TEESWORKS

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AIR QUALITY

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Chapter F: Air Quality

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Contents

F1.0 Introduction 2

About the Author 1

F2.0 Policy Context 2

National Policy and Guidance 2

Air Quality Legislation 3

Local Policy 4

Other Relevant Policy and Guidance 4

F3.0 Assessment Methodology & Significance Criteria 6

Assessment Methodology 6

Significance Criteria 14

Consultation 16

Assumptions and Limitations 16

F4.0 Baseline Conditions 18

Existing Conditions 18

Future Baseline 21

F5.0 Potential Effects 22

Embedded Mitigation 22

Major Hazards and Accidents 24

Phasing 24

During Construction 25

During Operation 25

F6.0 Mitigation and Monitoring 30

During Construction 30

During Operation 30

F7.0 Residual Effects 31

During Construction 31

During Operation 31

F8.0 Summary & Conclusions 32

F9.0 Abbreviations & Definitions 33

F10.0 References **35**

F1.0 Introduction

F1.1 This Chapter of the Environmental Statement ('ES') has been prepared by Arup on behalf of the applicant, South Tees Development Corporation ('STDC'). It assesses the proposed development described in Chapter B and it considers the effects of the proposed development on air quality surrounding the site.

F1.2 The baseline situation is considered before the likely environmental effects of the development are identified, both during construction and operational phases of the development. Mitigation measures to reduce any negative environmental effects are identified as appropriate, before the residual environmental effects are assessed.

F1.3 This Chapter is supported by the following technical appendices:

1 **Appendix F1**: Traffic Data and Road Details;

2 **Appendix F2**: Consultation records; and

3 **Appendix F3**: Modelled Receptor Results.

About the Author

F1.4 The author is Cat Dixon, an experienced air quality consultant at Arup, based in Newcastle Upon Tyne. She has five years' experience in air quality consultancy, is an associate member of the Institute of Air Quality Management ('IAQM') and is an associate member of the Institute of Environmental Sciences ('IES'). She holds a BSc degree in Meteorology and Climate Science and an MSc in Hydrology and Climate Science.

F1.5 The author has extensive experience in air quality modelling and assessment, as well as providing mitigation measures across a range of projects, ranging from small scale to major development scale Environmental Impact Assessments ('EIA').

F1.6 This assessment has been reviewed by a Senior Consultant at Arup, John Hodgson, who has over 14 years of experience leading air quality impact studies as part of bespoke commissions, or wider EIA across a broad range of sectors. He is a Chartered Environmentalist ('CEnv'), Chartered Scientist ('CSci') and a Full Member of the IAQM.

F1.7 This assessment has been approved by a Director at Arup, Michael Bull, who has over 30 years of experience in air quality, odour and EIA.

F2.0 Policy Context

National Policy and Guidance

F2.1 The land-use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality consideration that relates to land-use and its development can be a material planning consideration in the determination of planning applications, dependent on the details of the proposed development.

National Planning Policy Framework (2019)

F2.2 The most recent version of the National Planning Policy Framework ('NPPF') was published in February 2019 [

F2.3 i] with the purpose of planning to achieve sustainable development. Paragraph 181 of the NPPF on air quality 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."

F2.4 In addition, paragraph 103 states that:

"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."

F2.5 Paragraph 170 discusses how planning policies and decisions should contribute to and enhance the natural and local environment. In relation to air quality, the NPPF notes that this can be achieved by:

"e) 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, taking into account relevant information such as river basin management plans."

Planning Practice Guidance (2014)

F2.6 As part of the NPPF, Planning Practice Guidance ('PPG') on various topics was published in 2014 [ii]. In relation to air quality, the guidance refers to the significance of air quality

assessments to determine the impacts of proposed developments in the area and describes the role of local and neighbourhood plans with regard to air quality. It also provides a flowchart method to assist local authorities to determine how considerations of air quality fit into the development management process.

Air Quality Legislation

European Air Quality Management

F2.7 In 1996 the European Commission published the Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC)[iii]. This Directive defined the policy framework for 12 air pollutants, including NO_2, known to have harmful effects on human health and the environment. Limit values (pollutant concentrations not to be exceeded by a certain date) for each specified pollutant were set through a series of Daughter Directives, including Directive 1999/30/EC (the 1st Daughter Directive)[iv], which sets limit values for nitrogen dioxide (NO_2) and particulate matter (amongst other pollutants) in ambient air.

F2.8 In May 2008, the Directive 2008/50/EC[v]on ambient air quality and cleaner air for Europe came into force. This Directive consolidates the above (apart from the 4th Daughter Directive) and makes provision for extended compliance deadlines for NO2 and PM10.

F2.9 The Directive has been transposed into national legislation in England by the Air Quality Standards Regulations 2010[vi]. The Secretary of State for the Environment, Food and Rural Affairs has the duty of ensuring compliance with the air quality limit values.

Environment Act 1995

F2.10 Part IV of the Environment Act 1995[vii] places a duty on the Secretary of State for the Environment to develop, implement and maintain an air quality strategy with the aim of reducing atmospheric emissions and improving air quality. The national air quality strategy (NAQS) for England, Scotland, Wales and Northern Ireland provides the framework for ensuring compliance with air quality limit values based on a combination of international, national and local measures to reduce emissions and improve air quality. This includes the statutory duty, also under Part IV of the Environment Act 1995, for local authorities to undergo a process of local air quality management and declare Air Quality Management Areas (AQMAs) where necessary.

Air Quality Objectives and Limit Values

F2.11 Air quality limit values and objectives are quality standards for clean air. Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment (i.e. effects occur (long-term) after a prolonged period of exposure to elevated concentrations) and others have standards expressed as 24-hour, 1-hour or 15-minute average concentrations (short-term) due to the acute way in which they affect health or the natural environment (i.e. after a relatively short period of exposure). Some pollutants have standards expressed in terms of both long-term and short-term concentrations. sets out these EU air quality limit values and national air quality objectives for the pollutants relevant to this study (NO_2 and PM_{10}).

F2.12 In the majority of cases, the air quality limit values and air quality objectives have the same pollutant concentration threshold and date for compliance. The key difference is that the Secretary of State for the Environment is required under European Law to ensure compliance with the air quality limit values whereas local authorities are only obliged under national legislation to undertake best efforts to comply with the air quality objectives. To assist local

authorities in demonstrating best efforts, the Environment Act 1995 requires that when carrying out their local air quality management functions, local authorities shall have regard to guidance issued by the Secretary of State.

Table F2.1 UK and EU Air quality standards and guidelines

Pollutant	Averaging period	Limit value/objective
Nitrogen dioxide (NO2)	1 hour mean	200µg/m3, not to be exceeded more than 18 times a year (99.79th percentile)
	Annual mean	40µg/m3
Particulate matter (PM10)	Daily mean	50µg/m3, not to be exceeded more than 35 times a year (90.4th percentile)
	Annual mean	40µg/m3
Fine particulate matter (PM2.5)	Annual mean	25µg/m3

Dust Nuisance

F2.13 Dust is the generic term that the British Standard document BS 6069 (Part Two) used to describe particulate matter in the size range 1 – 75 µm (micrometers) in diameter. Dust nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 1990, dust nuisance is defined as a statutory nuisance.

F2.14 There are currently no standards or guidelines for dust nuisance in the UK, nor are formal dust deposition standards specified. This reflects the uncertainties in dust monitoring technology, and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance. In law, complaints about excessive dust deposition would have to be investigated by the local authority and any complaint upheld for a statutory nuisance to occur. However, dust deposition is generally managed by suitable on-site practices and mitigation rather than by the determination of statutory nuisance and/or prosecution or enforcement notice(s).

Local Policy

Redcar and Cleveland Borough Council

F2.15 The Redcar and Cleveland Borough Council ('RCBC') Local Plan was adopted in 2018[viii] and discusses how new developments should seek to promote sustainable travel to minimise environmental impacts and support the health and wellbeing of residents. This is highly relevant to air quality.

Other Relevant Policy and Guidance

Institute of Air Quality Management Dust Guidance

F2.16 The IAQM dust guidance [ix] provides guidance to development consultants and environmental health officers on how to assess air quality impacts from construction. The IAQM guidance provides a method for classifying the significance of effect from construction activities based on the 'dust magnitude' (high, medium or low) and proximity of the site to the closest receptors.

The guidance recommends that once the significance of effect from construction is identified, the appropriate mitigation measures are implemented. Experience has shown that once the appropriate mitigation measures are applied, in most cases the resulting dust impacts can be reduced to negligible and therefore non-significant levels.

Local Air Quality Management (LAQM) Policy and Technical Guidance

F2.17 Policy guidance note LAQM.PG(16) [x] provides additional guidance on the links between transport and air quality. LAQM.PG(16) describes how road transport contributes to local air pollution and how transport measures may bring improvements in air quality. Key transport related Government initiatives are set out, including regulatory measures and standards to reduce vehicle emissions and improve fuels, tax-based measures and the development of an integrated transport strategy.

F2.18 LAQM.PG(16) also provides guidance on the links between air quality and the land use planning system. The guidance advises that air quality considerations should be integrated within the planning process at the earliest stage and is intended to aid local authorities in developing action plans to deal with specific air quality problems and create strategies to improve air quality. It summarises the main ways in which the land use planning system can help deliver compliance with the air quality objectives.

F2.19 The 2016 technical guidance note from the Department for Environment, Food & Rural Affairs (Defra), LAQM (TG16) [xi], which accompanies the policy guidance document, is designed to support local authorities in carrying out their duties to review and assess air quality in their area. Regulations stated in the guidance cover England, Scotland, Wales and Northern Ireland with the exception of London. LAQM (TG16) provides detailed guidance on how to assess the impact of measures using existing air quality tools on the main pollutants of interest (nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$) and sulphur dioxide (SO_2). Where relevant, this guidance has been taken into account in this assessment.

EPUK/IAQM land-use planning and development control

F2.20 The 2017 Land-Use Planning & Development Control guidance document [xii] produced by Environmental Protection UK (EPUK) and the IAQM provides a framework for professionals operating in the planning system to provide a means of reaching sound decisions, with regard to the air quality implications of development proposals.

F2.21 The document provides guidance on when air quality assessments are required by providing screening criteria regarding the size of a development, changes to traffic flows/composition energy facilities or combustion processes associated with the development.

F3.0 Assessment Methodology & Significance Criteria

Assessment Methodology

F3.1 The overall approach to the air quality assessment comprises the following:

i. A review of the existing air quality conditions at, and in the vicinity of the proposed development;

ii. An assessment of the potential changes in air quality arising from the construction and operation of the proposed development;

iii. A conclusion on the significance of any effects on local air quality; and

iv. Formulation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

Methodology of Baseline Assessment

F3.2 Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, road traffic and natural sources.

F3.3 A desk-based review of the following data sources has been undertaken to determine the baseline conditions of air quality in this assessment:

i. Local authority review and assessment reports and local air quality monitoring data[xiii][xiv][xv];

ii. The Defra Local Air Quality Management website [xvi];

iii. The UK Air Information Resource website [xvii]; and

iv. The Environment Agency (EA) register on industrial installations [xviii].

F3.4 This review identified the main sources of air pollution within 2km of the proposed development, the local air quality monitoring data for recent years and local background pollutant concentrations.

F3.5 The proposed development is located in the RCBC Local Authority area.

Methodology of Construction Assessment

Construction Dust

F3.6 The potential impacts that may arise as a result of construction works for the proposed development are dust deposition, resulting in the soiling of surfaces; visible dust plumes; elevated PM_{10} and $PM_{2.5}$ concentrations as a result of dust generating activities on site; and an increase in NO_2, PM_{10} and $PM_{2.5}$ concentrations due to exhaust emissions from Non-Road Mobile Machinery (NRMM).

F3.7 Detailed information is not currently available on the construction phase of the development as the scheme is in outline, however based on professional experience, and given the size of the proposed development site, its development parameters and the likely cumulative impacts associated with the construction of several sites within the Teesworks area in close succession, an assessment of construction activities on site is likely to result in a classification of medium to high risk.

F3.8 Mitigation measures applicable to high risk sites outlined in the IAQM guidance [ix] will therefore be employed at the proposed development site. According to this guidance, on the assumption that the required mitigation measures are appropriately implemented, the residual effect will normally be 'not significant'. An assessment of effects from construction dust has therefore been scoped out, on the understanding that the appropriate level of mitigation will be in place within the Framework Construction Environmental Management Plan (Framework CEMP) and is considered as embedded mitigation. This approach has been agreed with the Environmental Health Officer ('EHO') at RCBC. Further details on the Framework CEMP are set out in Section F5.0 (Potential Effects) of this Chapter.

Construction Traffic

F3.9 As this is an outline planning application, the end users of the development site, and therefore specifics of construction, are not known at the time of writing. Once traffic data for the construction phase are available at the detailed stage of the planning process, the data should be screened using the IAQM/EPUK criteria [xii] and, if the criteria are exceeded, then an air quality modelling assessment would be required.

Methodology of Operational Traffic Assessment

F3.10 Operational air quality impacts from the proposed development could arise because of traffic changes on the local road network.

F3.11 The proposed development is not located within an Air Quality Management Area ('AQMA') and, as such, the following criteria for developments outside an AQMA from the EPUK/IAQM land-use guidance document [xii] have been used to determine whether a detailed air quality assessment is likely to be considered necessary for operational traffic:

i. A change of Light Duty Vehicle ('LDV') flows of more than 500 Annual Average Daily Traffic ('AADT') movements; and

ii. A change of Heavy Duty Vehicle ('HDV') flows of more than 100 AADT movements.

F3.12 Meeting either of these criteria would indicate that detailed dispersion modelling of the road traffic emissions would be likely to be required.

F3.13 The traffic data were provided by the Arup transport team. The traffic data consists of 24-hour AADT flows for all vehicle types, together with the percentage of HDVs for each road link. The data provided includes a vehicle speed on each road, which was used in this air quality assessment. The exception to this is where road links are recognised as junctions, where modelled speeds were assumed to be 20kph following Defra's LAQM.TG16 guidance [xi]. The traffic data provided for the future year scenarios includes committed development traffic (further details are provided in Chapter C (Transport)). As such, this assessment is inherently cumulative.

F3.14 The operational traffic volumes generated by the proposed development will exceed the screening criteria at some locations, therefore, a detailed assessment of operational traffic has been scoped into this assessment. Modelled roads that did not exceed the screening criteria but were adjacent to receptor locations have been included in the model to provide a robust assessment of the impact of local air quality emissions to sensitive receptors.

F3.15 The baseline year for this assessment was 2019, as this is the latest year for which a full year of air quality monitoring data are available for model verification (described in Section F5.0). The baseline year for the traffic data provided was 2020, however the data were confirmed to be representative of 2019 vehicle numbers by the Arup transport consultants and therefore suitable for use in the air quality assessment.

F3.16 The ADMS Roads (Atmospheric Dispersion Modelling System) atmospheric dispersion model has been used in this assessment (version 5.1.1.0).

F3.17 The modelled road network is shown in **Error! Reference source not found.** with associated road link ID numbers below and details of the modelled roads and the traffic data used are provided in Appendix F1.

Figure F3.1 Modelled Road Network

Assessment Scenarios

F3.18 The operational traffic assessment scenarios can be summarised as follows:

i. Baseline scenario (using 2020 traffic volumes, representative of 2019, and using 2019 emission factors) [xix];

ii. Do-Minimum ('DM') scenario, including committed developments (see Chapter C of the ES for further details), which is the operational year without the proposed development (using 2033 traffic volumes and 2019 emission factors); and

iii. Do Something ('DS') scenario, which is the operational year including the operational vehicles for the proposed development (using 2033 traffic volumes and using 2019 emission factors).

F3.19 Emission rates have been calculated using the latest Defra Emissions Factor Toolkit ('EFT') v10.0[xx]. Impacts on air quality during operation have been modelled using 2019 vehicle emissions and 2019 background concentrations throughout, which represent a conservative (pessimistic) scenario of future emission rates. This accounts for the uncertainty around future emission rates from road vehicles. This is considered to be an appropriate means of deriving emission rates, rather than using the future year emission rates, which could potentially be too optimistic.

F3.20 The road emissions were calculated in the EFT with a fleet mix described as 'urban (not London)'.

Sensitive Receptors

F3.21 The traffic modelling was undertaken to calculate predicted pollutant concentrations at sensitive receptor locations. Sensitive receptors are defined as those residential properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction or operation of the proposed development. A desk-top study was undertaken to identify the sensitive receptors near the proposed development. Details of the sensitive receptors used in this assessment are shown in Table F3.1.

F3.22 To the north-west of the proposed development, there are ecological designations: the Teesmouth and Cleveland Coast Site of Special Scientific Interest ('SSSI') (which also has geological interest) and the Special Protection Area ('SPA')/Ramsar site Teesmouth and Cleveland Coast. The SSSI also overlaps with the SPA, although the SSSI is closer to the proposed development. Other than road emissions, there are no other sources of emissions to air from the proposed development, and the nearest road (Smith's Dock Road) to these ecological sites is not predicted to experience a change in traffic as a result of the proposed development. Therefore, these designations are unlikely to experience a change in predicted concentrations and have been included here as receptors for completeness only.

F3.23 Residential receptors have been modelled at a height of 1.5m and ecological receptors have been modelled at ground level.

Table F3.1: Sensitive receptors

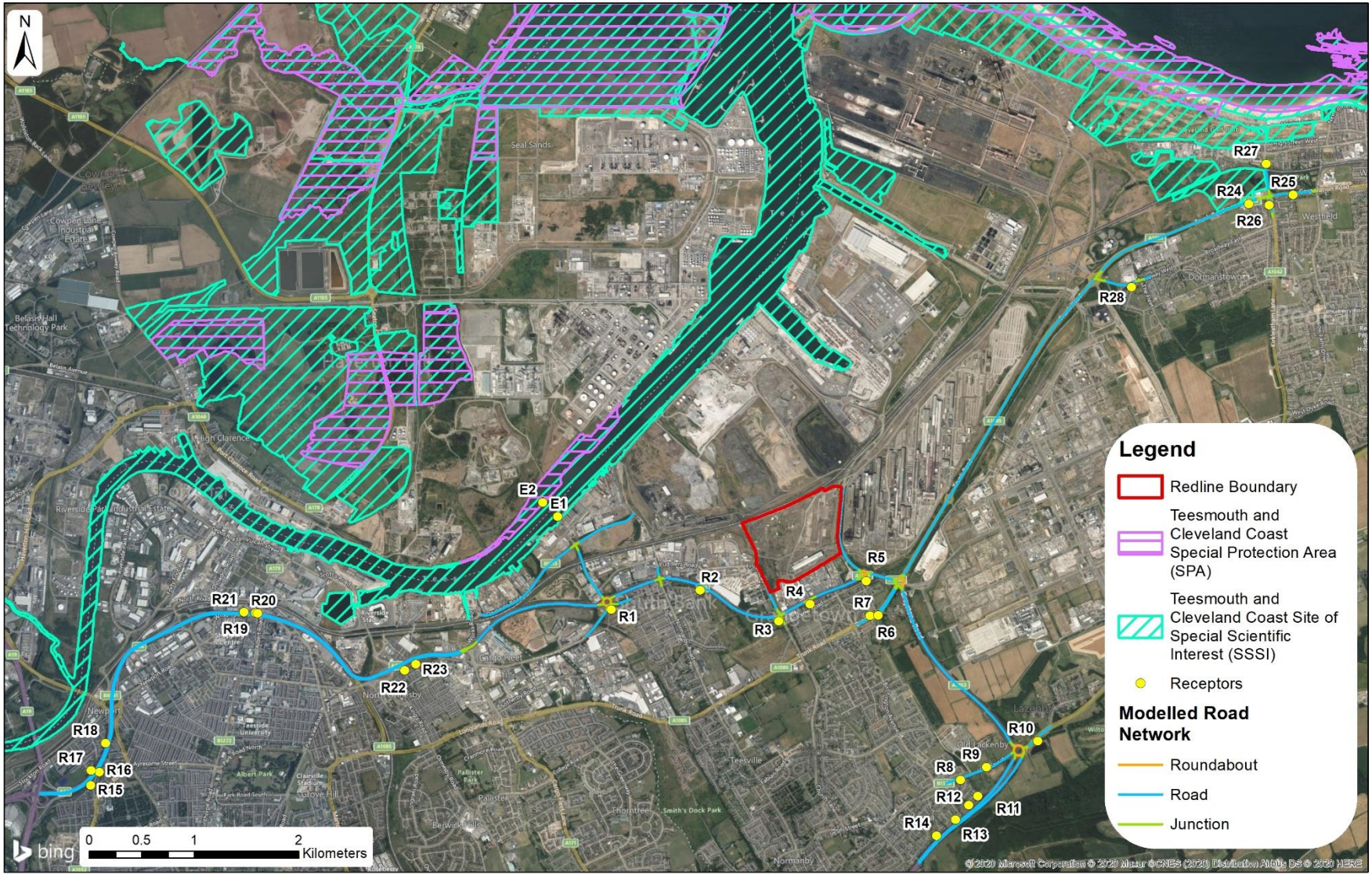
Receptor ID	Street Name	Description	OS grid reference (m)		Height (m)
			X	Y	
R1	Salisbury Terrace	Residential	452942	520658	1.5
R2	Jones Road	Residential	453791	520842	1.5
R3	Elgin Avenue	Residential	454541	520549	1.5
R4	St Nicholas Court	Residential	454840	520708	1.5

Receptor ID	Street Name	Description	OS grid reference (m)		Height (m)
			X	Y	
R5	Corncroft Mews	Residential	455377	520929	1.5
R6	Broadway	Residential	455413	520600	1.5
R7	St David's Road	Residential	455491	520603	1.5
R8	High Street	Residential	456277	519031	1.5
R9	High Street	Residential	456525	519154	1.5
R10	House off A174	Residential	457015	519404	1.5
R11	Southgate	Residential	456444	518878	1.5
R12	Sunnygate	Residential	456354	518793	1.5
R13	Parkgate	Residential	456231	518655	1.5
R14	Stonegate	Residential	456049	518501	1.5
R15	West Lane	Residential	447968	518979	1.5
R16	West Lane	Residential	448050	519108	1.5
R17	Dunlane Close	Residential	447969	519122	1.5
R18	Aidan Court	Residential	448107	519384	1.5
R19	Brunswick Street	Residential	449542	520625	4.5
R20	Brunswick Street	Residential	449560	520623	4.5
R21	Crown Square	Residential	449432	520634	1.5
R22	Kildale Court	Residential	450965	520077	1.5
R23	Saxon Close	Residential	451073	520136	1.5
R24	A1085 Trunk Road	Residential	459033	524529	1.5
R25	Corporation Road	Residential	459455	524617	1.5
R26	Kirkleatham Lane	Residential	459224	524520	1.5
R27	Kirkleatham Lane	Residential	459196	524914	1.5
R28	Broadway West	Residential	457911	523737	1.5
E1	Teesmouth and Cleveland Coast SSSI	Ecological	452429	521549	0.0
E2	Teesmouth and Cleveland Coast SPA	Ecological	452286	521680	0.0

F3.24 Several diffusion tubes located on the modelled road network have been included as receptor points within the model to allow for model verification – RCBC tubes R26 and R27, and MC tubes M13, M23 and triplicate sites M29, M30 and M31. Details of model verification are provided in Section F5.0. The diffusion tubes have been modelled at heights corresponding to those in the latest RCBC Annual Status Report ('ASR') [xiii].

F3.25 The locations of the receptors used in this assessment are shown below in **Error! Reference source not found.**.

Figure F3.2 Sensitive receptor locations



Dispersion Model Setup

F3.26 The following information details the setup of the dispersion modelling for the operational traffic assessment.

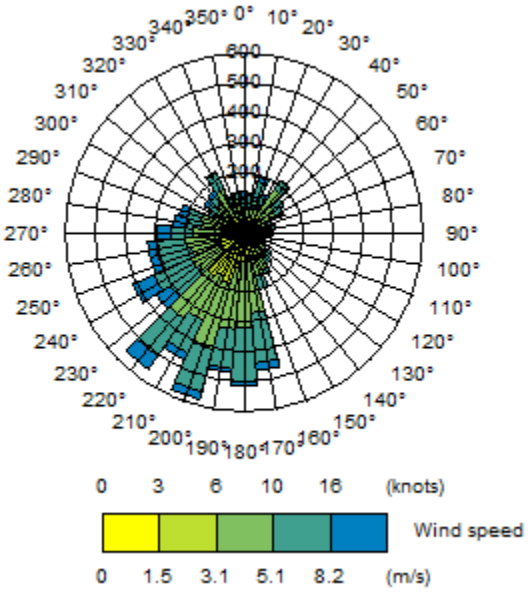
Meteorological Data

F3.27 The meteorological data used in this assessment were measured at Teesside International Airport (previously known as Durham Tees Valley Airport) meteorological station. The data were collected over the period 1 January 2019 to 31 December 2019 (inclusive). Teesside International Airport is located approximately 18km south-west of the proposed development. This meteorological site was chosen due to its proximity to the proposed development.

F3.28 Most dispersion models of roads do not use meteorological data if modelling calm wind conditions, as dispersion of air pollutants is more difficult to calculate in these circumstances. ADMS-Roads treats calm wind conditions by setting the minimum wind speed to 0.75m/s. Defra's LAQM.TG16 guidance [xi] recommends that the meteorological data file is tested in a dispersion model and the relevant output log file checked to confirm the number of missing hours and calm hours that cannot be used by the dispersion model. The guidance recommends that meteorological data should only be used if the percentage of usable hours is greater than 75% and preferably 90%.

F3.29 Hourly sequential observation data was used. The dataset includes 8,656 lines of usable hourly data, out of a total of 8,760 lines of data. This corresponds to 99% of the year. This is above the 90% threshold, so meets the requirements of the Defra guidance and is adequate for the dispersion modelling. **Error! Reference source not found.** shows the wind rose for 2019. It can be seen that the predominant wind direction is south westerly.

Figure F3.3 Wind rose for Teesside International Airport, 2019



Other input parameters

F3.30 The extent of mechanical turbulence (and hence, mixing) in the atmosphere is affected by the surface/ground over which the air is passing. Typical surface roughness values range from 0.0001m (for water or sandy deserts) to 1.5 (for cities, forests and industrial areas). In this assessment, the general land use in the local study area can be described in the model as

"Parkland, open suburbia" with a corresponding surface roughness of 0.5m. This is considered to be representative of the study area. The surface roughness value used for the meteorological station site was set to the same value.

F3.31 The minimum Monin-Obukhov length is a model parameter that describes the extent to which the urban heat island effect limits stable atmospheric conditions. A Monin-Obukhov length of 30m has been used in this dispersion modelling study. It is suggested in ADMS-Roads that this length is suitable for "Mixed urban/ industrial" (as described in ADMS). This is considered representative of the study area. The same Monin-Obukhov length was used for the meteorological station site.

NOx to NO_2 Conversion

F3.32 The dispersion model predicts NOx concentrations which comprise nitric oxide ('NO') and nitrogen dioxide ('NO_2'). NOx is emitted from combustion processes, primarily as NO with a small percentage of NO_2. The emitted NO reacts with oxidants in the air (mainly ozone) to form NO_2. NO_2 is associated with effects on human health. The air quality standards for the protection of human health are based on NO_2 rather than total NOx or NO.

F3.33 LAQM.TG16[xi] details an approach for calculating the roadside conversion of NOx to NO_2. This approach takes into account the difference between ambient NOx concentrations with and without the proposed development, differences in regional ozone concentrations and the different proportions of primary NO_2 emissions in different years, split by each local authority in the UK. This approach is available as a spreadsheet calculator, with the most up-to-date version being version 8.1, released in August 2020[xxi].

F3.34 This most up-to-date version of the calculator was therefore applied to the modelled NOx concentrations to determine the impact of the NOx emissions on ambient NO2 concentrations.

F3.35 The receptors selected in the modelling study are located across two local authority areas (RCBC and MC), so a sensitivity test was carried out to understand the differences in NOx:NO2 conversion using this tool. Although the results from each were very similar, NOx:NO2 conversion based on RCBC was chosen for all receptor locations to provide a conservative approach as RCBC resulted in a greater proportion of NO2 converted from NOx, and therefore marginally greater overall NO2 concentrations (usually to two decimal places).

Model Verification

F3.36 Model verification refers to the comparison of modelled and measured pollutant concentrations at the same locations to determine the performance of the model. Should the majority of model results for NO_2 be within ±25% of the measured values and there is no systematic over or under-prediction of concentrations, then the LAQM.TG16[xi] guidance advises that no adjustment is necessary. If this is not the case, modelled concentrations are adjusted based on the observed relationship between modelled and measured NO_2 concentrations to provide a better agreement.

F3.37 The outcome of the model verification is reported in Section F5.0.

Significance Criteria

F3.38 The 2017 EPUK/IAQM guidance note [xii] provides an approach to determining the air quality impacts resulting from a proposed development and the overall significance of local air quality effects arising from a proposed development. For consistency with the other technical chapters, notes are included below to show how the EPUK/IAQM guidance relates to the EIA significance

criteria used within this ES. The EIA significance criteria are then adopted within the Potential Effects and Residual Effects sections of this Chapter.

F3.39 Firstly, the EPUK/IAQM guidance note states that impact descriptors are determined based on the magnitude of incremental change as a proportion of the relevant assessment level, in this instance the annual mean NO_2, PM_{10}, and $PM_{2.5}$ objectives. The change is then examined in relation to the predicted total pollutant concentrations in the assessment year and its relationship with the annual mean NO_2, PM_{10}, and $PM_{2.5}$ objectives.

F3.40 If the impact descriptor is Negligible or Slight (Minor), this is considered to not have a significant effect. The overall significance is determined by professional judgement.

F3.41 The assessment framework for determining impact descriptors at each of the assessed receptors is shown in Table F3.2. The EIA significance criteria used within this ES include Substantial, Moderate, Minor and Negligible/Neutral and reference to these terms are included in the below table. Impacts can be either adverse or beneficial.

Table F3.2: Impact descriptors

Annual average concentrations at receptor in the assessment year	**% Change in concentrations relative to annual mean NO_2 and PM_{10} objectives**			
	1	2-5	6-10	>10
75% or less of objective	Negligible	Negligible	Slight (Minor)	Moderate
76-94% of objective	Negligible	Slight (Minor)	Moderate	Moderate
95-102% of objective	Slight (Minor)	Moderate	Moderate	Substantial
103-109% of objective	Moderate	Moderate	Substantial	Substantial
110% of more of objective	Moderate	Substantial	Substantial	Substantial
Note: Changes in pollutant concentrations of 0% i.e. <0.5% would be described as Negligible.				

F3.42 The guidance also provides advice for determining the magnitude of change for hourly mean NO_2 concentrations, which is shown in Table F3.3. The impact descriptor is determined by considering the process contribution only. However, in assessing the significance, consideration is also given to total pollutant concentrations, including background concentrations, and comparison of these with the hourly mean NO_2 objective.

Table F3.3: Magnitude of change for hourly mean NO_2 concentrations

Change in hourly mean concentrations at receptor in the assessment year	**Magnitude of Change**	**Impact Descriptor**
<10% of hourly mean NO_2 threshold	Imperceptible	Negligible
10-20% of hourly mean NO_2 threshold	Small	Slight (Minor)
20-50% of hourly mean NO_2 threshold	Medium	Moderate
>50% of hourly mean NO_2 threshold	Large	Substantial

F3.43 The impact descriptors at each of the assessed receptors can then be used as a starting point to making a professional judgement on the overall significance of effect of a proposed development, however other influences would also need to be taken into account, such as:

i. The existing and future air quality in the absence of the development;

ii. The extent of current and future population exposure to the impacts; and

iii. The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

F3.44 Professional judgement should be used to determine the overall significance of effects of the proposed development, however in circumstances where the proposed development can be judged in isolation, it is likely that a 'Moderate' or 'Substantial' impact will give rise to a significant effect and a 'Negligible' or 'Slight' (Minor) impact will not result in a significant effect.

F3.45 Construction related air quality impacts are considered to be temporary, short-term, direct and adverse. Operational air quality impacts are considered to be permanent, long-term and direct. Each technical chapter describes the type of impact where impacts are identified, using terms such as those above. In this Chapter, where Negligible impacts are identified, a type of effect will not be assigned. This is because there is not considered to be a potential impact and therefore no or Negligible effect is likely to be felt.

Consultation

F3.46 Consultation has been undertaken with the EHO at RCBC to agree the methodology and to agree the scope of the construction and operational assessments. The EHO agreed with the proposed scope and methodology (the details of which are set out above).

F3.47 The EHO asked the team to clarify how cumulative effects would be assessed. The author responded to state that the operational traffic data included committed development traffic and is inherently cumulative in that regard. On a wider scale, it is known that there are five sites within the Teesworks area, including Dorman Point, that are being brought forward at a similar time, and it was confirmed to the EHO that a further cumulative assessment would be carried out assessing the five developments operating together, along with the neighbouring STDC development known as South Bank. The author also noted that a process contribution from the nearby Energy from Waste ('EfW') site known as Prairie would be included in the cumulative assessment. The approach to the cumulative assessment is set out in detail within Chapter N of this ES.

F3.48 A copy of the full consultation with the EHO is provided in Appendix F2.

Assumptions and Limitations

F3.49 There are a number of assumptions that have been made for the air quality assessment:

i. Emissions from industrially regulated processes are represented in the Defra background concentrations that were used in the assessment;

ii. It is assumed that no boilers, Combined Heat and Power plant or generators are included as part of this development at this stage, and therefore none are included in this assessment;

iii. Modelled road speeds of 20kph were used for all junctions and roundabouts to represent congested conditions, unless the speeds provided were less than 20kph;

iv. For all other roads the vehicle speeds in the model were assumed to be in line with the speed limit for the particular road, which is in keeping with the traffic data provided;

v. Future emissions have been modelled at 2019 levels to account for the lack of observed real world improvements in transport emissions, which provides a conservative assessment; and

vi. All necessary committed development was included in the traffic data provided. More detail on this can be found in Chapter C (Transport) of this ES.

F3.50 Air quality dispersion modelling has inherent limitations and areas of uncertainty within it, which are listed below:

i. Traffic data used in the air quality model. In particular, due to the Covid-19 pandemic, traffic surveys could not be undertaken in 2020 and the transport model was validated against a variety of existing sources of data for the area. Further assumptions and limitations around the traffic data are described in Chapter C (Transport);

ii. In addition to the above, the lack of traffic survey data required the development of a distribution approach for the traffic based on car trips, that was then applied to the total vehicles and HDVs. As a result, it is expected that the number of HDVs is likely to be an overestimate at some locations and underestimate at other locations;

iii. Traffic emissions data have been estimated using the latest EFT [xx];

iv. Simplifications in model algorithms and empirical relationships that are used to simulate complex physical and chemical processes in the atmosphere;

v. Meteorological data used in the assessment, although this is from an appropriate local monitoring site at Teesside International Airport;

vi. Although contributions from surrounding industrial processes are generally considered to be included within Defra background concentrations, it is noted here that a new Medium Combustion Plant ('MCP') exists within 1km of the proposed development (further details are provided in paragraph F4.3). As this is a new MCP, it is unknown if process contributions from this plant are included in the Defra background concentrations and these could be a slight underestimate. However, it should be noted that for the future year assessments, 2019 background data were used as a conservative approach, so this is unlikely to affect the DM and DS results, which are used to determine the impact and effect; and

vii. Given that full details of the proposed construction are currently not available at the time of writing, due to this application being outline, the construction traffic assessment has not been undertaken. An assessment will be undertaken once more information is known about the number and type of vehicle trips to and from the site and on the local road network. As set out in Chapter C (Transport) it will be undertaken based on a series of embedded mitigation measures that are built into the design of the development, namely the Framework CEMP and Construction Traffic Management Plan ('CTMP').

F3.51 In order to verify that the assessment is robust despite the above limitations, model verification is undertaken. Details of this are provided in Section F5.0.

F4.0 Baseline Conditions

Existing Conditions

Sources of Air Pollution – Industrial Processes

F4.1 Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met, and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A(1), A(2), Part B or MCP processes, and are regulated through the Pollution Prevention and Control ('PPC') system [xxii], [xxiii]. The larger more polluting processes are regulated by the Environment Agency ('EA'), and the smaller less polluting ones are regulated by local authorities. Local authorities focus on regulation for emissions to air, whereas the EA regulates emissions to air, water and land.

F4.2 There is one current industrial process with releases to air listed on the EA website[xxiv] within 1km of the site. The process is a new MCP on land bounded by the A66 Tees Dock Road, which is located approximately 200m to the south of the proposed development.

F4.3 The impact of industrially regulated facilities further from the proposed development are considered to be represented in the background concentrations used in this assessment, however it is unknown if the new MCP site is operational at this time and so it is unknown if the emissions from this site would be included in the Defra background concentrations.

F4.4 In addition, a new Energy from Waste ('EfW') plant known as Prairie has been granted outline planning permission, and this plant will be situated within the site boundary of the proposed development. As there is no detailed design information for the Prairie facility yet, the proposed development has been designed to incorporate land where the EfW plant is proposed to ensure that all land is eventually developed. In reality, if both schemes come forward, both of their designs will complement each other. For robustness, process contributions from the EfW plant will be included in the cumulative assessment, which is provided in Chapter N.

Local Air Quality

F4.5 The Environment Act 1995 [xxv] required local authorities to review and assess air quality with respect to the objectives for seven pollutants specified in the National Air Quality Strategy. Local authorities were required to carry out an Updating and Screening Assessment ('USA') of their area every three years and are now required to complete an ASR every year. If the ASR identifies potential hotspot areas likely to exceed air quality objectives, then a detailed assessment of those areas is required. Where objectives are not predicted to be met, local authorities must declare the area as an AQMA. In addition, local authorities are required to produce an Air Quality Action Plan ('AQAP'), which includes measures to improve air quality in the AQMA.

F4.6 A review of the Defra website [xxvi] and the RCBC ASR [xiii] showed that there are no AQMAs in the RCBC administrative area.

Local Monitoring

F4.7 The following sections detail local air quality monitoring undertaken by RCBC and Middlesbrough Council ('MC') to determine baseline air quality conditions.

F4.8 A review of existing local air quality conditions in the vicinity of the proposed development has been undertaken. RCBC and MC carry out both automatic monitoring and passive monitoring

(using diffusion tubes). All monitoring within a 2km radius of the proposed development is described in the sections below. The 2km buffer includes all relevant data.

Automatic Monitoring

F4.9 RCBC and MC carry out automatic monitoring but there are no monitoring sites within 2km of the site boundary.

F4.10 Automatic or continuous monitoring involves continuously drawing air in through an analyser to obtain near real-time pollutant concentration data. A review of the latest RCBC ASR[xiii] and MC data[xv] showed that there are no automatic monitoring sites within 2km of the proposed development.

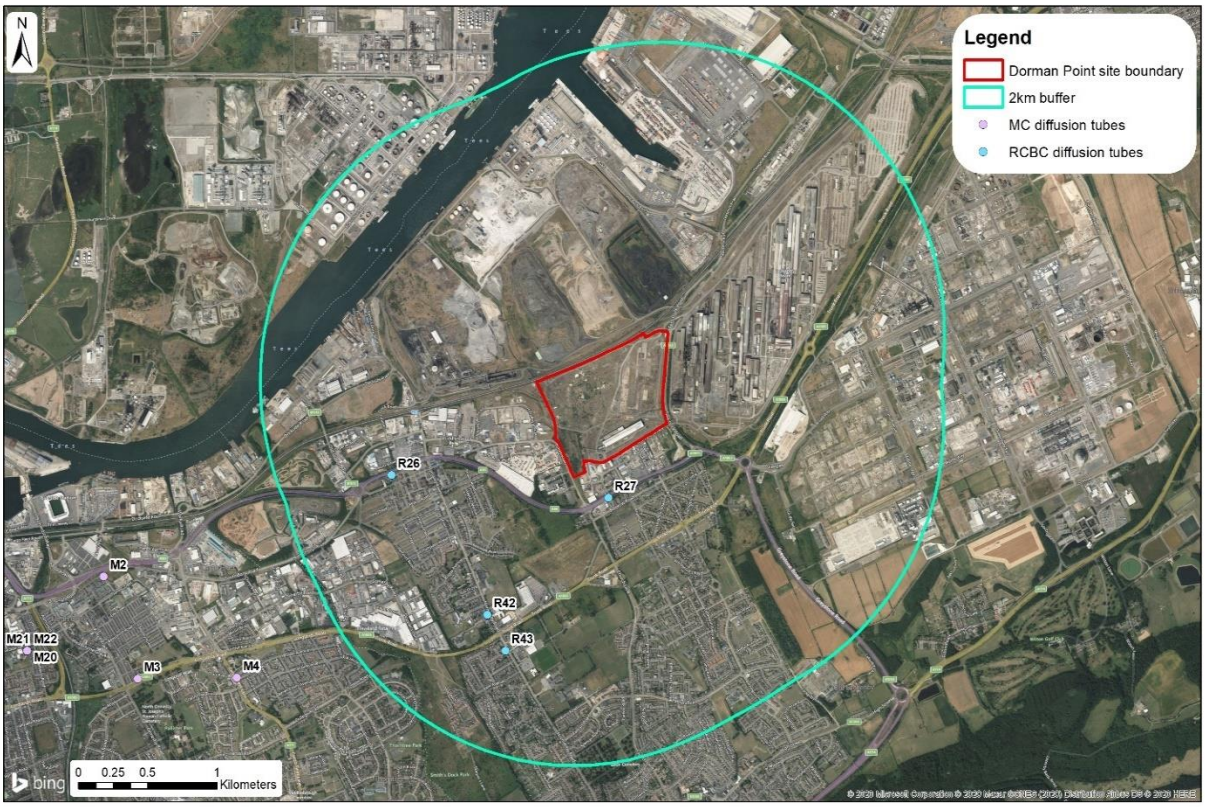
Diffusion Tube Monitoring

F4.11 RCBC operate 18 diffusion tubes in their administrative area. Four of these diffusion tubes are within 2km of the proposed development. Details of these diffusion tubes are provided in **Error! Reference source not found.**. The locations of these monitoring sites are shown in **Error! Reference source not found.**.

Table F4.1 Diffusion tube monitoring sites

Site ID	Site location	OS grid reference		Site type	Distance to kerb of nearest road (m)
		X	Y		
R26	South Bank, Trunk Road	453142	520836	Roadside	11.0
R27	West Lane, Grangetown	454712	520678	Roadside	1.0
R42	Primrose Court	453834	519869	Roadside	9.6
R43	Normanby Road	453964	519621	Roadside	11.6

Figure F4.1 Monitoring sites within 2km of the proposed development



F4.12 Monitored NO_2 concentrations from 2014 to 2019 are reported in **Error! Reference source not found.**. The results at R27 provide the closest monitoring data for the site. This data shows that concentrations of NO_2 are well below the air quality objective for annual mean NO_2 at roadside locations.

F4.13 No exceedances were recorded at any of these monitoring sites between 2014 and 2019. The maximum concentration in 2019 was recorded at R27 and was 24.8µg/m³.

Table F4.2 Diffusion tube annual mean NO2 monitoring results 2014-2019

Site ID	Site location	NO_2 annual mean concentration (µg/m³) [a]					
		2014	2015	2016	2017	2018	2019
R26	South Bank, Trunk Road	23.1	21.9	20.5	19.8	24.7	19.5
R27	West Lane, Grangetown	30.6	30.0	26.4	25.5	29.8	24.8
R42	Primrose Court	-	-	-	-	16.6	13.9
R43	Normanby Road	-	-	-	-	16.1	15.2
Air quality objective		40 µg/m³					

Notes:
[a] Mean concentrations have been bias adjusted. All means have been annualised in accordance with LAQM Technical Guidance, if valid data capture is less than 75%.
"-" denotes that no data is available.

Defra Background Concentrations

F4.14 The Defra website includes estimated background pollutant concentrations for NOx, NO_2, PM_{10} and $PM_{2.5}$ for each 1km by 1km OS grid square. Background pollutant concentrations for the

baseline modelling year (2019) have been obtained for the grid square in which the proposed development is located and are presented in **Error! Reference source not found.**.

Table F4.3 Defra 2019 background concentrations of NOx, NO2, PM10 and PM2.5

Location	OS Grid Square		Annual Mean Concentration (µg/m^3)			
	X	Y	NOx	NO_2	PM_{10}	$PM_{2.5}$
Proposed development	454500	521500	18.8	13.4	10.2	6.8
	454500	520500	20.5	14.6	11.3	7.3
	455500	521500	18.6	13.3	10.6	7.0

F4.15 The estimated Defra background concentrations are well below the air quality objectives for annual mean NO_2, PM_{10} (40µg/m^3) and for $PM_{2.5}$ (25µg/m^3).

F4.16 There are no urban background monitoring sites close to the proposed development (the nearest urban background monitoring site is over 4km to the west). As such, Defra background concentrations have been used in this assessment.

Future Baseline

F4.17 There is potential for local air quality conditions to change from the baseline year, 2019, up to 2033. Local air quality could improve due to vehicle improvements over time and a shift towards increased use of public transport, since air quality is becoming a nationally important issue.

F4.18 However, due to the uncertainty in future emission rates from road vehicles, this assessment uses a conservative approach and assumes no real-world improvement in emissions from vehicles between 2019 and 2033. As such, the potential for little to no significant future improvements to local air quality has been accounted for in this assessment.

F4.19 Should the proposed development not go ahead then it is likely that some alternative development would happen on the site given both the local planning policy position set out in chapter B and existing permissions. Therefore, the future baseline would be similar to that of the proposed development.

F5.0 Potential Effects

Embedded Mitigation

Construction

F5.1 As described in Section F3.8, the best practice construction dust mitigation measures for high risk sites outlined in the IAQM guidance [ix] have been included in the Framework CEMP and are considered as embedded mitigation and allowed construction dust to be scoped out of the assessment. These measures are outlined below for reference. Further information on the Framework CEMP is included within Chapter B (Site Description and Scheme Proposals) of this ES.

General

i. Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager;

ii. Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;

iii. Develop and implement a Dust Management Plan, which will include measures to control other emissions, approved by the local authority; and

iv. Display the head or regional office contact information.

Site Management

i. Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken;

ii. Make the complaints log available to the local authority when asked; and

iii. Record any exceptional incidents that cause dust and/or air emissions, both on- or off-site and the action(s) taken to resolve the situation in the log book.

Monitoring

i. Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results and make an inspection log available to the local authority, when asked;

ii. It is highly recommended that dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations is carried out and locations agreed with the Local Authority prior to commencement. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction; and

iii. Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Site Maintenance

i. Plan site layout so that machinery and dust causing activities are located away from receptors, as far as practical or possible;

ii. Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;

iii. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;

iv. Avoid site runoff of water or mud;

v. Keep site fencing, barriers and scaffolding clean using wet methods;

vi. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site;

vii. Cover, seed or fence stockpiles to prevent wind whipping; and

viii. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out.

Operating Vehicle/Machinery and Sustainable Travel

i. Ensure all vehicles switch off engines when stationary – no idling vehicles;

ii. Produce a Construction Logistics Plan (CTMP) to manage the sustainable delivery of goods and materials (see Chapter C (Transport));

iii. Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing) (see Chapter C (Transport)) for more details); and

iv. Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.

Operations

i. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques, such as water sprays or local extraction;

ii. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;

iii. Use enclosed chutes and conveyors and covered skips;

iv. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use the fine water sprays on such equipment wherever appropriate;

v. Avoid scabbling (roughening of concrete surfaces) if possible; and

vi. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste management

i. Avoid bonfires and burning of waste materials.

Measures Specific to Earthworks

i. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;

ii. Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable;

iii. Only remove the cover in small areas during work and not all at once.

Measures Specific to Construction

F5.2 The following measures are considered as desirable for construction for high risk construction impacts.

i. Avoid scabbling (roughening of concrete surfaces) if possible; and

ii. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

Measures Specific to Trackout

F5.3 As with the construction and earthworks mitigation, the below measures are highly recommended by IAQM for high risk trackout impacts.

i. Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;

ii. Avoid dry sweeping of large areas;

iii. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;

iv. Record all inspections of haul routes and any subsequent action in a site log book;

v. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable); and

vi. Access gates to be located at least 10 m from receptors where possible.

Operation

F5.4 There are no embedded mitigation measures that relate to the operational phase of the proposed development in terms of air quality.

Major Hazards and Accidents

F5.5 The potential for major hazards and accidents associated with the proposed development and surrounding area is not relevant to the air quality assessment. Based on the information available at this outline planning stage, it is considered unlikely that there would be significant effects from major hazards and accidents on air quality, assuming industrial uses that could include storage of hazardous combustible materials are not proposed for the site. This can be reviewed at detailed design stage once the intended industrial uses are known.

Phasing

Construction

F5.6 There are several sites within the Teesworks area that will be constructed in a similar timeframe. However, high risk mitigation measures from the IAQM guidance [ix] have been included in the Framework CEMP as embedded mitigation measures, which will address the potential overlap of construction of the various sites.

Operation

F5.7 The phasing of the proposed development shows the site will be operational by 2032 and the other developments within the Teesworks area will also be operational from 2032 to 2033. The

operational traffic data provided by the transport consultants assumes that all of the sites within the Teesworks area that are coming forward in a similar timeframe are operational by 2033. This is a conservative assumption in the traffic data for the proposed development.

During Construction

Construction Traffic

F5.8 A quantitative assessment of the air quality effects as a result of construction traffic has not been undertaken at this time. An assessment will be undertaken once more information is known about the number and type of vehicle trips to and from the site and on the local road network. Notwithstanding this, and as referred to above, a CTMP has been embedded into the proposed development and this will be taken into account in any future assessment.

During Operation

Model Verification

F5.9 Model verification was undertaken using five local diffusion tube monitoring sites operated by RCBC and MC, which are shown in Table F5.11. The locations of the monitoring sites used in the model verification exercise are shown with the modelled road network on **Error! Reference source not found.**. It should be noted that sites M29-M31 are triplicate sites that are co-located with an automatic monitor.

F5.10 Other monitoring sites were not included in the model verification as they were considered unsuitable for inclusion based on their location or the lack of traffic data available.

Table F5.1: Monitoring sites included in the model verification

Monitoring Site ID	Site Name	OS grid reference (m)		Height (m)
		X	Y	
R26	Diffusion Tube R26	453500	520500	2.5
R27	Diffusion Tube R27	454500	520500	2.0
M13	Diffusion Tube M13	447945	519098	2.8
M23	Diffusion Tube M23	449451	520631	7.1*
M29, M30, M31	Diffusion Tubes M29, M30 and M31	447967	519020	2.1
* This diffusion tube is situated at height above the A66 flyover.				

F5.11 Monitoring results for these diffusion tubes were obtained via the RCBC ASR[xiii] or were provided directly to the author by the EHO at MC [xv]. These were compared with the modelled concentrations at the same locations. The model verification was undertaken following the methodology described in LAQM.TG16 [xi].

F5.12 A comparison of monitored and modelled annual mean NO_2 concentrations for 2019 are shown in Table F5.2. The model was shown to slightly underpredict at two sites and slightly overpredict at three others. The percentage difference between the monitored and modelled results before adjustment ranges from -8.8% to +8.9%. As these percentage differences are within the recommended guideline stated in LAQM.TG16 [xi]of ±25%, therefore no verification factor has been applied and the model is considered to be performing well.

F5.13 All monitoring sites used within the model verification exercise are roadside sites, as recommended in LAQM.TG16 [xi].

Table F5.2: Comparison of modelled and monitored annual mean NO_2 concentrations

Site ID	Background NO_2 concentration ($\mu g/m^3$)	Monitored NO_2 concentration ($\mu g/m^3$)	Modelled NO_2 concentration ($\mu g/m^3$)	% Difference (modelled - monitored)/ monitored
Before adjustment				
R26	15.1	19.5	19.5	+4.6%
R27	13.9	24.8	22.7	-5.5%
M13	19.7	22.8	24.8	+8.9%
M23	22.0	30.5	27.8	-8.8%
M29, M30, M31	19.7	28.0[a]	29.1	+4.2%
Notes: Concentrations are provided to one decimal place. [a] The monitored concentrations of the triplicate sites were averaged to provide one concentration to compare modelled concentrations to.				

F5.14 The comparison of monitored and modelled annual mean NO_2 concentrations are shown below and a graph showing the model verification before adjustment is shown in **Error! Reference source not found.**.

Figure F5.1 Graph showing model agreement with no adjustment factor

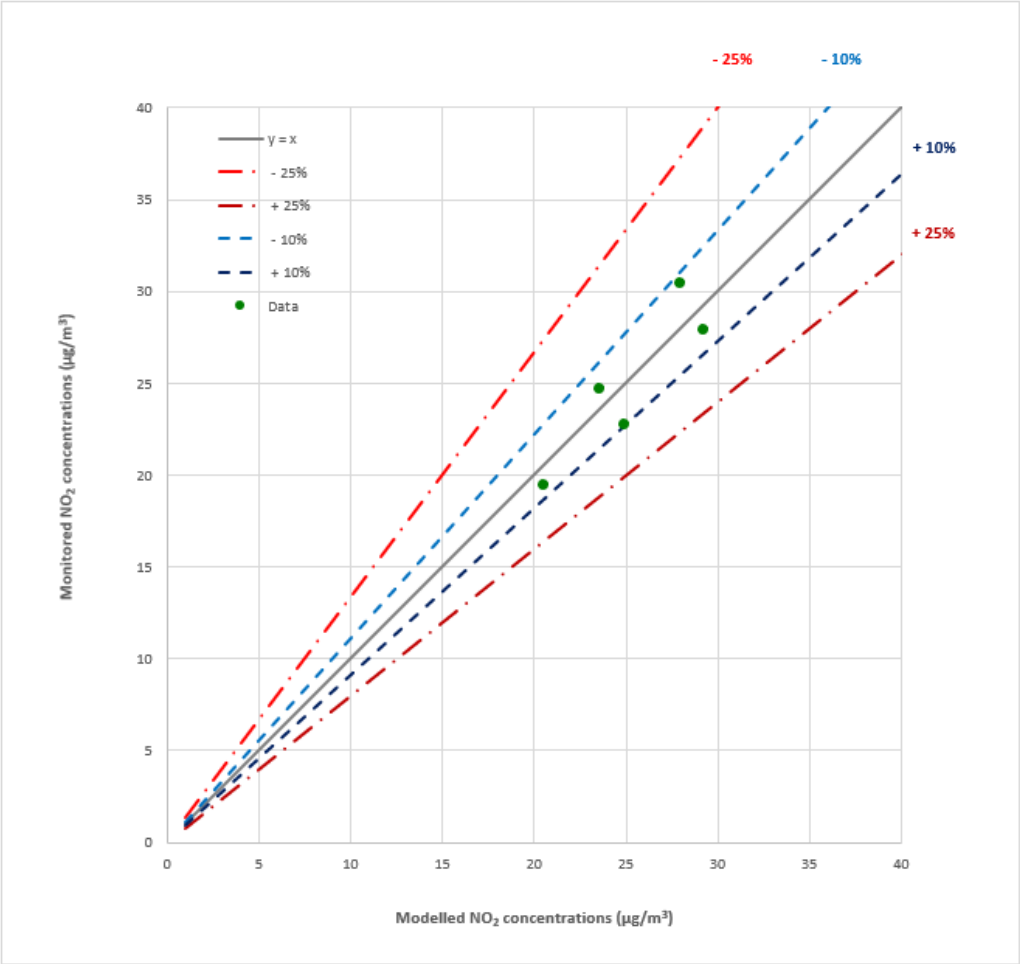
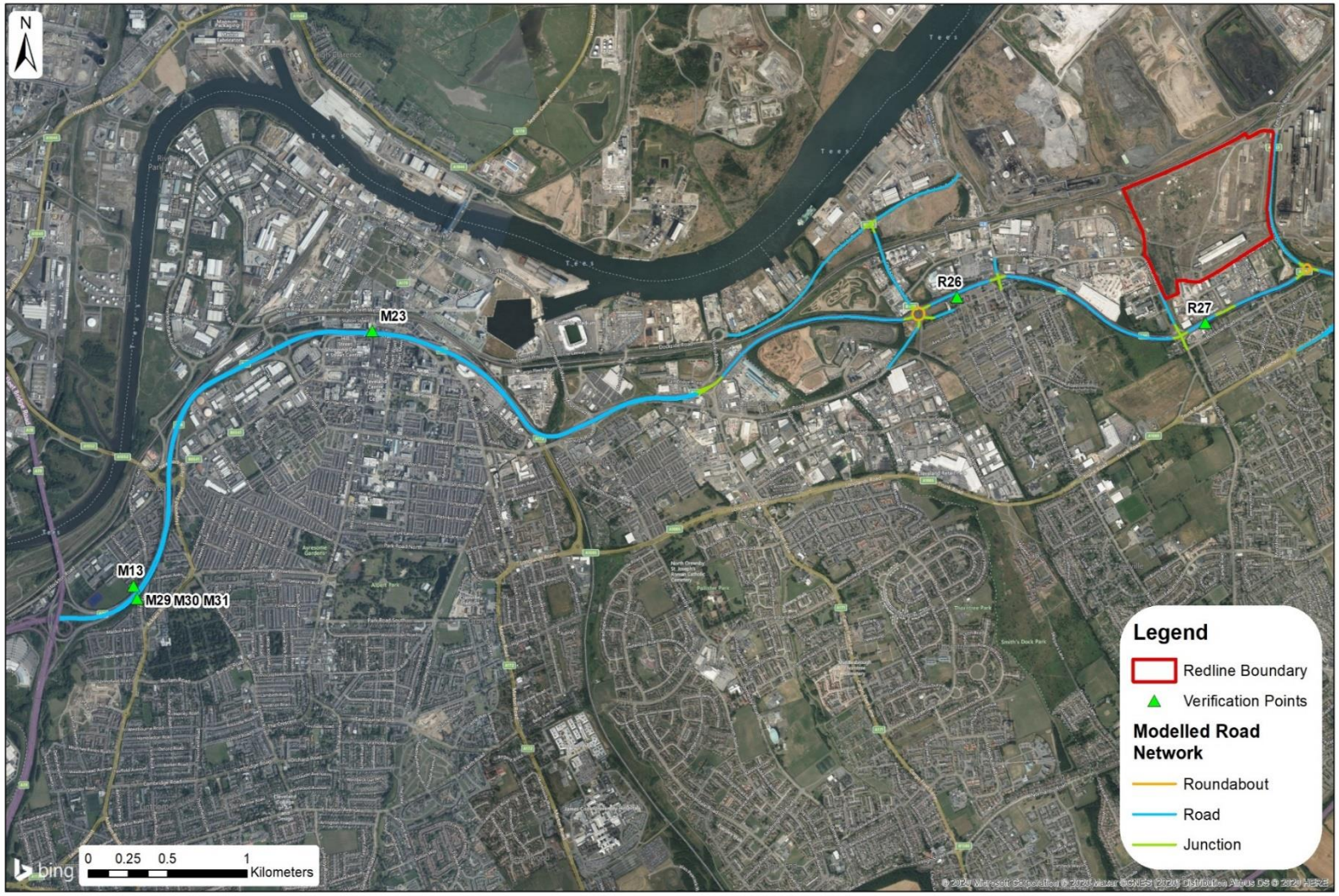


Figure F5.2 Locations of monitoring sites used for model verification



Operational Traffic

F5.15 This section provides the results of the assessment of effects from the operational traffic associated with the proposed development on air quality.

Model Results – NO_2

F5.16 The predicted annual mean concentrations of NO_2 for all three scenarios (Baseline 2019, DM 2033 and DS 2033) at each receptor are presented in Appendix F3, Table 1. The magnitude of impact with the proposed development operational has been assessed using the EPUK significance criteria [xii] and results are also provided in Appendix F3, Table 1. Predicted concentrations are below the annual mean air quality objective (40µg/m^3) at all of the sensitive receptor locations for each modelled scenario. The highest concentration was predicted at receptor R18 (an existing residential receptor at Aidan Court) and was 36.1µg/m^3 in the baseline scenario, 36.5µg/m^3 in the DM scenario and 36.6µg/m^3 in the DS scenario.

F5.17 The magnitude of change for annual mean NO_2 concentrations is predicted to result in a Negligible impact at all existing receptor locations and is considered to be Not Significant.

F5.18 The two ecological receptors (E1 Teesmouth and Cleveland Coast SSSI and E2 Teesmouth and Cleveland Coast SPA) included in this assessment were also found to experience a Negligible impact from NO_2 concentrations as a result of operational traffic. This is also considered to be Not Significant.

F5.19 According to TG16, previous research carried out on behalf of Defra and the Devolved Administrations identified that exceedances of the NO_2 1-hour mean are unlikely to occur where the annual mean is below 60µg/m^3. The predicted concentrations modelled here are well below 60 µg/m^3 so it can be concluded that there would be no exceedances of the hourly mean for NO_2.

Model Results – PM_{10}

F5.20 The predicted annual mean concentrations of PM_{10} for all three scenarios (Baseline 2019, DM 2033 and DS 2033) at each receptor are presented in Appendix F3, Table 2. The magnitude of impact with the scheme under operation has been assessed using the EPUK significance criteria [xii] and results are also provided in Appendix F3, Table 2. Predicted concentrations are below the annual mean air quality objective (40µg/m^3) at all of the sensitive receptor locations for each modelled scenario. The highest concentration was predicted at receptor R18 (an existing residential receptor at Aidan Court) and was 17.7µg/m^3 in the baseline scenario and 17.9µg/m^3 in both the DM and DS scenarios (when considered to one decimal place).

F5.21 The magnitude of change for annual mean PM_{10} concentrations is predicted to result in a Negligible impact at all existing receptor locations and is considered to be Not Significant.

F5.22 The two ecological receptors (E1 Teesmouth and Cleveland Coast SSSI and E2 Teesmouth and Cleveland Coast SPA) included in this assessment were also found to experience a Negligible impact from PM_{10} concentrations as a result of operational traffic. This is also considered to be Not Significant.

Model Results – $PM_{2.5}$

F5.23 The predicted annual mean concentrations of $PM_{2.5}$ for all three scenarios (Baseline 2019, DM 2033 and DS 2033) at each receptor are presented in Appendix F3, Table 3. The magnitude of impact with the scheme under construction has been assessed using the EPUK significance criteria [xii] and results are also provided in Appendix F3, Table 3. Predicted concentrations are below the annual mean air quality objective (25µg/m^3) at all of the sensitive receptor locations

for each modelled scenario. The highest concentration was predicted at receptor R18 (an existing residential receptor at Aidan Court) and was 11.2µg/m^3 in the baseline scenario and 11.3µg/m^3 in both the DM and DS scenarios (when considered to one decimal place).

F5.24 The magnitude of change for annual mean $PM_{2.5}$ concentrations is predicted to result in a Negligible impact at all existing receptor locations and is considered to be Not Significant.

F5.25 The two ecological receptors (E1 Teesmouth and Cleveland Coast SSSI and E2 Teesmouth and Cleveland Coast SPA) included in this assessment were also found to experience a Negligible impact from $PM_{2.5}$ concentrations as a result of operational traffic. This is also considered to be Not Significant.

Assessment of significance

F5.26 The magnitude of change for NO_2, PM_{10} and $PM_{2.5}$ concentrations is negligible at all receptors. As stated in paragraph F3.44, where the impact is Negligible or Slight (Minor) then the overall effect of the proposed development on local air quality is predicted to be Not Significant.

Cumulative Effects

F5.27 As described in the operational traffic methodology (see paragraph F3.13), the traffic data provided includes committed developments and this assessment is therefore inherently cumulative.

F5.28 In addition to this, a further cumulative assessment is provided in Chapter N that includes each of the five sites within the Teesworks area, the South Bank site and a process contribution from the proposed EfW plant, as well as the committed developments used in the main assessment.

F6.0 Mitigation and Monitoring

During Construction

F6.1 Once the detailed design of the scheme is known, the assessment of construction traffic will identify the need for any specific mitigation measures. Notwithstanding this, a Framework CEMP and CTMP will minimise air quality-related construction traffic impacts and these will be embedded into the proposed development.

During Operation

F6.2 There are no significant effects predicted as a result of the operational phase of the proposed development, therefore no air quality mitigation measures are required.

F7.0 Residual Effects

During Construction

F7.1 An assessment of the residual air quality effects as a result on construction traffic will be undertaken once detailed construction traffic information is known.

During Operation

F7.2 The assessment has demonstrated that the effects will be Negligible and therefore Not Significant as a result of the operational phase of the proposed development. As no mitigation and monitoring measures have been proposed, the conclusions remain the same (the residual effects will be Negligible and Not Significant) for all receptors.

F8.0 Summary & Conclusions

F8.1 An assessment of likely air quality effects arising as a result of the construction and operation of the proposed development at Dorman Point has been undertaken.

F8.2 A review of current legislation, planning policy and a baseline assessment describing the current air quality conditions in the vicinity of the proposed development was carried out. The proposed development does not contradict policy or legislation relating to air quality.

F8.3 Current monitoring undertaken by RCBC indicates that the air quality at roadside locations in the area surrounding the proposed development is below the national annual mean NO_2 objective. At the monitoring location nearest to the proposed development, the concentrations are well below the objective.

F8.4 Best practice mitigation measures in line with the IAQM guidance on the assessment of construction practices have been included as embedded mitigation. With the appropriate best practice mitigation measures suitable for high risk sites in place, there is likely to be a Negligible effect on all receptors from the dust-generating activities onsite, as such this was scoped out of the assessment. An assessment of the air quality effects as a result of construction traffic will be undertaken once more detailed information is known about the number and type of vehicle trips to and from the site.

F8.5 A detailed modelling assessment was carried out for the operational phase traffic to determine the likely impact of the proposed development. The assessment showed that all pollutant concentrations at all sensitive receptor locations are predicted to be below the relevant air quality objectives.

F8.6 The magnitude of change for NO_2, PM_{10} and $PM_{2.5}$ concentrations at all receptors is Negligible. The overall effect of the proposed development on local air quality is therefore predicted to be Not Significant. Therefore, no mitigation measures are proposed for the operational phase.

Table F8.1 Summary of Effects

Receptor	Impact	Potential Effects (taking account of embedded mitigation)	Additional Mitigation and Monitoring	Residual Effects
During Construction				
All sensitive receptors	Construction traffic impact on local air quality and subsequent effect on human health and ecological receptors	Not assessed at this time	N/A	N/A
During Operation				
All sensitive receptors	Operational traffic impact on local air quality and subsequent effect on human health and ecological receptors	Negligible and Not Significant	None.	Negligible and Not Significant

F9.0 Abbreviations & Definitions

1 AADT: Annual Average Daily Traffic
2 ADMS: Atmospheric Dispersion Modelling System
3 AQAP: Air Quality Action Plan
4 AQMA: Air Quality Management Area
5 ASR: Annual Status Report
6 CEMP: Construction Environmental Management Plan
7 CEnv: Chartered Environmentalist
8 CTMP: Construction Traffic Management Plan
9 Defra: Department of Environment, Food and Rural Affairs
10 DM: Do Minimum
11 DS: Do Something
12 EA: Environment Agency
13 EFT: Emission Factor Toolkit
14 EfW: Energy from Waste
15 EHO: Environmental Health Officer
16 EIA: Environmental Impact Assessment
17 EPUK: Environmental Protection UK
18 ES: Environmental Statement
19 EU: European Union
20 HDV: Heavy Duty Vehicle
21 HGV: Heavy Goods Vehicles
22 IAQM: Institute of Air Quality Management
23 IES: Institution of Environmental Sciences
24 kph: Kilometres per hour
25 LAQM: Local Air Quality Management
26 LDV: Light Duty Vehicles
27 MC: Middlesbrough Council
28 MCP: Medium Combustion Plant
29 NO: Nitric Oxide
30 NO_2: Nitrogen Dioxide
31 NOx: Nitrogen Oxides
32 NPPF: National Planning Policy Framework
33 OS: Ordinance Survey
34 PG: Policy Guidance
35 PM: Particulate Matter

36 PPC: Pollution Prevention Control
37 PPG: Planning Practice Guidance
38 RCBC: Redcar and Cleveland Borough Council
39 SO_2: Sulphur Dioxide
40 SPA: Special Protection Area
41 SSSI: Site of Special Scientific Interest
42 STDC: South Tees Development Corporation
43 TG: Technical Guidance
44 USA: Updating and Screening Assessment

F10.0 References

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