product level, whilst preventing vapours from escaping. To prevent vapour releasing during loading of road tankers, the proposed road loading bays will be fitted with vapour recovery units to ensure

[364] United States Environmental Protection Agency (2017) Shore Power Technology Assessment at U.S. Ports

[365] United States Environmental Protection Agency (2017) Shore Power Technology Assessment at U.S. Ports

[366] Air Quality (England) (Amendment) Regulation 2002

[367] HSE (2009) Safety and environmental standards for fuel storage sites, Process Safety Leadership Group Final Report

that vapour is not released into the atmosphere. The Oikos Facility currently has consent to handle diesel, kerosene and gasoline, although does not handle gasoline at present. The OMSSD project is principally based on providing additional diesel and kerosene storage capacity, however, two of the ten main product storage tanks will also have consent to allow the storage of gasoline. With the use of floating decks on gasoline storage tanks and vapour recovery systems on road loading bays, there is no risk of impacts from fugitive VOC emissions.

Significance Criteria

12.68 It is important to differentiate between the terms impact and effect with respect to the assessment of air quality. The term impact is used to describe a change in pollutant concentration at a specific location. The term effect is used to describe an environmental response resulting from an impact, or series of impacts. Within this chapter, the air quality preliminary assessment has used published guidance and criteria described in the following sections to determine the likely air quality impacts at a number of sensitive locations. The potential significance of effects has then been determined by professional judgement, based on the frequency, duration and magnitude of predicted impacts and their relationship to appropriate air quality objectives.

Construction Dust

12.69 Guidance from IAQM[368] is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'. This preliminary assessment thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be 'not significant'.

Operational

12.70 There is no statutory guidance in the UK in relation to development control on how to assess the significance of operational air quality impacts. The approach developed jointly by EPUK and the IAQM[369] has therefore been used. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors; the experience of the consultants preparing the chapter is set out in Appendix 12.2. Full details of the EPUK/IAQM approach are provided in Appendix 12.1.

Consultation

12.71 Consultation was completed in April 2020 through the submission of a scoping report to the Planning Inspectorate. Further consultation was also sought with the Environmental Health

[368] IAQM (2016), Guidance on the Assessment of Dust from Demolition and Construction v1.1

[369] Moorcroft and Barrowcliffe et al. (2017), Land-Use Planning & Development Control: Planning For Air Quality v1.2

Officer at Castle Point Borough Council and with the Port of London Authority in October and November 2020, respectively. Table 12.5 outlines the responses with respect to air quality.

Table 12.5: Summary of consultation to date

Consultee	Date	Summary of Response	How comments have been addressed in this Chapter
Castle Point Borough Council (CPBC)	29th October 2020	CPBC agreed in principle to the scope of the air quality assessment set out in the Scoping Report. CPBC reported previous complaints relating to dust from construction works on Compound 10 construction works at the site.	The approach to the assessment set out in the chapter is consistent with the approach described to and agreed by CPBC during consultation. Mitigation measures for construction activities have been reviewed in light of previous dust complaints to protect neighbours during construction of the proposed development and are detailed in Appendix 12.8.
Port of London Authority (PLA)	5th November 2020	PLA agreed in principle to the scope of the air quality assessment set out in the Scoping Report. PLA requested consideration is made to their air quality strategy which includes emissions reduction targets for NOx and PM.	The approach to the assessment set out in the Chapter is consistent with the approach described to and agreed by PLA. Opportunities to reduce emissions from vessels in the future to be considered.
The Planning Inspectorate	May 2020	The Scoping Report incorrectly states that the nearest AQMA to the Proposed Development is located adjacent to the A13 in North Stifford, approximately 18 km to the west of the project site. There are in fact several AQMAs closer to the Proposed Development, the closest being Rayleigh AQMA within Rochford District Council, which is approximately 7 km north west of the Proposed Development. The Scoping Report does not include a Figure to delineate the study area and therefore it is unclear how the ZOI for air quality extends and whether these AQMAs. It is also relevant that the ZOI for air quality will relate to the information obtained from the TA and effects to and from increased traffic.	Figure 12.2 presents the operational study area, and Figures 12.6 and 12.7 identify the AQMAs in the study area, including the Rayleigh and North Stifford AQMAs. The impacts within the North Stifford AQMA have been assessed by modelling the impacts at relevant receptors in the AQMA. The impacts at the Rayleigh AQMA have been discussed qualitatively in paragraphs 12.189 to 12.193.

Consultee	Date	Summary of Response	How comments have been addressed in this Chapter
		The Scoping Report proposes to scope out plant emissions during the construction phase, yet the number, size and type of plant machinery required for construction has not yet been determined and therefore the potential air quality impacts of this machinery are unknown.	Paragraph 12.149 discusses plant emissions during the construction phase. Whilst the siting and location of these plant are currently unknown, where possible, the distance between any areas where plant emissions will typically operate and nearby sensitive receptors (such as those on Haven Quay), will be maximised, and machinery will be switched off when not in use. It should also be noted that due to the short-term operational nature of the equipment, it is likely that there would be no measurable effect on air quality.
		The Scoping Report proposes to scope operational vessel emissions out of the ES assessment due to the number of vessel movements anticipated and being significantly below the DEFRA guidance criteria of 5,000 movements per year. However, this guidance is for the designation of AQMAs rather than EIA assessment.	Whilst the guidance does reference that monitoring should be carried out at relevant receptors to determine whether an AQMA should be declared, this guidance is also routinely used to screen out the need for detailed assessments. Whilst there is relevant exposure within 1 km of the OMSSD Facility, the expected increases in shipping movements associated with the project are marginal, and below the 15,000 large shipping movements per annum. On this basis, given the expected additional shipping movements and the distances between sensitive areas (>100 m) and the transit routes, emissions from shipping movements are considered unlikely to be significant. Accordingly, the designated AQMAs are sufficiently far away, such that there will be no impacts on these areas. It should also be noted that the potentially largest source of emissions from ships in ports, which are intrinsically included in the Defra screening criteria, are emissions from auxiliary generators while vessels are at berth. These emissions have been quantified in the assessment. A vessel at Oikos may take only a few minutes on

Consultee	Date	Summary of Response	How comments have been addressed in this Chapter
			arrival to maneuver and berth, but will remain at berth for around 36 hours. It is judged that the arrival and departure of vessels will only represent a very minor source of emissions for the OMSSD project.
		The ES should also explain how operation of the Proposed Development will support the delivery of objectives identified in the Clean Maritime Plan (2019) and the Port Air Quality Strategies (2019) guidance documents.	The assessment has demonstrated that the air quality effects of the OMSSD project will be not significant. It is however acknowledged that there will be an increase in emissions associated with the project. The opportunity to discuss ways to support the PLA's air quality strategy and principles of the Clean Maritime Plan with the PLA during PIER consultation is welcomed.
		The Scoping Report proposes to scope out operational fugitive emissions (VOCs) on the basis that products stored on site would not contain the principal VOC (Benzene) and if they should in future, this would be controlled via licence already obtained from the Local Authority Pollution and Prevention Control. Whilst the Inspectorate accepts this, there is no consideration for other VOC emissions and whether these could cause any potential impacts and subsequent effects.	The Oikos Facility is primarily used for storage and distribution of diesel and kerosene (jet fuel), which are both products with low vapour potential, i.e. which do not release VOC compounds as vapours. Storage tanks for gasoline products will be fitted with internal floating decks to prevent vapour release during tank filling and new loading bays will be connected to vapour recovery units. As such, fugitive emissions from VOCs will not lead to significant environmental impacts. Further discussion is provided in paragraphs 12.66 and 12.67 of this Chapter.
		The study area is based on screening criteria from IAQM 2016 guidance on assessment of dust during construction and demolition. This is not considered an appropriate study area for emissions other than dust, PM10 and PM2.5 and only from construction plant and traffic. The ES should describe the study area for the assessment, and this should be established in line with relevant guidance and in consultation with relevant consultation bodies. The study areas should be based on the ZOI for all types of	The IAQM guidance on assessment of dust during construction and demolition has only been used to determine the study area for the construction phase. For the operational phase, the study area has been defined based on the availability of traffic data, focusing on the locations where the impacts are expected to be greatest. At locations outside of the study area, and where traffic flows have subsequently dispersed, it is reasonable to assume that there will be no impacts.

Consultee	Date	Summary of Response	How comments have been addressed in this Chapter
		vehicles associated with the Proposed Development including traffic, on site plant machinery and vessel movements serving the site; the extent of the study area should be depicted on a Figure and informed by the TA.	The study area for the construction phase has been delineated in Figure 12.1, whilst that for the operational phase (incorporating both road traffic and auxiliary generator emissions) is shown in Figure 12.2.
		The Scoping Report chapter does not explain the relationship between the air quality assessment, the TA and the Traffic and Transport assessment Chapter. The air quality assessment should be informed by the TA and Traffic and Transport assessment particularly with regards to defining the study area and the potential impact from vehicle movements during both construction and operation.	The assessment of road traffic is underpinned by traffic data detailed within the TA and the Traffic and Transport assessment – Chapter 11. Traffic data for use in the air quality assessment have been provided by David Tucker Associates, who have completed the TA and Traffic and Transport chapter.
		The Scoping Report identifies a number of human and ecological receptors within the surrounding area based on screening criteria provided by IAQM guidance. Currently, the Figures provided with the Chapter in the Scoping Report (Figures 11.3 and 11.4) omit Canvey Wick SSSI and Local wildlife sites amongst others mentioned in paragraph 11.5. The ES should provide a Figure depicting the appropriate study area and the sensitive receptors considered within the assessment; effort should be made to agree the approach with the relevant consultation bodies.	Figure 12.3 presents the locations of the specific human health, whilst Figure 12.4 presents the ecological receptors included in the chapter. Figure 12.5 presents the locations of the ecological transects included in the assessment. The locations of the assessed receptors are described further in Table 12.1 of Appendix 12.3. In addition, the emissions from the auxiliary generators have been assessed across a grid of receptors, covering a 10 km x 10 km domain to identify the extent of the impacts.
		The Scoping Report states that the assessment of impacts generated during the construction and operational phases will be based on relevant guidance and criteria but there is limited detail in this regard. The ES should include details of any criteria used within the assessment to enable understanding of how the assessment has	The impact assessment and assessment of significance is largely informed by guidance from the IAQM / EPUK, full details of which are provided in Appendix 12.1 and references are made throughout this Chapter where relevant.

Consultee	Date	Summary of Response	How comments have been addressed in this Chapter
		been carried out and against which criteria the Proposed Development has been assessed.	
		The Applicant should ensure that the future baseline includes the consideration of anticipated change in terrestrial vehicle fleet and numbers visiting the site as well as the number and vessel types in operation.	The existing (2019) and future (2024 Without OMSSD project) baseline account for vehicle and vessel movements associated with the current operation of the Facility. It is not expected that the Oikos Facility will experience a material growth in vehicles or vessels between 2019 and 2024 without the OMSSD project. The future 2024 (With OMSSD project) scenario considers the additional vehicle movements associated with transport of fuel, and the emissions associated with additional vessels berthed at the jetties.
		The Applicant has proposed that the IAQM/EPUK screening criterion of 25 HDV AADT should not apply on the A13 within North Stifford AQMA and instead the less stringent criterion of 100 HDV AADT is appropriate. The Inspectorate is not able to agree with this approach from the information provided. In the most recent Air Quality Annual Status Report (2019), Thurrock Council has measured exceedances of annual mean NO2 within the North Stifford AQMA. The Applicant should make effort to discuss and agree their proposed approach with relevant consultation bodies including Thurrock Council. The Applicant should include all AQMAs in the road traffic dispersion modelling where there is a potential increase due to the Proposed Development in HDV of 25 AADT or more.	Receptors have been included within the North Stifford AQMA (HH_35, HH_36 and HH_37) to assess the impact of additional vehicles on the North Stifford AQMA using dispersion modelling. Thurrock Council does not currently have an Air Quality Officer, and therefore consultation to agree the approach to the assessment in the North Stifford AQMA has not been possible. In terms of the Rayleigh and Southend AQMAs, the impacts of vehicles travelling through these AQMAs are discussed in paragraphs 12.189 to 12.193.

Implications of Legislation, Policy and Guidance

Legislation

12.72 All European legislation referred to in this report is written into UK law and remains in place, although there is uncertainty at this point in time as to who will enforce the requirements of some of this legislation.

Air Quality (England) Regulations (2000) and Air Quality (England) (Amendment) Regulations (2002)

12.73 The Air Quality (England) Regulations 2000[370] set national objectives for Local Authorities in England, as well as the dates for which the air quality objectives were to be achieved. The objectives relevant to this assessment are provided in Table 12.1. The air quality objectives for benzene and carbon monoxide were amended in the Regulations in 2002[371].

Air Quality Strategy

12.74 The Air Quality Strategy[372] published by the Department for Environment, Food, and Rural Affairs (Defra), provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Air Quality Directive - Directive 2008/50/EC

12.75 Directive 2008/50/EC on ambient air quality and cleaner air for Europe sets legally binding limit values for human health and vegetation, which are incorporated into national legislation. It merges, consolidates and replaces previous EU air quality legislation, and incorporates the 4th daughter directive. The directive is implemented in UK law through the Air Quality Standards Regulations[373] and continues to apply despite the UK's exit from the EU.

[370] The Air Quality (England) Regulations 2000

[371] The Air Quality (England) (Amendment) Regulation 2002

[372] Defra (2007), The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

[373] The Air Quality Standards Regulations 2010

The Habitats Directive – Directive 92/43/EEC

12.76 Directive 92/43/EEC, the "Habitats Directive"[374] requires member states to introduce a range of measures for the protection of habitats and species. The Conservation of Habitats and Species Regulations 2017[375] transpose the Directive into UK law. They require the Secretary of State to provide the European Commission with a list of sites which are important for the habitats or species listed in the Directive. The Commission then designates worthy sites as Special Areas of Conservation (SACs). The Regulations also require the compilation and maintenance of a register of European sites, to include SACs and Special Protection Areas (SPAs), with the latter classified under the "Birds Directive"[376], which is implemented in UK law through the Conservation of Habitats and Species Regulations[377]. These sites form a network termed "Natura 2000".

12.77 The Regulations primarily provide measures for the protection of European Sites and European Protected Species, but also require local planning authorities to encourage the management of other features that are of major importance for wild flora and fauna.

12.78 In addition to SACs and SPAs, some internationally important UK sites are designated under the Ramsar Convention. Originally intended to protect waterfowl habitat, the Convention has broadened its scope to cover all aspects of wetland conservation.

12.79 The Habitats Directive (as implemented by the Regulations) requires the competent authority, which in this case will be the planning authority, to firstly evaluate whether the development is likely to give rise to a significant effect on the European site. Where this is the case, it has to carry out an 'appropriate assessment' in order to determine whether the development will adversely affect the integrity of the site.

Planning Policy

Human Health

National Policy

12.80 The National Policy Statement (NPS) for Ports[378] identifies key emission sources to include:

- large volumes of HGV traffic…, with emissions exacerbated by congestion and stop-start driving conditions;
- emissions (especially sulphur dioxide) from ships entering the port and using coastal routes, estuaries and inland waterways; and
- certain cargoes such as cements and aggregates which can cause local dust pollution.

[374] European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora

[375] The Conservation of Habitats and Species Regulations 2017 *as amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019*

[376] Directive 2009/147/EC of the European Parliament and of the Council

[377] The Conservation of Habitats and Species Regulations 2010

[378] Department for Transport (2012) National Policy Statement for Ports

12.81 Paragraphs 5.7.8 to 5.7.15 in the NPS for Ports also provides guidance to mitigate air quality emissions due to port activity, addressing both vehicular and nautical emissions. One example of such mitigation is the function of cold-ironing, which involves the use of fixed shore side electrical power to replace ships' generators when they are at port.

12.82 The Overarching National Policy Statement for Energy (EN-1)[379] includes Section 5.2 on air quality and emissions. This identifies that infrastructure development can have adverse effects on air quality, through the construction, operation and decommissioning phases. The NPS for Energy provides details of what should be contained within any Environmental Statement, as well as mitigation measures mainly targeting HGV traffic, and states that "*water-borne or rail transport is preferred over road transport at all stages of the project".*

12.83 The National Planning Policy Framework (NPPF)[380] sets out planning policy for England. Whilst Paragraph 5 of the NPPF states that the framework does not contain policies for Nationally Significant Infrastructure Projects (NSIPs), it clarifies that matters considered relevant to NSIPs may include the NPFF, and thus has been included for context.

12.84 The NPPF states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

"to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy".

12.85 To prevent unacceptable risks from air pollution, Paragraph 170 of the NPPF states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality".

12.86 Paragraph 180 states:

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

12.87 More specifically on air quality, Paragraph 180 makes clear that:

[379] Department of Energy and Climate Change (2011) Overarching National Policy Statement for Energy (EN-1)

[380] Ministry of Housing, Communities & Local Government (2019) National Planning Policy Framework

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

Local Transport Plan

12.88 The Essex Transport Strategy[381] was adopted by Essex County Council in June 2011. The Strategy establishes a series of outcomes the Council seeks to achieve. Outcome 2 sets as an ambition for the Council to "*reduce carbon dioxide emissions and improve air quality through lifestyle changes, innovation and technology*". This is to be achieved through improving the public transport infrastructure, providing up-to-date travel information and investing in facilities to support and encourage greater use of low carbon travel modes.

12.89 Air quality is also specifically referred to in Policy 9 – The Natural, Historic and Built Environment. The policy states that *"The County Council will protect the natural, historic and built environment from the harmful effects of transport by:…addressing air quality issues through appropriate measures, particularly in designated Air Quality Management Areas"*

Local Policies

12.90 The current CPBC Local Plan was adopted in November 1998[382]. In 2007 certain policies of the Local Plan were saved, including Policy EC4 'Pollution' which states that:

"Development which would have a significant adverse effect on health, the natural environment, or general amenity by reason of releases of pollutants to water, land or air, or by reason of noise, dust vibration, light or heat, will be refused."

12.91 CPBC submitted its new Local Plan in October 2020 for examination; once adopted existing policies will replace the saved policies. Within the new plan, Strategic Policy NE7 refers to air quality:

"Policy NE 10 Pollution Control

…2. Development proposals should be located and designed in such a manner as to not cause a significant adverse effect upon the environment, the health of new and existing residents or surrounding residential amenity by reason of pollution to land, air or water, or as

[381] Essex County Council (2011) Essex Transport Strategy: The Local Transport Plan for Essex

[382] Castle Point Borough Council (1998) Adopted Local Plan

a result of any form of disturbance including, but not limited to, noise, light, odour, heat, dust and vibrations.

3. Where necessary, the Council will seek to manage and mitigate the effects of pollution and/or disturbance arising from development, (including during site clearance and construction) by means of appropriate planning conditions. Exceptionally, a Section 106 Agreement may be used to secure measures to control pollution and/or disturbance.

Air Quality Action Plans

National Air Quality Plan

12.92 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK[383]; a supplement to the 2017 Plan[384] was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. Alongside a package of national measures, the 2017 Plan and the 2018 Supplement require those identified English Local Authorities to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a Clean Air Zone. There is currently no straightforward way to take account of the effects of the 2017 Plan or 2018 Supplement in the modelling undertaken for this assessment; however, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the vicinity of the application site. This assessment has principally been carried out in relation to the air quality objectives, rather than the EU limit values that are the focus of the Air Quality Plan.

Local Air Quality Action Plan

12.93 CPBC has not declared any AQMAs, and thus has not prepared an air quality action plan.

Sensitive Ecosystems

National Policies

12.94 Sites of national importance may be designated as Sites of Special Scientific Interest (SSSIs). Originally notified under the National Parks and Access to the Countryside Act[385], SSSIs have been re-notified under the Wildlife and Countryside Act[386]. Improved provisions for the protection and management of SSSIs (in England and Wales) were introduced by the Countryside and Rights of Way Act[387] (the "CROW" act). If a development is "*likely to*

[383] Defra (2017) Air quality plan for nitrogen dioxide (NO_2) in the UK

[384] Defra (2018) Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations

[385] National Parks and Access to the Countryside Act 1949

[386] Wildlife and Countryside Act 1981

[387] Countryside and Rights of Way Act 2000

damage" a SSSI, the CROW act requires that a relevant conservation body (i.e. Natural England) is consulted. The CROW act also provides protection to local nature conservation sites, which can be particularly important in providing 'stepping stones' or 'buffers' to SSSIs and European sites. In addition, the Environment Act[388] and the Natural Environment and Rural Communities Act[389] both require the conservation of biodiversity.

12.95 National planning policy on biodiversity and conservation is set out in the NPPF. This emphasises that the planning system should seek to minimise impacts on biodiversity and provide net gains in biodiversity wherever possible as part of the Government's commitment to halting declines in biodiversity and establishing coherent and resilient ecological networks.

12.96 Local planning authorities should set criteria based policies against which proposals for any development on or affecting protected wildlife sites will be judged, making distinctions between different levels of site designation. If significant harm from a development cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused.

Air Quality Strategies

Clean Air Strategy 2019

12.97 The Clean Air Strategy[390] sets out a wide range of actions by which the UK Government will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

Port of London Air Quality Strategy

12.98 Following the publication of the Clean Air Strategy, major ports in England were asked to develop air quality strategies to reduce emissions across their operations. The strategies outline the steps that each port is taking to identify and address its impacts on air quality.

12.99 The Air Quality Strategy for the tidal Thames was published in May 2018[391], and updated in 2020, outlines actions, including implementing green technology, monitoring of river emissions, establishing standards and encouraging best practice. The purpose of these actions is to help realise a 50% reduction in NOx and PM_{10} emissions over the next 25 years. Following progress with the initial actions since its inception, the Strategy was updated in 2020 to account for revised targets[392].

[388] Environment Act 1995

[389] Natural Environment and Rural Communities Act 2006

[390] Defra (2019) Clean Air Strategy 2019

[391] Port of London Authority (2018) Air Quality Strategy for the Tidal Thames

[392] Port of London Authority (2020) Air Quality Strategy for the Tidal Thames: Update

Reducing Emissions from Road Transport: Road to Zero Strategy

12.100 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper[393] in July 2018 outlining how the government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This paper affirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040, and states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by this year, and that by 2050 almost every car and van should have zero tailpipe emissions. It states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.

12.101 The paper sets out a number of measures by which Government will support this transition, but is clear that Government expects this transition to be industry and consumer led. The Government has since announced that the phase-out date for the sale of new petrol and diesel cars and vans will be brought forward to 2030 and that all new cars and vans must be fully zero emission at the tailpipe from 2035. If these ambitions are realised then road traffic-related NOx emissions can be expected to reduce significantly over the coming decades, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

Clean Maritime 2050 Plan

12.102 The Clean Maritime 2050 Plan[394], adopted in July 2019, identifies ways to address air pollutants and greenhouse gas emissions in tandem, whist securing clean growth opportunities for the UK. The Government's vision of the maritime environment is that it will be "*environmentally sustainable and its impact on the marine environment, climate and air quality will be close to zero".* The strategy primarily deals with emissions from vessels, and identifies three key areas to focus on:

- treating emissions at exhaust;
- improving fuel efficiency; and
- substituting existing fuels with less polluting alternatives.

[393] DfT (2018) The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy

[394] DfT (2019) Maritime 2050: Navigating the Future, Clean Maritime Plan

Guidance

Planning Practice Guidance

12.103 The NPPF is supported by Planning Practice Guidance (PPG)[395], which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states that:

"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with Limit Values. It is important that the potential impact of new development on air quality is taken into account where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified".

12.104 The PPG also states that:

"Air quality considerations may also be relevant to obligations and policies relating to the conservation of nationally and internationally important habitats and species".

12.105 Regarding plan-making, the PPG states:

"It is important to take into account air quality management areas, Clean Air Zones and other areas including sensitive habitats or designated sites of importance for biodiversity where there could be specific requirements or limitations on new development because of air quality".

12.106 The role of the local authorities through the LAQM regime is covered, with the PPG stating that a local authority Air Quality Action Plan "*identifies measures that will be introduced in pursuit of the objectives and can have implications for planning*". In addition, the PPG makes clear that "*Odour and dust can also be a planning concern, for example, because of the effect on local amenity*".

12.107 Regarding the need for an air quality assessment, the PPG states that:

"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity".

12.108 The PPG sets out the information that may be required in an air quality assessment, making clear that:

[395] Ministry of Housing, Communities & Local Government (2019) Planning Practice Guidance

"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific".

12.109 Regarding sites that will operate under an Environmental Permit, PPG states that:

"It is not necessary for air quality assessments that support planning applications to duplicate aspects of air quality assessments that will be done as part of non-planning control regimes, such as under Environmental Permitting Regulations".

12.110 The PPG also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that:

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented".

Defra's LAQM Technical Guidance LAQM TG16

12.111 Defra's technical guidance[396]is designed to support local authorities in carrying out their duties under the Environment Act 1995 and subsequent regulations. The guidance sets out the objectives, defines public exposure and describes the relationship between annual mean concentrations and short-term (1-hour mean and 24-hour mean) concentrations. It also provides guidance for dispersion modelling, including modelling street canyons, terrain, meteorological data and consideration of background concentrations. Finally, the guidance details monitoring processes, information regarding air quality progress reports, updating and screening assessments and further assessments for the LAQM reporting process.

EPUK & IAQM Planning for Air Quality Guidance

12.112 The guidance issued by EPUK and IAQM[397] is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance are summarised in Appendix 12.1.

Preliminary Description of the Existing Environment

12.113 This section of the chapter outlines the existing environment and baseline conditions in the study area.

[396] Defra (2018) Review & Assessment: Technical Guidance LAQM.TG16 February 2018 Version

[397] Moorcroft and Barrowcliffe et al. (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2

Industrial Sources

12.114 No significant industrial or waste management sources have been identified that are likely to affect the local area, in terms of air quality[398].

Air Quality Management Areas

12.115 Castle Point Borough Council has not declared any AQMAs, however, the neighbouring authorities of Rochford and Southend have declared AQMAs for exceedances of the annual mean nitrogen dioxide objective in Rayleigh and Southend-on-Sea, respectively. The locations of these AQMAs are shown in Figure 12.6. Nonetheless, whilst these are the closest AQMAs to the OMSSD project, they are not located on the strategic route used by road tankers, and therefore are unlikely to be affected by the increased operations. Only part of the Rochford AQMA covers the A127 and within this part of the AQMA there are no sensitive receptors directly adjacent to the road; the nearest receptor in the Rochford AQMA is located over 45 m from the road edge.

12.116 The nearest AQMA likely to be affected by the OMSSD project is located adjacent to the A13 in North Stifford, approximately 18 km to the west of the OMSSD project site. This AQMA is in the borough of Thurrock (known as AQMA no. 5) and was declared in 2004 for exceedances of the annual mean nitrogen dioxide objective. The extent of the North Stifford AQMA is shown in Figure 12.7. It can be seen in Figure 12.7 that only part of the AQMA covers the A13 and within this part of the AQMA there are only a small number of sensitive receptors, which are all set well back (>20 m) from the road.

Local Air Quality Monitoring

Nitrogen Dioxide

12.117 Castle Point Borough Council operates one automatic monitoring station within its area. This site is located in Hadleigh, and is not in close proximity to the study area or on a route used by OMSSD project road tankers.

12.118 The Council also operates a number of NO_2 diffusion tubes prepared and analysed by Socotec (using the 50% TEA in acetone method). This includes eight sites within 2 km of the Oikos Facility, as well as an additional site located at the roundabout between the A13 and the A130 which forms part of the strategic route.

12.119 Annual mean results for the years 2015 to 2019 are summarised in Table 12.6, and the monitoring locations are shown on Figure 12.8. The monitoring data have been taken from

[398] Defra (2021) UK Pollutant Release and Transfer Register

Castle Point[399], Thurrock[400], Rochford[401] and Basildon[402] Council 2020 Annual Status Reports.

Table 12.6: Summary of Annual Mean NO_2 Monitoring ($\mu g/m^3$)

Site ID	Site Type	Location	2015	2016	2017	2018	2019
Castle Point Borough							
CP01	Roadside	Waterside Farm, Sommes Avenue	27	31	32	29	30
CP02	Roadside	Garden Centre	-	29	30	29	29
CP03	Urban Background	No.18 Picketts	-	21	22	19	21
CP04	Suburban	Thames Road	16	18	19	17	18
CP05	Urban Background	Thameside Crescent	20	21	24	21	23
CP07	Roadside	93 Link Road	23	24	25	25	24
CP08	Urban Background	54 Prince William Avenue	-	25	24	24	24
CP09	Roadside	Link Road / Sommes Avenue Roundabout	35	40	38	38	38
CP14	Roadside	2 Sadlers Villas, Clare Road	31	31	33	28	30
Basildon							
BA006	Roadside	The Meads	27	30	31	27	26
BA007	Kerbside	52 Merricks Lane	28	30	30	26	26
Thurrock							
CC	Intermediate	Catherine Close	-	-	24	26	- [b]
HD	Roadside	Hawkins Drive	-	-	36	33	- [b]
GRPL	Intermediate	Grifton Road	-	-	34	33	- [b]
LYD	Urban Background	Lydden	27	31	32	30	- [b]
HR	Roadside	Howard Road	29	32	33	30	- [b]
NAS2	Roadside	A1306	**48**	**56**	**54**	**51**	- [b]
Rochford							
HRD	Roadside	109 High Road	-	-	29	29	28

[a] Exceedances of the objective shown in bold.

[b] Data are not currently available.

[399] Castle Point Borough Council (2020) 2020 Air Quality Annual Status Report (ASR)

[400] Thurrock Council (2019) 2019 Air Quality Annual Status Report (ASR)

[401] Rochford District Council (2020) 2020 Air Quality Annual Status Report (ASR)

[402] Basildon Council (2020) 2020 Air Quality Annual Status Report

12.120 Annual mean concentrations of NO_2 have consistently measured below the annual mean objective, and no monitoring site within the Castle Point local authority has measured an exceedance in the past five years. The highest concentrations from monitoring sites presented in Table 12.6 occur at site CP09, which is adjacent to the main route into the centre of Canvey Island, and at the roundabout between the B1014 and Link Road in Canvey Island where traffic may be congested and slow moving. At monitoring sites adjacent to the roads closest to the Oikos Facility, CP02 and CP14, concentrations are well below the objective.

PM_{10} and $PM_{2.5}$

12.121 No monitoring of PM_{10} or $PM_{2.5}$ concentrations is undertaken by Castle Point Borough Council, Basildon Council or Rochford District Council; it is, therefore, reasonable to assume that there are no exceedances of the PM objectives in these boroughs.

12.122 Thurrock Council measures concentrations of PM_{10} at three locations; in Grays, Purfleet and Stanford-le-Hope, whilst $PM_{2.5}$ concentrations are also measured at the automatic monitor in Stanford-le-Hope. No exceedances of any objective have been measured since 2014.

SO_2

12.123 Defra measures concentrations of SO_2 as part of the AURN, including in close proximity to several ports and large industrial areas across the UK. Results for each objective relevant to human health (15-minute, 1-hour and 24-hour), as well as the annual mean objective which is relevant to ecological receptors, are presented in Table 12.7 for 2019. It can be seen in the data that there were no exceedances of any SO_2 objectives in 2019 and concentrations are, in general, well below the objectives.

Table 12.7: Summary of 2019 SO_2 Monitoring at UK Industrial Ports ($\mu g/m^3$) [a, b]

Location	Site Type	Annual Mean	15-minute Mean	1-hour Mean	24-hour Mean
Grangemouth	Urban Industrial	3	2 (107)	0 (50)	0 (15)
Middlesbrough	Urban Industrial	1	0 (12)	0 (9)	0 (5)
Port Talbot Margam	Urban Industrial	3	0 (77)	0 (49)	0 (18)
Objective		**20**	**15 (266)**	**24 (350)**	**3 (125)**

a Data have been downloaded from the UK-Air website[403].

b Values in brackets are the relevant percentiles.

[403] Defra (2021) UK-Air. Available: https://uk-air.defra.gov.uk/interactive-map

Exceedances of EU Limit Values

12.124 The Stanford-le-Hope AURN monitoring site lies within the study area and measured no exceedance (26.2 $\mu g/m^3$) of the annual mean NO_2 limit value (40 $\mu g/m^3$) in 2019. Defra's roadside annual mean NO_2 concentrations[404], which are used to report exceedances of the limit value to the EU, do not identify any exceedances within the study area. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the OMSSD project site by the time that it is operational, since measures implemented as part of Defra's roadside air quality plan[405] will also improve concentrations further in the future.

Background Concentrations and Fluxes

National Background Pollution Maps

12.125 Estimated background concentrations in the study area are set out in Table 12.8 and are all well below the objectives. A range in estimated background concentrations is provided, since the study area covers multiple grid squares. Estimated background concentrations of NOx and NH_3 cover only the designated habitats of interest, whilst concentrations of NO_2, PM_{10} and $PM_{2.5}$ cover any grid square within which a receptor selected for the operational assessment (see Table 12.1 of Appendix 12.3) is located.

Table 12.8: Estimated Annual Mean Background Pollutant Concentrations in 2019 and 2024 ($\mu g/m^3$)

Year	NOx	NH_3	NO_2	PM_{10}	$PM_{2.5}$
2019	20.4 – 30.8	1.1 – 4.1	16.1 – 25.2	13.7 – 18.5	9.4 – 12.2
2024	17.6 – 24.9	1.1 – 4.1	13.6 – 20.4	12.7 – 17.3	8.6 – 11.3
Objectives	**30**	**20**	**40**	**40**	**25** [a]

a The PM2.5 objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Background Deposition and Acidity

Background nitrogen deposition fluxes to the designated habitats are presented in Table 12.9, and have been defined using APIS[406] and are 5 x 5 km grid square averages based on the three-year mean between 2016 and 2018. Background nutrient nitrogen deposition rates exceeded the critical load in this period at the Thames Estuary and Marshes SPA and Ramsar, but were below the critical load at all other habitats. With respect to acid nitrogen deposition fluxes, baseline deposition rates exceeded the critical load in some locations at the South Thames Estuary and Marshes SSSI, but were below the critical load at the Thames Estuary and Marshes SPA and Ramsar.

[404] Defra (2020), 2020 NO_2 projections data (2018 reference year)

[405] Defra (2018) Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations

[406] APIS (2021) Air Pollution Information System

Table 12.9: Estimated Annual Mean Nitrogen Background Deposition

Site	Nutrient Nitrogen Deposition (kgN/ha/yr)		Acid Nitrogen Deposition (keq/ha/yr)	
	Baseline	Critical Load	Baseline	Critical Load
Canvey Wick SSSI	- [a]	- [a]	- [a]	- [a]
Vange & Fobbing Marshes SSSI	- [a]	- [a]	- [a]	- [a]
Holehaven Creek SSSI	13.1 – 28.3	20 – 30	- [a]	- [a]
Thames Estuary and Marshes SPA and Ramsar	10.6 – 17.2	10 - 20	0.759 – 1.228	1.389
Langdon Ridge SSSI	28.3	15	2.019	2.048
Pitsea Marsh SSSI	28.3	15	- [a]	- [a]
South Thames Estuary and Marshes SSSI	9.5 – 15.1	20 – 30	0.681 – 1.082	0.733
Benfleet and Southend Marshes SPA and Ramsar	10.5 – 15.9	20 – 30	- [a]	- [a]
West Canvey Marshes LWS	13.2 – 16.0	20	- [a]	- [a]
Canvey Village Marsh LWS	13.2	15	- [a]	- [a]
Northwick Farm and Sea Wall LWS	13.2	20	- [a]	- [a]
Brick House Farm Marsh LWS	13.2	15	- [a]	- [a]

[a] Habitats are not sensitive to deposition.

Environmental Change without the OMSSD Project

Human Health Receptors

12.126 Baseline concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been modelled at each of the existing receptor locations (see Figure 12.3 and Appendix 12.3 for receptor locations).

12.127 The results, which cover both the existing (2019) and future year (2024) baseline (Without OMSSD project), are set out in Table 12.15 of Appendix 12.6 for nitrogen dioxide and Table 12.16 of Appendix 12.6 for PM_{10} and $PM_{2.5}$. The modelled road components of NOx, PM_{10} and $PM_{2.5}$ have been increased from those predicted by the model based on a comparison with local measurements (see Appendix 12.5 for the verification methodology). The baseline

results also take into account the existing emissions associated with the auxiliary generator emissions, based on the existing ships berthing at the jetties[407].

12.128 The predicted annual mean concentrations of NO_2 are below the objective at every modelled receptor in 2019 and 2024 (Without OMSSD project). The highest concentrations are predicted at Receptors HH_34 to HH_37, which are located within the North Stifford AQMA. Further, the annual mean NO_2 concentrations are well below 60 $\mu g/m^3$ at every receptor in both assessment years; it is, therefore, unlikely that the 1-hour mean NO_2 objective will be exceeded (see paragraph 12.12).

12.129 The predicted annual mean concentrations of PM_{10} and $PM_{2.5}$ are well below the objectives at all receptors in both 2019 and 2024. The annual mean PM_{10} concentrations are below 32 $\mu g/m^3$ and it is, therefore, unlikely that the 24-hour mean PM_{10} objective will be exceeded.

12.130 These results are consistent with the conclusions of air quality review and assessment work completed by CPBC, Basildon Council and Thurrock Council. No exceedances of the NO_2 annual mean objectives have been measured in Castle Point or adjacent to the A13 in Basildon, consistent with the outcomes of the modelling results.

12.131 With respect to Thurrock Council, only one location in the North Stifford AQMA regularly records exceedances of the annual mean nitrogen dioxide objective, being located adjacent to the Arterial Road North Stifford, and not adjacent to the A13. Traffic generated by the OMSSD project is not expected to use the Arterial Road, but will be limited to the A13. The monitoring site within the North Stifford AQMA, and adjacent to the A13 (LYD) has not measured any exceedances of the annual mean nitrogen dioxide objective in the last five years (see Table 12.6), consistent with the outcomes of the baseline (2019) model at this location.

12.132 Whilst the North Stifford AQMA is also declared for exceedances of the 24-hour mean PM_{10} objective, no exceedances of the annual mean or daily mean objective have been measured at any automatic monitor since 2015, consistent with the outcomes of the baseline (2019) modelling.

Specific Ecological Receptors

12.133 Baseline concentrations of NOx and NH_3 at the specific ecological receptors (see Figure 12.4) within the designated habitats in 2019 and 2024 (Without OMSSD Project) are set out in Table 12.17 in Appendix 12.6. Baseline nutrient nitrogen and acid nitrogen deposition fluxes are set out in Table 12.18 of Appendix 12.6; only habitats sensitive to nutrient nitrogen and acid deposition have been presented (see Table 12.3).

12.134 Predicted concentrations in 2019 exceed the annual mean NOx critical level in 2019 at Langdon Ridge SSSI (E_8 and E_9) and Pitsea Marshes SSSI (E_11, closest to the A13).

[407] In 2019, 43 vessels utilised Jetty 1, whilst 42 used Jetty 2, resulting in 85 vessels berthed for a period of 36 hours. No change to vessel movements has been assumed to occur between the 2019 and 2024 Without OMSSD Project scenarios.

Predicted 24-hour mean concentrations exceed the critical level at all habitats directly adjacent to Haven Quay, Roscommon Way, Canvey Way and Canvey Road (Receptors E_13 to E_20). Exceedances of the NH_3 critical level are predicted in 2019 at Langdon Ridge SSSI and Pitsea Marshes SSSI, owing to high background concentrations in the area.

12.135 Predicted annual mean NOx concentrations are below the critical level in 2024 without OMSSD project at all locations. Predicted concentrations of 24-hour mean NOx and annual mean NH_3 in 2024 are not materially different to those presented for 2019.

12.136 Predicted baseline nutrient nitrogen deposition fluxes exceed the critical load at the Thames Estuary and Marshes SPA and Ramsar (E_1 to E_5), Langdon Ridge SSSI (E_8 and E_9) and Pitsea Marshes SSSI (E_10 to E_12) in both assessment scenarios. In terms of acid nitrogen, predicted deposition fluxes exceed the critical load at South Thames Estuary and Marshes SSSI (E_21 to E_25) in both assessment years, but are below the relevant critical loads at all other sensitive locations.

Ecological Transect Receptors

12.137 Baseline concentrations of NOx and NH_3 at the transect receptors (see Figure 12.5) within the designated habitats in 2019 and 2024 (Without OMSSD Project) are set out in Table 12.19 and Table 12.20 of Appendix 12.6, respectively.

12.138 Annual mean NOx concentrations exceed the objective at all transect locations within Vange and Fobbing Marshes SSSI in 2019 (out to 99 m from the road). In 2024, without the OMSSD project, an exceedance of the objective is predicted at the SSSI boundary only. For 24-hour mean NOx concentrations, exceedances are predicted in 2019 up to 59 m from the carriageway of the A13, but no exceedances are predicted at any assessed location in 2024 without the OMSSD project. This is due to expected improvements in vehicles emissions through the introduction of cleaner vehicles, including zero emission electric vehicles.

12.139 At Canvey Wick SSSI, exceedances of the annual mean NOx objective are predicted up to 15 m from the eastern edge of Roscommon Way (transect 2) and up to 4 m from the carriageway on the western side of Roscommon Way (transect 3). No exceedances of the objective are predicted in Canvey Wick SSSI in 2024 without the OMSSD project. For 24-hour mean NOx concentrations, exceedances are predicted up to 10 m from the edge of the eastern carriageway (transect 2) and up to 4 m from the edge of the western carriageway of Roscommon Way (transect 3).

12.140 At Canvey Village Marshes LWS, exceedances of the annual mean NOx objective are predicted up to 30 m from the edge of Haven Road. No exceedances of the objective are predicted in Canvey Village Marshes LWS in 2024 without the OMSSD project. For 24-hour mean NOx concentrations, exceedances are predicted across the whole transect in 2019, but only at 1 m from the road edge in 2024 without the OMSSD project.

12.141 At Brick House Farm Marsh LWS, exceedances of the annual mean NOx objective are predicted up to 50 m from the edge of Haven Road. No exceedances of the objective are predicted in Brick House Farm Marsh LWS in 2024 without the OMSSD project. For 24-hour

mean NOx concentrations, exceedances are across the whole transect in 2019, but are predicted to be below the critical level in 2024 without the OMSSD project at all locations.

12.142 At West Canvey Marshes LWS, exceedances of the annual mean NOx objective are predicted up to 100 m from the edge of Roscommon Way in 2019, and up to 40 m from the road edge in 2024 with the OMSSD project. For 24-hour mean NOx concentrations, exceedances are predicted up to 50 m from the edge of the road, and up to 20 m from the edge of Roscommon Way in 2024 without the OMSSD project.

12.143 Concentrations of NH_3 at the Vange and Fobbing Marshes SSSI are predicted to exceed the critical level of 3 $\mu g/m^3$ in 2019 and 2024 Without the OMSSD project, owing to existing high baselines in the area. Predicted concentrations of NH_3 at Canvey Wick SSSI are predicted to be below the critical level in both 2019 and 2024, without the OMSSD project. At the Local Wildlife Sites, an exceedance of the critical level in 2024 without the OMSSD project is predicted at West Canvey Marshes, 1 m from the edge of Roscommon Way; at all other locations, and in 2019, predicted concentrations are below the critical level.

12.144 As stated in Table 12.3, Vange and Fobbing Marshes SSSI and Canvey Wick SSSI are not sensitive to nutrient nitrogen or acid nitrogen deposition. Predicted deposition fluxes at Canvey Village Marshes LWS and Brick House Farm Marsh LWS are below the relevant critical loads at all transect locations, in both assessment years, as shown in Table 12.21 of Appendix 12.6. At West Canvey Marshes LWS, exceedances of the critical load are predicted up to 20 m from the edge of Roscommon Way in 2019, and up to 10 m from the edge of the road in 2024 without the OMSSD project.

Preliminary Consideration of Likely Impacts and Effects

Construction Phase Impact Assessment

12.145 The assessment of construction traffic and construction dust effects is based on the assumption that the construction works will all take place over a single 24-month period, however, in reality, the construction works may be phased over a longer period. In terms of the assessment, consideration of construction traffic emissions examines the peak construction traffic and would not be materially affected by phased construction. Similarly the assessment of construction dust impacts from site activities is primarily based on the scale and nature of activities and is not materially affected by the duration of construction works, therefore the assessment presented represents as realistic worst-case assessment.

Construction Traffic

12.146 Forecast peak construction traffic volumes are predicted to involve 160 HGV movements and 196 LDV movements per day; these volumes are considerably lower than the theoretical operational traffic generation (480 HGVs per day). All HGV movements associated with the

construction of the OMSSD project will route via Roscommon Way and the A130, along which there are few sensitive roadside receptors.

12.147 Emission rates calculated using Defra's EFT[408] and based on the projected construction and operational vehicle AADT flows, are provided in Table 12.10.

Table 12.10: NOx Emission Rates Associated with Construction and Operational Phases

Phase	AADT	% HDV	Total Emissions (g/km)
Construction	356	44.9	208.1 [a]
Operational	494	97.2	411.3 [b]

[a] Emissions calculated using 2023 emissions factors, the proposed start date for construction.

[b] Emissions calculated using 2024 emissions factors, the earliest year of operation of the OMSSD Facility.

12.148 The emissions for the operational traffic flows are nearly twice those calculated based on the construction traffic flows. On this basis, it is reasonable to conclude that the assessment of operational road traffic impacts in 2024 is a suitable proxy for determining the potential for effects during the construction phase, and it is not considered necessary to explicitly model these emissions or impacts. The operational air quality impacts set out in Appendix 12.7 are all demonstrated to be negligible and therefore the air quality impacts from construction traffic will also be negligible.

On-Site Exhaust Emissions

12.149 The IAQM guidance[409] states:

"Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur".

12.150 Whilst the exact siting and numbers of NRMM used on site is unknown, where possible, the distance between any areas of operation and sensitive receptors, such as residential properties on Haven Quay, will be maximised. Engine emission limits will be established in consultation with the local authority, as required by the Construction Environmental Management Plan, machinery will be switched off when not in use, and where appropriate, limits or restrictions on plant emissions will be set, which will be complied with by contractors. Given the transient nature of the construction period, it is judged that there is no risk of significant effects at existing receptors as a result of on-site machinery emissions.

[408] Defra (2021) Local Air Quality Management (LAQM) Support Website

[409] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1

Construction Dust and Particulate Matter Emissions

12.151 The construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Figure 12.1 and Appendix 12.4), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

12.152 There will be a requirement to demolish the existing structures on site, including concrete tank bases, steel tanks and switch rooms. Below ground, slops tanks, pumps and steel gantries will need to be demolished. This phase will take up to six months, and will involve crushing and screening equipment.

12.153 Based on the example definitions set out in Table 12.2 in Appendix 12.4 and taking a conservative approach, the dust emission class for demolition is considered to be *medium.*

Earthworks

12.154 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website[410], as set out in Table 12.11. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 12.11: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Mixed (Argillaceous [a] – Arenaceous [b])
European Soil Bureau Description	Quaternary Marine / Estuarine Clay / Silt
Soil Group	Medium (Silty) to Light (Silty) to Heavy
Soil Texture	Clayey Loam [c] to Silty Loam

[a] grain size < 0.06 mm.

[b] grain size 0.06 – 2.0 mm.

[c] a loam is composed mostly of sand and silt.

12.155 The terrestrial site covers some 14.93 hectares and most of this will be subject to earthworks, involving removal of 20,000 tonnes of contaminated soil, with a further 20,000 tonnes moved around the site as part of levelling work. Remediation and levelling of the site will take approximately six months, commencing in January 2023.

[410] British Geological Survey (2021) UK Soil Observatory Map Viewer

12.156 Activities will involve the formation of high bunds, excavation, haulage, tipping, stockpiling and landscaping. Dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil). All earthworks will involve a Material Management Plan, which will include a Mobile Treatment Licence, which will stipulate the installation of dust monitors. During the earthworks, it is anticipated that eight earth-moving vehicles will be active at any one time, including excavators.

12.157 Based on the example definitions set out in Table 12.2 in Appendix 12.4, the dust emission class for earthworks is considered to be *medium*.

Construction

12.158 The terrestrial construction phase will involve the installation of new product pipelines, made from welded steel, new operational infrastructure (such as switch rooms and Motor Control Centres), the largest of which will have cover approximately 110 m^2, new storage tanks, concrete bund walls and highways infrastructure, including road loading bays and HGV parking. At Jetties 1 and 2, new Marine Loading Arms and pipeline infrastructure will be installed. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete. The construction will take place over a two-year period, and is likely to commence in January 2023.

12.159 Based on the example definitions set out in Table 12.2 in Appendix 12.4, the dust emission class for construction is considered to be *large*.

Trackout

12.160 It is expected that approximately 80 HGVs per day will exit the OMSSD project site during the peak period of the construction phase. These vehicles will travel north on Haven Road, before taking the Roscommon Way toward the A130. Wheel wash facilities are currently operational, whilst roads (both internal and external to the OMSSD project site) are cleaned frequently to minimise the risk of trackout.

12.161 Based on the example definitions set out in Table 12.2 in Appendix 12.4, the dust emission class for trackout is considered to be *large*.

12.162 Table 12.12 summarises the dust emission magnitude for the proposed development.

Table 12.12: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	Medium
Earthworks	Medium
Construction	Large
Trackout	Large

Sensitivity of the Area

12.163 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM_{10} concentrations.

12.164 The IAQM guidance[411] explains that residential properties are 'high' sensitivity receptors to dust soiling, while playing fields and farmland are 'low' sensitivity receptors (Table 12.3 in Appendix 12.4).

12.165 Residential properties are also classified as being of 'high' sensitivity to human health effects, while locations where human exposure is transient, such as public footpaths and playing fields, are classified as being of 'low' sensitivity.

12.166 There are up to 15 residential properties within 20 m of the site, these being located at Haven Quays adjacent to the western boundary of the OMSSD Facility (see Figure 12.9).

12.167 Table 12.12 shows that the dust emission magnitude for trackout is large and Table 12.4 in Appendix 12.4 thus explains that there is a risk of material being tracked 500 m from the site exit. The nearest receptors adjacent to roads used by construction vehicles are on Ormsby Road and Coker Road which are over 80 m from Roscommon Way (see Figure 12.10). The IAQM guidance[412] explains that distances are measured from the sides of the roads used by construction traffic, and that for trackout, it is only necessary to consider impacts up to 50 m from the edge of the road, thus there will be no receptors affected by trackout movements.

Sensitivity of the Area to Effects from Dust Soiling

12.168 Using the information set out in paragraphs 12.164, 12.166 and Figure 12.9 alongside the matrix set out in Table 12.4 in Appendix 12.4, the area surrounding the onsite works is of 'high' sensitivity to dust soiling.

12.169 Using the information set out in paragraph 12.167 and Figure 12.10 alongside the same matrix, the area is of 'low' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

12.170 The matrix in Table 12.5 in Appendix 12.4 requires information on the baseline annual mean PM_{10} concentration in the area. Receptors HH_1 and HH_6 in Figure 12.3 are both within 20 m of the OMSSD site boundary. The maximum predicted 2019 baseline PM_{10} concentration at either of these receptors is 14.1 $\mu g/m^3$ (Table 12.16 in Appendix 12.6), and this value has been used.

[411] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1

[412] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1

12.171 Using the information set out in paragraphs 12.165, 12.166 and Figure 12.9 alongside the matrix in Table 12.5 in Appendix 12.4, the area surrounding the onsite works is of 'low' sensitivity to human health effects.

12.172 Using the information set out in paragraph 12.167 and Figure 12.10 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is also of 'low' sensitivity.

Sensitivity of the Area to any Ecological Effects

12.173 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. Holehaven Creek SSSI is approximately 100 m from the OMSSD site boundary, whilst Canvey Wick SSSI is beyond 500 m from the site exit.

12.174 Canvey Village Marsh LWS and Brick House Farm Marshes LWS are both within 50 m of construction activities; these sites are designated for coastal and floodplain grazing marsh and reedbed, owing to their importance for maintaining invertebrate populations. These designations are not considered to be sensitive to dust, and thus unlikely to be affected by dust deposition. As such, ecological impacts will not be considered further.

Summary of the Area Sensitivity

12.175 Table 12.13 summarises the sensitivity of the area around the proposed construction works.

Table 12.13: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High Sensitivity	Low Sensitivity
Human Health	Low Sensitivity	Low Sensitivity

Risk and Significance

12.176 The dust emission magnitudes in Table 12.12 have been combined with the sensitivities of the area in Table 12.13 using the matrix in Table 12.7 in Appendix 12.4, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 12.14. These risk categories have been used to determine the appropriate level of mitigation as set out in Mitigation section of this chapter (Step 3 of the assessment procedure).

Table 12.14: Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health
Demolition	Medium Risk	Low Risk
Earthworks	Medium Risk	Low Risk
Construction	High Risk	Low Risk
Trackout	Low Risk	Low Risk

12.177 The IAQM guidance[413] does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'.

Operational Phase Impact Assessment

Vessel Movements

12.178 The OMSSD project will lead to additional vessels visiting the Oikos Facility and operating in the Thames Estuary. A summary of the vessel movements associated with the OMSSD project are provided in Table 12.15.

Table 12.15: Vessel Movements in 2019 and 2024

Assessment Scenario	Number of Vessels	Two-way Vessel Movements
2019 Baseline	85	170
2024 Without OMSSD Facility	85	170
OMSSD Facility Alone	198	396
2024 With OMSSD Facility	283	566

12.179 It is predicted that the OMSSD project will generate a maximum of 396 (equivalent to 198 arrivals and 198 departures) additional vessel movements. In combination with the existing vessel movements this results in 566 vessel movements associated with the Oikos Facility in the future (2024). Defra guidance on Local Air Quality Management[414] advises local authorities that air quality may need to be assessed where there are facilities with more than 5,000 vessel movements per year, within 250 m of sensitive receptors or 15,000 movements per year where receptors are more than 1 km away. The OMSSD project once fully operational will lead to vessel movements totalling only 4-12% of these screening thresholds.

12.180 The Oikos Facility is located close to the eastern end of the Thames Estuary, where the estuary is 3 km wide and once sailing, the vessels will be around 1 km or more away from the shoreline and any sensitive receptors. At berth, the vessels on Jetty 1 are 150-200 m from the nearest residential receptors at Haven Quays, whilst vessels berthed at Jetty 2 are approximately 500 m from residential receptors at Haven Quays.

12.181 The Defra screening thresholds relate to all vessel activity in ports, including both the arrival and departure of vessels, but also the emissions of the vessels while at berth. The arrival and departure of each vessel to the Oikos Facility lasts in the order of minutes, to manoeuvre and berth the vessel. Once berthed, the vessel remains at the facility for around 36 hours. The vast majority of the emissions from each vessel visiting the Oikos Facility therefore occur at berth, while auxiliary generators are used to power the vessels.

[413] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1

[414] Defra (2018) Review & Assessment: Technical Guidance LAQM.TG16 February 2018 Version.

12.182 Emissions from berthed vessels, which predominate the emissions and potential air quality impacts related to vessel activity have been quantitatively assessed using a conservative approach to address uncertainty.

12.183 Due to the transience of vessel movements, the distance from sensitive receptors when sailing, and the significant headroom to Defra's air quality screening thresholds for port infrastructure, the movement of vessels to and from the Oikos Facility represent a minor emissions source with no potential for significant air quality impacts. As such, the emissions from the movement of vessels to and from the OMSSD project have not been quantitatively assessed, as they would not materially affect the assessment.

Road Traffic and Vessels at Berth

Human Health

Nitrogen Dioxide

12.184 Predicted annual mean concentrations of NO_2 at existing sensitive receptors are presented in Table 12.22 of Appendix 12.7 for both the "Without OMSSD Project" and "With OMSSD Project" scenarios. The concentrations presented include the impacts of local road traffic sources and the emissions associated with the auxiliary generators on berthed vessels. Concentrations have been calculated following the methodology set out in the Assessment Methodology section of this chapter and Appendix 12.5. The annual mean NO_2 concentrations are below the objective at all receptors both with and without the OMSSD project. The percentage changes in concentrations, relative to the air quality objective (when rounded) are predicted to range from zero to 5%. The maximum changes in concentration occur at receptors HH_3 to HH_6, which are the locations closest to the jetties (predominantly related to the contribution of additional vessel activity at the jetties), whilst the maximum predicted total concentrations occur at receptors located within the North Stifford AQMA. Using the matrix in Table 12.4, these impacts are all described as *negligible.*

12.185 The operation of the auxiliary generators on vessels berthed at the jetties may also contribute to 1-hour mean NO_2 concentrations at nearby receptors (principally those at Haven Quays). The 1-hour mean NO_2 objective allows for a threshold concentration (200 $\mu g/m^3$) to be exceeded 18 times per year (as described in Table 12.1). The highest 1-hour mean NO_2 concentrations occur when a vessel is berthed at both Jetty 1 and Jetty 2, since the combined contributions of emissions from two vessels is greater than just one. Currently, there are occasions when two vessels are berthed concurrently at the Oikos Facility. Since the OMSSD project does not introduce an additional jetty or changes to the existing jetties to allow more than two vessels to berth at once, the maximum 1-hour mean NO_2 concentrations are unaffected by the OMSSD project. Modelling has been undertaken to predict the maximum 1-hour mean NO_2 concentration at any of the human health receptors. The maximum predicted concentration with or without the OMSSD project is 76.9 $\mu g/m^3$, which includes a contribution from baseline emissions sources as well as the berthed vessels. As this is below the 1-hour mean NO_2 threshold concentration of 200 $\mu g/m^3$, it can be concluded that there is no risk of an exceedance of the 1-hour mean NO_2 objective with or without the OMSSD project.

PM_{10} and $PM_{2.5}$

12.186 Predicted annual mean concentrations of PM_{10} and $PM_{2.5}$ at existing sensitive receptors are presented in Table 12.23 of Appendix 12.7 for both the "Without OMSSD Project" and "With OMSSD Project" scenarios. The concentrations presented include the impacts of local road traffic sources and the emissions associated the auxiliary generators on berthed vessels. Concentrations have been calculated following the methodology set out in the Assessment Methodology section of this chapter and Appendix 12.5.

12.187 The annual mean PM_{10} and $PM_{2.5}$ concentrations are well below the relevant criteria at all receptors, with or without the OMSSD project. Percentage changes, relative to the objectives (when rounded) range between zero and 1%, and the impacts are described as *negligible* at all assessed locations. The highest concentrations occur within the North Stifford AQMA, whilst the greatest change in concentrations is predicted at receptors located adjacent to the roundabout joining Canvey Way, London Road and the A13.

12.188 The operation of the auxiliary generators on vessels berthed at the jetties will contribute to 24-hour mean PM_{10} concentrations. The 24-hour mean PM_{10} objective allows for a threshold daily concentration (50 $\mu g/m^3$) to be exceeded 35 times (as described in Table 12.1). As with the 1-hour mean NO_2 concentrations, the highest 24-hour PM_{10} concentrations will occur when a vessel is berthed at both Jetty 1 and Jetty 2, since the combined contributions of emissions from two vessels is greater than just one. Since the OMSSD project does not introduce an additional jetty or changes to the existing jetties to allow more than two vessels to berth at once, the maximum 24-hour mean PM_{10} concentrations are unaffected by the OMSSD project. Modelling has been undertaken to predict the maximum 24-hour mean PM_{10} concentration at any of the human health receptors. The maximum predicted concentration with or without the OMSSD project is 38.1 $\mu g/m^3$, which includes a contribution from baseline emissions sources as well as the berthed vessels. As this is below the 24-hour mean PM_{10} threshold concentration of 50 $\mu g/m^3$, it can be concluded that there is no risk of an exceedance of the 24-hour mean PM_{10} objective with or without the OMSSD project.

Rayleigh AQMA

12.189 The OMSSD project may route some vehicles to Southend Airport, via a route which uses the A127 which passes through the Rayleigh AQMA. The vehicles are not likely to deviate from the A127 and pass through any other parts of the Rayleigh AQMA.

12.190 The Rayleigh AQMA is declared for exceedances of the annual mean NO_2 objective. Although the Rayleigh AQMA boundary includes a small section of the A127, there are no locations which represent relevant exposure to the annual mean objective adjacent to the A127 in the Raleigh AQMA. As such, no receptors within the Rayleigh AQMA have been included in the modelling.

12.191 Monitoring data for locations in the AQMA closest to the A127 have measured concentrations well below the annual mean NO_2 objective in recent years (see Table 12.6). Although still declared as an AQMA, the absence of relevant exposure to the annual mean objective and low measured concentrations indicate that emissions from vehicles along the A127 will not adversely affect the AQMA.

12.192 The number of vehicles generated by the OMSSD project using the A127 has not been precisely estimated, but will be fewer than those using the A13. Traffic data used in the assessment shows that 256 vehicles per day will travel to/from the Oikos Facility along the A13 and 218 vehicles per day will travel to and from the Facility via routes north of South Benfleet on the A130, only a portion of which will end up using the A127. The air quality impacts at sensitive receptors all along the A13 have been demonstrated to be negligible, and as such the impacts at Rayleigh AQMA are also expected to be negligible.

12.193 Beyond the Rayleigh AQMA, there is also the Southend-on-Sea AQMA (see Figure 12.6) which covers a section of the A127. Any OMSSD project vehicles travelling beyond the Rayleigh AQMA will likely be delivering fuel to Southend Airport; however, fuel is delivered to a fuel farm north of the runway via Nestuda Way, which does not require vehicles to travel through the Southend AQMA. The OMSSD project will therefore not affect the Southend AQMA.

Sulphur Dioxide

12.194 Defra's measured concentrations (see Table 12.7) demonstrate that no exceedances of any SO_2 objectives were recorded at any location near to a port in 2019. There are also no AQMAs in the South East of England that have been declared for exceedances of the SO_2 objectives, a result of tightening legislation on the control of fuel quality, emissions standards and the development of SECAs. The PLA is a SECA and as such, all vessels attending Oikos must adhere to the rules of the SECA and operate using low sulphur fuels.

12.195 On this basis, in combination with the distance between the jetties and sensitive receptors at Haven Quays (~150 m), the dominant prevailing wind direction from the South West, and the sulphur emissions controls imposed by the SECA, it is judged that the potential impact on sulphur dioxide concentrations is not significant.

Specific Ecological Receptors

Nitrogen Oxides

12.196 Predicted annual mean and 24-hour mean concentrations of NOx at the specific ecological receptors are presented in Table 12.24 and Table 12.25 in Appendix 12.7, respectively, for both the "Without OMSSD Project" and "With OMSSD Project" scenarios. The concentrations presented include the impacts of local road traffic sources and the assumed worst-case emissions associated with the auxiliary generators on berthed vessels. Concentrations have been calculated following the methodology set out in the Assessment Methodology section of this chapter and Appendix 12.5. The tables also present the PCs, for comparison with the Environment Agency's screening criteria described in paragraph 12.28.

12.197 Predicted annual mean NOx concentrations are predicted to exceed 1% of the critical level at most assessed locations; total concentrations will, however remain below the critical level.

12.198 Contours of the area where changes in the annual mean nitrogen oxide concentrations, as a result of auxiliary generator emissions from additional vessels berthed at the jetties, are greater than 1% of the critical level screening criterion are shown in Figure 12.11.

12.199 Predicted changes in 24-hour mean NOx concentrations are less than 10% of the critical level; the potential for significant effects can, therefore, be discounted irrespective of the total concentrations at all assessed locations (see paragraph 12.28).

Ammonia

12.200 Predicted annual mean concentrations of NH_3 at the specific ecological receptors are presented in Table 12.26 in Appendix 12.7 for both the "Without OMSSD Project" and "With OMSSD Project" scenarios. The concentrations presented include the impacts of local road traffic sources; there are no emissions of NH_3 associated with the auxiliary generators on berthed vessels. Concentrations have been calculated following the methodology set out in the Assessment Methodology section of this chapter and Appendix 12.5. The tables also present the PCs, for comparison with the Environment Agency's screening criteria described in paragraph 12.28.

12.201 The percentage changes in annual mean NH_3 concentrations, relative to the critical level, at all receptors are less than 1% of the critical level; as such, the potential for significant effects can be discounted irrespective of total concentrations (see paragraph 12.28).

Nutrient Nitrogen Deposition

12.202 Predicted annual mean nutrient nitrogen deposition fluxes at the specific ecological receptors are presented in Table 12.27 in Appendix 12.7 for both the "Without OMSSD Project" and "With OMSSD Project" scenarios; only receptors susceptible to effects have been presented (see Table 12.3). The deposition fluxes presented include the impacts of local road traffic sources and the emissions associated with the auxiliary generators on berthed vessels. Deposition fluxes have been calculated following the methodology set out in the Assessment Methodology section of this chapter and Appendix 12.5. The tables also present the PCs, for comparison with the Environment Agency's screening criteria described in paragraph 12.28.

12.203 The percentage changes in annual mean nutrient nitrogen deposition fluxes, relative to the critical loads are less than 1% at most receptors; as such, the potential for significant effects can be discounted irrespective of total deposition fluxes (see paragraph 12.28). At receptors where the contribution to annual mean deposition fluxes as a result of the additional road traffic emissions and emissions associated with the auxiliary generators exceed 1% of the critical level (Canvey Village Marsh LWS and Holehaven Creek SSSI, Receptors E_15 to E_20), total fluxes will remain below the relevant critical load.

12.204 Contours of the area where changes in the annual mean nutrient nitrogen deposition fluxes, as a result of auxiliary generator emissions from additional vessels berthed at the jetties, are greater than 1% of the critical load screening criterion are shown in Figure 12.12. The figure presents the 1% contour for a critical load of 10 kgN/ha/yr, applicable to Thames Estuary and Marshes SPA and Ramsar, and 20 kgN/ha/yr, applicable to Holehaven Creek SSSI,

South Thames Estuary and Marshes SSSI and Benfleet and Southend Marshes SPA and Ramsar. At locations outside of the contours, the PC is less than 1%, and thus the effect will be not significant. As discussed in paragraph 12.203, within the contours, total deposition fluxes will remain below the relevant critical load, and thus the effects are 'not significant'.

Acid Nitrogen Deposition

12.205 Predicted annual mean acid nitrogen deposition fluxes at the specific ecological receptors are presented in Table 12.28 in Appendix 12.7 for both the "Without OMSSD Project" and "With OMSSD Project" scenarios; only receptors susceptible to effects have been presented (see Table 12.3). The deposition fluxes presented include the impacts of local road traffic sources and the emissions associated with the auxiliary generators on berthed vessels. Deposition fluxes have been calculated following the methodology set out in the Assessment Methodology section of this chapter and Appendix 12.5. The tables also present the PCs, for comparison with the Environment Agency's screening criteria described in paragraph 12.28.

12.206 The percentage changes in annual mean acid nitrogen deposition fluxes, relative to the critical loads are less than 1% at all receptors; as such, the potential for significant effects can be discounted irrespective of total deposition fluxes (see paragraph 12.28).

12.207 Contours of the area where changes in the annual mean acid nitrogen deposition fluxes, as a result of auxiliary generator emissions from additional vessels berthed at the jetties, are greater than 1% of the critical load screening criterion are shown in Figure 12.13. The figure presents the 1% contour for a critical load of 0.733 keq/ha/yr, applicable to South Thames Estuary and Marshes SSSI, and 1.389 keq/ha/yr, applicable to Thames Estuary and Marshes SPA and Ramsar. There are no designated habitats sensitive to acid deposition within the 1% contour; thus the effects are 'not significant'.

Ecological Transect Receptors

Nitrogen Oxides

12.208 Predicted annual mean and 24-hour mean concentrations of NOx at the roadside ecological transect receptors are presented in Table 12.29 and Table 12.30 in Appendix 12.7, respectively, for both the "Without OMSSD Project" and "With OMSSD Project" scenarios. The concentrations presented include the impacts of local road traffic sources and the emissions associated with the auxiliary generators on berthed vessels. Concentrations have been calculated following the methodology set out in the Assessment Methodology section of this chapter and Appendix 12.5. The tables also present the PCs, for comparison with the Environment Agency's screening criteria described in paragraph 12.28.

12.209 The percentage changes in annual mean NOx concentrations, relative to the critical level, at the Vange and Fobbing Marshes SSSI are less than 1% of the critical level; as such, the potential for significant effects can be discounted irrespective of total concentrations (see paragraph 12.28).

12.210 At Canvey Wick SSSI, the contribution to annual mean NOx concentrations as a result of the additional road traffic and auxiliary generator emissions exceeds 1% of the critical level. Total concentrations in 2024, with the OMSSD project, exceed the critical level up to 4 m from the edge of the eastern carriageway.

12.211 At Canvey Village Marshes LWS, predicted annual mean NOx PCs exceed 1% of the critical level at all assessed locations (up to 200 m from the edge of Haven Road). Total concentrations, including the contribution from the OMSSD project, are predicted to exceed the critical level up to 4 m from the edge of Haven Road; beyond 4 m, concentrations will be below the critical level.

12.212 At Brick House Farm Marsh LWS, predicted annual mean NOx PCs exceed 1% of the critical level at all assessed locations (up to 200 m from the edge of Haven Road). Total concentrations, including the contribution from the OMSSD project, are predicted to exceed the critical level up to 10 m from the edge of Haven Road; beyond 10 m, concentrations will be below the critical level.

12.213 At West Canvey Marshes LWS, predicted annual mean NOx PCs exceed 1% of the critical level at the majority of assessed locations. Total concentrations, including the contribution from the OMSSD project, are predicted to exceed the critical level up to 40 m from the edge of Roscommon Way; however, it should be noted that exceedances of the critical level are predicted in 2024 even without the OMSSD Facility.

12.214 The percentage changes in 24-hour mean NOx concentrations, relative to the critical level, at the Vange and Fobbings Marshes SSSI, on the western side of Roscommon Way at Canvey Wick SSSI (transect 3), Canvey Village Marshes LWS and West Canvey Marshes LWS are less than 10% of the critical level; as such, the potential for significant effects can be discounted irrespective of total concentrations (see paragraph 12.28).

12.215 On the eastern side of Roscommon Way at Canvey Wick SSSI, the contribution to 24-hour mean NOx concentrations as a result of the additional road traffic and auxiliary generator emissions marginally exceeds 10% of the critical level at 1 m from the kerbside. Total concentrations in 2024, with the OMSSD project, exceed the critical level up to 2 m from the edge of the eastern carriageway.

12.216 At Brick House Farm Marsh LWS, process contributions from the OMSSD Facility marginally exceed 10% of the critical level at 1 m from the kerbside of Haven Road; total concentrations also exceed the critical level up to 10 m from the road edge.

Ammonia

12.217 Predicted annual mean concentrations of NH_3 at the roadside ecological transect receptors are presented in Table 12.31 in Appendix 12.7 for both the “Without OMSSD Project” and “With OMSSD Project” scenarios. The concentrations presented include the impacts of local road traffic sources; there are no emissions of NH_3 associated with the auxiliary generators on berthed vessels. Concentrations have been calculated following the methodology set out in the Assessment Methodology section of this chapter and Appendix 12.5. The tables also

present the PCs, for comparison with the Environment Agency's screening criteria described in paragraph 12.28.

12.218 The percentage changes in annual mean NH_3 concentrations, relative to the critical level, at the Vange and Fobbing Marshes SSSI are less than 1% of the critical level; as such, the potential for significant effects can be discounted irrespective of total concentrations (see paragraph 12.28).

12.219 At Canvey Wick SSSI, the contribution to annual mean NH_3 concentrations as a result of the additional road traffic emissions exceeds 1% of the critical level at most modelled locations. However, total concentrations in 2024, with the OMSSD project, will remain below the critical level at all locations within the SSSI.

12.220 At the Canvey Village Marshes and Brick House Farm Marsh Local Wildlife Sites, the contributions from the OMSSD Facility exceed 1% of the critical level up to 20 m from the road edge; however, at all locations, total concentrations will remain below the critical level.

12.221 At West Canvey Marshes LWS, annual mean NH_3 PCs exceed 1% of the critical level up to 10 m from the edge of Roscommon Way, however, total concentrations are predicted to exceed the critical level with the operation of the OMSSD project only at locations within 2 m of the kerbside.

Nutrient Nitrogen Deposition

12.222 Predicted annual mean nutrient nitrogen deposition fluxes at the roadside ecological transect receptors are presented in Table 12.32 in Appendix 12.7 for both the "Without OMSSD Project" and "With OMSSD Project" scenarios. The fluxes presented include the impacts of local road traffic sources and emissions associated with the auxiliary generators on berthed vessels. Deposition fluxes have been calculated following the methodology set out in the Assessment Methodology section of this chapter and Appendix 12.5. The tables also present the PCs, for comparison with the Environment Agency's screening criteria described in paragraph 12.28.

12.223 The percentage changes in annual mean nutrient nitrogen deposition fluxes, relative to the critical load, at the Canvey Village Marshes LWS exceed 1% of the critical load up to 100 m from the edge of Haven Road; however, total deposition fluxes will remain below the critical load at all locations with the OMSSD Facility operational.

12.224 The percentage changes in annual mean nutrient nitrogen deposition fluxes, relative to the critical load, at Brick House Farm Marsh LWS exceed 1% of the critical load up to 50 m from the edge of Haven Road. Total deposition fluxes exceed the critical load at 1 m from the edge of the road.

12.225 At West Canvey Marshes LWS, the contribution to nutrient nitrogen deposition fluxes as a result of the operation of the OMSSD Facility exceeds 1% of the critical load up to 10 m from the edge of Roscommon Way. Exceedances of the critical load, including the contribution from the Facility, are predicted up to 10 m from the edge of the road, however it is worth

noting that the Facility is not causing the exceedances, and these are also predicted to occur in 2024 without the OMSSD Facility.

Significance of Operational Air Quality Effects

Human Health

12.226 For the OMSSD project, the operational air quality effects without mitigation are judged to be 'not significant' at all assessed human health receptor locations. This professional judgement is made in accordance with the methodology set out in Appendix 12.1.

12.227 More specifically, the judgement that air quality effects will be 'not significant' without mitigation takes account of the assessment that impacts on NO_2, PM_{10} and $PM_{2.5}$ concentrations at existing receptors will all be negligible, and total concentrations will remain below the relevant objectives set to protect human health.

Designated Ecological Habitats

12.228 The potential for significant air quality effects as a result of the OMSSD project can be discounted at the following designated habitats:

- Holehaven Creek SSSI;
- Thames Estuary and Marshes SPA and Ramsar;
- Langdon Ridge SSSI;
- Pitsea Marsh SSSI;
- South Thames Estuary and Marshes SSSI;
- Vange and Fobbings SSSI;
- Benfleet and Southend Marshes SPA and Ramsar;
- Northwick Farm and Sea Wall LWS.

12.229 The potential for significant effects cannot be instantly discounted at the following habitats, since the total "With OMSSD project" concentrations or fluxes exceed the critical level or load, respectively:

- Canvey Wick SSSI;
- West Canvey Marshes LWS;
- Brick House Farm Marsh LWS; and
- Canvey Village Marsh LWS.

12.230 At Canvey Wick SSSI, since the areas where exceedances of the NOx critical level screening criteria and critical levels are constrained to within 4 m of the roadside, it is judged that there will be no adverse effect to the condition of habitats present and the exceedances are not perceived to compromise the integrity of the wider designated sites which will continue to support invertebrates at the SSSI.

12.231 Since the areas within Brick House Farm Marsh and Canvey Village Marsh LWSs where exceedances of the screening criteria and critical levels/loads are constrained to within 10 m of the roadside, it is judged that there will be no adverse effect to the condition of habitats present and the exceedances are not perceived to compromise the integrity of the wider designated sites which will continue to support invertebrates at the LWSs.

12.232 Exceedances of the screening criteria in conjunction with exceedances of the annual mean critical level for NOx are predicted to occur up to 40 m from the edge of the road. Nonetheless, at locations closest to the road there are deep verges (extending up to 15 m in some locations) and hedgerows; these are unlikely to be sensitive areas of the West Canvey Marshes LWS. In addition, the West Canvey Marshes LWS covers approximately 256 hectares, and this area up to 40 m from Roscommon Way and Canvey Way represents only a very small proportion of the LWS. On this basis, the exceedances are considered not significant, since the integrity of the wider designated site is unlikely to be compromised, and a large proportion of the affected area is unlikely to accommodate the most sensitive features owing to their proximity to the road.

12.233 It should also be noted that the assessment is based on a number of conservative assumptions, including, but not limited to:

- The five new road loading bays will be operated at theoretical maximum capacity, potentially leading to an overestimation of the contribution to road-NOx concentrations;
- The assumption that the facility is fully operational in 2024. In reality, a phased commissioning is expected; since air quality is predicted to improve in the future through the adoption of low-NOx vehicle technologies, concentrations will be lower in 2025 and beyond; and
- The road-NOx outputs from the model have been verified against a monitoring site located in the centre of Canvey Island, at a roundabout where traffic may experience congestion. In contrast, Roscommon Way and Canvey Road are open, free-flowing roads, and thus applying a verification factor derived from an inner-town location will likely lead to an overprediction of impacts (i.e. the results of the assessment are worst-case).

12.234 Further consideration is provided in the Residual Effects section, and by an ecologist in Chapter 7 Terrestrial Ecology of this PEIR.

Climate Change

12.235 Air quality is predicted to improve in the future, owing to lower emissions from road vehicles and heating and cooling plant as progressively lower emission technologies become available. The assessment, therefore, focuses on the near-term (year of opening), but the outlook for the longer term is one of improvement, both in terms of local and regional air quality, but also in terms of emissions associated with the OMSSD Facility itself. Climate change is a long-term effect, and significant changes in climate are not expected by 2024 (the year of opening assumed by the assessment). Climate change will, therefore, not affect air quality model predictions set out in this chapter.

12.236 Further consideration of GHG emissions, and their effect on climate change as a result of the OMSSD Facility is provided in Chapter 13 of this PEIR.

Mitigation Measures

Construction

12.237 Measures to mitigate dust emissions will be required during the construction phase of the development in order to minimise effects upon nearby sensitive receptors.

12.238 The site has been identified as a *Medium* Risk site during demolition and earthworks, *High* Risk during construction, and *Low* Risk for trackout. Comprehensive guidance has been published by IAQM[415] that describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on monitoring during demolition and construction[416]. This reflects best practice experience and has been used, together with the professional experience of the consultants who have undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix 12.8.

12.239 Where practicable, the mitigation measures will be written into a Dust Management Plan (DMP). The DMP may be integrated into a Code of Construction Practice or the Construction Environmental Management Plan.

12.240 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Operational Phase

12.241 The assessment has demonstrated that the overall air quality effect of the OMSSD project will be 'not significant', with respect to human health, since the proposals will not lead to non-negligible impacts at any assessed receptor location. It is, therefore, not considered appropriate to propose further mitigation to address human health receptors.

12.242 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards written into UK law.

[415] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1

[416] IAQM (2018) Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites v1.1

Limitations

12.243 The study area for the assessment of air quality effects has been determined by the extent of the traffic data provided. As such, the potential for significant effects at locations within the Rayleigh AQMA has been considered qualitatively, taking into account impacts adjacent to roads carrying higher OMSSD flows and experiencing greater process contributions from the auxiliary generators on berthed vessels.

12.244 There is currently no comprehensive log of the auxiliary generators installed on vessels that berth at the Oikos Facility; as such, a series of assumptions, outlined in paragraph 12.65, have been made in order to predict emissions from the generators. It is, therefore, possible that emission rates, flow rates, temperatures and flue heights may, in reality, differ from those that have been applied within the modelling, but every attempt has been made to use conservative assumptions to provide a realistic worst-case assessment.

12.245 The assessment does not currently take into account any cumulative or in-combination effects from specific developments.

12.246 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions. Historic versions of Defra's EFT tended to over-state emissions reductions into the future. However, analyses of the most recent versions of Defra's EFT carried out by AQC[417,418] suggest that, on balance, these versions are unlikely to over-state the rate at which NOx emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence suggests that NOx concentrations are most likely to decline more quickly in the future, on average, than predicted by the current EFT, especially against a base year of 2016 or later. Using EFT v10.1 for future-year forecasts in this report thus provides a robust assessment, given that the model has been verified against measurements made in 2019.

Preliminary Conclusions on Residual Effects

Construction

12.247 The IAQM guidance[419] is clear that, with appropriate mitigation in place, the residual effects will normally be 'not significant'. The mitigation measures set out above and in Appendix 12.8 are based on the IAQM guidance. With these measures in place and effectively implemented the residual effects are judged to be 'not significant'.

[417] AQC (2020) Performance of Defra's Emission Factor Toolkit 2013-2019

[418] AQC (2020) Comparison of EFT v10 with EFT v9

[419] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1

12.248 The IAQM guidance does, however, recognise that, even with a rigorous Dust Management Plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. During these events, short-term dust annoyance may occur, however, the scale of this would not normally be considered sufficient to change the conclusion that overall the effects will be 'not significant'.

12.249 In terms of construction traffic effects, paragraph 12.148 states that impacts during the construction phase will be no greater than those predicted during the operational phase. The assessment has demonstrated that impacts at all human health receptors will be negligible during operation in 2024, and thus there will be no significant effect at any human health receptor. As such, the residual construction traffic effects can also be considered to be insignificant.

Operational

12.250 The air quality assessment has considered the impacts of the proposed OMSSD Facility on local air quality in terms of:

- Emissions from road traffic generated by the project; and
- Emissions from auxiliary generators associated with additional vessels berthed at the jetties.

12.251 The assessment has demonstrated that pollutants concentrations will be below the objectives at all existing human health receptors in 2024, with or without the proposed OMSSD project, and that emissions associated with additional road tankers generated by the proposals and auxiliary generators on berthed ships will have a *negligible* impact on air quality conditions at all existing receptors within the study area.

12.252 The potential for significant effects at sensitive designated habitats can be discounted at most nearby sites, either because total concentrations will remain below the critical loads and levels, or because changes in concentrations are below published screening criteria[343].

12.253 Since the areas where exceedances of the NOx critical level screening criteria and critical levels at Canvey Wick SSSI are constrained to within 4 m of the roadside, it is judged that there will be no adverse effect to the condition of habitats present and the exceedances are not perceived to compromise the integrity of the wider designated sites which will continue to support invertebrates at the SSSI. The effects of the OMSSD project are, therefore, considered not significant at Canvey Wick SSSI.

12.254 With respect to Brick House Farm Marsh and Canvey Village Marsh LWSs, where exceedances of the screening criteria and critical levels and loads are constrained to within 10 m of the roadside, it is judged that there will be no adverse effect to the condition of habitats present and the exceedances are not perceived to compromise the integrity of the wider designated sites which will continue to support invertebrates at the LWSs. The effects of the OMSSD project are, therefore, considered not significant at Brick House Farm Marsh and Canvey Village Marsh LWSs.

12.255 At West Canvey Marshes LWS, exceedances of the annual mean NOx critical level are predicted up to 40 m from the edge of Roscommon Way, whilst exceedances of the nutrient nitrogen critical load are expected up to 10 m from the edge of the road. It should, however, be noted that the PCs are typically less than 5% of the critical level, and the exceedances will occur both with, and without the OMSSD Facility, thus its operation is not directly leading to the exceedances.