CHAPTER 7 AIR QUALITY

7. AIR QUALITY

7.1. This chapter presents the findings of an assessment of local air quality impacts associated with the Proposed Development.

7.2. The potential impacts of the Proposed Development on local air quality during both the construction and operational phases have been assessed. For both phases, the type, source and significance of potential impacts are identified and the measures that should be employed to minimise these impacts are described.

7.3. The potential air quality impacts arising from the Proposed Development are as follows:

- Construction impacts including construction dust and emissions from on-site construction plant;
- Traffic-related air quality impacts from vehicles accessing the Proposed Development during construction and operation;
- Emissions to air from the proposed plant; and
- Emissions of dust generated during the operational phase.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Scope of the Assessment

7.4. The scope of the assessment has been determined in the following way:

- Review of air quality data for the area surrounding the Site, including data from the Defra Air Quality Information Resource (UK-AIR);
- Desk study to confirm the location of nearby areas that may be sensitive to changes in local air quality; and
- Review and modelling of emissions data which have been used as input to the ADMS Roads Extra dispersion modelling assessment.

7.5. Guidance is provided by the IAQM and Environmental Protection UK (EPUK) on indicative criteria for requiring a detailed traffic-related air quality assessment in their Land-use Planning Development Control: Planning for Air Quality (January 2017) (Ref: 7.1). For sites that are not located within an air quality management area (AQMA), these are 500 LDVs AADT (annual average daily traffic) and/or 100 HDVs AADT. Within an AQMA, these are reduced to 100 LDV and/or 25 HDV. The Site is not located within an AQMA. During construction, traffic accessing the Site will be very variable but very unlikely to exceed the IAQM criteria for requiring a detailed assessment. During operation, the site activities are expected to generate up to 37 HDV deliveries per day (74 movements). Staff travel is anticipated to

comprise 340 trips per day by all modes. Therefore, a detailed assessment of traffic-related air quality impacts for the operation of the Proposed Development is not required.

7.6. Impacts associated with the construction of the Proposed Development have been assessed using the Institute of Air Quality Management (IAQM) construction dust methodology.

7.7. Operational impacts associated with the proposed plant have been assessed using a dispersion model to predict the impacts utilising five years of meteorological data from Durham Tees Valley Airport (2018 to 2022). This has considered the impact on human health and sensitive habitat sites.

7.8. Emissions to air from the proposed plant will be governed by the Environment Agency Inorganic Chemicals Sector (EPR 4.03) (Ref: 7.2) which provides emission limits for the following pollutants that will be emitted from the plant:

- Nitrogen oxides (NO_x as NO_2);
- Carbon monoxide; and
- Total dust (as PM_{10} and $PM_{2.5}$).

7.9. The assessment for the Proposed Development comprises a review of emission parameters for the development and dispersion modelling to predict concentrations of pollutants at sensitive human and habitat receptor locations.

7.10. Predicted concentrations are compared with relevant air quality objectives and Environmental Assessment Levels for the protection of health (Appendix 7.2 Volume 2 of the ES) and critical levels/ loads for the protection of sensitive ecosystems and vegetation (Appendix 7.3 Volume 2 of the ES).

7.11. Dust may be generated during the operational phase arising from the handling and storage of feedstock and products. A qualitative assessment of dust during the operational phase has been included.

CONSTRUCTION IMPACTS

Overview

7.12. To assess the potential impacts associated with dust and PM_{10} releases during the construction phase and to determine any necessary mitigation measures, an assessment based on the latest guidance from the IAQM has been undertaken

7.13. This approach divides construction activities into the following dust emission sources:

- Demolition;
- Earthworks;

- Construction; and
- Track out.

7.14. The risk of dust effects (negligible, low, medium or high) is determined by the scale (magnitude) and nature of the works and the proximity of sensitive human and ecological receptors.

7.15. The IAQM guidance recommends that an assessment be undertaken where there are sensitive human receptors:

- Within 350 m of the site boundary; or
- Within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

7.16. An assessment should also be carried out where there are dust-sensitive ecological receptors:

- Within 50 m of the site boundary;
- Or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

7.17. The significance of the dust effects is based on professional judgement, taking into account the sensitivity of receptors and existing air quality.

Dust Emission Magnitude

7.18. The magnitude of the dust emissions for each source is classified as Small, Medium or Large depending on the scale of the proposed works. Table 7.1 summarises the IAQM criteria that may be used to determine the magnitude of the dust emission. These criteria are used in combination with site specific information and professional judgement.

Table 7.1 Dust Emission Magnitude Criteria

Source	Large	Medium	Small
Demolition	• Total building volume >50,000m^3 • Potentially dusty material (e.g., concrete) • Onsite crushing and screening • Demolition activities >20m above ground level.	• Total building volume 20,000 - 50,000m^3 • Potentially dusty material • Demolition activities 10 - 20m above ground level.	• Total building volume <20,000m^3 • Construction material with low potential for dust release • Demolition activities <10m above ground level • Demolition during wetter months

Earthworks	• Total site area >10,000m^2 • Potentially dusty soil type (e.g., clay • >10 heavy earth moving vehicles active at any one time • Formation of bunds >8m in height • Total material moved >100,000 tonnes	• Total site area 2,500 - 10,000m^2 • Moderately dusty soil type (e.g., silt) • 5 - 10 heavy earth moving vehicles active at any one time • Formation of bunds 4 - 8m in height • Total material moved 20,000 - 100,000 tonnes	• Total site area <2,500m^2 • Soil type with large grain size (e.g., sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <4m in height • Total material moved <20,000 tonnes • Earthworks during wetter months
Construction	• Total building volume >100,000m^3 • On site, concrete batching • Sandblasting	• Total building volume 25,000 - 100,000m^3 • Potentially dusty construction material (e.g., concrete) • On site, concrete batching	• Total building volume <25,000m^3 • Material with low potential for dust release (e.g., metal cladding or timber)
Track out	• >50 HGV movements in any one day (a) • Potentially dusty surface material (e.g., high clay content) • Unpaved road length >100m	• 10 - 50 HGV movements in any one day (a) • Moderately dusty surface material (e.g., silt) • Unpaved road length 50 - 100m	• <10 HGV movements in any one day (a) • Surface material with low potential for dust release • Unpaved road length <50m

(a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes.

Receptor Sensitivity

7.19. Factors defining the sensitivity of a receptor are presented in Table 7.2.

7.20. The sensitivity of a receptor will also depend on a number of additional factors including any history of dust generating activities in the area, likely cumulative dust impacts from nearby construction sites, any pre-existing screening such as trees or buildings and the likely duration of the impacts. In addition, the influence of the prevailing wind direction and local topography may be of relevance when determining the sensitivity of a receptor.

Table 7.2 Factors Defining the Sensitivity of a Receptor

Sensitivity	Human Health	Dust Soiling	Ecological

High	• Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM_{10} (a) • Examples include residential dwellings, hospitals, schools and residential care homes.	• Regular exposure • High level of amenity expected. • Appearance, aesthetics or value of the property would be affected by dust soiling. • Examples include residential dwellings, museums, medium and long-term car parks and car showrooms.	• Nationally or Internationally designated site with dust sensitive features (b) • Locations with vascular species (c)
Medium	• Locations where workers are exposed over a time period relevant to the air quality objectives for PM_{10} (a) • Examples include office and shop workers (d)	• Short-term exposure • Moderate level of amenity expected • Possible diminished appearance or aesthetics of property due to dust soiling • Examples include parks and places of work	• Nationally designated site with dust sensitive features (b) • Nationally designated site with a particularly important plant species where dust sensitivity is unknown
Low	• Transient human exposure • Examples include public footpaths, playing fields, parks and shopping streets	• Transient exposure • Enjoyment of amenity not expected. • Appearance and aesthetics of property unaffected • Examples include playing fields, farmland, footpaths, short-term car parks and roads	• Locally designated site with dust sensitive features (b)

(a) In the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day.

(b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).

(c) Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

(d) Does not include worker exposure to PM_{10} as protection is covered by Health and Safety at Work legislation. Except commercially sensitive horticulture.

Area Sensitivity

7.21. The sensitivity of the area to dust soiling and health impacts is dependent on the number of receptors within each sensitivity class and their distance from the source. In addition, human health impacts are dependent on the existing PM_{10} concentrations in the area. Tables 7.3 and 7.4 summarise the criteria

for determining the overall sensitivity of the area to dust soiling and health impacts, respectively. Table 7.5 summarised the criteria for determining the sensitivity of an area to ecological impacts.

Table 7.3: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the source (a)			
		<20m	<50m	<100m	<350m
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.

Table 7.4: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Annual Mean PM_{10} (µg/m^3)	Number of Receptors	Distance from the source (a)			
			<20m	<50m	<100m	<350m
High	> 32	> 100	High	High	High	Medium
		10 - 100	High	High	Medium	Low
		1 - 10	High	Medium	Low	Low
	28 - 32	> 100	High	High	Medium	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low
	24 - 28	> 100	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low
	< 24	> 100	Medium	Low	Low	Low
		10 - 100	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Medium	>32	> 10	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low
	28-32	> 10	Medium	Low	Low	Low
		1 - 10	Low	Low	Low	Low
	<28	-	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low

(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.

Table 7.5: Sensitivity of the Area to Ecological Impacts		
Sensitivity of Area	Distance from the Source	
	<20m	<50m
High	High	Medium
Medium	Medium	Low
Low	Low	Low

7.22. For each dust emission source (demolition, construction, earthworks and track out), the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts.

Risk of Dust Impacts

7.23. The risk of dust impacts prior to mitigation for each emission source is determined based on the dust emission magnitude and the area sensitivity. The assessment matrices for these are presented in Tables 7.6, 7.7 and 7.8 for demolition, construction and earthworks, and track out, respectively.

Table 7.6: Risk of Dust Impacts – Demolition			
Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 7.7: Risk of Dust Impacts – Earthworks and Construction			
Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 7.8: Risk of Dust Impacts - Track out			
Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

OPERATIONAL IMPACTS

Dispersion Modelling Parameters

7.24. Detailed air quality modelling using the ADMS Roads-Extra v.5.01 dispersion model has been undertaken to predict the impacts associated with emissions from the Proposed Development.

7.25. For the purposes of this assessment, it is assumed that the plant will comply with the upper range of emissions as provided in the process guidance note and reproduced in Table 7.9 below.

Table 7.9 Emission Benchmarks		
Released substance	Benchmark value (mg/Nm^3)	Basis for benchmark
Particulate Matter	5 - 20	-
Nitrogen Oxides	50-200	200mg/Nm^3 for wet scrubbing, 50mg/Nm^3 for Selective Catalytic Reduction (SCR)
Carbon Monoxide	100	

7.26. Emissions from the steam generators is assumed to comply with the Medium Combustion Plant Directive (MCPD).

7.27. For the purposes of the modelling assessment, the plant is assumed to be operating at full load, continually throughout the year, ensuring that a worst-case assessment of impacts is presented. Stack emission parameters (flow rate, temperature etc.) have been provided by the technology supplier. A summary of the input parameters for the emission points used in the dispersion mode are summarised in Appendix 7.1 Volume 2 of the ES.

Meteorological Data

7.28. Dispersion modelling has been undertaken using five years (2018 to 2022) of hourly sequential meteorological data in order to take account of inter-annual variability and reduce the effect of any atypical conditions. Data from a meteorological station at Tees Valley Airport (approximately 21 km southwest of the Site) have been used for the assessment. This is the most representative data currently available for the area.

Building Downwash

7.29. The presence of buildings close to emission sources can significantly affect the dispersion of pollutants by leading to a phenomenon called building downwash. This occurs when a building distorts the wind flow, creating zones of increased turbulence. Increased turbulence causes the plume to come to ground earlier than otherwise would be the case and results in higher ground level concentrations closer to the stack.

7.30. Downwash effects are only significant where building heights are greater than 30 to 40% of the emission release height. The downwash structures also need to be sufficiently close for their influence to be significant. All potential downwash structures have been included in the model as detailed in Appendix 7.1 Volume 2 of the ES.

Topography

7.31. The presence of elevated terrain can significantly affect the dispersion of pollutants by increasing turbulence and reducing the distance between the plume centre line and the ground level. A terrain data set has been included in the model to ensure that the impact of terrain features on the dispersion of emissions from the facility is taken into account.

Nitric Oxide to NO_2 Conversion

7.32. Oxides of nitrogen (NOx) emitted to atmosphere as a result of combustion will consist largely of nitric oxide (NO), a relatively innocuous substance. Once released into the atmosphere, NO is oxidised to NO_2. The proportion of NO converted to NO_2 depends on a number of factors including wind speed, distance from the source, solar irradiation and the availability of oxidants, such as ozone (O_3).

7.33. A conversion ratio of 70% NOx:NO_2 has been assumed for comparison of predicted concentrations with the long-term objectives for NO_2. A conversion ratio of 35% has been utilised for the assessment of short-term impacts, as recommended by the Environment Agency's risk assessment guidance.

Sensitive Human Receptors

7.34. LAQM.TG(22) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations 'where members of the public are regularly present' should be considered. At such locations, members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.

7.35. For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standard (i.e., 15-minute mean or 1-hour mean) may be relevant. In a school, or adjacent to a private dwelling, however; where exposure may be for longer periods, comparison with long-term (such as 24-hour mean or annual mean) standards may be most appropriate. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

7.36. The locations of the discrete sensitive receptors selected for the assessment are presented in Table 7.10 and Figure 7.1.

Table 7.10: Human Health Receptors				
ID	Receptor	Type	Easting	Northing
R1	87 Wilton Avenue	Residential	457821	523544
R2	Dormanstown Primary Academy	School	458310	523522
R3	20 Sorrel Gardens	Residential	458955	522912
R4	21 Kings Close	Residential	457152	519943
R5	14/15 Corncroft Mews	Residential	455361	520920
R6	19 Jones Road	Residential	453791	520845
R7	Ivy Court, Cowpen Bewley	Residential	448285	524754
R8	Flodden Way	Residential	447319	524965
R9	Da Haviland Way	Residential	452310	528813

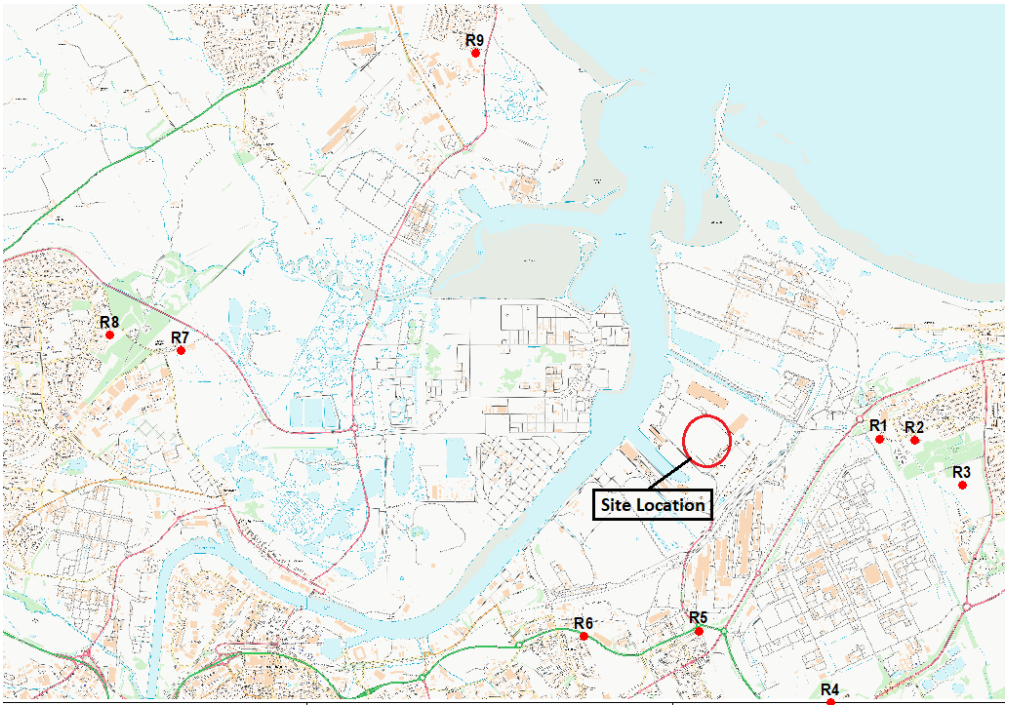

Figure 7.1: Sensitive Human Health Receptor Locations

7.37. Pollutant concentrations have been predicted at both discrete receptor locations and over a 5 km by 5 km Cartesian grid of 50 m grid resolution centred on the Site.

Sensitive Habitat Receptors

7.38. The Environment Agency's risk assessment guidance (Ref: 7.3) states that the impact of emissions to air on vegetation and ecosystems should be assessed for the following habitat sites within 10 km of the source:

- Special Areas of Conservation (SACs) and candidate SACs (cSACs) designated under the EC Habitats Directive;
- Special Protection Areas (SPAs) and potential SPAs designated under the EC Birds Directive; and
- Ramsar Sites designated under the Convention on Wetlands of International Importance.

7.39. Within 2 km of the source:

- Sites of Special Scientific Interest (SSSI) established by the 1981 Wildlife and Countryside Act;
- National Nature Reserves (NNR);
- Local Nature Reserves (LNR);
- local wildlife sites (Sites of Interest for Nature Conservation, SINC and Sites of Local Interest for Nature Conservation, SLINC); and
- Ancient Woodland (AW).

7.40. Habitat receptor designations and locations relevant to the assessment are presented in Table 7.11 and the location of each is presented in Figure 7.2.

Table 7.11: Sensitive Habitat Receptors		
Receptor	Primary Habitat	Approx. Location (Relative to the Site)
Teesmouth & Cleveland Coast Ramsar Site	Sand Dunes and Intertidal Mud Flats	3km to north 1.8km northwest 2.3km southwest
Teesmouth & Cleveland Coast SPA	Sand Dunes, Intertidal Mud Flats and River	550m north 750m west 600m southwest
Teesmouth & Cleveland Coast SSSI	River and Intertidal Mud Flats	550m north 750m west 600m southwest

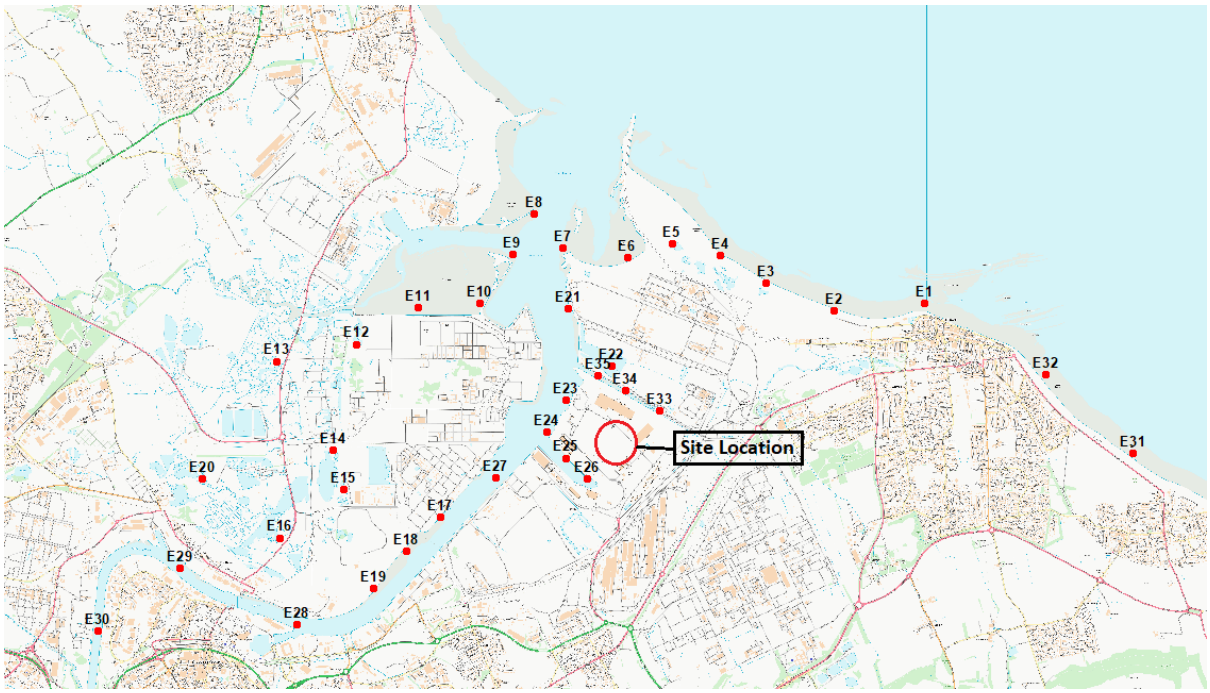

Figure 7.2: Sensitive Habitat Receptor Locations

7.41. Where appropriate, the modelled ground level pollutant concentrations are used to predict deposition rates, using typical deposition velocities. A summary of typical NO_2, dry deposition velocities is presented in Table 7.12.

Table 7.12: Dry Deposition Velocities (m/s)		
Pollutant	Grassland	Woodland
Nitrogen Dioxide (NO_2)	0.0015	0.0030

7.42. Predicted ground level concentrations and acidification / deposition rates are compared with relevant critical levels and critical loads for the protection of sensitive ecosystems and vegetation (Appendix 7.3 Volume 2 of the ES).

SIGNIFICANCE CRITERIA

IAQM Planning Guidance

7.43. The significance of the predicted impacts is determined in accordance with the EPUK & IAQM planning guidance, in combination with professional judgement. The guidance recommends that the impact at individual receptors is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the air quality assessment level (AQAL) and examining this change in the context of the new total concentration and its relationship with the assessment criterion as summarised in Table 7.13.

7.44. The EPUK & IAQM guidance notes that the criteria in Table 7.13 should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for.

Table 7.13: Impact Descriptors for Individual Receptors.				
Long Term Average Concentration at Receptor in Assessment Year	Change in concentration relative to AQAL (a)			
	1%	2%-5%	5%-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight adverse	Moderate adverse

76-94% of AQAL	Negligible	Slight adverse	Moderate adverse	Moderate adverse
95-102% of AQAL	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
103-109% of AQAL	Moderate adverse	Moderate adverse	Substantial adverse	Substantial adverse
110% or more of AQAL	Moderate adverse	Substantial adverse	Substantial adverse	Substantial adverse

(a) A change in concentration of less than 0.5% of the AQAL is considered insignificant, however changes between 0.5% and 1% are rounded up to 1%.

7.45. The EPUK & IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

7.46. The EPUK & IAQM guidance also advises that short-term impacts of 10% or less of the AQAL are described as negligible, regardless of existing air quality. Where the short-term process concentrations are 11-20% of the AQAL the severity of the impact is described as slight adverse. Impacts of 21-50% and over 50% are described as moderate and substantial adverse, respectively.

Habitat Sites

7.47. The Environment Agency has developed criteria for assessing at SPAs, SACs, Ramsar sites and SSSIs, compared with the relevant EAL and background air quality. The criteria are designed to ensure that there is a substantial safety margin to protect the environment.

Stage 1

7.48. A process concentration (PC) is considered potentially insignificant if:

- The long term PC < 1% of the long-term EAL.
- The short term PC < 10% of the short-term EAL.

Stage 2

7.49. If the Stage 1 screening criteria are not met, the PC should be considered in combination with relevant ambient background pollutant concentrations. The air quality standards are likely to be met if:

- The long term PC + background concentration < 70% of the EAL.

7.50. For local nature sites (SINCs, SLINC's, NNRs, LNRs and ancient woodland), a process contribution (PC) is considered not significant if:

- The long term PC < 100% of the long-term EAL.
- The short term PC < 100% of the short-term EAL.

7.51. The IAQM has issued guidance on the assessment of air quality impacts on designated nature conservation sites (Ref 7.4). The IAQM guidance suggests that LWS should be treated in the same manner as SSSIs and European sites.

LEGISLATION, PLANNING POLICY AND GUIDANCE

The European Directive on Ambient Air and Cleaner Air for Europe

7.52. European Directive 2008/50/EC of the European Parliament and of the Council of 21st May 2008, sets legally binding Europe-wide limit values for the protection of public health and sensitive habitats. The Directive streamlines the European Union's air quality legislation by replacing four of the five existing Air Quality Directives within a single, integrated instrument.

7.53. The pollutants included are sulphur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter of less than 10 micrometres (μm) in aerodynamic diameter (PM_{10}), particulate matter of less than 2.5 μm in aerodynamic diameter lead ($PM_{2.5}$), lead (Pb), carbon monoxide (CO), benzene (C_6H_6), ozone (O_3), polycyclic aromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni) and mercury (Hg).

Air Quality Strategy for England, Scotland, Wales and Northern Ireland

7.54. The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007 (Ref: 7.5), pursuant to the requirements of Part IV of the Environment Act 1995. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

7.55. The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems.

7.56. The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g., children, the elderly and the unwell) might experience adverse health effects.

7.57. The air quality objectives are medium-term policy based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e., a limited number of permitted exceedances of the standard over a given period.

7.58. For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of nitrogen dioxide (NO_2), the short-term standard is for a 1-hour averaging period, whereas for fine particulates (PM_{10}) it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g., temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

Air Quality (England) Regulations

7.59. Many of the objectives in the AQS were made statutory in England with the Air Quality (England) Regulations 2000 (Ref: 7.6) and the Air Quality (England) (Amendment) Regulations 2002 (the Regulations) (Ref 7.7) for the purpose of Local Air Quality Management (LAQM).

7.60. The Air Quality Standards Regulations 2010 (Ref 7.8) adopted into UK law the limit values required by EU Directive 2008/50/EC and came into force on the 10th of June 207. The Air Quality Standards (Amendment) Regulations 2016 (Ref 7.9) amend the Air Quality Standards Regulations 2010 to implement the changes made by Directive (EU) 2015/1480 and came into force on the 31st of December 2016. These regulations prescribe the 'relevant period' (referred to in Part I2V of the Environment Act 1995) that local authorities must consider in their review of the future quality of air within their area. The regulations also set out the air quality objectives to be achieved by the end of the 'relevant period'.

7.61. The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (Ref. 7.10) implements targets for $PM_{2.5}$ into UK law.

7.62. Ozone is not included in the Regulations as, due to its trans-boundary nature, mitigation measures must be implemented at a national level rather than at a local authority level.

Environment Act 2021

7.63. The Environment Act 2021 (Ref. 7.11) establishes a legally binding duty on the government to bring forward new air quality targets by 31 October 2022 for $PM_{2.5}$. These are now formally agreed under the Environmental Targets Regulations 2023.

7.64. Schedule 11 of the Environment Act 2021 also strengthens the Local Air Quality Management (LAQM) framework which was introduced by the Environment Act 1995. Schedule 11 requires the LAQM framework to be reviewed and where appropriate modified within 12 months of the Environment Act coming into force and every 5 years following the initial review. Schedule 11 also places a duty on the local authority to have regard to the LAQM framework when exercising a function which could affect air quality (i.e., determining a planning application with air quality implications).

Local Air Quality Management (LAQM)

7.65. Part IV of the Environment Act 1995 also requires local authorities to periodically review and assess the quality of air within their administrative area. The Reviews have to consider the present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future.

7.66. Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part an Air Quality Management Area (AQMA).

7.67. For each AQMA, the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

7.68. The Department of Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their Review and Assessment work (Ref: 7.12). This guidance, referred to in this chapter as LAQM.TG(22), has been used where appropriate in the assessment.

National Planning Policy Framework

7.69. The National Planning Policy Framework (NPPF) (Ref 7.13) sets out the Government's planning policies for England and how these are expected to be applied. At the heart of the NPPF is a presumption in favour of sustainable development. It requires Local Plans to be consistent with the principles and policies set out in the NPPF with the objective of contributing to the achievement of sustainable development.

7.70. The NPPF states that the planning system has three overarching objectives in achieving sustainable development including a requirement to 'to protect and enhance our natural, built and historic

environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'

7.71. Under Section 15: Conserving and Enhancing the Natural Environment, the NPPF (paragraph 174) requires 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 and water quality'

7.72. In dealing specifically with air quality the NPPF (paragraph 186) states that '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'.

7.73. Paragraph 188 states that 'the focus of planning policies and decisions should be on whether Proposed Development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively.'

EPUK & IAQM Land Use Planning and Development Control

7.74. Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) published the Land Use Planning and Development Control Air Quality guidance in January 2017 (Ref: 7.1) to provide guidance on the assessment of air quality in relation to planning proposals and ensure that air quality is adequately considered within the planning control process.

7.75. The main focus of the guidance is to ensure all developments apply good practice principles to ensure emissions and exposure are kept to a minimum. It also sets out criteria for identifying when a more detailed assessment of operational impacts is required, guidance on undertaking detailed assessments

and criteria for assigning the significance of any identified impacts. This guidance has been used within this assessment.

Redcar and Cleveland Borough Council Review and Assessment of Air Quality

7.76. The Site is located within the administrative area of Redcar & Cleveland Borough Council (RCBC).

7.77. RCBC carry out frequent review and assessments of air quality within their areas and produce Annual Status Reports in accordance with the requirements of Defra.

7.78. RCBC have not currently declared any areas as Air Quality Management Areas (AQMAs). Therefore, the Site is not located within or close to an AQMA.

BASELINE CONDITIONS

Local Monitoring

Nitrogen Dioxide

7.79. RCBC carried out automatic ambient air quality monitoring of NO_2 at one site in 2022. This is a suburban monitoring site located approximately 2.3km to the east of the Site. Ratified monitoring data from this monitoring station are presented in Table 7.14 below.

Table 7.14: Summary of NO_2 Concentrations measured at Automatic Monitors

Monitoring Site	Statistic	Year				
		2017	2018	2019	2020	2021
Redcar Dormanstown	Annual Mean	12	10	9	9	11
	No of exceedance of hourly mean limit of 200µg/m^3	0	0	0	0	0

Source: RCBC Annual Status Report

7.80. The results of the automatic monitoring show that the NO_2 concentrations have comfortably met the relevant objective levels for annual and hourly mean NO_2 concentrations at a suburban location in the vicinity of the Site over the 5 year period considered.

7.81. RCBC also measures NO_2 using a network of diffusion tubes at 16 locations within the borough. A summary of the annual mean NO_2 concentrations measured at the nearest diffusion tube locations is provided in Table 7.15 below.

Table 7.15: Annual Mean NO_2 Concentrations (µg/m^3)						
Monitoring Site	Type	2017	2018	2019	2020	2021
R17/R18/R19	Suburban	14.8	17.5	15.2	13.2	11.5
R41	Roadside	-	20.2	19.4	17.3	17.2
R52	Suburban	-	-	-	16.3	15.7
R59	Roadside	-	-	-	-	13.9
R51	Suburban	-	-	-	11.7	12.1
R27	Roadside	25.5	29.8	24.8	21.0	23.1
R26	Roadside	19.8	24.7	19.5	17.7	19.6
R57	Roadside	-	-	-	9.6	10.6

Source: RCBC Annual Status Report 2022

7.82. Measured concentrations over the 5 year period easily meet the AQS objective level for annual mean NO_2 concentrations at both suburban and roadside monitoring sites.

Particulate Matter (PM_{10} and $PM_{2.5}$)

7.83. RCBC carried out automatic ambient air quality monitoring of PM_{10} and $PM_{2.5}$ at one site in 2022 (Redcar Dormanstown). Ratified monitoring data from this monitoring station are presented in Tables 7.16 and 7.17 below.

Table 7.16: Summary of PM_{10} Concentrations measured at Automatic Monitors						
Monitoring Site	Statistic	Year				
		2017	2018	2019	2020	2021
Redcar Dormanstown	Annual Mean	12	12	14	13	14
	No of exceedance of 24 hour mean limit of 50µg/m^3	1	0	0	0	0

Source: RCBC Annual Status Report 2022

7.84. The results of the automatic monitoring show that the PM_{10} concentrations have comfortably met the relevant objective levels for annual and 24 hour PM_{10} concentrations at a suburban location in the vicinity of the Site over the 5 year period considered.

Table 7.17: Summary of $PM_{2.5}$ Concentrations measured at Automatic Monitors						
Monitoring Site	Statistic	Year				
		2017	2018	2019	2020	2021
Redcar Dormanstown	Annual Mean	8.4	8.4	9.8	9.1	7

Source: RCBC Annual Status Report 2022

7.85. The results of the automatic monitoring show that measured $PM_{2.5}$ concentrations have comfortably met the relevant objective level at a suburban location in the vicinity of the Site over the 5 year period considered.

Background Mapped Concentrations

Nitrogen Dioxide

7.86. Background concentrations of NO_2 have been obtained from the Defra UK Background Air Pollution Maps for use in the assessment. These 1km grid resolution maps are derived from a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites.

7.87. The latest background maps were issued in August 2020 and are based on 2018 monitoring data. For the nine 1km grid, the maximum mapped annual mean NO_2 concentration is 26.7µg/m^3, for the purposes of assessment this concentration has been used as the background concentration for the assessment.

Particulate Matter

7.88. The maximum mapped annual mean PM_{10} concentration within the nine 1km grid squares is 10.6µg/m^3 and for $PM_{2.5}$ is 7.2µg/m^3. These concentrations have been used as the background concentrations for the assessment.

Carbon Monoxide

7.89. The latest Defra background maps for CO are based on 2001 monitoring data. Factors are available to project concentrations to future years. The maximum mapped CO concentration within the nine 1km

grid squares is 126.7µg/m^3, this concentration has been used as the background concentration for the assessment.

SUMMARY OF BACKGROUND CONCENTRATIONS

7.90. A summary of background concentrations assumed for the assessment is provided in Table 7.18. Hourly mean and eight hour mean concentrations are assumed to be twice the annual mean concentrations in accordance with the Environment Agency's Risk Assessment Guidance.

Table 7.18: Summary of Background Concentrations (µg/m^3)

Pollutant	Annual Mean	Hourly / 8 Hour Mean
NO_2	26.7	53.4
PM_{10}	10.6	21.2
$PM_{2.5}$	7.2	14.4
CO	126.7	253.4

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

Construction Phase Effects

Area Sensitivity

7.91. The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the site boundary. The area surrounding the Site comprises industrial and warehousing use. There are no residential or other highly sensitive receptors within 350m of the Site. The area is therefore considered to be of low sensitivity to dust soiling. The background PM_{10} concentration in the vicinity of the Site is 10.6µg/m^3, therefore the sensitivity of the area to impacts on human health from particulates is also considered to be low.

7.92. Construction traffic will likely use the Tees Dock Road. As the Site is large in size, the sensitivity of the area to impacts arising from track out is considered within a distance of 500m from the site entrance. There are no sensitive receptors within 50m of the carriageway of this road up to 500m from the Site entrance, the sensitivity of the area to impacts on dust soiling and human health from trackout is therefore also considered to be low.

7.93. There are no sensitive ecological habitats within 50m of the Site or 50m of the route used by the construction traffic up to 500m from the Site entrance, therefore the impact on ecological habitats is not considered further.

7.94. The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

7.95. Wind roses for the years 2015 to 2019 from Tees Valley Airport are provided in Appendix 7.4 Volume 2 of the ES, which shows that the prevailing wind is from the south and southwest, therefore receptors to the north and northeast of the Site are the most likely to experience dust impacts from construction activities.

Dust Emission Magnitude

7.96. The proposals require the demolition / dismantling of a number of existing structures within the Site. These include two redundant switch rooms / substations, one small portal frame building and a redundant communication mask. In addition, there are two brick-built buildings which will be retained initially for use as offices during the construction phase, but will likely ultimately be demolished. To ensure a worst-case assessment, it is assumed these will be demolished. The total volume of buildings / structures to be demolished / dismantled is less than 20,000m^3, the dust emission magnitude is therefore considered to be 'small'.

7.97. Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling of the site and landscaping. The area of the Site is approximately 23.53 ha. During earthworks, there is likely to be more than 10 heavy duty vehicles working on site at any given time and materials are likely to be stored in bunds less than 4 m in height. Given the size of the Site, the magnitude of the potential dust emission for the earthworks phase is considered to be 'large'.

7.98. Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of the build. The completed development will have a volume greater than 100,000m^3. Therefore, based on the overall size of the Proposed Development the construction dust emission magnitude is considered to be 'large'.

7.99. Factors influencing the degree of track out and associated magnitude of effect include vehicle size, vehicle speed, vehicle numbers, geology and duration. Construction traffic will access the Site via Tees

Dock Lane. The number of HGV movements (leaving the Site) is not known therefore the dust emission magnitude due to track out is considered to be 'large'.

Dust Risk Affects

7.100. The dust emission magnitude and sensitivity of the area are combined to determine the risk of impacts. A summary of the risks is presented in Table 7.19. These are defined on the basis of no mitigation beyond that required by legislation. Where the risk is assessed as 'negligible' no additional mitigation is considered necessary.

Table 7.19: Summary of Risk of Dust Impacts Prior to Mitigation

Source	Impact Magnitude	Human Health Risk	Dust Soiling Risk
Demolition	Small	Negligible	Negligible
Earthworks	Large	Low	Low
Construction	Large	Low	Low
Trackout	Large	Low	Low

7.101. For earthworks, construction and track-out, the risk of dust impacts was assessed as low risk.

Operational Phase Effects - Human Health Impact

Introduction

7.102. Predicted process contributions (PC) for the five years of meteorological data are presented as the maximum concentration for each of the discrete receptors identified in Table 7.10.

7.103. The maximum PC is added to the estimated background concentration for the area to give the total predicted environmental concentration (PEC) for comparison with the relevant air quality objectives. The significance of the impacts has been assessed in accordance with the IAQM planning guidance.

Nitrogen Dioxide (NO_2)

7.104. The maximum predicted annual mean and 99.8th percentile of 1-hour mean ground level NO_2 concentrations are presented in Table 7.20.

Table 7.20: Predicted Concentrations of NO_2

Receptor	Annual Mean		99.8th Percentile of 1-hour Means (ug/m³)	
	PC (µg/m³)	PC (% AQO)	PC	PC (% AQO)
R1: 87 Wilton Avenue	0.32	0.79	4.6	2.3
R2: Dormanstown Primary Academy	0.25	0.62	3.9	1.9
R3: 20 Sorrel Gardens	0.20	0.49	3.7	1.8
R4: 21 Kings Close	0.19	0.47	7.1	3.6
R5: 14/15 Corncroft Mews	0.25	0.62	6.1	3.1
R6: 19 Jones Road	0.15	0.36	3.0	1.5
R7: Ivy Court, Cowpen Bewley	0.02	0.06	1.4	0.7
R8: Flodden Way	0.02	0.05	1.2	0.6
R9: Da Haviland Way	0.06	0.16	2.0	1.0
AQO (µg/m³)	40		200	
Background (µg/m³)	26.7		53.4	
Maximum PEC	27.02		60.5	
Maximum PEC as %age of AQO	67.5%		30.3%	

7.105. The maximum annual mean NO_2 PC occurs at Receptor R1, 87 Wilton Avenue which is located approximately 1.7km to the east of the Site. At this location the predicted annual mean PC is 0.32µg/m³ which is 0.79% of the Air Quality Assessment Level (AQAL) of 40µg/m³. At all of the nearby sensitive receptors, the impact is classed as negligible in accordance with the EPUK & IAQM significance criteria.

7.106. The maximum hourly mean PC (as the 99.8th percentile) occurs at Receptor R4, 21 Kings Close which is located approximately 3.5km to the southeast of the Site. At this location the predicted hourly mean PC is 7.1µg/m³ which is 3.6% of the AQAL. At all of the nearby sensitive receptors, the impact is classed as negligible in accordance with the guidance provided by the EPUK & IAQM.

7.107. Predicted annual mean and 99.8th percentile of hourly mean NO_2 PCs for the meteorological year in which the majority of the highest concentrations were predicted (2021), are presented as contour plots in Figures 7.3 and 7.4, respectively.

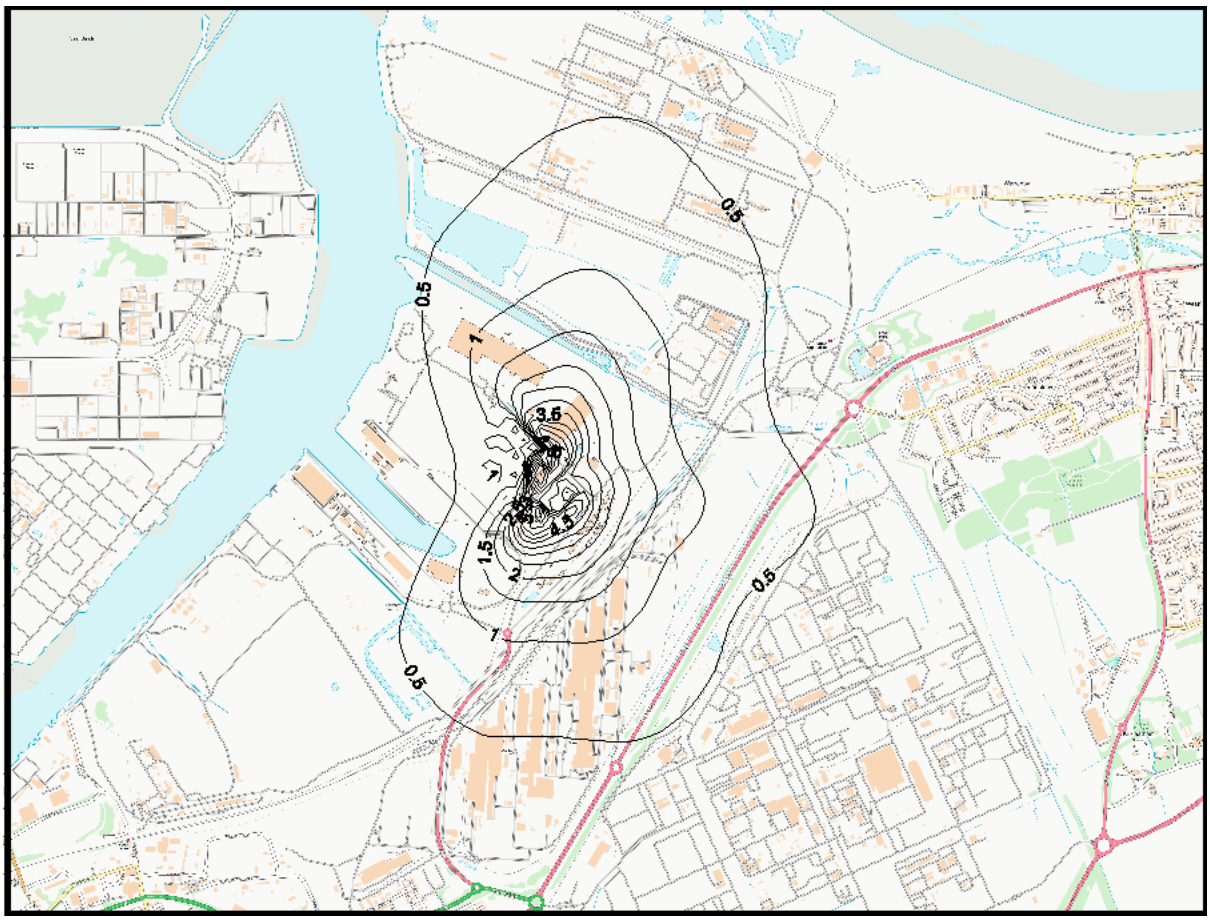

Figure 7.3: Predicted Annual Mean NO_2 Concentrations (µg/m^3)

Particulate Matter (as PM_{10})

7.108. Predicted annual mean and 90.4th percentile of 24-hour mean PM10 concentrations at the selected receptor locations are presented in Table 7.21. The predictions assume that 100% of the particulate matter emitted from the stack is PM10.

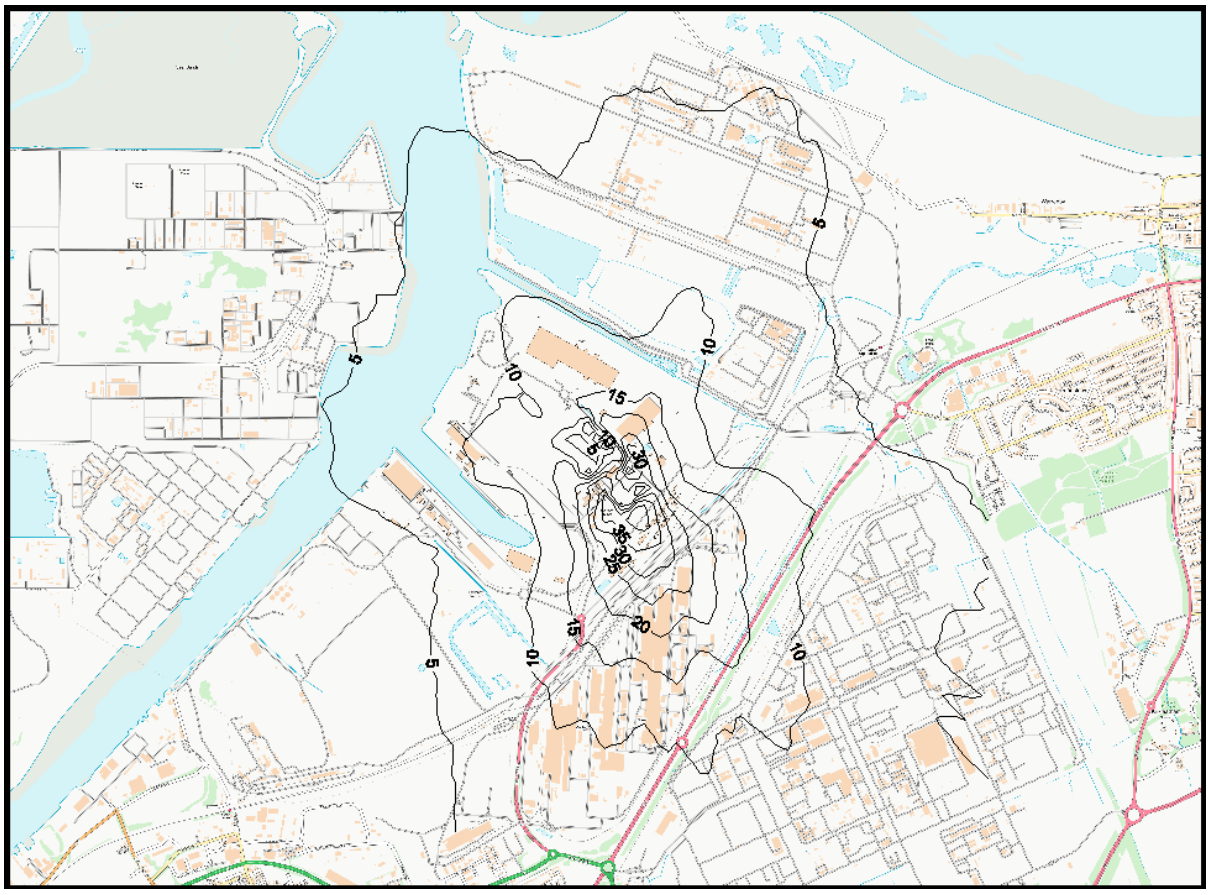

Figure 7.4: Predicted 99.8th Percentile of 1-Hour Mean NO_2 Concentrations (µg/m^3)

Table 7.21: Predicted PM_{10} Concentrations				
Receptor	Annual Mean		90.4th Percentile of 24-Hour Means	
	PC (µg/m^3)	PC (% of AQO)	PC (µg/m^3)	
R1: 87 Wilton Avenue	0.05	0.12	0.16	0.32
R2: Dormanstown Primary Academy	0.04	0.10	0.12	0.24
R3: 20 Sorrel Gardens	0.03	0.08	0.10	0.19
R4: 21 Kings Close	0.03	0.07	0.10	0.20
R5: 14/15 Corncroft Mews	0.04	0.10	0.14	0.27

R6: 19 Jones Road	0.02	0.06	0.08	0.16
R7: Ivy Court, Cowpen Bewley	0.00	0.01	0.02	0.03
R8: Flodden Way	0.00	0.01	0.01	0.03
R9: Da Haviland Way	0.01	0.03	0.04	0.08
AQO (µg/m^3)	40		50	
Background (µg/m^3)	10.6		10.6	
Maximum PEC	10.65		10.76	
Maximum PEC as %age of AQO	26.6%		26.9%	

7.109. The maximum annual mean PM_{10} PC occurs at Receptor R1, 87 Wilton Avenue which is located approximately 1.7km to the east of the Site. At this location the predicted annual mean PC is 0.05µg/m^3 which is 0.12% of the AQAL of 40µg/m^3. At all of the nearby sensitive receptors, the impact is classed as negligible in accordance with the EPUK & IAQM significance criteria.

7.110. The maximum 24 mean PC (as the 90.4th percentile) also occurs at Receptor R1. At this location the predicted 24 hour mean PC is 0.16µg/m^3 which is 0.32% of the AQAL. At all of the nearby sensitive receptors, the impact is classed as insignificant in accordance with the guidance provided by the EPUK & IAQM.

Particulate Matter (as $PM_{2.5}$)

7.111. Predicted annual mean $PM_{2.5}$ concentrations at the selected receptor locations are presented in Table 7.22. The predictions assume that 100% of the particulate matter emitted from the stacks is $PM_{2.5}$.

7.112. The maximum annual mean $PM_{2.5}$ PC occurs at Receptor R1, 87 Wilton Avenue which is located approximately 1.7km to the east of the Site. At this location the predicted annual mean PC is 0.05µg/m^3 which is 0.25% of the AQAL of 20µg/m^3. At all of the nearby sensitive receptors, the impact is classed as negligible in accordance with the EPUK & IAQM significance criteria.

7.113. A new annual mean concentration target level of 10 µg/m^3 has been established to be met across England by 31st December 2040.

7.114. On the worst-case assumption that background air quality has not improved by 2040 compared to the present day, the maximum predicted PC would be 0.5% and the maximum PEC would be 72.5% of the

proposed 2040 air quality target. In accordance with the IAQM planning guidance, the impact would be described as negligible.

Table 7.22: Predicted $PM_{2.5}$ Concentrations		
Receptor	Annual Mean	
	PC (µg/m^3)	PC (% of AQO)
R1: 87 Wilton Avenue	0.05	0.25
R2: Dormanstown Primary Academy	0.04	0.20
R3: 20 Sorrel Gardens	0.03	0.15
R4: 21 Kings Close	0.03	0.15
R5: 14/15 Corncroft Mews	0.04	0.19
R6: 19 Jones Road	0.02	0.12
R7: Ivy Court, Cowpen Bewley	0.00	0.02
R8: Flodden Way	0.00	0.02
R9: Da Haviland Way	0.01	0.05
Limit Value (µg/m^3)	20	
Background (µg/m^3)	7.2	
Maximum PEC	7.25	
Maximum PEC as %age of AQO	36.2%	

Carbon Monoxide (CO)

7.115. Maximum predicted 8-hour and 1-hour mean ground level CO concentrations are presented in Table 7.23.

Table 7.23: Predicted CO Concentrations				
Receptor	8-Hour Mean		1-Hour Mean	
	PC (µg/m³)	PC as % AQS	PC (µg/m³)	PC as % EAL
R1: 87 Wilton Avenue	6.0	0.06	13.6	0.05
R2: Dormanstown Primary Academy	5.2	0.05	11.8	0.04
R3: 20 Sorrel Gardens	4.5	0.04	8.8	0.03
R4: 21 Kings Close	7.2	0.07	14.9	0.05
R5: 14/15 Corncroft Mews	8.3	0.08	13.2	0.04
R6: 19 Jones Road	4.2	0.04	7.8	0.03
R7: Ivy Court, Cowpen Bewley	2.4	0.02	3.9	0.01
R8: Flodden Way	2.2	0.02	3.4	0.01
R9: Da Haviland Way	3.0	0.03	6.0	0.02
AQO / EAL (µg/m³)	10,000		30,000	
Background (µg/m³)	253.4		253.4	
Maximum PEC	261.7		268.3	
Maximum PEC as %age of AQO	2.62%		0.89%	

7.116. The maximum 8-hour mean CO PC occurs at Receptor R5, 14/15 Corncroft Mews which is located approximately 2.3km to the south of the Site. At this location the predicted 8-hour mean PC is 8.3µg/m³ which is 0.08% of the AQAL of 10000µg/m³. At all of the nearby sensitive receptors, the impact is classed as negligible in accordance with the EPUK & IAQM significance criteria.

7.117. The maximum hourly mean PC also occurs at Receptor R5. At this location the predicted hourly mean PC is 8.3µg/m³ which is 0.08% of the AQAL. At all of the nearby sensitive receptors, the impact is classed as insignificant in accordance with the guidance provided by the EPUK & IAQM.

Operational Phase Effects - Habitat Impact

Airborne Concentrations of NOx

7.118. Predicted maximum ground level concentrations of NOx at the identified habitat sites are compared with the relevant critical levels in Table 7.24.

Table 7.24: Predicted Maximum NOx Concentrations (µg/m^3)

Habitat Site	Annual Mean		24-Hour Mean	
	PC (µg/m^3)	PC (% of CL)	PC (µg/m^3)	PC (% of CL)
Teesmouth and Cleveland Coast Ramsar Site	0.5	1.7	4.4	5.8
Teesmouth and Cleveland Coast SPA	2.96	9.9	15.1	20.1
Teesmouth and Cleveland Coast SSSI	2.96	9.9	15.1	20.1
Critical Level (µg/m^3)	30		75	

7.119. In accordance with the EA screening criteria, where the predicted annual mean PC is greater than 1% of the Critical Level of 30µg/m^3, the background concentration has been added to predict the PEC. The PEC is then compared to the 70% of the Critical Level in accordance with the Stage 2 screening criteria.

7.120. With regards to the annual mean NOx concentrations, within the Teesmouth and Cleveland Coast Ramsar Site, the predicted PC as a result of the Proposed Development is predicted to exceed 1% of the Critical Level for annual mean NO_2 concentrations of 30µg/m^3 at a number of locations. The background concentrations were therefore added to determine the PEC. In accordance with the Stage 2 EA criteria, the impact of the Proposed Development on annual mean NOx concentrations is potentially significant at one location within the Teesmouth and Cleveland Ramsar Site (E6).

7.121. Within the Teesmouth and Cleveland Coast SSSI, the predicted PC as a result of the Proposed Development is again predicted to exceed 1% of the Critical Level for annual mean NOx at a number of locations. The background concentrations were added to determine the PEC. In accordance with the Stage 2 EA criteria, the impact of the Proposed Development on annual mean NOx concentrations is potentially significant at locations E21, E22, E23, E25, E26, E33, E34 and E35 which are located at the river or the arms of the river either side of the Site.

7.122. Teesmouth and Cleveland Coast SPA incorporates the areas of the Ramsar Site and the SSSI.

7.123. With regards to the 24 hour mean NOx, the predicted PCs within the Ramsar Site are all less than 10% of the Critical Level of 75μg/m^3 and therefore considered to be insignificant in accordance with the EA screening criteria.

7.124. Within the Teesmouth and Cleveland Coast SSSI, the predicted PC as a result of the Proposed Development is predicted to exceed 10% of the Critical Level for 24 hour mean NOx at a number of locations. Potential impacts are identified at location E22, E23, E25, E26, E33, E34 and E35 which are again located at the river or the arms of the river either side of the site.

7.125. Advice was sought regarding the sensitivity of the ecological habitats to airborne NOx concentrations. None of the location identified above were determined to be vulnerable to NOx.

Eutrophication

7.126. Predicted maximum nutrient nitrogen deposition rates arising from emissions of NOx from the facility are presented in Table 7.25. The process contributions (PC) are compared with the relevant critical loads (CL) and combined with the relevant background concentrations.

Table 7.25: Predicted Eutrophication Rates (kg N/ha/a)

Habitat Site	PC	Total Deposition (PEC)	Lowest CL	PC (% CL)
Teesmouth and Cleveland Coast Ramsar Site	0.072	15.87	10	0.72
Teesmouth and Cleveland Coast SPA	0.425	16.73	20	2.13
Teesmouth and Cleveland Coast SSSI	0.425	16.73	20	2.13

7.127. The maximum PC nutrient nitrogen deposition rate arising from the facility is low in comparison to the critical loads and the background deposition rates and the PC is less than 1% of the lowest critical load within the Ramsar Site.

7.128. Advice was sought from an Ecologist to determine the sensitivity of the areas impacted by the Proposed Development to nitrogen deposition. None of the locations identified as exceeding 1% of the Critical Load were determined to be vulnerable to nitrogen deposition. Therefore, it is considered that the impact of nutrient nitrogen deposition on surrounding habitats is insignificant.

Acidification

7.129. No areas sensitive to acid deposition were identified, therefore an assessment of the impact on acid deposition was not considered further.

Dust and Particulate Matter Effect

7.130. During the operational phase dust and particulate matter emissions may be generated by the operations on-site and may potentially affect the nearby sensitive receptors. An assessment following the principles of the IAQM guidance for assessment of dust and particulate matter from construction sites has been undertaken.

7.131. As discussed in the assessment of construction dust, the sensitivity of the area to impacts from nuisance dust and human health effects from PM_{10} concentrations is low.

7.132. Dust and particulate matter may potentially be generated during the unloading and treatment of raw material and during the bagging and dispatch of the final product. No information was available at the time of writing; however it is considered that good management practices would be sufficient to minimise the risk of dust generation from the Site.

7.133. Due to the distance of sensitive receptors from the Site and low sensitivity of the immediate surrounding area, it is considered that the impact of dust and particulate matter generated by the on-site operations would be insignificant.

ASSESSMENT OF CUMULATIVE EFFECTS

7.134. Cumulative effects can potentially be experienced during both the construction and operational phases. During the construction phase, cumulative effects of dust and particulate matter generated from on-site activities may be experienced in locations in close proximity to two or more development sites and when the timing of the construction phases overlap. There may also be an effect due to the increased construction traffic on local roads if construction vehicles are to use the same routes to access the sites. During the operational phase, cumulative effects may be experienced due to the additional road vehicles generated by one or more schemes if the traffic is likely to affect the same local roads or additional emissions from plant.

Construction Phase Effects

7.135. Guidance provided by the IAQM suggests that effects of dust and particulate matter generated from a construction site may be experienced up to 350 m from the site. There are no committed developments identified within close proximity of the Site as such it is considered that no sensitive receptors would be exposed to the combined effects of two or more construction sites. Therefore, the cumulative impact

of the Proposed Development with other committed developments is considered to remain negligible following the implementation of the relevant site specific mitigation measures.

Operational Phase Effects

7.136. Background concentrations will take into account other emission sources that have been well established. However, new or proposed facilities will not be included within the background data although it is recognised that peaks in concentrations will be smoothed within the mapping data.

7.137. The following committed developments have been identified in the vicinity of the Site:

- Circular Fuels Ltd DME production facility (Plot 10 Dorman's Point – Teesworks);
- Tees Valley Lithium (Plot 1 – Wilton International); and
- Redcar Energy Centre (Redcar Bulk Terminal, the former Corus Steel Works).

Circular Fuels Ltd (R/2020/0819/ESM)

7.138. The Proposed Development comprises general industry, storage and distribution. It is located approximately 1.8km to the southwest of the Site.

7.139. Emissions to air arising from the operation of this facility would be emissions from road traffic associated with the development. The affected road network is not within 200m of the sensitive ecological habitats, therefore the operation of this development would not alter the conclusions drawn above for the Proposed Development.

7.140. A number of residential properties are located within 200m of the affected road network (A66) which are also within the study area of the Proposed Development. Further consideration of the combined effect of the emissions from the Proposed Development and the Circular Fuels Ltd development is presented below.

Table 7.26: Predicted Concentrations of Annual NO_2

Receptor	PC from Proposed Development		PC from Circular Fuels Ltd	Combined PC	
	PC (µg/m³)	PC (% AQO)	PC (µg/m³)	PC (µg/m³)	PC (% AQO)
R5: 14/15 Corncroft Mews	0.25	0.62	0.4	0.65	1.6
R6: 19 Jones Road	0.15	0.36	0.2	0.35	0.9

AQO (µg/m^3)	40
Background (µg/m^3)	26.7
Maximum PEC	28.3
Maximum PEC as %age of AQO	70.8%

7.141. In accordance with the EPUK & IAQM criteria, the combined impact of the Proposed Development and Circular Fuels Ltd on annual mean NO_2 concentrations is considered to be negligible.

Table 7.27: Predicted Concentrations of Annual PM_{10}

Receptor	PC from Proposed Development		PC from Circular Fuels Ltd	Combined PC	
	PC (µg/m^3)	PC (% AQO)	PC (µg/m^3)	PC (µg/m^3)	PC (% AQO)
R5: 14/15 Corncroft Mews	0.04	0.10	0.1	0.14	0.35
R6: 19 Jones Road	0.02	0.06	0.1	0.12	0.31

AQO (µg/m^3)	40
Background (µg/m^3)	10.6
Maximum PEC	10.9
Maximum PEC as %age of AQO	27.4%

7.142. In accordance with the EPUK & IAQM criteria, the combined impact of the Proposed Development and Circular Fuels Ltd on annual mean PM_{10} concentrations is considered to be negligible.

Table 7.28: Predicted Concentrations of Annual $PM_{2.5}$

Receptor	PC from Proposed Development		PC from Circular Fuels Ltd	Combined PC	
	PC (µg/m^3)	PC (% AQO)	PC (µg/m^3)	PC (µg/m^3)	PC (% AQO)

R5: 14/15 Corncroft Mews	0.04	0.19	0.1	0.14	0.69
R6: 19 Jones Road	0.02	0.12	0.1	0.12	0.62
AQO (µg/m^3)	20				
Background (µg/m^3)	7.2				
Maximum PEC	7.34				
Maximum PEC as %age of AQO	36.7%				

7.143. In accordance with the EPUK & IAQM criteria, the combined impact of the Proposed Development and Circular Fuels Ltd on annual mean $PM_{2.5}$ concentrations is considered to be negligible.

Tees Valley Lithium (R/2022/0773/ESM)

7.144. This Proposed Development comprises the construction and operation of a LHM (LHM) manufacturing facility. It is located approximately 2.5km to the southeast of the Site.

7.145. Emissions to air arising from the operation of this plant would be dust and steam, with all other impurities removed by wet scrubber systems. All the remaining off gases will be directed through baghouses where dust will be recovered. The emissions from the baghouse filters are at the lower end of the range considered to be BAT for this facility. NOx is likely to be emitted from gas fired plant associated with the Sodium Sulphate Dryer which will comply with the MCPD. The air quality assessment completed for this assessment concluded that the emissions of dust and NOx from the proposed plant will be negligible. The air quality assessment also concluded that the impact arising from operational traffic would also be negligible.

7.146. It is concluded that the emissions arising from the Tees Valley Lithium would not alter the conclusions drawn above for the Proposed Development.

Redcar Energy Centre (R/2020/0411/FFM)

7.147. This Proposed Development comprises a material recovery facility incorporating, bulk storage, energy recovery, and an incinerator bottom ash recycling. It is located approximately 2.2km to the north of the Site.

7.148. Emissions to air arising from this facility would be emissions from the thermal treatment stack and potential fugitive emissions and dust. Emissions arising from this plant may potentially impact some of

the same receptors impacted by the Proposed Development. Further consideration of the combined effect of the emissions from the Proposed Development and the Redcar Energy Centre is presented below.

Table 7.29: Predicted Concentrations of Annual NO_2					
Receptor	PC from Proposed Development		PC from REC	Combined PC	
	PC (µg/m³)	PC (% AQO)	PC (µg/m³)	PC (µg/m³)	PC (% AQO)
R1: 87 Wilton Avenue	0.32	0.79	0.2	0.52	1.29
R2: Dormanstown Primary Academy	0.25	0.62	0.1	0.35	0.87
R3: 20 Sorrel Gardens	0.20	0.49	0.1	0.30	0.74
R9: Da Haviland Way	0.06	0.16	0.1	0.16	0.41
AQO (µg/m³)	40				
Background (µg/m³)	26.7				
Maximum PEC	27.22				
Maximum PEC as %age of AQO	68.0%				

7.149. In accordance with the EPUK & IAQM criteria, the combined impact of the Proposed Development and the Redcar Energy Centre on annual mean NO_2 concentrations is considered to be negligible.

7.150. Predicted Concentrations of annual mean PM_{10} and $PM_{2.5}$ arising from the Redcar Energy Centre at the location of these sensitive receptors is 0µg/m³, therefore the combined impact of the Proposed Development and the Redcar Energy Centre on annual mean PM_{10} and $PM_{2.5}$ concentrations is considered to remain negligible.

7.151. The Redcar Energy Centre is located adjacent to the Teesmouth & Cleveland Coast Ramsar Site / SPA and SSSI, emissions from the Redcar Energy Centre may potentially impact the same areas of these ecological habitats as the emissions from the Proposed Development. Further consideration of the combined effect of the emissions from the Proposed Development and the Redcar Energy Centre is presented below.

Table 7.30: Predicted Concentrations of Annual NO_2							
Receptor	PC from Proposed Development		PC from REC	Combined			
	PC ($\mu g/m^3$)	PC (% CL)	PC ($\mu g/m^3$)	PC ($\mu g/m^3$)	PC (% CL)	PEC	PEC as % CL
Teesmouth and Cleveland Coast Ramsar Site	0.5	1.67	1.0	1.5	5	20	66.7
Teesmouth and Cleveland Coast SPA	2.96	9.86	0.4	3.36	11.2	20.4	68.0
Teesmouth and Cleveland Coast SSSI	2.96	9.86	0.4	3.36	11.2	20.4	68.0

7.152. In accordance with the EA screening criteria, the combined impact of the Proposed Development and the Redcar Energy Centre on annual mean NO_x concentrations within the sensitive ecological habitats is in excess of 1% of the relevant Critical Level, however the PEC remains below 70% is considered to be insignificant.

Table 7.31: Predicted Concentrations of N Deposition (kgN/ha/yr)							
Receptor	PC from Proposed Development		PC from REC	Combined			
	PC	PC (as % lower CLd)	PC	PC	PC (as % lower CLd)	PEC	PEC (as % lower CLd)
Teesmouth and Cleveland Coast Ramsar Site	0.072	0.72	0.144	0.216	2.16	16.088	160.9
Teesmouth and Cleveland Coast SPA	0.425	2.13	0.058	0.483	2.41	17.208	86.0

Teesmouth and Cleveland Coast SSSI	0.425	2.13	0.058	0.483	2.41	17.208	86.0

7.153. The combined impact (PC's) of the Proposed Development and the Redcar Energy Centre on nitrogen deposition rates within the sensitive ecological habitats are slightly higher than with the Proposed Development alone. However, as the ecological habitats were determined not to be sensitive to nitrogen deposition, therefore the combined impact is considered to remain insignificant.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

Mitigation

Construction Phase

7.154. The control of dust emissions from construction site activities relies upon management provision and mitigation techniques to reduce emissions of dust and limit dispersion. Where dust emission controls have been used effectively, construction operations have been successfully undertaken without impacts to nearby properties.

7.155. Overall, the Site is considered to be a low risk of dust soiling and human health effects from particulate matter emissions from construction activities at the Site. Appropriate mitigation measures for the Proposed Development have been identified following the IAQM guidance and based on the risk effects presented in Table 7.19. It is recommended that the measures set out in Appendix 7.5 Volume 2 of the ES are incorporated into a Construction Environment Management Plan (CEMP) and approved by the council prior to commencement of any work on site.

Operational Phase

7.156. The Proposed Development is predicted to have a negligible impact on local air quality during operation. Therefore, mitigation measures are not considered necessary. It is recommended, however, that good housekeeping measures be maintained to minimise the risk of emissions of dust and particulate matter during the delivery and handling of material.

Residual Effects

<u>Construction Phase</u>

7.157. Following implementation of the measures recommended for inclusion within the CEMP, the impact of emissions during construction of the Proposed Development would be negligible.

Operational Phase

7.158. Emissions from the Proposed Development are predicted to have a negligible impact on local air quality during operation. Therefore, the residual effects are considered to be negligible.

SUMMARY

7.159. An assessment has been carried out to determine the local air quality impacts associated with the operation of the Proposed Development.

7.160. The Site is situated in an existing industrial location, with no immediate nearby sensitive (residential) receptors. The construction works on site would represent a low risk to dust soiling and human health effects. However, with the proposed mitigation measures incorporated into a Construction Environmental Management Plan (CEMP), the residual impact would be negligible.

7.161. Traffic generated by the Proposed Development during the construction and operational phases of the development will be well below the number required to undertake a detailed air quality assessment according to the IAQM planning guidance. Therefore, it is concluded that the impact of traffic generated by the Proposed Development would be negligible.

7.162. Detailed air quality modelling using the ADMS Roads Extra dispersion model has been undertaken to predict the impacts associated with stack emissions from the Proposed Development. The process contributions are assessed as negligible at all sensitive human receptor locations for all pollutants.

7.163. The impacts on nearby sensitive ecological habitat sites are assessed to be insignificant.

7.164. A summary of the air quality significance and residual effects for the Proposed Development is presented in Table 7.32.

Table 7.32 Air Quality Effects Summary Table				
Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Dust generated during demolition/ construction phases	Temporary	Potentially significant	Measures for minimising impacts to be incorporated into CEMP	Negligible
Emissions from construction traffic	Temporary	Not significant	None	Negligible
Emissions from plant	Permanent	Not significant	None	Negligible
Emissions from development traffic	Permanent	Not significant	None	Negligible

REFERENCES

Ref 7.1: EPUK & IAQM. Land-use Planning and Development Control: Planning for Air Quality, January 2017

Ref 7.2: Environment Agency's Inorganic Chemicals Sector (EPR 4.03)

Ref 7.3: Environment Agency Risk Assessment Guidance (https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit)

Ref 7.4: A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites, IAQM v1.1 (May 2020)

Ref 7.5: Department for Environment, Food and Rural Affairs (2007), The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

Ref 7.6: The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

Ref 7.7: The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043

Ref 7.8 The Air Quality Standards Regulations 2010 – Statutory Instrument 2010 No. 1001

Ref 7.9: The Air Quality Standards (Amendment) Regulations 2016 – Statutory Instrument 2016 No. 1184

Ref 7.10: The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 – Statutory Instrument 2023 No 96

Ref 7.11: Environment Act 2021

Ref 7.12: Department for Environment, Food and Rural Affairs (Defra), (2022): Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(22)

Ref 7.13: Communities and Local Government: National Planning Policy Framework (July 2021)