Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Environmental Statement

Volume 1

Chapter 22 - Air Quality

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Glossary of Acronyms

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System for Roads
APIS	Air Pollution Information System
ASR	Annual Status Report
BC	Breckland Council
BDC	Broadland District Council
CAS	Clean Air Strategy
CBS	Cement-Bound Sand
CEH	Centre for Ecology and Hydrology
CIA	Cumulative Impact Assessment
CoCP	Code of Construction Practice
CO_2	Carbon Dioxide
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
DPF	Diesel Particulate Filters
DECC	Department for Energy and Climate Change
DEFRA	Department for the Environment and Rural Affairs
DEP	Dudgeon Offshore Wind Farm Extension Project
DETR	Department of the Environment, Transport and the Regions
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DMT	Decision-Making Threshold
EA	Environmental Assessment
EC	European Commission
EFT	Emission Factor Toolkit
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EN-1	Energy
EN-3	Renewable Energy Infrastructure
EN-5	Electricity Networks Infrastructure
EPP	Evidence Plan Process
EPUK	Environmental Protection United Kingdom

ES	Environmental Statement
ETG	Expert Topic Group
EU	European Union
GC	Gaywood Clock
GYBC	Great Yarmouth Borough Council
HDD	Horizontal Directional Drilling
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicles
HVAC	High-Voltage Alternating Current
IAQM	Institute of Air Quality Management
IPC	Infrastructure Planning Commission (now Planning Inspectorate)
IRZ	Impact Risk Zone
JNCC	Joint Nature Conservation Committee
KLWNBC	King’s Lynn and West Norfolk Borough Council
km	Kilometre
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles
LNR	Local Nature Reserve
LPA	Local Planning Authority
MARPOL	International Convention for the Prevention of Pollution from Ships
MW	Megawatts
NB	Norfolk Boreas
NNDC	North Norfolk District Council
NorCC	Norwich City Council
NO_x	Nitrogen Oxide
NPS	National Policy Statement
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
NV	Norfolk Vanguard
oCoCP	outline Code of Construction Practice
OHID	Office for Health Improvement and Disparities
OS	Ordnance Survey
PEIR	Preliminary Environmental Information Report

PM	Particulate Matter
RIS	Road Investment Strategy
RMSE	Root Mean Square Error
RR	Railway Road
SAC	Special Area of Conservation
SEP	Sheringham Shoal Offshore Wind Farm Extension Project
SNC	South Norfolk Council
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UK	United Kingdom
UN	United Nations
WDC	Waveney District Council

Glossary of Terms

Order Limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.
Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP onshore site	The Dudgeon Offshore Wind Farm Extension onshore area consisting of the DEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Expert Topic Group (ETG)	A forum for targeted engagement with regulators and interested stakeholders through the EPP.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable route which would house HDD entry or exit points.
Jointing bays	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water
Onshore cable corridor	The area between the landfall and the onshore substation sites, within which the onshore cable circuits will be installed along with other temporary works for construction.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substation. 220 – 230kV.

Onshore Substation	Compound containing electrical equipment to enable connection to the National Grid.
PEIR boundary	The area subject to survey and preliminary impact assessment to inform the PEIR.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SEP onshore site	The Sheringham Shoal Wind Farm Extension onshore area consisting of the SEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
Study area	Area where potential impacts from the project could occur, as defined for each individual Environmental Impact Assessment (EIA) topic.
The Applicant	Equinor New Energy Limited

22 AIR QUALITY

22.1 Introduction

1. This chapter of the Environmental Statement (ES) describes the potential impacts of the proposed Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (DEP) on local air quality. The chapter provides an overview of the existing environment for the proposed onshore development area, followed by an assessment of the potential impacts and associated mitigation for the construction, operation, and decommissioning phases of SEP and/or DEP.

2. This assessment has been undertaken with specific reference to the relevant legislation and guidance, of which the primary source is the National Policy Statements (NPSs). The terminology and impact assessment methodologies used in this chapter differ from the generic impact assessment terminology presented within **Chapter 5 EIA Methodology**, as air quality guidance documents include specific assessment criteria. Details of these and the methodology used for the EIA and Cumulative Impact Assessment (CIA) are presented in **Section 22.4**.

3. The Planning Inspectorate has agreed, as stated in the Scoping Opinion (the Planning Inspectorate, 2019), to scope out both ‘Offshore Air Quality’ impacts and ‘Operational Impacts’ on air quality as the effects of these impacts are unlikely to be significant. Therefore, these elements have been scoped out of the assessment.

4. The assessment should be read in conjunction with the following linked chapters:

- **Chapter 20 Onshore Ecology and Ornithology**;
- **Chapter 24 Traffic and Transport**; and
- **Chapter 28 Health**.

5. Additional information to support the air quality assessment includes:

- **Appendix 22.1 Construction Dust and Particulate Matter Assessment Methodology**;
- **Appendix 22.2 Air Quality Assessment Traffic Data**;
- **Appendix 22.3 Air Quality Background Pollutant Concentrations**;
- **Appendix 22.4 Designated Ecological Sites and Critical Level and Load Values in the Air Quality Study Area**; and
- **Appendix 22.5 Air Quality Ecological Receptor Assessment Tables**.

22.2 Consultation

6. Consultation with regard to air quality has been undertaken in line with the general process described in **Chapter 5 EIA Methodology** and the **Consultation Report** (document reference 5.1). The key elements to date have included scoping, initial consultation with local authorities within the onshore DCO order limits (i.e. North Norfolk District Council (NNDC), Broadland District Council (BDC) and South Norfolk Council (SNC)) and the Preliminary Environmental Information Report (PEIR).

7. The feedback received throughout this process has been considered in preparing the ES. This chapter has been updated following consultation in order to produce the final assessment submitted within the Development Consent Order (DCO) application. **Table 22.1** provides a summary of the consultation responses received to date relevant to this topic, and details of how the Project team has had regard to the comment and how these have been addressed within this chapter.

8. The consultation process is described further in **Chapter 5 EIA Methodology**. Full details of the consultation process is presented in the **Consultation Report** (document reference 5.1), which has been submitted as part of the DCO application.

Table 22.1: Consultation Responses

Consultee	Date/ Document	Comment	Project Response
Scoping Responses			
The Planning Inspectorate	Scoping Opinion, 2019	Offshore Air Quality: The Scoping Report notes that marine exhaust emissions are limited in line with the provisions of International Convention for the Prevention of Pollution from Ships (MARPOL). It considers that the number of vessels and the associated atmospheric emissions would be small in comparison to the total shipping activity in this region of the North Sea, and that there are no offshore human receptors sensitive to air quality, and marine-based ecological designations are unlikely to be sensitive to air pollution impacts or are dominated by other sources of inputs. On this basis, the Inspectorate agrees that effects are unlikely to be significant and that this aspect can be scoped out of the ES.	Noted. Offshore air quality impacts have been scoped out of the assessment.
		Operational Impacts: The Scoping Report proposes to scope out operational air quality impacts. It states that operation of the proposed built infrastructure would not give rise to any emissions to air and that maintenance activities would not lead to a significant change in vehicle flows within the study area. However, no vehicle movement figures have been provided in the Scoping Report to support this assertion but the Inspectorate anticipates the numbers of movements are unlikely to lead to significant effects. Nevertheless, the Planning Inspectorate considers that given the nature of the development and as there are no designations for poor air quality within the scoping area (i.e. Air Quality Management Areas), significant effects to onshore operational air quality are unlikely and that this matter can be scoped out of the assessment.	Noted. Operational impacts have been scoped out of the assessment.
		Transboundary Impacts:	Noted. Transboundary impacts have been scoped out of the assessment.

Consultee	Date/ Document	Comment	Project Response
		Table 3-17 proposes to scope out transboundary impacts to air quality, although no justification is provided within the aspect chapter. Nevertheless, given the nature of the Proposed Development the Inspectorate agrees that significant transboundary effects are unlikely to occur and therefore this matter can be scoped out of the ES.	
		Study Area: The Scoping Report states that designated ecological sites within 50m of construction works and 200m of the road network may be affected. The Inspectorate considers that a 200m buffer should also be applied to construction works.	Noted. For the construction phase dust assessment, designated ecological sites within 200m of construction works within the red line boundary are considered in this chapter. For the construction phase road traffic emissions assessment, all designated ecological receptors within 200m of affected roads have been considered.
		Construction Phase Emissions: The Scoping Report addresses the potential for increases in emissions from road vehicles generated during construction. The ES should also assess impacts from construction plant emissions, where significant effects are likely.	Construction plant emissions are considered in **Section 22.6.1.2**.
		No Field Surveys Proposed to Inform Characterisation of Existing Environment: As no site specific air quality monitoring surveys are proposed, the ES should include a justification in support of the existing air quality monitoring data used to inform the assessment and its appropriateness to robustly inform the assessment.	The existing air quality monitoring data coverage is considered to be appropriate. This is presented in **Section 22.5.2**.
		Air Quality Modelling: The ES should provide details of the dispersion modelling used to inform the assessment, including the relevant input parameters.	Details of dispersion modelling used in the assessment are provided in **Section 22.4.3.3**.

Consultee	Date/ Document	Comment	Project Response
		Stakeholder Engagement: The Applicant should make effort to agree the methodology and choice of air quality receptors with relevant consultation bodies including the Environmental Health Officers of the local authorities and the EA as appropriate.	The air quality assessment methodology was agreed with the Environmental Health Officers (EHOs) at NNDC, BDC and SNC. Consideration has been given to any Section 42 responses received as part of the consultation on the PEIR.
		Statutory Air Quality Limits: The Inspectorate considers that the ES should include an assessment of impacts associated with all relevant pollutants under the EU ambient air quality directive including increases in $PM_{2.5}$ resulting from the Proposed Development where relevant. In determining significance, the assessment should take into account performance against relevant target/limit values.	The construction phase traffic exhaust emissions assessment (see **Section 22.6.1.3**) includes an assessment of NO_2, PM_{10} and $PM_{2.5}$ concentrations. The relevant Objectives and target used in the assessment are provided in **Table 22.5**, these are the EU Limit Values and have been implemented via the Air Quality Standards Regulations (2010).
		Emissions to Air Including Dust: The Health aspect chapter of the Scoping Report has not provided justification to scope out these impacts from the operational phase. However, the Inspectorate has agreed to scope out these operational impacts from the relevant aspect assessments (see Tables 5.1 of this Opinion) and considers that these potential impacts are unlikely to result in significant effects. As such the Inspectorate agrees that their impact on health can also be scoped out of the ES.	Noted. Operational phase impacts have been scoped out of the assessment.
BDC	Scoping Opinion, 2019	Requests inclusion of air quality.	This chapter presents the air quality assessment for SEP and DEP.
Cawston Parish Council	Scoping Opinion, 2019	Full assessment of cumulative impacts of DEP and SEP with the three other wind farm cable route schemes which affect North Norfolk – inclusive of air quality.	This chapter presents the air quality assessment for SEP and DEP. **Section 22.7** details the air quality CIA.

[redacted]

Consultee	Date/ Document	Comment	Project Response
Natural England	Scoping Opinion, 2019	The assessment should take account of the risks of air pollution and how these can be managed or reduced. Further information on air pollution impacts and the sensitivity of different habitats/designated sites can be found on the Air Pollution Information System (www.apis.ac.uk). Further information on air pollution modelling and assessment can be found on the Environment Agency website.	Noted.
		Para 715 states that designated ecological sites within 50m of construction works and 200m of the road network may be affected by changes in air quality. We recommend that construction works within 200m (as opposed to 50m) of a designated site is scoped into air quality assessment so the potential impacts of dust and particulate matter to sensitive features are fully considered. This is in line with Natural England's distance criteria (internal guidance).	Noted. Designated ecological sites within 200m of construction works were considered in the construction dust and fine particulate matter assessment (see **Section 22.6.1.1**).
Oulton Parish Council	Scoping Opinion, 2019	Main concerns – increase in Heavy Goods Vehicles (HGVs) alone and cumulative.	Noted. This is addressed in **Section 22.6.1.3** and **Section 22.7** respectively.
Public Health England (now the Office for Health Improvement and Disparities (OHID)	Scoping Opinion, 2019	Although assessing impacts on health beyond direct effects from for example emissions to air or road traffic incidents is complex, there is a need to ensure a proportionate assessment focused on an application's significant effects.	Noted.
		Our position is that pollutants associated with road traffic or combustion, particularly particulate matter and oxides of nitrogen are non-threshold; i.e., an exposed population is likely to be subject to potential harm at any level and that reducing public exposures of non-threshold pollutants (such as particulate matter and nitrogen dioxide) below air quality standards will have potential public health benefits. We support approaches which minimise or mitigate public exposure to non-threshold air pollutants, address inequalities (in exposure), maximise co-benefits (such as physical exercise). We encourage their consideration during development design, environmental and health impact assessment, and development consent.	Noted.

Consultee	Date/ Document	Comment	Project Response
NNDC, BDC, SNC	Scoping Opinion, 2019	No comments were received at this stage on the method statement provided to NNDC, BDC and SNC.	The EHO at BDC and SNC agreed with the approach presented in the method statement (as is in this chapter and detailed in **Section 22.4**) in relation to human health and the EHO at NNDC had no objections to the proposed methodology. The methodology for the assessment is detailed in **Section 22.4**.
Section 42 Responses			
NNDC	Section 42 response, 2021	Chapter 24 - Air Quality The contents of this chapter are noted together with the technical appendices. These issues have not been considered in detail by NNDC at this time but, in the main the most likely air quality impact will arise from transport and construction activities. NNDC would wish to work with Equinor in the preparation of any Outline Codes of Construction Practice and Outline Traffic Management Plans which can help avoid, or mitigate and potential adverse air quality impacts.	Noted. The assessment of construction phase impacts is provided in **Section 22.6.1**. Any mitigation measures recommended in this chapter will be included in the outline **Code of Construction Practice** (oCoCP) (document reference 9.17). Control measures and monitoring procedures for managing the potential traffic and transport impacts during the construction of SEP and DEP are detailed in **Chapter 24 Traffic and Transport** and will be included in an **outline Construction Traffic Management Plan** (OCTMP). The OCTMP will be developed further in consultation with Norfolk County Council (NCC) and National Highways prior to the commencement of the authorised Project.

[redacted]

Consultee	Date/ Document	Comment	Project Response
Natural England	Section 42 response, 2021	Section Chapter 24. Table 24-1: Vs. Chapter 24.3.1 Vs. Appendix 24.4 Comment Study Area, in relation to dust and particulate matter – confusion as to if 50m or 200m has been used. Previous paragraph (on page 15) states ‘designated ecological sites within 200m of the road network’, however, (on page 18) it now states ‘within 50m of routes used by construction vehicles’. It seems the Applicant has taken NE’s previous advice for 200m (not 50m) for the distance from construction works, but then changed the distance from 200m to 50m from the road network. (The same comment can be raised for point 131 on page 69) *‘A number of designated ecological sites are located within 200m of roads which are anticipated to experience increases in construction-related traffic flows above the criteria detailed...’* Perhaps there are just discrepancies within the text, as in appendix 24.4 it states that sites 200m from roads have been considered (point 1, page 5). Recommendations Overall, clarification is needed here as to if the points raised are just discrepancies within the text, or if the Applicant needs to consider 200m from the road and not 50m.	The construction dust and fine particulate matter assessment presented in this chapter (see **Section 22.6.1.1**) has considered ecological sites within 200m of construction activities within the red line boundary (as per Natural England internal guidance) and ecological sites within 50m of the road network up to 500m from the red line boundary (as per IAQM 'Guidance on the assessment of dust from demolition and construction' (2016)). The distance of 50m considered for dust and particulate matter from construction vehicle trackout *"takes account of the exponential decline in both airborne concentrations and the rate of deposition with distance"* (IAQM, 2016).

Consultee	Date/ Document	Comment	Project Response
		A rationale should be provide if 50m has been decided upon rather than 200m from the vehicle routes. Please amend text within documents to ensure consistency.	The construction road traffic emissions assessment has considered all ecological receptors within 200m of the affected road network, as per Highways England 'DMRB LA105 Air Quality' (2019), IAQM 'A guide to the assessment of air quality impacts on designated nature conservation sites' (2020) and 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations' (2018) guidance and has applied Decision-making Thresholds (DMTs) as per the recently released Joint Nature Conservation Committee (JNCC) reports (Chapman & Kite, 2021a and 2021b). Details of the ecological assessment methodology are provided in **Section 22.4.3.3.6**. The mitigation measures recommended from the construction dust and fine particulate matter assessment (see **Section 22.6.1.1.5**) are based on a worst-case assessment of the closest sensitive ecological sites to the highest magnitude of dust and particulate matter-generating construction activities, and therefore the assessment is considered conservative. In addition, these mitigation measures, based on the worst-case area, are recommended to be applied across the construction of the project and are therefore considered to be robust.

Consultee	Date/ Document	Comment	Project Response
		Section 24.4.3.3.7 Comment Various diffusion tube locations are discounted from the verification process, therefore 4 of the 9 original locations are used. Recommendations Please provide further justification that this remains sufficient for model verification.	The verification year has been updated from 2018 to 2019 for the ES, and the monitoring locations and data for each local authority in 2019 have been reviewed and the verification process updated. It has been clearly stated within this chapter (see **Section 22.4.3.3.5**) which diffusion tubes have been used and the reasons for their inclusion/exclusion. A base year of 2019 was used in the assessment as it was considered that it would be difficult to model representative conditions of a 2020 baseline, due to the Covid-19 outbreak in March 2020, i.e. it would be difficult to represent short or longer term impacts on emissions in 2020 as a result of behavioural changes during national or local lockdowns.
		Section 24.5.1. Comment Natural England queries the justification provided to rule out any significant increase in pollutant concentrations at distances of 400m, 1km and 1.6km from the Air Quality Management Areas (AQMAs). Recommendations Please provide further justification.	**Section 22.5.1** refers to the potential impact of the project on AQMAs. It is stated that, due to the distance of the AQMAs from roads on which project-generated traffic would travel, there is not expected to be any significant impacts on the AQMAs, which are designated based on exceedances of the human health-related air quality Objectives. This is because concentrations of pollutants emitted from road traffic sources decreases rapidly with distance back from the road. As such, at the cited distances, it is not expected that significant impacts would occur.

Consultee	Date/ Document	Comment	Project Response
			Impacts as a result of road traffic emissions during construction of SEP and/or DEP on designated ecological sites have been considered on designated sites within 200m of the affected road network, in accordance with the following guidance: Institute of Air Quality Management (IAQM) 'A guide to the assessment of air quality impacts on designated nature conservation sites' (2020), 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations' (2018) and Highways England 'LA105 Air Quality' (2019).
		Section 24.5.4.1.2 Table 24- 26 And point 182. And Table 24- 45, And Point 223 Comment River Wensum SSSI and Colton Wood ancient woodland within or 0m from PEIR boundary – re. sensitive to dust impacts Code of Construction Practice (CoCP) will be submitted at ES stage (point 182. On page 92). Mentions the development and implementation of a 'Dust Management Plan' Table 24-45, page 138, impact 3 (Construction road vehicle exhaust emissions) on designated ecological sties to be assessed at ES stage. *'In-combination increases in nutrient nitrogen and acid deposition and NOx concentrations may also cumulatively affect designated sites'.*	Designated ecological sites have been considered in both construction dust and construction road traffic emissions assessments. Any recommended mitigation measures presented in this chapter will be included in the oCoCP (document reference 9.17) or Dust Management Plan, where relevant.

[redacted]

Consultee	Date/ Document	Comment	Project Response
		Recommendations Please ensure that the designated ecological sites (detailed in appendix 24.4) and associated critical load values are considered at the ES stage, as stated within text. Natural England advises the Applicant to include commitments within the Outline Traffic Management Plan, CoCP and Schedule of Mitigation to include mitigation to reduce, wherever possible, impacts to designated sites. If there is likely to be an effect on a designated feature, the OLEMS should include mitigation measures to reduce changes in air quality, e.g. using efficient vehicles, reducing number of vehicles/time on the road, timing of construction to support biodiversity, possible use of barriers etc.	An in-combination assessment has been undertaken (see **Sections 22.4.3.3.6** and **22.6.1.3**), and a search of local planning authority (LPA) planning portals has been undertaken to determine if there are any projects of relevance (as per the Sites of Special Scientific Interest (SSSIs) Impact Risk Zones (IRZs) (Natural England, 2021) which could potentially have adverse impacts in-combination with SEP and/or DEP. If in-combination projects fitting the criteria and sufficient information has been provided in the submission (i.e. detailed air dispersion modelling results), the impacts of these projects has been included and considered in this chapter. The ecological sites considered in the road traffic emissions assessment are detailed in **Table 22.35**. Critical Load values for these sites are provided in **Appendix 22.4**.
		Section 24.7.3 Comment Assessing cumulative impact: The reasoning given for no significant impact for the 5 other plans and projects is that each one will have their own best practice mitigation in place. However, it is not clear if the impacts will be fully mitigated to an acceptable level; therefore there is the potential for there still be cumulative impacts from the residual impacts. Recommendations Natural England encourage some communication between plans/projects to ensure mitigation covers all areas of concern.	The CIA is presented in **Section 22.7**.

Consultee	Date/ Document	Comment	Project Response
		Appendix 24.4 – Designated Ecological Sites & Critical Load Values in the Air Quality Study Area Section: Table 24.4.1: Designated ecological sites and Critical Load values (pg 19) Comment Features of the River Wensum Special Area of Conservation (SAC) are noted to be sensitive to acidity and nutrient nitrogen on the Air Pollution Information System (APIS) website but noted to have no specified critical loads available due to being mainly ‘P limited (or N/P co-limiting), therefore decisions should be taken at a site-specific level’. The Applicant has recorded it as N/A within the table which suggests that this site isn’t sensitive, but provides no rationale for this statement. Also, there is no mention of Alderford Common SSSI within this table, despite being close to the PEIR boundary and noted on the APIS website as being sensitive to acidity and nutrient nitrogen. Again, there is no mention of Colton Wood Ancient Woodland named within the table (despite being close to the PEIR boundary in the chapters figures) Recommendations Need to ensure sites currently missing from the table are included and assessed, for example, Alderford Common SSSI, Colton Wood Ancient Woodland, and that the sensitivity of River Wensum SAC isn’t inadvertently dismissed.	Noted. As a result of further refinement of the traffic flow data for SEP and/or DEP between PEIR and ES, an updated screening of affected designated ecological sites has been performed, in accordance with recently released reports by the JNCC (Chapman & Kite, 2021a and 2021b). IAQM 'A guide to the assessment of air quality impacts on designated nature conservation sites' (2020), 'Natural England’s approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations' (2018) and Highways England 'LA105 Air Quality' (2019) has also been referenced in the assessment. All screened in designated ecological sites are included in **Table 22.35**, **Appendix 22.4** and **Appendix 22.5** and in this assessment. The River Wensum SAC (and SSSI) and Alderford Common SSSI are both included in the assessment presented in **Section 22.6.1.3** and **Appendix 22.5**. As no acidity Critical Load values for the River Wensum SAC are provided on the APIS website (CEH, 2022), the impact on acidity Critical Levels has not been assessed; however, the Project and in-combination contribution to acid deposition at the River Wensum SAC (and SSSI) is presented.

Consultee	Date/ Document	Comment	Project Response
			Colton Wood ancient woodland is not located within 200m of road links affected by Project-generated traffic and therefore has not been included in the road traffic emissions assessment (and therefore the Critical Load values for Colton Wood have not been included in **Appendix 22.4**). As Colton Wood is in proximity to the Project boundary, it has been included in both the construction dust and Non-Road Mobile Machinery (NRMM) emissions assessments.

22.3 Scope

22.3.1 Study Area

9. The study area for air quality has been defined on the basis of the Planning Inspectorate's Scoping Opinion (the Planning Inspectorate, 2019), through consultation with the local authorities within the administrative jurisdiction of the onshore study area and from Section 42 consultation responses.

10. The Planning Inspectorate agreed that offshore and operational air quality impacts could be scoped out of the assessment, as they were unlikely to be significant (see **Table 22.1**).

11. During construction, the onshore elements of SEP and DEP may give rise to construction phase dust and fine particulate matter, Non-Road Mobile Machinery (NRMM) emissions and road traffic emissions. These aspects were assessed as presented in this chapter.

12. The onshore DCO order limits is defined as the landfall area at Weybourne, a typically 45m (SEP or DEP in isolation) or 60m (SEP and DEP together) wide onshore cable corridor (increasing to a width of 100m for trenchless crossing zones), and the onshore substation site, including access requirements. From herein, reference to the SEP and DEP boundary is to the onshore DCO order limits, as previously stated, offshore impacts on air quality have been scoped out of the assessment.

13. The study area for the air quality assessment is defined as follows:

- Construction phase dust and fine particulate matter emissions:
  - Human receptors within 350m of the onshore DCO order limits and within 50m of routes used by construction vehicles (for routes used by construction-generated traffic up to 500m from the onshore DCO order limits); and
  - Ecological receptors within 200m of the onshore DCO order limits and within 50m of routes used by construction vehicles (for routes used by construction-generated traffic up to 500m from the onshore DCO order limits).
- Construction phase NRMM emissions:
  - Human and ecological receptors within 200m of construction works where NRMM will be present.
- Construction phase road traffic emissions:
  - Human and ecological receptors within 200m of roads. Further information on these routes is provided in **Chapter 24 Traffic and Transport**.

14. The air quality study area is shown in **Figure 22.1**.

22.3.2 Realistic Worst-Case Scenario

22.3.2.1 General Approach

15. The final design of SEP and DEP will be confirmed through detailed engineering design studies that will be undertaken post-consent to enable the commencement of construction. In order to provide a precautionary but robust impact assessment at this stage of the development process, realistic worst-case scenarios have been defined in terms of the potential effects that may arise. This approach to EIA, referred to as the Rochdale Envelope, is common practice for developments of this nature, as set out in Planning Inspectorate Advice Note Nine: Rochdale Envelope (v3, 2018). The Rochdale Envelope for a project outlines the realistic worst-case scenario for each individual impact, so that it can be safely assumed that all lesser options will have less impact. Further details are provided in **Chapter 5 EIA Methodology**.

16. The realistic worst-case scenarios for the air quality assessment are summarised in **Table 22.2**. These are based on the project parameters described in **Chapter 4 Project Description**, which provides further details regarding specific activities and their durations.

17. In addition to the design parameters set out in **Table 22.2**, consideration is also given to how SEP and DEP will be built out as described in **Section 22.3.2.2** to **Section 22.3.2.4** below. This accounts for the fact that whilst SEP and DEP are the subject of one DCO application, it is possible that either one or both of the projects will be developed, and if both are developed, that construction may be undertaken either concurrently or sequentially. Further details are provided in **Chapter 4 Project Description.**

22.3.2.2 Construction Scenarios

18. In the event that both SEP and DEP are built, the following principles set out the framework for how SEP and DEP may be constructed:
    - SEP and DEP may be constructed at the same time, or at different times;
    - If built at the same time both SEP and DEP could be constructed in four years;
    - If built at different times, either Project could be built first;
    - If built at different times, each Project would require a four year period of construction;
    - If built at different times, the offset between the start of construction of the first Project, and the start of construction of the second Project may vary from two to four years;
    - Taking the above into account, the total maximum period during which construction could take place is eight years for both Projects; and
    - The earliest construction start date is 2025.

[redacted]

19. In order to determine which construction scenario presents the realistic worst-case for each receptor and impact, the assessment considers both maximum duration effects and maximum peak effects, in addition to each project being developed in isolation, drawing out any differences between each of the two projects.

20. The three construction scenarios considered in the air quality assessment are therefore:

- Build SEP or build DEP in isolation;
- Build SEP and DEP sequentially with a gap of up to four years between the start of construction of each Project – reflecting the maximum duration of effects; and
- Build SEP and DEP concurrently – reflecting the maximum peak effects.

21. Any differences between the two projects, or differences that could result from the manner in which the first and the second projects are built (concurrent or sequential and the length of any gap) are identified and discussed where relevant in the impact assessment section of this chapter (**Section 22.6**). For each potential impact only the worst-case construction scenario for two projects is presented, i.e. either concurrent or sequential. The justification for what constitutes the worst-case is provided, where necessary, in **Section 22.6**.

22. SEP and DEP construction-generated road traffic flows were determined for the worst-case SEP and DEP together scenario (see **Chapter 24 Traffic and Transport**) which is the concurrent scenario (i.e. Scenario 2). It is anticipated that the magnitude of impacts of the sequential scenario (Scenario 3) would be no greater, or less than Scenario 2 (as the sequential scenario-generated construction traffic flows would be lower). Construction generated traffic impacts for the scenario where SEP or DEP are built in isolation (Scenario 1) have also been considered in this chapter.

22.3.2.3 Operation Scenarios

23. Operational phase air quality impacts have been scoped out of the assessment, as detailed in the Scoping Report (Equinor, 2019) and Scoping Opinion (the Planning Inspectorate, 2019).

22.3.2.4 Decommissioning Scenarios

24. Decommissioning scenarios are described in detail in **Chapter 4 Project Description**. Decommissioning arrangements for the onshore elements of SEP and DEP will be agreed through the submission of an onshore decommissioning plan to the relevant planning authority for approval within six months of the permanent cessation of commercial operation (unless otherwise agreed in writing by the relevant planning authority), however for the purpose of this assessment it is assumed that decommissioning of SEP and DEP could be conducted separately, or at the same time.

Table 22.2: Realistic Worst-Case Scenarios

Impact	SEP or DEP in Isolation	SEP and DEP Concurrently	SEP and DEP Sequentially	Notes and Rationale
Construction				
Impact 1: Construction Dust and Fine Particulate Matter	**Landfall** • HDD compound area: 75m x 75m • Transition joint bays: Number – 1, Dimensions – 26m x 10m x 3m (L x W x D) • Transition joint bay link box: 2.6m x 2m x 1.5m (L x W x D) • Total works area: 48,955.1m^2 • Approximate quantity of excavated material: Total – 3,250m^3 • Duration: Landfall HDD – 4 months (site setup, drilling and duct pull-in and demobilization), followed by 2 months for cable pull • Working hours: 0700 to 1900 hours Monday to Friday and 0700 to 1300 hours on Saturdays, plus 24 hour working required from the commencement of each HDD to completion of duct installation	**Landfall** • HDD compound area: 75m x 75m • Transition joint bays: Number – 2, Dimensions – 2 x 26m x 10m x 3m (L x W x D) • Transition joint bay link box: 2.6m x 2m x 1.5m (L x W x D) • Total works area: 48,955.1m^2 • Approximate quantity of excavated material: Total – 3,450m^3 • Duration: Landfall HDD – 5 months (site setup, drilling and duct pull-in and demobilization), followed by 4 months for cable pull • Working hours: 0700 to 1900 hours Monday to Friday and 0700 to 1300 hours on Saturdays, plus 24 hour working required from the commencement of each HDD to completion of duct installation	**Landfall** • HDD compound area: 75m x 75m for each project • Transition joint bays: Number – 2, Dimensions – 2 x 26m x 10m x 3m (L x W x D) per project • Transition joint bay link box: 2.6m x 2m x 1.5m (L x W x D) • Total works area: 48,955.1m^2 per project • Approximate quantity of excavated material: Total – 6,500m^3 • Duration: Landfall HDD – 4 months per project (site setup, drilling and duct pull-in and demobilization), followed by 2 months of cable pull per project • Working hours: 0700 to 1900 hours Monday to Friday and 0700 to 1300 hours on Saturdays, plus 24 hour working required from the commencement of each HDD to completion of duct installation	HDD and cable pull construction compound considered as one compound installed for duration of construction.

[redacted]

Impact	SEP or DEP in Isolation	SEP and DEP Concurrently	SEP and DEP Sequentially	Notes and Rationale
	Onshore Cable Corridor - High voltage alternating current (HVAC) cable corridor length from landfall to onshore substation: 60km - Number of trenches: 1 - Construction corridor width: 45m - Approximate working easement: 27m - Maximum number of workfronts at any one time: 10 - Approximate quantity of cable trench excavated material: 180,000m^3 - Jointing bays: Frequency – every 1km, Number – 60, Dimensions – 16m x 3.5m x 2m (L x W x D), Excavated material per jointing bay – 300m^3, Approximate total quantity of joint bay excavated material – 18,000m^3 - Link boxes: Frequency – every 1km, Number – 60, Dimensions – 2.6m x 2m x 1.5m (L x W x D), Excavated material per link box – 480m^3 - Access routes: various – public highway (6m wide) to single tracks (3m wide)	**Onshore Cable Corridor** - HVAC cable corridor length from landfall to onshore substation: 60km - Number of trenches: 2 - Construction corridor width: 60m - Approximate working easement: 38m - Maximum number of workfronts at any one time: 10 - Approximate quantity of cable trench excavated material: 360,000m^3 - Jointing bays: Frequency – every 1km, Number – 120, Dimensions – 16m x 3.5m x 2m (L x W x D), Excavated material per jointing bay – 300m^3, Approximate total quantity of joint bay excavated material – 36,000m^3 - Link boxes: Frequency – every 1km, Number – 60, Dimensions – 2.6m x 2m x 1.5m (L x W x D), Excavated material per link box – 480m^3 - Access routes: various – public highway (6m wide) to single tracks (3m wide)	**Onshore Cable Corridor** - HVAC cable corridor length from landfall to onshore substation: 60km - Number of trenches: 1 per project - Construction corridor width: 60m - Approximate working easement: 45m - Maximum number of workfronts at any one time: 10 - Approximate quantity of cable trench excavated material per project 180,000m^3 (total 360,000m^3) - Jointing bays: Frequency – every 1km, Number – 60 per project, Dimensions – 16m x 3.5m x 2m (L x W x D), Excavated material per jointing bay – 300m^3, Approximate total quantity of joint bay excavated material per project – 18,000m^3 (total 36,000m^3) - Link boxes: Frequency – every 1km, Number – 60, Dimensions – 2.6m x 2m x 1.5m (L x W x D), Excavated material per link box – 480m^3	Installation method: The primary cable installation method will be open cut trenching, with cable ducts installed within the trenches and backfilled with soil. Cables will then be pulled through the pre-laid ducts at a later stage in the construction programme. The working easement is narrower than the width of the DCO limits, and this will allow room for micrositing during detailed design. The onshore cable duct will be installed in sections of up to 1km at a time, with a typical construction presence of up to four weeks along each 1km section.

Impact	SEP or DEP in Isolation	SEP and DEP Concurrently	SEP and DEP Sequentially	Notes and Rationale
	• Haul road: Number – 1, Dimensions – 55km x 5m (L x W), Dimensions at passing places – 20m x 8m (L x W), Number of passing places: 254, Total area – 315,640m^2, approximate excavated material – 123,000m^3 • Main construction compound: Number – 1, Area – 30,000m^2, in use for full duration of onshore construction works (31 months), includes Cement-Bound Sand (CBS) batching • Secondary construction compounds (with CBS batching): Number – 2, Area – 7,500m^2, Duration – 18-24 months (active in operation for ~14 months) • Secondary construction compounds (without CBS batching): Number – 6, Area – 2,500m^2, Duration – 12-18 months (active in operation for ~6 months) • HDD compound dimensions: 1,500 to 4,500m^2 (subject to HDD length) • Trenchless crossings: Maximum installation time – 7 weeks, Width – 100m	• Haul road: Number – 1, Dimensions – 55km x 5m (L x W), Dimensions at passing places – 20m x 8m (L x W), Number of passing places: 254, Total area – 315,640m^2, approximate excavated material – 123,000m^3 • Main construction compound: Number – 1, Area – 30,000m^2, in use for full duration of onshore construction works (34 months), includes Cement-Bound Sand (CBS) batching • Secondary construction compounds (with CBS batching): Number – 2, Area – 7,500m^2, Duration – 18-24 months (active in operation for ~14 months) • Secondary construction compounds (without CBS batching): Number – 6, Area – 2,500m^2, Duration – 12-18 months (active in operation for ~6 months) • HDD compound dimensions: 1,500 to 4,500m^2 (subject to HDD length) • Trenchless crossings: Maximum installation time – 12 weeks, Width – 100m	• Access routes: various – public highway (6m wide) to single tracks (3m wide) • Haul road: Number – 1 for each project, Dimensions – 55km x 5m (L x W), Dimensions at passing places – 20m x 8m (L x W), Number of passing places: 254, Total area – 315,640m^2 per project (total for both projects: 631,280m^2), approximate excavated material – 123,000m^3 per project (total 246,000m^3) • Main construction compound per project: Number – 1, Area – 30,000m^2, in use for full duration of onshore construction works (31 months per project, with removal and reinstatement between projects and a gap of between two and four years between projects), includes Cement-Bound Sand (CBS) batching • Secondary construction compounds (with CBS batching) per project: Number – 2, Area – 7,500m^2, Duration – 18-24 months (active in operation for ~14 months) per project,	Main construction compound is at Attlebridge.

Impact	SEP or DEP in Isolation	SEP and DEP Concurrently	SEP and DEP Sequentially	Notes and Rationale
			with a gap of between two to four years between projects - Secondary construction compounds (without CBS batching) per project: Number – 6, Area – 2,500m^2, Duration – 12-18 months (active in operation for ~6 months) per project, with a gap of 2-4 years. - HDD compound dimensions: 1,500 to 4,500m^2 (subject to HDD length) - Trenchless crossings: Maximum installation time – 7 weeks, Width – 100m	
	Onshore Substation and 400kv connection - Maximum operational area: 32,500m^2 - Substation construction compound: 10,000m^2 - Permanent access road: 850m x 6m (L x W) (5,100m^2), excavated material – 2,000m^3 - Permanent access road construction compound: area – 2,500m^2, quantity excavated material – 4,875m^3 - Duration: site preparation – 6 months, construction – 22 months	**Onshore Substation and 400kv connection** - Maximum operational area: 60,000m^2 - Substation construction compound: 10,000m^2 - Permanent access road: 850m x 6m (L x W) (5,100m^2), excavated material – 2,000m^3 - Permanent access road construction compound: 2,500m^2, quantity excavated material – 4,875m^3 - Duration: site preparation – 6 months, construction – 24 months	**Onshore Substation and 400kv connection** - Maximum operational area: 60,000m^2 - Substation construction compound: 10,000m^2 per project - Permanent access road: 850m x 6m (L x W) (5,100m^2), excavated material – 2,000m^3 - Permanent access road construction compound: 2,500m^2, quantity excavated material – 4,875m^3 - Duration per project (with a gap of between two to four years between projects): site	It has been assumed the substation construction compound will be adjacent to the proposed onshore substation.

<table>
<tr><th>Impact</th><th>SEP or DEP in Isolation</th><th>SEP and DEP Concurrently</th><th>SEP and DEP Sequentially</th><th>Notes and Rationale</th></tr>
<tr><td></td><td></td><td></td><td>preparation – 6 months, construction – 22 months</td><td></td></tr>
<tr><td rowspan="2">Impact 2: Non-Road Mobile Machinery (NRMM) Emissions</td><td>Landfall
• HDD equipment: drilling rig (up to 2), 20kVa generator, 375kVa generator, site vehicle parking</td><td>Landfall
• HDD equipment: drilling rig (up to 4), 20kVa generator, 375kVa generator, site vehicle parking</td><td>Landfall
• HDD equipment: drilling rig (up to 4), 20kVa generator, 375kVa generator, site vehicle parking</td><td></td></tr>
<tr><td colspan="3">Onshore Cable Corridor
<table>
<tr><th rowspan="2">Plant</th><th colspan="5">Anticipated Plant – No. in operation per activity or location</th></tr>
<tr><th>Installation of temporary access tracks</th><th>Establishing temp work areas / small compounds</th><th>Cable duct installation (per work front)</th><th>Trenchless crossings (per location)</th><th>Cable pull (per location)</th></tr>
<tr><td>Asphalt spreader and roller</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Butt Fusion Jointing Machine Cabin & Generator</td><td>-</td><td>-</td><td>-</td><td>1</td><td>-</td></tr>
<tr><td>Cable Rollers</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1</td></tr>
<tr><td>Cable winch</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1</td></tr>
<tr><td>Cement Mixer Truck</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Circulation pump</td><td>-</td><td>-</td><td>-</td><td>1</td><td>-</td></tr>
<tr><td>Compacting Roller</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Compressor</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1</td></tr>
<tr><td>Dozer</td><td>1</td><td>-</td><td>1</td><td>-</td><td>-</td></tr>
<tr><td>Drilling rig</td><td>-</td><td>-</td><td>-</td><td>1</td><td>-</td></tr>
<tr><td>Drum Trailer</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1</td></tr>
</table></td><td>Numbers in operation are based on anticipated plant per activity or location at any one time. The anticipated number of plant per activity/location is not expected to differ under each scenario, however the number of work fronts or locations differs under each scenario.</td></tr>
</table>

Impact	SEP or DEP in Isolation	SEP and DEP Concurrently	SEP and DEP Sequentially	Notes and Rationale

Dumpers	-	-	-	-	-
Generator	-	-	1	1	1
Hiab wagon	1	1	1	1	1
Low loader	1	1	1	1	1
Mixing tank	-	-	-	1	-
Operative vehicles	multiple	multiple	multiple	multiple	multiple
Pump	-	-	1	-	-
Ride on Roller	-	-	-	-	-
Tele handler	1	1	1	1	1
Tipper Waggons	-	-	-	-	-
Tracked excavator	2	2	2	2	2
Tractor and Trailer	-	-	1	1	1
Truck Mounted Concrete Pump	-	-	-	-	-
Wacker Plate	-	-	-	-	-
Wacker Plate	-	-	1	-	-

Main compound

Plant	Anticipated Plant – No. in operation per activity/location		
	Day time	Night time	HDD from compound
Tipper wagon 29t	2	2	-
Tracked excavator 40t	2	-	1
Low loader 23t	2	1	1
Tele handler 10t	1	1	1
Hiab wagon	1	-	1
Mobile telescopic crane	1	1	-
Generator	1	1	1
Batching Plant	1	-	-

Numbers in operation are based on anticipated plant per activity or location at any one time. The anticipated number of plant per activity/location is not expected to differ under each scenario, however the number of work fronts or locations

<table>
<tr><th>Impact</th><th>SEP or DEP in Isolation</th><th>SEP and DEP Concurrently</th><th>SEP and DEP Sequentially</th><th>Notes and Rationale</th></tr>
<tr><td></td><td colspan="3"><table>
<tr><td>Operative vehicles</td><td>-</td><td>-</td><td>multiple</td></tr>
<tr><td>Drilling rig</td><td>-</td><td>-</td><td>1</td></tr>
<tr><td>Mixing tank</td><td>-</td><td>-</td><td>1</td></tr>
<tr><td>Circulation pump</td><td>-</td><td>-</td><td>1</td></tr>
</table></td><td>differs under each scenario.</td></tr>
<tr><td></td><td colspan="3">Onshore Substation and 400kv connection<table>
<tr><th>Plant</th><th>Anticipated Plant – No. in operation per activity/location</th></tr>
<tr><td>Tracked excavator</td><td>4</td></tr>
<tr><td>Low loader</td><td>2</td></tr>
<tr><td>Tele handler</td><td>1</td></tr>
<tr><td>Hiab wagon</td><td>2</td></tr>
<tr><td>Operative vehicles</td><td>multiple</td></tr>
<tr><td>Tractor and Trailer</td><td>1</td></tr>
<tr><td>Tipper Waggons</td><td>2</td></tr>
<tr><td>Compacting Roller</td><td>1</td></tr>
<tr><td>Ride on Roller</td><td>1</td></tr>
<tr><td>Wacker Plate</td><td>1</td></tr>
<tr><td>Dumpers</td><td>1</td></tr>
<tr><td>Dozer</td><td>1</td></tr>
<tr><td>Cement Mixer Truck</td><td>1</td></tr>
<tr><td>Truck Mounted Concrete Pump</td><td>1</td></tr>
<tr><td>Generator</td><td>2</td></tr>
</table></td><td>Numbers in operation are based on anticipated plant at the onshore substation under any scenario at any one time.</td></tr>
<tr><td>Impact 3: Road Vehicle Exhaust Emissions</td><td>SEP or DEP alone was assessed, as detailed in Chapter 24 Traffic and Transport and presented in Appendix 22.2.</td><td colspan="2">SEP and DEP together concurrently construction traffic was assessed as a worst-case scenario, as detailed in Chapter 24 Traffic and Transport and presented in Appendix 22.2.</td><td></td></tr>
</table>

Impact	SEP or DEP in Isolation	SEP and DEP Concurrently	SEP and DEP Sequentially	Notes and Rationale
Operation				
Operational phase air quality impacts have been scoped out of the assessment as detailed in the Scoping Report (Equinor, 2019) and Scoping Opinion (the Planning Inspectorate, 2019).				
Decommissioning				
No final decision has yet been made regarding the final decommissioning policy for the onshore project infrastructure including landfall, onshore cable corridor and onshore substation. It is also recognised that legislation and industry best practice change over time. However, it is likely that the onshore project equipment, including the cable, will be removed, reused or recycled where possible, with the transition joint bays and cable ducts being left in place. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that, for the purposes of a worst-case scenario, the impacts will be no greater than those identified for the construction phase.				

22.3.3 Summary of Mitigation Embedded in the Design

25. This section outlines the embedded mitigation relevant to the air quality assessment, which has been incorporated into the design of SEP and DEP (**Table 22.4**). Where other mitigation measures are proposed, these are detailed in the impact assessment (**Section 22.6**).

Table 22.3: Embedded Mitigation Measures

Parameter	Mitigation Measures Embedded into the Project Design
Site selection	SEP and DEP have undergone an extensive site selection process which has involved incorporating environmental considerations in collaboration with the engineering design requirements. Considerations include (but are not limited to) adhering to the Horlock Rules (for explanation see **Chapter 3 Site Selection and Assessment of Alternatives**) for the onshore substation and associated infrastructure, a preference for the shortest route length (where practical) and developing construction methodologies to minimise potential impacts. Key principles that have informed the onshore cable corridor route include: Preference for the shortest onshore cable corridor to minimise the overall footprint and the number of receptors that will be affected. Avoid key constraints, where possible; and Avoid populated areas, where possible. Consideration has been taken into account for the following constraints: Sites designated for nature conservation; Residential properties; and Other infrastructure (e.g. buried cables, railways, roads).

22.4 Impact Assessment Methodology

22.4.1 Policy, Legislation and Guidance

26. The following sections detail information on the key pieces of UK legislation, policy and guidance relevant to the assessment within this chapter. Further detail where relevant is provided in **Chapter 2 Policy and Legislative Context**.

22.4.1.1 National Policy Statements

27. The assessment of potential air quality impacts has been made with specific reference to the relevant National Policy Statements (NPS). These are the principal decision-making documents for Nationally Significant Infrastructure Projects (NSIPs). Those relevant to SEP and DEP are:

- Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC) 2011a);
- NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011b); and
- NPS for Electricity Networks Infrastructure (EN-5) (DECC 2011c).

28. The specific assessment requirements for air quality, as detailed in the NPS, are summarised in **Table 22.4** together with an indication of the section of the ES chapter where each is addressed.

29. It is noted that the NPS for Energy (EN-1) is in the process of being revised. A draft version of each NPS was published for consultation in September 2021 (Department for Business Energy and Industrial Strategy (BEIS). A review of these draft versions has been undertaken in the context of this ES chapter.

30. **Table 22.4** includes a section for the draft version of NPS EN-1 in which relevant additional NPS requirements not presented within the current NPS EN-1 have been included. A reference to the particular requirement's location within the draft NPS and to where within this ES chapter or wider ES it has been addressed has also been provided.

31. Minor wording changes within the draft version which do not materially influence the NPS EN-1 requirements have not been reflected in **Table 22.4**. Paragraph 5.2.2 of EN-1 (as detailed in **Table 22.4**) is no longer referenced in section '5.2 Air Quality and Emissions' of draft EN-1, as draft EN-1 has a new section '5.3 Greenhouse Gas Emissions' which covers carbon emissions. The **Greenhouse Gas Footprint Assessment** (document reference 9.2) provides the greenhouse gas assessment for SEP and DEP.

32. EN-3 and EN-5 (current or draft versions) do not specifically include details on the assessment of air quality.

Table 22.4: NPS Assessment Requirements

NPS Requirement	NPS Reference	Section Reference
NPS for Energy (EN-1)		
Any ES on air emissions will include an assessment of Carbon Dioxide (CO_2) emissions, but the policies set out in Section 2 [of EN-1], including the EU ETS, apply to these emissions. The IPC (now Planning Inspectorate) does not, therefore need to assess individual applications in terms of carbon emissions against carbon budgets.	Paragraph 5.2.2	Not applicable to this assessment. The greenhouse gas assessment is provided in **Greenhouse Gas Footprint Assessment** (document reference 9.2)
The ES should describe: Any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project; The predicted absolute emission levels of the proposed project, after mitigation methods have been applied; Existing air quality levels and the relative change in air quality from existing levels; and Any potential eutrophication impacts.	Paragraph 5.2.7	Please refer to **Section 22.6**

NPS Requirement	NPS Reference	Section Reference
NPS for Energy (EN-1)		
Other matters that the IPC may consider important and relevant to its decision-making may include Development Plan Documents or other documents in the Local Development Framework. In the event of a conflict between these or any other documents and an NPS, the NPS prevails for the purposes of IPC decision making given the national significance of the infrastructure.	Paragraph 4.1.5	Please refer to **Section 22.4.1**

22.4.1.2 Legislation and Guidance

33. In addition to the NPS, there are a number of pieces of legislation and guidance applicable to the assessment of air quality.

22.4.1.2.1 UK Legislation

34. Air pollution can have adverse effects on the health of humans and ecosystems. There are two type of air quality regulations that apply in England:

- Regulations implementing mandatory European Union (EU) Directive limit values originally set by the EU:
    - The EU Air Quality Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management entered into force in 1996 (European Parliament, 1996). This was a framework for tackling air quality through setting European wide air quality limit values in a series of Daughter Directives, prescribing how air quality should be assessed and managed by the Member States. Directive 96/62/EC and the first three Daughter Directives were combined to form the new EU Directive 2008/50/EC (European Parliament, 2008) on Ambient Air Quality and Cleaner Air for Europe, which came into force in June 2008.
    - The Air Quality Standards Regulations 2010 (Statutory Instrument (SI) 2010 No. 1001) (HMSO, 2010) and The Air Quality Standards (Amendment) Regulations 2016 (SI 2016 No. 1184) (HMSO, 2016).
- Regulations implementing national air quality Objectives:
    - Air Quality (England) Regulations 2000 (SI 2000 No. 928) (HMSO, 2000) and Air Quality (England) (Amendment Regulations 2022 (SI 2002 No. 3043) (HMSO, 2002)

22.4.1.2.2 Air Quality Limit Values or Objectives

35. The EU (Withdrawal Agreement) Act 2020 sets out arrangements for implementing the air quality limit values that are included in the EU Directive on Ambient Air Quality and Cleaner Air for Europe (2008/50/EC), included in air quality regulations (SI 2010 No. 1001) and as amended (SI 2016 No. 1184). The relevant air quality limit values for this assessment for the protection of human health are detailed further in the following sections and are presented in **Table 22.5**.

22.4.1.2.3 UK Air Quality Strategy

36. The 1995 Environment Act required the preparation of a national Air Quality Strategy which sets air quality standards for specified pollutants. The Act also outlined measures to be taken by local authorities in relation to meeting these standards and Objectives, which became the Local Air Quality Management (LAQM) system.

37. The UK Air Quality Strategy was originally adopted in 1997 (Department of Environment, 1997) and has been reviewed and updated to take account of the evolving EU legislation, technical and policy developments and the latest information on health effects of air pollution. The strategy was revised and reissued in 2000 as the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Department of the Environment, Transport and the Regions (DETR), 2000). This was subsequently amended in 2003 (DETR, 2003) and was last updated in July 2007 (Defra, 2007).

38. The Government published its Clean Air Strategy (CAS) in January 2019 (Defra, 2019), which reset the focus for the first time since the 2007 Air Quality Strategy revision (Defra, 2007). The CAS identifies a series of ‘new’ air quality issues, including biomass combustion, shipping emissions and releases from agricultural activities. There is a recognition that the effects of pollutant deposition on sensitive ecosystems and habitats needs greater focus. The concept of an overall exposure reduction approach is raised, in recognition that numerical standards are not safe dividing lines between a risk and a safe exposure, within a population with a varying age and health profile. Within the CAS, the government proposes an ambitious target to reduce the population exposed to concentrations of $PM_{2.5}$ above $10\mu g.m^{-3}$ by 50% by 2025. The CAS is supplemented by an Industrial Strategy, policy guidance for the ports sector, a developing approach for aviation, and by plans for road transport fuels shift to zero emissions by 2040.

39. The Environment Act achieved Royal Assent in November 2021. The Act requires the government to set targets on air quality, including for fine particulate matter, in order to deliver cleaner air for all. The Act introduces a legally binding duty on the government to bring forward at least two air quality targets by October 2022: one to reduce annual average $PM_{2.5}$ concentrations in ambient air and the second must be a long-term target (set a minimum of 15 years in the future) in order to encourage long-term investment and to provide certainty for businesses and other stakeholders. It is expected that a public consultation on the proposed targets will be published in 2022.

22.4.1.2.4 Local Air Quality Management (LAQM):

40. The standards and Objectives relevant to the LAQM framework have been prescribed through the Air Quality (England) Regulations (2000) (HMSO, 2000), and the Air Quality (England) (Amendment) Regulations (2002) (HMSO, 2002). The EU Limit Values have been implemented via the Air Quality Standards (England) Regulations (2010) set out the combined Daughter Directive Limit Values and Interim Targets for Member State compliance (HMSO, 2010). The Air Quality Standards (Amendment) Regulations 2016 (HMSO, 2016) were published on 6 December 2016.

41. The current air quality standards and Objectives of relevance to this assessment are presented in **Table 22.5**. Pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health. Pollutant Objectives, however, incorporate target dates and averaging periods which take into account economic considerations, practicability and technical feasibility.

42. Under Part IV of the Environment Act 1995, as amended by Part 4 of the Environment Act 2021, all local authorities are responsible for LAQM, the mechanism by which the government's AQS Objectives are to be achieved. It is the responsibility of local authorities to periodically review and assess present and likely future local pollution levels against these Objectives. Where an air quality Objective is unlikely to be met by the relevant deadline, local authorities must designate those areas as AQMAs and take action to work towards meeting the Objectives. Following the designation of an AQMA, local authorities are required to develop an Air Quality Action Plan to work towards meeting the Objectives and to improve air quality locally. Under the current LAQM regime, local authorities are to publish reports (following consultation and review by Defra) on the regular review and assessment of local air quality.

43. Pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health. Pollutant Objectives, however, incorporate target dates and averaging periods which take into account economic considerations, practicability and technical feasibility.

Table 22.5: Air Quality Strategy Objectives (England) for the Purposes of LAQM

Pollutant	**Air Quality Objective**		**To be achieved by**
	Concentration (μg.m^{-3})	**Measured as***	
Nitrogen dioxide (NO_2)	200	1-hour mean not to be exceeded more than 18 times per year	31/12/2005
	40	Annual mean	31/12/2005
Particles (PM_{10})	50	24-hour mean not to be exceeded more than 35 times per year	31/12/2004
	40	Annual mean	31/12/2004
Particles ($PM_{2.5}$)	25	Annual mean (target)	2020
	15% cut in annual mean (urban background exposure)	Annual mean	2010-2020
*The way the Objectives are to be measured is set out in the UK Air Quality (England) Regulations			

44. It should be noted that the AQS Objectives only apply in locations likely to have 'relevant exposure', i.e. where members of the public are exposed for periods equal to or exceeding the averaging periods set for the standards. For this assessment, locations of relevant exposure include building facades of residential properties, and where relevant schools and medical facilities. Places of work are not included. The Environment Act 2021 is expected to deliver key aspects of the CAS with the aim of maximising health benefits for all and will sit alongside the wider action on air quality.

45. National air quality Objectives also apply for the protection of vegetation and ecosystems, which are termed Critical Levels. Critical Levels apply irrespective of habitat type and are based on the concentration of the relevant pollutants in air. Institute of Air Quality Management (IAQM) guidance (IAQM, 2020) recommends that only the annual mean Critical Level is used in assessments due to the comparative importance of annual effects to impacts upon vegetation, except where specifically required by the regulator where high short-term emissions may occur, such as from an industrial stack emission source. As such, given the consistent traffic exhaust emission source along road links, only annual mean Critical Levels were considered.

46. The Critical Levels of relevance to this assessment are detailed in **Table 22.6**.

Table 22.6: Critical Levels

Pollutant	**Critical Level**	
	Concentration (µg.m^{-3})	**Measured as**
Oxides of nitrogen (NOx)	30	Annual mean
Ammonia (NH_3)	3*	Annual mean
*Critical Level is 1µg.m^{-3} if certain lichen/bryophyte species are present		

47. Critical Loads for habitat sites in the UK are published on the APIS website (CEH, 2022). These are the maximum levels of nutrient nitrogen and acid deposition that can be tolerated without harm to the most sensitive features of these habitat sites. An increase in Critical Load of less than 1% is typically considered to be insignificant, as a change in this level is within the magnitude of natural fluctuation and is unlikely to be measurable. The 1% threshold of insignificance is referenced in Natural England (2018), IAQM (2020) and Chapman & Kite (2021a, 2021b).

48. The onshore DCO order limits falls within the area of jurisdiction of three local authorities:

- NNDC;
- BDC; and
- SNC.

49. The onshore DCO order limits falls wholly within the jurisdiction of Norfolk County Council (NCC). In addition, construction vehicle access routes (as identified in **Chapter 24 Traffic and Transport**) would pass through the following local authority boundaries:

- King's Lynn and West Norfolk Borough Council (KLWNBC);

- Breckland Council (BC);
- Great Yarmouth Borough Council (GYBC); and
- Waveney District Council (WDC).

22.4.1.3 Local Policy

50. Local planning policy documents and policies of relevance to the air quality assessment include:

22.4.1.3.1 NNDC Core Strategy (NNDC, 2008):

51. ‘Policy EN13 Pollution and Hazard Prevention and Minimisation’ states that “Proposals will only be permitted where, individually or cumulatively, there are no unacceptable impacts on… air quality”.

22.4.1.3.2 North Norfolk Local Plan 2016 – 2036 – First Draft Local Plan (Part 1) (NNDC, 2019):

52. NNDC is currently preparing a new Local Plan and has undertaken consultation on its emerging First Draft Local Plan. The following policies of relevance to air quality were identified in the first draft of the Local Plan: ‘Policy SD 13 Pollution & Hazard Prevention and Minimisation’ states that *“Proposals will only be permitted where, individually or cumulatively, there are no unacceptable impacts on… air quality”*. ‘Policy ENV 10 Protection of Amenity’ states that *“in assessing the impact of development on the living conditions of occupants, regard will be had to the North Norfolk Design Guide and the following considerations… other forms of pollution (including, but not limited to: contaminated land, dust, air and light pollution).”*

22.4.1.3.3 BDC Development Management DPD (BDC, 2015):

53. ‘Policy EN4 – Pollution’ states that *“where a proposed development would result in airborne pollutants exceeding statutory objectives, it will not be permitted unless appropriate mitigation measures are agreed. Development which may give rise to airborne emissions of potentially harmful substances, including smoke, grit and dust, will be required to provide a risk assessment of the likelihood of demonstrable harm to human health or to the environment.”*

22.4.1.3.4 South Norfolk Local Plan: Development Management Policies Document (SNC, 2015):

54. 'Policy DM 3.13 Amenity, noise and quality of life' states that *"development should ensure a reasonable standard of amenity reflecting the character of the local area. In all cases particular regard will be paid to avoiding… introduction of incompatible neighbouring uses in terms of… air, dust*". 'Policy DM 3.14 Pollution, health and safety' states that *"when assessed individually or cumulatively, development proposals should ensure that there will be no unacceptable impacts on… air quality… Developments which may impact on air quality will not be permitted where they have an unacceptable impact on human health, sensitive designated species or habitats, and general amenity, unless adequate mitigation can be ensured. Development will not be granted in locations where it is likely to result in an Air Quality Management Area being designated or the worsening of air quality in an existing Air Quality Management Area."*

22.4.1.3.5 KLWNBC Site Allocations and Development Management Policies Plan (KLWNBC, 2016):

55. 'Policy DM15-Environment, Design and Amenity' states that *"development must protect and enhance the amenity of the wider environment including its heritage and cultural value. Proposals will be assessed against their impact on neighbouring uses and their occupants as well as the amenity of any future occupiers of the proposed development. Proposals will be assessed against a number of factors including: Air quality."*

56. 'Policy DM20-Renewable Energy' states that *"proposals for renewable energy (other than proposals for wind energy development) and associated infrastructure, including the landward infrastructure for offshore renewable schemes, will be assessed to determine whether or not the benefits they bring in terms of the energy generated are outweighed by the impacts, either individually or cumulatively, upon: Amenity (in terms of noise, overbearing relationship, air quality and light pollution)."*

22.4.1.3.6 KLWNBC Local Plan Review 2019 (KLWNBC, 2019):

57. In the new emerging Local Plan for KLWNBC, Policy DM15 is to be replaced by LP18 and Policy DM20 is to be replaced by LP21, but the polices have not changed.

22.4.1.3.7 Breckland Local Plan (BC, 2019):

58. 'Policy COM 01 – Design' states that *"development should be designed to reduce the impact on local air quality, particularly from road traffic, especially in those areas in or likely to impact on, areas identified as 'at risk' of exceeding air quality objectives."*

59. 'Policy COM 03 Protection of Amenity' states that *"in assessing the impact of development on the living conditions of occupants, regard will be had to the following amenity considerations: … other forms of pollution (including contaminated land, dust, air pollution, for example the emission of particulates etc)."*

22.4.1.3.8 GYBC Local Plan Core Strategy (GYBC, 2015):

60. ‘Policy CS9-Encourage well-designed, distinctive places’ *“seek to protect the amenity of existing and future residents, or people working in, or nearby, a proposed development, from factors such as noise, light and air pollution and ensure that new development does not unduly impact upon public safety.”*

61. ‘Policy CS11-Enhancing the natural environment’ states to ensure *“that all new development takes measures to avoid or reduce adverse impacts on existing biodiversity and geodiversity assets. Where adverse impacts are unavoidable, suitable measures will be required to mitigate any adverse impacts. Where mitigation is not possible, the Council will require that full compensatory provision be made.”*

22.4.1.3.9 Waveney Local Plan (East Suffolk Council, 2019):

62. No reference is made to air quality in the policies of the Waveney Local Plan, however reference is included to the following: *“where vehicle movements are likely to significantly increase in these [European protected habitats, particularly the Broads SAC] locations, further assessment on air quality and impact on habitats will be required to inform project level Habitat Regulations Assessments.”*

63. Further detail where relevant is provided in **Chapter 2 Policy and Legislative Context**.

22.4.2 Data and Information Sources

64. Other sources that have been used to inform the assessment are listed in **Table 22.7**.

Table 22.7: Data and Information Sources

Data set	Spatial coverage	Year	Notes
NNDC Air Quality Annual Status Report (ASR)	NNDC boundary	2015-2019	Local monitoring locations and baseline information
BDC and SNC Air Quality ASR	BDC and SNC boundary	2015-2019	
KLWNBC Air Quality ASR	KLWNBC boundary	2015-2020	
BC Air Quality ASR	BC boundary	2015-2020	
GYBC Air Quality ASR	GYBC boundary	2015-2018	
East Suffolk Council (ESC) Air Quality ASR	WDC boundary	2015-2019	
Defra LAQM Technical Guidance (TG16) (Defra, 2021)	UK	2021	Assessment methodology

Data set	Spatial coverage	Year	Notes
Defra's LAQM support portal	Study area	Assessment years	2018-based 1km x 1km grid pollutant background maps
JNCC (Chapman & Kite, 2021a and 2021b)	UK	2021	Guidance on Decision-making Thresholds for Air Pollution: Main Report and Technical Report
Centre for Ecology and Hydrology (CEH)	UK	2022	Details of Critical Loads and Levels for ecological habitats
Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK)	UK	2017	Assessment methodology
IAQM	UK	2016	Guidance on the assessment of impacts from construction dust and fine particulate matter
IAQM	UK	2020	Guidance on the assessment of air quality impacts on designated nature conservation areas
Highways England	UK	2019	Design Manual for Roads and Bridges (DMRB) assessment methodology
Natural England	England	2018	Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations
Norfolk Environmental Protection Group	Norfolk boundary	No year	Annex to technical guidance for planning and pollution in Norfolk, assessment methodology

22.4.3 Impact Assessment Methodology

65. **Chapter 5 EIA Methodology** provides a summary of the general impact assessment methodology applied to SEP and DEP. The following sections confirm the methodology used to assess the potential impacts on air quality.

22.4.3.1 Construction Phase Dust and Fine Particulate Matter

66. Assessment of potential impacts associated with construction phase dust and fine particulate matter emissions was undertaken in accordance with the latest Institute of IAQM guidance (IAQM, 2016). The terminology differs from the generic impact assessment terminology presented within **Chapter 5 EIA Methodology**.

67. A summary of the assessment process is provided below.

22.4.3.1.1 Assessment Steps

68. The assessment steps are as follows:

  a. Screen the need for a more detailed assessment;
  b. Assessment conducted separately for demolition, earthworks, construction and trackout:
    i. Determine potential dust emission magnitude;
    ii. Determine sensitivity of the area; and
    iii. Establish the risk of dust impacts.
  c. Determine site specific mitigation; and
  d. Examine the residual effects to determine if additional mitigation is required.

69. It should be noted that trackout is defined as the transport of dust and dirt from the construction site onto the public road network. Full details of the assessment methodology are provided in **Appendix 22.1**.

22.4.3.1.2 Sensitivity

70. Definitions of the different sensitivity levels for human and ecological receptors to dust (IAQM, 2016) are given in **Table 22.8**.

Table 22.8: Definitions of the Different Sensitivity Levels for Receptors to Construction Dust

Sensitivity	Sensitivity of people and property to dust soiling	Sensitivity of people to the health effects of PM_{10}	Sensitivity of ecological receptors
High	Dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.	Residential properties, hospitals, schools and residential care homes.	International or national designation and features affected by dust soiling or locations with dust-sensitive species.
Medium	Parks, places of work.	Office and shop workers not occupationally exposed to PM_{10}.	Locations with important plant species or national designation with features affected by dust soiling.
Low	Playing fields, farmland, footpaths, short-term car parks and roads.	Public footpaths, playing fields, parks and shopping streets.	Local designation where features may be affected by dust deposition.

22.4.3.1.3 Magnitude

71. The magnitude of construction phase dust emissions should be defined for each type of activity. These are broken down into four categories: demolition, earthworks, construction and trackout. The dust emission magnitudes can either be small, medium or large and are dependent on the methods of work undertaken and the scale of the activity.

72. It is anticipated that there will be no dust-generating demolition required as part of the construction phase of SEP and DEP; therefore, this was not considered as part of the assessment.

73. The dust emission magnitudes for each activity are detailed in **Table 22.9**.

Table 22.9: Definitions of the Different Magnitudes of Construction Phase Dust Emissions

Activity	**Criteria used to Determine Dust Emission Magnitude**		
	Small	**Medium**	**Large**
Earthworks	Total site area <2,500m^2. Potentially dusty soil type (e.g. clay).	Total site area 2,500-10,000m^2. Moderately dusty soil type (e.g. silt).	Total site area >10,000m^2. Soil type with large grain size (e.g. sand)
Construction	Total building volume <25,000m^3.	Total building volume 25,000-100,000m^3.	Total building volume >100,000m^3.
Trackout	<10 outward Heavy Duty Vehicle (HDV) trips in any one day. Unpaved road length <50m.	10-50 outward HDV trips in any one day. Unpaved road length 50-100m.	>50 outward HDV trips in any one day. Unpaved road length >100m.

74. As detailed in **Table 22.9**, the IAQM guidance provides broad ranges of the area of a site, the total building volume and the number of outward vehicle trips which are used to determine the dust emission magnitude.

22.4.3.1.4 Significance

75. In assessing the significance of construction dust impacts using the IAQM guidance (2016), the dust emission magnitude is combined with the sensitivity of the area to determine the risk of impacts prior to mitigation. This is shown in more detail in **Appendix 22.1**. This assessment deviates slightly from the methodology set out in **Chapter 5 EIA Methodology**, as the IAQM guidance does not assign a significance before applying mitigation measures. Once appropriate mitigation measures have been identified as required, the significance of construction phase impacts can be determined. The IAQM considers it to be most appropriate to only assign significance post mitigation as it assumes mitigation is inherent in the design/construction approach. A matrix is therefore not provided in the guidance to determine significance.

22.4.3.2 Construction Phase NRMM Emissions

76. The Scoping Opinion requested that *"impacts from construction plant emissions"* be assessed where significant effects are likely. Defra technical guidance (Defra, 2021a) states that emissions from NRMM used on construction sites are unlikely to have a significant impact on local air quality where relevant control and management measures are employed. A qualitative assessment of Project-generated NRMM used during construction of the onshore cable corridor and/or onshore substation has been undertaken, where impacts on receptors may occur.

77. This assessment has taken into account:

- The number and type of plant to be used;
- The working hours to be employed and the duration of works;
- Distances from NRMM to the nearest receptors;
- Existing air quality conditions in the area (based on either local monitoring (where available) and/or Defra background pollutant concentration maps (Defra, 2020a)); and
- Prevailing meteorological conditions.

22.4.3.3 Construction Road Vehicle Exhaust Emissions

22.4.3.3.1 Screening Criteria and Assessed Road Links/Haul Roads

78. The requirement for a detailed assessment of construction vehicle exhaust emissions at human receptors has been considered using screening criteria provided by IAQM and EPUK (2017). Guidance from recently released reports by the JNCC (Chapman & Kite, 2021a and 2021b) has been used for the screening of ecological receptors, within 200m from affected road links. The assessment criteria are detailed in **Table 22.10**.

Table 22.10: Road Traffic Assessment Screening Criteria

Guidance Document	Receptor	Screening Criteria	
IAQM and EPUK (2017)	Human receptors	Light duty vehicles (LDVs)	A change in annual average daily traffic (AADT) of more than 100 within or adjacent to an AQMA, or more than 500 elsewhere.
		HGVs	An increase in HGV movements of more than 25 per day within or adjacent to an AQMA, or more than 100 elsewhere.
JNCC (Chapman & Kite, 2021a and 2021b)	Ecological receptors	AADT	An increase 0.15% or more of existing AADT (over 5 years) (i.e. Decision-making Threshold (DMT))

79. The screening criteria above for ecological receptors are considered by Natural England to equate to a 1% change in the Critical Load or Level (Natural England, 2018) which is regarded as a threshold of insignificance. A change of this magnitude is likely to be within the natural range of fluctuation in deposition and is unlikely to be perceptible. Ecological receptors are screened inclusive of in-combination traffic growth from the base year (2019) to the future base year (2025). Reasoning for this is provided in further detail in **Section 22.4.3.3.6**.

80. The increases in traffic flows on the road network associated with the construction phase of SEP and/or DEP were screened using the criteria detailed in **Table 22.10**. As mentioned previously in **Section 22.3.2**, this was undertaken for the SEP/DEP in isolation scenario (Scenario 1) and for the concurrent scenario (Scenario 2) as this represents the worst-case of the scenarios for construction traffic, see **Chapter 4 Project Description** for further detail on the different construction scenarios. All road links were anticipated to experience increases in traffic flows greater than the stringent JNCC DMT screening criteria (i.e. 0.15% of existing 2019 baseflow AADT). As such, sensitive ecological receptor locations were identified on all affected road links for Scenario 1 (SEP or DEP in isolation) and Scenario 2 (concurrent construction) .

81. The road links which were predicted to experience increases in vehicles numbers and HGVs in exceedance of the human screening criteria for Scenario 1 (SEP/DEP in isolation) and 2 (SEP and DEP concurrent construction) are detailed in **Table 22.11**.

82. More information on the derivation of the traffic flows is provided in **Chapter 24 Traffic and Transport** and the traffic data used in the assessment is provided in **Appendix 22.2**.

83. Traffic flows on the temporary haul roads within the construction footprint to be used for SEP and/or DEP during construction have also been screened against the criteria detailed in **Table 22.10** and are discussed in **Section 22.4.3.3.6.3.2**.

Table 22.11: Human Receptor Screening – Affected Road Links Under Scenario 1 (SEP or DEP in Isolation) and Scenario 2 (SEP and DEP Concurrent Construction) (boxes shaded in blue show traffic flows (LDV and/or HGVs) that exceed the IAQM & EPUK (2017) criteria)

Link ID	Road	Number of vehicles generated by the construction phase of SEP and DEP – Human Receptor Screening (2025)			
		Scenario 1 – SEP or DEP in Isolation		Scenario 2 – SEP and DEP Concurrent Construction	
		Total LDVs	HGVs	Total LDVs	HGVs
1	A1078 Low Road / A148 Grimston Road	40	299	49	379
2	A148 from A149 to A1065	54	138	66	145
3	A148 from A1065 to A1067	46	138	54	145
4	A148 from A1067 to B1149	41	101	48	105
24	A149 from B1141 to A47	0	252	0	304
25	A12 from A47 to Williams Adams Way	52	134	64	140
26	A12 from Williams Adams Way to B1385	28	134	34	140
27	A12 from B1385 to A1117	0	134	0	140
28	A12 from A1117 to Mill Road	0	134	0	140
29	A12 from Mill Road to B1384 / A1145 from B1384 to A146	0	144	0	189
30	A146 from A47 to A1145	235	144	285	189
31	A47 from A146 to A1042	206	144	257	189
32	A47 from A1042 to Cucumber Lane	62	224	73	273
33	A47 from Cucumber Lane to A1064	74	224	90	273
34	A47 from A1064 to A12	58	224	71	273
35	A1270 from A1151 to A47	187	109	230	106
40	A1270 from B1150 to A1151	219	109	271	106
41	A1270 from A140 to B1150	191	109	230	106
42	A140 from B1149 to A1042	435	0	527	0
86	A47 from A1065 to Berrys Lane	116	187	142	260
87	A47 from A10 to A1065	75	187	92	260
88	A149 from A148 to A47	0	187	2	260
89	A47 from Wood Lane to Taverham Road	130	185	159	259
94	A47 from Blind Lane to Dereham Road	137	187	170	260
95	A47 from Dereham Road to A1074	181	180	220	253
97	A47 from A1074 to B1108	154	180	190	253
105	A47 from B1108 to A11	226	185	265	259
122	A47 from A11 to A140	179	177	216	251
127	A140 south of the A47	225	136	360	229
128	Mangreen	194	136	325	229

Link ID	Road	Number of vehicles generated by the construction phase of SEP and DEP – Human Receptor Screening (2025)			
		Scenario 1 – SEP or DEP in Isolation		Scenario 2 – SEP and DEP Concurrent Construction	
		Total LDVs	HGVs	Total LDVs	HGVs
129	A47 from A140 to A146	206	144	263	189

22.4.3.3.2 Assessment Scenarios

84. The onshore construction works of both Scenarios 1 (SEP or DEP in isolation) and 2 (SEP and DEP concurrent construction) are expected to occur over an approximate three-year period from 2025 at the earliest to 2027. To provide a conservative assessment, the maximum annual average project-generated traffic across the construction period was combined with the earliest year of construction, where pollutant emission rates and background concentrations would be higher than in the later years of construction.

85. The average construction traffic flows (derived from a worst-case 171 week (SEP or DEP in isolation) and 168 week (SEP and DEP concurrent construction) construction period at each section of works along onshore construction, see **Chapter 24 Traffic and Transport** for further details) were used to derive a representative AADT for the purposes of the air quality assessment. Peak construction flows were not used in the assessment, as peak construction would occur over a 1 or 2 month period (at worst) and using these to derive AADT across a full year would unrealistically inflate the impacts of construction generated traffic. The use of average construction flows was deemed to be robust and more appropriate representation of construction impacts from traffic over an annual period, and aligns with the requirement for use of AADT flows.

86. The assessment has therefore considered the following four scenarios:

- Verification / Base year (2019);
- Earliest Year of Construction (2025) ‘without SEP and/or DEP’;
- Earliest Year of Construction (2025) ‘with SEP or DEP in isolation’; and
- Earliest Year of Construction (2025) ‘with SEP and DEP constructed concurrently’.

87. A base year of 2019 was used in the assessment as it was considered that conditions in 2020 (or 2021) would not provide a representative baseline due to the Covid-19 outbreak in March 2020. Therefore, it would not be possible to represent short or longer term impacts on emissions in 2020 (and 2021) as a result of behavioural changes during national or local lockdowns within the dispersion model.

22.4.3.3.3 Traffic Data

88. 24-hour AADT flows and HGV percentages were derived for the worst-case construction year. The traffic data for the assessment is detailed in **Appendix 22.2**.

89. Traffic data has been factored to account for traffic growth between 2019 and 2025, by applying background growth factors that account for regional traffic growth from the Trip End Model Presentation Program (TEMPro), which takes into account traffic growth from committed developments (e.g. residential developments and employment developments). Cumulative construction traffic from the consented Hornsea Project Three, Norfolk Vanguard and Norfolk Boreas offshore wind farms has also been incorporated into the traffic data used in this assessment to provide a robust cumulative assessment.

22.4.3.3.4 Background Pollutant Concentrations

90. The assessment requires the derivation of background pollutant concentration data that are factored to the year of assessment, to which contributions from the assessed roads are added. Background NOx, NO_2, PM_{10} and $PM_{2.5}$ concentrations were therefore obtained from Defra mapping (Defra, 2020a) for the 1km x 1km grid squares covering the study area and receptor locations for the 2019 and 2025 assessment years.

91. Background NH_3, nutrient nitrogen and acid deposition concentrations were obtained from the APIS website (CEH, 2022) and are provided for 5km x 5km grid squares. The data are provided as three-year averages (2017-2019) and are not factored forward to future years.

22.4.3.3.5 Human Receptor Assessment Methodology

22.4.3.3.5.1 Dispersion Model

92. The potential impact of exhaust emissions from construction road vehicles accessing the onshore project area was assessed using the Atmospheric Dispersion Modelling System for Roads (ADMS-Roads) v5.0.1.3. The main pollutants of concern for human health as a result of vehicle emissions are annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$. Concentrations of these pollutants were therefore the focus of the ADMS-Roads assessment.

93. Detailed dispersion modelling was not undertaken for ecological receptors as a semi-quantitative approach was taken, using data provided by the JNCC (Chapman & Kite, 2021a and 2021b) to consider impacts at designated sites. This is discussed in further details in **Section 22.4.3.3.6**.

22.4.3.3.5.2 Traffic Data

94. 24-hour AADT flows and HGV percentages were derived for the worst-case construction year. The traffic data for the assessment is detailed in **Appendix 22.2**.

95. Traffic speeds were included in the air dispersion model as follows:

- Roundabouts and queues at junctions were modelled at 20km/h; and

- Speed data for free-flowing traffic conditions were obtained from average speeds recorded during the traffic count surveys (discussed in **Chapter 24 Traffic and Transport**) where applicable, or national speed limits. Where speeds vary across a road link, the lowest speed was used to provide a conservative assessment. For the purposes of model verification, the recorded road speed adjacent to the monitoring location was used to more adequately represent monitored conditions.

22.4.3.3.5.3 Emission Factors

96. Emission factors were obtained from the Emission Factor Toolkit (EFT) v11.0 provided by Defra (Defra, 2021b). 2019 emission factors were used in the verification/base year assessment and emission factors for 2025 were used in the future year 'without' and 'with' DEP and/or SEP scenarios.

97. There has been uncertainty in the future vehicle emissions projections in versions previous to v9.0 of the EFT. However, evidence has been published to suggest that v9.0 of the EFT onwards provide a reasonable prediction of vehicle emissions into the future and therefore sensitivity testing is not required (Air Quality Consultants, 2020). Given this evidence, the use of 2025 emission factors in the assessment is considered to be appropriate.

98. The use of future year emission factors was agreed with the EHOs at NNDC, BDC and SNC during consultation.

99. The default fleet projections in EFT v11.0 are based on fleet growth assumptions which were current before the Covid-19 outbreak in the UK. In consequence, default fleet outputs from the tool do not reflect short- or longer-term impacts on emissions in 2020 or beyond resulting from behavioural change during the national or local lockdowns (Defra, 2021b).

22.4.3.3.5.4 Meteorological Data

100. Meteorological data from the Norwich International Airport recording station from 2019 was used in the ADMS-Roads model. There is also a station at Weybourne, which is located on the coastline, 100m from the closest point of the onshore DCO order limits. However, the majority of the roads affected by SEP and DEP are located further inland, and therefore data from the Norwich station is considered to be more representative of the overall study area.

101. The use of the Norwich recording station data was agreed with the EHOs at NNDC, BDC and SNC during consultation.

22.4.3.3.5.5 Model Verification

102. Model verification is the process of adjusting model outputs to improve the consistency of modelling results with respect to available monitored data. In this assessment, model uncertainty was minimised following Defra (2021a) and IAQM and EPUK (2017) guidance.

103. Monitoring locations within the study area were reviewed to establish the suitability for use in model verification. Locations were considered where the assessed road links provided sufficient representation of road traffic sources that would affect monitored concentrations at that point. Monitoring locations that were situated in proximity to several road links which were not considered in the assessment were discounted on the basis that modelled concentrations would be underestimated.

104. A review of the monitoring data identified ten NO_2 diffusion tubes located on the considered road network with available data for 2019. These diffusion tubes and the reason for their inclusion or exclusion in the verification process are detailed in **Table 22.12**.

105. As detailed previously in **Section 22.4.3.3.2**, a base year of 2020 was not used in the assessment, as it was considered that monitored concentrations in 2020 would not be representative, as a result of the Covid-19 outbreak in March 2020, and therefore it would not be possible to represent short or longer term impacts on emissions in 2020 in the dispersion model as a result of behavioural changes during national or local lockdowns.

Table 22.12: Model Verification Diffusion Tubes

Local Authority	Site ID	Site Type	Included or Excluded	Reasoning
NNDC	7	Roadside	Included	NNDC 7 is located on Link 4 (A148 from A1067 to B1149), is a suitable roadside monitoring site and has monitoring data available.
BDC	BN1	Roadside	Included	BN1 is located on Link 33 (A47 from Cucumber Lane to A1064), is a suitable roadside monitoring site and has monitoring data available.
	BN28	Suburban	Excluded	BN28 has been excluded as it is a suburban monitoring site*.
SNC	DT1	Suburban	Excluded	DT1 has been excluded as it is a suburban monitoring site*.
	DT11	Rural	Excluded	DT11 has been excluded as it is a rural monitoring site*.
	DT13	Suburban	Excluded	DT13 has been excluded as they are suburban monitoring site*.

Local Authority	Site ID	Site Type	Included or Excluded	Reasoning
	DT27	Roadside	Excluded	DT27 is located at the junction of Lord Nelson Drive (a link for which traffic data is not provided in the assessment) and Link 96 (A1074 Dereham Road), according to the 2020 SNDC ASR (BDC and SNC, 2020). The coordinates included in the SNC 2020 ASR show DT27 to be located in Turnpike Belts along Link 96 (i.e., not on Lord Nelson Drive) and the diffusion tube could not be accurately located using Google Maps Street View, therefore this location was discounted from the verification process.
WDC	LOW 1	Roadside	Included	LOW 1 and 6a, b, c are located on Link 28 (A12 from A1117 to Mill Road), are suitable roadside monitoring sites and have monitoring data available.
	LOW 6a, b, c	Roadside	Included	
	LOW 7	Roadside	Excluded	LOW 7 is located near A12 Belvedere Road (Link 28) but is located on B1532 which is not included within the assessment, according to the coordinates provided.
KLWNBC	NA	NA	NA	NA
GYBC	NA	NA	NA	NA
*Defra (2021a) guidance recommends that only roadside sites are used in the verification process. NA – diffusion tubes monitoring sites in these local authorities are not located on road links considered in this assessment or else did not have monitoring data available for 2019.				

106. The following four locations were brought forward into the verification process:

- NNDC location 7 (located on Link 4 – A148 from A1067 to B1149);

- BDC location BN1 (located on Link 33 – A47 from Cucumber Lane to A1064); and
- WDC locations LOW 1 and LOW 6 a,b,c (both located on Link 28 – A12 from A1117 to Mill Road).

107. Model verification showed that the difference between modelled and monitored concentrations was greater than 25% at location 7 operated by NNDC. The model was under predicting concentrations in this area by approximately 67%. The model was revisited to determine whether any further improvements could be made to improve the agreement, but no further adjustments were possible. Therefore, to provide a conservative assessment the ratio of monitored to modelled NOx at this location was applied as a separate adjustment factor to receptor results in NNDC to account for model performance within this area (see **Table 22.13**).

108. Model verification also showed that modelled road concentrations at LOW 1 (operated by WDC) and BN1 (operated by BDC) were over predicting monitored road concentrations. The model was reviewed to determine whether any changes could be made to account for this, however no changes could be made. Therefore, to provide a conservative assessment, these locations were removed from the model verification, resulting in a higher overall adjustment factor. The resulting adjustment factor was calculated using NNDC location 7 and WDC location LOW 6a,b,c and applied to the remainder of receptor results in the study area (i.e. excluding NNDC receptor results) (see **Table 22.14**).

109. Details of the model verification process for NNDC and the rest of the study area are provided in **Table 22.13** and **Table 22.14**.

Table 22.13: Model Verification (Receptors within NNDC only)

Model Verification	**NO_2 Diffusion Tube Monitoring Location**
	NNDC Location 7
2019 Monitored Total NO_2 ($\mu g.m^{-3}$)	19.2
2019 Background NO_2 ($\mu g.m^{-3}$)	8.3
Monitored Road Contribution NOx (total - background) ($\mu g.m^{-3}$)	20.33
Modelled Road Contribution NOx (excludes background) ($\mu g.m^{-3}$)	6.7
Ratio of Monitored Road Contribution NOx / Modelled Road Contribution NOx	3.05
Adjustment Factor for Modelled Road Contribution	**3.045**
Adjusted Modelled Road Contribution NOx ($\mu g.m^{-3}$)	20.3
Modelled Total NO_2 (based on empirical NOx / NO_2 relationship) ($\mu g.m^{-3}$)	19.2
Monitored Total NO_2 ($\mu g.m^{-3}$)	19.2
% Difference [(modelled - monitored) / monitored] x 100	0%

Table 22.14: Model Verification (All Receptors, excluding those in NNDC)

Model Verification	**NO_2 Diffusion Tube Monitoring Location**	
	NNDC Location 7	**WDC LOW 6a, b, c**
2019 Monitored Total NO_2 ($\mu g.m^{-3}$)	19.2	33.2
2019 Background NO_2 ($\mu g.m^{-3}$)	8.3	23.8
Monitored Road Contribution NOx (total - background) ($\mu g.m^{-3}$)	20.33	18.5
Modelled Road Contribution NOx (excludes background) ($\mu g.m^{-3}$)	6.7	11.5
Ratio of Monitored Road Contribution NOx / Modelled Road Contribution NOx	3.05	1.60
Adjustment Factor for Modelled Road Contribution	**1.965**	
Adjusted Modelled Road Contribution NOx ($\mu g.m^{-3}$)	13.1	22.7
Modelled Total NO_2 (based on empirical NOx / NO_2 relationship) ($\mu g.m^{-3}$)	15.43	35.21
Monitored Total NO_2 ($\mu g.m^{-3}$)	19.2	33.2
% Difference [(modelled - monitored) / monitored] x 100	-20%	+6%

110. As shown in **Table 22.13** and **Table 22.14**, the verification process highlighted that model performance varied at the monitoring locations considered, which reflects the uncertainties in each of a range of factors which will influence this relationship (including the representation of road traffic flow data, vehicle speeds, and individual vehicle emissions compared to emission factors, as well as model performance in representing dispersion). The average ratio between the modelled and monitored nitrogen oxides (NOx) road contribution across the two sites detailed in **Table 22.14** was used to determine the adjustment factors applied to receptor results (excluding NNDC).

111. For the verification shown in **Table 22.14**, the Root Mean Square Error (RMSE) of the model was 3$\mu g.m^{-3}$. The RMSE is used to determine the average error or uncertainty of the model. Defra technical guidance (Defra, 2021a) states that this would ideally be within 4$\mu g.m^{-3}$ (10% of the annual mean NO_2 Objective of 40$\mu g.m^{-3}$) but should be less than ± 25% of the Objective (i.e. 10$\mu g.m^{-3}$). If the RMSE value is higher than ± 25% of the Objective, Defra guidance recommends that model inputs and verification should be revisited. Model performance in this assessment was therefore considered to be suitable, as the RMSE was within ± 10% of the Objective. Without adjustment, an RMSE of 6$\mu g.m^{-3}$ was predicted; therefore, model performance is improved by the application of the adjustment factor.

112. There is no monitoring of PM_{10} and $PM_{2.5}$ carried out along the links included in the air quality assessment. Therefore, the derived NOx adjustment factors were applied to the modelled PM_{10} and $PM_{2.5}$ concentrations to provide a conservative assessment (in accordance with guidance in LAQM TG(16) (Defra, 2021a)).

22.4.3.3.5.6 NOx to NO_2 Conversion

113. NOx concentrations were predicted using the ADMS-Roads model. The modelled road contribution of NOx at the identified receptor locations was then converted to NO_2 using the NOx to NO_2 calculator (v8.1) (Defra, 2020b), in accordance with Defra guidance (Defra, 2021a).

22.4.3.3.5.7 Calculation of Short-Term Pollutant Concentrations

114. Defra guidance (Defra, 2021a) sets out the method for the calculation of the number of days, in which the PM_{10} 24-hour Objective is exceeded, based on a relationship with the predicted PM_{10} annual mean concentration. The relevant calculation utilised in the prediction of short-term PM_{10} concentrations was:

$$No.24\ hour\ mean\ exceedances = -18.5 + 0.00145\ x\ (annual\ mean)^3 + (\frac{206}{annual\ mean})$$

115. Research projects completed on behalf of Defra and the Devolved Administrations (Laxen and Marner, 2003; AEAT, 2008) concluded that the hourly mean NO_2 Objective is unlikely to be exceeded if annual mean concentrations are predicted to be less than $60\mu g.m^{-3}$. This value was therefore used as an annual mean equivalent threshold to evaluate likely exceedance of the hourly mean NO_2 Objective.

22.4.3.3.5.8 Sensitivity

116. The sensitivity of a human receptor is not considered in the assessment of air quality impacts; the Air Quality Objectives in **Table 22.5**, which are health-based, only apply at locations where there is relevant public exposure as detailed in **Table 22.15**.

Table 22.15: Examples of where the Air Quality Objectives Should and Should Not apply

Averaging Period	Objectives should apply to:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes, etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24-hour mean	All locations where the annual mean Objective would apply, together with hotels and gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual and 24-hour mean Objectives apply. Kerbside sites (for example, pavements of busy shopping streets).	Kerbside sites where the public would not be expected to have regular access.

Averaging Period	Objectives should apply to:	Objectives should generally not apply at:
	Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	

117. Sensitive receptor locations that experience pollutant concentrations close to, or in exceedance of the Objectives experience a larger impact magnitude with a smaller change in pollutant concentrations, as detailed below.

22.4.3.3.5.9 Magnitude and Significance

118. Guidance is provided by the IAQM and EPUK (IAQM and EPUK, 2017) on determining the magnitude and significance of a project's impact on local air quality. The guidance was developed specifically for use in planning and assessing air quality impacts associated with mixed-use and residential developments. However, due to the nature of SEP and DEP, the criteria detailed below were utilised in the assessment to provide consideration of the impacts associated with SEP and DEP.

119. The impact descriptors that take account of the magnitude of changes in pollutant concentrations, and the concentration in relation to the Air Quality Objectives, are detailed in **Table 22.16**.

Table 22.16: Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in Concentration Relative to the Air Quality Objective			
	1	2 to 5	6 to 10	>11
75% or less of Objective	Negligible	Negligible	Slight	Moderate
76 – 94% of Objective	Negligible	Slight	Moderate	Moderate
95 – 102% of Objective	Slight	Moderate	Moderate	Substantial
103 – 109% of Objective	Moderate	Moderate	Substantial	Substantial
110% or more of Objective	Moderate	Substantial	Substantial	Substantial
Note: Figures are to be rounded up to the nearest round number. Any value less than 1% after rounding (effectively less than 0.5%) will be described as "Negligible".				

120. Further to the determination of the impact at individual receptors, the guidance recommends that assessment is made of the overall significance of the impact from a development on local air quality. The overall significance will need to take into account the following factors:

- The existing and future air quality in the absence of SEP and/or DEP;
- 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.

121. The guidance also states that a judgement of the significance should be made by a competent professional who is suitably qualified. This air quality assessment and determination of the significance of SEP and/or DEP on local air quality was undertaken by members of the IAQM. For the purposes of this assessment, any effects with a significance level of minor or less have been concluded to be **not significant** in terms of the EIA Regulations.

22.4.3.3.6 Ecological Receptor Assessment Methodology

122. The JNCC recently published a suite of documents (Chapman & Kite, 2021a and 2021b) which provide additional guidance on cumulative and in-combination effects assessment for projects and plans which generate increases in atmospheric nitrogen emissions. The reports deal with identifying thresholds for road traffic flow increases, above which detailed assessment of the effects upon Critical Level and/or Critical Loads for nitrogen at nearby designated sites would be required. The reports were solely concerned with the effects arising as a result of permanent and lasting changes (increases) in operational phase road traffic flows, associated exhaust emissions of NH_3 and NOx and consequent permanent impacts on designated sites.

123. While any potential impacts of SEP and/or DEP traffic emissions on ecological sites during construction will be short-term, transient and temporary, the guidance, screening criteria and methodology provided in JNCC reports were used for this assessment of ecological receptors, which is an update to the screening and methodology presented at PEIR. The reports provide data on the magnitude of increases in pollutant concentrations and deposition (NOx, NH_3, N-dep and acid) with different levels of traffic generation experienced, at varying distances from the road, based on detailed modelling and monitoring measurements. The JNCC Technical Report (Chapman & Kite, 2021b) states that the road-relevant approach provided in the report is expected to provide robust and representative, albeit indicative, information which will often be better than a detailed model if that model has not been verified against measurements. As such, the consideration of impacts on designated ecological sites has been undertaken using a semi-quantitative approach, using the data provided within the JNCC reports, without project-specific detailed dispersion modelling.

124. Use of the JNCC guidance has allowed for a more conservative assessment of any potential road traffic emission impacts on ecological receptors, as the 0.15% increase in AADT screening criterion (or DMT) is more stringent than the previous screening criteria of a 1,000 AADT or 200 HGV increase (Natural England (2018), IAQM (2020) and Highways England (2019). As such, a greater number of links, and therefore a greater number of ecological receptors, have been screened into the assessment.

125. As discussed in **Section 22.4.3.3.1**, and provided in **Table 22.10**, the first step of the ecological assessment was to screen the road links for increases in AADT (inclusive of (a) project-generated traffic, (b) 2019 to 2025 baseline traffic growth (see **In-Combination Assessment Section** below for further details on this) and (c) cumulative projects traffic) greater than a DMT of 0.15% of existing 2019 AADT flows. This resulted in the screening in of all road links considered in the assessment. Following this, a search of ecological receptors within 200m of these road links, with habitats/features sensitive to air pollutants, was then undertaken. The ecological receptors present within 200m of road links are presented in **Table 22.35**, as well as reasoning for their inclusion/exclusion in the assessment.

22.4.3.3.6.1 In-Combination Assessment

126. A project or plan in isolation may not lead to significant effects, however the 2017 EIA Regulations require the consideration of impacts associated with a project or plan both in isolation, and in addition to other plans or projects which may affect the same designated site (an ‘in-combination’ assessment). The outcome of recent court judgements (notably the Wealden Judgement in 2017) has led to the requirement for the 1% criterion to be applied to the in-combination impact to determine whether impacts remain insignificant, or whether further ecological investigation is required.

127. The road links which pass alongside the designated sites considered in the assessment will experience background traffic growth between the base year (2019) and the year of peak construction (2025), which may increase nutrient nitrogen/acid deposition or NOx at the designated sites. These in-combination impacts have been considered in the impact assessment (see **Section 22.6.1.3**).

128. In addition, any consented agricultural or industrial projects in the vicinity of designated sites which may be affected by traffic generated by SEP and/or DEP may also contribute to in-combination nutrient nitrogen/acid deposition and NOx concentrations. Natural England developed SSSI Impact Risk Zones (IRZs) which specify the types of projects which may impact on SSSIs based on the distance from the site, as shown in **Table 22.17**. These IRZ criteria were applied to relevant SACs, Special Protection Areas (SPAs), ancient woodlands and Local Nature Reserves (LNRs), in addition to SSSIs, to provide a conservative assessment.

Table 22.17: Natural England's SSSI IRZ

Distance from Designated Site	Proposals, permissions and permits	
	Air Pollution	Combustion
0 to 0.05 km	All planning applications, except householder applications	
0.05 to 0.2 km	Any development that could cause air pollution or dust either in its construction or operation (including industrial/commercial processes, livestock and poultry units, slurry lagoons and digestate stores, manure stores). All general combustion processes including energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.	All general combustion processes. Including: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.

Distance from Designated Site	Proposals, permissions and permits	
	Air Pollution	**Combustion**
0.2 to 0.5 km	Any development that could cause air pollution (including industrial/commercial processes, livestock and poultry units, slurry lagoons and digestate stores, manure stores). All general combustion processes including energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.	
0.5 to 2 km	Any industrial/agricultural development that could cause air pollution (including industrial processes, livestock and poultry units with floorspace > 500m², slurry lagoons and digestate stores > 200m², manure stores > 250t). General combustion processes >20MW energy input including energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.	General combustion processes >20MW energy input. Including: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.
2 to 5 km	Any industrial/agricultural development that could cause air pollution (including industrial processes, livestock and poultry units with floorspace > 500m², slurry lagoons and digestate stores > 750m², manure stores > 3500t). General combustion processes >50MW energy input including energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.	General combustion processes >50MW energy input. Including: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/combustion.

129. A search was carried out for projects within the relevant distances of each ecological receptor screened into the assessment (see **Table 22.35**), which meet the above criteria. Additional contributions of nutrient nitrogen from these sources (from both NO_2 and NH_3) and airborne NOx were included in the 'in-combination' assessment, where there was sufficient information included within the application to quantify these emissions (see **Section 22.6.1.3**).

130. This approach to the assessment is also in accordance with the requirements of IAQM Guidance on the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (IAQM, 2020).

22.4.3.3.6.2 Sensitivity

131. Whilst Critical Levels (see **Table 22.6**) apply regardless of habitat type, Critical Loads for habitat sites in the UK are published on the APIS website (CEH, 2022). These are the maximum levels of nutrient nitrogen and acid deposition that can be tolerated without harm to the most sensitive features of these habitat sites (see **Appendix 22.4**).

22.4.3.3.6.3 Magnitude and Significance

132. An increase in Critical Load of less than 1% is typically considered to be insignificant, as a change of this magnitude is likely to be within the natural range of fluctuations in deposition and is unlikely to be perceptible. The 1% threshold of insignificance is referenced in Natural England (2018), IAQM (2020) and Chapman & Kite (2021a, 2021b). The exceedance of a threshold is not decisive in and of itself, nor does it suggest that damage is likely to occur (in the case of SSSIs) or that it will not be possible to avoid adverse effects to site integrity (in the case of European sites) (Chapman & Kite, 2021a).

133. Using the JNCC reports (Chapman & Kite, 2021a and 2021b), it is possible to apply a road-relevant approach based on the distance between the affected road and the nearest boundary of a (European) designated site. The thresholds proposed in the JNCC reports focus on SSSI and European designated sites; however, they have also been applied to ancient woodlands and LNRs in this assessment in order to provide a conservative and robust assessment.

134. **Table 22.18** provides the AADT change which is required to trigger an exceedance of 1% of the Critical Level for NOx and NH_3 at different distances from a roads edge. **Table 22.19** contains similar values for nutrient nitrogen deposition (N-dep) Critical Loads at different distances from a road edge. As discussed above, the 1% threshold is taken from the Natural England (2018) guidance document on the assessment of traffic emissions as the threshold of insignificance to be applied as part of an in-combination assessment. It should be noted that these tables are based on an average vehicle fleet mix in 2019 for NOx and 2015 for NH_3; as such, changes in emissions of these pollutants into the future is not accounted for.

Table 22.18: AADT Changes (for a typical fleet composition) Required to Cause a Change of 1% of Critical Levels as a Function of Distance from the Edge of a Road (Chapman & Kite, 2021b) [Amended]

Distance from Road Edge (m)	AADT		
	1% CL for NOx (30 µg.m^{-3})	1% CL for lower NH_3 (1 µg.m^{-3})	1% CL for higher NH_3 (3 µg.m^{-3})
1	120	91	274
5	171	259	776
5-10	225	332	995
10	278	405	1,214
10-25	413	568	1,704
25	547	731	2,194
25-50	732	938	2,814
50	917	1,145	3,434
50-100	1,269	1,468	4,403

Distance from Road Edge (m)	**AADT**		
	1% CL for NOx (30 µg.m^{-3})	**1% CL for lower NH_3 (1 µg.m^{-3})**	**1% CL for higher NH_3 (3 µg.m^{-3})**
100	1,620	1,791	5,372
100-150	2,015	2,059	6,176
150	2,410	2,327	6,980
150-200	2,917	2,565	7,693
200	3,424	2,802	8,406
Colour coding:			
⬜	AADT provided in the JNCC report (Chapman & Kite, 2021b)		
🟦	Approximate AADT calculated from averaging AADT flows provided in the JNCC report for each distance band (Chapman & Kite, 2021b) (i.e. 100-150m band = average of 1,620 AADT (100m 1% CL for NOx) and 2,410 AADT (150m 1% CL for NOx))		

Table 22.19: AADT Changes (for a typical fleet composition) Required to Cause a Change of 1% of Critical Loads as a Function of Distance from the Edge of a Road (Chapman & Kite, 2021b) [Amended]

Distance from Road Edge (m)	**AADT**			
	1% CL for N-Dep (5 kg-N.ha^{-1}.yr^{-1})	**1% CL for N-Dep (10 kg-N.ha^{-1}.yr^{-1})**	**1% CL for N-Dep (15 kg-N.ha^{-1}.yr^{-1})**	**1% CL for N-Dep (20 kg-N.ha^{-1}.yr^{-1})**
Deposition to Woodland				
1	35	71	106	142
5	86	171	257	343
5-10	106	211	317	423
10	125	251	376	502
10-25	166	333	499	666
25	207	415	622	829
25-50	255	511	766	1,021
50	303	606	909	1,212
50-100	373	747	1,120	1,493
100	443	887	1,330	1,773
100-150	499	998	1,496	1,994

Distance from Road Edge (m)	**AADT**			
	1% CL for N-Dep (5 kg-N.ha^{-1}.yr^{-1})	**1% CL for N-Dep (10 kg-N.ha^{-1}.yr^{-1})**	**1% CL for N-Dep (15 kg-N.ha^{-1}.yr^{-1})**	**1% CL for N-Dep (20 kg-N.ha^{-1}.yr^{-1})**
150	554	1,108	1,661	2,215
150-200	601	1,203	1,803	2,405
200	648	1,297	1,945	2,594
Deposition to Short Vegetation				
1	59	118	177	236
5	145	291	436	582
5-10	180	360	540	720
10	215	429	644	858
10-25	287	573	860	1,146
25	359	717	1,076	1,434
25-50	444	888	1,332	1,775
50	529	1,058	1,587	2,116
50-100	655	1,310	1,964	2,619
100	780	1,561	2,341	3,121
100-150	880	1,760	2,640	3,520
150	980	1,959	2,939	3,918
150-200	1,066	2,131	3,196	4,261
200	1,151	2,302	3,453	4,604
Colour coding:				
⬜	AADT provided in the JNCC report (Chapman & Kite, 2021b)			
🟦	Approximate AADT calculated from averaging AADT flows provided in the JNCC report for each distance band (Chapman & Kite, 2021b)			

135. As an example, whereby an affected road with an existing AADT of 5,000 is located 100m from the boundary of an ecological site (for which a Critical Load to a woodland feature of 10 kg-N.ha^{-1}.yr^{-1} applies), a DMT of 7.5 vehicles applies (i.e. 0.15% of 5,000). However, the DMT is derived on a precautionary basis which assumes that a designated site is adjacent to the road concerned. It can be seen from **Table 22.19** that a change in AADT of 887 vehicles would be required to trigger the 1% exceedance of the N-dep Critical Load at the site boundary, for this particular example. If the predicted change in traffic along the road from the development example is 150 AADT, it may be reasonable to assert that there is no credible evidence that the effects of other plans and projects would ever be such to lead to an overall change of 887 AADT, in spite of the fact that the DMT (7.5 vehicles) is exceeded.

136. The distances from ecological receptor boundaries to affected road edges was therefore taken into consideration in the next stage of ecological receptor screening. AADT flows (inclusive of (a) project-generated traffic, (b) background 2019 to 2025 traffic growth and (c) cumulative projects traffic) were compared to those in **Table 22.18** and **Table 22.19**, and ecological receptors were brought forward into the next stage of the ecological assessment if they exceeded thresholds corresponding to a 1% increase in the Critical Level or Load for the relevant habitat present in designated site.

137. These initial ecological receptor screening stages are shown in **Appendix 22.5** for SEP or DEP in isolation and SEP and DEP together concurrently. As detailed in the above Section, site-specific Critical Levels and Critical Loads are presented in **Appendix 22.4**, and these have been taken into consideration in the comparison to AADT flows shown in **Table 22.18** and **Table 22.19**. Only links with ecological receptors within 200m of the roads edge are presented in **Appendix 22.5**.

138. Of the 88 ecological sites (this number includes some ecological sites more than once as, due to their size, they are within 200m of more than one road link) initially screened in (i.e. for being within 200m of affected road link(s)), 59 ecological sites have been brought forward for further assessment. This is because the AADT at the relevant distance from the road edge to the ecological site boundary exceeded those representative of greater than 1% increase in Critical Level and/or Load (see **Table 22.18** and **Table 22.19**). Not all of the 59 ecological sites exceed the representative 1% AADT flows for all Critical Level and Critical Load values, e.g. on Link 4 Bullfer Grove ancient woodland only exceeds the 1% N-dep Critical Load but not the NOx and NH_3 Critical Levels (see **Appendix 22.5**). Therefore, ecological sites have only been assessed further for Critical Levels and/or Loads shown to be in exceedance of 1%. In addition, for some ecological sites not all of the designated features and Critical Load classes are exceeded, so only those in exceedance have been considered further in this assessment.

139. Following this detailed initial screening of ecological sites, those sites screened in for further assessment were assessed for impacts of traffic emissions using the guidance and methodology provided in the JNCC reports (Chapman & Kite, 2021a and 2021b). Table 11 of the JNCC Technical Report (Chapman & Kite, 2021b) provides changes in concentrations (2019) and fluxes (2015) that could reasonably be expected from an increase of 1,000 AADT on a typical road. The guidance also states that these can be scaled to represent alternative increases in traffic flows, for example an increase in 250 AADT results in 25% of the impact of the values shown in **Table 22.20**, which is a slightly amended version of Table 11 in the JNCC Technical Report.

140. This approach has been adopted to quantify increases in annual mean NOx and NH_3, and N-dep in this assessment. The relationship between N-dep and its acidifying potential is linear, so a 1 kg $N.ha^{-1}.yr^{-1}$ reduction will always deliver a 0.07 $keq.ha^{-1}.yr^{-1}$ reduction in acidity. Therefore, increases in nitrogen-driven acidity, i.e. those from road traffic vehicle emissions, is directly proportional to increases in N-dep (Chapman & Kite, 2021b). Acid deposition has therefore been quantified in the assessment by multiplying the N-dep concentration by 0.07.

Table 22.20: Change in Concentration (in 2019) and Flux (in 2015) for an Example Flow of 1,000 AADT in a Typical Vehicle Fleet (Chapman & Kite, 2021b) [Amended]

Distance from Road Edge (m)	Annual Mean NOx ($\mu g.m^{-3}$)	Annual Mean NH_3 ($\mu g.m^{-3}$)	N-Dep to Forest ($kgN.ha^{-1}.yr^{-1}$)	N-Dep to Short Vegetation ($kgN.ha^{-1}.yr^{-1}$)
1	2.5	0.109	1.41	0.85
5	1.8	0.039	0.58	0.34
5-10	1.45	0.032	0.49	0.285
10	1.1	0.025	0.4	0.23
10-25	0.825	0.0195	0.32	0.185
25	0.55	0.014	0.24	0.14
25-50	0.44	0.01135	0.2	0.1175
50	0.33	0.0087	0.16	0.095
50-100	0.26	0.00715	0.135	0.0795
100	0.19	0.0056	0.11	0.064
100-150	0.155	0.00495	0.1	0.0575
150	0.12	0.0043	0.09	0.051
150-200	0.1065	0.00395	0.0835	0.047
200	0.093	0.0036	0.077	0.043

Distance from Road Edge (m)	Annual Mean NOx ($\mu g.m^{-3}$)	Annual Mean NH_3 ($\mu g.m^{-3}$)	N-Dep to Forest ($kgN.ha^{-1}.yr^{-1}$)	N-Dep to Short Vegetation ($kgN.ha^{-1}.yr^{-1}$)
Colour coding:				
	Concentration/flux provided in the JNCC report (Chapman & Kite, 2021b)			
🟦	Approximate concentration/flux calculated from averaging concentration/flux provided in the JNCC report for each distance band (Chapman & Kite, 2021b)			

22.4.3.3.6.3.1 SEP and/or DEP Alone compared to In-combination Traffic Flows

141. As detailed at the beginning of this section, an in-combination assessment has been undertaken. To provide context around the proportion of AADT generated as a result of SEP and/or DEP, and that from other in-combination sources (background growth and cumulative projects), **Table 22.21** provides Project-generated construction traffic flows, background traffic growth between 2019 (base year) and 2025, and cumulative traffic from other consented projects with a spatial/temporal overlap.

Table 22.21: SEP and/or DEP Project AADT Flows Compared to In-combination Project Flows Considered in the Assessment (2025)

Link	Scenario 1 – SEP or DEP in Isolation			Scenario 2 – SEP and DEP Concurrent Construction		
	Project AADT	Incombination AADT	Project as % of Total	Projects AADT	Incombination AADT	Projects as % of Total
4	142	1,862	7.6%	153	1,872	8.2%
10	57	322	17.8%	64	329	19.4%
11	61	778	7.9%	70	787	8.9%
13	168	2,654	6.3%	183	2,668	6.8%
14	144	1,892	7.6%	158	1,906	8.3%
20	61	1,374	4.4%	64	1,377	4.6%
21	61	1,565	3.9%	64	1,568	4.1%
25	186	4,694	4.0%	204	4,712	4.3%
28	134	1,877	7.1%	140	1,883	7.5%
30	379	2,844	13.3%	474	2,940	16.1%
31	350	6,600	5.3%	447	6,697	6.7%
34	283	3,304	8.6%	344	3,365	10.2%
35	296	3,881	7.6%	336	3,921	8.6%
40	328	3,899	8.4%	377	3,948	9.6%
43	216	2,178	9.9%	234	2,196	10.6%
49	260	1,719	15.1%	296	1,755	16.9%
51	272	1,840	14.8%	310	1,878	16.5%
59	127	1,183	10.8%	145	1,201	12.1%
79	285	2,302	12.4%	307	2,323	13.2%

Link	Scenario 1 – SEP or DEP in Isolation			Scenario 2 – SEP and DEP Concurrent Construction		
	Project AADT	Incombination AADT	Project as % of Total	Projects AADT	Incombination AADT	Projects as % of Total
80	110	1,660	6.6%	125	1,675	7.5%
85	105	320	32.7%	119	334	35.5%
86	302	2,342	12.9%	402	2,442	16.5%
87	262	1,777	14.7%	352	1,868	18.9%
88	187	2,904	6.4%	262	2,979	8.8%
114	209	5,649	3.7%	220	5,661	3.9%
125	123	3,066	4.0%	169	3,112	5.4%
133	16	131	11.9%	17	133	12.9%
136	16	131	11.9%	17	133	12.9%
138	55	85	64.4%	101	132	77.0%

142. As can be seen from **Table 22.21**, the majority of in-combination AADT considered in this assessment comprises traffic other than SEP and/or DEP-generated traffic. For the most part, SEP and/or DEP construction traffic contributes to approximately 4% to 19% of overall in-combination AADT, with the exception of two links (Link 85 and 138) which have a low total AADT and therefore Project traffic contributes to a higher proportion of AADT increase, but no greater than 119 AADT.

143. Any development-generated or in-combination values above 1% of the Critical Load or Level requires additional assessment by an ecologist to determine whether any significant impacts may be experienced at the affected habitats. The determination of the significance of impacts associated with nutrient nitrogen/acid deposition and airborne NOx concentrations is detailed in **Chapter 20 Onshore Ecology and Ornithology**.

22.4.3.3.6.3.2 Haul Road Traffic

144. The potential impacts on designated ecological sites as a results of LDVs and HGVs travelling along the haul road have been considered. The average daily number of vehicles travelling along the haul road was calculated where the onshore DCO order limits is within 200m of a designated ecological site, as described in **Section 22.4.3.3.1**, and is detailed in **Table 22.22**.

Table 22.22: Traffic flows on the haul road within 200m of designated ecological sites

Designated ecological site	Distance from onshore DCO order limits*	Accesses	AADT generated during construction	
			SEP or DEP in isolation	SEP and DEP concurrent construction
Alderford Common SSSI	185m	ACC31 ACC32	49	56

Designated ecological site	Distance from onshore DCO order limits*	Accesses	AADT generated during construction	
			SEP or DEP in isolation	SEP and DEP concurrent construction
River Wensum SAC and SSSI	Site crosses the onshore DCO order limits**	ACC33 ACC36	32	42
Unnamed ancient woodland (ID 6)	190m	ACC61 ACC62	62	62
Cawston wood ancient woodland	67m	ACC28 ACC29	50	52
Colton wood ancient woodland	10m	ACC52 ACC53	62	59
Smeeth wood ancient woodland	170m	ACC61 ACC62	62	62

*and therefore worst case distance from haul road (as the haul road is unlikely to be adjacent to the closest boundary))
**this site will be crossed using trenchless techniques and the haul road will be utilised from accesses at either side (i.e. not through) of the site

145. As shown above, the number of vehicles travelling along the haul road do not exceed the screening criteria detailed in **Table 22.18** and **Table 22.19** that correspond to a 1% change in Critical Level or Load, at the respective distances from the (assumed worst-case) haul road edge. As such, impacts on designated sites as a result of haul road traffic were not considered further in the assessment, as they are considered to be insignificant.

22.4.4 Cumulative Impact Assessment Methodology

146. The CIA considers other plans, projects and activities that may impact cumulatively with SEP and DEP. As part of this process, the assessment considers which of the residual impacts assessed for SEP and/or DEP on their own have the potential to contribute to a cumulative impact, the data and information available to inform the cumulative assessment and the resulting confidence in any assessment that is undertaken. **Chapter 5 EIA Methodology** provides further details of the general framework and approach to the CIA.

147. For air quality, the CIA utilised the same methodology as detailed above in **Section 22.4.3**. The results of the CIA are presented in **Section 22.7**.

22.4.5 Transboundary Impact Assessment Methodology

148. As detailed in **Table 22.1**, the Planning Inspectorate has agreed that transboundary air quality effects are unlikely to occur, and that this topic can be scoped out of the assessment.

22.4.6 Assumptions and Limitations

149. Traffic data was utilised in the prediction of impacts at sensitive human and ecological receptor locations. Any assumptions made in the derivation of the traffic data are therefore applicable to the air quality assessment. For further details please refer to **Chapter 24 Traffic and Transport**.

150. Diffusion tube monitoring is a standard indicative monitoring method used by local authorities to measure air quality within their administrative areas. Diffusion tubes do not provide the same level of precision and accuracy as automatic monitoring methods; however, good quality assurance and quality control processes will minimise uncertainties insofar as possible. Furthermore, annual mean diffusion tube monitoring results are adjusted for bias using a factor derived using MCerts reference method monitoring equipment. The uncertainties and limitations to monitored air pollution data are therefore unlikely to significantly affect the certainty of the EIA.

151. Background pollutant concentrations within the air quality study area were derived using the pollution maps provided by Defra for 1 km x 1 km grid squares across the UK. These data are derived using an empirical model, calibrated using monitoring data from the UK Automatic Urban and Rural Network and, as such, there are inherent uncertainties associated with modelled data. However, the use of these maps is an industry-standard approach and was agreed with stakeholders during consultation (see **Table 22.1**). Uncertainties in these mapped background values are unlikely to significantly affect the certainty of the EIA and the conclusions of the assessment.

152. The latest version of Defra's air quality assessment tools, including the background pollutant maps, are based on assumptions prior to the Covid-19 pandemic. As such, the tools do not reflect any short or long-term changes to emissions which may have occurred as a result of behavioural change during the pandemic.

22.5 Existing Environment

153. A desk-based review was undertaken to determine the air quality baseline within the study area. Monitoring data were obtained from the following local authority websites for use in the assessment:

- NNDC;
- BDC;
- SNC;
- KLWNBC.
- BC;
- GYBC; and
- WDC.

154. The characterisation of the existing environment was undertaken using data sources listed in **Table 22.7**. The baseline data sources are sufficient to provide an assessment of potential air quality impacts arising from SEP and DEP and were agreed with the local authorities within the onshore DCO order limits (i.e. NNDC, BDC and SNC) during consultation via email in November and December 2020.

22.5.1 Local Air Quality Management (LAQM)

155. A review of the annual air quality review and assessment reports for the seven local authorities identified that the onshore cable corridor and associated affected road network do not pass through or close to any statutory designated AQMAs.

156. The statutory designated AQMA in Swaffham, declared in 2017 for exceedances of the NO_2 annual mean, is located approximately 1km south of the A47, which forms part of the affected road network. However, as SEP and/or DEP generated traffic would not pass through the AQMA itself, it is not anticipated that, given the distance, there would be any significant increases in pollutant concentrations within the AQMA as a result of SEP and/or DEP.

157. The statutory designated Railway Road and Gaywood Clock AQMAs in King's Lynn, declared in 2003 and 2009 respectively for exceedances of the NO_2 annual mean, are located approximately 400m and 1.6km south respectively of the A1078 Edward Benefer Way, which also forms part of the affected road network. However, SEP and/or DEP generated traffic would not pass through the AQMAs themselves as traffic commences/terminates at King's Lynn Docks, therefore there would not be any significant increases in pollutant concentrations within these AQMAs as a result of SEP and/or DEP.

22.5.2 Air Quality Monitoring Data

22.5.2.1 NNDC

158. There are ten NO_2 diffusion tube locations in the vicinity of the onshore cable corridor or associated affected road network considered. The results were obtained from the latest available 2020 ASR (NNDC, 2020) and are presented in **Table 22.23**.

Table 22.23: Annual Mean NO_2 Monitoring Undertaken by NNDC

Site ID	Location	Site Type	Monitored Annual Mean NO_2 Concentration ($\mu g.m^{-3}$)				
			2015	2016	2017	2018	2019
3	Grammar School Rd, North Walsham	Roadside	-	20.2	24.7	22.3	22.9
4	Norwich Road North Walsham	Roadside	-	-	20.7	21.3	19.3
7	Norwich Holt Road	Roadside	-	-	17.7	19.9	19.2
8	Woodfield Road, Holt	Roadside	-	7.7	10	9.5	8.8
9	Queens Rd, Fakenham	Roadside	-	21.6	21.7	19.9	20.3
10	Barons Hall Rd, Fakenham	Roadside	-	7.5	10.0	8.9	8.6
11	Corbett Road, North Walsham	Roadside	-	9.9	11.5	11.5	13.1
12	High Street, Holt	Roadside	-	19.3	21.9	21.2	19.2
15	Trinity Rd, Fakenham	Roadside	-	-	12.5	14.6	14.6
16	Rudham Stile Lane	Roadside	-	-	10.3	9.3	10.3

159. As detailed in **Table 22.23**, annual mean NO_2 concentrations were well below (i.e. less than 75% of) the annual mean Objective of $40\mu g.m^{-3}$ at all monitoring locations within the NNDC study area.

22.5.2.2 BDC

160. There were 11 NO_2 diffusion tube locations in the vicinity of the onshore cable corridor or associated affected road network considered. The results were obtained from the latest available 2020 ASR (BDC & SNC, 2020) and are presented in **Table 22.24**.

Table 22.24: Annual Mean NO_2 Monitoring Undertaken by BDC

Site ID	Location	Site Type	Monitored Annual Mean NO_2 Concentration (µg.m^{-3})				
			2015	**2016**	**2017**	**2018**	**2019**
BN1	A47 Nth Burlingham	Roadside	28.4	30.6	24	26.3	24.5
BN7	Heath Crescent Hellesdon	Suburban	13.6	14	15.5	14.2	13.5
BN11	Reepham Road Hellesdon	Suburban	30.1	32	34	29.6	28
BN12	Boundary Rd Hellesdon	Suburban	29.2	30.5	30	29.4	29.6
BN13	Milecross Ln Hellesdon	Suburban	24.4	24.8	23.4	22.8	24
BN17	School Rd Drayton	Roadside	-	-	19.5	14	12.9
BN18	Middletons Lane Hellesdon	Suburban	-	-	18.1	26	23.8
BN20	The Street Acle	Kerbside	-	-	-	22.5	21.1
BN24	Fifers Lane Hellesdon	Suburban	-	-	-	18.1	18.7
BN26	Plumstead Road East Thorpe St Andrew	Suburban	-	-	-	-	15.1
BN28	Holt Road Hellesdon	Suburban	-	-	-	-	16.2

161. As detailed in **Table 22.24**, recent annual mean NO_2 concentrations were well below the annual mean Objective of 40µg.m^{-3} at all monitoring locations in the BDC study area.

22.5.2.3 SNC

162. There were ten NO_2 diffusion tube locations in the vicinity of the onshore cable corridor or associated affected road network considered. The results were obtained from the latest available 2020 ASR (BDC & SNC, 2020) and are presented in **Table 22.25**.

Table 22.25: Annual Mean NO_2 Monitoring Undertaken by SNC

Site ID	Location	Site Type	Monitored Annual Mean NO_2 Concentration (µg.m^{-3})				
			2015	**2016**	**2017**	**2018**	**2019**
DT1	46a Newmarket Rd Cringleford	Suburban	17.1	20.2	21.2	19.7	19.9
DT2	131 Longwater Ln Costessey	Suburban	18.1	21.2	21.6	20.1	19.1
DT9	Kirby Bedon Rd Bixley	Suburban	21.4	25.4	24.9	23.2	23.9
DT10	209 Norwich Rd Wymondham	Suburban	12.0	18.0	16.5	15.3	15.7
DT11	2 Thickthorn Cottages	Rural	12.8	15.8	14.9	13.9	15.0
DT13	233 Norwich Rd Wymondham	Suburban	11.9	15.9	16.1	15.0	14.2
DT14	Norwich Road Wymondham	Suburban	13.3	17	16.2	15.1	15.9
DT23	3 Norwich Rd Costessey	Suburban	13.0	16.7	15.6	14.5	15.2
DT26	Newmarket Road Cringleford	Roadside	21.4	25.5	24.1	22.4	20.7
DT27	Lord Nelson Drive Costessey	Roadside	23.1	28.4	25.4	23.6	16.2

163. As detailed in **Table 22.25**, annual mean NO_2 concentrations were well below the annual mean Objective of 40µg.m^{-3} at all monitoring locations in the SNC study area.

22.5.2.4 KLWNBC

164. KLWNBC undertakes automatic and diffusion tube monitoring within its area of jurisdiction. Monitoring is undertaken predominantly within King's Lynn, including at several locations within the Railway Road and Gaywood Clock AQMAs. Recent NO_2 monitoring data in the vicinity of the onshore cable corridor and associated affected road network or within either of the King's Lynn AQMAs were obtained from the 2021 ASR (KLWNBC, 2021) and are detailed in **Table 22.26**. Exceedances of the annual mean Objective are shown in **bold** text.

Table 22.26: Annual Mean NO_2 Monitoring Undertaken by KLWNBC (CM = continuous monitor sites)

Site ID	Location	Site Type	In AQMA?*	Monitored Annual Mean NO_2 Concentration ($\mu g.m^{-3}$)				
				2016	2017	2018	2019	2020
CM1	Southgate Park, King's Lynn	Roadside	RR	25.0	25.0	23.9	21.0	14.2
CM2	Gaywood, King's Lynn	Roadside	GC	**45.0**	38.0	34.5	37.0	26.7
1	Railway Road 1	Roadside	RR	35.5	35.9	33.8	36.3	25.8
2	Railway Road 2	Roadside	RR	**44.6**	**45.5**	**43.2**	**42.4**	33.2
3	Railway Road 5	Roadside	RR	38.6	38.5	37.4	37.5	26.4
6,7,8	Southgate Monitoring Station	Roadside	RR	24.6	24.6	23.9	24.3	17.8
10	London Road 1	Roadside	GC	36.3	37.2	36.2	35.5	26.6
11	London Road 2	Roadside	RR	27.9	27.7	28.1	28.4	21.2
12	London Road 3	Roadside	RR	32.0	33.5	29.8	31.4	22.5
13	London Road 4	Roadside	RR	31.0	29.9	28.8	29.0	21.7
14	London Road 5	Roadside	RR	33.1	33.6	33.6	33.2	25.9
20	London Road 10	Roadside	RR	30.6	28.2	30.0	28.2	21.7
22	London Road 6	Roadside	RR	32.6	30.1	34.0	31.0	21.8
23	London Road 7	Roadside	RR	32.5	29.6	32.6	31.2	23.1
24	London Road 8	Roadside	RR	28.9	26.4	30.5	29.7	21.4
26	Railway Road 7	Roadside	RR	31.5	31.4	32.9	31.5	23.0
27	St John's Terrace	Roadside	RR	28.5	27.8	28.5	27.6	20.0
28	St. John's Terrace/ Blackfriar's	Roadside	RR	30.0	30.5	28.9	29.8	19.5
31	Railway Road 2	Roadside	RR	28.2	28.3	30.2	29.1	21.2
32	Railway Road 3	Roadside	RR	29	28.3	28.8	27.8	21.3
34	Blackfriars 2	Roadside	RR	28.7	28.9	31.1	28.8	22.9
35	Blackfriars 1	Roadside	RR	27.2	28.2	27.7	27.6	20.7
37	Blackfriars 3	Roadside	RR	26.5	26.5	30.6	29.7	23.3
38	Littleport Street	Roadside	RR	31.5	33.2	34.0	34.2	24.9
40	The Swan (1) Gayton Road	Roadside	GC	30.2	31.2	31.3	32.0	24.6
41	Wootton Road 2	Roadside	GC	32.2	32.1	36.7	34.9	24.5
42	Wootton Road 1	Roadside	GC	29.3	30.5	30	29.7	22.9
43	Lynn Road 1	Roadside	GC	30	29.2	30.9	29.4	22.0

Site ID	**Location**	**Site Type**	**In AQMA?***	**Monitored Annual Mean NO_2 Concentration ($\mu g.m^{-3}$)**				
				2016	**2017**	**2018**	**2019**	**2020**
44	Lynn Road 2	Roadside	GC	32.8	32.4	36	34.6	26.3
47	Austin Street 1	Roadside	RR	30.3	29.3	30.6	29.7	21.5
48	Austin Street 2	Roadside	RR	26.8	27.8	27.7	27.2	19.1
75	The Swan (2) Gayton Road	Roadside	GC	32.2	31.6	34.1	35.8	26.5
87	Albion Street	Roadside	RR	30.5	29.3	32	30	19.3
90	Spenser Road	Roadside	No	14	15	15.9	16.1	11.5
97	Low Road, King's Lynn	Roadside	No	-	-	-	-	14.1
*RR: Railway Road AQMA, GC: Gaywood Clock AQMA								

165. As detailed in **Table 22.26**, annual mean NO_2 concentrations were in exceedance of the Objective (40µg.m^{-3}) at two roadside locations (CM2 in 2016; Location 2 from 2016 to 2019) within the Gaywood Clock and Railway Road AQMAs respectively; however, concentrations at these locations have been decreasing since 2016. Monitoring at all other locations were below the annual mean Objective across the five-year period. Annual mean concentrations in 2020 were lower at all monitoring locations in **Table 22.26**, most likely as a result of local and/or national lockdowns associated with the Covid-19 pandemic. Decreases in 2020 NO_2 concentrations ranged from 20% (Location 34) to 36% (Location 87) of 2019 concentrations.

166. Particulate matter continuous analyser monitoring was also undertaken in King's Lynn between 2016 and 2020, and these results are presented in **Table 22.27**.

Table 22.27: Annual Mean PM_{10} Monitoring Undertaken by KLWNBC

Site ID	**Location**	**Site Type**	**Monitored Annual Mean Concentration ($\mu g.m^{-3}$)**				
			2016	**2017**	**2018**	**2019**	**2020**
PM_{10}							
OS1	Page Stair Lane, King's Lynn	Roadside	21	18	16.4	11	14.7
OS3	Estuary Road, King's Lynn	Roadside	15	13	14.6	13	10.1
$PM_{2.5}$							
OS1	Page Stair Lane, King's Lynn	Roadside	6	6	7	5	7.9
OS3	Estuary Road, King's Lynn	Roadside	4	6	6.9	7	6.7

167. As detailed in **Table 22.27**, annual mean PM_{10} and $PM_{2.5}$ concentrations were well below the annual mean Objectives of 40µg.m^{-3} and 25µg.m^{-3} respectively at the monitoring locations in King's Lynn.

22.5.2.5 BC

168. Breckland Council undertakes automatic and diffusion tube monitoring within its area of jurisdiction. Monitoring is undertaken at three diffusion tube locations in Dereham and at several locations within the Swaffham AQMA. Recent monitoring data were obtained from the 2021 ASR (BC, 2021) and are detailed in **Table 22.28**. Exceedances of the annual mean Objective are shown in **bold** text and coloured blue.

Table 22.28: Annual Mean NO_2 Monitoring Undertaken by BC

Site ID	**Location**	**Site Type**	**Within AQMA?**	**Monitored Annual Mean NO_2 Concentration ($\mu g.m^{-3}$)**				
				2016	**2017**	**2018**	**2019**	**2020**
D1	High Street Dereham	Urban Centre	No	34.3	30.9	27.3	29.3	18.4
D2	Station Rd Dereham	Urban Background	No	28.6	25	22.5	22.6	13.6
D3	Wellington St Dereham	Urban Centre	No	11.2	13.7	20	22.4	18.7
S1	Butchers Swaffham	Urban Centre	No	24.2	20.2	20	20	13.3
S2	Ceres Books Swaffham	Urban Centre	No	38.4	33.5	28.6	28.7	19.5
S3*	London Street	Roadside	No	30.5	25.8	25.7	26.2	17.3
S4	Bridewell Place Swaffham	Roadside	No	26.9	20.9	21.4	22.4	14.6
S5	London Street Zebra Crossing	Roadside	No	25.7	22.7	21.8	24.1	17.1
S6	London Street N Roundabout	Roadside	No	33.2	29.1	26.9	29.6	21
S7	Station Road Swaffham	Roadside	No	38.4	29.7	30.2	30.2	19.1
S8	Station Road Swaffham	Roadside	No	**41**	34.3	30.5	31.6	24.1
S9	Anglia Computer Solutions Swaffham	Roadside	Yes	26.7	21.9	21.8	23	14.2
S10	Kev's Tackle Swaffham	Roadside	Yes	24.9	22.7	20.3	21.6	14.5
S11	13 Station Road Swaffham	Roadside	Yes	37	30.6	30.9	26.6	12.3
S12	Glazedale Lamp post Swaffham	Roadside	No	32	29.2	31.5	38	16.3
S13	33 Station Road Swaffham	Roadside	Yes	26.4	21.7	14.9	25.2	20.1
S14	Corner Whitecross	Roadside	Yes	24.2	21.2	17.2	21.3	19.2
*Triplicate site								

169. As detailed in **Table 22.28**, annual mean NO_2 concentrations were in exceedance of the Objective (40µg.m^{-3}) at one roadside location (S8 in 2016) within the Swaffham AQMA; however, concentrations at this location have been decreasing since 2016. There was a large change in concentrations at location S12 and S13 between 2018 and 2019. Monitoring locations in Dereham were below the annual mean Objective across the five-year period.

170. Site S12 only monitored eight months of data (66.7%) in 2019 and results were therefore annualised, which increased the raw data measurement from 29.7 to 38µg.m^{-3}, which may be responsible for the large change between 2018 and 2019. There is no information available in the annual report regarding S13, however this may be due to a change in location or introduction of a new pollution source in the vicinity of the diffusion tubes.

171. Similarly to the 2020 KLWNBC monitoring data, NO_2 concentrations in 2020 were between 10% (S14) and 58% (S12) lower than in 2019; however, data capture for 2020 ranged from 58.3% to 83.3% (depending on the site), so 2020 monitored concentrations may not be fully representative of typical conditions.

22.5.2.6 GYBC

172. GYBC undertakes automatic and diffusion tube monitoring within its area of jurisdiction. GYBC operates one continuous analyser, which monitors NO_2 and PM, at a background site. This analyser was relocated from Maltings House to Fenner Road in 2018. Monitoring data were obtained from the latest ASR (GYBC, 2019) and are presented in **Table 22.29**.

Table 22.29: Continuous Analyser Monitoring Undertaken by GYBC

Site ID	Location	Site Type	Monitored Annual Mean Concentration (µg.m^{-3})				
			2014	2015	2016	2017	2018
NO_2							
CM1	Maltings House, Gorleston	Urban Background	17.1	16.8	14.5	-	-
CM1	Fenner Road	Urban Background	-	-	-	-	15.0
PM_{10}							
CM1	Maltings House, Gorleston	Urban Background	16.6	16.8	15.5	-	-
CM1	Fenner Road	Urban Background	-	-	-	-	20.0
$PM_{2.5}$							
CM1	Fenner Road	Urban Background	-	-	-	-	12.0

173. As detailed in **Table 22.29**, continuous analyser annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations were below the annual mean Objective at both continuous analyser monitoring locations in the GYBC study area.

174. There are also 12 NO_2 diffusion tubes located in the vicinity of the affected road network that are operated by GYBC. The triplicate site at DT8 was relocated in 2019 to Fenner Road. Monitoring data were obtained from the 2019 ASR (GYBC, 2019) and are presented in **Table 22.30**.

Table 22.30: Annual Mean NO_2 Monitoring Undertaken by GYBC

Site ID	Location	Site Type	Monitored Annual Mean NO_2 Concentration ($\mu g.m^{-3}$)				
			2014	2015	2016	2017	2018
DT1	12 Bridge Road	Roadside	22	21.9	21.1	25.6	22.5
DT2	44 North Quay	Roadside	24.1	22.5	21.2	20.9	19.4
DT3	60 North Quay (upper)	Roadside	26.9	25.4	24.4	21.8	22.2
DT4	Southtown Road Junction	Roadside	37.8	37.4	33.2	36.7	30.3
DT5	110 South Quay	Roadside	23.5	23.8	22.9	21.7	18.9
DT6	9 Southgates Road	Roadside	25.6	24.4	22.2	22.3	19.8
DT7	41 Southgates Road	Roadside	22.9	20.9	20.3	19	18.1
DT8 (Triplicate site)	Maltings House, Gorleston	Urban Background	17.8	16	17.7	16.7	-
			16.9	16.3	17.7	16.2	-
			15.4	15.7	17.1	16.3	-
DT8 (Triplicate site)	Fenner Rd	Urban Background	-	-	-	-	14
			-	-	-	-	14
			-	-	-	-	13.6
DT9	81 North Quay	Roadside	18.7	19.9	18.5	18.8	17
DT10	1 South Quay	Roadside	30.6	32.8	33.7	33.2	29.8
DT11	25 South Quay	Roadside	-	31.6	27.4	27.9	21.6
DT12	Pasteur Road	Roadside	-	-	24.9	23.3	21

175. As detailed in **Table 22.30**, annual mean NO_2 concentrations were below the annual mean Objective of 40µg.m^{-3} at the monitoring location in the GYBC study area.

22.5.2.7 WDC

176. There are ten NO_2 diffusion tubes located in the vicinity of the affected road network that are operated by WDC. Monitoring data were obtained from the 2020 ASR (East Suffolk Council, 2020) and are presented in **Table 22.31**.

Table 22.31: Annual Mean NO_2 Monitoring Undertaken by WDC

Site ID	Location	Site Type	Monitored Annual Mean NO_2 Concentration ($\mu g.m^{-3}$)				
			2015	2016	2017	2018	2019
LOW 1	Belvedere Rd 1, Lowestoft	Roadside	31	29	34	27	28
LOW 2	Fir Lane, Lowestoft	Kerbside	22	23	20	25	30
LOW 3	Mill Road, Lowestoft	Roadside	20	21	24	23	20

Site ID	**Location**	**Site Type**	**Monitored Annual Mean NO_2 Concentration (µg.m^{-3})**				
			2015	**2016**	**2017**	**2018**	**2019**
LOW 5	St Margarets Church, Lowestoft	Urban Background	12	15	15	14	14
LOW 6a, b, c	Pier Terrace, Lowestoft	Roadside	-	38	36	35	33
LOW 7	Pier Terrace 1, Lowestoft	Roadside	28	31	30	29	30
LOW 8	Levington Court, Lowestoft	Roadside	-	-	-	-	21
LOW 9	24/26 Denmark Road, lowestoft	Roadside	-	-	-	-	28
LOW 10	42 Waveney Drive	Roadside	-	-	-	-	23
LOW 11	241 Stradbroke Rd/Bloodmoor Rd	Roadside	-	-	-	-	26

177. As detailed in **Table 22.31**, annual mean NO_2 concentrations were below the annual mean Objective of 40µg.m^{-3} at the monitoring locations in the WDC study area. Location LOW 6a, b, c recorded the highest NO_2 concentrations of all monitoring locations, however these have been decreasing year-on-year since 2017.

22.5.3 Background Pollutant Concentrations

178. Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ were obtained from the air pollutant concentration maps provided by Defra for the grid squares covering the air quality study area (Defra, 2020a). 2019 background concentrations were used for the base year assessment. Background concentrations for 2025 were used for the future year scenarios. The highest and lowest background concentrations within each local authority boundary covering the human receptors in the study area are detailed in **Table 22.32**. The full table of background concentrations used in the assessment is provided in **Appendix 24.3**.

Table 22.32: Background Pollutant Concentrations

Local Authority	**Annual Mean Background Concentration (µg.m^{-3})**					
	NO_2		**PM_{10}**		**$PM_{2.5}$**	
	Min.	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**
2019						
NNDC	7.4	8.9	14.9	16.3	8.8	9.3
BDC	8.6	13.7	14.5	16.4	9.2	9.8
SNC	8.4	14.4	14.9	17.3	9.2	10.1
KLWNBC	7.0	12.8	14.9	16.9	9.1	10.2
BC	7.4	8.8	15.7	16.6	9.3	9.5
GYBC	11.0	16.6	13.3	14.7	8.7	10.2
WDC	9.1	23.8	13.7	15.6	8.9	10.0
2025						
NNDC	5.9	7.3	13.8	15.2	7.9	8.4
BDC	6.8	11.1	13.3	15.4	8.3	8.8
SNC	6.8	11.8	13.7	16.1	8.2	9.1
KLWNBC	5.7	10.6	13.8	15.7	8.1	9.3

Local Authority	**Annual Mean Background Concentration (µg.m^{-3})**					
	NO_2		**PM_{10}**		**$PM_{2.5}$**	
	Min.	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**
BC	5.8	6.9	14.6	15.4	8.3	8.6
GYBC	8.9	13.6	12.1	13.5	7.8	9.2
WDC	7.3	20.0	12.5	14.5	8.0	9.1

179. As detailed in **Table 22.32**, background pollutant concentrations were ‘well below’ (e.g. less than 75% of) and no greater than 50% of the relevant Air quality Objectives/target. This is to be expected in areas that are largely rural in nature.

180. The current baseline description above provides reflection of the current state of the existing environment. The earliest possible date for the start of construction for the onshore elements in 2025, with an anticipated operational life of 40 years and therefore, there is the potential for the baseline to evolve between the time of assessment and point of impact. Outside of short-term or seasonal fluctuations, changes to the baseline in relation to air quality usually occur over an extended period of time (considered in **Section 22.5.6**). Based on current information regarding reasonably foreseeable events over the next three years, the baseline environment is not anticipated to fundamentally change from its current state at the point in time when impacts occur.

181. Background concentrations considered in the ecological assessment are provided in **Appendix 22.3**.

22.5.4 Identification of Receptors

22.5.4.1 Construction Phase Dust and Fine Particulate Matter

182. IAQM guidance (IAQM, 2016) states that a Detailed Assessment is required where there are human receptors within 350m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s). Internal guidance from Natural England recommends that ecological receptors within 200m of a site should be considered in a construction dust and fine particulate matter assessment, as opposed to only those ecological sites within 50m of the site (as stated in IAQM guidance).

183. The onshore cable corridor from landfall at Weybourne to the onshore substation site near the existing Norwich Main substation was assessed (see **Figure 22.2**).

184. Receptor locations were identified in the areas closest to the potential maximum impacts due to construction (as defined in **Table 22.2**) within the study area, taking into account the following:

- There are human receptors within 350m of the Project boundary and within 50m of the planned construction vehicle route up to 500m from the onshore DCO order limits; and
- There are designated ecological receptors within 200m of construction activity within the Project boundary, and/or within 50m of the planned construction vehicle routes, up to 500m from the onshore DCO order limits.

185. A Detailed Assessment is therefore required to assess the impact of dust during the construction phase at human and ecological receptors.

22.5.4.1.1 Human Receptors

186. There are human receptors within 350m of the onshore works located in Weybourne, Bodham, Little Barningham, Oulton, Cawston, Swannington, Attlebridge, Weston Longville, Barford, Ketteringham, Swardeston and Swainsthorpe.

187. As detailed in **Appendix 22.1**, the number of receptors potentially exposed to dust impacts is a factor that determines the receptor sensitivity. For SEP and/or DEP, the areas with the most human receptors within 350m of the onshore DCO order limitsare Weybourne, Bodham, Attlebridge, Barford and Swardeston.

188. The current proposed locations for the construction compounds are as follows:

- Landfall;
- East of Bodham;
- East of Plumstead;
- East of Saxthorpe;
- East of Heydon;
- South of Cawston;
- South-east of Attlebridge (main construction compound);
- South-west of Easton;
- Between Hethersett and Wymondham;
- North of East Carleton; and
- Onshore substation.

189. The proximity of construction compounds to receptors has been taken into the consideration within the design of the Project and, therefore, the proposed construction compounds are not located within 100m of any human receptors. The construction compounds located nearest to human receptors (i.e. between 100m and 200m) are the main construction compound south-east of Attlebridge and the secondary construction compounds located to the east of Saxthorpe and south of Cawston.

190. The location of maximum impact along the onshore cable corridor, i.e. dustiest activities and greatest number of receptors within close proximity of the construction works, was determined to be Attlebridge. Therefore, this area has been the focus of the construction dust assessment for human receptors along the onshore cable corridor, to provide a conservative assessment, as the combined sources of dust from both the main construction compound location and cable trenching is considered to represent the worst-case in terms of dust impact magnitude. The assessment has also considered construction dust impacts at landfall and the onshore substation separately, due to the large Project footprint.

191. There are other areas along the onshore cable corridor where a greater number of human receptors are present within 350m of the onshore DCO order limits (i.e. Weybourne or Bodham); however these receptors would either be further away from construction works relating to the worst-case scenario mentioned above, or closer to a reduced level of construction works (i.e. close to cable trenching but away from a construction compound). It is therefore anticipated that the sensitivity of these receptors would be equal to, or less than, those located at landfall, Attlebridge or the onshore substation (**Table 22.1.3** and **Table 22.1.4** of **Appendix 22.1** provides further details on how the sensitivity of human receptors to dust soiling and human health impacts are determined).

192. It should be noted that the mitigation measures identified to suppress dust emissions (see **Section 22.6.1.1.5**) would be applied across the onshore works, and are not only applicable as mitigation for those receptors included within the assessment. As such, the assessment is considered to be robust.

22.5.4.1.2 Ecological Receptors

193. Designated ecological receptors that may be sensitive to dust impacts within 200m of the onshore construction works (or within 50m of access routes) are identified in **Table 22.33**; as well as the distance each ecological site is from the onshore DCO order limits. **Figure 22.2** shows the location of the ecological receptors listed in **Table 22.33**.

Table 22.33: Designated Sites within 200m of Project Boundary

Local Authority	Designated Ecological Site	Distance from Project boundary (m)
NNDC	Greater Wash SPA	Within 0m of the landfall Project boundary*,**
	Weybourne Cliffs SSSI	10m from Project boundary (at landfall)*,***
BDC	Cawston Wood ancient woodland	70m from Project boundary
	Alderford Common SSSI	180m from Project boundary
	River Wensum SSSI	Within Project boundary****
SNC	Colton Wood ancient woodland	10m from Project boundary
	Unnamed ancient woodland (near Ketteringham)	190m from Project boundary
	Smeeth Wood ancient woodland	170m from Project boundary

*While the Greater Wash SPA and Weybourne Cliffs SSSI are within the Project boundary at landfall, the offshore export cables would be installed at the landfall using HDD techniques, which is not considered a dusty construction activity. A temporary landfall compound would be required to accommodate the drilling rigs, ducting and welfare facilities and this would be set back 100m from the cliff edge (approximately 80m from the SSSI boundary).
**Habitats sensitive to air quality impacts under the Greater Wash SPA designation include shifting coastal dunes and coastal stable dune grasslands (acid and calcareous type), however; none of these habitats are present within the SPA boundary at landfall, according to Priority Habitat Inventory (Natural England, 2021). Therefore, this receptor is not anticipated to be sensitive to dust impacts and has been scoped out of the assessment.
***Weybourne Cliffs SSSI is not sensitive to air quality impacts (CEH, 2022). Therefore, this receptor has been scoped out of the assessment.

Local Authority	Designated Ecological Site	Distance from Project boundary (m)
****While the River Wensum SSSI crosses a portion of the onshore cable corridor red line boundary, the onshore cable would be installed using trenchless (i.e. HDD) techniques to avoid impacting the SSSI, and this technique is not considered a dusty construction activity.		

194. As detailed in **Section 22.4.3.1.3**, three different construction activities are considered in a dust assessment: earthworks, construction and trackout. Colton Wood ancient woodland was chosen as the worst-case ecological receptor location for dust from earthwork and construction activities, as it is 10m from the onshore DCO order limitsand may be sensitive to dust. The unnamed ancient woodland (near Ketteringham) was chosen as the worst-case ecological receptor with respect to dust from trackout activities, as it is adjacent to Link 114 (A11 from B1135 to A47). Both of these ecological receptors can be seen on **Figure 22.2**. Alderford Common SSSI was also considered for trackout impacts, as it is adjacent to Links 136 and 138, however these experience less outward SEP and DEP generated HGV movements from the DCO order limitsthan Link 114, so the unnamed ancient woodland (near Ketteringham) represents a worst-case location for this activity.

195. The construction dust and fine particulate matter assessment was undertaken using a worst-case scenario whereby the maximum amount of works (e.g. cable trenching, a construction compound, jointing bay and link box construction) are undertaken in proximity to the greatest number of human and ecological receptors. Recommended mitigation measures for these worst-case locations would then be applied to all onshore construction works, to provide a conservative assessment.

22.5.4.2 Construction Phase NRMM Emissions Assessment

22.5.4.2.1 Landfall

196. The closest human receptors to the proposed NRMM works and construction compound at landfall are the residential properties on Beach Lane, approximately 215m south-east of landfall Project boundary. The closest ecological receptors are the Greater Wash SPA (within the offshore Project boundary approaching landfall) and Weybourne Cliffs SSSI (approximately 20m east of the landfall Project boundary). Habitats sensitive to air quality impacts under the Greater Wash SPA designation include shifting coastal dunes and coastal stable dune grasslands (acid and calcareous type), however; none of these habitats are present within the SPA boundary at landfall, according to the Priority Habitat Inventory (Natural England, 2021). Weybourne Cliffs SSSI does not contain any features sensitive to air quality impacts. As such, no impacts are anticipated on ecological receptors at landfall; therefore, they have been scoped out of the assessment.

22.5.4.2.2 Onshore Cable Corridor

197. The closest human receptors to the works along the onshore cable corridor include the residential areas of Weybourne, Bodham, Little Barningham, Oulton, Cawston, Swannington, Attlebridge, Weston Longville, Barford, Ketteringham and Swardeston. As stated previously, the proposed locations for the construction compounds along the cable corridor are at landfall, east of Bodham, east of Plumstead, east of Saxthorpe, east of Heydon, south of Cawston, south-east of Attlebridge (main construction compound), south-west of Easton, between Hethersett and Wymondham, north of East Carleton and at the onshore substation. The closest ecological receptors to works which may require NRMM (i.e. anywhere within the Project boundary) are listed in **Table 22.33**.

22.5.4.2.3 Onshore Substation

198. The onshore substation is located approximately 600m north of Swainsthorpe, with the nearest human receptor to the onshore construction compound off the A140 Ipswich Road (to the east). The nearest ecological receptor is Dunston Common LNR, approximately 700m north-east of the substation construction compound at the onshore substation and approximately 475m east of a smaller construction compound (to install the access road) at the onshore substation.

22.5.4.3 Construction Phase Road Traffic Emissions Assessment

22.5.4.3.1 Human Receptors

199. Existing sensitive receptor locations were identified within the air quality study area for consideration in the assessment. Predicted changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of project-generated traffic were calculated at these locations.

200. The sensitive receptor locations were selected based on their proximity to road links affected by SEP and/or DEP and exceeding the screening criteria detailed in **Table 22.10**, where the potential effect of project-generated traffic emissions on local air pollution would be most significant. These links are identified in **Table 22.11** for Scenario 1 (SEP or DEP in isolation) and Scenario 2 (SEP and DEP concurrent construction) (i.e. the worst-case traffic scenario for SEP and DEP together).

201. The sensitive receptor locations for both scenarios are detailed in **Table 22.34** and shown in **Figure 22.3** for both SEP and/or DEP in isolation and concurrent construction scenarios. The same road links and receptors have been included in both scenarios, for ease of reference, as only one additional road link (Link 4, see **Table 22.11**) has been screened into the assessment for the SEP and DEP concurrent construction scenario. Results were not reported for receptors on Link 4 (R28 to R31) in the SEP or DEP in isolation scenario, as this link was not screened in for further assessment in this scenario (see **Section 22.4.3.3.1** and **Table 22.11** for further details).

Table 22.34: Sensitive Human Receptor Locations

Local Authority	Receptor ID	Link	OS grid reference (m)	
			X	Y
KLWNBC	R1	1	562081	321297
	R2	1	564143	322368
	R3	1	565745	322662
	R4	2	570389	324987
	R5	2	571633	325516
	R6	2	574277	325818
	R7	2	581782	328015
	R8	2	583222	328775
	R9	88	564840	319453
	R10	87	565729	316091
	R11	87	569207	316306
	R12	87	571804	315310
NNDC	R13	2	587864	330815
	R14	2	588885	330909
	R15	3	591434	330959
	R16	3	593366	330998
	R17	4	595352	331138
	R18	4	598765	333396
	R19	4	607659	338689
BC	R20	86	585205	309742
	R21	86	590481	312144
	R22	86	606212	313494
BDC	R23	41	623274	314306
	R24	35	627740	312785
	R25	32	630874	309049
	R26	33	638372	310073
	R27	89	611616	311202
	R28	42*,**	620629	313968
	R29	42*,**	620599	313921
	R30	42*,**	620934	313341
	R31	42*,**	621427	312511
SNC	R32	95	613987	310979
	R33	97	616318	308940
	R34	105	616931	307393
	R35	122	619708	304357
	R36	128	621337	303106
	R37	127	622215	302239
	R38	129	622272	304317
	R39	31	627470	307758
	R40	30	631000	302280
	R41	30	639280	293622
GYBC	R42	34	650033	308960

Local Authority	Receptor ID	Link	OS grid reference (m)	
			X	Y
	R43	24	652055	308189
	R44	25	651499	307173
	R45	26	652239	302281
WDC	R46	26	652904	297411
	R47	27	653414	296228
	R48	28	653844	295236
	R49	28	654621	294752
	R50	28	655057	293992
	R51	29	654262	292434
	R52	29	652149	290432
	R53	29	651310	290514
	R54	30	647951	289899

*It should be noted that receptors have only been included along Link 42 (A140 from B1149 to A1042) up to Heath Crescent, as any Project-generated traffic using this link will relate to non-local workers (i.e. cars/LGVs) travelling from hotels on the outskirts of Norwich City to the Project and not into Norwich City (nor near or through the Norwich City Council AQMA) itself.
**SEP and DEP concurrent construction scenario only

22.5.4.3.2 Designated Ecological Sites

202. A number of designated ecological sites are located within 200m of roads which are anticipated to experience increases in construction-related traffic flows above the criteria detailed in **Table 22.10**. The APIS website (CEH, 2022) was consulted to identify any habitats or features of these designated sites that are sensitive to nutrient nitrogen and acid deposition. Where sensitive habitats or features were found, the Critical Loads for nutrient nitrogen and acid deposition were obtained. A full list of the designated ecological sites and associated Critical Level and Load values that have been considered is presented in **Appendix 22.4**.

203. The designated ecological sites that have been screened into the assessment (i.e. within 200m of affected road links) are detailed in **Table 22.35**, as well as reasoning for the exclusion of certain sites, and whether or not sites have been considered further in the assessment for exceeding the AADT flows (at the distance from the site boundary to the road edge) required to result in a 1% increase in the site-relevant Critical Level and/or Load. Further details on this are provided in **Section 22.4.3.3.6** and **Appendix 22.5**. The designated ecological sites listed in **Table 22.35** are also shown in **Figure 22.4**.

Table 22.35: Designated Ecological Sites within 200m of Affected Road Links

Link	Designated Ecological Site		Distance from affected road link (m)	Screened in for further assessment[1]?
	Site Type	Name		
4	Ancient woodland	Bullfer Grove	155	Yes
	Ancient woodland	Pereers Wood	20	Yes
10	SSSI	Kelling Heath	0*	Yes
11	SSSI	Weybourne Town Pit**	0	No

Link	Designated Ecological Site		Distance from affected road link (m)	Screened in for further assessment[1]?
	Site Type	Name		
	Ancient woodland	Oak Wood	0.5	Yes
13	Ancient woodland	Unnamed (ID 1)	0	Yes
	SSSI	Felbrigg Wood	0	Yes
	Ancient woodland	Great Wood	5	Yes
			37	Yes
14	SSSI	Felbrigg Wood	0	Yes
20	SSSI	Ant Broads and Marshes	113	Yes
	SAC	The Broads	113	No
	SPA	Broadland	113	No
	Ramsar	Broadland	113	No
21	SSSI	Trinity Broads	0	Yes
	SAC	The Broads	0	Yes
23	SPA	Outer Thames Estuary	6***	No
24	SPA	Outer Thames Estuary	0***	No
25	SSSI	Breydon Water	1	Yes
	SPA	Breydon Water	1	Yes
	Ramsar	Breydon Water	1	No[2]
	LNR	Breydon Water	1	Yes
	SPA	Outer Thames Estuary	0***	No
28	Ancient woodland	Foxburrow Wood	1	Yes
30	Ancient woodland	Raveningham Covert	0	Yes
	Ancient woodland	Blacks Grove	165	Yes
	SSSI	Barnby Broad & Marshes	48	Yes
	SAC	The Broads	48	Yes
	SPA	Broadland	48	Yes
	Ramsar	Broadland	48	No[2]
31	LNR	Whitlingham	25	Yes
	LNR	Whitlingham	1	Yes
	LNR	Whitlingham Marsh, Whitlingham	0	Yes
34	SSSI	Damgate Marshes, Acle	0	Yes
	SAC	The Broads	0	Yes
	Ramsar	Broadland	0	No[2]
	SPA	Outer Thames Estuary	80***	No
	SSSI	Breydon Water	35	Yes
	SPA	Breydon Water	35	Yes
	Ramsar	Breydon Water	40	No[2]
	LNR	Breydon Water	40	Yes
35	Ancient woodland	Unnamed (ID 2)	105	Yes

Link	Designated Ecological Site		Distance from affected road link (m)	Screened in for further assessment[1]?
	Site Type	Name		
39	SSSI	Smallburgh Fen	197****	No
	SAC	The Broads	197****	No
	SPA	Broadland	197****	No
	Ramsar	Broadland	197****	No
40	Ancient woodland	Unnamed (ID 3)	17	Yes
	Ancient woodland	Sprowston Wood	75	Yes
43	Ancient woodland	Unnamed (ID 4)	160	Yes
49	SSSI	Buxton Heath	50	Yes
	SAC	Norfolk Valley Fens	50	Yes
	Ancient woodland	Great Wood	160	Yes
50	Ancient woodland	Unnamed (ID 5)	8	No
	SSSI	Cawston and Marsham Heaths	0	No
51	SSSI	Cawston and Marsham Heaths	90	Yes
59	SSSI	Holt Lowes	0	Yes
	SAC	Norfolk Valley Fens	0	Yes
60	SSSI	Holt Lowes	140	No
	SAC	Norfolk Valley Fens	140	No
69	Ancient woodland	Mileplain Plantation	25	No
79	SSSI	River Wensum	0	Yes
	SAC	River Wensum	0	Yes
80	SSSI	River Wensum	0	Yes
	SSSI	River Wensum	110	Yes
	SAC	River Wensum	0	Yes
	SAC	River Wensum	110	Yes
82	Ancient woodland	Primrose Grove	30	No
85	Ancient woodland	Mouse Wood	0	Yes
86	SSSI	Holly Farm Meadow, Wendling	7	Yes
	SSSI	Potter & Scarning Fens, East Dereham	1	Yes
	SAC	Norfolk Valley Fens	<5	Yes
87	SSSI	East Winch Common	0	Yes
	SSSI	River Nar**	0	No
88	Ancient woodland	Reffley Wood	5	Yes
96	LNR	Wensum Valley (Mile Cross Marsh and Sycamore Crescent)	160	No

Link	Designated Ecological Site		Distance from affected road link (m)	Screened in for further assessment[1]?
	Site Type	Name		
	SSSI	Sweetbriar Road Meadows, Norwich	195	No
114	Ancient woodland	Unnamed (ID 6)	0	Yes
	Ancient woodland	Smeeth Wood	30	Yes
121	SSSI	Eaton Chalk Pit	175	No
125	LNR	Danby Wood	43	Yes
	LNR	Marston Marshes	105	Yes
129	SSSI	Caistor St. Edmund Chalk Pit**	195	No
133	SSSI	River Wensum	0	Yes
	SAC	River Wensum	0	Yes
136	SSSI	Alderford Common	0*	Yes
138	SSSI	Alderford Common	0	Yes
150	SSSI	River Wensum	65	No
	SAC	River Wensum	65	No

[1] See **Section 22.4.3.3.6** and **Appendix 22.5** for further details
[2] Ramsar sites are designated wetland sites and are not included in the APIS database for being sensitive to air quality impacts. Impacts on Ramsar sites have therefore been considered under the associated SAC or SPA designations for the same area.
*Road goes over/through designated site boundary. However, sensitive habitats may not be located this close to the road/be present.
**Excluded from assessment as not sensitive to air quality impacts.
***Excluded from the assessment as the only habitats present within 200m of the road are mudflats (as per the Priority Habitat Inventory (England), Natural England (2021)) and these are not listed as sensitive under the site's designation.
****Excluded from the assessment as the site boundary is 197m from road; however, habitats are greater than 200m from road (Natural England, 2021).

204. LNRs were assessed against Critical Levels only as Critical Loads are not provided for LNRs on the APIS website (CEH, 2022).

22.5.5 Baseline Road Traffic Emissions

205. The ADMS-Roads model was used to estimate contributions of vehicle exhaust emissions to annual and short term NO_2, PM_{10} and $PM_{2.5}$ concentrations for the 2019 base year and the 2025 'without SEP and/or DEP' assessment. The 24-hour AADT flows and HGV percentages used in the assessment are detailed in **Appendix 22.2**.

206. **Table 22.36** provides the results of the baseline assessment for the base year (2019) and the peak year of construction 'without SEP and/or DEP' (2025), which is inclusive of background concentrations as well as the traffic contribution.

Table 22.36: Baseline Road Traffic Emissions Assessment Base Year (2019) and Worst-Case Year of Peak Construction (2025) 'without SEP and/or DEP'

Local Authority	**Receptor ID**	**Base year (2019) (µg.m^{-3})**			**Year of peak construction (2025) 'without SEP and/or DEP' (µg.m^{-3})**		
		NO_2	**PM_{10}**	**$PM_{2.5}$**	**NO_2**	**PM_{10}**	**$PM_{2.5}$**
KLWNBC	R1	25.8	17.5	11.3	18.2	16.4	10.3
	R2	25.9	18.0	11.4	17.6	17.0	10.5
	R3	17.8	17.1	10.6	12.5	16.0	9.6
	R4	15.4	17.0	10.0	11.3	16.2	9.2
	R5	16.6	17.0	10.0	12.1	16.3	9.3
	R6	14.6	17.5	10.0	10.4	16.7	9.2
	R7	17.7	17.7	10.1	12.8	17.1	9.5
	R8	15.5	16.8	9.9	11.2	16.2	9.2
	R9	20.2	18.6	11.3	14.0	17.5	10.4
	R10	21.5	18.3	11.1	13.9	17.4	10.2
	R11	24.9	19.9	11.6	16.1	18.8	10.6
	R12	20.4	17.7	10.6	13.4	16.6	9.6
NNDC	R13	14.0	16.9	9.7	10.0	16.2	9.0
	R14	13.2	17.2	9.7	9.6	16.4	9.0
	R15	16.7	16.1	9.8	11.7	15.2	9.0
	R16	15.6	17.1	9.9	11.3	16.1	9.0
	R17	18.2	18.0	10.2	13.1	17.4	9.5
	R18	15.8	16.3	9.6	11.3	15.5	8.9
	R19	25.7	18.5	10.8	18.5	18.0	10.3
BC	R20	18.1	18.3	10.5	12.0	17.2	9.6
	R21	19.1	17.7	10.5	12.7	16.7	9.6
	R22	15.5	17.5	10.1	10.7	16.4	9.2
BDC	R23	15.2	16.8	10.0	11.3	15.7	9.1
	R24	17.3	15.6	9.9	12.7	14.6	9.0
	R25	37.2	19.0	11.5	24.8	17.9	10.4
	R26	36.3	19.8	11.5	24.7	18.8	10.6
	R27	25.2	18.2	10.9	16.6	17.2	10.0
	R28	26.2	17.7	11.1	17.8	16.7	10.1
	R29	18.2	16.1	10.2	13.0	15.0	9.2
	R30	18.3	16.4	10.3	13.0	15.3	9.4
	R31	24.3	16.8	11.0	17.4	15.7	10.0

Local Authority	**Receptor ID**	**Base year (2019) (µg.m^{-3})**			**Year of peak construction (2025) 'without SEP and/or DEP' (µg.m^{-3})**		
		NO_2	**PM_{10}**	**$PM_{2.5}$**	**NO_2**	**PM_{10}**	**$PM_{2.5}$**
SNC	R32	27.9	18.3	11.1	18.3	17.2	10.1
	R33	27.9	18.7	11.3	18.6	17.7	10.3
	R34	23.7	18.1	10.9	16.0	17.0	9.9
	R35	22.4	17.5	10.7	15.3	16.4	9.7
	R36	15.8	17.2	10.1	11.5	16.0	9.2
	R37	16.9	16.2	9.9	11.6	15.1	9.0
	R38	18.1	18.2	10.6	12.8	17.0	9.6
	R39	27.9	18.2	11.0	19.9	17.3	10.1
	R40	20.9	18.4	10.5	14.5	17.4	9.7
	R41	25.1	18.4	10.8	17.0	17.5	9.9
GYBC	R42	19.3	14.5	9.5	13.9	13.5	8.6
	R43	35.2	18.8	12.5	25.6	18.2	11.8
	R44	33.5	18.2	12.0	24.4	17.6	11.3
	R45	25.4	17.0	10.9	18.4	16.3	10.2
WDC	R46	24.7	18.2	11.0	17.2	17.6	10.2
	R47	19.2	15.8	10.0	13.6	14.8	9.1
	R48	15.5	14.9	9.8	11.8	14.0	9.0
	R49	19.2	15.8	10.8	14.6	15.0	10.0
	R50	35.9	16.4	11.0	28.3	15.9	10.3
	R51	34.3	16.1	10.9	27.0	15.1	10.0
	R52	17.2	16.0	10.5	12.8	15.0	9.6
	R53	15.6	15.9	10.3	11.6	14.8	9.5
	R54	23.3	17.9	10.8	16.2	17.0	9.9

207. As detailed in **Table 22.36**, annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations were predicted to be below the relevant Objectives at all receptors in both baseline years.

208. All predicted NO_2 concentrations were 'well below' 60µg.m^{-3} and therefore, in accordance with Defra guidance (Defra, 2021a), the 1-hour mean Objective is unlikely to be exceeded (see **Table 22.5**). The short term PM_{10} Objective was predicted to be met at all modelled locations (Objective being less than 35 exceedances of the daily mean objective of 50µg.m^{-3}).

22.5.6 Climate Change and Natural Trends

209. The baseline review of air quality in **Section 22.5.2** and **22.5.5** provide a clear indication that the air quality in the SEP and DEP study area is good, which is to be expected in an area which is largely rural in nature, with areas of air quality concern and monitoring confined to urban areas. Air quality is managed, and improvement driven, by EU, UK and local legislation and policies. The UK's national air quality strategy and standards are enacted locally through management actions at a local authority level including a LAQM framework, as detailed in **Section 22.4.1**. There is a policy trend towards the achievement and maintenance of good air quality across the UK, which is reflected in the local planning policies also detailed in **Section 22.4.1**.

210. Air pollution in the study area is generally dominated by emissions from road vehicles. The quantity and composition of vehicle emissions is dependent on the type of fuel used, engine type, size and efficiency, vehicle speeds and the type of exhaust emissions abatement equipment employed. As such, it is anticipated that future pollutant concentrations will be reduced from baseline levels, as reflected in the predicted background concentrations provided by Defra, shown in **Table 22.32** and provided in further detail in **Appendix 22.3**.

22.6 Potential Impacts

22.6.1 Potential Impacts During Construction

22.6.1.1 Impact 1: Construction Dust and Fine Particulate Matter

211. A qualitative assessment of construction phase dust and PM_{10} emissions was carried out in accordance with the latest IAQM guidance (IAQM, 2016). Full details of the methodology and dust assessment undertaken are provided in **Appendix 22.1**.

212. The onshore construction works associated with SEP and DEP have the potential to impact on local air quality conditions as described below:
    - Dust emissions generated by excavation, construction and earthwork activities have the potential to cause nuisance to, and soiling of, sensitive receptors (see **22.5.4.1** for further details on the identification of sensitive receptors)
    - Emissions of exhaust pollutants, especially NO_X and PM_{10} from construction traffic on the local road network, have the potential to impact upon local air quality at sensitive receptors situated adjacent to the routes utilised by construction vehicles
    - Emissions of NO_X and PM_{10} from on-site plant, termed NRMM operating within the onshore project area have the potential to impact local air quality at sensitive receptors in close proximity to the works.

213. The assessment consisted of four steps (Step 1, Step 2A, Step 2B and Step 2C) as outlined below.

214. Further details are provided in **Section 22.5.4.1** on the focus areas for the assessment in relation to the locations of the expected worst-case construction works (i.e. landfall, Attlebridge and the onshore substation for human receptors and Colton Wood ancient woodland and unnamed ancient woodland (near Ketteringham) for ecological receptors).

215. Both Scenario 2 (concurrent construction) and Scenario 3 (sequential construction) have similar potential for generating construction dust and fine particulate matter impacts on receptors, as overall they both cover the maximum footprint of construction works, however the sequential build may result in the same area of land being affected twice, which would affect the duration of impacts. This is not explicitly accounted for within the IAQM assessment methodology.

22.6.1.1.1 Step 1: Screen the need for a Detailed Assessment

22.6.1.1.1.1 All SEP and DEP Scenarios

216. The IAQM guidance states that a Detailed Assessment is required if there are human receptors located within 350m and ecological receptors within 200m (internal Natural England guidance) of the onshore DCO order limits. Human and ecological receptors are present within 350m and 200m respectively of the onshore DCO order limitsunder all Scenarios, therefore a Detailed Assessment was required.

22.6.1.1.2 Step 2A: Define the potential dust emission magnitude

217. The IAQM guidance recommends that the dust emission magnitude is determined for demolition, earthworks, construction and trackout. It is anticipated that no buildings/structures would be demolished as part of construction of SEP and/or DEP, therefore demolition has not been considered in the assessment.

218. The onshore cable corridor from landfall near Weybourne to the proposed onshore substation site near the existing Norwich Main substation was assessed (**see Figure 22.2**). The worst-case scenarios for human and ecological receptors were identified based on the number of receptors within 350m and 200m respectively the onshore DCO order limitsand construction works. For trackout activities, receptors within 50m from the construction vehicle routes up to 500m from the onshore DCO order limitswere considered, as this distance *"takes account of the exponential decline in both airborne concentrations and the rate of deposition with distance"* in accordance with IAQM (2016) guidance.

22.6.1.1.2.1 SEP or DEP in isolation (Scenario 1)

219. The potential dust emission magnitude for the onshore DCO order limits under Scenario 1 was determined using the criteria detailed in **Appendix 22.1**. The dust emission magnitudes were determined from the worst-case assumptions identified in **Table 22.2** and are detailed in **Table 22.37**.

Table 22.37: Defined Dust Emission Magnitudes Associated for Each Construction Activity for the Onshore DCO Order Limits (Under Scenario 1)

Construction activity	Dust emission magnitude	Rationale
Human Receptors (Worst-Case)		
Earthworks (site area and earth works)	**Medium** (2,500 to 10,000m^2)	**Landfall:** The proposed construction compound at landfall will be 75 x 75 m (i.e. 5,625m^2) Approximate quantity of excavated material is 3,250m^3
	Large (>10,000m^2)	**Attlebridge (i.e. onshore cable corridor and main construction compound):** The proposed main construction compound near Attlebridge will have a footprint of up to 30,000m^2 Earthworks within the onshore cable corridor will comprise removal and the storage of topsoil and subsoil separately at the side of the trench, followed by excavation of a trench An approximate 2m deep and (on average) 2m wide trench would be excavated in sections along the onshore cable corridor; as a worst-case at Attlebridge, an approximate 3,160m^3 of excavation could occur within 350m of the receptors considered at Attlebridge (approximately 790m of trenching) and reinstatement* Haul road area and excavated material (within 350m of worst-case receptors at Attlebridge, i.e. approx. 790m of haul road) = ~4,500m^2 and ~1,750m^3 respectively Joint bays (16m x 3.5m x 2m) and link boxes (2.6m x 2m x 1.5m) would be required one per every *c.*1km, therefore a maximum of one of each would be located within 350m of worst-case receptors at Attlebridge)
	Large (>10,000m^2)	**Onshore substation**: The maximum operational area at the onshore substation will have a footprint of approximately 32,500m^2, this includes a substation construction compound (10,000m^2) and permanent access road construction compound (2,500m^2) Permanent access road area and excavated material = approximately 5,100m^2 and 2,000m^3 respectively
Construction (construction materials)	**Medium**	**All locations**: There are not anticipated to be any buildings built within the construction compounds (offices, etc. at the onshore substation would be prefabricated), however it has been assumed that CBS would be used to line the cable trench and pack around the ducts then backfilled using the stored subsoil and topsoil **Attlebridge (i.e. main construction compound):** CBS batching will occur at the main construction compound
Trackout (no. HGV outward movements per day)	**Medium**	**All locations**: There would be between 10 and 50 outward daily HGV movements**
Ecological Receptors (worst-case)		
Earthworks (site area and earthworks)	**Medium** (2,500 to 10,000m^2)	**Colton Wood ancient woodland**: Approximately 2,660m^3 of excavation could occur within 200m of Colton Wood (approx. 665m of trenching) and reinstatement of stored subsoil and topsoil***

Construction activity	Dust emission magnitude	Rationale
		Haul road area and excavated material (within 200m of Colton Wood, approx. 665m of haul road) = ~3,820m^2 and ~1,490m^3 respectively Joint bays (16m x 3.5m x 2m) and link boxes (2.6m x 2m x 1.5m) would be required as a worst-case of one per every *c.*1km
Construction (construction materials)	**Medium**	**Colton Wood ancient woodland**: It has been assumed that CBS would be used to line the cable trench and pack around the ducts then backfilled using the stored subsoil and topsoil
Trackout (no. HGV outward movements per day)	**Medium**	**Alderford Common SSSI**: It is assumed as a worst-case that there would be between 10 and 50 outward daily HGV movements**
*It has been assumed as a worst-case scenario that all onshore cable installation near sensitive receptors at Attlebridge would be open cut; however, less dusty trenching installation techniques are proposed for some sections near Attlebridge **HGV outward movements per day have been estimated from the HGV traffic flows presented in **Table 22.11** and **Appendix 22.2**, where the number of outward HGV movements per day is half the HGV (per day) flow. While some construction routes (up to 500m from the onshore DCO order limits) have more than 50 HDV outward movements per day, very few human receptors (<10) and no ecological receptors are located on these routes, therefore assessing fewer HGV movements on routes with >10 human receptors results in the same dust emission magnitude overall. **It has been assumed as a worst-case scenario that all onshore cable installation near Colton Wood would be open cut; however, less dusty trenching installation techniques are proposed for some sections near Colton Wood		

22.6.1.1.2.2 SEP and DEP concurrent construction (Scenario 2)

220. The potential dust emission magnitude for the onshore DCO order limitsunder Scenario 2 was determined using the criteria detailed in **Appendix 22.1**. The dust emission magnitudes were determined from the worst-case assumptions identified in **Table 22.2** and are detailed in **Table 22.38**.

Table 22.38: Defined Dust Emission Magnitudes Associated for Each Construction Activity for the Onshore DCO Order Limits (under Scenario 2)

Construction activity	Dust emission magnitude	Rationale
Human Receptors (worst-case)		
Earthworks (site area and earth works)	**Medium** (2,500 to 10,000m^2)	**Landfall:** The proposed construction compound at landfall will be 75 x 75 m (i.e. 5,625m^2) per project Approximate quantity of excavated material is 3,250m^3 per project
	Large (>10,000m^2)	**Attlebridge (i.e. onshore cable corridor):** The proposed main construction compound near Attlebridge will have a footprint of up to 30,000m^2 Two approximate 2m deep and (on average) 2m wide trench would be excavated in sections along the onshore cable corridor; as a worst-case at Attlebridge, an approximate 6,320m^3 of excavation could occur within 350m of the receptors considered at Attlebridge (approximately 790m of trenching) and reinstatement* Haul road area and excavated material (within 350m of worst-case receptors at Attlebridge, approx. 790m of haul road) = ~4,500m^2 and ~1,750m^3 respectively Joint bays (16m x 3.5m x 2m) and link boxes (2.6m x 2m x 1.5m) would be required one per every *c.*1km, therefore a maximum of one of each would be located within 350m of worst-case receptors at Attlebridge)
	Large (>10,000m^2)	**Onshore substation**: The maximum operational area at the onshore substation will have a footprint of approximately 60,000m^2 in total for both projects, this includes (per project) a substation construction compound (10,000m^2) and permanent access road construction compound (2,500m^2) Permanent access road area and excavated material = approximately 5,100m^2 and 2,000m^3 respectively
Construction (construction materials)	**Medium**	**All locations**: There are not anticipated to be any buildings built within the construction compounds (offices, etc. at the onshore substation would be prefabricated), however it has been assumed that CBS would be used to line the cable trench and pack around the ducts then backfilled using the stored subsoil and topsoil **Attlebridge (i.e. main construction compound):** CBS batching will occur at the main construction compound
Trackout (no. HGV outward movements per day)	**Medium**	**All locations**: There would be between 10 and 50 outward daily HDV movements**
Ecological Receptors (worst-case)		
Earthworks (site area and earthworks)	**Medium** (2,500 to 10,000m^2)	**Colton Wood ancient woodland**: Approximately 5,320m^3 of excavation could occur within 200m of Colton Wood (approx. 665m of trenching) and reinstatement of stored subsoil and topsoil***

Construction activity	Dust emission magnitude	Rationale
		Haul road area and excavated material (within 200m of Colton Wood, approx. 665m of haul road) = ~3,820m^2 and ~1,490m^3 respectively Joint bays (16m x 3.5m x 2m) and link boxes (2.6m x 2m x 1.5m) would be required as a worst-case of one per every *c.*1km
Construction (construction materials)	**Medium**	**Colton Wood ancient woodland**: It has been assumed that CBS would be used to line the cable trench and pack around the ducts then backfilled using the stored subsoil and topsoil
Trackout (no. HGV outward movements per day)	**Medium**	**Alderford Common SSSI**: It is assumed as a worst-case that there would be between 10 and 50 outward daily HGV movements**
*It has been assumed as a worst-case scenario that all onshore cable installation near sensitive receptors at Attlebridge would be open cut; however, less dusty trenching installation techniques are proposed for some sections near Attlebridge **HGV outward movements per day have been estimated from the HGV traffic flows presented in **Table 22.11** and **Appendix 22.2**, where the number of outward HGV movements per day is half the HGV (per day) flow. While some construction routes (up to 500m from the onshore DCO order limits) have more than 50 HDV outward movements per day, very few human receptors (<10) and no ecological receptors are located on these routes, therefore assessing fewer HGV movements on routes with >10 human receptors results in the same dust emission magnitude overall. ***It has been assumed as a worst-case scenario that all onshore cable installation near Colton Wood would be open cut; however, less dusty trenching installation techniques are proposed for some sections near Colton Wood		

22.6.1.1.3 Step 2B: Define the sensitivity of the area

221. The sensitivity of receptors to dust soiling, impacts on human health and ecological effects was determined using the criteria in **Appendix 22.1**. **Figure 22.2** details the distance bands from the onshore DCO order limitsused in determining the sensitivity of the area.

22.6.1.1.3.1 All SEP and DEP Construction Scenarios

222. The sensitivity of the area is defined as:

- Sensitivity of receptors to dust soiling:
    - **Earthworks and construction**: There are between 1 and 10 high sensitivity residential receptors within 350m of the proposed compound at landfall. There are between 1 and 10 high sensitivity residential receptors within 100m of the main construction compound and onshore cable corridor at Attlebridge. There is 1 medium sensitivity receptor (i.e. place of work) within 200m of the onshore substation red line boundary at the onshore substation. The sensitivity is therefore **low** for all assessed locations; and

    - **Trackout**: There are between 10 and 100 high sensitivity residential receptors within 20m of roads used by construction vehicles up to 500m from the site at landfall, and between 1 and 10 high sensitivity residential receptors within 20m of roads used at Attlebridge and the onshore substation. The sensitivity is therefore **high** at landfall and **medium** at Attlebridge and the onshore substation.

- Sensitivity of receptors to human health effects of PM_{10}:
    - The highest annual mean background PM_{10} concentration across the study area is less than 24µg.m^{-3}
    - **Earthworks** and **construction**: There are between 1 and 10 high sensitivity residential receptors within 350m of the proposed compound at landfall. There are between 1 and 10 high sensitivity residential receptors within 100m of the main construction compound and onshore cable corridor at Attlebridge. There is 1 medium sensitivity receptor (i.e. place of work) within 200m of the onshore substation red line boundary at the onshore substation. The sensitivity is therefore **low** for all assessed locations; and
    - **Trackout**: There are between 10 and 100 high sensitivity residential receptors within 20m of roads used by construction vehicles up to 500m from the site at landfall, and between 1 and 10 high sensitivity residential receptors within 20m of roads used at Attlebridge and the onshore substation. The sensitivity is therefore **low** at all locations.
- Sensitivity of receptors to ecological effects:
    - **Earthworks** and **construction**: Colton Wood ancient woodland is conservatively assumed to be of high sensitivity (as it is a national designation and may be affected by dust soiling) and is within 20m of the onshore cable corridor. The sensitivity is therefore **high**.
    - **Trackout**: The unnamed ancient woodland (near Ketteringham) is conservatively assumed to be of high sensitivity (as it is a national designation and may be affected by dust soiling) and is within 20m of routes used by construction vehicles, up to 500m from the onshore DCO order limits. The sensitivity is therefore **high**.

223. The sensitivity of receptors to dust soiling, human health impacts and ecological impacts (as an assessment of the worst-case scenario location) for each activity is summarised in **Table 22.39**.

Table 22.39: Sensitivity of the Area to Each Activity Under All SEP And DEP Construction Scenarios

Potential impact	Sensitivity of the surrounding area		
	Earthworks	Construction	Trackout
Dust soiling	Low	Low	High (landfall) Medium (Attlebridge and onshore substation)
Human health	Low	Low	Low

Potential impact	Sensitivity of the surrounding area		
	Earthworks	Construction	Trackout
Ecological	High	High	High

22.6.1.1.4 Step 2C: Define the risk of impacts

22.6.1.1.4.1 All SEP and DEP Construction Scenarios

224. The dust and PM_{10} emission magnitude and sensitivity of the area(s) are combined, and the risk of impacts determined using **Appendix 22.1**. The risks for dust soiling, human health and ecological effects are shown in **Table 22.40**.

Table 22.40: Risk of Dust Impacts Under All SEP And DEP Construction Scenarios

Potential impact	Dust risk		
	Earthworks	Construction	Trackout
Dust soiling	Low risk	Low risk	Medium risk (landfall) Low risk (Attlebridge and onshore substation)
Human health	Low risk	Low risk	Low risk
Ecological	Medium risk	Medium risk	Medium risk

225. It is anticipated that the risk of dust impacts would be the same under all SEP and DEP construction scenarios as the dust emission magnitudes and the sensitivity of the area, defined in **Section 22.6.1.1.2** and **22.6.1.1.3** respectively, were the same for each assessed scenario. However, the risk of dust impacts in Scenario 3 would be of a longer duration than either Scenario 1 or Scenario 2.

22.6.1.1.5 Mitigation – Step 3: Site Specific Mitigation (under all Scenarios)

226. Step 3 of the IAQM guidance (2016) identifies the appropriate good practice mitigation measures required based on the findings of Step 2 of the assessment methodology. Step 2 of the dust assessment determined that the greatest risk of impacts was 'medium risk' under the worst-case scenario, without the implementation of mitigation measures. The aim of these mitigation measures is to achieve the same residual level of impact (i.e. not significant) regardless of the SEP/DEP construction scenario.

227. Recommended mitigation measures are listed in the IAQM guidance document according to the 'risk' of impacts associated with the release of dust and PM_{10} from construction activities. Recommended mitigation measures include minimising the production and transmission of dust from construction activities, and the requirement to carry out visual on-site and off-site inspections of dust deposition levels.

228. A list of mitigation measures that are highly recommended for a **medium risk** site, as determined by Step 2 of the dust assessment, by the IAQM are provided below:

- Communications:
    - Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.

  - 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.
  - Display the head or regional office contact information.
  - Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the local authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.
- Dust Management:
  - 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.
  - Make the complaints log available to the local authority when asked.
  - Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the logbook.
  - Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
  - 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.
  - Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
  - Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
  - Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
  - Avoid site runoff of water or mud.
  - Keep site fencing, barriers and scaffolding clean using wet methods.
  - Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
  - Manage stockpiles to prevent wind whipping.
  - Ensure all vehicles switch off engines when stationary - no idling vehicles.
  - Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
  - Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

  - Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.
  - Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
  - Use enclosed chutes and conveyors and covered skips.
  - Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
  - 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.
  - Avoid bonfires and burning of waste materials.
- Construction:
  - Ensure sand and other aggregates are stored in appropriate manner to minimise dust generation for example the use of bunded areas.
- Trackout:
  - 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.
  - Avoid dry sweeping of large areas.
  - Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
  - Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
  - Record all inspections of haul routes and any subsequent action in a site logbook.
  - Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
  - Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
  - Access gates to be located at least 10 m from receptors where possible.

229. A list of mitigation measures that are desirable for a medium risk site, as determined by Step 2 of the dust assessment, by the IAQM are provided below:

- Dust Management:

  - Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of site boundary, with cleaning to be provided if necessary.
  - Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
  - Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
- Earthworks:
  - Manage earthworks and exposed areas/soil stockpiles to stabilise surfaces.
  - Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Construction:
  - Avoid scabbling (roughening of concrete surfaces) if possible.
  - Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
  - For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

22.6.1.1.6 Residual Impacts – Step 4: Determine Significant Effects (under all Scenarios)

230. With the implementation of the above mitigation measures, which will be secured in the final CoCP, the residual impacts from either Scenario 2 (concurrent construction of SEP and DEP) or Scenario 1 (SEP or DEP in isolation) are considered to be **not significant**, in accordance with IAQM guidance (2016).

22.6.1.2 Impact 2: NRMM Emissions

231. It is anticipated at this stage that the number and type of plant per activity/location and assessment parameters (i.e. working hours, duration of works, etc.) would be the same for all construction scenarios. It is considered that the scale of a single project being constructed (Scenario 1) and the two projects being constructed concurrently (Scenario 2) are such that the magnitude of impacts will be no greater than that of the two projects constructed sequentially (Scenario 3). Therefore, Scenario 3 has been the focus of the NRMM emissions assessment, as it will require the longest construction duration and any mitigation measures recommended for Scenario 3 would be the same as the other two scenarios.

232. A qualitative assessment of SEP and DEP-generated NRMM used during construction at landfall, the onshore substation and along the onshore cable corridor, where impacts on receptors may occur, has been undertaken below as requested by the Planning Inspectorate in the Scoping Opinion (see **Table 22.2**).

233. This qualitative assessment takes into account:

- The number and type of plant to be used (see **Table 22.2**);
- The working hours to be employed and the duration of works;
- Existing air quality conditions in the area (based on Defra background pollutant concentration maps);
- Prevailing meteorological conditions (see **Plate 22-1**); and
- Distances from NRMM to the nearest receptors.

234. The anticipated number and type of plant needed per activity/location are detailed in **Table 22.2**. The numbers in operation in the table are based on anticipated plant on site at any one time. The greatest anticipated number of plant working at one location at the same time is for the substation civils.

235. The anticipated working hours for construction of SEP and DEP are 7am-7pm Monday to Friday and 7am-1pm Saturday (i.e., 66 hours per week), subject to any essential activities that are required to be undertaken outside of these times. The duration of trenchless crossing (i.e., HDD) at landfall is anticipated to take up to four months for Scenario 1, five months for Scenario 2, and four months per project under Scenario 3, with up to a four-year gap between the end of onshore construction of the first project and the start of onshore construction of the second project.

236. Under each scenario, each team would typically work on a 400m length of the onshore cable corridor on any given day, and within that length the extent of open trenches would typically be between 50-100m on any given day, with the trench being excavated at one end and backfilled at the other as works progress along that section. Construction may be carried out by up to ten teams along the onshore cable corridor at any one time. Under Scenario 3, these activities would then be repeated for the second project between two and four years after the completion of the first project.

237. The onshore DCO order limitsstudy area is largely rural in nature and, as shown in **Table 22.41**, the 2021 and future 2025 background concentrations of NO_2, PM_{10} and $PM_{2.5}$ along the onshore cable corridor and at the onshore substation are 'well below' (i.e. less than 75% of) and no greater than 50% of their respective annual mean Objectives and are expected to continue to decrease into the future.

Table 22.41: 2021 and 2025 Defra (2020a) Background Pollutant Concentrations Along the Onshore DCO Order LTimits

Local authority	**Onshore works (landfall, onshore cable corridor and onshore substation) Background Concentrations**		
	NO_2	**PM_{10}**	**$PM_{2.5}$**
	Annual Mean Objective = 40µg.m^{-3}	**Annual Mean Objective = 40µg.m^{-3}**	**Annual Mean Target = 25µg.m^{-3}**
2021 (µg.m^{-3})			
NNDC	6.4 – 7.0	12.5 – 15.6	7.8 – 8.7

Local authority	**Onshore works (landfall, onshore cable corridor and onshore substation) Background Concentrations**		
	NO_2	**PM_{10}**	**$PM_{2.5}$**
	Annual Mean Objective = 40µg.m^{-3}	**Annual Mean Objective = 40µg.m^{-3}**	**Annual Mean Target = 25µg.m^{-3}**
BDC	6.4 – 7.9	14.1 – 16.4	8.5 – 9.1
SNC	7.0 – 10.5	14.1 – 16.4	8.6 – 9.5
2025 (µg.m^{-3})			
NNDC	5.6 – 6.1	11.8 – 14.9	7.2 – 8.1
BDC	5.6 – 6.8	13.4 – 15.7	7.9 – 8.6
SNC	6.2 – 8.8	13.4 – 15.6	8.0 – 8.9

238. **Plate 22-1** shows the wind rose of meteorological conditions recorded at the Norwich station between 2015 and 2019. The prevailing wind direction over the five-year period was from the south-west.

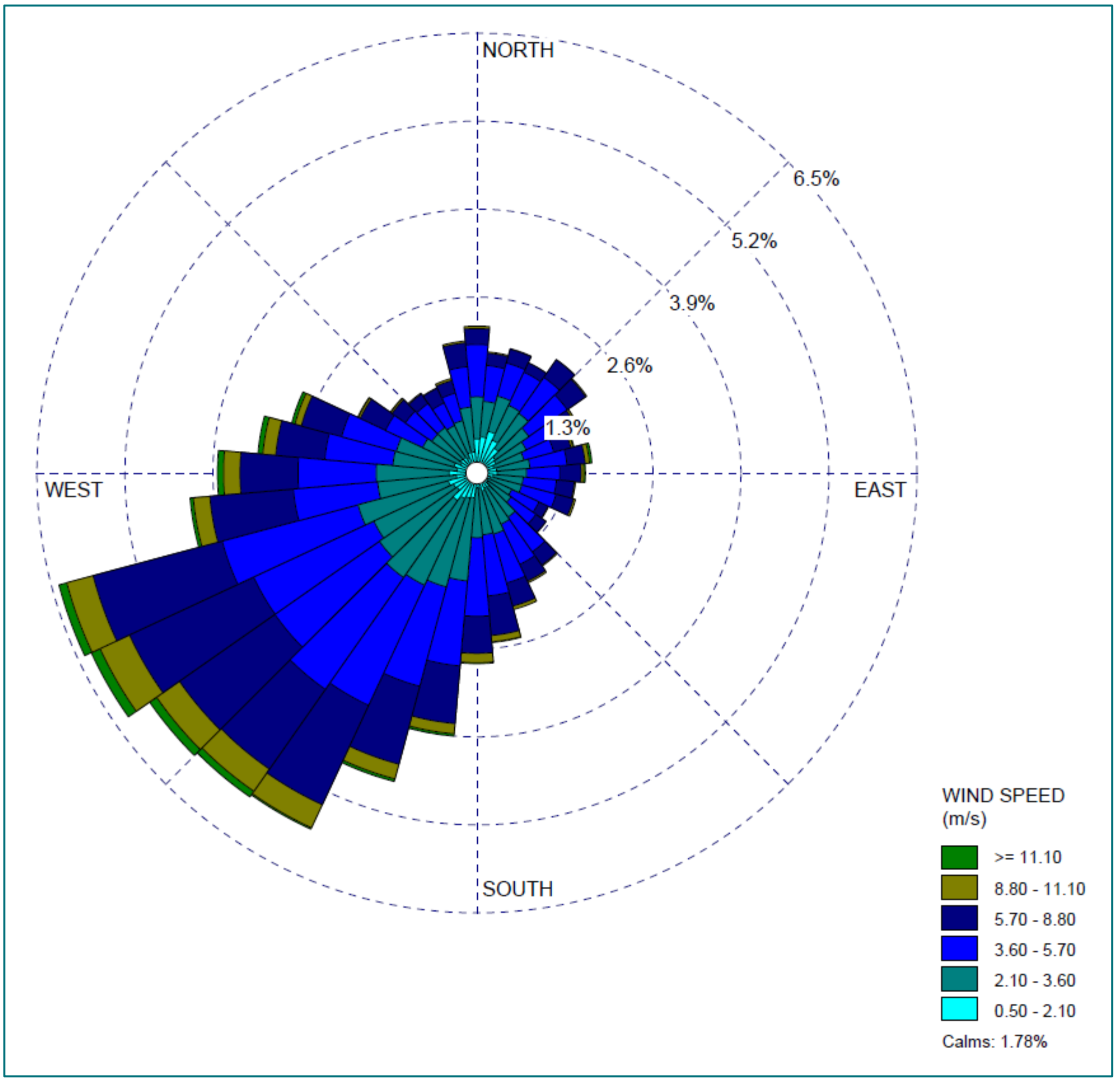

Plate 22-1: Norwich Recording Station Wind Roses (2015 to 2019)

22.6.1.2.1 NRMM at Landfall

239. NRMM at the landfall compound could be associated with either the trenchless crossing (HDD) and/or work within the proposed construction compound. The closest human receptors to this compound at landfall are the residential properties off Beach Lane, approximately 200m south-east of the proposed construction compound. It is considered that this distance would provide sufficient dilution and dispersion of pollutant emissions from NRMM within the construction compound. As detailed in **Section 22.5.4.2.1**, none of the ecological receptors in proximity to landfall are sensitive to air pollution.

240. The works associated with HDD would be temporary under each scenario and, given the low background pollutant concentrations in the area, it is unlikely significant impacts would occur as a result of NRMM at landfall where relevant control and management measures are employed (see **Section 22.6.1.2.5**). Works associated with the construction compound would be of a longer duration, however, it is expected that activities would be intermittent and would only occur during working hours and given the low background pollutant concentrations in the area and the fact that once construction of the onshore cable corridor has been completed no more pollution sources would be present (i.e. there are no operational phase impacts on local air quality) as a result of SEP and/or DEP, it is unlikely significant impacts would occur as a result of NRMM at landfall where relevant control and management measures are employed see **Section 22.6.1.2.5**).

22.6.1.2.2 NRMM along the Onshore Cable Corridor

241. The primary activities that would occur along the onshore cable corridor are temporary haul road construction and removal/excavation/backfilling works associated with the trench.

242. As detailed in **Chapter 4 Project Description**, the onshore cable corridor would be subdivided into 1km lengths between work fronts, with a typical works duration of up to four weeks at any particular location, and work would be undertaken in a practical, logical and sequential manner, e.g., topsoil stripping would be undertaken prior to construction of the haul road in advance of trench excavation. Furthermore, each item of plant present would not necessarily be fully utilised throughout the working day.

243. It is not anticipated that NRMM would be in excess of that required on a ‘standard’ construction site due to:

- the linear nature of works area;
- the number of items of each type of plant active in the vicinity of receptors for each activity, along the length of each section of cable corridor; and
- the short duration NRMM and plant would be active in each section.

244. Therefore, it is unlikely that NRMM along the onshore cable corridor would have a significant impact on local air quality where relevant control and management measures are employed (see **Section 22.6.1.2.5**).

22.6.1.2.3 NRMM at the Onshore Substation

245. The onshore substation for SEP and DEP is located in arable land south of the existing Norwich Main substation. Construction activities at the onshore substation include site preparation, and construction of the onshore substation and permanent access routes, both of which have an associated temporary construction compound.

246. The onshore substation is located approximately 600m north of Swainsthorpe, with the nearest human receptor to the onshore construction compound off the A140 Ipswich Road (to the east). The nearest ecological receptor is Dunston Common LNR, approximately 700m north-east of the main construction compound at the onshore substation and approximately 475m east of a smaller construction compound at the onshore substation.

247. Works at the onshore substation would occur for up to 28 months if SEP or DEP are built in isolation, or if DEP and DEP are built concurrently (with up to a four year gap between the start of onshore construction of the first project and the start of onshore construction of the second project). Works at the onshore substation would occur for up 30 months if SEP and DEP are built sequentially. The anticipated number of NRMM in operation at any one time is set out in **Table 22.2**. However, emissions would only occur during working hours, rather than continually. In addition, given that the prevailing wind direction (see **Plate 22-1**) is from the south-west, NRMM emissions would be dispersed away from any nearby human receptors for the majority of the time. It is anticipated that the distance between the Dunston Common LNR and the potential closest works at the onshore substation would allow for sufficient dilution and dispersion of pollutant emissions from NRMM. Also, given the low background pollutant concentrations in the area, and the fact that the source of NRMM emissions would be temporary during construction only, it is unlikely NRMM at the onshore substation would have a significant impact on local air quality where relevant control and management measures are employed (see **Section 22.6.1.2.5**).

22.6.1.2.4 NRMM Significance

248. Defra technical guidance (Defra, 2021a) states that emissions from NRMM used on construction sites are unlikely to have a significant impact on local air quality where relevant control and management measures are employed (see **Section 22.6.1.2.5** below). As such, given the results of the qualitative assessment above and with the implementation of the below measures, impacts are considered to be **not significant**.

22.6.1.2.5 Mitigation measures Specific to NRMM (under all Scenarios)

249. The following mitigation measures specific to NRMM will be secured through the final CoCP.

250. NRMM and plant would be well maintained. If any emissions of dark smoke occur, then the relevant machinery should stop immediately, and any problem rectified. In addition, the following controls should apply to NRMM:

- All NRMM should use fuel equivalent to ultralow sulphur diesel (fuel meeting the specification within EN590:2004) where practicable;
- All NRMM should comply with the appropriate NRMM regulations;
- All NRMM would be fitted with Diesel Particulate Filters (DPF) conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting);
- The ongoing conformity of plant retrofitted with DPF, to a defined performance standard, should be ensured through a programme of onsite checks; and
- Fuel conservation measures should be implemented, including instructions to (i) throttle down or switch off idle construction equipment; (ii) switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded and (iii) ensure equipment is properly maintained to ensure efficient fuel consumption.

22.6.1.3 Impact 3: Construction Road Vehicle Exhaust Emissions

22.6.1.3.1 SEP or DEP in Isolation (Scenario 1)

22.6.1.3.1.1 Human Receptors

251. The 24-hour AADT flows and HGV percentages used in the air quality assessment for SEP or DEP in isolation (Scenario 1) are detailed in **Appendix 22.2**.

252. Predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for the 2025 year of peak construction 'with SEP or DEP in isolation' scenario are detailed in **Table 22.42** to **Table 22.45**. Concentrations for the 'without SEP and DEP' assessment are also shown for comparison purposes. All concentrations are inclusive of the background concentration at each receptor. Results are not presented for R28 to R31 as this link (Link 42) was not screened into the assessment for the SEP or DEP in isolation scenario (see **Section 22.4.3.3.1** and **Table 22.11** for more details).

Table 22.42: Annual Mean NO_2 Results at Sensitive Human Receptor Locations for SEP or DEP in Isolation

Local Authority	Receptor ID	Scenario 1 (SEP or DEP in Isolation) –				
		2025 Annual Mean NO_2 Concentrations (µg.m^{-3}) Objective = 40µg.m^{-3}				
		Without SEP or DEP	With SEP or DEP	Change	Change as % of the Objective	Impact Descriptor
KLWNBC	R1	18.2	18.7	0.47	1%	Negligible
	R2	17.6	18.0	0.40	1%	Negligible
	R3	12.5	12.7	0.15	0%	Negligible
	R4	11.3	11.5	0.15	0%	Negligible
	R5	12.1	12.3	0.18	0%	Negligible
	R6	10.4	10.5	0.08	0%	Negligible
	R7	12.8	13.0	0.21	1%	Negligible
	R8	11.2	11.3	0.13	0%	Negligible
	R9	14.0	14.0	0.05	0%	Negligible
	R10	13.9	14.1	0.19	0%	Negligible
	R11	16.1	16.3	0.17	0%	Negligible
	R12	13.4	13.5	0.11	0%	Negligible
NNDC	R13	10.0	10.1	0.09	0%	Negligible
	R14	9.6	9.6	0.08	0%	Negligible
	R15	11.7	11.8	0.06	0%	Negligible
	R16	11.3	11.4	0.06	0%	Negligible
	R17	13.1	13.2	0.11	0%	Negligible
	R18	11.3	11.4	0.07	0%	Negligible
	R19	18.5	18.7	0.24	1%	Negligible
BC	R20	12.0	12.1	0.09	0%	Negligible
	R21	12.7	12.9	0.14	0%	Negligible

Local Authority	Receptor ID	Scenario 1 (SEP or DEP in Isolation) –				
		2025 Annual Mean NO_2 Concentrations (µg.m^{-3}) Objective = 40µg.m^{-3}				
		Without SEP or DEP	With SEP or DEP	Change	Change as % of the Objective	Impact Descriptor
	R22	10.7	10.8	0.06	0%	Negligible
BDC	R23	11.3	11.3	0.03	0%	Negligible
	R24	12.7	12.8	0.05	0%	Negligible
	R25	24.8	24.9	0.07	0%	Negligible
	R26	24.7	24.8	0.07	0%	Negligible
	R27	16.6	16.7	0.10	0%	Negligible
SNC	R32	18.3	18.4	0.07	0%	Negligible
	R33	18.6	18.6	0.05	0%	Negligible
	R34	16.0	16.0	0.05	0%	Negligible
	R35	15.3	15.4	0.03	0%	Negligible
	R36	11.5	11.8	0.26	1%	Negligible
	R37	11.6	11.7	0.07	0%	Negligible
	R38	12.8	12.8	0.05	0%	Negligible
	R39	19.9	19.9	0.05	0%	Negligible
	R40	14.5	14.6	0.12	0%	Negligible
	R41	17.0	17.2	0.17	0%	Negligible
GYBC	R42	13.9	13.9	0.06	0%	Negligible
	R43	25.6	25.8	0.19	0%	Negligible
	R44	24.4	24.5	0.07	0%	Negligible
	R45	18.4	18.5	0.09	0%	Negligible
WDC	R46	17.2	17.3	0.08	0%	Negligible
	R47	13.6	13.7	0.10	0%	Negligible
	R48	11.8	11.9	0.08	0%	Negligible
	R49	14.6	14.7	0.12	0%	Negligible
	R50	28.3	28.7	0.45	1%	Negligible
	R51	27.0	27.3	0.29	1%	Negligible
	R52	12.8	12.8	0.09	0%	Negligible
	R53	11.6	11.7	0.07	0%	Negligible
	R54	16.2	16.4	0.16	0%	Negligible

Table 22.43: Annual Mean PM_{10} Results at Sensitive Human Receptor Locations for SEP or DEP in Isolation

Local Authority	**Receptor ID**	**Scenario 1 (SEP or DEP in Isolation) – 2025 Annual Mean PM_{10} Concentrations ($\mu g.m^{-3}$) Objective = $40\mu g.m^{-3}$**				
		Without SEP or DEP	**With SEP or DEP**	**Change**	**Change as % of the Objective**	**Impact Descriptor**
KLWNBC	R1	16.4	16.5	0.12	0%	Negligible
	R2	17.0	17.2	0.19	0%	Negligible
	R3	16.0	16.1	0.11	0%	Negligible
	R4	16.2	16.3	0.07	0%	Negligible
	R5	16.3	16.4	0.08	0%	Negligible
	R6	16.7	16.7	0.06	0%	Negligible
	R7	17.1	17.2	0.10	0%	Negligible
	R8	16.2	16.3	0.08	0%	Negligible
	R9	17.5	17.6	0.05	0%	Negligible
	R10	17.4	17.5	0.12	0%	Negligible
	R11	18.8	19.0	0.13	0%	Negligible
	R12	16.6	16.7	0.09	0%	Negligible
NNDC	R13	16.2	16.2	0.06	0%	Negligible
	R14	16.4	16.4	0.06	0%	Negligible
	R15	15.2	15.2	0.04	0%	Negligible
	R16	16.1	16.1	0.03	0%	Negligible
	R17	17.4	17.5	0.07	0%	Negligible
	R18	15.5	15.6	0.06	0%	Negligible
	R19	18.0	18.1	0.11	0%	Negligible
BC	R20	17.2	17.3	0.07	0%	Negligible
	R21	16.7	16.8	0.08	0%	Negligible
	R22	16.4	16.4	0.04	0%	Negligible
BDC	R23	15.7	15.7	0.02	0%	Negligible
	R24	14.6	14.6	0.02	0%	Negligible
	R25	17.9	18.0	0.06	0%	Negligible
	R26	18.8	18.9	0.07	0%	Negligible
	R27	17.2	17.2	0.07	0%	Negligible
SNC	R32	17.2	17.3	0.05	0%	Negligible
	R33	17.7	17.7	0.04	0%	Negligible
	R34	17.0	17.1	0.03	0%	Negligible
	R35	16.4	16.4	0.02	0%	Negligible
	R36	16.0	16.1	0.14	0%	Negligible
	R37	15.1	15.1	0.03	0%	Negligible
	R38	17.0	17.1	0.02	0%	Negligible

Local Authority	Receptor ID	Scenario 1 (SEP or DEP in Isolation) – 2025 Annual Mean PM_{10} Concentrations (µg.m^{-3}) Objective = 40µg.m^{-3}				
		Without SEP or DEP	With SEP or DEP	Change	Change as % of the Objective	Impact Descriptor
	R39	17.3	17.3	0.03	0%	Negligible
	R40	17.4	17.5	0.07	0%	Negligible
	R41	17.5	17.6	0.09	0%	Negligible
GYBC	R42	13.5	13.6	0.04	0%	Negligible
	R43	18.2	18.3	0.10	0%	Negligible
	R44	17.6	17.6	0.06	0%	Negligible
	R45	16.3	16.4	0.06	0%	Negligible
WDC	R46	17.6	17.7	0.07	0%	Negligible
	R47	14.8	14.9	0.05	0%	Negligible
	R48	14.0	14.1	0.04	0%	Negligible
	R49	15.0	15.1	0.06	0%	Negligible
	R50	15.9	16.0	0.11	0%	Negligible
	R51	15.1	15.2	0.07	0%	Negligible
	R52	15.0	15.0	0.05	0%	Negligible
	R53	14.8	14.9	0.05	0%	Negligible
	R54	17.0	17.1	0.09	0%	Negligible

Table 22.44: Short Term PM_{10} Results at Sensitive Human Receptor Locations for SEP or DEP in Isolation

Local Authority	Receptor ID	Scenario 1 (SEP or DEP in Isolation) – 2025 Number of Days >50µg.m^{-3} (Objective being fewer than 35 exceedances per year)		
		Without SEP or DEP	With SEP or DEP	Change
KLWNBC	R1	0	0	0
	R2	1	1	0
	R3	0	0	0
	R4	0	0	0
	R5	0	0	0
	R6	1	1	0
	R7	1	1	0
	R8	0	0	0
	R9	1	1	0
	R10	1	1	0
	R11	2	2	0
	R12	1	1	0

Local Authority	Receptor ID	Scenario 1 (SEP or DEP in Isolation) –		
		2025 Number of Days >50µg.m^{-3} (Objective being fewer than 35 exceedances per year)		
		Without SEP or DEP	With SEP or DEP	Change
NNDC	R13	0	0	0
	R14	0	0	0
	R15	0	0	0
	R16	0	0	0
	R17	1	1	0
	R18	0	0	0
	R19	1	2	0
BC	R20	1	1	0
	R21	1	1	0
	R22	0	0	0
BDC	R23	0	0	0
	R24	0	0	0
	R25	1	1	0
	R26	2	2	0
	R27	1	1	0
SNC	R32	1	1	0
	R33	1	1	0
	R34	1	1	0
	R35	0	0	0
	R36	0	0	0
	R37	0	0	0
	R38	1	1	0
	R39	1	1	0
	R40	1	1	0
	R41	1	1	0
GYBC	R42	0	0	0
	R43	2	2	0
	R44	1	1	0
	R45	0	0	0
WDC	R46	1	1	0
	R47	0	0	0
	R48	0	0	0
	R49	0	0	0
	R50	0	0	0
	R51	0	0	0
	R52	0	0	0
	R53	0	0	0
	R54	1	1	0

Table 22.45: Annual Mean $PM_{2.5}$ Results at Sensitive Human Receptor Locations for SEP or DEP in Isolation

Local Authority	Receptor ID	Scenario 1 (SEP or DEP in Isolation) –				
		2025 Annual Mean $PM_{2.5}$ Concentrations (µg.m^{-3}) Objective = 25µg.m^{-3}				
		Without SEP or DEP	**With SEP or DEP**	**Change**	**Change as % of the Objective**	**Impact Descriptor**
KLWNBC	R1	10.3	10.4	0.07	0%	Negligible
	R2	10.5	10.6	0.10	0%	Negligible
	R3	9.6	9.7	0.06	0%	Negligible
	R4	9.2	9.3	0.04	0%	Negligible
	R5	9.3	9.3	0.05	0%	Negligible
	R6	9.2	9.2	0.04	0%	Negligible
	R7	9.5	9.5	0.06	0%	Negligible
	R8	9.2	9.2	0.05	0%	Negligible
	R9	10.4	10.4	0.02	0%	Negligible
	R10	10.2	10.2	0.07	0%	Negligible
	R11	10.6	10.7	0.08	0%	Negligible
	R12	9.6	9.7	0.05	0%	Negligible
NNDC	R13	9.0	9.0	0.04	0%	Negligible
	R14	9.0	9.0	0.03	0%	Negligible
	R15	9.0	9.0	0.02	0%	Negligible
	R16	9.0	9.0	0.02	0%	Negligible
	R17	9.5	9.6	0.04	0%	Negligible
	R18	8.9	8.9	0.03	0%	Negligible
	R19	10.3	10.3	0.06	0%	Negligible
BC	R20	9.6	9.6	0.04	0%	Negligible
	R21	9.6	9.6	0.05	0%	Negligible
	R22	9.2	9.2	0.02	0%	Negligible
BDC	R23	9.1	9.1	0.01	0%	Negligible
	R24	9.0	9.0	0.01	0%	Negligible
	R25	10.4	10.5	0.04	0%	Negligible
	R26	10.6	10.6	0.04	0%	Negligible
	R27	10.0	10.0	0.04	0%	Negligible
SNC	R32	10.1	10.1	0.03	0%	Negligible
	R33	10.3	10.4	0.02	0%	Negligible
	R34	9.9	9.9	0.02	0%	Negligible
	R35	9.7	9.7	0.01	0%	Negligible
	R36	9.2	9.2	0.08	0%	Negligible
	R37	9.0	9.0	0.02	0%	Negligible
	R38	9.6	9.6	0.01	0%	Negligible

Local Authority	**Receptor ID**	**Scenario 1 (SEP or DEP in Isolation) –**				
		2025 Annual Mean $PM_{2.5}$ Concentrations (µg.m^{-3}) Objective = 25µg.m^{-3}				
		Without SEP or DEP	**With SEP or DEP**	**Change**	**Change as % of the Objective**	**Impact Descriptor**
	R39	10.1	10.1	0.02	0%	Negligible
	R40	9.7	9.7	0.04	0%	Negligible
	R41	9.9	10.0	0.05	0%	Negligible
GYBC	R42	8.6	8.6	0.02	0%	Negligible
	R43	11.8	11.9	0.05	0%	Negligible
	R44	11.3	11.3	0.03	0%	Negligible
	R45	10.2	10.2	0.03	0%	Negligible
WDC	R46	10.2	10.3	0.04	0%	Negligible
	R47	9.1	9.1	0.03	0%	Negligible
	R48	9.0	9.0	0.02	0%	Negligible
	R49	10.0	10.0	0.03	0%	Negligible
	R50	10.3	10.4	0.06	0%	Negligible
	R51	10.0	10.1	0.04	0%	Negligible
	R52	9.6	9.6	0.03	0%	Negligible
	R53	9.5	9.5	0.03	0%	Negligible
	R54	9.9	10.0	0.05	0%	Negligible

253. The results of the construction phase road traffic emissions assessment show that annual mean concentrations of NO_2 (see **Table 22.42**), PM_{10} (see **Table 22.43**) and $PM_{2.5}$ (see **Table 22.45**) are predicted to be well below (i.e. less than 75% of) the respective air quality Objectives in the year of peak construction (2025) under Scenario 1 – SEP or DEP in isolation at all receptors, both ‘with’ and ‘without’ SEP or DEP in place.

254. The changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations were 1% or less at all receptors; this corresponded to a ‘negligible’ impact due to low total pollutant concentrations at all receptors, in accordance with IAQM and EPUK guidance (IAQM & EPUK, 2017).

255. All predicted NO_2 concentrations were well below 60µg.m^{-3} and therefore, in accordance with Defra guidance (Defra, 2021a), the 1-hour mean Objective is unlikely to be exceeded (see **Table 22.5**). Based on the calculation provided by Defra, as detailed in **Section 22.4.3.3.5**, the short-term PM_{10} Objective was predicted to be met at all modelled locations (objective being less than 35 exceedances of the daily mean objective of 50µg.m^{-3}). As shown in **Table 22.44**, there was no change in the number of days exceeding the daily mean Objective between the ‘without’ and ‘with’ SEP or DEP in isolation assessments, using the Defra (2021a) calculation.

256. The assessment concluded that impacts generated by SEP or DEP construction road traffic upon local air quality are **not significant** based upon:

- A predicted **negligible** impact at all receptor locations;
- Predicted pollutant concentrations were well below the relevant air quality Objectives/target at all considered human receptor locations; and
- SEP or DEP generated traffic was not predicted to cause a breach of any of the air quality Objectives at any identified sensitive receptor locations.

22.6.1.3.1.2 Ecological Receptors

257. Due to the number of ecological receptors screened into the assessment (see **Table 22.35**), the full assessment of the impact of SEP or DEP in isolation road traffic emissions on ecological receptors has been presented in **Appendix 22.5**. The in-combination assessment is also presented in **Appendix 22.5**.

258. **Table 22.46** and **Table 22.47** below presents the maximum potential contribution of the Project alone and in-combination (respectively) on the most sensitive feature(s) under each designation, i.e. the most stringent Critical Levels and Loads of designated features have been presented below and may not all relate to the same feature. **Table 22.46** presents the Project contribution (i.e. ‘SEP or DEP in isolation’) and **Table 22.47** presents the in-combination contribution (i.e. Project traffic, 2019 to 2025 traffic growth, cumulative projects) (see **Section 22.4.3.3.6**). Values in exceedance of 1% of the Critical Load or Level, i.e. those which cannot be considered to be insignificant, are shaded in blue shown in **bold text**.

259. It should be noted that the most sensitive Critical Levels and Loads for feature(s) under each designated ecological site are presented below and all features may not be present in each designated site, nor may they be located within 200m of the affected road network.

Table 22.46: SEP or DEP in Isolation – Maximum Contribution of Project-generated NOx, NH3, N-dep and Acid Deposition from Traffic on Feature(s) under Designation Ecological Sites

Link	**Designated Ecological Site**		**'SEP or DEP in Isolation' Road Traffic Contribution**										
	Site Type	**Name**	**Concentration or Flux**				**% of Critical Level or Critical Load**						
			NOx	**NH$_3$**	**N-dep**	**Acid dep.**	**NOx**	**NH$_3$**		**N-dep**		**Acid dep.**	
			µg.m^{-3}	**µg.m^{-3}**	**kgN.ha^{-1}.yr^{-1}**	**kgN.ha^{-1}.yr^{-1}**	**-**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**
4	Ancient woodland	Bullfer Grove	-	-	0.013	0.001	-	-	-	0.1%	0.1%	0.0%	0.0%
	Ancient woodland	Pereers Wood	0.117	0.003	0.046	0.003	0.4%	0.3%	0.1%	0.5%	0.2%	0.2%	0.2%
10	SSSI	Kelling Heath	0.143	0.006	0.049	0.003	0.5%	0.6%	0.2%	0.5%	0.2%	0.2%	0.1%
11	Ancient woodland	Oak Wood	0.154	0.007	0.087	0.006	0.5%	0.7%	0.2%	0.9%	0.4%	0.5%	0.5%
13	Ancient woodland	Unnamed (ID 1)	0.421	0.018	0.238	0.017	**1.4%**	**1.8%**	0.6%	**2.4%**	**1.2%**	0.9%	0.9%
	SSSI	Felbrigg Wood	0.421	0.018	0.238	0.017	**1.4%**	**1.8%**	**1.8%**	**2.4%**	**1.2%**	**1.3%**	0.9%
	Ancient woodland	Great Wood	0.303	0.007	0.098	0.007	**1.0%**	0.7%	0.2%	1.0%	0.5%	0.5%	0.5%
14	SSSI	Felbrigg Wood	0.360	0.016	0.203	0.014	**1.2%**	**1.6%**	0.5%	**2.0%**	**1.0%**	**1.1%**	0.8%
20	SSSI	Ant Broads and Marshes	-	-	0.007	0.000	-	-	-	0.1%	0.0%	0.1%	0.0%
21	SSSI	Trinity Broads	0.152	0.007	0.086	0.006	0.5%	0.7%	0.2%	0.9%	0.4%	**1.2%**	0.1%
	SAC	The Broads	0.152	0.007	0.052	0.004	0.5%	0.7%	0.7%	0.3%	0.2%	0.7%	0.1%

Link	Designated Ecological Site		'SEP or DEP in Isolation' Road Traffic Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH_3	N-dep	Acid dep.	NOx	NH_3		N-dep		Acid dep.	
			$\mu g.m^{-3}$	$\mu g.m^{-3}$	$kgN.ha^{-1}.yr^{-1}$	$kgN.ha^{-1}.yr^{-1}$	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
25	SSSI	Breydon Water	0.466	0.020	0.158	-	**1.6%**	**2.0%**	0.7%	0.8%	0.5%	-	-
	SPA	Breydon Water	0.466	0.020	0.158	0.011	**1.6%**	0.7%	0.7%	**2.0%**	**1.6%**	**1.0%**	0.2%
	LNR	Breydon Water	0.466	0.020	-	-	**1.6%**	0.7%	0.7%	-	-	-	-
28	Ancient woodland	Foxburrow Wood	0.334	0.015	0.189	0.013	**1.1%**	**1.5%**	0.5%	**1.9%**	0.9%	0.7%	0.7%
30	Ancient woodland	Raveningham Covert	0.947	0.041	0.534	0.037	**3.2%**	**4.1%**	**1.4%**	**5.3%**	**2.7%**	**1.4%**	**1.4%**
	Ancient woodland	Blacks Grove	0.045	0.002	0.034	0.002	0.2%	0.2%	0.1%	0.3%	0.2%	0.1%	0.1%
	SSSI	Barnby Broad & Marshes	0.125	0.003	0.036	0.003	0.4%	0.3%	0.1%	0.2%	0.1%	0.5%	0.1%
	SAC	The Broads	0.125	0.003	0.036	0.003	0.4%	0.3%	0.3%	0.4%	0.2%	0.5%	0.5%
	SPA	Broadland	0.125	-	0.036	0.003	0.4%	-	-	0.4%	0.2%	0.5%	0.1%
31	LNR	Whitlingham	0.192	0.005	-	-	0.6%	0.2%	0.2%	-	-	-	-
	LNR	Whitlingham	0.875	0.038	-	-	**2.9%**	**1.3%**	**1.3%**	-	-	-	-
	LNR	Whitlingham Marsh,	0.875	0.038	-	-	**2.9%**	**1.3%**	**1.3%**	-	-	-	-

Link	**Designated Ecological Site**		**'SEP or DEP in Isolation' Road Traffic Contribution**										
	Site Type	**Name**	**Concentration or Flux**				**% of Critical Level or Critical Load**						
			NOx	**NH$_3$**	**N-dep**	**Acid dep.**	**NOx**	**NH$_3$**		**N-dep**		**Acid dep.**	
			µg.m^{-3}	**µg.m^{-3}**	**kgN.ha^{-1}.yr^{-1}**	**kgN.ha^{-1}.yr^{-1}**	**-**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**
		Whitlingham											
34	SSSI	Damgate Marshes, Acle	0.707	0.031	-	-	**24%**	**1.0%**	**1.0%**	-	-	-	-
	SAC	The Broads	0.707	0.031	0.240	0.017	**2.4%**	**3.1%**	**3.1%**	**2.4%**	**1.6%**	**3.4%**	**3.2%**
	SSSI	Breydon Water	0.124	0.003	0.033	-	0.4%	0.1%	0.1%	0.2%	0.1%	-	-
	SPA	Breydon Water	0.124	0.003	0.033	0.002	0.4%	0.1%	0.1%	0.2%	0.1%	0.2%	0.1%
	LNR	Breydon Water	0.124	0.003	-	-	0.4%	0.1%	0.1%	-	-	-	-
35	Ancient woodland	Unnamed (ID 2)	0.056	-	0.033	0.002	0.2%	-	-	0.7%	0.2%	0.1%	0.1%
40	Ancient woodland	Unnamed (ID 3)	0.271	0.006	0.105	0.007	0.9%	0.6%	0.2%	**1.1%**	0.5%	0.4%	0.4%
	Ancient woodland	Sprowston Wood	0.085	0.002	0.044	0.003	0.3%	0.2%	0.1%	0.9%	0.3%	0.2%	0.2%
43	Ancient woodland	Unnamed (ID 4)	-	-	0.019	0.001	-	-	-	0.2%	0.1%	0.1%	0.1%
49	SSSI	Buxton Heath	0.086	-	-	0.002	0.3%	-	-	-	-	0.3%	0.2%
	SAC	Norfolk Valley Fens	0.086	-	0.025	0.002	0.3%	-	-	0.5%	0.2%	0.3%	0.0%

Link	Designated Ecological Site		‘SEP or DEP in Isolation’ Road Traffic Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH_3	N-dep	Acid dep.	NOx	NH_3		N-dep		Acid dep.	
			$\mu g.m^{-3}$	$\mu g.m^{-3}$	$kgN.ha^{-1}.yr^{-1}$	$kgN.ha^{-1}.yr^{-1}$	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
	Ancient woodland	Great Wood	-	-	0.023	0.002	-	-	-	0.5%	0.2%	0.1%	0.1%
51	SSSI	Cawston and Marsham Heaths	0.071	0.002	0.022	0.002	0.2%	0.2%	0.1%	0.2%	0.1%	0.1%	0.1%
59	SSSI	Holt Lowes	0.318	0.014	0.108	0.008	**1.1%**	**1.4%**	**1.4%**	**1.1%**	0.5%	**1.4%**	**1.4%**
	SAC	Norfolk Valley Fens	0.318	0.014	0.108	0.008	**1.1%**	**1.4%**	**1.4%**	**2.2%**	**1.1%**	**1.3%**	0.2%
79	SSSI	River Wensum	0.714	0.031	0.243	0.017	**2.4%**	**3.1%**	**1.0%**	**1.6%**	0.8%	-	-
	SAC	River Wensum	0.714	0.031	-	0.017	**2.4%**	**1.0%**	**1.0%**	-	-	-	-
80	SSSI	River Wensum	0.274	0.012	0.093	0.007	0.9%	**1.2%**	0.4%	0.6%	0.3%	-	-
	SAC	River Wensum	0.274	0.012	-	0.007	0.9%	0.4%	0.4%	-	-	-	-
	SSSI	River Wensum	0.021	-	-	-	0.1%	-	-	-	-	-	-
	SAC	River Wensum	0.021	-	-	-	0.1%	-	-	-	-	-	-
85	Ancient woodland	Mouse Wood	0.262	0.011	0.148	0.010	0.9%	**1.1%**	0.4%	**2.9%**	1.0%	0.1%	0.1%
86	SSSI	Holly Farm	0.438	0.010	0.086	0.006	**1.5%**	1.0%	0.3%	0.6%	0.3%	0.9%	0.1%

Link	Designated Ecological Site		'SEP or DEP in Isolation' Road Traffic Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH_3	N-dep	Acid dep.	NOx	NH_3		N-dep		Acid dep.	
			$\mu g.m^{-3}$	$\mu g.m^{-3}$	$kgN.ha^{-1}.yr^{-1}$	$kgN.ha^{-1}.yr^{-1}$	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
		Meadow, Wendling											
	SSSI	Potter & Scarning Fens, East Dereham	0.756	0.033	0.257	0.018	**2.5%**	**3.3%**	**1.1%**	**1.7%**	0.9%	0.4%	0.4%
	SAC	Norfolk Valley Fens	0.756	0.033	0.257	0.018	**2.5%**	**3.3%**	**3.3%**	**5.1%**	**2.6%**	**3.0%**	0.4%
87	SSSI	East Winch Common	0.654	0.029	0.222	0.016	**2.2%**	**2.9%**	**2.9%**	**2.2%**	**1.1%**	**1.6%**	0.3%
88	Ancient woodland	Reffley Wood	0.336	0.007	0.108	0.008	**1.1%**	0.7%	0.2%	**2.2%**	0.7%	0.1%	0.1%
114	Ancient woodland	Unnamed (ID 6)	0.522	0.023	0.294	0.021	**1.7%**	**2.3%**	0.8%	**2.9%**	**1.5%**	0.8%	0.8%
	Ancient woodland	Smeeth Wood	0.092	0.002	0.042	0.003	0.3%	0.2%	0.1%	0.4%	0.2%	0.1%	0.1%
125	LNR	Danby Wood	0.054	-	-	-	0.2%	-	-	-	-	-	-
	LNR	Marston Marshes	0.023	-	-	-	0.1%	-	-	-	-	-	-
133	SSSI	River Wensum	0.039	0.002	-	0.001	0.1%	0.2%	0.1%	-	-	-	-
	SAC	River Wensum	0.039	0.002	-	0.001	0.1%	0.1%	0.1%	-	-	-	-

Link	Designated Ecological Site		‘SEP or DEP in Isolation’ Road Traffic Contribution											
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH$_3$	N-dep	Acid dep.	NOx	NH$_3$		N-dep		Acid dep.	
			µg.m^{-3}	µg.m^{-3}	kgN.ha^{-1}.yr^{-1}	kgN.ha^{-1}.yr^{-1}	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
136	SSSI	Alderford Common	0.039	-	-	0.001	0.1%	-	-	-	-	0.1%	0.1%

Table 22.47: SEP or DEP in Isolation – Maximum Contribution of Incombination NOx, NH3, N-dep and Acid Deposition on Feature(s) under Designation Ecological Sites

Link	Designated Ecological Site		‘SEP or DEP in Isolation’ In-combination Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH$_3$	N-dep	Acid dep.	NOx	NH$_3$		N-dep		Acid dep.	
			µg.m^{-3}	µg.m^{-3}	kgN.ha^{-1}.yr^{-1}	kgN.ha^{-1}.yr^{-1}	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
4	Ancient woodland	Bullfer Grove	-	-	0.168	0.012	-	-	-	**1.7%**	0.8%	0.1%	0.1%
	Ancient woodland	Pereers Wood	1.536	0.036	0.596	0.042	**5.1%**	**3.6%**	**1.2%**	**6.0%**	**3.0%**	**2.3%**	**2.3%**
10	SSSI	Kelling Heath	0.806	0.035	0.274	0.019	**2.7%**	**3.5%**	**1.2%**	**2.7%**	**1.4%**	**1.4%**	0.4%
11	Ancient woodland	Oak Wood	1.945	0.085	1.097	0.077	**6.5%**	**8.5%**	**2.8%**	**11.0%**	**5.5%**	**6.0%**	**6.0%**
13	Ancient woodland	Unnamed (ID 1)	6.635	0.289	3.742	0.262	**22.1%**	**28.9%**	**9.6%**	**37.4%**	**18.7%**	**14.5%**	**14.5%**
	SSSI	Felbrigg Wood	6.635	0.289	3.742	0.262	**22.1%**	**28.9%**	**28.9%**	**37.4%**	**18.7%**	**20.2%**	**14.2%**

Link	Designated Ecological Site		'SEP or DEP in Isolation' In-combination Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH_3	N-dep	Acid dep.	NOx	NH_3		N-dep		Acid dep.	
			$\mu g.m^{-3}$	$\mu g.m^{-3}$	$kgN.ha^{-1}.yr^{-1}$	$kgN.ha^{-1}.yr^{-1}$	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
	Ancient woodland	Great Wood	4.777	0.104	1.539	0.108	**15.9%**	**10.4%**	**3.5%**	**15.4%**	**7.7%**	**8.3%**	**8.3%**
14	SSSI	Felbrigg Wood	4.730	0.206	2.668	0.187	**15.8%**	**20.6%**	**6.9%**	**26.7%**	**13.3%**	**14.4%**	**10.1%**
20	SSSI	Ant Broads and Marshes	-	-	0.151	0.011	-	-	-	**1.5%**	0.8%	**2.0%**	0.6%
21	SSSI	Trinity Broads	3.912	0.171	2.207	0.154	**13.0%**	**17.1%**	**5.7%**	**22.1%**	**11.0%**	**29.7%**	**3.5%**
	SAC	The Broads	3.912	0.171	1.330	0.093	**13.0%**	**17.1%**	**5.7%**	**13.3%**	**8.9%**	**18.7%**	**17.6%**
25	SSSI	Breydon Water	11.734	0.512	3.990	-	**39.1%**	**51.2%**	**17.1%**	**19.9%**	**13.3%**	-	-
	SPA	Breydon Water	11.734	0.512	3.990	0.279	**39.1%**	**17.1%**	**17.1%**	**49.9%**	**39.9%**	**25.3%**	**6.1%**
	LNR	Breydon Water	11.734	0.512	-	-	**39.1%**	**17.1%**	**17.1%**	-	-	-	-
28	Ancient woodland	Foxburrow Wood	4.692	0.205	2.646	0.185	**15.6%**	**20.5%**	**6.8%**	**26.5%**	**13.2%**	**10.0%**	**10.0%**
30	Ancient woodland	Raveningham Covert	7.110	0.310	4.010	0.281	**23.7%**	**31.0%**	**10.3%**	**40.1%**	**20.1%**	**10.3%**	**10.3%**
	Ancient woodland	Blacks Grove	0.341	0.012	0.256	0.018	**1.1%**	**1.2%**	0.4%	**2.6%**	**1.3%**	0.7%	0.7%
	SSSI	Barnby Broad & Marshes	0.939	0.025	0.270	0.019	**3.1%**	**2.5%**	0.8%	**1.8%**	0.9%	**3.4%**	0.4%
	SAC	The Broads	0.939	0.025	0.270	0.019	**3.1%**	**2.5%**	**2.5%**	**2.7%**	**1.8%**	**3.8%**	**3.6%**
	SPA	Broadland	0.939	-	0.270	0.019	**3.1%**	-	-	**2.7%**	**1.4%**	**3.5%**	0.4%
31	LNR	Whitlingham	3.630	0.092	-	-	**12.1%**	**3.1%**	**3.1%**	-	-	-	-

Link	Designated Ecological Site		‘SEP or DEP in Isolation’ In-combination Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH_3	N-dep	Acid dep.	NOx	NH_3		N-dep		Acid dep.	
			µg.m^{-3}	µg.m^{-3}	kgN.ha^{-1}.yr^{-1}	kgN.ha^{-1}.yr^{-1}	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
	LNR	Whitlingham	16.500	0.719	-	-	**55.0%**	**24.0%**	**24.0%**	-	-	-	-
	LNR	Whitlingham Marsh, Whitlingham	16.500	0.719	-	-	**55.0%**	**24.0%**	**24.0%**	-	-	-	-
34	SSSI*	Damgate Marshes, Acle	8.261	0.362*	-	-	**27.5%**	**12.1%**	**12.1%**	-	-	-	-
	SAC*	The Broads	8.261	0.362*	2.820*	0.197	**27.5%**	**36.2%**	**36.2%**	**28.2%**	**18.8%**	**39.7%**	**37.4%**
	SSSI	Breydon Water	1.454	0.038	0.388	-	**4.8%**	**1.3%**	**1.3%**	**1.9%**	**1.3%**	-	-
	SPA	Breydon Water	1.454	0.038	0.388	0.027	**4.8%**	**1.3%**	**1.3%**	**1.9%**	**1.3%**	**2.5%**	0.6%
	LNR	Breydon Water	1.454	0.038	-	-	**4.8%**	**1.3%**	**1.3%**	-	-	-	-
35	Ancient woodland	Unnamed (ID 2)	0.737	0.022	0.427	0.030	**2.5%**	**2.2%**	0.7%	**8.5%**	**2.8%**	**1.7%**	**1.7%**
40	Ancient woodland	Unnamed (ID 3)	3.217	0.076	1.248	0.087	**10.7%**	**7.6%**	**2.5%**	**12.5%**	**6.2%**	**5.0%**	**5.0%**
	Ancient woodland	Sprowston Wood	1.014	0.028	0.526	0.037	**3.4%**	**2.8%**	0.9%	**10.5%**	**3.5%**	**2.1%**	**2.1%**
43	Ancient woodland	Unnamed (ID 4)	-	-	0.196	0.014	-	-	-	**2.0%**	1.0%	**1.3%**	**1.3%**
49	SSSI	Buxton Heath	0.567	-	-	0.011	**1.9%**	-	-	-	-	**1.9%**	**1.0%**
	SAC	Norfolk Valley Fens	0.567	-	0.163	0.011	**1.9%**	-	-	**3.3%**	**1.6%**	**1.9%**	0.3%
	Ancient woodland	Great Wood	-	-	0.155	0.011	-	-	-	**3.1%**	**1.0%**	0.9%	0.9%

Link	Designated Ecological Site		‘SEP or DEP in Isolation’ In-combination Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH$_3$	N-dep	Acid dep.	NOx	NH$_3$		N-dep		Acid dep.	
			µg.m^{-3}	µg.m^{-3}	kgN.ha^{-1}.yr^{-1}	kgN.ha^{-1}.yr^{-1}	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
51	SSSI	Cawston and Marsham Heaths	0.478	0.013	0.146	0.010	**1.6%**	**1.3%**	0.4%	**1.5%**	0.7%	0.7%	0.6%
59	SSSI	Holt Lowes	2.958	0.129	1.006	0.070	**9.9%**	**12.9%**	**12.9%**	**10.1%**	**5.0%**	**13.0%**	**12.8%**
	SAC	Norfolk Valley Fens	2.958	0.129	1.006	0.070	**9.9%**	**12.9%**	**12.9%**	**20.1%**	**10.1%**	**11.6%**	**1.6%**
79	SSSI	River Wensum	5.756	0.251	1.957	0.137	**19.2%**	**25.1%**	**8.4%**	**13.0%**	**6.5%**	-	-
	SAC	River Wensum	5.756	0.251	-	0.137	**19.2%**	**8.4%**	**8.4%**	-	-	-	-
80	SSSI	River Wensum	4.149	0.181	1.411	0.099	**13.8%**	**18.1%**	**6.0%**	**9.4%**	**4.7%**	-	-
	SAC	River Wensum	4.149	0.181	-	0.099	**13.8%**	**6.0%**	**6.0%**	-	-	-	-
	SSSI	River Wensum	0.315	-	-	-	**1.1%**	-	-	-	-	-	-
	SAC	River Wensum	0.315	-	-	-	**1.1%**	-	-	-	-	-	-
85	Ancient woodland	Mouse Wood	0.801	0.035	0.452	0.032	**2.7%**	**3.5%**	**1.2%**	**9.0%**	**3.0%**	0.3%	0.3%
86	SSSI	Holly Farm Meadow, Wendling	3.396	0.075	0.667	0.047	**11.3%**	**7.5%**	**2.5%**	**4.4%**	**2.2%**	**6.7%**	**1.1%**
	SSSI	Potter & Scarning Fens, East Dereham	5.854	0.255	1.991	0.139	**19.5%**	**25.5%**	**8.5%**	**13.3%**	**6.6%**	**3.2%**	**3.2%**

Link	Designated Ecological Site		‘SEP or DEP in Isolation’ In-combination Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH_3	N-dep	Acid dep.	NOx	NH_3		N-dep		Acid dep.	
			$\mu g.m^{-3}$	$\mu g.m^{-3}$	$kgN.ha^{-1}.yr^{-1}$	$kgN.ha^{-1}.yr^{-1}$	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
	SAC	Norfolk Valley Fens	5.854	0.255	1.991	0.139	**19.5%**	**25.5%**	**25.5%**	**39.8%**	**19.9%**	**23.0%**	**3.2%**
87	SSSI	East Winch Common	4.443	0.194	1.510	0.106	**14.8%**	**19.4%**	**19.4%**	**15.1%**	**7.6%**	**11.2%**	**2.3%**
88	Ancient woodland	Reffley Wood	5.227	0.113	1.684	0.118	**17.4%**	**11.3%**	**3.8%**	**33.7%**	**11.2%**	**1.4%**	**1.4%**
114	Ancient woodland	Unnamed (ID 6)	14.123	0.616	7.965	0.558	**47.1%**	**61.6%**	**20.5%**	**79.7%**	**39.8%**	**20.4%**	**20.4%**
	Ancient woodland	Smeeth Wood	2.486	0.064	1.130	0.079	**8.3%**	**6.4%**	**2.1%**	**11.3%**	**5.6%**	**2.9%**	**2.9%**
125	LNR	Danby Wood	1.349	-	-	-	**4.5%**	-	-	-	-	-	-
	LNR	Marston Marshes	0.595	-	-	-	**2.0%**	-	-	-	-	-	-
133	SSSI	River Wensum	0.328	0.014	-	0.008	**1.1%**	**1.4%**	0.5%	-	-	-	-
	SAC	River Wensum	0.328	0.014	-	0.008	**1.1%**	0.5%	0.5%	-	-	-	-
136	SSSI	Alderford Common	0.328	-	-	0.008	**1.1%**	-	-	-	-	**1.1%**	**1.1%**

*In-combination of agricultural contribution from BDC Application Number 20201399 (AS Modelling & Data Ltd., 2020)

260. As shown in **Table 22.47**, there are several sites which are predicted to experience in-combination impacts significantly in excess of 1% of the Critical Load or Level. However, comparison with **Table 22.46** shows that only a small percentage of impacts at almost all sites is due to the contribution from SEP or DEP in isolation. Furthermore, as previously discussed, the impact of SEP or DEP in isolation is temporary and would be experienced only during construction. The impact of other in-combination plans and projects (with the exception of other offshore wind farms within the study area for which the same applies), for example traffic generated as a result of residential and employment developments associated with regional Local Plan allocations, would be experienced over a significantly longer duration. However, all sites where the NOx, NH_3, N-dep and/or Acid deposition were predicted to be above 1% of the relevant Critical Level or Load, cannot be considered to be insignificant. As such, the significance of impacts is discussed in **Chapter 20 Onshore Ecology and Ornithology**.

22.6.1.3.2 SEP and DEP Concurrent Construction (Scenario 2)

22.6.1.3.2.1 Human Receptors

261. The 24-hour AADT flows, and HGV percentages used in the air quality assessment for SEP and DEP concurrent construction (Scenario 2) are detailed in **Appendix 22.2**.

262. Predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for the 2025 year of peak construction with the SEP and DEP concurrent construction' scenario are detailed in **Table 22.48** to **Table 22.51**. Concentrations for the 'without SEP and DEP' assessment are also shown for comparison purposes. All concentrations are inclusive of the background concentration at each receptor.

Table 22.48: Annual Mean NO_2 Results at Sensitive Human Receptor Locations for SEP and DEP Concurrent Construction

Local Authority	Receptor ID	Scenario 2 (SEP and DEP Concurrent Construction)				
		2025 Annual Mean NO_2 Concentrations ($\mu g.m^{-3}$) Objective = $40\mu g.m^{-3}$				
		Without SEP and DEP	With SEP and DEP	Change	Change as % of the Objective	Impact Descriptor
KLWNBC	R1	18.2	18.8	0.60	1%	Negligible
	R2	17.6	18.1	0.51	1%	Negligible
	R3	12.5	12.7	0.20	1%	Negligible
	R4	11.3	11.5	0.16	0%	Negligible
	R5	12.1	12.3	0.19	0%	Negligible
	R6	10.4	10.5	0.09	0%	Negligible
	R7	12.8	13.0	0.22	1%	Negligible
	R8	11.2	11.3	0.14	0%	Negligible
	R9	14.0	14.0	0.07	0%	Negligible
	R10	13.9	14.2	0.25	1%	Negligible

Local Authority	Receptor ID	Scenario 2 (SEP and DEP Concurrent Construction)				
		2025 Annual Mean NO_2 Concentrations ($\mu g.m^{-3}$) Objective = $40\mu g.m^{-3}$				
		Without SEP and DEP	With SEP and DEP	Change	Change as % of the Objective	Impact Descriptor
	R11	16.1	16.3	0.22	1%	Negligible
	R12	13.4	13.6	0.14	0%	Negligible
NNDC	R13	10.0	10.1	0.09	0%	Negligible
	R14	9.6	9.6	0.09	0%	Negligible
	R15	11.7	11.8	0.06	0%	Negligible
	R16	11.3	11.4	0.06	0%	Negligible
	R17	13.1	13.2	0.12	0%	Negligible
	R18	11.3	11.4	0.08	0%	Negligible
	R19	18.5	18.7	0.25	1%	Negligible
BC	R20	12.0	12.2	0.12	0%	Negligible
	R21	12.7	12.9	0.19	0%	Negligible
	R22	10.7	10.8	0.08	0%	Negligible
BDC	R23	11.3	11.3	0.04	0%	Negligible
	R24	12.7	12.8	0.06	0%	Negligible
	R25	24.8	24.9	0.09	0%	Negligible
	R26	24.7	24.8	0.09	0%	Negligible
	R27	16.6	16.7	0.13	0%	Negligible
	R28	17.8	18.0	0.22	1%	Negligible
	R29	13.0	13.1	0.11	0%	Negligible
	R30	13.0	13.2	0.11	0%	Negligible
	R31	17.4	17.6	0.15	0%	Negligible
SNC	R32	18.3	18.4	0.09	0%	Negligible
	R33	18.6	18.7	0.07	0%	Negligible
	R34	16.0	16.1	0.07	0%	Negligible
	R35	15.3	15.4	0.04	0%	Negligible
	R36	11.5	11.9	0.43	1%	Negligible
	R37	11.6	11.7	0.11	0%	Negligible
	R38	12.8	12.8	0.06	0%	Negligible
	R39	19.9	19.9	0.07	0%	Negligible
	R40	14.5	14.6	0.16	0%	Negligible
	R41	17.0	17.3	0.21	1%	Negligible
GYBC	R42	13.9	13.9	0.07	0%	Negligible
	R43	25.6	25.8	0.22	1%	Negligible
	R44	24.4	24.5	0.07	0%	Negligible
	R45	18.4	18.5	0.09	0%	Negligible
WDC	R46	17.2	17.3	0.09	0%	Negligible

[redacted]

Local Authority	Receptor ID	Scenario 2 (SEP and DEP Concurrent Construction)				
		2025 Annual Mean NO_2 Concentrations ($\mu g.m^{-3}$) Objective = $40\mu g.m^{-3}$				
		Without SEP and DEP	With SEP and DEP	Change	Change as % of the Objective	Impact Descriptor
	R47	13.6	13.7	0.11	0%	Negligible
	R48	11.8	11.9	0.09	0%	Negligible
	R49	14.6	14.8	0.13	0%	Negligible
	R50	28.3	28.7	0.47	1%	Negligible
	R51	27.0	27.4	0.38	1%	Negligible
	R52	12.8	12.9	0.12	0%	Negligible
	R53	11.6	11.7	0.09	0%	Negligible
	R54	16.2	16.4	0.20	1%	Negligible

Table 22.49: Annual Mean PM_{10} Results at Sensitive Human Receptor Locations for SEP and DEP Together Concurrently

Local Authority	Receptor ID	Scenario 2 (SEP and DEP Together Concurrently)				
		2025 Annual Mean PM_{10} Concentrations ($\mu g.m^{-3}$) Objective = $40\mu g.m^{-3}$				
		Without SEP and DEP	With SEP and DEP	Change	Change as % of the Objective	Impact Descriptor
KLWNBC	R1	16.4	16.5	0.15	0%	Negligible
	R2	17.0	17.3	0.24	1%	Negligible
	R3	16.0	16.2	0.13	0%	Negligible
	R4	16.2	16.3	0.07	0%	Negligible
	R5	16.3	16.4	0.08	0%	Negligible
	R6	16.7	16.8	0.07	0%	Negligible
	R7	17.1	17.2	0.10	0%	Negligible
	R8	16.2	16.3	0.09	0%	Negligible
	R9	17.5	17.6	0.06	0%	Negligible
	R10	17.4	17.5	0.17	0%	Negligible
	R11	18.8	19.0	0.18	0%	Negligible
	R12	16.6	16.8	0.12	0%	Negligible
NNDC	R13	16.2	16.2	0.07	0%	Negligible
	R14	16.4	16.4	0.06	0%	Negligible
	R15	15.2	15.2	0.04	0%	Negligible
	R16	16.1	16.1	0.03	0%	Negligible
	R17	17.4	17.5	0.08	0%	Negligible
	R18	15.5	15.6	0.06	0%	Negligible

[redacted]

Local Authority	**Receptor ID**	**Scenario 2 (SEP and DEP Together Concurrently)**				
		2025 Annual Mean PM_{10} Concentrations (µg.m^{-3}) Objective = 40µg.m^{-3}				
		Without SEP and DEP	**With SEP and DEP**	**Change**	**Change as % of the Objective**	**Impact Descriptor**
	R19	18.0	18.2	0.12	0%	Negligible
BC	R20	17.2	17.3	0.09	0%	Negligible
	R21	16.7	16.8	0.11	0%	Negligible
	R22	16.4	16.5	0.06	0%	Negligible
BDC	R23	15.7	15.7	0.02	0%	Negligible
	R24	14.6	14.6	0.03	0%	Negligible
	R25	17.9	18.0	0.08	0%	Negligible
	R26	18.8	18.9	0.08	0%	Negligible
	R27	17.2	17.3	0.09	0%	Negligible
	R28	16.7	16.8	0.07	0%	Negligible
	R29	15.0	15.1	0.03	0%	Negligible
	R30	15.3	15.4	0.04	0%	Negligible
	R31	15.7	15.8	0.05	0%	Negligible
SNC	R32	17.2	17.3	0.06	0%	Negligible
	R33	17.7	17.7	0.05	0%	Negligible
	R34	17.0	17.1	0.04	0%	Negligible
	R35	16.4	16.5	0.03	0%	Negligible
	R36	16.0	16.2	0.23	1%	Negligible
	R37	15.1	15.1	0.05	0%	Negligible
	R38	17.0	17.1	0.03	0%	Negligible
	R39	17.3	17.3	0.04	0%	Negligible
	R40	17.4	17.5	0.09	0%	Negligible
	R41	17.5	17.6	0.12	0%	Negligible
GYBC	R42	13.5	13.6	0.05	0%	Negligible
	R43	18.2	18.3	0.12	0%	Negligible
	R44	17.6	17.6	0.06	0%	Negligible
	R45	16.3	16.4	0.06	0%	Negligible
WDC	R46	17.6	17.7	0.07	0%	Negligible
	R47	14.8	14.9	0.05	0%	Negligible
	R48	14.0	14.1	0.04	0%	Negligible
	R49	15.0	15.1	0.06	0%	Negligible
	R50	15.9	16.0	0.12	0%	Negligible
	R51	15.1	15.2	0.09	0%	Negligible
	R52	15.0	15.1	0.07	0%	Negligible
	R53	14.8	14.9	0.06	0%	Negligible
	R54	17.0	17.1	0.11	0%	Negligible

Table 22.50: Short Term PM_{10} Results at Sensitive Human Receptor Locations for SEP and DEP Together Concurrently

Local Authority	**Receptor ID**	**Scenario 2 (SEP and DEP Together Concurrently)**		
		2025 Number of Days >50µg.m^{-3} (Objective being less than 35 exceedances per year)		
		Without SEP and DEP	**With SEP and DEP**	**Change**
KLWNBC	R1	0	1	0
	R2	1	1	0
	R3	0	0	0
	R4	0	0	0
	R5	0	0	0
	R6	1	1	0
	R7	1	1	0
	R8	0	0	0
	R9	1	1	0
	R10	1	1	0
	R11	2	2	0
	R12	1	1	0
NNDC	R13	0	0	0
	R14	0	0	0
	R15	0	0	0
	R16	0	0	0
	R17	1	1	0
	R18	0	0	0
	R19	1	2	0
BC	R20	1	1	0
	R21	1	1	0
	R22	0	0	0
BDC	R23	0	0	0
	R24	0	0	0
	R25	1	1	0
	R26	2	2	0
	R27	1	1	0
	R28	1	1	0
	R29	0	0	0
	R30	0	0	0
	R31	0	0	0
SNC	R32	1	1	0
	R33	1	1	0
	R34	1	1	0
	R35	0	0	0
	R36	0	0	0
	R37	0	0	0
	R38	1	1	0

Local Authority	Receptor ID	Scenario 2 (SEP and DEP Together Concurrently)		
		2025 Number of Days >50µg.m^{-3} (Objective being less than 35 exceedances per year)		
		Without SEP and DEP	With SEP and DEP	Change
	R39	1	1	0
	R40	1	1	0
	R41	1	1	0
GYBC	R42	0	0	0
	R43	2	2	0
	R44	1	1	0
	R45	0	0	0
WDC	R46	1	1	0
	R47	0	0	0
	R48	0	0	0
	R49	0	0	0
	R50	0	0	0
	R51	0	0	0
	R52	0	0	0
	R53	0	0	0
	R54	1	1	0

Table 22.51: Annual Mean $PM_{2.5}$ Results at Sensitive Human Receptor Locations for SEP and DEP Together Concurrently

Local Authority	Receptor ID	Scenario 2 (SEP and DEP Together Concurrently)				
		2025 Annual Mean $PM_{2.5}$ Concentrations (µg.m^{-3}) Objective = 25µg.m^{-3}				
		Without SEP and DEP	With SEP and DEP	Change	Change as % of the Objective	Impact Descriptor
KLWNBC	R1	10.3	10.4	0.09	0%	Negligible
	R2	10.5	10.6	0.13	1%	Negligible
	R3	9.6	9.7	0.07	0%	Negligible
	R4	9.2	9.3	0.04	0%	Negligible
	R5	9.3	9.3	0.05	0%	Negligible
	R6	9.2	9.2	0.04	0%	Negligible
	R7	9.5	9.5	0.06	0%	Negligible
	R8	9.2	9.2	0.05	0%	Negligible
	R9	10.4	10.4	0.03	0%	Negligible
	R10	10.2	10.3	0.09	0%	Negligible
	R11	10.6	10.7	0.10	0%	Negligible
	R12	9.6	9.7	0.07	0%	Negligible

Local Authority	**Receptor ID**	**Scenario 2 (SEP and DEP Together Concurrently)**				
		2025 Annual Mean $PM_{2.5}$ Concentrations (µg.m^{-3}) Objective = 25µg.m^{-3}				
		Without SEP and DEP	**With SEP and DEP**	**Change**	**Change as % of the Objective**	**Impact Descriptor**
NNDC	R13	9.0	9.0	0.04	0%	Negligible
	R14	9.0	9.0	0.03	0%	Negligible
	R15	9.0	9.0	0.03	0%	Negligible
	R16	9.0	9.0	0.02	0%	Negligible
	R17	9.5	9.6	0.04	0%	Negligible
	R18	8.9	8.9	0.03	0%	Negligible
	R19	10.3	10.3	0.07	0%	Negligible
BC	R20	9.6	9.7	0.05	0%	Negligible
	R21	9.6	9.6	0.06	0%	Negligible
	R22	9.2	9.2	0.03	0%	Negligible
BDC	R23	9.1	9.1	0.01	0%	Negligible
	R24	9.0	9.0	0.01	0%	Negligible
	R25	10.4	10.5	0.04	0%	Negligible
	R26	10.6	10.6	0.05	0%	Negligible
	R27	10.0	10.0	0.05	0%	Negligible
	R28	10.1	10.1	0.04	0%	Negligible
	R29	9.2	9.2	0.02	0%	Negligible
	R30	9.4	9.4	0.02	0%	Negligible
	R31	10.0	10.1	0.03	0%	Negligible
SNC	R32	10.1	10.1	0.03	0%	Negligible
	R33	10.3	10.4	0.03	0%	Negligible
	R34	9.9	10.0	0.02	0%	Negligible
	R35	9.7	9.7	0.01	0%	Negligible
	R36	9.2	9.3	0.13	1%	Negligible
	R37	9.0	9.0	0.03	0%	Negligible
	R38	9.6	9.6	0.02	0%	Negligible
	R39	10.1	10.1	0.02	0%	Negligible
	R40	9.7	9.7	0.05	0%	Negligible
	R41	9.9	10.0	0.07	0%	Negligible
GYBC	R42	8.6	8.6	0.03	0%	Negligible
	R43	11.8	11.9	0.06	0%	Negligible
	R44	11.3	11.3	0.03	0%	Negligible
	R45	10.2	10.2	0.03	0%	Negligible
WDC	R46	10.2	10.3	0.04	0%	Negligible
	R47	9.1	9.1	0.03	0%	Negligible
	R48	9.0	9.0	0.02	0%	Negligible

Local Authority	**Receptor ID**	**Scenario 2 (SEP and DEP Together Concurrently)**				
		2025 Annual Mean $PM_{2.5}$ Concentrations ($\mu g.m^{-3}$) Objective = 25$\mu g.m^{-3}$				
		Without SEP and DEP	**With SEP and DEP**	**Change**	**Change as % of the Objective**	**Impact Descriptor**
	R49	10.0	10.1	0.03	0%	Negligible
	R50	10.3	10.4	0.07	0%	Negligible
	R51	10.0	10.1	0.05	0%	Negligible
	R52	9.6	9.6	0.04	0%	Negligible
	R53	9.5	9.5	0.03	0%	Negligible
	R54	9.9	10.0	0.06	0%	Negligible

263. The results of the construction phase road traffic emissions assessment show that annual mean concentrations of NO_2 (see **Table 22.48**), PM_{10} (see **Table 22.49**) and $PM_{2.5}$ (see **Table 22.51**) are predicted to be well below (i.e. less than 75% of) the respective air quality Objectives in the year of peak construction (2025) under Scenario 2 (SEP and DEP concurrent construction) at all receptors, both ‘with’ and ‘without’ SEP and DEP in place.

264. The changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations were 1% or less at all receptors; this corresponded to a ‘negligible’ impact due to low total pollutant concentrations at all receptors, in accordance with IAQM and EPUK guidance (IAQM & EPUK, 2017).

265. All predicted NO_2 concentrations were well below 60$\mu g.m^{-3}$ and therefore, in accordance with Defra guidance (Defra, 2021a), the 1-hour mean Objective is unlikely to be exceeded (see **Table 22.5**). Based on the calculation provided by Defra, as detailed in **Section 22.4.3.3.5**, the short-term PM_{10} Objective was predicted to be met at all modelled locations (objective being less than 35 exceedances of the daily mean objective of 50$\mu g.m^{-3}$). As shown in **Table 22.50**, there was no change in the number of days exceeding the daily mean Objective between the ‘without’ and ‘with’ SEP and DEP concurrent construction assessments, using the Defra (2021a) calculation.

266. The assessments concluded that impacts generated by road traffic upon local air quality are **not significant** in the SEP and DEP concurrent construction scenario based upon:

- A predicted **negligible** impact at all receptor locations;
- Predicted pollutant concentrations were well below the relevant air quality Objectives/target at all considered human receptor locations; and
- SEP and DEP generated traffic was not predicted to cause a breach of any of the air quality Objectives at any identified sensitive receptor locations.

22.6.1.3.2.2 Ecological Receptors

267. Due to the number of ecological receptors screened into the assessment (see **Table 22.35**), the full assessment of the road traffic emissions impact from SEP and DEP concurrent construction on ecological receptors has been presented in **Appendix 22.5**. The in-combination assessment is also presented in **Appendix 22.5**.

268. **Table 22.52** and **Table 22.53** below presents the maximum potential contribution of the Projects alone and in-combination (see **Section 22.4.3.3.6**) (respectively) on the most sensitive feature(s) under each designation, i.e. the most stringent Critical Levels and Loads of designated features have been presented below and may not all relate to the same feature. **Table 22.52** presents the Project contribution (i.e. ‘SEP and DEP concurrent construction’) and **Table 22.53** presents the in-combination contribution (i.e. Project traffic, 2019 to 2025 traffic growth, cumulative projects). Values in exceedance of 1% of the Critical Load or Level, i.e. those which cannot be considered to be insignificant, are shaded in blue and shown in **bold text**.

269. It should be noted that the most sensitive Critical Levels and Loads for feature(s) under each designated ecological site are presented below and all features may not be present in each designated site, nor may they be located within 200m of the affected road network.

Table 22.52: SEP and DEP Concurrent Construction – Maximum Contribution of Project-generated NOx, NH_3, N-dep and Acid Deposition from Traffic on Feature(s) Under Designation Ecological Sites

Link	**Designated Ecological Site**		**'SEP and DEP Concurrent Construction' Road Traffic Contribution**										
	Site Type	**Name**	**Concentration or Flux**				**% of Critical Level or Critical Load**						
			NOx	**NH_3**	**N-dep**	**Acid dep.**	**NOx**	**NH_3**		**N-dep**		**Acid dep.**	
			$\mu g.m^{-3}$	**$\mu g.m^{-3}$**	**$kgN.ha^{-1}.yr^{-1}$**	**$kgN.ha^{-1}.yr^{-1}$**	**-**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**
4	Ancient woodland	Bullfer Grove	-	-	0.014	0.001	-	-	-	0.1%	0.1%	0.0%	0.0%
	Ancient woodland	Pereers Wood	0.126	0.003	0.049	0.003	0.4%	0.3%	0.1%	0.5%	0.2%	0.2%	0.2%
10	SSSI	Kelling Heath	0.159	0.007	0.054	0.004	0.5%	0.7%	0.2%	0.5%	0.3%	0.3%	0.1%
11	Ancient woodland	Oak Wood	0.175	0.008	0.099	0.007	0.6%	0.8%	0.3%	1.0%	0.5%	0.5%	0.5%
13	Ancient woodland	Unnamed (ID 1)	0.457	0.020	0.257	0.018	**1.5%**	**2.0%**	0.7%	**2.6%**	**1.3%**	1.0%	1.0%
	SSSI	Felbrigg Wood	0.457	0.020	0.257	0.018	**1.5%**	**2.0%**	**2.0%**	**2.6%**	**1.3%**	**1.4%**	1.0%
	Ancient woodland	Great Wood	0.329	0.007	0.106	0.007	**1.1%**	0.7%	0.2%	**1.1%**	0.5%	0.6%	0.6%
14	SSSI	Felbrigg Wood	0.394	0.017	0.222	0.016	**1.3%**	**1.7%**	0.6%	**2.2%**	**1.1%**	**1.2%**	0.8%
20	SSSI	Ant Broads and Marshes	-	-	0.007	0.000	-	-	-	0.1%	0.0%	0.1%	0.0%
21	SSSI	Trinity Broads	0.159	0.007	0.090	0.006	0.5%	0.7%	0.2%	0.9%	0.4%	**1.2%**	0.1%
	SAC	The Broads	0.159	0.007	0.054	0.004	0.5%	0.7%	0.2%	0.5%	0.3%	0.7%	0.1%
25	SSSI	Breydon Water	0.510	0.022	0.174	-	**1.7%**	**2.2%**	0.7%	0.9%	0.6%	-	-
	SPA	Breydon Water	0.510	0.022	0.174	0.012	**1.7%**	0.7%	0.7%	**2.2%**	**1.7%**	**1.1%**	0.3%

Link	Designated Ecological Site		'SEP and DEP Concurrent Construction' Road Traffic Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH_3	N-dep	Acid dep.	NOx	NH_3		N-dep		Acid dep.	
			μg.m^{-3}	μg.m^{-3}	kgN.ha^{-1}.yr^{-1}	kgN.ha^{-1}.yr^{-1}	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
	LNR	Breydon Water	0.510	0.022	-	-	**1.7%**	0.7%	0.7%	-	-	-	-
28	Ancient woodland	Foxburrow Wood	0.351	0.015	0.198	0.014	**1.2%**	**1.5%**	0.5%	**2.0%**	1.0%	0.8%	0.8%
30	Ancient woodland	Raveningham Covert	1.185	0.052	0.669	0.047	**4.0%**	**5.2%**	**1.7%**	**6.7%**	**3.3%**	**1.7%**	**1.7%**
	Ancient woodland	Blacks Grove	0.057	0.002	0.043	0.003	0.2%	0.2%	0.1%	0.4%	0.2%	0.1%	0.1%
	SSSI	Barnby Broad & Marshes	0.156	0.004	0.045	0.003	0.5%	0.4%	0.1%	0.3%	0.2%	0.6%	0.1%
	SAC	The Broads	0.156	0.004	0.045	0.003	0.5%	0.4%	0.4%	0.5%	0.3%	0.6%	0.6%
	SPA	Broadland	0.156	-	0.045	0.003	0.5%	-	-	0.5%	0.2%	0.6%	0.1%
31	LNR	Whitlingham	0.246	0.006	-	-	0.8%	0.2%	0.2%	-	-	-	-
	LNR	Whitlingham	1.117	0.049	-	-	**3.7%**	**1.6%**	**1.6%**	-	-	-	-
	LNR	Whitlingham Marsh, Whitlingham	1.117	0.049	-	-	**3.7%**	**1.6%**	**1.6%**	-	-	-	-
34	SSSI	Damgate Marshes, Acle	0.859	0.037	-	-	**2.9%**	**1.2%**	**1.2%**	-	-	-	-
	SAC	The Broads	0.859	0.037	0.292	0.020	**2.9%**	**3.7%**	**3.7%**	**2.9%**	**1.9%**	**4.1%**	**3.9%**
	SSSI	Breydon Water	0.151	0.004	0.040	-	0.5%	0.1%	0.1%	0.2%	0.1%	-	-
	SPA	Breydon Water	0.151	0.004	0.040	0.003	0.5%	0.1%	0.1%	0.2%	0.1%	0.3%	0.1%

Link	Designated Ecological Site		'SEP and DEP Concurrent Construction' Road Traffic Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH_3	N-dep	Acid dep.	NOx	NH_3		N-dep		Acid dep.	
			$\mu g.m^{-3}$	$\mu g.m^{-3}$	$kgN.ha^{-1}.yr^{-1}$	$kgN.ha^{-1}.yr^{-1}$	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
	LNR	Breydon Water	0.151	0.004	-	-	0.5%	0.1%	0.1%	-	-	-	-
35	Ancient woodland	Unnamed (ID 2)	0.064	-	0.037	0.003	0.2%	-	-	0.7%	0.2%	0.1%	0.1%
40	Ancient woodland	Unnamed (ID 3)	0.311	0.007	0.121	0.008	**1.0%**	0.7%	0.2%	**1.2%**	0.6%	0.5%	0.5%
	Ancient woodland	Sprowston Wood	0.098	0.003	0.051	0.004	0.3%	0.3%	0.1%	**1.0%**	0.3%	0.2%	0.2%
43	Ancient woodland	Unnamed (ID 4)	-	-	0.021	0.001	-	-	-	0.2%	0.1%	0.1%	0.1%
49	SSSI	Buxton Heath	0.098	-	-	0.002	0.3%	-	-	-	-	0.3%	0.2%
	SAC	Norfolk Valley Fens	0.098	-	0.028	0.002	0.3%	-	-	0.6%	0.3%	0.3%	0.0%
	Ancient woodland	Great Wood	-	-	0.027	0.002	-	-	-	0.5%	0.2%	0.1%	0.1%
51	SSSI	Cawston and Marsham Heaths	0.071	0.002	0.022	0.002	0.2%	0.2%	0.1%	0.2%	0.1%	0.1%	0.1%
59	SSSI	Holt Lowes	0.363	0.016	0.124	0.009	**1.2%**	**1.6%**	**1.6%**	**1.2%**	0.6%	**1.6%**	**1.6%**
	SAC	Norfolk Valley Fens	0.363	0.016	0.124	0.009	**1.2%**	**1.6%**	**1.6%**	**2.5%**	**1.2%**	**1.4%**	0.2%
79	SSSI	River Wensum	0.767	0.033	0.261	0.018	**2.6%**	**3.3%**	**1.1%**	**1.7%**	0.9%	-	-
	SAC	River Wensum	0.767	0.033	-	0.018	**2.6%**	**1.1%**	**1.1%**	-	-	-	-
80	SSSI	River Wensum	0.313	0.014	0.106	0.007	**1.0%**	**1.4%**	0.5%	0.7%	0.4%	-	-

Link	Designated Ecological Site		'SEP and DEP Concurrent Construction' Road Traffic Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH_3	N-dep	Acid dep.	NOx	NH_3		N-dep		Acid dep.	
			µg.m^{-3}	µg.m^{-3}	kgN.ha^{-1}.yr^{-1}	kgN.ha^{-1}.yr^{-1}	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
	SAC	River Wensum	0.313	0.014	-	0.007	**1.0%**	0.5%	0.5%	-	-	-	-
	SSSI	River Wensum	0.024	-	-	-	0.1%	-	-	-	-	-	-
	SAC	River Wensum	0.024	-	-	-	0.1%	-	-	-	-	-	-
85	Ancient woodland	Mouse Wood	0.297	0.013	0.167	0.012	1.0%	**1.3%**	0.4%	**3.3%**	**1.1%**	0.1%	0.1%
86	SSSI	Holly Farm Meadow, Wendling	0.583	0.013	0.115	0.008	**1.9%**	**1.3%**	0.4%	0.8%	0.4%	**1.1%**	0.2%
	SSSI	Potter & Scarning Fens, East Dereham	1.006	0.044	0.342	0.024	**3.4%**	**4.4%**	**1.5%**	**2.3%**	**1.1%**	0.5%	0.5%
	SAC	Norfolk Valley Fens	1.006	0.044	0.342	0.024	**3.4%**	**4.4%**	**4.4%**	**6.8%**	**3.4%**	**3.9%**	0.5%
87	SSSI	East Winch Common	0.881	0.038	0.300	0.021	**2.9%**	**3.8%**	**3.8%**	**3.0%**	**1.5%**	**2.2%**	0.5%
88	Ancient woodland	Reffley Wood	0.472	0.010	0.152	0.011	**1.6%**	**1.0%**	0.3%	**3.0%**	**1.0%**	0.1%	0.1%
114	Ancient woodland	Unnamed (ID 6)	0.551	0.024	0.311	0.022	**1.8%**	**2.4%**	0.8%	**3.1%**	**1.6%**	0.8%	0.8%
	Ancient woodland	Smeeth Wood	0.097	0.002	0.044	0.003	0.3%	0.2%	0.1%	0.4%	0.2%	0.1%	0.1%
125	LNR	Danby Wood	0.074	-	-	-	0.2%	-	-	-	-	-	-

Link	**Designated Ecological Site**		**'SEP and DEP Concurrent Construction' Road Traffic Contribution**										
	Site Type	**Name**	**Concentration or Flux**				**% of Critical Level or Critical Load**						
			NOx	**NH$_3$**	**N-dep**	**Acid dep.**	**NOx**	**NH$_3$**		**N-dep**		**Acid dep.**	
			$\mu g.m^{-3}$	**$\mu g.m^{-3}$**	**kgN.ha^{-1}.yr^{-1}**	**kgN.ha^{-1}.yr^{-1}**	**-**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**
	LNR	Marston Marshes	0.032	-	-	-	0.1%	-	-	-	-	-	-
133	SSSI	River Wensum	0.043	0.002	-	0.001	0.1%	0.2%	0.1%	-	-	-	-
	SAC	River Wensum	0.043	0.002	-	0.001	0.1%	0.1%	0.1%	-	-	-	-
136	SSSI	Alderford Common	0.043	-	-	0.001	0.1%	-	-	-	-	0.1%	0.1%
138	SSSI	Alderford Common	0.253	-	-	0.006	0.8%	-	-	-	-	0.8%	0.8%

Table 22.53: SEP and DEP Concurrent Construction – Maximum Contribution of Incombination NOx, NH$_3$, N-dep and Acid Deposition on Feature(s) Under Designation Ecological Sites

Link	**Designated Ecological Site**		**'SEP and DEP Concurrent Construction' In-combination Contribution**										
	Site Type	**Name**	**Concentration or Flux**				**% of Critical Level or Critical Load**						
			NOx	**NH$_3$**	**N-dep**	**Acid dep.**	**NOx**	**NH$_3$**		**N-dep**		**Acid dep.**	
			$\mu g.m^{-3}$	**$\mu g.m^{-3}$**	**kgN.ha^{-1}.yr^{-1}**	**kgN.ha^{-1}.yr^{-1}**	**-**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**
4	Ancient woodland	Bullfer Grove	-	-	0.169	0.012	-	-	-	**1.7%**	0.8%	0.1%	0.1%
	Ancient woodland	Pereers Wood	1.545	0.037	0.599	0.042	**5.1%**	**3.7%**	**1.2%**	**6.0%**	**3.0%**	**2.3%**	**2.3%**
10	SSSI	Kelling Heath	0.822	0.036	0.279	0.020	**2.7%**	**3.6%**	**1.2%**	**2.8%**	**1.4%**	**1.4%**	0.4%

Link	Designated Ecological Site		'SEP and DEP Concurrent Construction' In-combination Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH_3	N-dep	Acid dep.	NOx	NH_3		N-dep		Acid dep.	
			$\mu g.m^{-3}$	$\mu g.m^{-3}$	$kgN.ha^{-1}.yr^{-1}$	$kgN.ha^{-1}.yr^{-1}$	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
11	Ancient woodland	Oak Wood	1.967	0.086	1.109	0.078	**6.6%**	**8.6%**	**2.9%**	**11.1%**	**5.5%**	**6.1%**	**6.1%**
13	Ancient woodland	Unnamed (ID 1)	6.670	0.291	3.762	0.263	**22.2%**	**29.1%**	**9.7%**	**37.6%**	**18.8%**	**14.5%**	**14.5%**
	SSSI	Felbrigg Wood	6.670	0.291	3.762	0.263	**22.2%**	**29.1%**	**29.1%**	**37.6%**	**18.8%**	**20.3%**	**14.3%**
	Ancient woodland	Great Wood	4.803	0.104	1.547	0.108	**16.0%**	**10.4%**	**3.5%**	**15.5%**	**7.7%**	**8.4%**	**8.4%**
14	SSSI	Felbrigg Wood	4.765	0.208	2.687	0.188	**15.9%**	**20.8%**	**6.9%**	**26.9%**	**13.4%**	**14.5%**	**10.2%**
20	SSSI	Ant Broads and Marshes	-	-	0.151	0.011	-	-	-	**1.5%**	0.8%	**2.0%**	0.6%
21	SSSI	Trinity Broads	3.919	0.171	2.210	0.155	**13.1%**	**17.1%**	**5.7%**	**22.1%**	**11.1%**	**29.8%**	**3.5%**
	SAC	The Broads	3.919	0.171	1.333	0.093	**13.1%**	**17.1%**	**17.1%**	**13.3%**	**8.9%**	**18.8%**	**17.7%**
25	SSSI	Breydon Water	11.779	0.514	4.005	-	**39.3%**	**51.4%**	**17.1%**	**20.0%**	**13.3%**	-	-
	SPA	Breydon Water	11.779	0.514	4.005	0.280	**39.3%**	**17.1%**	**17.1%**	**50.1%**	**40.0%**	**25.4%**	**6.1%**
	LNR	Breydon Water	11.779	0.514	-	-	**39.3%**	**17.1%**	**17.1%**	-	-	-	-
28	Ancient woodland	Foxburrow Wood	4.709	0.205	2.656	0.186	**15.7%**	**20.5%**	**6.8%**	**26.6%**	**13.3%**	**10.1%**	**10.1%**
30	Ancient woodland	Raveningham Covert	7.349	0.320	4.145	0.290	**24.5%**	**32.0%**	**10.7%**	**41.4%**	**20.7%**	**10.7%**	**10.7%**
	Ancient woodland	Blacks Grove	0.353	0.013	0.265	0.019	**1.2%**	**1.3%**	0.4%	**2.6%**	**1.3%**	0.7%	0.7%
	SSSI	Barnby Broad & Marshes	0.970	0.026	0.279	0.020	**3.2%**	**2.6%**	0.9%	**1.9%**	0.9%	**3.5%**	0.4%
	SAC	The Broads	0.970	0.026	0.279	0.020	**3.2%**	**2.6%**	**2.6%**	**2.8%**	**1.9%**	**3.9%**	**3.7%**

Link	Designated Ecological Site		'SEP and DEP Concurrent Construction' In-combination Contribution										
	Site Type	Name	Concentration or Flux				% of Critical Level or Critical Load						
			NOx	NH_3	N-dep	Acid dep.	NOx	NH_3		N-dep		Acid dep.	
			µg.m^{-3}	µg.m^{-3}	kgN.ha^{-1}.yr^{-1}	kgN.ha^{-1}.yr^{-1}	-	% of lower CL	% of upper CL	% of lower CL	% of upper CL	% of lower CL	% of upper CL
	SPA	Broadland	0.970	-	0.279	0.020	**3.2%**	-	-	**2.8%**	**1.4%**	**3.6%**	0.4%
31	LNR	Whitlingham	3.683	0.094	-	-	**12.3%**	**3.1%**	**3.1%**	-	-	-	-
	LNR	Whitlingham	16.742	0.730	-	-	**55.8%**	**24.3%**	**24.3%**	-	-	-	-
	LNR	Whitlingham Marsh, Whitlingham	16.742	0.730	-	-	**55.8%**	**24.3%**	**24.3%**	-	-	-	-
34	SSSI	Damgate Marshes, Acle*	8.413	0.369*	-	-	**28.0%**	**12.3%**	**12.3%**	-	-	-	-
	SAC	The Broads*	8.413	0.369*	2.872*	0.201	**28.0%**	**36.9%**	**36.9%**	**28.7%**	**19.1%**	**40.4%**	**38.1%**
	SSSI	Breydon Water	1.481	0.038	0.395	-	**4.9%**	**1.3%**	**1.3%**	**2.0%**	**1.3%**	-	-
	SPA	Breydon Water	1.481	0.038	0.395	0.028	**4.9%**	**1.3%**	**1.3%**	**2.0%**	**1.3%**	**2.5%**	0.6%
	LNR	Breydon Water	1.481	0.038	-	-	**4.9%**	**1.3%**	**1.3%**	-	-	-	-
35	Ancient woodland	Unnamed (ID 2)	0.745	0.022	0.431	0.030	**2.5%**	**2.2%**	0.7%	**8.6%**	**2.9%**	**1.7%**	**1.7%**
40	Ancient woodland	Unnamed (ID 3)	3.257	0.077	1.263	0.088	**10.9%**	**7.7%**	**2.6%**	**12.6%**	**6.3%**	**5.1%**	**5.1%**
	Ancient woodland	Sprowston Wood	1.026	0.028	0.533	0.037	**3.4%**	**2.8%**	0.9%	**10.7%**	**3.6%**	**2.2%**	**2.2%**
43	Ancient woodland	Unnamed (ID 4)	-	-	0.198	0.014	-	-	-	**2.0%**	1.0%	**1.3%**	**1.3%**
49	SSSI	Buxton Heath	0.579	-	-	0.012	**1.9%**	-	-	-	-	**1.9%**	**1.0%**
	SAC	Norfolk Valley Fens	0.579	-	0.167	0.012	**1.9%**	-	-	**3.3%**	**1.7%**	**1.9%**	0.3%
	Ancient woodland	Great Wood	-	-	0.158	0.011	-	-	-	**3.2%**	**1.1%**	0.9%	0.9%

Link	**Designated Ecological Site**		**'SEP and DEP Concurrent Construction' In-combination Contribution**										
	Site Type	**Name**	**Concentration or Flux**				**% of Critical Level or Critical Load**						
			NOx	**NH$_3$**	**N-dep**	**Acid dep.**	**NOx**	**NH$_3$**		**N-dep**		**Acid dep.**	
			µg.m^{-3}	**µg.m^{-3}**	**kgN.ha^{-1}.yr^{-1}**	**kgN.ha^{-1}.yr^{-1}**	**-**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**
51	SSSI	Cawston and Marsham Heaths	0.488	0.013	0.149	0.010	**1.6%**	**1.3%**	0.4%	**1.5%**	0.7%	0.8%	0.6%
59	SSSI	Holt Lowes	3.003	0.131	1.021	0.071	**10.0%**	**13.1%**	**13.1%**	**10.2%**	**5.1%**	**13.2%**	**13.0%**
	SAC	Norfolk Valley Fens	3.003	0.131	1.021	0.071	**10.0%**	**13.1%**	**13.1%**	**20.4%**	**10.2%**	**11.8%**	**1.6%**
79	SSSI	River Wensum	5.809	0.253	1.975	0.138	**19.4%**	**25.3%**	**8.4%**	**13.2%**	**6.6%**	-	-
	SAC	River Wensum	5.809	0.253	-	0.138	**19.4%**	**8.4%**	**8.4%**	-	-	-	-
80	SSSI	River Wensum	4.188	0.183	1.424	0.100	**14.0%**	**18.3%**	**6.1%**	**9.5%**	**4.7%**	-	-
	SAC	River Wensum	4.188	0.183	-	0.100	**14.0%**	**6.1%**	**6.1%**	-	-	-	-
	SSSI	River Wensum	0.318	-	-	-	**1.1%**	-	-	-	-	-	-
	SAC	River Wensum	0.318	-	-	-	**1.1%**	-	-	-	-	-	-
85	Ancient woodland	Mouse Wood	0.835	0.036	0.471	0.033	**2.8%**	**3.6%**	**1.2%**	**9.4%**	**3.1%**	0.3%	0.3%
86	SSSI	Holly Farm Meadow, Wendling	3.540	0.078	0.696	0.049	**11.8%**	**7.8%**	**2.6%**	**4.6%**	**2.3%**	**7.0%**	**1.1%**
	SSSI	Potter & Scarning Fens, East Dereham	6.104	0.266	2.075	0.145	**20.3%**	**26.6%**	**8.9%**	**13.8%**	**6.9%**	**3.3%**	**3.3%**
	SAC	Norfolk Valley Fens	6.104	0.266	2.075	0.145	**20.3%**	**26.6%**	**26.6%**	**41.5%**	**20.8%**	**24.0%**	**3.3%**
87	SSSI	East Winch Common	4.669	0.204	1.588	0.111	**15.6%**	**20.4%**	**20.4%**	**15.9%**	**7.9%**	**11.8%**	**2.4%**
88	Ancient woodland	Reffley Wood	5.363	0.116	1.728	0.121	**17.9%**	**11.6%**	**3.9%**	**34.6%**	**11.5%**	**1.4%**	**1.4%**
114	Ancient woodland	Unnamed (ID 6)	14.152	0.617	7.982	0.559	**47.2%**	**61.7%**	**20.6%**	**79.8%**	**39.9%**	**20.4%**	**20.4%**

Link	**Designated Ecological Site**		**'SEP and DEP Concurrent Construction' In-combination Contribution**										
	Site Type	**Name**	**Concentration or Flux**				**% of Critical Level or Critical Load**						
			NOx	**NH_3**	**N-dep**	**Acid dep.**	**NOx**	**NH_3**		**N-dep**		**Acid dep.**	
			$\mu g.m^{-3}$	**$\mu g.m^{-3}$**	**$kgN.ha^{-1}.yr^{-1}$**	**$kgN.ha^{-1}.yr^{-1}$**	**-**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**	**% of lower CL**	**% of upper CL**
	Ancient woodland	Smeeth Wood	2.491	0.064	1.132	0.079	**8.3%**	**6.4%**	**2.1%**	**11.3%**	**5.7%**	**2.9%**	**2.9%**
125	LNR	Danby Wood	1.369	-	-	-	**4.6%**	-	-	-	-	-	-
	LNR	Marston Marshes	0.591	-	-	-	**2.0%**	-	-	-	-	-	-
133	SSSI	River Wensum	0.331	0.014	-	0.008	**1.1%**	**1.4%**	0.5%	-	-	-	-
	SAC	River Wensum	0.331	0.014	-	0.008	**1.1%**	0.5%	0.5%	-	-	-	-
136	SSSI	Alderford Common	0.331	-	-	0.008	**1.1%**	-	-	-	-	**1.1%**	**1.1%**
138	SSSI	Alderford Common	0.329	-	-	0.008	**1.1%**	-	-	-	-	**1.1%**	**1.1%**
*In-combination of agricultural contribution from BDC Application Number 20201399 (AS Modelling & Data Ltd., 2020)													

270. Similarly to Scenario 1, **Table 22.53** shows that there are several sites which are predicted to experience in-combination impacts significantly in excess of 1% of the Critical Load or Level. However, as shown in **Table 22.52**, only a small percentage of impacts at almost all sites is due to the contribution from SEP and DEP together concurrently. Furthermore, as previously discussed, impacts from SEP and DEP would be experienced only during construction. The impact of other in-combination plans and projects (with the exception of other offshore wind farms within the study area for which the same applies), for example traffic generated as a result of residential and employment developments associated with regional Local Plan allocations would be experienced over a significantly longer duration. Any sites where the NOx, NH_3, N-dep and/or Acid deposition were above 1% of the relevant Critical Level or Load, and therefore cannot be considered to be insignificant, are discussed further in **Chapter 20 Onshore Ecology and Ornithology**.

22.6.2 Potential Impacts During Operation

271. Operational phase impacts were scoped out of the assessment, as agreed by the Planning Inspectorate (Planning Inspectorate, 2019; also see **Table 22.1**) and therefore have not been considered within this assessment.

22.6.3 Potential Impacts During Decommissioning

272. No decision has been made regarding the final decommissioning policy for SEP and/or DEP, as it is recognised that industry best practice, rules and legislation change over time. It is likely the cables would be pulled through the ducts and recycled, with the transition pits and ducts capped and sealed then left in situ.

273. A full EIA will be carried out ahead of any decommissioning works being undertaken at the onshore substation. The programme for onshore decommissioning is expected to be similar in duration to the construction phase of 22 to 30 months. The detailed activities and methodology for decommissioning would be determined later within lifetime of SEP and/or DEP, in line with relevant policies at that time, but would be expected to include:

- Dismantling and removal of electrical equipment;
- Removal of cabling from site;
- Removal of any building services equipment;
- Demolition of the buildings and removal of fences; and
- Landscaping and reinstatement of the sites.

274. Whilst details regarding the decommissioning of the onshore substation are currently unknown, considering the worst-case assumptions for all scenarios which would be the removal and reinstatement of the current land use at the site, it is anticipated that the impacts would be similar to those during construction and therefore no significant impact.

275. The decommissioning methodology cannot be finalised until immediately prior to decommissioning but would be in line with relevant policy at that time.

22.7 Cumulative Impacts

22.7.1 Identification of Potential Cumulative Impacts

276. The CIA was undertaken in two stages. The first stage is the identification of which residual impacts assessed for SEP and/or DEP on their own have the potential for a cumulative impact with other plans, projects and activities (described as ‘impact screening’). This information is set out in **Table 22.54** below. Only potential impacts assessed in **Section 22.6** as negligible or above are included in the CIA (i.e. those assessed as ‘no impact’ are not taken forward as there is no potential for them to contribute to a cumulative impact).

Table 22.54: Potential Cumulative Impacts (Impact Screening)

Impact	Potential for Cumulative Impact	Rationale
Construction		
Construction Impact 1: Construction dust and fine particulate matter	Yes	There is potential for cumulative construction dust impacts where projects occur within 700m of each other, as dust impacts are considered within a 350m buffer from each project, as detailed in **Section 22.4.3.1**. Therefore, two projects would need to be within 700m of each other for cumulative dust impacts to occur.
Construction Impact 2: NRMM Emissions	Yes	There is potential for cumulative NRMM emission impacts where projects overlap.
Construction Impact 3: Construction phase road traffic emissions	Yes	Where construction phase of SEP and/or DEP overlaps with other projects, there is the potential for cumulative impacts associated with Project-generated traffic emissions on the local road network.
Operation		
Operation impacts were scoped out of the assessment, as detailed in **Section 22.3.2.3**, therefore there would be no cumulative operational impacts.		
Decommissioning		
The detail and scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan would be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

277. In-combination increases in nutrient nitrogen and acid deposition and NOx and NH_3 concentrations may also cumulatively affect designated ecological sites (see **Section 22.4.3.3.6** for further details). Due to the requirement to apply the 1% threshold to in-combination impacts (see **Section 22.4.3.3.6.1**), the ecological assessment was inherently cumulative. As such, any projects which are within the relevant distances which meet the criteria of the included SSSI IRZs (see **Table 22.17**) for ecological sites were brought forward into the ecological assessment of road traffic emissions during construction of SEP and/or DEP (see **Table 22.35**) and are therefore included in the in-combination assessment presented in **Section 22.6.1.3** and **Appendix 22.5**. Additional contributions of nutrient nitrogen from these in-combination sources (from both NO_2 and NH_3) and airborne NOx have been included in the 'in-combination' assessment, where there was sufficient information included within the application to quantify these emissions.

22.7.2 Other Plans, Projects and Activities

278. The second stage in the cumulative assessment is the identification of the other plans, projects and activities that may result in cumulative impacts for inclusion in the CIA (described as 'project screening'). This information is set out in **Table 22.55** below, together with a consideration of the relevant details of each, including current status (e.g., under construction), planned construction period, closest distance to SEP and/or DEP, status of available data and rationale for including or excluding from the assessment.

279. The project screening has been informed by the development of a CIA Project List which forms an exhaustive list of plans, projects and activities in a very large study area relevant to SEP and/or DEP. The list has been appraised, based on the confidence in being able to undertake an assessment from the information and data available, enabling individual plans, projects and activities to be screened in or out.

280. Six projects have been identified for inclusion on the shortlist of projects to be assessed cumulatively for air quality, these are summarised in **Table 22.55**. The remaining projects on the CIA Project List have not been considered as resulting in likely cumulative significant effects for air quality, as they are either outside the zone of influence, have no temporal or spatial overlap or there is no potential effect pathway. The remainder of this section details the nature of the cumulative impacts against all those receptors scoped in for cumulative assessment.

281. Furthermore, sub-regional growth in housing and employment, as adopted by the region's Local Plans, has been captured within future year traffic growth factors applied (further detail is provided in **Chapter 24 Traffic and Transport**) and used within the air quality assessment. The cumulative effect of housing and employment projects is therefore inherent in the air quality assessment, and these projects have not been included in **Table 22.55**.

Table 22.55: Summary of Projects Considered for the CIA in Relation to Air Quality (Project Screening)

Project	Status	Construction Period	Closest Distance from the Project (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
The Planning Inspectorate						
Norfolk Vanguard (NV) Offshore Wind Farm	DCO consented	Expected construction 2023 to 2025	0km – onshore cable intersects SEP and DEP	High	Y	There is potential for the construction phases of the proposed project and SEP and/or DEP to overlap and traffic movements for both projects could use the same road links. These projects have therefore been considered in the air quality CIA.
Hornsea Project Three (HP3) Offshore Wind Farm	DCO consented	2023-2025 (single phase) 2023-2031 (two phase)	0km – onshore cable intersects SEP and DEP 0.75km – between project onshore substations	High	Y	
Norfolk Boreas (NB) Offshore Wind Farm	DCO consented	Expected construction 2024 to 2027 (if Norfolk Vanguard lay ducts as part of project)	0km – onshore cable intersects SEP and DEP	High	Y	
A47 North Tuddenham to Easton road investment strategy (RIS)	Awaiting decision (Examination closed)	Expected to be completed by 2025 (see **Chapter 24 Traffic and Transport** for further details on this scheme)	0km – RIS intersects SEP and DEP	N/A	Y	As detailed in **Chapter 24 Traffic and Transport**, it has been agreed with NCC and National Highways that potential cumulative impacts between the construction phases of the RIS scheme could be managed through the respective Construction Traffic Management Plan (CTMP) rather than in the DCO application. Therefore, this RIS scheme has been screened out of the CIA for traffic emissions.

Project	Status	Construction Period	Closest Distance from the Project (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
						This scheme has been considered in the CIA for cumulative construction dust and NRMM emissions as the projects intersect and there may be a short construction phase overlap during 2025.
A47 Blofield to North Burlingham RIS	Awaiting decision (Examination closed)	Expected to be completed by 2025 (see **Chapter 24 Traffic and Transport** for further details on this scheme)	14.3km (onshore substation)	N/A	N	As detailed in **Chapter 24 Traffic and Transport**, it has been agreed with NCC and National Highways that potential cumulative impacts between the construction phases of the RISs could be managed through the respective CTMP rather than in the DCO application. Therefore, these RIS schemes have been screened out of the CIA for traffic emission. As the proposed RIS schemes are greater than 700m from SEP and/or DEP, there would be no potential for cumulative dust impacts. It is also considered that the projects are not in close enough proximity for cumulative NRMM emissions to occur. Therefore, these RIS schemes have been screened out of the CIA.
A47/A11 Thickthorn junction improvement RIS	Awaiting decision (Examination closed)	Expected to be completed by 2025 (see **Chapter 24 Traffic and Transport** for further details on this scheme)	0.73km (onshore cable corridor)	N/A	N	
East Anglia Green Energy Enablement (GREEN) Project	Pre-examination (submission expected Q4 2024)	2027 – 2031	The alignment and location of the proposed works would likely cross the route of the onshore cable corridor	Moderate	N	This Project has been screened out as insufficient details are available on the proposal to undertake a meaningful cumulative impact assessment.
NCC						

Project	Status	Construction Period	Closest Distance from the Project (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
A47 Great Yarmouth (junction improvements)	Pre-application	Anticipated operational from 2025	30.2km (onshore substation)	N/A	N	As detailed in **Chapter 24 Traffic and Transport**, it has been agreed with NCC and National Highways that potential cumulative impacts between the construction phases of the highway schemes could be managed through the respective CTMP rather than in the DCO application. Therefore, these schemes have been screened out of the CIA for traffic emission. The A47 Great Yarmouth project is greater than 700m from SEP and/or DEP, therefore there would be no potential for cumulative dust impacts. It is also not in close enough proximity for cumulative NRMM emission impacts. Therefore, this project has been scoped out of the CIA. There is potential for the construction phases of the proposed Norwich Western Link and SEP and/or DEP to overlap. The project has therefore been considered in the air quality CIA for construction dust and NRMM emissions.
Norwich Western Link (highway improvement scheme)	Pre-application	Anticipated operational from Q3 2025	0km – preferred route intersects SEP and DEP	N/A	Y	

Project	Status	Construction Period	Closest Distance from the Project (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
C/5/2017/5007 Change of use from B8 Warehouse: to a Sui Generis use for waste processing and the production of refuse derived fuel	Permitted	N/A	1.85km (onshore cable corridor)	N/A	N	The air quality assessment undertaken for this proposed project only included construction dust and this project is >700m from the SEP and/or DEP boundary, therefore there would be no potential for cumulative dust impacts.
BDC						
Application Reference: 20201399 – construction of a free range poultry unit (1 No.)	Full planning	Commence before November 2023	17.1km (onshore substation)	High	Y	Following a search of LPA planning portals to determine if there were any projects of relevance (as per **Table 22.17**) for the ecological road traffic emissions in-combination assessment, this project was determined to fit the criteria and had sufficient information submitted in the application to include impacts in-combination. Therefore, this project was considered in the in-combination assessment for road traffic emission impacts on ecological receptors and thus the CIA.
20181024 Nationally Significant Infrastructure Proposal - underground cable corridor associated with	Registered	N/A	200m (onshore cable corridor)	N/A	N	There is insufficient information within the public domain to enable an air quality CIA to be carried out. This proposed project was not taken forward in the air quality CIA.

Project	Status	Construction Period	Closest Distance from the Project (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
offshore wind farm.						
Application Reference 20211249 – Ground mounted solar farm	Full planning	Commence before February 2025	~0m (onshore cable corridor)	N/A	N	Air quality was not assessed as part of the planning application for the proposed project, presumably as no significant environmental effects were considered likely to arise. Therefore, given the nature of the proposed project (i.e. construction would generate very little dust and requires very little maintenance once constructed), it is unlikely there would be potential for significant cumulative impacts.
Application Reference 20200036 – Erection of 5 new dwellings	Full planning	Commence before December 2023	520m (onshore cable corridor)	N/A	N	Given the small size of the proposed development, it is unlikely there would be potential for cumulative impacts or that the construction timeframes would overlap.
SNC						
Application Reference: 2021/1293 – Seven dwellings	Reserved Matters approval	Commence before January 2025	130m (onshore cable corridor)	N/A	N	Air quality was not assessed as part of the planning application for the proposed project, presumably as no significant environmental effects were considered likely to arise. Therefore, given the nature of the proposed project (i.e. construction would generate very little dust), it is unlikely there would be potential for cumulative impacts.

Project	Status	Construction Period	Closest Distance from the Project (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
Application Reference: 2021/0370 – Tennis court and outdoor swimming pol	Approval with conditions	Commence before April 2024	550m (onshore substation)	N/A	N	Air quality was not assessed as part of the planning application for the proposed project, presumably as no significant environmental effects were considered likely to arise. Therefore, given the nature of the proposed project (i.e. construction would generate very little dust), it is unlikely there would be potential for cumulative impacts or that the construction timeframes would overlap.
Application Reference: 2021/1255 – Agricultural building	Approval with conditions	Commence before August 2024	230m (onshore cable corridor)	N/A	N	Given the small size of the proposed development, it is unlikely there would be potential for cumulative impacts or that the construction timeframes would overlap.

282. In summary, the following projects will be assessed for potential direct cumulative impacts:

- NV Offshore Wind Farm (dust, NRMM and road traffic emissions);
- HP3 Offshore Wind Farm (dust, NRMM and road traffic emissions);
- NB Offshore Wind Farm (dust, NRMM and road traffic emissions);
- A47 North Tuddenham to Easton RIS (dust and NRMM);
- Norwich Western Link (dust and NRMM); and
- BDC Planning Application 20201399 (proposed poultry unit) (impacts on some ecological receptors).

22.7.3 Assessment of Cumulative Impacts

283. Having established the residual impacts from SEP and/or DEP with the potential for a cumulative impact, along with the other relevant plans, projects and activities, the following sections provide an assessment of the level of impact that may arise.

22.7.3.1 Cumulative Impact 1: Construction Phase Dust and Particulate Matter

284. There is the potential for cumulative dust impacts associated with the following projects and SEP and/or DEP as they intersect the onshore Project boundary and therefore are located within 700m of each other:

- NV Offshore Wind Farm;
- NB Offshore Wind Farm;
- HP3 Offshore Wind Farm;
- A47 North Tuddenham to Easton RIS; and
- Norwich Western Link.

285. The HP3 onshore substation is located approximately 750m from the proposed SEP and/or DEP onshore substation, therefore it is not anticipated any cumulative construction dust impacts would occur during the construction of the onshore substations. The SEP and/or DEP Project boundary crosses the cable corridors for NV, NB and HP3, and the A47 North Tuddenham to Easton RIS project boundary. All of these proposed projects have undertaken construction dust assessments which include a suite of best practice mitigation methods to minimise emissions of dust and fine particulate matter during construction, which would be implemented across the onshore project area.

286. It is anticipated that a construction dust assessment would be undertaken and/or best practice mitigation methods will be recommended for the Norwich Western Link project (as the Environmental Impact Report for this project currently only presents the air quality impact appraisal of traffic opening and design year (WSP, 2021)).

287. IAQM guidance (IAQM, 2016) states that, with the implementation of the recommended mitigation, impacts would be not significant. It is therefore not anticipated that there would be significant cumulative impacts associated with construction phase dust emissions from these other projects combined with SEP and/or DEP.

22.7.3.2 Cumulative Impact 2: Construction Phase NRMM

288. Due to the potential for overlapping construction programmes and intersecting onshore cable corridors of NV, NB and HP3 and also overlap with the development boundaries of the A47 North Tuddenham to Easton RIS and Norwich Western Link, there is the potential (albeit unlikely) for NRMM associated with SEP and/or DEP to be located and operating at the same time, and in the same area as NRMM associated with the aforementioned projects.

289. However, pollutant concentrations at all receptors considered in this assessment were well below the relevant Objectives. It is anticipated that each project will employ mitigation measures to control and manage NRMM emissions and it is highly unlikely NRMM would be present in the same area at the same time for any extended period of time due to the sequential nature of SEP and/or DEP and the other aforementioned projects. Therefore, it is unlikely that there would be a significant cumulative impact associated with construction phase NRMM. Inter-project engagement will seek to avoid temporal overlap.

22.7.3.3 Cumulative Impact 3: Construction Phase Road Traffic Emissions

290. As previously stated in **Section 22.4.3.3.3** and **Section 22.7.2**, traffic associated with future residential and employment developments in the study area was included in the predicted future traffic growth, which were incorporated into the future baseline traffic flows used in the air quality assessment. A cumulative assessment has therefore inherently been carried out for these developments.

291. The construction of SEP and/or DEP and the three offshore wind farm projects (NV, HP3, NB) screened into the CIA for road traffic emissions could overlap and also could use some of the same road links as in this assessment. As detailed in **Chapter 24 Traffic and Transport**, it has been considered as a reasonable worst-case for 2025 if NV were to lay the ducts for NB (i.e. there would be greater construction traffic than if NV were to lay ducts just for NV alone). Daily peak AADT and HGV flows for NV and HP3 have been sourced from the respective Outline Construction Traffic Management Plans and included in the traffic data used in this assessment (see **Appendix 22.2** and **Section 22.6.1.3**). A cumulative assessment has therefore already been carried out for these offshore wind farm developments.

292. As air quality impacts at human receptors were well below the relevant Objectives (see **Section 22.6.1.3**), therefore no significant cumulative impacts are anticipated.

293. As detailed in **Section 22.4.3.3.6**, as part of the road traffic emissions ecological assessment, in-combination impacts have been considered in the impact assessment, and therefore the assessment is inherently cumulative (**Section 22.6.1.3**). This includes background traffic growth (from 2019 to 2025, which represents regional growth due to residential and employment developments) in addition to any consented agricultural or industrial projects in the vicinity of designated sites which may be affected by traffic generated by SEP and/or DEP. Using Natural England's SSSI IRZs to determine relevant projects for inclusion, one project (BDC Planning Application 20201399 (proposed poultry unit)) was identified as fitting the criteria and had sufficient information submitted in the application to include impacts in-combination. In accordance with guidance detailed in **Section 22.4.3.3.6**, additional contributions of NH_3 and N-dep from the proposed poultry unit were included in the in-combination assessment (see **Section 22.6.1.3** and **Appendix 22.5**).

294. Details of the significance of air quality impacts on ecological receptors as a result of traffic emissions is provided in **Chapter 20 Onshore Ecology and Ornithology**.

22.8 Transboundary Impacts

295. As detailed in **Table 22.1**, the Planning Inspectorate has agreed that transboundary air quality effects are unlikely to occur, and that this topic can be scope out of the assessment.

22.9 Inter-relationships

296. The chapters detailed in **Table 22.56** have been identified as having inter-relationships with air quality.

Table 22.56: Air Quality Inter-Relationships

Impact / Receptor	Topic and description	Where addressed in this chapter	Rationale
Impact 1: Construction dust and fine particulate matter	**Chapter 28 Health**	**Section 22.6**	There could be the potential for human health impacts associated with increases in pollutant concentrations at sensitive receptors.
	Chapter 20 Onshore Ecology and Ornithology	**Section 22.5.4.3.2** and **22.6**	Potential ecological receptors may be impacted by changes to air quality.
Impact 2: NRMM emissions	**Chapter 28 Health**	**Section 22.6**	There could be the potential for human health impacts associated with NRMM emissions.
	Chapter 20 Onshore Ecology and Ornithology	**Section 22.5.4.3.2** and **22.6**	Potential ecological receptors may be impacted by changes to

Impact / Receptor	Topic and description	Where addressed in this chapter	Rationale
			air quality resulting from NRMM emissions.
Impact 3: Construction road vehicle exhaust emissions	**Chapter 24 Traffic and Transport**	**Sections 22.5.4.3** and **22.6**	Pollutant emissions from traffic movements associated with SEP and/or DEP have the potential to impact on air quality.
	Chapter 20 Onshore Ecology and Ornithology	**Section 22.5.4.3.2** and **22.6**	Potential ecological receptors may be impacted by changes to air quality resulting from construction road vehicle exhaust emissions. Impacts discussed in **Chapter 20 Onshore Ecology and Ornithology**.
	Chapter 28 Health	**Section 22.6**	There could be the potential for human health impacts associated with increases in pollutant concentrations at sensitive receptors.

22.10 Interactions

297. The impacts identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic impacts as a result of that interaction. The areas of potential interaction between impacts are presented in **Table 22.57**. This provides a screening tool for which impacts have the potential to interact. For clarity the areas of potential interaction between impacts are presented in **Table 22.57**, along with an indication as to whether the interaction may give rise to synergistic impacts.

Table 22.57: Interaction Between Impacts

Potential interactions between impacts			
Construction			
	Impact 1: Construction dust and fine particulate matter	**Impact 2**: NRMM emissions	**Impact 3**: Construction road vehicle exhaust emissions
Impact 1: Construction dust and fine particulate matter	-	Yes	Yes
Impact 2: NRMM emissions	Yes	-	Yes

Potential interactions between impacts			
Impact 3: Construction road vehicle exhaust emissions	Yes	Yes	-
Operation			
Operational impacts on air quality have been scoped out.			
Decommissioning			
It is anticipated that the decommissioning impacts would be similar in nature to those of construction.			

298. **Table 22.58** provides an assessment for each receptor group (i.e. human or ecological) as related to these impacts. Within **Table 22.58** the impacts are assessed relative to construction (it is assumed decommissioning impacts would be no greater than those during construction, so have not been included to prevent repetition) to see if multiple construction impacts affecting the same receptor could increase the level of impact upon that receptor. The worst-case impacts assessed within the chapter take these interactions into account and for the impact assessments are considered conservative and robust.

Table 22.58: Interaction Between Impacts During Construction

Receptor	Highest significance level during construction	Construction phase assessment
Human receptors	• Impact 1: **not significant** with the implementation of mitigation measures detailed in **Section 22.6.1.1.5** • Impact 2: **not significant** with the implementation of best available technique mitigation measures detailed in **Section 22.6.1.2.5** • Impact 3: **not significant** (**negligible** impact at all receptors)	**No greater than individually assessed impact** The proposed mitigation will minimise the potential for significant impacts on human receptors (Impact 1 and 2) within the study area and no significant impacts are predicted for Impact 3 during the construction phase of SEP and/or DEP. Very few human receptors (i.e. R28, R37 and R38) have the potential to be affected by all three construction impacts. Background pollutant concentrations in the study area are low (see **Table 22.32** and **Appendix 22.2**) and therefore it is unlikely that the Air Quality Objectives would be exceeded even in the unlikely event if the impacts were to interact. It is therefore considered that there will therefore be no pathway for interaction to exacerbate the potential impacts associated with these activities during construction.
Ecological receptors	• Impact 1: **not significant** with the implementation of mitigation measures detailed in **Section 22.6.1.1.5**	**No greater than individually assessed impact** The proposed mitigation will minimise the potential for significant impacts on ecological receptors (Impact 1 and 2) within the study area during the construction phase of SEP and/or DEP. Very few ecological receptors (i.e. Smeeth Wood ancient woodland, the unnamed

Receptor	Highest significance level during construction	Construction phase assessment
	- Impact 2: **not significant** with the implementation of best available technique mitigation measures detailed in **Section 22.6.1.2.5** - Impact 3: see **Chapter 20 Onshore Ecology and Ornithology**	ancient woodland near Ketteringham, Alderford Common SSSI and small areas of the River Wensum SSSI and SAC (near Links 79, 80, 133 and 150)) have the potential to be affected by all three construction phase impacts. It is therefore considered that there will therefore be no pathway for interaction to exacerbate the potential impacts associated with these activities during construction.

22.11 Potential Monitoring Requirements

299. No air quality monitoring is proposed. Visual dust inspections will be undertaken as part of the dust management measures (see **Section 22.6.1.1.5**).

22.12 Assessment Summary

300. A summary of the potential impacts identified with relation to air quality is provided in **Table 22.59**.

Table 22.59: Summary of Potential Impacts on Air Quality

Potential impact	Project	Receptor	Sensitivity	Magnitude	Pre-Mitigation Impact	Mitigation Measures Proposed	Residual Impact	Cumulative Residual Impact
Construction								
Impact 1: Construction dust and fine particulate matter	SEP or DEP	Human receptors within 350m of the Project boundary (and/or within 50m of HGV routes up to 500m from the Project boundary)	Dust soiling: low to high Human health: low	Low to medium risk	Assessment methodology does not assign significance before mitigation.	Measures as recommended by the IAQM (see **Section 22.6.1.1.5**).	**Not significant**	**Not significant**
		Ecological receptors within 200m of the Project boundary (and/or within 50m of HGV routes up to 500m from the Project boundary)	Ecological effects: high	Medium risk				
	SEP and DEP	Human receptors within 350m of the Project boundary (and/or within 50m of HGV routes up to 500m from the Project boundary)	Dust soiling: low to high Human health: low	Low to medium risk				
		Ecological receptors within 200m of the Project boundary (and/or within 50m of HGV routes up to 500m from the Project boundary)	Ecological effects: high	Medium risk				
Impact 2: NRMM emissions	SEP and/or DEP	Human and ecological receptors within close proximity to NRMM works will occur within the Project boundary	High	N/A	Defra technical guidance (Defra, 2021a) states that emissions from NRMM used on	Best available technique mitigation measures	**Not significant**	**Not significant**

[redacted]

Potential impact	Project	Receptor	Sensitivity	Magnitude	Pre-Mitigation Impact	Mitigation Measures Proposed	Residual Impact	Cumulative Residual Impact
					construction sites are unlikely to have a significant impact on local air quality where relevant control and management measures are employed.	(see **Section 22.6.1.2.5**).		
Impact 3: Construction road vehicle exhaust emissions	SEP or DEP	Residential properties, schools, hospitals and care homes within 200m of roads	High	The maximum increase in NO$_2$ concentrations as a result of SEP or DEP was 0.47µg.m^{-3} at R1. The maximum increase in PM$_{10}$ and PM$_{2.5}$ concentrations was 0.19µg.m^{-3} and 0.10µg.m^{-3} respectively at R2.	**Not significant**, negligible impact at all receptors	No additional mitigation measures required	**Not significant**	**Not significant***
		Designated ecological sites within 200m of roads	High	See **Chapter 20 Onshore Ecology and Ornithology**				
	SEP and DEP	Residential properties, schools, hospitals and care homes within 200m of roads	High	The maximum increase in NO$_2$ concentrations as a result of SEP and DEP was 0.60µg.m^{-3} at R1. The maximum increase in PM$_{10}$ and PM$_{2.5}$ concentrations was	**Not significant**, negligible impact at all receptors	No additional mitigation measures required	**Not significant**	**Not significant***

Potential impact	Project	Receptor	Sensitivity	Magnitude	Pre-Mitigation Impact	Mitigation Measures Proposed	Residual Impact	Cumulative Residual Impact
				0.24µg.m^{-3} and 0.13µg.m^{-3} respectively at R1.				
		Designated ecological sites within 200m of roads	High	See **Chapter 20 Onshore Ecology and Ornithology**				
Operation								
Operational impacts on air quality have been scoped out.								
Decommissioning								
As per construction.								
*The assessment of road traffic emissions on human receptors was inherently cumulative as it included traffic growth from 2019 to 2025 and traffic from consented offshore wind farm projects with a spatial/temporal overlap as SEP and/or DEP								

References

AEAT (2008). Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedances of the 1-hour mean AQS Objective, http://laqm.defra.gov.uk/documents/NO2relationship_report.pdf. [Accessed 27 April 2022].

Air Quality Consultants (2020). Comparison of EFT v10 with EFT v9. September 2020. [Accessed April 2022].

Breckland Council (BC) (2019). Breckland Council Local Plan 2019. [Accessed April 2022].

BC (2021). Air Quality Annual Status Report (ASR) (2021). [Accessed April 2022].

Broadland District Council (BDC) (2015). Development Management DPD 2015. [Accessed April 2022].

AS Modelling & Data Ltd. (2020). A Report on the Modelling of the Dispersion and Deposition of Ammonia from the Proposed Free Range Broiler Chicken Rearing House at Manor Farm, Beighton in Norfolk. Available at: https://secure.broadland.gov.uk/MVM/Online/dms/DocumentViewer.aspx?PK=757282&SearchType=Planning%20Application [Accessed 27 April 2022].

BDC, South Norfolk District Council (SNC) (2020). Air Quality Annual Status Report (ASR) (2020). [Accessed April 2022].

Centre for Ecology and Hydrology (CEH) (2022). Air Pollution Information System. [Accessed April 2022].

Chapman, C., Kite, B. (2021a). Guidance on Decision-Making Thresholds for Air Pollution. JNCC Report No.696 (Main Report), JNCC, Peterborough, ISSN 0963-8091. Air Quality Consultants Ltd. 2021. [Accessed April 2022].

Chapman, C., Kite, B. (2021b). Decision-Making Thresholds for Air Pollution. JNCC Report No. 696 (Technical Report), JNCC, Peterborough, ISSN 0963-8091. [Accessed April 2022].

Department of Energy and Climate Change (DECC) (2011a). Overarching National Policy Statement for Energy (EN-1). [Accessed April 2022].

Department of Energy and Climate Change (DECC) (2011b). National Policy Statement for Renewable Energy Infrastructure (EN-3). [Accessed April 2022].

Department of Energy and Climate Change (DECC) (2011c). National Policy Statement for Electricity Networks Infrastructure (EN-5). [Accessed April 2022].

Department of Energy and Climate Change (DECC) (2021a). Draft Overarching National Policy Statement for Energy (EN-1). [Accessed June 2022].

Department of Energy and Climate Change (DECC) (2021b). Draft National Policy Statement for Renewable Energy Infrastructure (EN-3). [Accessed June 2022].

Department of Energy and Climate Change (DECC) (2021c). Draft National Policy Statement for Electricity Networks Infrastructure (EN-5). [Accessed June 2022].

Department for the Environment Food and Rural Affairs (Defra) (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. London: HMSO. [Accessed April 2022].

Department for the Environment Food and Rural Affairs (Defra) (2017). UK plan for tackling roadside nitrogen dioxide concentrations, July 2017, Available at: https://uk-air.defra.gov.uk/library/no2ten/index

Department for the Environment Food and Rural Affairs (Defra) (2018). Supplement to the UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations: Local Authorities Feasibility Studies. Available at: https://uk-air.defra.gov.uk/library/no2ten/2018-la-tfs-documents

Department for the Environment Food and Rural Affairs (Defra) (2019). Clean Air Strategy 2019. [Accessed April 2022].

Defra (2020a). Background Mapping data for local authorities – 2018. [online] Defra. Available at: https://uk-air.defra.gov.uk/data/laqm-background-home [Accessed July 2022].

Defra (2020b). NOx to NO_2 Calculator, v8.1.[Accessed July 2022].

Department for the Environment Food and Rural Affairs (Defra) (2021a). Local Air Quality Management Technical Guidance (TG16) [Accessed April 2022].

Defra (2021b). Emission Factor Toolkit, v11.0 [Accessed July 2022].

Department of the Environment (DoE) (1997). The UK National Air Quality Strategy London: HMSO. [Accessed: February 2022].

Department of the Environment, Transport and the Regions (DETR) (2000). Air Quality Strategy for England, Scotland, Wales and Northern Ireland. London: HMSO. [Accessed: February 2022].

Department of the Environment, Transport and the Regions (DETR) (2003). Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Addendum. London: HMSO. [Accessed: February 2022].

East Suffolk Council (2019). Waveney Local Plan 2019. [Accessed: February 2022].

East Suffolk Council (2020). 2020 Air Quality Annual Status Report (ASR). [Accessed: February 2022].

Environment Agency (2020). Air Emissions Risk Assessment for your Environmental Permit https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit [Accessed 27 April 2022].

Equinor (2019). Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions Scoping Report. October 2019. [Accessed: February 2022].

European Parliament (1996). Council Directive 96/62/EC on Ambient Air Quality Assessment and Management. [Accessed: February 2022].

European Parliament (2008). Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe. [Accessed: February 2022].

Her Majesty's Stationary Office (HMSO) (1995). The Environment Act 1995 (c.25) London: TSO. [Accessed: February 2022].

Her Majesty's Stationary Office (HMSO) (2000). Statutory Instrument 2000 No. 928 The Air Quality (England) Regulations 2000 London: HMSO. [Accessed: February 2022].

Her Majesty's Stationary Office (HMSO) (2002). Statutory Instrument 2002 No. 3043 The Air Quality (England) (Amendment) Regulations 2002 London: HMSO. [Accessed: February 2022].

Her Majesty’s Stationary Office (HMSO) (2010). The Air Quality Standards Regulations 2010. [Accessed: February 2022].

HMSO (2016). The Air Quality Standards (Amendment) Regulations 2016.

Highways England (2019). LA 105 Air quality. [Accessed: February 2022].

Great Yarmouth Borough Council (2015). Great Yarmouth Local Plan: Core Strategy 2013 - 2030. [Accessed: February 2022].

Great Yarmouth Borough Council (2019). 2019 Air Quality Annual Status Report (ASR). [Accessed: February 2022].

Institute of Air Quality Management (IAQM) (2016). Guidance on the assessment of dust from demolition and construction. Version 1.1. [Accessed: February 2022].

Institute of Air Quality Management (IAQM) (2020). A guide to the assessment of air quality impacts on designated nature conservation sites. Version 1.1, May 2020. [Accessed: February 2022].

Institute of Air Quality Management (IAQM), Environment Protection UK (EPUK) (2017). Land-Use Planning & Development Control: Planning for Air Quality. January 2017. [Accessed: February 2022].

King's Lynn and West Norfolk Borough Council (2016). Site Allocations and Development Management Policies Plan. Adopted September 2017. [Accessed: February 2022].

King's Lynn and West Norfolk Borough Council (2019). Local Plan Review 2019. [Accessed: February 2022].

King's Lynn and West Norfolk Borough Council (2021). 2021 Air Quality Annual Status Report (ASR). [Accessed: February 2022].

Laxen and Marner (2003). Analysis of the Relationship Between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites. [Accessed: February 2022].

Natural England (2018). Natural England’s approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations, Version: June 2018. [Accessed: February 2022].

Natural England (2021). SSSI Impact Risk Zones (England). Available at: SSSI Impact Risk Zones (England) - data.gov.uk [Accessed: February 2022].

Natural England (2021b). Priority Habitat Inventory (England). [Accessed: February 2022].

Norfolk Environmental Protection Group (no date). Technical Guidance: Air Quality and Land use Planning. [Accessed: February 2022].

North Norfolk District Council (NNDC) (2008). North Norfolk Local Development Framework: Core Strategy. [Accessed: February 2022].

North Norfolk District Council (NNDC) (2019). North Norfolk Local Plan 2016 – 2036. First Draft Local Plan (Part 1): Consultation Period 7 May to 19 June 2019. [Accessed: February 2022].

NNDC (2020). Air Quality Annual Status Report (ASR) (2020). [Accessed: February 2022].

The Planning Inspectorate (2018). Planning Inspectorate Advice Note Nine: Rochdale Envelope. [Accessed: February 2022].

The Planning Inspectorate (2019). SCOPING OPINION: Proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions. Case Reference: EN010109. [Accessed: February 2022].