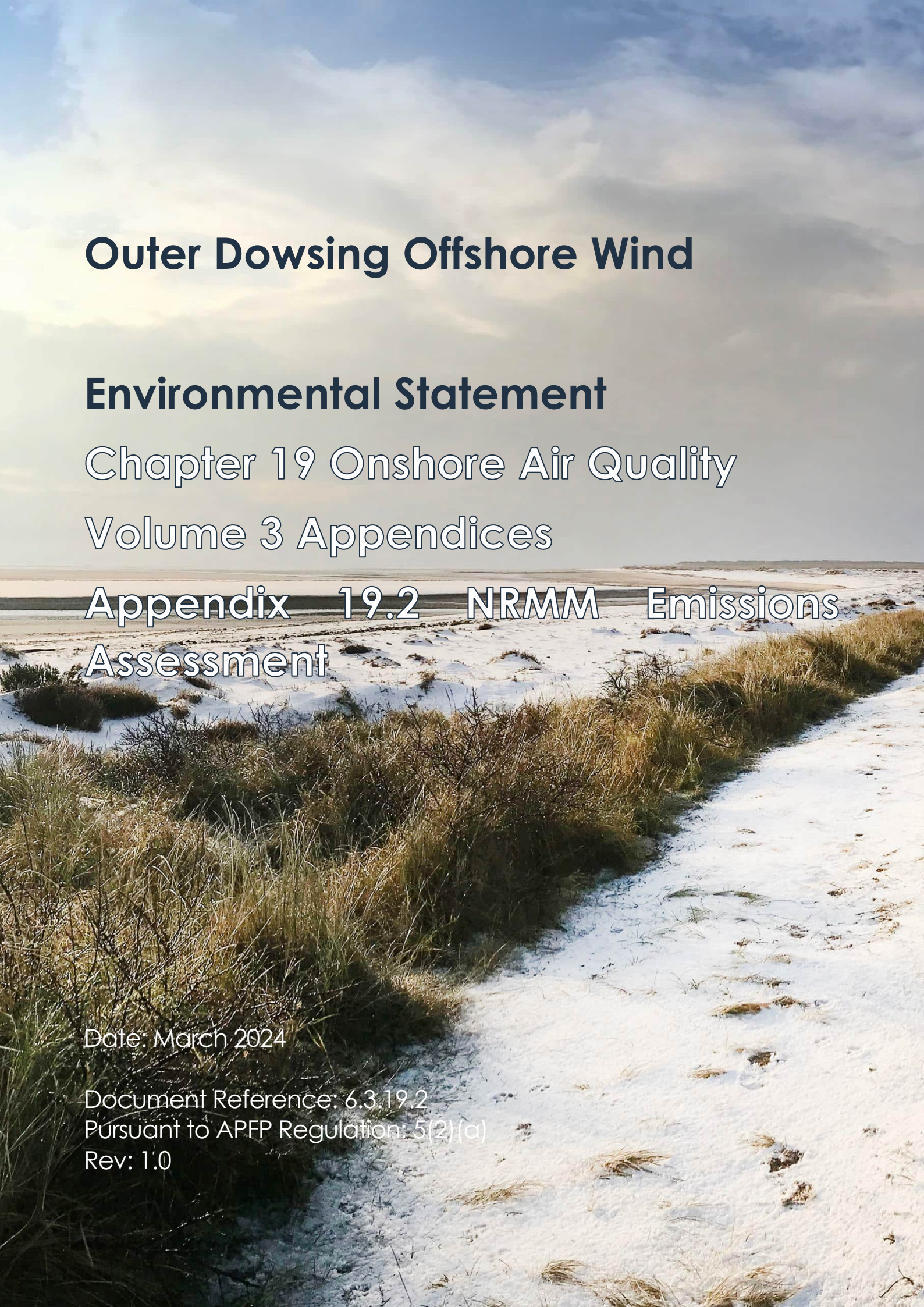

Outer Dowsing Offshore Wind

Environmental Statement

Chapter 19 Onshore Air Quality

Volume 3 Appendices

Appendix 19.2 NRMM Emissions Assessment

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Volume 3, Appendix 19.2: NRMM Emissions Assessment

Outer Dowsing Offshore Wind Environmental Statement

GoBe Consultants Ltd

Prepared by:

SLR Consulting Limited

3rd Floor, Brew House, Jacob Street, Tower Hill, Bristol, BS2 0EQ

SLR Project No.: 410.V05356.00013

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Basis of Report

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Table of Contents

Tables in Text

Acronyms and Abbreviations

Acronym	Description
µg/m3	Micrograms per cubic metre
APIS	Air Pollution Information System
AQAL	Air Quality Assessment Level
AQMP	Air Quality Management Plan
CoCP	Code of Construction Practice
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
DPF	Diesel Particulate Filters
ECC	Export Cable Corridor
EU	European Union
HDD	Horizontal Directional Drill
IAQM	Institute of Air Quality Management
LAQM.TG22	Local Air Quality Management Technical Guidance 2022
LNR	Local Nature Reserve
LWS	Local Wildlife Site
LWT	Lincolnshire Wildlife Trust
MDS	Maximum Design Scenario
NGSS	National Grid Substation
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
ODOW	Outer Dowsing Offshore Wind (The Project)
OnSS	Onshore Substation
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm (micrometres) or less
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TCC	Temporary Construction Compounds
TJB	Transition Joint Bay
UK	United Kingdom

Terminology

Term	Description
400kV cable	High-voltage cables linking the OnSS to the NGSS.
400kV cable corridor	The 400kV cable corridor is the area within which the 400kV cables connecting the onshore substation to the NGSS will be situated.
Baseline	The status of the environment at the time of assessment without the development in place.
Cable Circuit	A number of electrical conductors necessary to transmit electricity between two points bundled as one cable or taking the form of separate cables and may include one or more auxiliary cables (normally fibre optic cables).
Cable ducts	A duct is a length of underground piping which is used to house the Cable Circuits.
Connection Area	An indicative search area for the NGSS.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP).
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the sensitivity of the receptor, in accordance with defined significance criteria.
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
Environmental Statement	The suite of documents that detail the processes and results of the EIA.
Export cables	High voltage cables which transmit power from the Offshore Substations (OSS) to the Onshore Substation (OnSS) via an Offshore Reactive Compensation Platform (ORCP) if required, which may include one or more auxiliary cables (normally fibre optic cables).
Haul Road	The track within the onshore ECC which the construction traffic would use to facilitate construction.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Intertidal	The area between Mean High-Water Springs (MHWS) and Mean Low Water Springs (MLWS).
Joint bays	An excavation formed with a buried concrete slab at sufficient depth to enable the jointing of high voltage power cables.
Landfall	The location at the land-sea interface where the offshore export cables and fibre optic cables will come ashore.
Link boxes	Underground metal chamber placed within a plastic and/or concrete pit where the metal sheaths between adjacent export cable sections are connected and earthed.
Maximum Design Scenario	The project design parameters, or a combination of project design parameters that are likely to result in the greatest potential for change in relation to each impact assessed.
Mitigation	Mitigation measures are commitments made by the Project to reduce and/or eliminate the potential for significant effects to arise as a result of the Project. Mitigation measures can be embedded (part of the project design) or

Term	Description
	secondarily added to reduce impacts in the case of potentially significant effects.
Onshore Export Cable Corridor (ECC)	The Onshore Export Cable Corridor (Onshore ECC) is the area within which the export cables running from the landfall to the onshore substation will be situated.
Onshore Infrastructure	The combined name for all onshore infrastructure associated with the Project from landfall to grid connection.
Onshore substation (OnSS)	The Project's onshore HVAC substation, containing electrical equipment, control buildings, lightning protection masts, communications masts, access, fencing and other associated equipment, structures, or buildings; to enable connection to the National Grid.
Order Limits	The area subject to the application for development consent. The limits shown on the works plans within which the Project may be carried out.
Outer Dowsing Offshore Wind (ODOW)	The Project.
The Planning Inspectorate	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
Pre-construction and post-construction	The phases of the Project before and after construction takes place.
The Project	Outer Dowsing Offshore Wind, an offshore wind generating station together with associated onshore and offshore infrastructure.
Receptor	A distinct part of the environment on which effects could occur and can be the subject of specific assessments. Examples of receptors include species (or groups) of animals or plants, people (often categorised further such as 'residential' or those using areas for amenity or recreation), watercourses etc.
Statutory consultee	Organisations that are required to be consulted by the Applicant, the Local Planning Authorities and/or The Planning Inspectorate during the pre-application and/or examination phases, and who also have a statutory responsibility in some form that may be relevant to the Project and the DCO application. This includes those bodies and interests prescribed under Section 42 of the Planning Act 2008.
Study area	Area(s) within which environmental impact may occur – to be defined on a receptor-by-receptor basis by the relevant technical specialist.
Transition Joint Bay (TJBs)	The offshore and onshore cable circuits are jointed on the landward side of the sea defences/beach in a Transition Joint Bay (TJB). The TJB is an underground chamber constructed of reinforced concrete which provides a secure and stable environment for the cable.
Trenched technique	Trenching is a construction excavation technique that involves digging a narrow trench in the ground for the installation, maintenance, or inspection of pipelines, conduits, or cables.
Trenchless technique	Trenchless technology is an underground construction method of installing, repairing, and renewing underground pipes, ducts and cables using techniques which minimize or eliminate the need for excavation. Trenchless technologies involve methods of new pipe installation with minimum surface and environmental disruptions. These techniques may include Horizontal Directional Drilling (HDD), thrust boring, auger boring, and pipe ramming,

Term	Description
	which allow ducts to be installed under an obstruction without breaking open the ground and digging a trench.

19.0 NRMM Emissions Assessment

19.1 Introduction

1. The scope of the assessment is to understand potential air quality effects associated with emissions generated by Non-Road Mobile Machinery (NRMM) during the construction phase of Outer Dowsing Offshore Wind (ODOW) ('the Project'). This is in response to comments from The Planning Inspectorate contained within the Scoping Opinion (The Planning Inspectorate, 2022).

19.2 Background

2. According to the Institute of Air Quality Management (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2016) experience of assessing exhaust emissions from NRMM suggests that they are unlikely to have significant effects on local air quality.

3. This position is supported by the Department for Environment, Food and Rural Affairs (Defra) Local Air Quality Management Technical Guidance (TG22) (LAQM.TG22) (Defra, 2022), providing suitable NRMM controls are applied.

4. Consistent with advice provided by the IAQM and Defra, it was initially proposed to scope out effects associated with emissions generated from NRMM used during the construction phase of the Project on the basis that suitable controls will be applied. A series of example controls were included within the Scoping Report (ODOW, 2022).

5. In the Scoping Opinion (The Planning Inspectorate, 2022), The Planning Inspectorate stated that there was insufficient information on the type, quantity, and use of NRMM during the construction phase to scope this matter out of the assessment. The Planning Inspectorate therefore recommended to undertake an assessment of emissions generated from the operation of NRMM during construction.

6. A series of construction phase control measures are included within the Outline Air Quality Management Plan (document reference 8.1.2) to minimise emissions from NRMM. The Outline Air Quality Management Plan forms part of the Outline Code of Construction Practice (CoCP) (document reference 8.1). Implementation of a final CoCP in accordance with the Outline CoCP will be a requirement of the Development Consent Order (DCO).

7. In recognition of The Planning Inspectorate's recommendations, a qualitative assessment of NRMM emissions has been undertaken to inform the likelihood of a significant effect arising during the construction phase. The assessment has been conducted in accordance with guidance prescribed within Defra's LAQM.TG22. A qualitative approach to NRMM assessment is supported by both the IAQM and Defra (IAQM, 2016 and Defra, 2022) and should provide sufficient screening of impacts.

19.3 Assessment Methodology

8. With reference to LAQM.TG22, the qualitative assessment has considered the following factors:

- Duration of construction works and associated phasing (where available);
- The number and type of NRMM to be used (including the emissions standards of the NRMM);
- Operating hours of NRMM;
- Proximity of sensitive receptors to NRMM working areas; and
- Existing air quality conditions in the area (e.g., Defra background pollutant concentrations).

9. Following a review of approaches adopted for other Nationally Significant Infrastructure Projects (NSIPs) where extensive onshore construction activities are proposed, a 50m distance screening threshold in relation to NRMM emissions has previously been accepted by statutory consultees and The Planning Inspectorate. Following submission and with use of this distance screening threshold, the DCO for the Northampton Gateway Rail Freight Interchange was awarded by the Secretary of State in 2019[1]. Use of 50m for screening impacts from NRMM emissions is considered appropriate. The basis for this distance screening threshold relates to guidance provided in LAQM.TG22, used for the purposes of establishing background monitoring stations to ensure there is no additional influence of local pollution sources:

> "*For urban background or suburban sites there should be no major sources of pollution (for example a large multi-storey car park) within 50m. There should be no medium sized emission sources (for example, petrol stations, boiler vents, or ventilation outlets to catering establishments) within 20m.*"

10. As detailed, the 50m distance threshold relates to major sources of pollution. NRMM emissions generated by Project activity are not considered to be comparable to major sources of pollution (for example a large multi-storey car park). Furthermore, in consideration of likely construction activities, the extent of NRMM used during the construction phase of the Project is likely to be lower than that used to facilitate the construction of the Northampton Gateway Rail Freight Interchange. Construction activities for the Project will also occur in a temporary and mobile manner (e.g., across the spatial extent of the onshore Export Cable Corridor (ECC) and 400kV cable corridor). Exposure to emission contributions will therefore be transient. Whereas for the Northampton Gateway Rail Freight Interchange, construction activities are confined to a smaller boundary where exposure to NRMM emissions is likely to be constant throughout the construction phase. In this context, use of 50m to screen impacts from NRMM is considered to be precautionary.

11. A 50m distance screening threshold in relation to NRMM emissions has been applied to the Order Limits to inform the spatial extent of affected receptors (human and ecological). Use of the Order Limits for the purposes of informing the extent of NRMM emissions is conservative, as the boundary represents the maximum design parameters/extents of any proposed construction area. In addition, it assumes that NRMM will be located concurrent with the Order Limits, which is highly unlikely to be the case; as NRMM locations will vary across the active construction area and will not typically be operated continuously at the Order Limits.

[1] Statutory Instruments. 2019 No. 1358 Infrastructure Planning. The Northampton Gateway Rail Freight Interchange Order 2019. Accessed: https://www.legislation.gov.uk/uksi/2019/1358/made.

19.4 Baseline Environment

12. This worst presents the baseline environment in relation to NRMM, including NRMM emissions regulation and background air quality.

19.4.1 NRMM Emissions Regulation

13. NRMM emissions are controlled through European Directives (e.g., Regulation (EU) 2016/1628) in terms of maximum operable emission limits. The Regulation is written into UK legislation by The Non-Road Mobile Machinery (Type-Approval and Emissions of Gaseous and Particulate Pollutants) Regulations 2018[2]. Emissions standards are applied to NRMM engines at the point of placing on the market and typically become stricter following the introduction and availability of cleaner technologies and fuels. The most recent stringent emission standards, Stage V, were effective from 2019 for engines below 56kW and above 130kW, and from 2020 for engines of 56-130kW.

19.4.2 Background Pollutant Concentrations

14. As discussed in Volume 1, Chapter 19: Onshore Air Quality (document reference 6.1.19), Defra maintains a nationwide model of existing and future background air quality concentrations at a 1km grid square resolution. The datasets include annual average concentration estimates for nitrogen oxides (NO_x), nitrogen dioxide (NO_2), and particulate matter (PM_{10} and $PM_{2.5}$) using a reference year of 2018 (the year in which comparisons between modelled and monitored concentrations are made).

15. Consideration has been given to pollutant concentrations reported for the first year of construction activities associated with the Project. Use of 2027 datasets to characterise baseline pollutant concentrations for the whole construction phase is conservative, in recognition of the forecast improvements to air quality (associated with the introduction of policy and cleaner emission technologies/restrictions). Baseline concentrations anticipated beyond 2027 are expected to be lower in comparison to those reported. The start of the construction phase (2027) also coincides with the greatest extent of potential NRMM activity and is therefore worst-case with respect to potential emission contributions and background pollutant levels. Pollutant concentrations for the assessment base year of 2019 have also been provided as a comparison and to inform the evolution of the baseline.

16. The maximum values from the grid squares covered by the Order Limits are provided in Table 1919.1. The corresponding annual mean Air Quality Assessment Levels (AQALs) and/or Critical Levels (where available) are provided for comparison.

Table 1919.1: Maximum Defra Mapped Background Pollutant Concentrations

Pollutant		Year	Annual Mean Concentration (µg/m^3)	
			Maximum Background	AQAL or Critical Level
Nitrogen Oxides	NO_x	2019	12.1	30: Critical Level
		2027	9.6	

[2] Statutory Instruments. 2018 No. 764 Environmental Protection. The Non-Road Mobile Machinery (Type-Approval and Emission of Gaseous and Particulate Pollutants) Regulations 2018. Accessed: https://www.legislation.gov.uk/uksi/2018/764/made.

Pollutant		Year	Annual Mean Concentration (µg/m^3)	
			Maximum Background	AQAL or Critical Level
Nitrogen Dioxide	NO_2	2019	9.2	40: AQAL
		2027	7.4	
Particulate Matter	PM_{10}	2019	16.8	40: AQAL
		2027	15.8	
	$PM_{2.5}$	2019	9.4	20: AQAL
		2027	8.4	

17. The maximum annual mean background concentrations across the NRMM onshore study area are well below the respective AQALs and Critical Levels in both 2019 and 2027. The likelihood of NRMM causing potential exceedances of the AQALs and/or Critical Levels is low.

19.5 Affected Receptors

18. A review of onshore sensitive receptor locations (human and ecological) within 50m of potential NRMM activity has been undertaken (i.e., areas within proximity to the Order Limits). Outcomes of this exercise will be used to identify whether receptors are present and further assessment is required. The areas affected by potential NRMM activity are presented in Volume 2, Figure 19.4: Non-Road Mobile Machinery Emissions Affected Areas (document reference 6.2.19.4).

19.5.1 Human Receptors

19. There are human receptors located within 50m of the Order Limits, which could potentially be impacted by NRMM activity. These are largely sporadic and relate to singular properties or receptor exposure locations.

20. Detailed examination of NRMM interactions with specific receptors is discussed in Section 19.6.5.

19.5.2 Ecological Receptors

21. Table 19.2 details the extent of designated ecological sites within 50m of potential NRMM activity, the corresponding onshore ECC route segment, extent of the affected area (%) within each of the designations and the main habitats. These locations are illustrated in Volume 2, Figure 19.4 (document reference 6.2.19.4).

22. The Air Pollution Information System (APIS)[3] was reviewed to provide an indication of sensitive habitats within the Greater Wash Special Protection Area (SPA) and the Sea Bank Clay Pits Site of Special Scientific Interest (SSSI). The Local Nature Reserve (LNR), Local Wildlife Site (LWS) and Lincolnshire Wildlife Trust reserves (LWT) citations have been reviewed to provide the main habitat.

[3] APIS, https://www.apis.ac.uk/srcl [accessed November 2023].

Table 19.2: Details of Affected Designated Ecological Sites

Site Name and Designation	Route Segment	Extent of Affected Area (%) within Designation	Habitat
Greater Wash SPA	ECC1: Landfall to A52 – Hogsthorpe	<0.01	Coastal dune grasslands (grey dunes) – acid type
			Coastal dune grasslands (grey dunes) – calcareous type
			Shifting coastal dunes
Sea Bank Clay Pits SSSI		2.1	Rich fens
Havenside LNR	ECC10: Church End Lane to The Haven	6.8	Coarse or rank grassland
Anderby Creek Sand Dunes LWS	ECC1: Landfall to A52 – Hogsthorpe	54.3	Coarse or rank grassland
			Sand dune
			Scrub – scattered/dense
Anderby Marsh LWT		48.5	Coastal grazing marsh
Wolla Bank Reedbed LWT		8.2	Reedbed
Friskney Decoy Wood LWT	ECC6: Steeping River to Fodder Dike Bank/Fen Bank	3.2	Woodland
Doves' Lane Drains LWS	ECC9: Ings Drove to Church End Lane	0.5	Drain
Havenside LWS	ECC10: Church End Lane to The Haven	7.0	Coarse or rank grassland
Hobhole Bank LWS		39.9	Scrub
			Semi-improved neutral grassland
			Semi-improved calcareous grassland
Hobhole Drain, Baker's Bridge South LWS		4.5	Scrub
			Semi-improved neutral grassland
			Semi-improved calcareous grassland
			Coarse or rank grassland
			Ditch
Frampton Hall LWS	ECC11: The Haven to Marsh Road	0.1	Parkland
Risegate Eau LWS	ECC13: Fosdyke to Surfleet Marsh OnSS/Marsh Drove	14.9	Coarse or rank grassland
			Drain

Site Name and Designation	Route Segment	Extent of Affected Area (%) within Designation	Habitat
			Linear reedbed
			Scrub
South Bank Fosdyke LWS		100	Coarse or rank grassland
			Saltmarsh
Surfleet Bank LWS	ECC14: Surfleet Marsh OnSS/Marsh Drove to Connection Area	9.4	Neutral grassland

23. Sensitive ecological receptors are found within 50m of potential NRMM activity generated by the Project.

24. Detailed examination of NRMM interactions with specific receptors is discussed in Section 19.6.5.

19.6 NRMM Construction Phase Assessment

19.6.1 Overview and Duration of Works

25. The construction phase of the Project is anticipated to commence in 2027, with onshore construction anticipated to last for a duration up to 51-months. The construction phase is therefore considered short term.

26. Onshore construction activities will occur in a phased manner and will vary along the spatial extent of the Order Limits, according to specific works (e.g., construction of the Onshore Substation (OnSS)). Discrete construction activities will not occur concurrently in the same location (e.g., construction, use and reinstatement).

27. It is considered that required construction works can be split into three main elements:

- Landfall connection;
- Onshore ECC and 400kV cable corridor; and
- OnSS construction.

19.6.1.1 Landfall Connection

28. The landfall connection works are required to connect the offshore and onshore cable circuits, whereby these are jointed within Transition Joint Bays (TJB) located on the landward side of the sea defences/beach.

29. The installation of the offshore export cables at landfall will be undertaken by Horizontal Directional Drilling (HDD), with the punch out to be in the subtidal zone. Given the location and nature of landfall operations are yet to be decided, a worst-case assessment is considered, with activities assumed intertidal nearer to potential onshore sensitive receptors.

30. The landfall works shall require temporary piling activities to facilitate the drilling and cable installation activities. The activities shall be required for the installation works only and may consist of localised driven beam, sheet pile wall and steel casing at the trenchless launch point and exit point.

31. Offshore cables will be connected onshore within TJBs, located on the landward side of the Roman Bank Road. Specific TJB activities include transition bay excavation, wall and base construction, cable pulling and connection of cables in the bay, subsequent roof and backfill over the bays, and testing plant.

19.6.1.2 Onshore ECC and 400kV Cable Corridor

32. The onshore ECC is the cable corridor within which the final cable route will be located. The onshore ECC extends approximately 70km in length to the grid connection point at the OnSS. The final permanent cable route corridor width will be 60m within the 80m wide temporary construction corridor.

33. The 400kV cable corridor will contain high-voltage cables and will link the OnSS to the National Grid Substation (NGSS). The 400kV cables will be buried and therefore will require trenches to be excavated or trenchless techniques to be adopted to install ducts to house the cable circuits. The 400kV cable corridor has a typical working width of 60m.

34. Most of the cable route will be constructed using an open cut method of construction, however, trenchless techniques at specific locations will also be employed. Major roads, rivers and Internal Drainage Board managed drains will be crossed using trenchless techniques.

35. Construction works associated with the onshore ECC and 400kV cable corridor can be described as five key stages, with different activities associated with each stage. Some of these activities/stages will follow on from one another, however, others will be intermittent.

36. It’s possible that different segments of the route will be worked on independently at the same time and the route may not be worked sequentially from one end to the other.

37. The key construction stages and activities associated with the onshore ECC and 400kV cable corridor are as follows:

- Stage 1 – pre-construction works (pre-mobilisation preparation works) – environmental works that are non-intrusive;
- Stage 2 – enabling works (mobilisation, access, and welfare establishment);
    - Establish Temporary Construction Compounds (TCCs) and other compounds;
    - Topsoil stripping and site preparation;
    - Pre-construction drainage;
    - Haul road installation;
- Stage 3 – cable infrastructure installation;
    - ECC – minor trenchless drills;

- ECC – major trenchless drills;
- Open cut trenching works;
- Open trench backfilling;

- Stage 4 – cable installation;
  - Joint bays excavation (localised);
  - Cable pulling through the pre-installed cable ducts;
  - Joint bays backfill (localised);
- Stage 5 – reinstatement works and demobilisation;
  - Post-construction drainage installation;
  - Haul road removal; and
  - Topsoil reinstatement.

19.6.1.3 OnSS Construction

38. The OnSS is to be located near Surfleet Marsh. Specific activities associated with the OnSS construction include ground works and platform formation, building foundation works, access road and car parking works, building fabrication, and plant installation.

19.6.2 Working Hours

39. Construction working hours will be set by a requirement of the DCO, with necessary permit/authorisations required for the construction work to commence. Typically, construction activities will be in the daytime only; between 07:00 and 19:00, Monday to Saturday, with no work on Sundays, Bank Holidays or in the night-time. The typical construction period therefore equates to less than half of the calendar year.

40. Certain ‘time critical activities’ (e.g. use of HDD at major crossings, and cable pulling and testing at the TJB) may require continuous working outside the normal hours; which will require prior agreement from the relevant planning authority.

19.6.3 Controls and Mitigation

41. In line with the emission standards discussed in Section 19.4.1 and the anticipated construction commencement year (2027), it is likely that NRMM utilised by the Project will comply with the Stage V emission standard. However, in some instances, this will depend on whether specialist equipment is commercially available.

42. Furthermore, a series of construction phase control measures are included in the Outline Air Quality Management Plan (document reference 8.1.2), which forms part of the Outline CoCP (document reference 8.1), to minimise NRMM emissions. Implementation of the CoCP will be secured as a requirement of the DCO. The measures, as included in the Outline AQMP, specific to NRMM emissions are as below:

- Plan site layout so that machinery is located away from receptors, as far as is practicable;
- Ensure all vehicles switch off engines when stationary – no idling vehicles. This applies to idle construction equipment, and trucks waiting to access the site and being loaded/unloaded;

- NRMM equipment to be properly maintained and regularly checked to support efficient fuel consumption;
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable;
- Adhere to the Construction Traffic Management Plan to manage potential impacts of construction traffic. Document 8.15 has been prepared in support of the DCO application and will be finalised by the appointed Principal Contractor(s);
- Where feasible and commercially available, ensure all equipment complies with the latest (Stage V) emission standards;
- Where feasible, ensure further abatement plant is installed on NRMM equipment, e.g., Diesel Particulate Filters (DPFs); and
- Impose and signpost a maximum-speed-limit of 20mph on haul roads and work areas.

43. As per Defra's LAQM.TG22, following application of the above controls, effects associated with NRMM emissions on sensitive receptors are unlikely to be significant.

19.6.4 Number, Type and Percentage Use of NRMM

44. Table 19.3 to Table 19.16 detail the number and type of plant to be used during the different construction activities. Construction activities have been grouped to represent different stages of the process (where applicable), and the number of operable equipment that could interact with a receptor at any one time is presented. The actual number of NRMM utilised for each activity at any point could be less than this.

45. The estimated percentage use of the NRMM during each activity, or the number of vehicle movements, is presented in Table 19.3 to Table 19.16. As noted, some items of plant are required for the entirety of the activity's duration (i.e., 100%) whereas other items are required for much less (e.g., 20% of the time). Whilst certain NRMM usage may be intense (100%), its use will be transient across the wider active construction area. Furthermore, the onshore construction area is expected to shift in location throughout the construction phase, as construction progresses, minimising the duration of exposure at any one location.

19.6.4.1 Landfall Connection

Table 19.3: NRMM: Landfall

Vehicle / Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
Generator	1	100%
Telehandler	1	75%
Silent Piling Rig	2	10%
Directional Drill Generator	2	100%
25 Tonne Excavator	1	10 movements in an hour
Small Dump Truck or similar	1	10 movements in an hour
Mud Pump	2	100%

Vehicle / Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
Mixing Tank	1	100%
Shaker System	1	100%
Cuttings/Recycling Tank	1	100%

19.6.4.2 Onshore ECC and 400kV Cable Corridor

Stage 1 – Pre-Construction Works

Stage 1 is pre-construction works and consists of environmental works that are non-intrusive i.e. without the use of the NRMM.

Stage 2 – Enabling Works

Table 19.4: NRMM: Topsoil Stripping and Site Preparation

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
30 Tonne Excavators	3	80%
20 Tonne Dozer	2	80%
Dump truck or similar	1	80%
Refuelling – tractor and double skinned trailer	1	20%

Table 19.5: NRMM: Pre-Construction Drainage

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
13 Tonne Excavator	3	80%
Hopper truck – Stone cart	1	80%
Mastenbroek trencher	1	80%
Stone delivery	1	20%
Fuel delivery	1	20%

Table 19.6: NRMM: Haul Road Installation

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
13 Tonne Excavator	3	80%
20 Tonne Dozer	1	80%
Vibrating Roller – driven	1	80%
Vibrating Roller – Rammax	1	80%
Dump truck or similar	2	80%

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
Stone delivery	1	20%
Plant refuelling	1	20%
Welfare unit (Garric)	1	100%

Stage 3 – Cable Infrastructure Installation

Table 19.7: NRMM: ECC Minor Trenchless Drills

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements
Generator	1	100%
Telehandler	1	20%
Sheet piling	0	0%
Drilling Rig	1	100%
Excavator	1	10 movements/day
Small dump truck/bowser/mud return	1	1 movements/hour
Mud Pump	1	100%
Mixing Tank	1	100%

Table 19.8: NRMM: ECC Major Trenchless Drills

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
Generator	1	100%
Telehandler	1	75%
Drilling Rig	1	100%
20 Tonne Excavator	1	100%
Excavator Mounted Vibrator for Sheet Piles	1	100%
Small dump truck/bowser/mud return	1	1 movement/hour
Mud Pump	1	100%
Mixing Tank	1	100%
Shaker System	1	100%
Cuttings/recycling tanks	1	100%

Table 19.9: NRMM: Trench Works

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
30 Tonne Excavators	2	80%
Hopper truck	1	80%
Vibratory Roller	1	80%
Thermal sand delivery – Tractor and trailer	1	20%
Tractor and trailer for duct installation	1	20%
Dewatering plant and generator	1 of each	100%
Refuelling	1	20%

Table 19.10: NRMM: Trench Backfilling

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
30 Tonne Excavators	2	80%
Vibratory Roller	2	80%
Dewatering and generator	1 of each	100%
Refuelling	1	20%

Stage 4 – Cable Installation

Table 19.11: NRMM: Joint Bays Excavation and Backfill (localised)

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
30 Tonne Excavators	1	80%
Vibratory Roller	2	80%
Concrete delivery	1	50%
Dewatering plant and generator	1 of each	100%
Refuelling	1	20%

Table 19.12: NRMM: Cable Pulling

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
Diesel Powered Winch Unit	1	100%
Generator	1	100%
Cable Delivery	1	20%

Stage 5 – Reinstatement Works and Demobilisation

Table 19.13: NRMM: Post Construction Drainage Installation

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
13 Tonne Excavator	3	80%
Hopper truck – Stone cart – CT12	1	80%
Mastenbroek trencher	1	80%
Stone delivery	1	20%
Fuel delivery	1	20%

Table 19.14: NRMM: Haul Road Removal

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
13 Tonne Excavator	3	80%
20 Tonne Dozer	2	80%
Raker/stone picker	1	80%
Dump truck or similar	2	80%
Stone removal	1	20%
Plant refuelling	1	20%
Welfare unit (Garric)	1	100%

Table 19.15: NRMM: Topsoil Reinstatement

Vehicle/Equipment	Indicative Number	Estimated Percentage of Operation During Activity or Movements in an Hour
30 Tonne Excavators	3	80%
Rakers/rotavator machines	2	80%
Dewatering plant and generator	1 of each	100%
Plant refuelling	1	20%

19.6.4.3 OnSS Construction

Table 19.16: NRMM: OnSS Construction

Vehicle/Equipment	Activity Description	Indicative Number (No.) at any Point	Estimated Percentage (%) of Operation During Activity
Excavator (earthworks)	Groundworks	6	100
Excavator (hydraulic breaker)		4	100
Dozer		4	75

Vehicle/Equipment	Activity Description	Indicative Number (No.) at any Point	Estimated Percentage (%) of Operation During Activity
Air compressor		4	100
Dump truck or similar		8	70
Generator		2	100
Crusher		2	80
Percussive piling rig	Building foundation works	1	100
Tracked drilling rig with hydraulic drifter		1	100
Crane mounted auger		1	100
Mini piling rig		2	100
Compressor for mini piling		1	100
Dump truck or similar		4	50
Truck mixer with pump		2	10
Excavator (earthworks)		3	80
Grinder		5	50
Compressor		2	100
Generator		2	100
Excavator	Access road and car parking works road works	2	100
Dump truck or similar		4	70
Asphalt spreader with support lorry		1	100
Vibratory roller		2	70
Grader		1	100
Mobile crane	Building fabrication and HV Plant Installation	1	50
Lorry		3	25
MEWP		2	75
Dump truck or similar		4	10
Compressor		1	100
Forklift truck		2	50
Grinder		5	50
Pneumatic chipper/drill		3	50
Scaffolding		1	25

19.6.5 NRMM Activity in Relation to Sensitive Receptors

46. Where there is uncertainty and/or optionality regarding the extent of specific construction activities within 50m of a receptor, all possible construction activities have been considered for completeness. This is considered the worst-case, as it is possible that the full extent of construction activities and NRMM identified may not occur within 50m of the

receptor. However, this approach ensures all potential scenarios and associated impacts have been assessed for completeness.

19.6.5.1 Human Receptors

Landfall Connection

47. When considering activities associated with the landfall connection, i.e. landfall beach and TJB activities (NRMM outlined in Table 19.3), there are no high sensitivity human receptors within 50m of potential NRMM activity. There are transient exposure locations present within 50m of potential NRMM activity – associated with the beach, footpaths, and farmland.

48. Any potential exposure to NRMM emissions is expected to be intermittent throughout the construction period. Furthermore, as a large proportion of construction activities at the landfall will be below ground level i.e., associated with trenchless techniques, this will minimise any impacts from NRMM emissions on sensitive human receptors.

Onshore ECC and 400kV Cable Corridor

49. There are human receptors located within 50m of the onshore ECC and 400kV cable corridor which may potentially be exposed to NRMM activity associated with the construction phase (NRMM outlined in Table 19.4 to Table 19.15).

50. For the onshore ECC to the grid connection point, this includes approximately 100 high sensitivity residential receptors along the ~70km route, in addition to hotels/inns, caravan parks and farm properties. For the 400kV cable corridor, this amounts to a few high sensitivity receptors.

51. Assessment of the onshore ECC and 400kV cable corridor represents the Maximum Design Scenario (MDS), as it effectively assumes NRMM is continuously operable within the Order Limits during construction. This is highly unlikely to be the case, as NRMM locations will vary across the active construction area and will not typically be operated continuously at the boundary.

52. Furthermore, NRMM exposure from the construction activities identified within 50m is considered short term and temporary in nature, indicatively lasting up to 51-months, however likely to be far shorter at most locations given the cable construction works will be moving about the extent of the onshore ECC and 400kV cable corridor.

53. Potential NRMM exposure associated with the construction compounds will occur in a more fixed location when compared to the cable construction works. Certain compounds may be established for much of the construction period (up to 51-months). This is still considered short term, and NRMM activity within this period would be limited to the agreed working hours, and NRMM not necessarily utilised for 100% of the time.

OnSS Construction

54. From review of the OnSS construction area, there are no high sensitivity human receptors (e.g., residential properties) located within 50m. As such, further consideration of NRMM activities associated with the OnSS construction is not required for human receptors. OnSS construction would have represented worst-case exposure to NRMM

activity, given the fixed location of work, extent of NRMM activity (Table 19.16) and duration of construction (up to 51-months). The absence of high sensitivity human receptors in proximity is therefore considered positive in terms of minimising the extent of potential interactions.

19.6.5.2 Ecological Receptors

55. The ecological receptors in proximity to the potential onshore construction activities (i.e., within 50m) and the spatial extent of the affected area are presented in Table 19.2.

Landfall

56. There are several designated sites located near the coastline and therefore, there is potential to interact with NRMM activity associated with landfall activities (NRMM outlined in Table 19.3). The designations include the Greater Wash SPA, Sea Bank Clay Pits SSSI, and several non-statutory LWS/LWT.

57. Only <0.01% of the overall SPA designation is potentially exposed to NRMM activity associated with onshore construction works, therefore representing a very small area of the designation potentially exposed to impacts.

58. Near the landfall, 2.1% of the Sea Bank Clay Pits SSSI will be exposed to potential NRMM activity, and the extent of the LWS/LWT designations potentially exposed varies from 8.2% to 54.3%. However, a large proportion of the landfall construction activities are expected to be below ground level i.e., associated with trenchless techniques. This is likely to minimise any impacts from NRMM emissions on the designated ecological sites.

Onshore Export Cable Corridor (ECC) and 400kV Cable Corridor

59. There are several designations with the potential to be affected by cable construction operations (NRMM outlined in Table 19.4 to Table 19.15).

60. This includes Havenside LNR and LWS, Friskney Decoy Wood LWS, Doves' Lane Drains LWS, Hobhole Bank LWS, Hobhole Drain, Baker's Bridge South LWS, Frampton Hall LWS, South Bank Fosdyke LWS and Surfleet Bank LWS.

61. For most of these designations <10% of the area is potentially exposed to NRMM activity, apart from Hobhole Bank LWS (39.9%), and South Bank Fosdyke LWS (100%).

OnSS Construction

62. From review of the OnSS construction area, there is one designated ecological site within 50m. This is the Risegate Eau LWS. As displayed in Table 19.2, only 14.9% of the LWS is located within 50m of potential NRMM activity (presented in Table 19.16), representing a small area of the overall designation. Whilst NRMM activity associated with the OnSS construction is concentrated in one area, it is expected to be transient across the area.

19.6.6 Assessment of Significance of Effect

63. This section provides a summary of the information to determine the likelihood of a significant effect arising from construction NRMM emissions. The following points are considered:

- The construction period is considered short term (i.e., up to 51-months), and working hours within this are further limited (typically in the daytime, Monday to Saturday);
- Construction activities are carried out in a sequence and an overlap of multiple activities at the same time at any location is unlikely;
- NRMM is likely to comply with the Stage V emission standard;
- A series of construction phase control measures are included within the Outline Air Quality Management Plan (Document 8.1.2), which forms part of the Outline CoCP (Document 8.1). These will help control any potential NRMM emissions;
- Use of the Order Limits in the assessment is considered conservative as it effectively assumes that NRMM use is consistent with the boundary. This is unlikely to be the case as NRMM locations will vary across the active construction area;
- Construction activities will be temporary/mobile, and plant will not be fixed for the full duration of works. The active construction area will spatially vary as construction progresses. Exposure to NRMM emissions (in the majority of cases) will be transient;
- Whilst some NRMM is required for 100% of the activity duration, some is required for much less than this. Furthermore, the use of NRMM will be transient across the wider active construction area; and
- The number of NRMM and its use (presented in Table 19.3 to Table 19.16) represent worst-case values associated with the activities, and therefore the actual number of plant or its use could be less than this at certain times or during certain activities.

19.6.6.1 Human Receptors

64. Human receptors are present within 50m of potential NRMM activity associated with the landfall connection and onshore ECC and 400kV cable corridor elements. The following additional points are considered for human receptors:

- There are no human receptors within 50m of the OnSS location (which would have represented worst-case exposure in terms of construction and NRMM activity);
- There are no high sensitivity human receptors located within 50m of potential NRMM activity associated with the landfall connection;
- Human receptor locations are intermittent along the onshore ECC and 400kV cable corridor. Activities associated with the construction of the onshore ECC and 400kV cable corridor occurs in stages and will be intermittent as construction will move along the extent; and
- The maximum annual mean background concentrations across the study area are well below the respective AQALs (Table 1919.1). Concentrations across the full extent of the Order Limits are expected to vary and be lower relative to the maximum reported. The likelihood of NRMM causing an exceedance (whilst considering the above points e.g. transient nature, type, quantum, and emission standards) is therefore low.

19.6.6.2 Ecological Receptors

65. Ecological receptors are present within 50m of potential NRMM activity associated with all three discussed elements – the landfall connection, onshore ECC and 400kV cable corridor, and OnSS construction. The following additional points are considered for ecological receptors:

- There is only one ecological receptor located near the OnSS construction area (Risegate Eau LWS), whereby only 14.9% of the designation is potentially exposed to NRMM activity;
- There are several designations located in proximity to the landfall connection activities. Of the statutory designations near the coastline, only <0.01% of the Greater Wash SPA potentially interacts with NRMM associated with the activities, and less than half (2.1%) of the Sea Bank Clay Pits SSSI. However, a large proportion of the landfall activities are expected to be below ground level i.e., associated with trenchless techniques. This is likely to minimise any impacts from NRMM emissions on the designated ecological sites;
- In terms of activities associated with the onshore ECC and 400kV cable corridor, the extent of designations potentially impacted varies, however for the majority, <10% of the area of each designation may be impacted. For the statutory Havenside LNR, this is 6.8%. Given the separation distance between activities, there is unlikely to be cumulative NRMM construction activities within 50m of any point within the designation; and
- The maximum annual mean background concentrations across the study area are well below the respective Critical Levels (Table 1919.1). Concentrations across the full extent of the Order Limits are expected to vary and be lower relative to the maximum reported. The likelihood of NRMM causing an exceedance (whilst considering the above points e.g., transient nature, type, quantum, and emission standards) is therefore low.

19.6.6.3 Summary

66. Given the above, it is considered unlikely that significant effects on onshore sensitive human and ecological receptors will arise due to NRMM emissions generated during the construction phase of the Project. Potential impacts from NRMM emissions would therefore be considered negligible, direct, and short term/temporary, with the resultant effect '**not significant'** in terms of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

References

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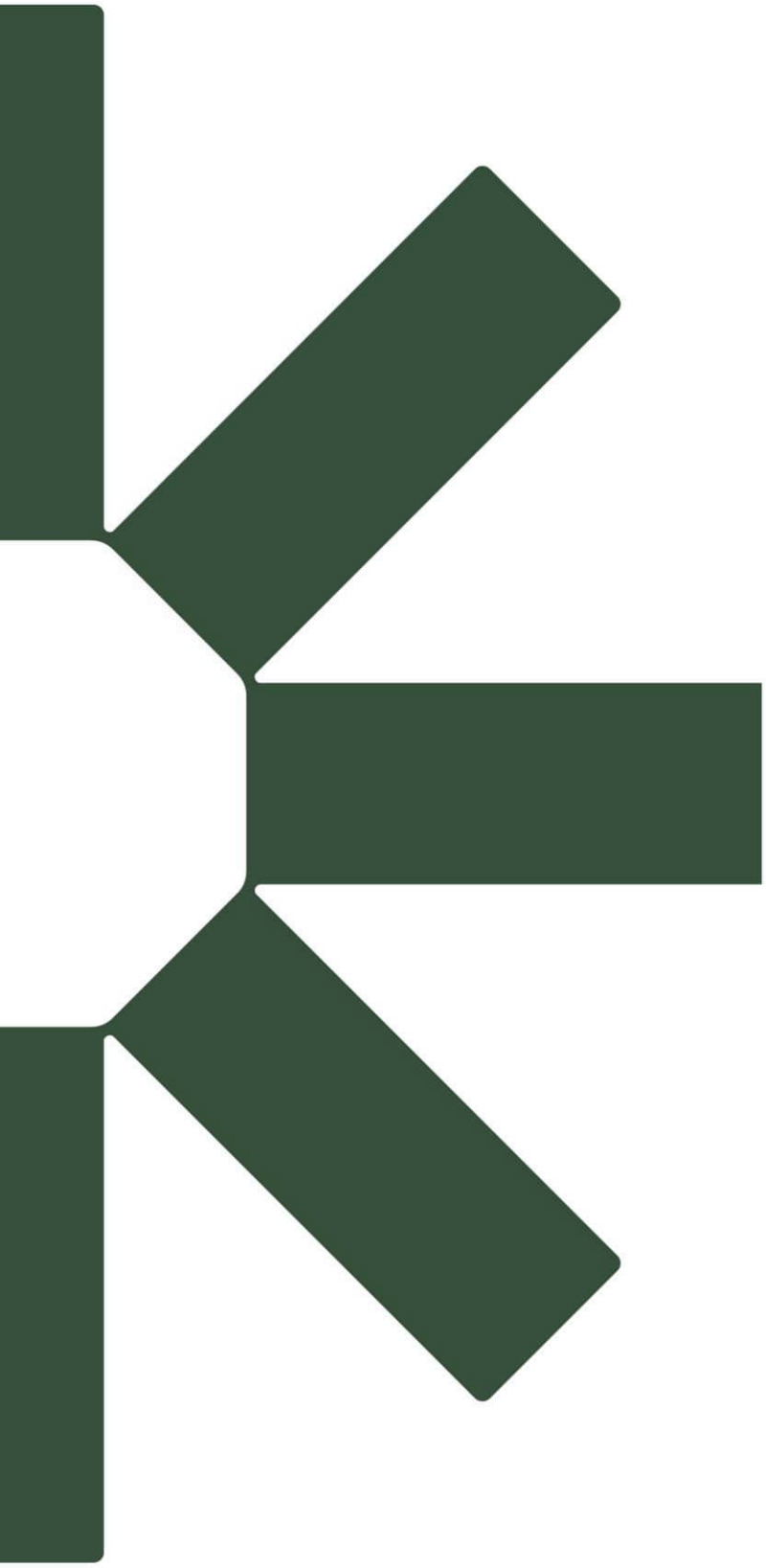

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