East Anglia TWO Offshore Windfarm

Appendix 19.2

Air Quality Cumulative Impact Assessment with the Proposed East Anglia ONE North Project

Preliminary Environmental Information
Volume 3
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Glossary of Acronyms

AADT	Annual Average Daily Traffic
CCS	Construction Consolidation Sites
CIA	Cumulative Impact Assessment
DCO	Development Consent Order
EPUK	Environmental Protection UK
ES	Environmental Statement
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
IAQM	The Institute of Air Quality Management
LAQM	Local Air Quality Management
MW	Megawatt
mg.m-3	Milligrams (of pollutant) per cubic meter (of air)
NGET	National Grid Electricity Transmission
NO_2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
PEIR	Preliminary Environmental Information Report
PM_{10}	Particulate Matter with an aerodynamic diameter of less than 10 µm
$PM_{2.5}$	Particulate Matter with an aerodynamic diameter of less than 2.5 µm
TG	Technical Guidance

Glossary of Terminology

Applicant	East Anglia TWO Limited.
Construction consolidation sites	Compounds which will contain laydown, storage and work areas for onshore construction works. The HDD construction compound will also be referred to as a construction consolidation site.
Development Area	The area comprising the Proposed Onshore Development Area and the Offshore Development Area
East Anglia TWO project	The proposed project consisting of up to 75 wind turbines, up to four offshore electrical platforms, up to one offshore construction operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive, as defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017 and regulation 18 of the Conservation of Offshore Marine Habitats and Species Regulations 2017. These include candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to the EIA and the information required to support HRA.
Horizontal directional drilling (HDD)	A method of cable installation where the cable is drilled beneath a feature without the need for trenching.
Jointing Bay	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 area (from Mean Low Water Springs) where the offshore export cables would make contact with land, and connect to the onshore cables.
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing electrical earthing links.
Mitigation areas	Areas captured within the Development Area specifically for mitigating expected or anticipated impacts.
National Grid infrastructure	A National Grid substation, connection to the existing electricity pylons and National Grid overhead line realignment works which will be consented as part of the proposed East Anglia TWO project Development Consent Order but will be National Grid owned assets.
National Grid overhead line realignment works	Works required to upgrade the existing electricity pylons and overhead lines to transport electricity from the National Grid substation to the national electricity grid
National Grid overhead line	The proposed area for National Grid overhead line realignment

realignment works area	works.
National Grid substation	The substation (including all of the electrical equipment within it) necessary to connect the electricity generated by the proposed East Anglia TWO project to the national electricity grid which will be owned by National Grid but is being consented as part of the proposed East Anglia TWO project Development Consent Order.
National Grid substation location	The proposed location of the National Grid substation.
Natura 2000 site	A site forming part of the network of sites made up of Special Areas of Conservation and Special Protection Areas designated respectively under the Habitats Directive and Birds Directive.
Onshore cable corridor	The corridor within which the onshore cable route will be located
Onshore cable route	This is the construction swathe within the onshore cable corridor which would contain onshore cables as well as temporary ground required for construction which includes cable trenches, haul road and spoil storage areas.
Onshore cables	The cables which would bring electricity from landfall to the onshore substation. The onshore cable is comprised of up to six power cables and two fibre optic cables.
Onshore infrastructure	The combined name for all of the onshore infrastructure associated with the proposed East Anglia TWO project from landfall to the connection to the national electricity grid.
Onshore substation	The East Anglia TWO substation and all of the electrical equipment, both within and connecting to the National Grid infrastructure.
Onshore substation location	The proposed location of the onshore substation for the proposed East Anglia TWO project.
Proposed Onshore Development Area	The area in which the landfall, onshore cable corridor, onshore substation, mitigation areas, temporary construction facilities (such as access roads and construction consolidation sites), and the National Grid Infrastructure will be located.
Transition Bay	Underground structures at the landfall that house the joints between the offshore export cables and the onshore cables.

19.2 Air Quality Cumulative Impact Assessment with the proposed East Anglia ONE North Project

19.1 Introduction

1. This appendix covers the cumulative impact assessment of the proposed East Anglia TWO project with the proposed East Anglia ONE North project in relation to air quality.

2. The East Anglia ONE North offshore windfarm project (the proposed East Anglia ONE North project) is also in the pre-application stage. The proposed East Anglia ONE North project will have a separate Development Consent Order (DCO) application but is working to the same programme of submission as the proposed East Anglia TWO project. The two projects will share the same landfall location and cable route and the two onshore substations will be co-located, and feed into the same National Grid substation.

3. The proposed East Anglia TWO project Cumulative Impact Assessment (CIA) for air quality will therefore initially consider the cumulative impact with only the East Anglia ONE North project against two different construction scenarios (i.e. construction of the two projects simultaneously and sequentially). The realistic worst case scenario of each impact is then carried through to the main body of the CIA assessment which considers other developments which are in close proximity to the proposed East Anglia TWO project.

4. For a more detailed description of the CIA please refer to ***Chapter 5 EIA Methodology***.

19.2 Construction Scenarios Realistic Worst Case Parameters

5. This appendix considers the proposed East Anglia TWO project and the proposed East Anglia ONE North project under two construction scenarios:

    - Scenario 1 - the proposed East Anglia TWO project and proposed East Anglia ONE North project are built simultaneously; and
    - Scenario 2 - the proposed East Anglia TWO project and the proposed East Anglia ONE North project are built sequentially.

6. As discussed in ***section 19.1***, the realistic worst case (based on the assessment of these two construction scenarios) for each impact is then carried

through to the wider CIA which considers other developments, projects or plans which have been screened into the CIA assessment for the proposed East Anglia TWO project.

7. It should be noted that the operational phase impacts on air quality will be the same irrespective of the construction scenario. Therefore, operational impacts identified in Scenario 1 will be the same as those for Scenario 2.

8. Mitigation measures for the proposed East Anglia TWO project and proposed East Anglia ONE North project will be the same. These are detailed in ***Chapter 19 Air Quality***

19.2.1 Scenario 1

9. ***Table A19.1*** presents the realistic worst case parameters of Scenario 1. In this instance, the proposed East Anglia TWO project and proposed East Anglia ONE North project are built simultaneously.

Table A19.1 Scenario 1 Realistic Worst Case

Impact	Parameter	Notes
Construction		
Construction duration	The minimum realistic duration that the onshore works can be completed in, resulting in the highest traffic demand due to the intensity of activities, is 36 months (three years).	This duration has been used as the realistic onshore construction duration date for the purpose of the assessment of environmental impacts in this PEIR[1]. Vehicle movements have been calculated using this parameter and are detailed further in ***Chapter 26 Traffic and Transport***.
Construction Date	Earliest start of construction 2024.	2024 has been used as the realistic construction start date for the purpose of the assessment of environmental impacts in this PEIR[2]. Vehicle movements have been calculated using this parameter and are detailed further in ***Chapter 26 Traffic and Transport***.

[1] This assumed construction duration has been used for the assessment presented in this PEIR. Any refinement of the programme prior to submission of the DCO will be captured in the Environmental Statement.
[2] This assumed construction start date has been used for the assessment presented in this PEIR. Any refinement of the programme prior to submission of the DCO will be captured in the Environmental Statement.

Impact	Parameter	Notes
Impacts related to the landfall	HDD temporary works area: 13,300m^2 (70m x 190m) Transition bay excavation footprint (for 4 transition bays): 3,108m^2 (37m x 42m) Landfall CCS: 40,950m^2 (210m x 195m) Landfall transition bays approximate quantity of spoil material (for 4 transition bays): 908m^3	Landfall to be achieved via HDD. No beach access required.
Impacts related to the onshore cable corridor	Onshore cable route: 574,720m^2 (8,980m x 64m) Jointing bay construction excavation footprint: 570m^2 (30.6m x 18.6m). Total for 72 jointing bays: 41,040m^2 (570m^2 x 36) HDD (retained as an option to cross SPA / SSSI): • Entrance pit CCS (x1): 13,650m^2 (195m x 70m) • Exit pit CCS (x1): 5,850m^2 (195m x 30m) Onshore cable route CCS: 40,950m^2 (210m x 195m). Total for 5 CCS: 204,750m^2 (40,950m^2 x 5) Temporary roads: • Onshore cable route haul road between landfall and Snape Road (4.5m wide with additional 4m for passing places at approximately 87m intervals): 41,376m^2 • Onshore cable route and substation access haul road (9m width): 18,675m^2 • Temporary access road: 23,495m^2 Onshore cable trench approximate quantity of spoil material: 26,642m^3	Onshore cable corridor construction footprint may be located anywhere within the proposed onshore development area. The location strategy for access routes, CCS and jointing bays will be to site them near to field boundaries or roads as far as practical. Two link boxes sit underground beside each jointing bay at a depth of approximately 1.2m. The construction footprint of these is included in the jointing bay construction excavation footprint.
Impacts related to the onshore substation(s)	Onshore substation CCS: 17,100m^2 (190m x 90m). Total for 3 CCS: 51,300m^2 Permanent footprint (used as CCS during construction): 36,100m^2 (190m x 190m). Total for 2: 72,200m^2 Substation operational access road: 12,800m^2 (1,600m x 8m)	Construction access is included above as the onshore cable route and substation access haul road.
Impacts related to the National Grid Infrastructure	National Grid substation CCS: 78,750m^2 (250m x 315m) Permanent footprint (used as CCS during	Design for the required overhead line (OHL) realignment work (including cable sealing end CCSs and pylon realignment CCS) is currently on going. As

Impact	Parameter	Notes
	construction): 45,500m^2 (325m x 140m)	more detail is made available, this will be fully assessed and included in the Environmental Statement (ES) and DCO application. However, indicative locations for cable sealing end CCSs and pylon realignment CCS are shown in ***Figure 6.6*** of ***Chapter 6 Project Description***. Construction access is included above as the onshore cable route and substation access haul road. Operational access is included above as the substation operational access road,
Operation		
Impacts related to the landfall	4 transition bays will be installed underground, each with an operational volume of 227m^3	Transition bays will be buried approximately 1.2m underground – there will no above ground infrastructure.
Impacts related to the onshore cable corridor	72 jointing bays will be installed underground, each with an operational volume of 77m^{3}144 link boxes will be installed underground (2 per jointing bay), each with an operational volume of 3m^3	Jointing bays will be buried approximately 1.2m underground – there will no above ground infrastructure. Link boxes will be located underground immediately adjacent to jointing bays – there will be no above ground infrastructure.
Impacts related to the onshore substation(s)	Operational footprint: 36,100m^2 (190m x 190m). Total for 2: 72,200m^2 Substation operational access road: 12,800m^2 (1,600m x 8m)	The operational footprint does not include the additional landscaping footprint (which will be agreed post-PEIR).
Impacts related to the National Grid Infrastructure	National Grid operational substation: 45,500m^2 (325m x 140m)	The operational footprint does not include the additional landscaping footprint (which will be agreed post-PEIR). Design for the required overhead line (OHL) realignment work (including cable sealing end CCSs and pylon realignment CCS) is currently on going. As more detail is made available, this will be fully assessed and included in the Environmental

Impact	Parameter	Notes
		Statement (ES) and DCO application. However, indicative locations for cable sealing end CCSs and pylon realignment CCS are shown in ***Figure 6.6*** of ***Chapter 6 Project Description***.
Decommissioning		
No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. However, the onshore substation will likely be removed and be reused or recycled. It is expected that the onshore cables will be removed and recycled, with the transition bays and cable ducts (where used) left *in situ*. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.		

19.2.2 Scenario 2

10. Scenario 2, represents the realistic worst case scenario in the eventuality that the proposed East Anglia TWO project and proposed East Anglia ONE North project are built with a construction gap.

11. Scenario 2 assumes that when permission is granted, the proposed East Anglia TWO project will be constructed as soon as permission is granted. The proposed East Anglia ONE North project will leave the largest possible gap (between the reinstatement of the proposed East Anglia TWO project and start of construction for the proposed East Anglia ONE North project) to begin construction within the consent period. Further detail regarding the likely construction gap is provided in ***Chapter 5 EIA Methodology***.

Table A19.1 Scenario 2 Realistic Worst Case

Impact	Proposed East Anglia TWO Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
Construction			
Construction duration	The minimum realistic duration that the onshore works can be completed in, resulting in the highest traffic demand due to the intensity of activities, is 36 months (three years).	The minimum realistic duration that the onshore works can be completed in, resulting in the highest traffic demand due to the intensity of activities, is 36 months (three years).	This duration has been used as the realistic onshore construction duration date for the purpose of the assessment of

Impact	Proposed East Anglia TWO Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
			environmental impacts in this PEIR[3]. Vehicle movements have been calculated using this parameter and are detailed further in ***Chapter 26 Traffic and Transport***.
Construction Date	Earliest start of construction 2024.	Earliest start of construction 2024.	2024 has been used as the realistic construction start date for the purpose of the assessment of environmental impacts in this PEIR[4]. Vehicle movements have been calculated using this parameter and are detailed further in ***Chapter 26 Traffic and Transport***.
Impacts related to the landfall	HDD temporary works area: 13,300m^2 (70m x 190m) Transition bay excavation footprint (for 4 transition bays): 3,108m^2 (37m x 42m) Landfall CCS: 40,950m^2 (210m x 195m) Landfall transition bays approximate quantity of spoil material (for 4 transition bays): 908m^3	HDD temporary works area: 13,300m^2 (70m x 190m) Transition bay excavation footprint (for 4 transition bays): 3,108m^2 (37m x 42m) Landfall CCS: 40,950m^2 (210m x 195m) Landfall transition bays approximate quantity of spoil material (for 4 transition bays): 908m^3	Landfall to be achieved via HDD. No beach access required.
Impacts related to the onshore cable corridor	Onshore cable route: 574,720m^2 (8,980m x 64m) Jointing bay construction excavation footprint: 570m^2	Onshore cable route: 574,720m^2 (8,980m x 64m) Jointing bay construction excavation footprint: 570m^2	Onshore cable corridor construction footprint may be located anywhere within the proposed

[3] This assumed construction duration has been used for the assessment presented in this PEIR. Any refinement of the programme prior to submission of the DCO will be captured in the Environmental Statement.
[4] This assumed construction start date has been used for the assessment presented in this PEIR. Any refinement of the programme prior to submission of the DCO will be captured in the Environmental Statement.

Impact	Proposed East Anglia TWO Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
	(30.6m x 18.6m). Total for 72 jointing bays: 41,040m^2 (570m^2 x 36) HDD (retained as an option to cross SPA / SSSI): • Entrance pit CCS (x1): 13,650m^2 (195m x 70m) • Exit pit CCS (x1): 5,850m^2 (195m x 30m) Onshore cable route CCS: 40,950m^2 (210m x 195m). Total for 5 CCS: 204,750m^2 (40,950m^2 x 5) Temporary roads: • Onshore cable route haul road between landfall and Snape Road (4.5m wide with additional 4m for passing places at approximately 87m intervals): 41,376m^2 • Onshore cable route and substation access haul road (9m width): 18,675m^2 • Temporary access road: 23,495m^2 Onshore cable trench approximate quantity of spoil material: 26,642m^3	(30.6m x 18.6m). Total for 72 jointing bays: 41,040m^2 (570m^2 x 36) HDD (retained as an option to cross SPA / SSSI): • Entrance pit CCS (x1): 13,650m^2 (195m x 70m) • Exit pit CCS (x1): 5,850m^2 (195m x 30m) Onshore cable route CCS: 40,950m^2 (210m x 195m). Total for 5 CCS: 204,750m^2 (40,950m^2 x 5) Temporary roads: • Onshore cable route haul road between landfall and Snape Road (4.5m wide with additional 4m for passing places at approximately 87m intervals): 41,376m^2 • Onshore cable route and substation access haul road (9m width): 18,675m^2 • Temporary access road: 23,495m^2 Onshore cable trench approximate quantity of spoil material: 26,642m^3	onshore development area. The location strategy for access routes, CCS and jointing bays will be to site them near to field boundaries or roads as far as practical. Two link boxes sit underground beside each jointing bay at a depth of approximately 1.2m. The construction footprint of these is included in the jointing bay construction excavation footprint.
Impacts related to the onshore substation(s)	Onshore substation CCS: 17,100m^2 (190m x 90m). Total for 3 CCS: 51,300m^2 Permanent footprint (used as CCS during construction): 36,100m^2 (190m x 190m). Total for 2: 72,200m^2 Substation operational access road: 12,800m^2 (1,600m x 8m)	Onshore substation CCS: 17,100m^2 (190m x 90m). Total for 3 CCS: 51,300m^2 Permanent footprint (used as CCS during construction): 36,100m^2 (190m x 190m). Total for 2: 72,200m^2 Substation operational access road: 12,800m^2 (1,600m x 8m)	Construction access is included above as the onshore cable route and substation access haul road.
Impacts related to the National Grid	National Grid substation CCS: 78,750m^2 (250m x 315m) Permanent footprint (used as	National Grid substation CCS: 78,750m^2 (250m x 315m) Permanent footprint (used as	Design for the required overhead line (OHL) realignment work (including cable

Impact	Proposed East Anglia TWO Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
Infrastructure	CCS during construction): 45,500m^2 (325m x 140m)	CCS during construction): 45,500m^2 (325m x 140m)	sealing end CCSs and pylon realignment CCS) is currently on going. As more detail is made available, this will be fully assessed and included in the Environmental Statement (ES) and DCO application. However, indicative locations for cable sealing end CCSs and pylon realignment CCS are shown in ***Figure 6.6*** of ***Chapter 6 Project Description***. Construction access is included above as the onshore cable route and substation access haul road. Operational access is included above as the substation operational access road,
Operation			
Impacts related to the landfall	4 transition bays will be installed underground, each with an operational volume of 227m^3	4 transition bays will be installed underground, each with an operational volume of 227m^3	Transition bays will be buried approximately 1.2m underground – there will no above ground infrastructure.
Impacts related to the onshore cable corridor	72 jointing bays will be installed underground, each with an operational volume of 77m^{3}144 link boxes will be installed underground (2 per jointing bay), each with an operational volume of 3m^3	72 jointing bays will be installed underground, each with an operational volume of 77m^{3}144 link boxes will be installed underground (2 per jointing bay), each with an operational volume of 3m^3	Jointing bays will be buried approximately 1.2m underground – there will no above ground infrastructure. Link boxes will be located underground immediately adjacent to jointing bays – there will be no above ground infrastructure.
Impacts related	Operational footprint:	Operational footprint:	The operational

Impact	Proposed East Anglia TWO Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
to the onshore substation(s)	36,100m^2 (190m x 190m). Total for 2: 72,200m^2 Substation operational access road: 12,800m^2 (1,600m x 8m)	36,100m^2 (190m x 190m). Total for 2: 72,200m^2 Substation operational access road: 12,800m^2 (1,600m x 8m)	footprint does not include the additional landscaping footprint (which will be agreed post-PEIR).
Impacts related to the National Grid Infrastructure	National Grid operational substation: 45,500m^2 (325m x 140m)	National Grid operational substation: 45,500m^2 (325m x 140m)	The operational footprint does not include the additional landscaping footprint (which will be agreed post-PEIR). Design for the required overhead line (OHL) realignment work (including cable sealing end CCSs and pylon realignment CCS) is currently on going. As more detail is made available, this will be fully assessed and included in the Environmental Statement (ES) and DCO application. However, indicative locations for cable sealing end CCSs and pylon realignment CCS are shown in ***Figure 6.6*** of ***Chapter 6 Project Description***.
Decommissioning			
No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. However, the onshore substation will likely be removed and be reused or recycled. It is expected that the onshore cables will be removed and recycled, with the transition bays and cable ducts (where used) left *in situ*. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.			

19.3 Cumulative Impact Assessment during Construction

12. The following sections discuss which of the two construction scenarios detailed in ***section 19.2*** will be the realistic worst case in terms of impacts to air quality.

19.3.1 Cumulative Impact 1: Construction Phase Dust and Fine Particulate Matter Emissions

13. Under Scenario 2 each project is constructed as a standalone scheme, whereby any works are completed for the proposed East Anglia TWO project (full reinstatement), and then the proposed East Anglia ONE North project construction would follow at a later date. Therefore, the impact significance during construction of the proposed East Anglia TWO project alone will then be the same for construction of the proposed East Anglia ONE North project alone at the landfall, onshore cable route and substation sites. Therefore, under scenario 2, the cumulative impact with the proposed East Anglia ONE North project will be of **negligible** significance.

14. The following assessment was therefore carried out for Scenario 1.

19.3.1.1 Step 1: Screen the need for a Detailed Assessment

15. The same receptors were identified and are considered to represent the worst-case for Scenario 1 as for the proposed East Anglia TWO project alone assessment as detailed in ***section 19.6.1.1*** of ***Chapter 19 Air Quality***. A detailed assessment is therefore required.

19.3.1.2 Step 2A: Define the Potential Dust Emission Magnitude

16. The dust emission magnitude calculated for Scenario 1 is presented in ***Table A19.2.***

Table A19.2 Defined Dust Emission Magnitudes Associated for each Construction Activity for Scenario 1

Construction Activity	Dust Emission Magnitude Assessment – Human Receptors	Dust Emission Magnitude Assessment – Ecological Receptors
Earthworks	• It was assumed that up to two CCS areas will be built within 350m of human receptors, as the worst case scenario is near the junction of two sections within the proposed onshore development area each CCS having an area of 40,950m^2. • Earthworks within the onshore cable route will comprise removal and storage of topsoil, followed by excavation and reinstatement of 4	It was assumed that an HDD entrance and exit pit CCS are both located within 50m of the ecological receptor, with a combined footprint of 19,500m^2. Total earthworks area is greater than 10,000m^2. The dust emission magnitude is therefore Large.

Construction Activity	Dust Emission Magnitude Assessment – Human Receptors	Dust Emission Magnitude Assessment – Ecological Receptors
	trenches • Total earthworks area is greater than 10,000m^2. • The dust emission magnitude is therefore Large.	
Construction	• There are not anticipated to be any buildings constructed within the mobilisation areas, however it was assumed that cement-bound sand will be used to line the cable trench and pack around the ducts then backfilled using the stored subsoil and topsoil. • The dust emission magnitude is therefore Medium.	There are no elements of construction to be carried out within the designation of ecological receptors. N/A
Trackout	• There are greater than 50 outward daily HGV movements from the CCS during the construction phase. • The dust emission magnitude is therefore Large.	There are between 10 and 50 outward daily HGV movements from the CSS during the construction phase. The dust emission magnitude is therefore Medium.

17. The dust magnitudes for earthworks, construction and trackout associated with scenario 1 are summarised for each worst case area in ***Table A19.3.***

Table A19.3 Dust Emission Magnitudes for the onshore works - Scenario 1

Activity	Dust Emission Magnitude for Worst Case Scenario	
	Human Receptors	Ecological Receptors
Earthworks	Large	Large
Construction	Medium	N/A
Trackout	Large	Medium

19.3.1.3 Step 2B: Define the Sensitivity of the Area

18. The sensitivity of the area to dust soiling, human health impacts and ecological impacts remains as per the proposed East Anglia TWO project alone assessment, and is reiterated in ***Table A19.4***.

Table A19.4 Sensitivity of the Area to each activity - Scenario 1

Potential Impact	Sensitivity of the Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium
Human Health	Low	Low	Low
Ecological impacts	High	High	High

19.3.1.4 Step 2C: Define the Risks of Impacts

19. The dust emission magnitude and sensitivity of the area are combined and the risk of impacts determined using ***TableA19.1*** – ***TableA19.7*** in ***Appendix 19.1***. The risks for dust soiling and human health are shown in ***Table A19.5.***

Table A19.5 Risk of Dust Impacts - Scenario 1

Potential Impact	Dust Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	Medium Risk	Medium Risk
Human Health	Low Risk	Low Risk	Low Risk
Ecological Impacts	High Risk	N/A	Medium Risk

20. As described in ***section 19.6.1.1.4*** of ***Chapter 19 Air Quality***, the proposed East Anglia TWO project would employ embedded mitigation measures relating to construction dust. The Institute of Air Quality Management (IAQM) construction dust assessment methodology does not include the consideration of embedded mitigation measures when determining the potential risk of dust impacts.

21. Implementation of embedded mitigation measures would ensure that the risk of dust impacts is lower than those in ***Table A19.5.***

22. Step 3 of the IAQM guidance 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 ‘high risk’ resulting from earthworks, construction and trackout without the implementation of mitigation measures.

23. The identified level of dust risk for Scenario 1 is the same as the proposed East Anglia TWO project alone assessment. Therefore, the mitigation measures detailed in ***section 19.6.1.1.5*** of ***Chapter 19 Air Quality*** remain applicable to Scenario 1.

24. The implementation of the appropriate mitigation measures, in addition to embedded mitigation measures, will reduce the magnitude of dust emissions and the likelihood of their occurrence. The residual impacts from construction are considered to be not significant, in accordance with IAQM guidance.

19.3.2 Cumulative Impact 2: Construction Phase Road Traffic Emissions

19.3.2.1 Human Receptors

25. The worst-case cumulative impact scenario was determined based on the change in traffic flows associated with Scenario 1 and Scenario 2. Traffic flows are expected to increase year on year, therefore the assessment of the years of project construction in 2030 is the most conservative scenario with regard to traffic movement. The latest year of construction in Scenario 2 would be 2030, which, taking into account future traffic growth, would result in higher baseline traffic flows and therefore higher pollutant concentrations than Scenario 1, which would occur up to 2028 at the latest. However, there would be more construction works undertaken under Scenario 1 as both projects would be constructed simultaneously; therefore, there would be a higher project impact at receptors due to a greater number vehicle movements. It is therefore considered that this higher magnitude of change represents the worst-case scenario, and therefore the cumulative assessment was carried out for Scenario 1.

26. The 24-hour Annual Average Daily Traffic (AADT) flows and Heavy Goods Vehicle (HGV) percentages used in the cumulative Scenario 1 assessment are detailed in ***Appendix 19.1***.

27. Predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for the 2028 year of peak construction 'with Scenario 1' scenario are detailed in ***Table A19.6*** to ***Table A19.9***. Concentrations for 'without Scenario 1' scenarios and the predicted change in NO_2, PM_{10} and $PM_{2.5}$ concentrations, as a result of the East Anglia TWO project, are also shown for comparison purposes.

Table A19.6 Annual Mean NO_2 results at Sensitive Human Receptor Locations – Scenario 1

Receptor ID	Annual mean NO_2 concentrations ($\mu g.m^{-3}$)				
	Without Scenario 1	With Scenario 1	Change	Change as % of objective	Impact descriptor
R1	37.91	39.44	1.53	4%	Moderate adverse
R2	24.88	25.81	0.93	2%	Negligible
R3	27.82	28.91	1.09	3%	Negligible
R4	25.45	26.18	0.73	2%	Negligible

Receptor ID	Annual mean NO_2 concentrations ($\mu g.m^{-3}$)				
	Without Scenario 1	With Scenario 1	Change	Change as % of objective	Impact descriptor
R5	18.12	18.57	0.45	1%	Negligible
R6	17.31	17.87	0.56	1%	Negligible
R7	20.45	21.18	0.73	2%	Negligible
R8	19.61	20.12	0.51	1%	Negligible
R9	12.06	12.9	0.84	2%	Negligible
R10	9.3	9.73	0.43	1%	Negligible
R11	10.13	10.62	0.49	1%	Negligible
R12	9.25	9.53	0.28	1%	Negligible
R13	17.33	18.54	1.21	3%	Negligible
R14	13.98	14.69	0.71	2%	Negligible
R15	11.37	12.32	0.95	2%	Negligible
R16	12.28	13.42	1.14	3%	Negligible

Table A19.7 Annual Mean PM_{10} results at Sensitive Human Receptor Locations – Scenario 1

Receptor ID	Annual mean PM_{10} concentrations ($\mu g.m^{-3}$)				
	Without Scenario 1	With Scenario 1	Change	Change as % of objective	Impact descriptor
R1	14.23	14.29	0.06	0%	Negligible
R2	14.87	14.90	0.03	0%	Negligible
R3	13.94	13.98	0.04	0%	Negligible
R4	13.58	13.61	0.04	0%	Negligible
R5	13.34	13.36	0.02	0%	Negligible
R6	14.90	14.93	0.02	0%	Negligible
R7	15.02	15.05	0.03	0%	Negligible
R8	14.20	14.22	0.03	0%	Negligible
R9	13.40	13.43	0.03	0%	Negligible
R10	13.82	13.83	0.01	0%	Negligible
R11	12.68	12.70	0.02	0%	Negligible
R12	13.86	13.87	0.01	0%	Negligible

Receptor ID	Annual mean PM_{10} concentrations ($\mu g.m^{-3}$)				
	Without Scenario 1	With Scenario 1	Change	Change as % of objective	Impact descriptor
R13	13.79	13.83	0.04	0%	Negligible
R14	14.54	14.57	0.02	0%	Negligible
R15	12.58	12.61	0.03	0%	Negligible
R16	12.61	12.65	0.04	0%	Negligible

Table A19.8 Short-Term PM_{10} Results at Sensitive Human Receptor Locations – Scenario 1

Receptor ID	Number of Exceedences of the Short-Term PM_{10} Objective (Days)		
	Without Scenario 1	With Scenario 1	Change
R1	0	0	0
R2	0	0	0
R3	0	0	0
R4	0	0	0
R5	0	0	0
R6	0	0	0
R7	0	0	0
R8	0	0	0
R9	0	0	0
R10	0	0	0
R11	1	1	0
R12	0	0	0
R13	0	0	0
R14	0	0	0
R15	1	1	0
R16	1	1	0

Table A19.9 Annual Mean $PM_{2.5}$ results at Sensitive Human Receptor Locations - Scenario 1

Receptor ID	Annual mean $PM_{2.5}$ concentrations ($\mu g.m^{-3}$)				
	Without Scenario 1	With Scenario 1	Change	Change as % of objective	Impact descriptor
R1	9.42	9.46	0.04	0%	Negligible

Receptor ID	Annual mean $PM_{2.5}$ concentrations ($\mu g.m^{-3}$)				
	Without Scenario 1	With Scenario 1	Change	Change as % of objective	Impact descriptor
R2	9.78	9.80	0.02	0%	Negligible
R3	9.25	9.27	0.02	0%	Negligible
R4	8.93	8.96	0.02	0%	Negligible
R5	8.78	8.80	0.01	0%	Negligible
R6	9.57	9.59	0.02	0%	Negligible
R7	9.64	9.66	0.02	0%	Negligible
R8	9.41	9.42	0.02	0%	Negligible
R9	8.73	8.75	0.02	0%	Negligible
R10	8.96	8.97	0.01	0%	Negligible
R11	8.48	8.49	0.01	0%	Negligible
R12	9.33	9.34	0.01	0%	Negligible
R13	9.10	9.13	0.03	0%	Negligible
R14	9.45	9.47	0.01	0%	Negligible
R15	8.43	8.45	0.02	0%	Negligible
R16	8.45	8.47	0.02	0%	Negligible

28. The results of the Scenario 1 road traffic emissions assessment show a similar pattern to those predicted in the proposed East Anglia TWO project alone assessment. Annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted to be 'well below' (i.e. less than 75% of) the respective air quality Objectives at all receptors outside of the Stratford St Andrew Air Quality Management Area (AQMA), both with and without Scenario 1. NO_2 concentrations were predicted to approach the annual mean Objective at receptor R1 which is located on Long Row, Stratford St Andrew which is where the AQMA is designated.

29. The change in NO_2 concentrations was no greater than 4% at all receptors; this corresponded to a 'negligible' impact at receptors R2 – R16 due to low total NO_2 concentrations, in accordance with IAQM and Environmental Protection UK (EPUK) guidance (IAQM and EPUK 2017). Receptor R1 was predicted to experience a 'moderate adverse' impact due to higher overall concentrations which are consistent with the AQMA designation.

30. The assessment of Scenario 1 was carried out using the same conservative assessment assumptions as described in the proposed East Anglia TWO project alone assessment. It is therefore considered that reported concentrations are conservative, and that by 2028, overall pollutant concentrations and the subsequent magnitude of impact would be reduced at all receptors from those reported.

31. All predicted NO_2 concentrations were well below 60µg.m-3 and therefore, in accordance with Defra guidance in Local Air Quality Management Technical Guidance (LAQM.TG) (16) (Defra 2016), the 1-hour mean Objective is unlikely to be exceeded (see ***Table A19. 10***). Based on the calculation provided by Defra, as detailed in ***section 19.4.3.2.9*** of ***Chapter 19 Air Quality***, the short-term PM_{10} objective was predicted to be met at all modelled locations with less than 35 exceedances of the daily mean objective of 50µg.m^{-3}. Using the Defra calculation, there was no change in the number of days exceeding the daily mean objective between the 'without' and 'with' development scenarios.

Table A19. 10 Air Quality Strategy Objectives (England) for the Purposes of LAQM

Pollutant	Air Quality Objective		To Be Achieved By
	Concentration	Measured as*	
Nitrogen Dioxide (NO_2)	200 µg.m^{-3}	1 hour mean not to be exceeded more than 18 times per year	31/12/2005
	40 µg.m^{-3}	Annual mean	31/12/2005
Particles (PM_{10})	50 µg.m^{-3}	24-hour mean not to be exceeded more than 35 times per year	31/12/2004
	40 µg.m^{-3}	Annual mean	31/12/2004
Particles ($PM_{2.5}$)	25 µg.m^{-3}	Annual mean (target)	2020
	15% cut in annual mean (urban background exposure)	2010 - 2020	

32. This assessment concludes that traffic impacts associated with Scenario 1 upon local air quality are not significant based upon:

- A predicted negligible impact at all receptor locations except one, which was predicted to experience a 'moderate adverse' impact;

- Predicted pollutant concentrations were 'well below' the relevant air quality Objectives at all considered receptor locations outside of the AQMA;
- Scenario 1 traffic flows were not predicted to cause a breach of any of the air quality Objectives at any identified sensitive receptor location; and
- A conservative approach to the assessment was taken, with the use of conservative traffic assumptions and 2017 emission factors, background concentrations and NOx to NO_2 conversion rates in the future year assessment scenarios.

19.3.3 Ecological Receptors

33. The results of the assessment of nutrient nitrogen deposition on designated ecological sites are detailed in ***Table A19.11.***

Table A19.11 Nutrient Nitrogen Deposition Results

Designated ecological site	Transect ID	Nutrient nitrogen deposition (kgN.ha.y^{-1})		Change (kgN.ha.y^{-1})	Change as % of lowest Critical Load
		Without Scenario 1	With Scenario 1		
Sandlings SPA/Leiston-Aldeburgh SSSI	T-1	1.01	1.06	0.050	1%
	T-2	0.77	0.78	0.011	0%
	T-3	0.74	0.74	0.006	0%
	T-4	0.73	0.73	0.004	0%
	T-5	0.72	0.72	0.003	0%

34. As detailed in ***Table A19.11***, increases in nutrient nitrogen deposition were no greater than 1% of the most stringent critical load at the transect location closest to the road network. Impacts are therefore considered to be not significant, in accordance with Environment Agency guidance (Environment Agency 2017).

19.4 Summary

35. ***Table A19.12*** gives an overarching summary of which of the two construction scenarios, detailed above, will be the realistic worst case in terms of impacts relating to air quality.

Table A19.12 Summary of Scenario 1 and Scenario 2 Realistic Worst Case Assumptions

Impact	Worst Case	Notes
Impact 1: Construction phase dust and fine particulate matter	Scenario 1	Identified as worst case, but with mitigation measures is predicted not to be significant.
Impact 2: Construction phase road traffic emissions	Scenario 1	Identified as worst case, but with mitigation measures is predicted not to be significant.
Ecological receptors	N/A	Effects considered insignificant in both scenarios.

36. Overall, construction scenario 1 creates a realistic worst case in terms of impacts to air quality. Therefore, scenario 1 will be carried through into the wider CIA with other developments, see ***section 19.7*** of ***Chapter 19 Air Quality.***

19.5 References

Department for the Environment Food and Rural Affairs (Defra) (2016) Local Air Quality Management Technical Guidance Document Local Air Quality Management.TG (16) London: Defra

Environment Agency (2017) Air Emissions Risk Assessment for your Environmental Permit https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) (2017). Land-Use Planning & Development Control: Planning for Air Quality