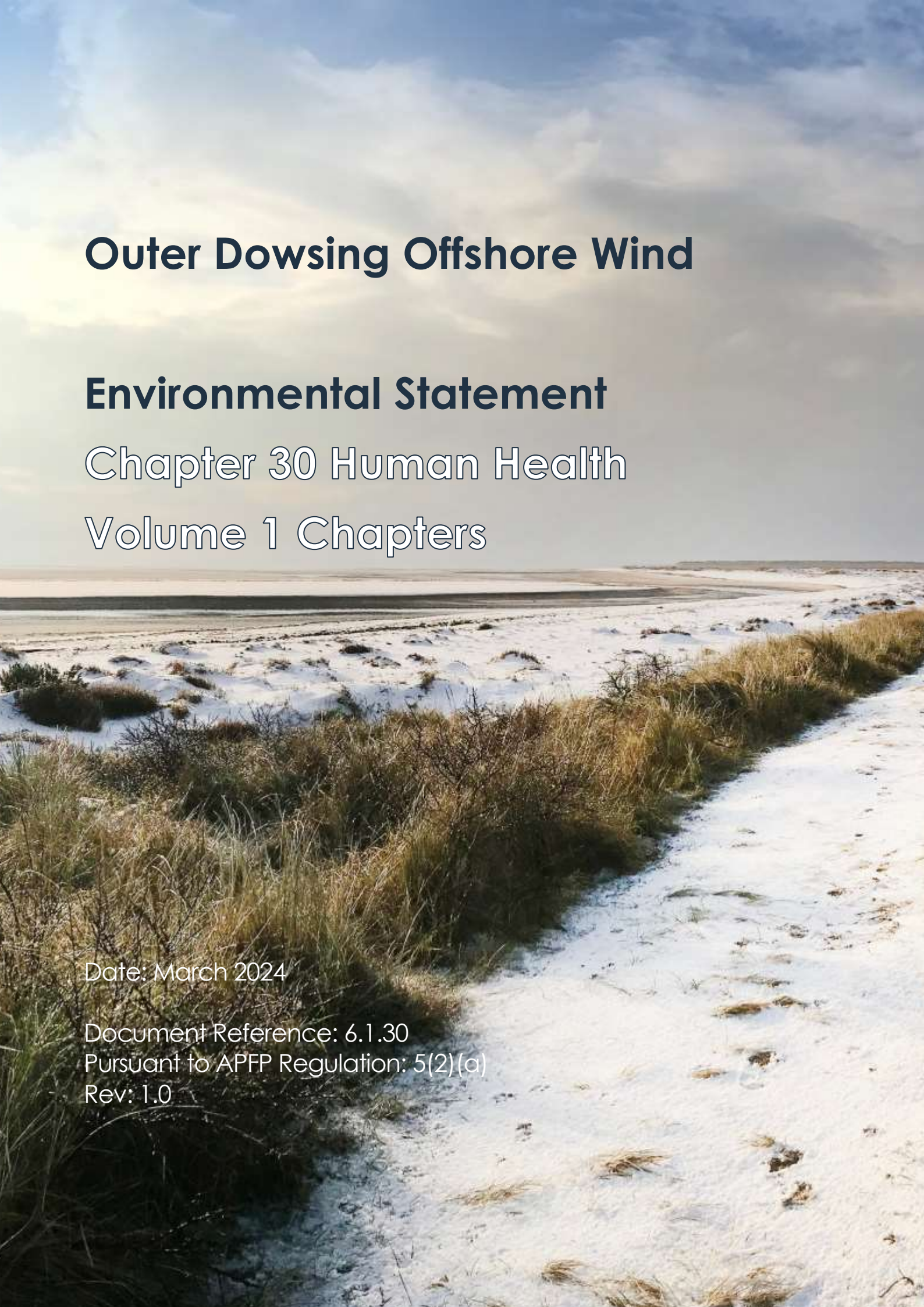

Outer Dowsing Offshore Wind

Environmental Statement

Chapter 30 Human Health

Volume 1 Chapters

Date: March 2024

Document Reference: 6.1.30
Pursuant to APFP Regulation: 5(2)(a)
Rev: 1.0

Company:	**Outer Dowsing Offshore Wind**	Asset:	**Whole Asset**
Project:	**Whole Wind Farm**	Sub Project/Package:	Whole Asset
Document Title or Description:	Chapter 30 Human Health		
Internal Document Number:	PP1-ODOW-DEV-CS-REP-0138	3rd Party Doc No (If applicable):	N/A

Rev No.	Date	Status / Reason for Issue	Author	Checked by	Reviewed by	Approved by
1.0	March 2024	DCO Application	SLR	SLR	Shepherd and Wedderburn	Outer Dowsing

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Acronyms & Terminology

Abbreviations / Acronyms

Abbreviation / Acronym	Description
ALARP	As low as reasonably practicable
AMP	Access Management Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
CEA	Cumulative Effects Assessment
CIA	Cumulative Impact Assessment
CoCP	Code of Construction Practice
DCO	Development Consent Order
DESNZ	Department for Energy Security and Net Zero, formerly department of Energy & Climate Change, which was previously Department of Business, Energy and Industrial Strategy (BEIS)
ECC	Onshore Export Cable Corridor
EIA	Environmental Impact Assessment
EMF	Electromagnetic field
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Technical Group
EU	European Union
GT R4 Ltd	The Applicant. The special project vehicle created in partnership between Corio Generation (a wholly owned Green Investment Group portfolio company), Gulf Energy Development and TotalEnergies.
HAZID	Hazard Identification Study
HDD	Horizontal Directional Drilling
HIA	Health Impact Assessment
HLE	Healthy Life Expectancy
HRA	Habitats Regulations Assessment
HSE	Health and Safety Executive
HVAC	High Voltage Alternating Current
IAQM	Institute of Air Quality Management
ICNIRP	International Commission Non-Ionising Radiation Protection
ICS	Integrated Care Systems
IEMA	Institute of Environmental Management and Assessment
IPC	Infrastructure Planning Commission
JHWS	Joint Health and Wellbeing Strategy for Lincolnshire
LCC	Lincolnshire County Council
LPA	Local Planning Authority
LSE	Likely Significant Effect
LSOA	Lower Super Output Area
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MW	Mega Watt
NGET	National Grid Electricity Transmission
NGSS	National Grid Sub-Station
NHS	National Health Service

Abbreviation / Acronym	Description
NPPF	National Planning Policy Framework
NPS	National Policy Statements
NRPB	National Radiological Protection Board
NSIP	Nationally Significant Infrastructure Project
O&M	Operations and Maintenance
ODOW	Outer Dowsing Offshore Wind
OnSS	Onshore substation
ORCP	Offshore Reactive Compensation Platform
OSS	Offshore Substation
PEIR	Preliminary Environmental Information Report
PHE	Public Health England
PPG	Planning Practice Guidance
PRoW	Public Rights of Way
SoS	Secretary of State
TJB	Transition Joint Bay
UK	United Kingdom
WHO	World Health Organisation
ZoI	Zone of Influence

Terminology

Term	Definition
400kV cables	High-voltage cables linking the OnSS to the NGSS.
Baseline	The status of the environment at the time of assessment without the development in place.
Biodiversity Net Gain	An approach to development that leaves biodiversity in a measurably improved state than it was previously. Where a development has an impact on biodiversity, developers are encouraged to provide an increase in appropriate natural habitat and ecological features over and above that being affected, to ensure that the current loss of biodiversity through development will be halted and ecological networks can be restored.
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.
Cumulative effects	The combined effect of the Project acting additively with the effects of other projects, on the same single receptor/resource.
Cumulative impact	Impacts that result from changes caused by other past, present or reasonably foreseeable actions together with the Project.
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 Directive	European Union 2011/92/EU (as amended by Directive 2014/52/EU).
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Term	Definition
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Regulations, including the publication of an Environmental Statement (ES).
Environmental Statement (ES)	The suite of documents that detail the processes and results of the EIA.
Evidence Plan	A voluntary process of stakeholder consultation with appropriate Expert Topic Groups (ETGs) that discusses and, where possible, agrees the detailed approach to the Environmental Impact Assessment (EIA) and information to support Habitats Regulations Assessment (HRA) for those relevant topics included in the process, undertaken during the pre-application period.
Export cables	High voltage cables which transmit power from the Offshore Substations (OSS) to the Onshore Substation (OnSS) via the 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).
Landfall	The location at the land-sea interface where the offshore export cables and fibre optic cables will come ashore.
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 secondarily added to reduce impacts in the case of potentially significant effects.
National Grid's OnSS	Onshore substation which is owned and operated by National Grid Electricity Transmission.
National Policy Statement (NPS)	A document setting out national policy against which proposals for Nationally Significant Infrastructure Projects (NSIPs) will be assessed and decided upon.
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.
Pre-construction and post-construction	The phases of the Project before and after construction takes place.

Term	Definition
Preliminary Environmental Information Report (PEIR)	The PEIR was written in the style of a draft Environmental Statement (ES) and provided information to support and inform the statutory consultation process during the pre-application phase.
Project Design Envelope	A description of the range of possible elements that make up the Project's design options under consideration, as set out in detail in the project description. This envelope is used to define the Project for Environmental Impact Assessment (EIA) purposes when the exact engineering parameters are not yet known. This is also often referred to as the "Rochdale Envelope" approach.
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.
The Applicant	GT R4 Ltd. The Applicant making the application for a DCO. The Applicant is GT R4 Limited (a joint venture between Corio Generation, Tota Energies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore Wind. The Project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF.
The Planning Inspectorate	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
The Project	Outer Dowsing Offshore Wind (ODOW), an offshore wind generating station together with associated onshore and offshore infrastructure including proposed onshore and offshore infrastructure.
Transition Joint Bay (TJB)	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.
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, which allow ducts to be installed under an obstruction without breaking open the ground and digging a trench.

Reference Documentation

Document Number	Title
5.1	Consultation Report
5.1.2	Scoping Report and Opinion
6.1.3	Chapter 3 Project Description
6.1.4	Chapter 4 Site Selection and Alternatives
6.1.5	Chapter 5 EIA Methodology
6.1.6	Chapter 6 Technical Consultation
6.1.19	Chapter 19 Onshore Air Quality
6.1.23	Chapter 23 Geology and Ground Conditions
6.1.24	Chapter 24 Hydrology and Flood Risk
6.1.25	Chapter 25 Land Use
6.1.26	Chapter 26 Noise and Vibration
6.1.27	Chapter 27 Traffic and Transport
6.1.29	Chapter 29 Socio-Economics Characteristics
8.1	Outline Code of Construction Practice
8.1.4	Outline Onshore Pollution Prevention and Emergency Incident Response Plan
8.17	Outline Public Access Management Plan

30 Human Health

30.1 Introduction

1. This chapter of the Environmental Statement (ES) presents the results of the Environmental Impact Assessment (EIA) for the potential impacts of Outer Dowsing Offshore Wind ("the Project") on Human Health. Specifically, this chapter considers the potential impact of the Project from the Landfall, along the Onshore Export Cable Corridor (ECC), and incorporating the Onshore substation (OnSS) during the construction, operation, maintenance, and decommissioning phases. The Offshore aspect of the Project on Human Health is considered **not significant** due to it being out of the radius of potential human health receptors**.** This aspect has therefore been scoped out from the assessment.
2. GT R4 Limited (trading as Outer Dowsing Offshore Wind) hereafter referred to as the 'Applicant', is proposing to develop the Project. The Project will be located approximately 54km from the Lincolnshire coastline in the southern North Sea. The Project will include both offshore and onshore infrastructure including an offshore generating station (windfarm), export cables to landfall, onshore cables, and connection to the electricity transmission network, and ancillary and associated development (see Volume 1, Chapter 3: Project Description (document reference 6.1.3) for full details).
3. The aim of this chapter is to meet the requirements of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations). The sections of note are; Part 5(2)*(Publicity and procedure on submission of environmental statements and decision making)* and Schedule 4(4) *(Information for Inclusion in Environmental Statements*).
4. The relevant section of the EIA regulations stated above have been noted below.

   Part 5, paragraph 2 states:

   A subsequent application is to be taken to be accompanied by an environmental statement for the purpose of paragraph (1) where the application for planning permission to which it relates was accompanied by a statement referred to by the applicant as an environmental statement for the purposes of these Regulations, but this is subject to regulation 9.

5. Schedule 4 provides key information for what should be provided within Environmental Statements. Paragraph 4 states:

   "A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora); land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydro morphological changes, quantity, and quality), air climate (for example greenhouse gas emissions, impacts relevant to adaption), material assets, cultural heritage, including architectural and archaeological aspects, and landscape'.

6. In providing conclusions for the identification and assessment of any likely significant effects (LSE) of the Project on human health receptors. The consideration of health and well-being matters are inherent within a number of the technical assessments presented within this ES and specific policies apply to specific topic areas and impacts. Where impacts have already been assessed in another chapter further policy information is presented in the relevant chapter.
7. A Scoping Report dated July 2022 (document reference 5.1.2b) was submitted to the Secretary of State on 1 August 2022 and a Scoping Opinion (document reference 5.1.2a) was adopted by the Secretary of State on 9 September 2022. As outlined in the Scoping Report, this chapter is focused on the onshore aspects relating to Human Health.
8. This chapter brings together the relevant information on health, including assessing the findings of other chapters within this ES in terms of population health. This approach aims to assist in identifying project factors which may affect human health and wellbeing.
9. This chapter should be read alongside the following chapters found in Volume 1 of the ES:
   - Chapter 19: Onshore Air Quality (document reference 6.1.19);
   - Chapter 23: Geology and Ground Conditions (document reference 6.1.23);
   - Chapter 24: Hydrology and Flood Risk (document reference 6.1.24);
   - Chapter 25: Land Use (document reference 6.1.25);
   - Chapter 26: Noise and Vibration (document reference 6.1.26);
   - Chapter 27: Traffic and Transport (document reference 6.1.27); and
   - Chapter 29: Socio-Economics Characteristics (document reference 6.1.29).
10. The construction, operation, and decommissioning of any major project has potential to affect the health, well-being, and quality of life of the people who live and work in the area. This study aims to predict these impacts and to avoid or reduce their occurrence by considering them in the environmental assessment. This chapter presents the results of the study on the likely significant health impacts that may arise as a result of the construction, operation and decommissioning of the Project.
11. This chapter has been prepared in accordance with established good practice for major energy infrastructure projects in the UK. The report is intended to provide both the decision makers and other stakeholders, including the affected communities, with information about issues that have potential to affect health and how they will be mitigated.

30.1.1 Purpose of the Health Chapter

12. The purpose of this chapter is to identify and assess the potential positive or negative effects in health and wellbeing arising from the Project. In addition to considering impacts on the health of the existing local community, this chapter identifies appropriate mitigation and recommendations as necessary to minimise any potential negative health impacts.

13. There is now a recognition that public health is the outcome of a number of different, interrelated factors, not just health services. This chapter can help the development of the Project by identifying potential impacts and by identifying ways in which negative impacts can be mitigated and benefits maximised.
14. Following best practice (IEMA., 2022), this chapter considers health effects with regards to the general population and vulnerable population groups. Populations are considered at regional and local levels. The advice acknowledges that EIA includes some aspects of health, for example consideration of human receptors in relation to air or water quality and noise or light disturbance. Furthermore, the socio-economics chapter of EIAs typically include the implications on public services (including health services), education and employment (as is the case for the Project).
15. This chapter follows the World Health Organisation (WHO) definition of health as:

"a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity." (Source: Constitution of the World Health Organization 1948, as amended)"

16. Similarly, WHO also considers issues of wellbeing as:

"a state in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to their community." (Source: WHO online page on Health and well-being - https://www.who.int/data/gho/data/major-themes/health-and-well-being)"

17. The definition of 'health' has not changed since 1948, and it is clear that mental and social wellbeing are also to be considered in addition to effects on physical health.
18. The context of people's lives determines their health. Therefore, both the WHO and Public Health England (PHE) consider that health and wellbeing are influenced by a range of factors, termed the 'wider determinants of health'. Determinants include the social and economic environment, the physical environment, and individual characteristics or behaviours.
19. The focus of this chapter is on community health and wellbeing and not on occupational health and safety. Occupational health and safety falls under 'safety' which is the responsibility of an employer. The effect of work on health and that of health on work is considered for each individual. This is managed separately and required as a separate process with The Health and Safety Executive (HSE) who is responsible for enforcing a range of occupational health and safety legislation. The term 'health' is used to describe 'human health' and 'wellbeing' unless specifically referenced otherwise.

30.2 Statutory and Policy Context

30.2.1 Legislative and Policy Context

20. This section identifies legislation, guidance, national, and local policy of particular relevance to the potential impact on public health associated with the construction, operation and decommissioning of the Project.

21. Planning policy on offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs) is provided by the National Policy Statements (NPSs). The NPSs were originally published in 2011, in 2023 they were revised. As of the 17th January 2024, the revised 2023 NPSs (EN-1 to EN-5) have been formally adopted. The NPSs referenced throughout this report are:
    - EN-1 Overarching Energy (DESNZ, 2023);
    - EN-3 Renewable Energy Infrastructure (DESNZ, 2023), which covers nationally significant renewable energy infrastructure (including offshore generating stations in excess of 100 MW); and
    - EN-5 Electricity Networks Infrastructure (DESNZ, 2023), which covers the electrical infrastructure associated with an NSIP.
22. The NPSs are a series of principal decision-making documents to appropriately assess NSIPs. As such, this assessment has made explicit reference to the relevant NPS requirements.
23. In order to reflect the current climate, the revised NPSs are more focused and clarify that offshore wind is now a critical national priority, including the related onshore and offshore network infrastructure.
24. The relevant legislation and planning policy for offshore renewable energy NSIPs, specifically in relation to Human Health, is outlined in Table 30.1 below. This legislation provides the primary basis for the recommendations made by The Planning Inspectorate to the Secretary of State (SoS) for the Department for Energy Security and Net Zero (DESNZ) on nationally significant renewable energy project applications for development consent. Overarching guidance on nationally significant energy projects is provided in the Overarching National Policy Statement for energy (NPS EN-1) (DESNZ 2023).
25. The National Planning Policy Framework (NPPF)[1] is also relevant to the policy context of renewable energy NSIPs and the relevant policy is also outlined in Table 30.1. The NPPF sets the framework for planning policy in England, and states that the purpose of the planning system is to contribute to the achievement of sustainable development. The three stated dimensions to sustainable development - economic, social and environmental - include building a strong, responsive economy, identifying and coordinating development requirements including the provision of infrastructure, supporting strong, vibrant and healthy communities by providing the supply of housing required to meet the needs of present and future generations, and by creating a high quality built environment with accessible local services that reflect the community's needs and support its health, social and cultural well-being.

[1] Department for Levelling Up, Housing and Communities, *National Planning Policy Framework,* December 19th 2023

26. The Planning Practice Guidance (PPG)[2] is another relevant resource for the policy context and relevant sections from the Healthy and Safe Communities Guidance[3] are outlined in Table 30.1. The PPG is a web-based resource and that is updated as necessary. The section on design provides advice on issues including a network of greenspaces (including parks) and public places, access and inclusion and cohesive and vibrant neighbourhoods. It also sets out what makes for a well-designed place, which includes ensuring the community has easy access to facilities such as shops, schools, clinics, workplaces, parks, play areas, pubs, or cafés. This helps achieve multiple benefits from the use of land, and encourage a healthier environment, reducing the need for travel and helping greater social integration.
27. Relevant NPS, NPPF and PPG policies are outlined in Table 30.1.

Table 30.1: Policy context

Legislation/policy	Key provisions	Section where comment addressed
NPS EN-1 (DESNZ 2023a) Section 4.1. Paragraph 4.1.7.	EN-1 sets out the national policy for the delivery of energy infrastructure, including offshore renewable electricity generation. Paragraph 4.1.7 states that: "where this NPS or the relevant technology specific NPSs require an applicant to mitigate a particular impact as far as possible, but the Secretary of State considers that there would still be residual adverse effects after the implementation of such mitigation measures, the Secretary of State should weigh those residual effects against the benefits of the proposed development. For projects which qualify as CNP Infrastructure, it is likely that the need case will outweigh the residual effects in all but the most exceptional cases. This presumption, however, does not apply to residual impacts which present an unacceptable risk to, or	The embedded mitigation measures are detailed in Section 30.1 and the impacts to health are assessed in section 30.6.5. Section 30.7 concludes that there are no residual impacts.

[2] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government, *Planning Practice Guidance,* 2021

[3] Department for Levelling Up, Housing and Communities, and Ministry of Housing, Communities & Local Government, *Guidance: Healthy and safe communities, 2022*

Legislation/policy	Key provisions	Section where comment addressed
	interference with, ***human health*** and public safety, defence, irreplaceable habitats or unacceptable risk to the achievement of net zero."	
NPS EN-1 (DESNZ 2023a) Section 4.3 Paragraphs 4.3.1 – 4.3.2.	4.3.1 advises that all proposals for projects that are subject to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) must be accompanied by an ES describing the aspects of the environment likely to be significantly affected by the project. Paragraph 4.3.2 goes on to state that "the Regulations specifically refer to effects on population, ***human health***, biodiversity, land, soil, water, air, climate, the landscape, material assetsand cultural heritage, and the interaction between them."	Human health has been considered as part of the ES and is in accordance with Paragraph 4.3.1 – 4.3.2.
NPS EN-1 (DESNZ 2023a) Section 4.3 Paragraphs 4.3.3– 4.3.4.	Paragraph 4.3.4 states: "to consider the potential effects, including benefits, of a proposal for a project, the applicant must set out information on the likely significant environmental, social and economic effects of the development, and show how any likely significant negative effects would be avoided, reduced, mitigated or compensated for, following the mitigation hierarchy. This information could include matters such as employment, equality, biodiversity net gain, community cohesion**, health and well-being**."	The embedded mitigation measures are detailed in Section 30.1 and the positive and negative impacts to health are assessed in section 30.6.5.
NPS EN-1 (DESNZ 2023a) Section 4.4	Section 4.4 of EN-1 relates to energy infrastructure potentially	The health determinants considered relevant to the Project are shown in Table 30.4. Changes to

Legislation/policy	Key provisions	Section where comment addressed
Paragraphs 4.4.4 – 4.4.6	having a negative impact on some people's health. Paragraphs 4.4.4 – 4.4.6 state that: "as described in the relevant sections of this NPS and in the technology specific NPSs, where the proposed project has an effect on humans, the ES should assess these effects for each element of the project, identifying any potential adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate. The impacts of more than one development may affect people simultaneously, so the applicant should consider the cumulative impact on health in the ES where appropriate. Opportunities should be taken to mitigate indirect impacts, by promoting local improvements to encourage health and wellbeing, this includes potential impacts on vulnerable groups within society, and impacts on those with protected characteristics under the Equality Act 2010, i.e. those groups which may be differentially impacted by a development compared to wider society as a whole."	health determinants can affect the health status of different individuals or communities depending on their characteristics and sensitivity to change. These effects will also be considered cumulatively within the Project and with other projects. This chapter assesses the potential for likely significant health effects to occur during construction and operation as described in Section 30.7. Embedded mitigation measures are detailed in section 30.1 and the impacts to health are assessed in section 30.6.5.
NPS EN-1 (DESNZ 2023a) Section 5.2 Paragraph 5.2.3.	Paragraph 5.2.3 states that "for many air pollutants there is not a threshold below which there is no health impact, so it is important that energy infrastructure schemes consider not just how a scheme may impact statutory air quality limits, objectives or targets but also measures to mitigate all emissions	Embedded mitigation measures are detailed in section 30.1 and the impacts to health are assessed in section 30.6.5. These sections have considered air quality and assessed vulnerable populations that are more susceptible to the impacts of poor air quality.

Legislation/policy	Key provisions	Section where comment addressed
	in order to minimise human exposure to air pollution, especially for those who are more susceptible to the impacts of poor air quality."	
NPS EN-1 (DESNZ 2023a) Section 5.2 Paragraph 5.11.6	Paragraph 5.11.6 states that "the government's policy is to ensure there is adequate provision of high-quality open space and sports and recreation facilities to meet the needs of local communities. Connecting people with open spaces, sports and recreational facilities all help to underpin people's quality of life and have a vital role to play in promoting healthy living."	Volume 3, Appendix 30.1: Population Baseline (document reference 6.3.30.1) has considered distances to open space and recreational facilities. Section 30.6.5 assesses the impact on this determinant.
PS EN-1 (DESNZ 2023a) Section 5.12 Paragraph 5.12.1; and 5.12.6	Paragraph 5.12.1 states that "excessive noise can have wide-ranging impacts on the quality of human life and, health (for example owing to such as annoyance or, sleep disturbance), cardiovascular disease and mental ill-health. It can also have an impact on the environment, and the use and enjoyment of areas of value such as quiet places and areas with high landscape quality." Paragraph 5.12.6 goes on to advises that where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment in relation to health: ▪ an assessment of the effect of predicted changes in the noise environment on any noise-sensitive receptors, including an assessment of any likely impact on health and quality of life / well-being where appropriate, and particularly among	Embedded mitigation measures are detailed in section 30.1 and the impacts to health are assessed in section 30.6.5. These sections have considered noise and vibration and assessed vulnerable populations that are more susceptible to the impacts of excessive noise. Volume 1, Chapter 26: Noise and Vibration has been used to inform the assessment. The noise assessment within this chapter has also considered health.

Legislation/policy	Key provisions	Section where comment addressed
	those disadvantaged by other factors who are often disproportionately affected by noise-sensitive areas. It goes on to advise that all reasonable steps taken to mitigate and minimise potential adverse effects on health and quality of life.	
NPS EN-1 (DESNZ 2023a) Section 5.15 Paragraph 5.15.1	Paragraph 5.15.1 states that "Government policy on hazardous and non-hazardous waste is intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. Where this is not possible and disposal is required as a last resort, waste management regulation ensures that waste is disposed of in a way that is least damaging to the environment and to human health."	The need to assess the impact of hazardous and non-hazardous waste on health was scoped out for the Operational and Maintenance (O&M) Phase by The Planning Inspectorate in their 2022 scoping opinion.
NPS EN-1 (DESNZ 2023a) Section 5.15 Paragraphs 5.15.1 – 5.15.5	*"Government policy on hazardous and non-hazardous waste is intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. Where this is not possible and disposal is required as a last resort, waste management regulation ensures that waste is disposed of in a way that is least damaging to the environment and to human health. Sustainable waste management is implemented through the "waste hierarchy", which sets out the priorities that must be applied when managing waste, these are (in order):* • *prevention;* • *preparing for reuse;* • *recycling;*	In the Scoping Opinion 2022 (document reference 5.1.2a, Section 3.22 'Wider Environment: Human Health' (ID 3.22.3)), it is advised that within the operation and maintenance phase *"the Inspectorate is content to scope out this matter from the assessment taking into account the proposed measures to avoid a likely significant effect"* for the O&M phase. It is further stated that "*Measures relied upon to address impacts from unplanned maintenance should be described in the Code of Construction Practice (CoCP) for the Proposed Development."* This matter has therefore been addressed in the CoCP for the Project.

Legislation/policy	Key provisions	Section where comment addressed
	• *other recovery, including energy recovery; and* • *disposal.* *Disposal of waste should only be considered where other waste management options are not available or where it is the best overall environmental outcome.* *All large infrastructure projects are likely to generate some hazardous and non-hazardous waste. The EA's Environmental Permit regime incorporates operational waste management requirements for certain activities. When an applicant applies to the EA for an Environmental Permit, the EA will require the application to demonstrate that processes are in place to meet all relevant Environmental Permit requirements.* *Specific considerations regarding radioactive waste are set out in Section 2.11 and Annex B of EN-6. The present section will apply to non-radioactive waste for nuclear infrastructure as for other energy infrastructure."*	
NPS EN-1 (DESNZ 2023a) Section 5.16 Paragraph 5.16.1 – 5.16.2	*"Infrastructure development can have adverse effects on the water environment, including groundwater, inland surface water, transitional waters , coastal and marine waters.* *During the construction, operation, and decommissioning phases, development can lead to increased demand for water, involve discharges to water, and cause adverse ecological effects resulting from physical modifications to the*	The embedded mitigation measures are detailed in section 30.1 and the impacts to health are assessed in section 30.6.5.

Legislation/policy	Key provisions	Section where comment addressed
	water environment. There may also be an increased risk of spills and leaks of pollutants to the water environment. These effects could lead to adverse impacts on health or on protected species and habitats (see Section 4.3) and could result in surface waters, groundwaters or protected areas failing to meet environmental objectives established under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and the Marine Strategy Regulations 2010."	
NPS EN-1 (DESNZ 2023a) Section 5.12 Paragraph 5.12.6	*"Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:* • *a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal characteristics, if the noise is impulsive, whether the noise contains particular high or low frequency content or any temporal characteristics of the noise.* • *identification of noise sensitive receptors and noise sensitive areas that may be affected.* • *the characteristics of the existing noise environment* • *a prediction of how the noise environment will change with the proposed development.* o *in the shorter term, such as during the construction period*	The siting of the proposed OnSS has taken into account the locations of the nearest sensitive receptors. The embedded measures adopted to avoid and mitigate effects are set out in Volume 1, Chapter 26: Noise and Vibration. The operational and construction noise assessments have included mitigation measures that have reduced the noise to an acceptable level (see Section 30.6.5).

Legislation/policy	Key provisions	Section where comment addressed
	○ *in the longer term, during the operating life of the infrastructure* ○ *at particular times of the day, evening and night (and weekends) as appropriate, and at different times of year* • *an assessment of the effect of predicted changes in the noise environment on any noise-sensitive receptors, including an assessment of any likely impact on health and quality of life / well-being where appropriate, particularly among those disadvantaged by other factors who are often disproportionately affected by noise-sensitive areas.* • *if likely to cause disturbance, an assessment of the effect of underwater or subterranean noise.* • *all reasonable steps taken to mitigate and minimise potential adverse effects on health and quality of life*	

Legislation/policy	Key provisions	Section where comment addressed
NPS EN-5 (DESNZ 2023c) Section 2.9 Paragraphs 2.9.46 – 2.9.48	*"All overhead power lines produce EMFs. These tend to be highest directly under a line and decrease to the sides at increasing distance. Although putting cables underground eliminates the electric field, they still produce magnetic fields, which are highest directly above the cable. EMFs can have both direct and indirect effects on human health, aquatic, and terrestrial organisms.* *The direct effects occur in terms of impacts on the central nervous system resulting in its normal functioning being affected. Indirect effects occur through electric charges building up on the surface of the body producing a microshock on contact with a grounded object, or vice versa, which, depending on the field strength and other exposure factors, can range from barely perceptible to being an annoyance or even painful."*	Although the Project does not include the provision of new overhead line infrastructure, this section of NPS EN-5 is still of relevance to the project given the potential for all electrical infrastructure to produce EMFs. As per The Planning Inspectorate's comments within the Scoping Opinion (Section 3.22 'Wider Environment: Human Health' (ID 3.22.5), the full assessment to demonstrate all electrical infrastructure will remain below negligible levels in line with the International Commission Non-Ionising Radiation Protection (ICNIRP) guidelines (2020), as detailed within Volume 1, Chapter 3: Project Description will be detailed within the ES.
NPS EN-5 (DESNZ 2023c) Section 2.9	EN-5 taken together with the Overarching National Policy Statement for Energy (EN-1), provides the primary policy for decisions taken by the Secretary of State on applications it receives for electricity networks infrastructure.	The need to assess EMFs was scoped out by the Inspector in the 09 September 2022 Scoping Opinion. This was on the basis that the ES can demonstrate all electrical infrastructure will remain below negligible levels in line with the International Commission Non-Ionising Radiation Protection (ICNIRP) guidelines (2020), The Planning Inspectorate is content to scope out the potential for EMF affects from the Project alone and cumulatively. It should be noted that there are no overhead lines proposed as part of the Project, thus there are no impact to human health.

Legislation/policy	Key provisions	Section where comment addressed
National Planning Policy Framework (NPPF) (19th December 2023)	The latest NPPF (December 2023) consolidates the Government's economic, environmental, and social planning policies for England into a single document and describes how it expects these to be applied. It provides overarching guidance on the Government's development aims. The NPPF places emphasis on achieving sustainable development including by supporting "strong, vibrant and healthy communities".	
NPPF (19th December 2023) Section 8. Promoting healthy and safe communities Paragraph 92	Chapter 8: 'Promoting healthy and safe communities' outlines the key role that planning policy has in ensuring the health and wellbeing of communities through considerations such as the availability of school places, public safety and security, and the promotion of social interaction and community cohesion. Within this chapter, the NPPF identifies key principles that local planning authorities should ensure they consider in order to achieve this aim. Paragraph 96 emphasises that planning policies and decisions should aim to achieve healthy, inclusive, and safe places and beautiful buildings. In particular, 96 c) states that policies should aim to "enable and support healthy lifestyles, especially where this would address identified local health and well-being needs – for example through the provision of safe and accessible green infrastructure, sports facilities, local	The embedded mitigation measures are detailed in section 30.1 and the impacts to health are assessed in section 30.6.5. The health determinants considered align with the themes throughout Section 8 of the NPPF.

Legislation/policy	Key provisions	Section where comment addressed
	shops, access to healthier food, allotments, and layouts that encourage walking and cycling"; and	
NPPF (19th December 2023) Section 15. Conserving and enhancing the natural environment Paragraph 92	Paragraph 191 illustrates that "*planning policies and decisions ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."* Decisions should, for example, attempt to "*mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life*".	
PPG Healthy and Safe Communities 2019	The national PPG (Ref 24-8) updated in October 2019. It provides a web-based resource in support of the NPPF and offers guidance on health and wellbeing in planning and planning obligations. It covers both: ▪ The role of health and wellbeing in ▪ planning; and ▪ The links between health and wellbeing and ▪ planning. The PPG suggests that local authority planners should consult with the Director of Public Health	Section 30.3 discusses consultation and shows how consultation has informed the assessment in section 30.6.5. The embedded mitigation measures are detailed in section 30.1. Appendix A has considered distances to open space and recreational facilities. Section 30.7 assesses the impact on this determinant and includes an assessment of PRoW.

Legislation/policy	Key provisions	Section where comment addressed
	on mitigation measures for any planning applications that are likely to have a significant impact on the health and wellbeing of the local population or particular groups. A health impact assessment is a useful tool to use when assessing expected significant impacts. The guidance states that: "plan-making authorities may work with public health leads and health organisations to understand and take account of the health status and needs of the local population, including the quality, quantity of and accessibility to healthcare and the effect any planned growth may have on this. Authorities should also assess quality, quantity of and accessibility to green infrastructure, sports, recreation, and places of worship including expected future changes, and any information about relevant barriers to improving health and well-being". The PPG for health and safe communities covers the role of positive planning on healthier communities and how the design and use of the built and natural environments, including green infrastructure, are major determinants of health and wellbeing. The guidance states that "planning and health need to be considered together in two ways: in terms of creating environments that support and encourage healthy lifestyles, and in terms of identifying and securing the facilities needed for primary,	

Legislation/policy	Key provisions	Section where comment addressed
	secondary and tertiary care, and the wider health and care system". The PPG for open space, sports and recreation facilities, PRoW and local green space provides additional guidance on those designation and how they should be taken into consideration in planning. The guidance mentions that planning should consider proposals that may affect existing open space as they provide health and recreational benefits to people living and working nearby. It is for local planning authorities to assess the need for open space and, when doing so, should have regard to the duty to cooperate where open space serves a wider area.	

28. In addition to NPS's, the NPPF and PPG outlined within Table 30.1, other relevant Government strategies and guidance has informed the assessment:

- The Health and Safety at Work Act 1974 (UK Government, 1974) places duties on employers to ensure, so far as is reasonably practicable: the health, safety, and welfare at work of all their employees; and that persons not in their employment are not exposed to risks to their health or safety as a result of the activities undertaken. In both cases, the requirement for risks to be reduced to 'As Low As Reasonably Practicable' (ALARP) is fundamental and applies to all activities within the scope of the Health and Safety at Work Act 1974;
- The Control of Major Accident Hazards Regulations 2015 relate to the management of threshold quantities of dangerous substances identified in the regulations (UK Government, 2015);
- The Public Health (Control of Disease) Act 1984, which was substantially amended by the Health and Social Care Act 2008 is complemented by three sets of regulations. These are:
  - The Health Protection (Notification) Regulations 2010 (SI 2010/659);
  - The Health Protection (Local Authority Powers) Regulations 2010 (SI 2010/657); and
  - The Health Protection (Part 2A Orders) Regulations 2010 (SI 2010/658).

- The Clean Air Act 1993 aims to reduce pollution from smoke, grit and dust and gives local authorities powers to designate smoke control areas (UK Government, 1993). The Air Quality Standards Regulations 2010 transpose into English law the requirements of Directives 2008/50/EC and 2004/107/EC on ambient air quality and are now the primary legislative mechanism for Air Quality standards in the UK;
- Part III of the Environmental Protection Act 1990 discusses control of emissions (including dust, noise, and light) that may be prejudicial to health or a nuisance (UK Government, 1990);
- The International Convention for the Prevention of Pollution from Ships (MARPOL) includes regulations aimed at preventing and minimising, both accidental and operational, pollution from ships (International Maritime Organisation, 1973);
- The Bathing Water Regulations (2013) and The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 are the primary legislations for the water environment;
- The Planning Act 2008, Infrastructure Planning EIA Regulations 2017 (EIA Regulations), Environment Act 1995, and Environment Act 2021 have also been considered along with the more specific legislation relevant to health;
- Health and Care Act (2022), proposes health reforms in England, removes existing competition rules and formalises Integrated Care Systems (ICS). It also grants the health secretary authority over the health service. The Act also aims to support the development of ICS and integration of all health bodies, by requiring them to strive towards the collective aims of better care for all patients; better health and wellbeing for everyone; and sustainable use of National Health Service (NHS) resources. This Act provides context to the assessment of the Project's impacts on access to local healthcare facilities;
- NHS Long Term Plan (2019) The NHS Long Term Plan sets out a ten-year programme of phased improvements to the NHS. The plan outlines how the NHS will attempt to reduce health inequalities through wider preventative action in deprived areas and improvements to integrated community-based care systems. The NHS Long Term Plan stresses the importance of the NHS and the built environment sector continuing to work together to improve health and wellbeing. This Plan provides context to the assessment of the Project's impacts on access to local healthcare facilities;
- Levelling Up the United Kingdom (February 2022) White Paper contains 12 specific missions which are set out as key objectives for the Government to deliver against. One of these missions includes that: 'By 2030, the gap in Healthy Life Expectancy (HLE) between local areas where it is highest and lowest will have narrowed, and by 2035 HLE will rise by five years. The goal is for the Government to tackle the existing disparities in health outcomes across the UK, ensuring that people have the opportunity to have long healthy lives wherever they live. The White Paper has provided context to stated governmental ambitions to reduce health disparities and provides justification for highlighting vulnerable groups and existing deprivation within the baseline conditions;
- Public Health England Strategy 2020 to 2025 sets out how the organisation will work to improve public health and reduce health inequalities. This provides guidance on the relationship between the development of the built environment and health improvement priorities. The impact of the Project on health and wellbeing is assessed in Section 30.7;

- A Green Future: 25 Year Plan to Improve Our Environment (2018), outlines proposed action to protect the environment and economy simultaneously. This includes the following objectives: “Helping people to improve their health and wellbeing by using green spaces” – there will be a renewed reliance on green spaces to help address issues such as isolationism and loneliness, something which is becoming increasingly prevalent with an ageing population and increased reliance on technology. It will also help to tackle obesity and act as a preventative and therapeutic approach to mental health. This has provided guidance on the relationship between the development of the built environment and health improvement priorities. The impact of the Project on health and wellbeing is assessed in Section 30.7;
- Health Equity in England: The Marmot Review 10 Years On (2020), highlights the growth in health inequality over the preceding 10 years, especially for people living in more deprived districts and regions, and that for the population as a whole, health is declining. The report argues that greater levels of government intervention are required and that those areas who are most deprived should receive investment first and at higher levels. As well as this, it calls upon the Government to create a health inequalities strategy with clear targets and to create a Cabinet-level cross-departmental committee. It calls upon the government to re-order national priorities and to make wellbeing a central goal of policy, which will in turn create a better society, with better health and health equity. This has provided context to stated governmental ambitions to reduce health disparities and provided justification for highlighting vulnerable groups and existing deprivation within the baseline conditions; and
- The Marmot Review (2010) argues that serious avoidable health inequalities exist across England and shows these inequalities to be determined by a wide range of socio-economic factors. Health is linked to both individuals and communities. This has provided context to stated governmental ambitions to reduce health disparities and provided justification for highlighting vulnerable groups and existing deprivation within the baseline conditions.

30.2.2 Local Planning Policy

29. NPS EN-1 states that The Planning Inspectorate will also consider Development Plan Documents or other documents in the Local Development Framework to be relevant to its decision making.
30. The Project area falls under the authority of Lincolnshire County Council and other local planning authorities which are listed below alongside the relevant policies applicable to those authorities:
    - East Lindsey District Council:
        - The Core Strategy (East Lindsey District Council, 2018a); and
        - Settlement Proposals Document (East Lindsey District Council, 2018b).
    - The South East Lincolnshire Joint Strategic Planning Committee is a partnership of Boston Borough, South Holland District and Lincolnshire County Councils who are working together to plan the future of South Holland District and Boston Borough:
        - South East Lincolnshire Local Plan 2011-2036 (South East Lincolnshire, 2019).

31. All Local Planning Authorities encourage Developers to consider health as part of development proposals. In particular, policy 32 of the South East Lincolnshire Local Plan 2011-2036 which refers to 'Community, Health and Well-being' states that '*Development shall contribute to: the creation of socially-cohesive and inclusive communities; reducing health inequalities; and improving the community's health and well-being*.'
32. In addition, the Joint Health, and Wellbeing Strategy for Lincolnshire (JHWS) (2022) outlines the following as being the most important health and wellbeing issues facing the county.
33. These are as follows:
    - Mental Health & Emotional Wellbeing (Children & Young People);
    - Mental Health (Adults);
    - Carers;
    - Physical Activity;
    - Housing and Health;
    - Healthy Weight; and
    - Dementia.

30.2.3 Guidance

34. The approach to assessing health in EIA has been informed by relevant UK guidance on Health Impact Assessment (HIA). Regard has been given to the advice provided in the Institute of Environmental Management and Assessment:
    - Institute of Environmental Management and Assessment ("IEMA") Determining Significance for Human Health in Environmental Impact Assessment, discusses the process and methodology for assessing significance of human health effects as part of Environmental Impact Assessments in 2022. This guidance has formed the basis of the methodology used to conduct the human health and wellbeing assessment; and
    - Institute of Environmental Management and Assessment (IEMA) Effective Scoping of Human Health in Environmental Impact Assessment. IEMA published additional guidance in 2022 pertaining to the scoping of human health effects. It suggests a range of health determinants to be considered as part of the scoping of human health impacts. This guidance has been considered with respect to reviewing the scoped in health determinants during the preparation of the ES.
35. Guidance published by the World Bank Group (World Bank Group, 2015) advises that community health and safety hazards specific to wind energy facilities include blade or ice throw, aviation impacts, marine navigation, and safety, electromagnetic interference and radiation, public access, and abnormal load transportation. Due to the Project being offshore, located 54km east of the Lincolnshire coast at its closest point (see Volume 1, Chapter 3: Project Description (document reference 6.1.3)), blade or ice throw and aviation issues are not considered a relevant concern for local populations within proximity of the onshore ECC.

36. Public Health England released guidance in 2013[4] regarding the health effects of exposure to electric and magnetic field. In March 2004, the National Radiological Protection Board (NRPB, now part of PHE), published advice on limiting public exposure to EMF[5].
37. In addition to IEMA (2022), the following guidance has been considered in the production of this chapter:
    - Planning Practice Guidance: Healthy and safe communities (MHCLG 2019b);
    - Health Impact Assessment of Government Policy: A guide to carrying out a Health Impact Assessment of new policy as part of the Impact Assessment process (Department of Health 2010);
    - Healthy Urban Planning Checklist (NHS London Health Urban Development Unit 2017);
    - Health Impact Assessment: A Practical Guide (Wales) (WHIASU 2012);
    - Health Impact Assessment Guidance (Northern Ireland) (Metcalfe *et al*., 2009);
    - Health Impact Assessment of Rural Development: a Guide. Scottish Health and Inequalities Impact Assessment Network and Scottish Public Health Network (ScotPHN) (Higgins *et al.,* 2015); and
    - Environmental, Health, and Safety Guidelines for Wind Energy (World Bank Group 2015).

30.3 Consultation

38. Consultation is a key part of the Development Consent Order (DCO) application process. Consultation regarding the Project has been conducted through the Evidence Plan Process (EPP), Expert Technical Group (ETG) meetings, the EIA scoping process (ODOW, 2022), and the Preliminary Environmental Information Report (PEIR) process (Outer Dowsing Offshore Wind, 2023).
39. An overview of the Project's technical consultation process is presented within Volume 1, Chapter 6: Technical Consultation (document reference 6.1.6) with The Consultation Report (document reference 5.1) providing full detail on how the Applicant has complied with the pre-application consultation requirements.
40. A summary of the key issues raised during consultation to date, specific to health, is outlined in Table 30.2, together with how these issues have been considered in the production of this ES.

[4] Public Health England, Guidance: Electric and magnetic fields: health effect of exposure, 2013

[5] National Radiological Protection Board, The National Archives, Volume 15, No.2, 'Advice on Limiting Exposure to Electromagnetic Fields (0-300 GHz)', 2004

Table 30.2 Summary of Section 42 consultation relating to Human Health

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
19 July 2022 Traffic & Transport, Air Quality, Noise & Health and Socio-economics ETG	Outline of scoping assessment methodology, study area, baseline data, alignment to Public Health England Guidance, mitigation measures and impacts to be scoped out for the Scoping Report. No key comments were raised by stakeholders.	Noted.
09 September 2022 Scoping Opinion	Impact from dust and traffic emissions – O&M: "The Inspectorate considers that based on the low predicted operational traffic volumes and maintenance activities, consideration of impacts from emissions on human health during operation may be scoped out from the ES. However, the ES should confirm anticipated traffic movements and maintenance activities."	The anticipated traffic movements and maintenance activities is described in Volume 1, Chapter 27: Traffic and Transport.
09 September 2022 Scoping Opinion	Impacts from emissions to water – O&M: "On the basis that the submission secures the requirement to reinstate all ground surfaces along the cable route to their original condition and a drainage strategy is secured and implemented, The Planning Inspectorate is content to scope out impacts from emissions to water on human health during O&M."	Noted.
09 September 2022 Scoping Opinion	Impacts from emissions to soil (including hazardous waste and substances) – O&M: "The Inspectorate is content to scoped out this matter from the assessment taking into account the proposed measures to avoid a likely significant effect. Measures relied upon to address impacts from unplanned maintenance should be described in the CoCP for the Proposed Development."	Noted.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
09 September 2022 Scoping Opinion	Disruption to local road networks including reduced access to services and amenities – O&M: "The Inspectorate considers that based on the low predicted operational traffic volumes and maintenance activities, consideration of impacts from disruption to local road networks and reduced access on human health during O&M can be scoped out from the ES. However, the ES should confirm anticipated traffic movements and maintenance activities."	The anticipated traffic movements and maintenance activities is described in Volume 1, Chapter 27: Traffic and Transport.
09 September 2022 Scoping Opinion	Impacts from exposure to EMF – alone and cumulative: "On the basis that the ES can demonstrate all electrical infrastructure will remain below negligible levels in line with the International Commission Non-Ionising Radiation Protection (ICNIRP) guidelines (2020), The Planning Inspectorate is content to scope out the potential for EMF affects from the Proposed Development alone and cumulatively."	Noted. Volume 1, Chapter 3: Project Description confirms information on all electrical infrastructure.
09 September 2022 Scoping Opinion	Impacts from pests: "Based on the nature of the Proposed Development, The Planning Inspectorate agrees that it is unlikely to result in the increase of pests that would affect human health and therefore is content to scope this matter out."	Noted.
09 September 2022 Scoping Opinion	Impacts from odour: "Considering the nature of the Proposed Development, The Planning Inspectorate is of the view that significant odours are not likely to be generated and is content that this matter can be scoped out of the ES."	Noted.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
09 September 2022 Scoping Opinion	Cumulative impacts – non-radioactive effects: "Scoping Report paragraph 9.1.42 states that cumulative impacts will be considered following determination of the onshore ECC and OnSS and if agreed as appropriate, the Applicant would seek to scope out cumulative impacts with relevant consultation bodies, including the UK Health Security Agency (UKHSA). The Planning Inspectorate welcomes the intention to discuss this matter with consultation bodies once further information is available on the design/route of the Proposed Development and likely effects and receptors. For clarity, The Planning Inspectorate considers this should be informed by the location and potential impacts of both the Proposed Development and other relevant development particularly where the Zone of Influence (ZoI) overlap. The ES should include an assessment of cumulative effects to human health, where likely significant effects could occur."	By its nature, Health interacts with each of the other onshore topics assessed in this ES, due to its direct involvement as a receptor for other impacts, and it is therefore important to avoid duplication of the assessment of effects. Of particular note regarding the potential for inter-related and cumulative, are the following ES Chapters presented in Volume 1: Chapter 19: Onshore Air Quality; Chapter 23: Geology and Ground Conditions; Chapter 24: Hydrology and Flood Risk; Chapter 25: Land Use; Chapter 26: Noise and Vibration Chapter 27: Traffic and Transport; and Chapter 29: Socio-Economics Characteristics. It is concluded that there are no likely significant effects could occur regarding human health, therefore, at this stage, the Project does not anticipate any cumulative impacts on Health except from those mentioned within the relevant technical chapters detailed above.
09 September 2022 Scoping Opinion	Transboundary effects: "The Inspectorate agrees that due to the likely localised nature of any potential effects on human health this matter can be scoped out of the impact assessment."	Noted.
09 September 2022 Scoping Opinion	Standalone Major Accidents and Disasters: "A separate chapter on Major Accidents and Disasters within the ES is not proposed. Instead, the Scoping Report proposes to identify	The risk of 'major accidents and/or disasters' occurring associated with any aspect of the Project, during the construction, operation and decommissioning phases are

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	accidents and disasters by undertaking a Hazard identification Study (HAZID), which will be informed by other relevant aspect chapters in the ES. A Major Accidents and Disaster risk assessment matrix will then be used to assess the significance of potential impacts and identify any appropriate mitigation to be secured through the DCO. The Planning Inspectorate is content with this approach on the basis that relevant risks, or likely major accidents and disasters associated with the Proposed Development identified and included in the ES, where significant effects are likely to occur."	anticipated to be negligible, following guidance published by IEMA on Major Accidents and Disasters in EIA (IEMA, 2020). Instead, an outline Code of Construction Practice (document reference 8.1) and Outline Onshore Pollution Prevention and Emergency Incident Response Plan (document reference 8.1.4) has been provided as part of the DCO application (document reference: 8.1). A Hazard Identification (HazID) Report will be prepared and agreed with the relevant planning authority prior to construction.
09 September 2022 Scoping Opinion	Census data: "New census data was published in June 2022 with further data anticipated to be published by the end of 2023. Up-to-date census data should be used to inform baseline data and the ES assessment."	Noted.
09 September 2022 Scoping Opinion	Study area: "The study area is defined as all 'local populations which have potential to be affected' but it is unclear what constitutes a 'local' population. The ES should define and justify the extent of the study area. Effort should be made to agree the study area with the relevant consultation bodies."	Noted.
13 October 2022 Traffic & Transport, Air Quality, Noise, Health, and Socio-Economics Expert Topic Group	Outline of Scoping Opinion comments (as outlined above) No key comments raised by stakeholders.	Noted.
21 July 2023 UK Health Security Agency	UK Health Security Agency advised: "the report (para 30.1.12) notes there is no fixed method for assessing human health in this context.	Noted. The methodology used has been updated to include Pyper, R *et al*., 2022 'Determining *Significance*

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	Para 30.6.5 further notes the report methodology uses emerging best practice published by the Institute of Environmental Management and Assessment (IEMA) in line with the 'Health in Environmental Impact Assessment: A Primer for a Proportionate Approach' (Cave *et al*., 2017a). Professional judgements on significance are based on Table 30.10: Human health guide questions for determining significance. The report fails to note the latest guidance in relation to assessing significance for population and human health (Pyper, R *et al*., 2022), published by the Institute of Environmental".	*for Human Health in Environmental Impact Assessment'.*
March 2023 Traffic & Transport, Air Quality, Noise, Health, and Socio-Economics Expert Topic Group.	Topic updates provided. There were no human health stakeholders present on the call and no key comments raised by stakeholders.	Noted.
August 2023 Traffic & Transport, Air Quality, Noise, Health, and Socio-Economics Expert Topic Group.	Topic updates provided. Lincolnshire County Council (LCC) advised that that the HIA needs to be about opportunities to improve population health and wellbeing (e.g., improved rights of way network and/or accessible green space) as much as mitigating against possible adverse health effects. LCC advised that certain aspects of improvements should be sought as part of the HIA following the extensive groundworks being undertaken and should this lead	Public Rights of Way (PRoW) have been discussed in the Transport Assessment in Volume 1, Chapter 27 (document reference 6.1.27). This includes diversions, traffic management, safety and change to road traffic. This assessment has been used to predict any impact on health. The assessment of impacts associated with the diversion and temporary/ permanent closure of

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	to opportunities to improve access etc.	PRoWs and impacts to cycle routes are considered. During the construction phase of the Project, there will only be three PROW that are temporarily diverted. Alternative routes and management practices of route impacts would be agreed with the County Council (and any other relevant stakeholders) prior to construction in accordance with the Public Rights of Way Management Plan. The temporary diversions would be unlikely to affect population physical activity levels to the extent of changes in the risk of developing new health conditions or of exacerbating existing conditions. Any short-term changes in physical activity levels would be unlikely to have a lasting influence on population health and would lead to a minor change in quality of life to a very small population.
October 2023 Traffic & Transport, Air Quality, Noise, Health, and Socio-Economics Expert Topic Group.	Topic updates provided. Further discussion on PRoW.	Refer to point above in relation to August 2023 ETG.
November 2023 Traffic & Transport, Air Quality, Noise, Health, and Socio-Economics Expert Topic Group.	Topic updates provided. Further discussion on PRoW. LCC questioned whether the Project has identified opportunities for longer term health improvements gains, such as improvements to the PRoW network. The Project advised that this would not be considered as part of	Refer to point above in relation to August 2023 ETG.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	the ES but could be considered as part of the community benefit fund. LCC approved of this approach.	

41. As identified in Volume 1, Chapter 3: Project Description (document reference 6.1.3) and Volume 1, Chapter 4: Site Selection and Alternatives (document reference 6.1.4) the Project design envelope has been further refined in accordance with stakeholder consultation feedback.
42. Design amendments to cable routing and site selection are of relevance to this chapter. These have been undertaken throughout the EIA process to inform the final design of the landfall area, onshore ECC and OnSS and is detailed in Chapter 4 (document reference 6.1.4). To minimise disruption to sensitive receptors (e.g., populated areas), the early adoption of primary (intrinsic design) commitments was made which define minimum separation distances from onshore infrastructure to residential properties (Chapter 3 (document reference 6.1.3)).

30.4 Baseline Environment

30.4.1 Study Area

43. A full description of the Project is provided in Chapter 3 (document reference 6.1.3).
44. The offshore ECC will make landfall at Wolla Bank, to the south of Anderby Creek, where cables will be installed using trenchless techniques to pass under the intertidal area, the sand dunes; and the coastal Lincolnshire Wildlife Trust site (Anderby Marsh), to connect into the Landfall Compound which is located on agricultural land to the west of Roman Bank (road).
45. From the Transition Joint Bays (TJBs) at the Landfall Compound, the onshore ECC will run south (west of the A52) underground, to the Project's OnSS location at Surfleet Marsh, located on agricultural land on the north side of the River Welland, east of the A16 and south of the Risegate Eau (Drain) to the north of Spalding.
46. The length of the ECC from the landfall to the Surfleet OnSS is approximately 70km.
47. 400kV cables will then run underground between the OnSS and the National Grid substation (NGSS) that will be built, owned, and operated by the National Grid Electricity Transmission (NGET) and is anticipated to be located within, or near to, an area identified by the Project as the "Connection Area".
48. Whilst the width of the cable corridor may fluctuate along the route to account for specific environmental and engineering constraints, the Project is expected to require a typical working width of 80m during cable construction within which a typical 60m wide permanent corridor will be located. Further detail on the site selection of the onshore ECC and OnSS taken forward for DCO Application and assessment within the ES has been included in Chapter 4 (document reference 6.1.4).
49. Where trenchless crossing techniques are proposed, this working width may need to be larger to accommodate this type of crossing. The maximum extent of the temporary footprint would be up to 220m, at the River Haven Crossing.
50. The inclusion of effects on local populations and their health receptors will be determined by the extent of the effects of those relevant receptors identified, for which potential effects are currently possible only within the jurisdictions of Lincolnshire County Council and are located within the East Lindsey, Boston, and South Holland administrative areas.
51. The following geographic area classifications have been used within this chapter:
    - Site-specific (the Project's Order Limits);
    - Local (East Lindsey, Boston, and South Holland);
    - Regional (Lincolnshire); and
    - National (England).

52. The 'site specific' level considers localised effects with reference to routine statistics collected for Lower Super Output Areas (LSOAs). The LSOAs selected (see below) were chosen as they were located within the landfall, onshore ECC and OnSS locations footprint and had the worst health/deprivation levels. The assessment was therefore based on a worst-case approach to health.

53. The following design elements are most likely to impact on health and will need to be considered as part of the assessment.

- Landfall – identification of exact landfall location, construction methods, working times, trenchless drilling locations;
- Onshore ECC – identified cable corridor, construction methods, working times, trenchless technique locations; and
- OnSS – site and footprint locations, change in plant specifications, height of any buildings, amendments on the materials utilised for the construction of any buildings.

54. It should be noted that these LSOAs have been selected to provide a profile of population potentially affected rather than the entirety of the area that may be affected. The selected LSOAs (East Lindsey 010B, Boston 007A, and South Holland 007C) characterise the population near the onshore design elements of the proposed Application (Landfall, ECC, OnSS), which is being assessed using a worst-case scenario. As such, this assessment assumes that the potential effects for other LSOAs, will be no greater than those assessed within this HIA.

30.4.1.1 The Landfall

Landfall Study Area Description

55. The local environment in the vicinity of the landfall can be characterised as a rural/agricultural land environment, with a small number of individual dwellings located to the south. Anderby Creek comprises a small mixture of residential dwellings and holiday homes.

56. Specific consideration is given to the most representative LSOA:

- East Lindsey 010B (representation of the population at landfall).

57. The LSOA is shown in Volume 2, Figure 30.1 East Lindsey 010B Lower Super Output Area (document reference 6.2.30.1)

30.4.1.2 Onshore ECC

Onshore ECC Study Area Description

58. The local environment in the vicinity of the onshore ECC can be characterised as predominantly rural and agricultural, not taking into account the small towns of Skegness and Boston, which are significantly built up in comparison.

59. Specific consideration is given to the Boston 007A LOSA, which has been chosen as it is considered the most representative of the population situated along the proposed onshore ECC.

60. The LSOA selected is not intended to indicate the area of effect, but rather the most representative profile of the affected population. It is considered disproportionate to the assessment to include all LSOAs along the onshore ECC, therefore, using Boston 007A is deemed appropriate to represent the medium population along the cable route.
61. The onshore ECC through Boston 007A includes trenchless sections, mobilisation areas and a representative spread of dwellings.
62. The LSOA is shown in Volume 2, Figure 30.2 Boston 007A Lower Super Output Area (document reference 6.2.30.2).

30.4.1.3 Onshore Sub-Station

Onshore Substation Study Area Description

63. The local environment within the vicinity of the OnSS study area can be characterised as rural, with land which is predominately used for agricultural purposes.
64. The study area extends to the residential dwellings located closest to the OnSS, to the north, and south. At its closest point, the OnSS will be located approximately 250m from receptors.
65. Specific consideration is given to the most representative LSOA:
    - South Holland 007C (representative of the population at the OnSS).
66. The LSOA is shown in Volume 2, Chapter 30, Figure 30.3 South Holland 007C Lower Super Output Area (document reference 6.2.30.3).

National Grid's substation study area and the Project's Connection Area)

67. The local environment within the NGSS study area can be characterised as rural, with land which is predominately used for agricultural purposes.
68. The study area extends to the residential dwellings located to the north, east, south, and west.
69. The study area includes the residential dwellings located closest to the NGSS and associated cables, where construction and operational activities could have a potential impact.
70. Specific consideration is given to the most representative LSOA:
    - South Holland 007C (representative of the population at the NGSS).
71. The LSOA is shown in Volume 2, Figure 30.3 (document reference 6.2.30.3).

Population Groups

72. Within the study areas the assessment defines 16 population groups (see Table 30.3). Defining these population groups allows a structured and consistent discussion in both the Project assessment and the cumulative assessment. Six of these population groups are geographically defined, the remaining 10 are defined in relation to reasons that a population may be sensitive, other than due to proximity.
73. The study areas used in other chapters of this ES are of relevance, but do not necessarily define the boundaries of potential health effects. For example, effects on mental health and wellbeing are subjective and may not be limited to the area defined in relation to achieving certain regulatory thresholds. Consequently, this health chapter uses study areas to broadly define representative population groups rather than to set boundaries on the extent of potential effects.

74. The noise and air quality chapters were used to determine the local study area comprising a 500m buffer to factor in local services and receptors (such as doctors' surgeries and schools). The effects predicted in these chapters form the basis for assessment of health impact under the air quality and noise impact health determinant, explained in subsequent sections.

30.4.2 Data Sources

75. The data sources used are:

- Office for National Statistics Census 2021 (published 2022);
- Department for Ministry of Housing, Communities & Local Government. English Indices of Deprivation 2019;
- The Index of Multiple Deprivation 2015 has been consulted and referenced as appropriate, including sub-domains and underlying indicators (Department of Communities and Local Government, 2015);
- Office for National Statistics (2016) Personal well-being in the UK;
- Public Health England (2010) The Public Health Outcomes Framework; and
- Public Health England (2017a). Health assets profile.

30.4.3 Baseline Environment

76. This section provides information on the current conditions in relation to health and wellbeing for people who live within the local area, including age, health issues, ethnicity, and qualifications. It also provides information on the community infrastructure that supports the existing population in terms of education, health care provision and access to recreation facilities and open space. It is necessary to understand the baseline conditions in order to assess how the Project would impact on health and wellbeing of the existing community.
77. The Population Baseline (document reference 6.3.30.1) is appended to this chapter. This section captures the main baseline comparisons and should be referred to alongside the data contained within document reference 6.3.30.1. In particular**,** Table 30.1 below compares data from local, regional, and national groups that are most relevant to health.

30.4.3.1 Limitations

78. The baseline data on demography and health patterns of the local residents have largely been based on secondary sources and information collected from initial consultation with key stakeholders. While this search has provided information on vulnerable groups along the proposed route, it is possible that not all specific cases have been captured.

30.4.3.2 General

79. The Lincolnshire County Council JHWS (2022) identifies the following four priorities:

- Mental health and emotional wellbeing in children and adults:

- Lincolnshire Research Observatory (2021) found that in 2019 8% of 5 to 10 years old, 12% of 8- to 16-year-olds and 17% of adults (aged 16 and over) in Lincolnshire suffer from a mental health disorder. It is reported that although this prevalence is below the national average, the prevalence of depression is above the national average;

- Carers and physical activity:
  - Data from the 2021 Census show that Lincolnshire reported 1,800 young carers under the age of 15, and a further 3,500 young adult carers (16 to 24). Lincolnshire has one of the fastest growing rates of carers in the UK. Between 2001 and 2015, the county experienced a 27.5% increase in the number of carers, compared to the general rate of population growth of 6.2%. In terms of physical inactivity, Lincolnshire has a significantly worse proportion of inactive adults (25.2%) compared with the East Midlands (22.7%) and England (22.2%);
- Housing and health:
  - Lincolnshire Research Observatory (2021) also found that approximately 2% of households are overcrowded and 18% of private sector housing is estimated to have a Category One hazard under the Housing Health and Safety Rating System; and
- Obesity and dementia:
  - According to Lincolnshire Research Observatory (2021), 15% of 4–5- year-olds are classified as obese and 65% of adults are classified as overweight or obese. The amount of people over the age of 65 living with dementia accounts for 1.6% of the county's entire population.

30.4.3.3 Baseline Comparisons

80. The below table compares data from local to national groups that are most relevant to health.

Table 30.3 Health baseline comparisons local to national

Population Group	Site-Specific (Local)						Regional		National	
Variable	East Lindsey 010B		Boston 007A		South Holland 007C		Lincolnshire		England	
	No.	%	No.	%	No.	%	No.	%	No.	%
Age Structure (2020 Census data for local and 2021 Census data for regional-national)										
Age 0 to 15- children and young people	234	12	260	11	515	23.1	128155	17	10483094	19
Age 16-64- working aged people	1048	52	1582	70	1401	62.9	460058	60	35605651	63
Age 65 and over- older people	742	37	421	19	313	14.0	180151	23	10401300	23
Health (Nomis Data, 2021)										
Very good health	725	37	637	39	777	41.5	330873	43	27390829	49
Good health	690	35	578	35	733	39.1	278189	36	19040735	34
Fair health	398	20	292	18	267	14.3	114630	15	7147346	13
Bad health	123	6	99	6	72	3.8	35083	5	2248255	4
Provision of unpaid care (Nomis Data, 2021)										
Provides no unpaid care	1645	90	1381	88	1,612	92.0	662159	90	48734833	91
Provides 1 to 19 hours unpaid care a week	97	5	78	5	48	2.7	32084	4	2303725	4
Provides 20 to 49 hours unpaid care a week	26	1	36	2	39	2.2	14097	2	969769	2
Provides 50 or more hours unpaid care a week	56	3	83	5	53	3.0	24206	3	1404771	3
Car or van availability (Nomis Data, 2021)										

Population Group	Site-Specific (Local)						Regional		National	
No cars or vans in household	72	7.8	59	8	171	23.5	54834	16	5516098	24
One or more cars or vans in household	365	40	277	40	314	43.1	141075	42	967465	41
Distance travelled to work (Nomis Data, 2021)										
Less than 2km	17	2	35	5	373	39.1	49486	14	2898994	11
2km to less than 5km	45	6	35	5	123	12.9	36347	10	3335948	13
5km to less than 10km	104	14	115	16	18	1.9	32596	10	3099302	12
10km to less than 20km	108	15	189	26	81	8.5	42241	12	2750302	10
20km to less than 30km	51	7	44	6	91	9.5	28835	8	1051967	4
40km to less than 60km	24	3	17	2	14	1.5	10970	3	439294	2
60 km and over	30	4	18	3	11	1.2	8713	3	336581	1
Works mainly from home	18	2	19	3	14	1.5	8157	2	355062	1
Households by deprivation dimensions[6] (Nomis Data, 2021)										
Households is not deprived in any dimension	332	35	255	37	270	37.0	154886	46	11349737	48
Households is deprived in one dimension	400	44	283	41	294	40.3	117909	35	7842691	34
Households is deprived in two dimensions	159	17	123	18	130	17.8	49200	15	3320584	14
Households is deprived in three dimensions	39	4	37	5	30	4.1	10973	3	868104	4

[6] Household by deprivation dimensions is a measure that classifies households in England and Wales according to four dimensions of deprivation; employment , education, health and disability and house overcrowding (ONS, 2021)

Population Group	Site-Specific (Local)						Regional		National	
Households is deprived four dimensions	0	0	1	0.1	6	0.8	584	0.2	54970	0.2
Economic activity status (Nomis Data, 2021)										
Economically active: Total	758	43	750	54	996	67.5	354237	55	26945252	59
Economically inactive: Total	1002	57	622	45	460	31.2	273744	43	18005455	39
Economically inactive: Retired	732	41	396	29	239	16.2	175243	27	9882054	22
Economically inactive: Looking after home or family	73	4	62	5	78	5.3	26812	4	2207738	5
Economically inactive: Long-term sick or disabled	95	5	79	6	46	3.1	26882	4	1874300	4

30.5 Basis of Assessment

30.5.1 Scope of the Assessment

30.5.1.1 Geographic Population Groups

81. Six population groups have been selected based on the geographic study areas:

- The population near landfall (site-specific);
- The population along the onshore ECC (site-specific);
- The population near the OnSS (site-specific);
- The population of East Lindsey, Boston, and South Holland districts (local);
- The population of Lincolnshire County (regional); and
- The population of England and beyond the borders of England (national and international).

30.5.2 Potentially Vulnerable Groups

82. Vulnerable Groups comprise sets of people who are may be more susceptible to the impact of the Project in comparison to the wider population. Groups are considered vulnerable for a myriad of reasons, resulting from different social barriers or specific disadvantages. Vulnerable groups may include the following:

- Children and young adults are more susceptible than others to air pollution, noise, and other environmental impacts. They are likely to have less experience and as a result lack judgement when moving around in traffic and other public spaces;
- The elderly and people with physical disabilities are more sensitive than young and middle-aged people. They are likely to have less able visual or other sensory perception and may have physical mobility problems. Changes to access routes may create anxiety or worry leading to withdrawal or isolation or reduced physical activity such as walking. They may or may not use public transport, depending on accessibility for family or other social visits, which could be affected as a result of the Project programme;
- People with physical and mental health problems, such as sleep disturbance, depression, and anxiety, may be more sensitive than others to the changes in their local environment;
- Cyclists, pedestrians, equestrians, and public transport users are likely to be affected by diversions to their travel routes or road and footpath closures, which may change their exposure to health risks, such as safety, air quality and noise; and
- People in low-income groups (income deprivation) are more likely to live in areas affected by environmental pollution (World Health Organisation, 2010) and face barriers to housing, which may cause stress and anxiety.

30.5.2.1 Other Target Groups

83. Other target groups that may face health impacts disproportionately are:

- Population within 100 m of the construction sites;

- Residents affected by construction-related traffic plying along their roads for a longer period throughout the day;
- Residents affected by other projects that will be built in the area around the same time;
- Employees (in offices or commercial spaces) working within 300m of the work site; and
- Tourists and visitors (likely to be impacted by construction, road closures, footpath diversion).

30.5.3 Temporal Scope

84. The temporal scope has been defined as follows:
    - 'Very short term' relates to effects measured in hours, days, or weeks (e.g., effects, associated with cable laying activity past a particular dwelling);
    - 'Short term' relates to effects measured in months (e.g., workforce use of accommodation);
    - 'Medium term' relates to effects measured in years (e.g., local employment during construction); and
    - 'Long term' relates to effects measured in decades (e.g., the operational stage).

30.5.4 Topic Scope

85. The scope of the health chapter focuses on the onshore infrastructure associated with the Project.
86. In line with the Scoping Opinion (document reference 5.1.2; The Planning Inspectorate, 2022), and based on the receiving environment, expected parameters of the Project (see Chapter 3 (document reference 6.1.3)) and expected scale of impact/potential for a pathway for effect on the environment, and following the principles outlined in Section 30.6 below, the following impacts have been scoped out of the assessment:
    - Operational windfarms should not produce dust and traffic emissions, nor should they produce emissions to water or soil (including hazardous waste and substances);
    - Impacts from dust and traffic during operation and maintenance and have been scoped out as a consequence of the low predicted operational traffic volumes and maintenance activities;
    - Impacts from emissions to water during operation and maintenance on the basis that the submission secures the requirement to reinstate all ground surfaces along the cable route to their original condition and given a strategy will be secured and implemented;
    - Impacts from emissions to soil (including hazardous waste and substances) during the operational and maintenance phases has been scoped out given measures described in the CoCP will be secured;
    - Disruption to local road networks including reduced access to services and amenities, during operation has been scoped out based on the low predicted operational traffic volumes and maintenance activities;

- Impacts from exposure to EMF-alone and cumulative across all phases of the project has been scoped out on the basis that the ES n demonstrates all electrical infrastructure will remain below negligible levels in line with the International Commission Non-Ionising Radiation Protection (ICNIRP) guidelines (2020);
- Impacts from pests across all phases pf the project has been scoped out, given the project is unlikely to result in the increase of pests that would affect human health;
- Impacts from odours across all phases of the project has been scoped out as The Planning Inspectorate is of the view that significant odours are not likely to be generated; and
- Transboundary effects across all phases of the project have been scoped out due to the likely localised nature of any potential effects on human health.

87. The above factors have been consulted on as part of the PEIR and no comments were raised.

30.5.5 Health Determinants

88. Health Determinants are considered to be pre-existing factors such as age, genetic make-up and gender are fixed and strongly influence a person's health status.
89. Other determinants of health can include:
    - Social and economic circumstances such as poverty, unemployment, and other forms of social exclusion. These strongly influence health, and improving them can significantly improve health;
    - How the environment in which people live, work, and play are provided and managed (for example air quality, aspects of the built environment). These can either damage health or provide opportunities for health improvement;
    - Lifestyle factors; and
    - The accessibility of services such as the NHS, education, social services, transport, and leisure facilities influence the health of the population.
90. The Project has potential to impact anyone who may live or work close by; however, it is acknowledged that some people may be disproportionately impacted based on a variety of social, environmental, and geographical factors beyond their control.
91. In many cases vulnerable groups are at greater risk to poor health and can experience significant disparities in life expectancy. In line with industry guidance (PHE, 2020a), 'health determinants' are considered, to describe the potential effects of human health and wellbeing. The methodology applies best practice published by IEMA in line with Pyper *et al.* (2022), 'Determining Significance for Human Health in Environmental Impact Assessment'.
92. The health determinants considered relevant to the Project are shown in Table 30.4. Changes to health determinants can affect the health status of different individuals or communities depending on their characteristics and sensitivity to change. These effects will also be considered cumulatively within the Project and with other projects. This chapter assesses the potential for likely significant health effects to occur during construction and operation as described in Table 30.4.

Table 30.4: Determinants and potential effects scoped in for assessment and potential sources of impact leading to potential health effect.

Health Determinant	Potential Health Effect	Relevant Technical ES Chapter	Specific Assessment
Noise and Vibration	Environmental noise is defined as unwanted or harmful outdoor noise created by human activities, including noise emitted by means of transport, road traffic, rail traffic, and from sites of industrial activity. Population exposure to environmental noise have been linked to adverse health effects. Annoyance and sleep disturbance are the key direct effects on the population. Evidence also suggests that high levels of noise nuisance and vibration cause by traffic and activities associated with construction works can result in indirect effects such as increased aggression, and impaired communication (WHO, 1995). Onshore construction phase noise effects have the potential to affect health, as does operational noise from the onshore substation.	Chapter 26: Noise and Vibration	The combined effect of noise and vibration, as predicted in Chapter 26 (document reference 6.1.26) was taken as the basis for this assessment. The impact of the new onshore substation as well as construction related noise have been considered to predict the impact on: ▪ Residents in urban and rural areas; ▪ Vulnerable Groups of people with physical and mental illness; ▪ Individuals with physical and mental illness, such as cardiovascular disorders or depression; ▪ Office or factory staff, whose workplace might be located near the construction sites; and ▪ Vulnerable Groups of able people such as the elderly and children (for example near schools or sheltered homes or supported housing).

Health Determinant	Potential Health Effect	Relevant Technical ES Chapter	Specific Assessment
Air Quality and Emissions	Temporary inhalation of particulates or exposure to exhaust emissions and dust.	Chapter 19: Onshore Air Quality	This health determinant considers a combination of Nox, Sox, PM10 and dust emissions. The baseline profile, including information on Air Quality Management Areas ("AQMA"), was taken into account. Any change to the baseline, as a result of the proposed works and cumulative effect from other projects executed in parallel, are modelled and assessed in Chapter 19 (document reference 6.1.19). This information has been used to judge how the predicted change is likely to affect the population, including vulnerable groups such as the elderly and children, and people with illness such as asthma or respiratory diseases or any sensitive receptors such as schools, health centres and hospitals. Construction related emissions such as material transport, plant emissions and dust will be attenuated through measures to be implemented by the contractors. A Code of Construction Practice ("CoCP") will be prepared setting out a framework of the measures to be adopted by the contractor in the management of construction.
Employment, access to work and local business	Potential for significant beneficial effects in relation to enabling residents of the area to access employment opportunities through construction activities and during operation.	Chapter 29: Socio-Economic Characteristics	This determinant looks at the impact of changes on local employment and business activities e.g., disruption to business during construction. Adverse impacts such as disruption and relocation may lead to stress, anxiety, lower self-esteem and well-being. Conversely, the scheme may

Health Determinant	Potential Health Effect	Relevant Technical ES Chapter	Specific Assessment
			increase access to more employment opportunities in the wider sub-region, with beneficial impacts on well-being and mental health.
Contaminated Land (and Water)	Contaminated land disturbed during construction could result in health effects through ingestion, inhalation or contact with liberated contamination. Pollution of surface or groundwater bodies which are subsequently used as a potable source could result in health effects.	Chapter 23: Geology and Ground Conditions Chapter 24: Hydrology and Flood Risk	East Lindsey, Boston and South Holland are predominantly agricultural areas and food health could be compromised by contaminated soils or water. Further details are described in Chapter 23 (document reference 6.1.23). The assessment will look at conclusions within Chapter 24 (document reference 6.1.24), to see if there are any likely impacts on health from contamination.
Physical Promoting walking and cycling Safety Access to green space, open spaces and physical activity Minimising car use	Effects of PRoW causing changes in accessing the footpath, cycleway and bridleway network. Effects from increased traffic on safety/accidents, severance/connectivity may arise due to connectivity. Loss of access to green space or diversions to access routes. Disruption of access to services and amenities.	Chapter 25: Land Use Chapter 27: Traffic and Transport	This determinant focuses on the impact of changes on all road users such as motorists, cyclists and pedestrians, to assess accessibility to amenities and services. Information from the Transport Assessment in Chapter 27 (document reference 6.1.27), including diversions, traffic management, safety and change to road traffic, have been used to predict the impact on access to services. Physical access and visual access to green spaces and open spaces have been found to have a positive impact on the health of individuals. This determinant looks at the health impact of changes to the spaces that local residents may use for physical activities, such as walking and exercise as well as visual amenity.

30.5.6 Realistic Worst-Case Scenario

93. The full Project description is provided in Chapter 3 (document reference 6.1.3). The following sections summarise the key elements of the Project that may affect human health. Assumptions considered for a worst-case scenario are outlined in Table 30.5.

94. The final design of the Project will be confirmed through detailed engineering design studies that will be undertaken post-consent to enable the commencement of construction. 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 The Planning Inspectorate Advice Note Nine (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 Volume 1, Chapter 5: EIA Methodology (document reference 6.1.5).

95. Details of human health impacts associated with the following technical topics are detailed within the worst case tables within the relevant chapters (Volume 1 of the ES):

- Chapter 19 (document reference 6.1.19);
- Chapter 23 (document reference 6.1.23);
- Chapter 24 (document reference 6.1.24);
- Chapter 25 (document reference 6.1.25);
- Chapter 26 (document reference 6.1.26);
- Chapter 27 (document reference 6.1.27); and
- Chapter 29 (document reference 6.1.29).

Table 30.5 Worst case assumptions

Element	Worst Case Criteria	Worst Case Definition
Landfall HDD		
Construction	▪ Maximum temporary works duration Working hours ▪ Expected noise level ▪ Trenchless (HDD) cable ducts ▪ Diameter of ducts (m) ▪ Length of ducts (km) ▪ Trenchless (HDD) launch pit area (m2) ▪ Trenchless (HDD) launch pit depth (m) ▪ Trenchless (HDD) burial depth maximum (m) ▪ Trenchless (HDD) burial depth minimum (m) ▪ Trenchless (HDD) exit pits number ▪ Trenchless (HDD) exit pit area (m2) ▪ Trenchless (HDD) exit pit excavated material volume (m3) ▪ Trenchless (HDD) exit pits depth (m) ▪ Temporary onshore/intertidal Trenchless exit pit working area (m2)	▪ 3 years ▪ 24-hour working may be required ▪ See Volume 3, Chapter 7: Noise and Vibration ▪ 6 ▪ 1.2 ▪ 2 ▪ 200 ▪ 6 ▪ 25 ▪ 5 ▪ 6 ▪ 1000 ▪ 5000 ▪ 5 ▪ 2500
Onshore ECC		
Construction	▪ Length ▪ Temporary Working Width ▪ Peak onshore construction employment ▪ Total ducting duration ▪ Total cable pull, joint and commission duration ▪ Total ▪ Expected noise level	▪ 80km ▪ 80m 654 daily employees ▪ 3-years ▪ 3-years ▪ 3-years

Element	Worst Case Criteria	Worst Case Definition
		▪ See Chapter 26 (document reference 6.1.26)
OnSS		
Construction	▪ Maximum land take for temporary works area ▪ Maximum duration ▪ Expected noise level	▪ 254,400 m^2 ▪ 36-months ▪ See Chapter 26 (document reference 6.1.26)
Operation	▪ Maximum number of onshore substations ▪ Maximum land take for permanent footprint ▪ Maximum height ▪ Access ▪ Expected noise level	▪ 1 ▪ 209,000m2 ▪ 16.5m building ▪ One visit per week, site lighting required during maintenance visits only. ▪ See Chapter 26 (document reference 6.1.26)

30.5.7 Embedded Mitigation

96. Mitigation measures that have been identified and adopted as part of the evolution of the Project design that are relevant are listed in Table 30.6. The mitigation includes embedded measures such as design changes, and applied mitigation, which is subject to further study; these include avoidance measures that will be informed by pre-construction surveys, and necessary additional consents where relevant. The composite of embedded and applied mitigation measures apply to all parts of the Project development works, including pre-construction, construction, operation and maintenance and decommissioning unless otherwise stated.

Table 30.6 Embedded mitigation relating to Human Health

Project phase	Mitigation measures embedded into the project design
General	
Cable Routing	The routing aims to avoid or minimise impacts on residential properties.
Construction	
Best practice construction measures	Construction works would be undertaken in accordance with best practice measures that are proportional to the likely impacts. In terms of air quality, dust mitigation measures are identified by the applied Institute of Air Quality Management (IAQM) methodology (IAQM, 2024). This would apply to all onshore construction activities.
Code of Construction Practice (CoCP)	Development of, and adherence to, a CoCP that sets out management measures, commitments and working standards proposed to be adopted and implemented throughout the construction process. In terms of noise and vibration, all construction work will be undertaken in accordance with a Noise and Vibration Management Plan (NVMP). An outline version will be provided as an Appendix to the outline CoCP (document reference 8.1). Approval of the final NVMP by LCC will be as a requirement of the DCO. The outline version of the NVMP sets out the principles to be followed when the final NVMP is finalised. This CoCP would apply to all onshore construction activities and work areas.
Project Design	As far as reasonably practicable, routing of the ECC and locations of the Temporary Construction Compounds and OnSS to avoid key areas of sensitivity.
No overhead lines	The commitment to use underground cable systems for the onshore ECC between the landfall and OnSS avoids the requirement to construct new overhead lines. The mitigation embedded in this approach will lead to notably reduced impacts on landscape and visual receptors during the construction phase and minimal impacts during the operational phase. This is as a consequence of the visual and aesthetic environment being associated with positive well-being and are increasingly recognised as an asset for promoting higher levels of health (see literature review contained within document reference 6.3.30.2). It also

Project phase	Mitigation measures embedded into the project design
	notably reduces the potential for the onshore ECC to contribute to significant landscape and visual cumulative effects. The construction works for the onshore cable route will have a negligible impact on landscape and visual receptors as the components will be buried under ground.
Micro-siting	Micro-siting will avoid, where possible positioning the onshore cable route and construction haul roads within the mapped landfill sites and will employ an appropriate buffer zone. This will remove any direct impacts upon or from the historic landfills.
Operation and Maintenance	
Operational noise from the OnSS	As far as reasonably practicable, OnSS sited to avoid key areas of sensitivity, that could cause potential harm to human health.
Decommissioning	
Best practice decommissioning measures	Decommissioning works would be undertaken in accordance with best practice measures that are proportional to the likely impacts. In terms of noise, it is not anticipated that any further mitigation measures would be required, other than those associated with construction operations. This would apply to all onshore decommissioning works.

30.6 Assessment Methodology

30.6.1 Approach

97. This chapter sets out the methods for providing reasoned conclusions for the identification and assessment of any likely significant effects of the Project on human health (as required by the EIA Regulations 2017).

98. The EIA Directive 2014/52/EU defines the process which ensures that projects likely to have significant effects on the environment, whilst this legislation no longer holds weight within the UK following the Implementation Period completion day (31st December 2020), however, the directive is still considered as it provides the principles which sit behind UK EIA and is useful in providing key information. Consistent with the objective of EIA (as set out in EIA Directive 2014/52/EU), the methods identify effects that provide, or are contrary to providing, a high level of protection to human health. This includes reasoned conclusions in relation to health protection, health improvement and/or improving services.

99. The methods provide a framework to identify:

- The 'likelihood' of the Project having an effect on health; and
- If an effect is likely, whether it may be 'significant' in the terms of the EIA regulations.

100. Effects are considered with regards the general population and vulnerable groups. Populations are considered at regional and local levels.

101. In line with best practice guidance from the WHO (WHO, 2012) and PHE (PHE, 2020), "health determinants" are considered to understand effects on human health and wellbeing. The methodology uses emerging best practice published by the Institute of Environmental Management and Assessment (IEMA) in line with the 'Health in Environmental Impact Assessment: Determining Significance for Human Health in Environmental Impact Assessment (IEMA, 2022), in addition to other best practice guidance by IEMA (Cave *et al.*, 2017).

102. To identify whether there will be an effect on health, the chapter addresses the following key questions:

- Who are likely to be affected by the Project?
    - The Project might affect different population groups in different ways, for example the health consequences of a scheme may be different for existing residents, workers on site during construction, and vulnerable groups;

- What determinants of health may be affected?
    - Health determinants are the factors that can influence health. For example, air quality, noise or access to green spaces and open spaces. The state of the health of individuals and communities is determined by many factors including their circumstances and environment. The assessment aims to forecast changes in health condition as a result of the potential changes to the health determinants due to the Project. The health determinants include community and economic factors as well as the physical environment. The list of determinants is drawn from existing literature and the local profile and is discussed in section 30.1;
- What is the current health status of the community (baseline information from desktop studies (section 30.4);
- What are the potential positive and negative impacts of the Project against each of the categories identified in the determinants of health checklist? And if there are any negative effects, how can they be avoided, reduced, or compensated? Impacts often arise in indirect ways or could be unforeseen consequences and can happen at different stages of a causal pathway; and
- Identify whether any further evidence/research is needed to inform the final recommendations of the assessment.

103. The study has been conducted through the following steps:

- Policy reviews to provide the evidence base for identifying health determinants as well as to understand evidence available on the link between the health determinants and health effects;
- Determine the study area boundary and identify the health determinants;
- Profiling health characteristics of the population / determinants in the study area;
- Consult with the Project team to gather their views on health concerns relating to their discipline chapters of the ES; and
- Conduct the assessment and identify and incorporate mitigation measures, if any required, into the scheme design, construction activities and operational procedures.

104. The assessment has been conducted in line with the relevant sections of the NPSs as listed below:

- EN-1 Overarching Energy (DESNZ, 2023);
- EN-3 Renewable Energy Infrastructure (DESNZ, 2023), which covers nationally significant renewable energy infrastructure (including offshore generating stations in excess of 100 MW); and
- EN-5 Electricity Networks Infrastructure (DESNZ, 2023), which covers the electrical infrastructure associated with an NSIP.

105. The assessment will:

- Identify the impact on health of direct and indirect impacts;

- Identify and include information on any significant adverse health impact in the ES, and
- Identify measures to avoid, reduce or compensate adverse health impacts, including cumulative impacts.

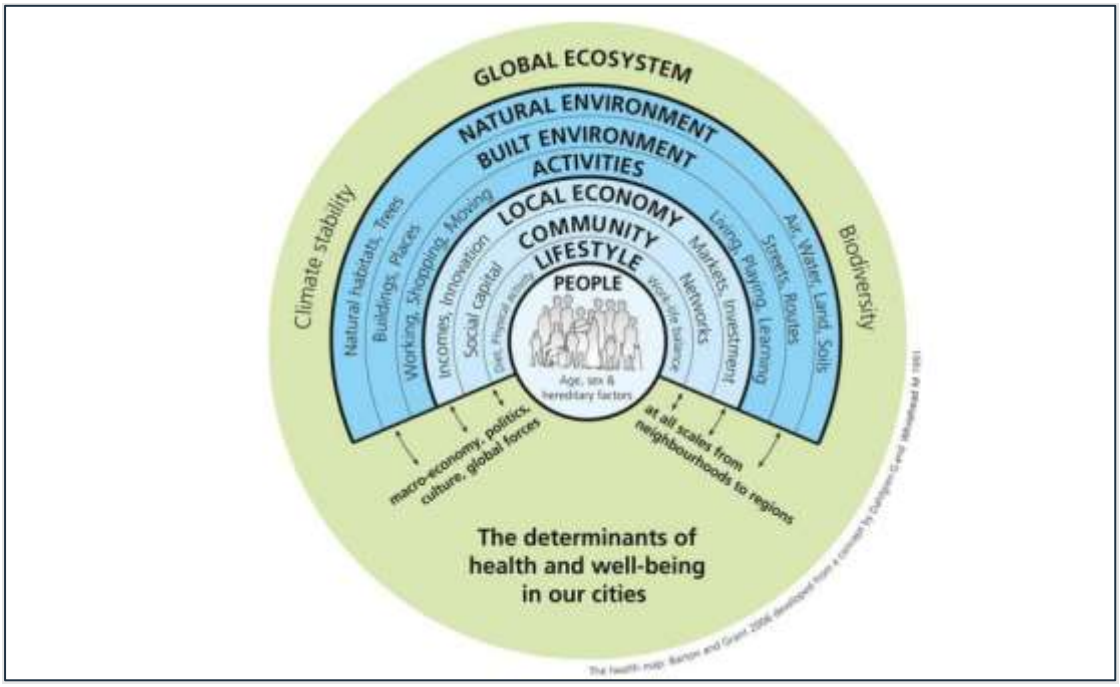
106. This chapter has drawn upon the studies undertaken for the ES including modelling data and potential impacts on the population and the environment, for air quality and noise and vibration and other health determinants. This information has been used to map the causal pathways and impact prediction for this assessment.

30.6.2 Health Determinants

107. The range of personal, social, economic, and environmental factors that influence health status are known as health determinants and include the physical environment, income levels, employment, education, social support, and housing. The 'wider determinants of health' model is used to conceptualise how human health spans environmental, social, and economic aspects. This is illustrated Plate 30.1 below.

108. Influences that result in a change in determinants have the potential to cause beneficial or adverse effects on health, either directly or indirectly. The degree to which these determinants influence health varies, given the degree of personal choice, location, mobility, and exposure.

Plate 30.1: Wider determinants of health and well-being[7]



[7] Source: Based on the Dahlgren and Whitehead (1991) diagram as amended by Barton and Grant (2006)

30.6.3 Likelihood

109. The first issue to consider is the likelihood of the Project having an effect. A likely effect should be both plausible and probable.

- Plausible relates to their being a relevant source, pathway, and receptor (see discussion of health pathways below); and
- Probable relates to a qualitative judgement to exclude those effects that could only occur under certain very rare conditions, except where these relate to the Project's vulnerability to major accidents or disasters (as required by Part 1 paragraph 4(4) EIA Regulation 2017). The term 'health pathways' describe how a specific activity of the Project could change a determinant of health and potentially result in a change in health outcomes (an effect).

110. Health pathways are considered with regards the source, pathway, and receptor as follows:

- A 'source' represents an activity or factor that could affect the health outcomes of a receptor population;
- A 'pathway' describes the method or route by which the 'source' could affect the 'receptor' (either causation or association); and
- A 'receptor' is the recipient of an effect from the 'source', via the 'pathway'.

111. Table 30.7 below shows how the Source-Pathway-Receptor model can be used to identify plausible health effects.

Table 30.7 Use of a Source-Pathway-Receptor model to identify plausible health effects

Source	Pathway	Receptor	Plausible Health effect?	Rationale
X	√	√	No	There is not a clear source from where a potential health effect could originate.
√	X	√	No	The source of a potential health effect lacks a means of transmission to a population.
√	√	X	No	Receptors that would be sensitive or vulnerable to the health effect are not present.
√	√	√	Yes	Identifying a source, pathway and receptor does not mean an effect is a likely significant effect; the probability of the effect should be qualitatively considered, and a professional judgement reached on the significance of effects that are considered likely.

30.6.4 Significance

112. A determination of significance is required for compliance with the EIA regulations 2017 when a potential effect of the Project is likely (or relates to the Project's vulnerability to major accidents or disasters). It should be noted that it was agreed at the Scoping stage that a separate chapter on Major Accidents and Disasters within the Environmental Statement (ES) was not required. The risk of 'major accidents and/or disasters' occurring associated with any aspect of the Project, during the construction, operation and decommissioning phases are anticipated to be negligible, following guidance published by IEMA on Major Accidents and Disasters in EIA (IEMA, 2020). Instead, an outline Code of Construction Practice and Outline Pollution Prevention and Emergency Incident Response Plan has been provided as part of the DCO application (document reference: 8.1). A Hazard Identification (HazID) Report will be prepared and agreed with the relevant planning authority prior to construction of DCO Work.

113. The determination of significance has two stages:

- Firstly, the sensitivity of the receptor affected, and the magnitude of the effect upon it are characterised. This establishes whether there is a relevant population and a relevant change in health outcomes to consider; and
- Secondly, a professional judgement is made as to whether or not the change in a population's health is significant. This judgement is based on the collection and presentation of data to evidence reasoned conclusions.

30.6.5 General population and vulnerable groups

114. In line with IEMA (2022) guidance, the assessment considers effects on how the 'general population' may differ from 'vulnerable group population' which is considered when determining the scoring sensitivity, with an overview provided below:

- In terms of life stage, the general population can be characterised as including a high proportion of people who are independent, as well as those who are providing some care. By contrast, the vulnerable group population can be characterised as including a high proportion of people who are providing a lot of care, as well as those who are dependant.
- The general population can be characterised as experiencing low deprivation. However, the professional judgment is that the vulnerable group population experiences high deprivation (including where this is due to pockets of higher deprivation within low deprivation areas).
- The general population can be characterised as broadly comprised of people with good health status. Vulnerable groups, however, tend to include those parts of the population reporting bad or very bad health status.
- The general population tends to include a large majority of people who characterise their day-to-day activities as not limited. The vulnerable group population tends to represent those who rate their day-to-day activities as limited a little or limited a lot.

- Based on a professional judgement the general population's resilience (capacity to adapt to change) can be characterised as high, whilst the vulnerable group population can be characterised as having limited resilience.
- Regarding the usage of affected infrastructure or facilities, the professional judgement is that the general population are more likely to have many alternatives to resources shared with the Project. For the vulnerable group population, the professional judgement is that they are more likely to have a reliance on shared resources.

30.6.6 Sensitivity

115. Table 30.8 sets out factors characterising sensitivity for human health as per IEMA (2022). The table informs the professional judgement on scoring high, medium, low, or negligible sensitivity. In line with best practice a formulaic matrix approach to determining sensitivity has been avoided. The 'higher' and 'lower' sensitivity characterisations represent instructive positions on a spectrum that would also include more extreme, as well as intermediate, positions. Most situations have a mix of higher and lower characterising factors, so a balanced expert view of sensitivity is taken.

Table 30.8 Factors Characterising Population Sensitivity (IEMA, 2022)

Category/Level	Indicative Criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories)
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependants; people with very poor health status; and/or people with a very low capacity to adapt
Medium	Moderate levels of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care; people with poor health status; and/or people with a limited capacity to adapt
Low	Low levels of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and/or people with a high capacity to adapt

Category/Level	Indicative Criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories)
Negligible	Very low levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a community whose outlook is predominantly support with some concern; people who are not limited from undertaking daily activities; people who are independent (not a carer or dependant); people with good health status; and/or people with a very high capacity to adapt

116. The Assessment characterises the relevant populations for each health issue. For each category, the text sets out detail on the one or more relevant factors Table 30.8 that informed the score.

30.6.7 Magnitude

117. Table 30.9 sets out factors characterising magnitude for human health, as per IEMA (2022). The table informs the professional judgement on assigning scoring of large, medium, small, or negligible magnitude. In line with best practice a formulaic matrix approach to determining magnitude has been avoided. The 'larger' and 'smaller' magnitude characterisations represent instructive positions on a spectrum that would also include more extreme, as well as intermediate, positions.

Table 30.9: Factors Characterising Magnitude (IEMA, 2022)

Category/Level	Indicative Criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories)
High	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/ injury outcomes; majority of population affected; permanent change; substantial service quality implications
Medium	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications
Low	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications
Negligible	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life; very few people affected; immediate reversal once activity complete; no service quality implication.

118. The Assessment characterises the relevant changes in health outcomes for each health issue. For each professional judgement on magnitude, the text sets out detail on the one or more relevant factors from Table 30.9 that informed the score.

30.6.8 Judgement Framework for Significance

119. Having established that a source, pathway, and receptor for impact exist, the magnitude/sensitivity methods are used to consider whether there is a relevant population to consider and a relevant change in health outcomes, a professional judgement is made as to whether or not the change in a population's health is significant.

120. The characterisation of sensitivity and magnitude provides consistency between EIA topics. However, other relevant information sources (in addition to sensitivity and magnitude) also need to be evidenced for the professional judgement on significance to be a reasoned and robust conclusion on population health outcomes.

121. The approach uses a framework for reporting on a range of data sources to ensure reasoned and robust professional judgements are reached. Key sources of data include scientific literature; baseline conditions; health priorities; consultation responses; regulatory standards; and policy context.

122. Guide questions set out in Table 30.10 are used to inform the professional judgements on significance. The table informs the professional judgement on scoring major, moderate, minor, or negligible significance.

Table 30.10: Human Health Guide Questions for Determining Significance (IEMA, 2022)

Evidence sources	Guide Questions
Scientific literature	Is there a sufficient strength of evidence from sufficiently high-quality studies to support an association between the Project change, a relevant determinant of health and a relevant health outcome? Does the literature indicate thresholds or conditions for effects to occur? Are particular population groups identified as being particularly susceptible?
Baseline conditions	Are relevant sensitivities or inequalities identified in the scientific literature present? Does the baseline indicate that conditions differ from relevant local, regional, or national comparators? Are their geographic or population features of the baseline that indicate effects could be amplified?
Health priorities	Have local, regional, or national health priorities been set for the relevant determinant of health or health outcome (e.g., in Joint Strategic Needs Assessments or in Health and Wellbeing Strategies)?
Consultation responses	Has a theme of local, regional, or national consultation responses related to the relevant determinant of health or health outcome?

Regulatory standards (if relevant)	Is the change one that would be formally monitored by regulators? Are there regulatory or statutory limit values set for the relevant context? Has EIA modelling predicted change that exceed thresholds from the scientific literature or set by regulators? Are there relevant international advisory guideline limit values (e.g., by the WHO)?
Policy context	Does local, regional, or national government policy raise particular expectations for the relevant project change, determinant of health or health outcome (e.g., levels should be as low as reasonably practicable)? Is there a relevant international policy context (e.g., treaties or conventions)?

123. The table above informs the professional judgement on scoring major, moderate, minor, or negligible significance matrix, which is displayed in Table 30.11.

Table 30.11 Generic Indicative EIA Significance Matrix

		Magnitude of impact			
		Negligible	Low	Medium	High
Sensitivity of receptor	Negligible	Negligible (Not significant)	Negligible (Not significant)	Minor (Not significant)	Minor (Not significant)
	Low	Negligible (Not significant)	Minor (Not significant)	Minor (Not significant)	Moderate (Significant)
	Medium	Minor (Not significant)	Minor (Not significant)	Moderate (Significant)	Major (Significant)
	High	Minor (Not significant)	Moderate (Significant)	Major (Significant)	Major (Significant)

124. As professional judgement is used to determine the level of significance of effect, IEMA (2022) provides guidance which is shown in Table 30.12 to support decision making.

Table 30.12: Significance conclusion and reasoning related to public health.

Category/Level	Indicative Criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories)
Major (significant)	The narrative explains that this is significant for public health because (select as appropriate): ▪ Changes, due to the project, have a substantial effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size (magnitude and sensitivity levels), and as informed by consultation themes among stakeholders, particularly public health stakeholders, that show consensus on the importance of the effect. ▪ Change, due to the project, could result in a regulatory threshold or statutory standard being crossed (if applicable). ▪ There is likely to be a substantial change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a causal relationship between changes that would result from the project and changes to health outcomes. ▪ In addition, health priorities for the relevant study area are of specific relevance to the determinant of health or population group affected by the project
Moderate (significant)	The narrative explains that this is significant for public health because (select as appropriate): ▪ Changes, due to the project, have an influential effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size, and as informed by consultation themes among stakeholders, which may show mixed views. ▪ Change, due to the project, could result in a regulatory threshold or statutory standard being approached (if applicable). ▪ There is likely to be a small change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a clear relationship between changes that would result from the project and changes to health outcomes.

Category/Level	Indicative Criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories)
	▪ In addition, health priorities for the relevant study area are of general relevance to the determinant of health or population group affected by the project
Minor (not significant)	The narrative explains that this is not significant for public health because (select as appropriate): ▪ Changes, due to the project, have a marginal effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size of limited policy influence and/or that no relevant consultation themes emerge among stakeholders. ▪ Change, due to the project, would be well within a regulatory threshold or statutory standard (if applicable); but could result in a guideline being crossed (if applicable). ▪ There is likely to be a slight change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is only a suggestive relationship between changes that would result from the project and changes to health outcomes. ▪ In addition, health priorities for the relevant study area are of low relevance to the determinant of health or population group affected by the project.
Negligible (not significant)	The narrative explains that this is not significant for public health because (select as appropriate): ▪ Changes, due to the project, are not related to the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size or lack of relevant policy, and as informed by the project having no responses on this issue among stakeholders. ▪ Change, due to the project, would not affect a regulatory threshold, statutory standard or guideline (if applicable). ▪ There is likely to be a very limited change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is an unsupported relationship between changes that would result from the project and changes to health outcomes. ▪ In addition, health priorities for the relevant study area are not relevant to the determinant of health or population group affected by the project

125. The text of the assessment section provides a structured discussion that responds to each of these questions and criteria set out in this section for each health issue. The discussion provides reasoned conclusions for the professional judgement as to whether in EIA terms an issue is significant, or not. Where appropriate, variation expressed in each evidence source has been reported. This approach is considered proportionate and in line with best practice for the consideration of human health.

126. Ultimately for human health, a likely significant effect is one that should be brought to the attention of the determining authority, as the effect of the Project is judged to provide, or be contrary to providing, a high level of protection to human health. This may include reasoned conclusions in relation to health protection, health improvement and/or improving services.

127. For the purposes of this ES, as previously discussed within Volume 1, Chapter 5: EIA Methodology (document reference 6.1.5), only major and moderate effects are deemed to be significant. In addition, whilst minor effects are not significant in their own right, it is important to distinguish these from other non-significant effects as they may contribute to significant cumulative effects.

128. Where significant adverse effects are identified, mitigation has been considered to reduce the significance of such effects. Similarly, enhancements have been considered where significant and proportionate opportunities to benefit population health have been identified. The residual effects represent the output of iterative assessment, taking into consideration the mitigation and enhancement measures.

129. This chapter takes as its starting point the residual effects as assessed and determined in other relevant ES topic chapters. This includes taking into account relevant embedded and standard good practice mitigation.

30.6.9 Population Conclusions

130. A population health approach has been used, as it would be disproportionate to reach conclusions on the potential health outcomes of individuals. To take account of potential inequalities, where appropriate, conclusions on a particular health issue have been reached for more than one population. For example:

- One conclusion for the general population (for a defined area); and
- A second separate sub-population conclusion for relevant vulnerable groups.

30.7 Impact Assessment

30.7.1 Construction

30.7.1.1 Noise

131. During construction, there is potential for noise to temporarily arise from construction works and movement of heavy goods vehicles across the Project's onshore Order Limits(see section 30.4).

132. The population groups relevant to this assessment, due to either proximity or other sensitivity, are defined in section 30.1.

133. The key health outcomes relevant to noise as a determinant of health are cardiovascular health (only as a result of chronic noise effects), mental health (including stress, anxiety or depression) and cognitive performance in children, particularly at school. This is particularly relevant to two of the health priorities (section 30.1) outlined by Lincolnshire County Council, care for the elderly and support to young children.

134. The temporal scope for this effect (as described in section 30.1) varies depending on the area of the Project:

- At landfall, there is a short-term temporal scope due to use of trenchless techniques and presence of a temporary onshore works area;
- Along the onshore ECC there is a short-term temporal scope because (as described in Volume 1 Chapter 3: Project Description) the onshore cable route will be constructed sequentially, with works proposed to be undertaken during the daytime;
- At the OnSS, there is a short-term temporal scope because the works are planned across several-weeks; and
- With regards to traffic noise, there is a medium-term temporal scope because this will be a requirement for the entirety of the Project construction period. However, locally, the impacts will be short term as the works move along the onshore ECC.

135. The conclusions of Chapter 26 Noise and Vibration (document reference 6.1.26) can be summarised as follows:

- No residual impact at landfall after mitigation;
- **Negligible** localised impacts along the onshore ECC following the application of mitigation measures;
- No residual impact at the OnSS following the application of mitigation measures;
- **Minor adverse** impacts due to traffic noise following mitigation; and
- No impacts due to vibration.

136. The mitigation measures taken into consideration during the assessment are described in Chapter 26 (document reference 6.1.26). Details regarding mitigation are outlined within the Outline Noise and Vibration Management Plan (document reference 8.1.1).

137. The potential effect is considered likely because there is a plausible source-pathway-receptor relationship where:

- The source is construction plant and operations;
- The pathway is pressure waves through the air; and
- Receptors are communities of people, or institutions (e.g. schools/ hospitals) situated within 500 metres to the onshore elements of the Project.

138. Furthermore, the potential effect is probable as no unusual conditions are required for the source-pathway-receptor linkage. The sensitivity of the general population and particularly for vulnerable groups (collectively as a single group) can be characterised as follows.

139. The sensitivity of the general population and vulnerable groups (collectively as a single group) can be characterised as:

- The sensitivity of the general population is considered to be low because overall health indicators show a healthy population of working age, with a skew towards an older population;
- The sensitivity of vulnerable groups is considered high. This is because there is a marginally higher proportion of households where nobody is in employment, of retirement aged people (65+) or young children, and where people have long term illness. The deprivation of some neighbourhoods in Lincolnshire is amongst the 20% most deprived in England; and
- Within East Lindsey and Boston, there are schools and nurseries that lie within 500m of the site boundary. However, the noise assessment did not highlight these as being at risk due to lying outside 160 metres from any works.

140. In Lincolnshire the health of the population is varied. Life expectancy is higher overall but lower in the most deprived areas, when compared against the average for England. In East Lindsey and Boston, the average life expectancy at birth for both males (78.1) and females (81.8) are below the average for Lincolnshire (79.2 and 82.8 respectively) and the East Midlands region (78.5 and 82.3 respectively). In South Holland the average is higher.

141. Some people would be more sensitive to changes in noise. For this population, sensitivity is considered high. Vulnerability in this case is particularly linked to:

- Living close to sources of noise;
- Age (both young people and older people);
- Existing poor health (e.g., Long-term illness);
- Spending more time in affected dwellings (e.g., Due to low economic activity, shift work; or ill health); or
- Vulnerability due to deprivation or health inequalities.

142. Compared to the national average, there are a lower number of children (age 0-15) across East Lindsey and Boston LSOA's when compared nationally and with Lincolnshire. The South Holland LSOA has a higher number of children.

143. The baseline indicates a sub-population more likely to spend extended periods at home due to retirement or long-term illness. The baseline data indicates that the population at East Lindsey and Boston LSOA's consider itself to have worse health than compared with the rest of England. Within the South Holland LSOA, the population consider *themselves* to have better health compared to the rest of England. Some populations in Lincolnshire in the vicinity of the onshore study area are amongst the 20%

most deprived neighbourhoods in England.

144. In East Lindsey and Boston LSOAs, there are a higher number of people at retirement age. In South Holland LSOA there is a lower percentage than regional and national.

145. The magnitude of the change due to the Project can be characterised as small. Construction related noise close to particular dwellings or other community receptors would be infrequent and of short duration (being predominantly limited to periods of passing trench work or vehicle traffic). The levels of noise experienced would be within working noise limits for temporary disruption. At these levels it is unlikely that there would be changes in the risk of developing a new health condition or of exacerbating an existing condition.

146. Reductions in wellbeing associated with short-term, or very short-term, noise levels would be unlikely to persist beyond the period of elevated exposure. The general exposure profile would be one of low exposure to a small population.

147. Chapter 26 (document reference 6.1.26) describes how, following implementation of mitigation, residual impacts are assessed as not significant.

148. The significance of the potential effects has been informed by the guide questions in Table 30.10.

149. The following discussion sets out the reasoned conclusions for the professional judgement reached:

- Scientific literature does show a causal link between chronic noise above certain thresholds and health determinants. The evidence does not indicate a lower threshold at which health effects do not occur;
- Baseline conditions do show that compared to national comparators the affected population has higher levels of deprivation in the populations around the onshore study area with Boston and South Holland being slightly lower. East Lindsey and Boston LSOA populations have a marginally higher level of retirement aged people. This suggest that there is potential for more people to be at home during the day. With the exception of South Holland LSOA, the proportion of children is relatively low by a comparable amount;
- Although there are slight differences in the LSOA's, it is considered that these are not significant enough to result in a different impact;
- Lincolnshire County Council's health priorities focus on care for children and people who suffer from dementia. Whilst noise is not a key public health priority issue for the County, localised issues are a priority of the Environmental Health Practitioners at the LPA, who have legal powers to investigate and control statutory noise nuisance; and
- Consultation responses received to date predominantly refer to requirements for the assessment in Chapter 26 (document reference 6.1.26) to comply with relevant standards and undertake appropriate consultation. Chapter 26 (document reference 6.1.26) describes how, assuming mitigation is implemented, residual impacts are assessed as not significant.

150. In line with the NPS for Overarching Energy (EN-1) (Department of Energy and Climate Change, 2023a) it can be confirmed that (based on the assessment in Chapter 26 (document reference 6.1.26) the Project has avoided significant impacts for noise and vibration, has proposed mitigation in place where impacts are predicted, and will put in place measures to effectively manage and control noise. The conclusion of the assessment for population health is that the significance of the effect would be **negligible** for the general population and **minor adverse** for vulnerable groups. This is considered **not significant** in terms of the EIA Regulations. Vulnerability in this case relates to, carers, young children, retirement aged population, those with long term illness, and those who are unemployed or shift workers who are most likely to spend more of their time at home and who are living adjacent to the Project. All effects would be short-term, temporary and would cease on completion of the works. Therefore, there would be no residual long-term health outcome.

30.7.1.2 Air Quality

151. During construction, there is potential for air quality to be temporarily affected by dust and fine particulate from construction, and emissions from construction vehicles.

152. The population groups relevant to this assessment, due to either proximity or other sensitivity, are defined in section 30.1.

153. The key health outcomes relevant to this determinant of health are an increased risk of cardiovascular diseases (Meo and Suraya, 2015) and asthma exacerbation (Orellano *et al*., 2017).

154. The temporal scope for this effect (as described in section 30.1) varies depending on the area of the Project:

- At landfall, there is a short-term temporal scope due to the use of trenchless techniques and the presence of landfall compound;
- Along the onshore ECC there are a very short-term temporal scope because (as described in Chapter 3 (document reference 6.1.3)) the onshore cable route will be constructed sequentially. ECC works will include trenchless crossings of major obstacles, roads, railways, rivers, drains with the potential for 24-hour working;
- At the OnSS, there is a medium-term temporal scope because the construction works are planned for approximately three years; and
- With regards to traffic emissions, there is a medium-term temporal scope because this will be a requirement for the entirety of the Project construction phase. However, locally, the impacts will be short term as the works move along the onshore cable route.

155. The conclusions in Chapter 19 Air Quality (document reference 6.1.19) of this ES can be summarised as follows:

- Impacts due to construction dust and fine particulate are **not significant** with appropriate mitigation; and

- Construction vehicle exhaust emissions are **not significant**.

156. The mitigation measures taken into consideration during the assessment are as described in Chapter 19 (document reference 6.1.19).

157. The potential effect is considered likely because there is a plausible source-pathway-receptor relationship:

- Sources of dust are excavated materials and sources of particulate or emissions are construction traffic;
- The pathway is dispersion through the air; and
- Receptors are communities of people.

158. Furthermore, the potential effect is probable as no unusual conditions are required for the source-pathway-receptor linkage.

159. The sensitivity of the general population and vulnerable groups (collectively as a single group) can be characterised as follows:

- The sensitivity of the general population is considered to be low because overall health indicators show a healthy population of working age, with a skew towards an older population;
- As with noise, the sensitivity of vulnerable groups is considered high. This is because there is a marginally higher proportion of households where nobody is in employment, of retirement aged people, and where people have long term illness. The deprivation of some neighbourhoods in Lincolnshire is amongst the 20% most deprived in England; and
- Within East Lindsey and Boston, there are schools and nurseries that lie within 500m of the site boundary.

160. The magnitude of the change due to the Project can be characterised as low. For air pollutants that are respirable (e.g., NO_2, PM_{10} and $PM_{2.5}$), the change in air quality close to particular dwellings or other community receptors would be infrequent and of short duration (being predominantly limited to periods of passing trench work or vehicle traffic). The changes would be below all recognised statutory thresholds for health protection. For particles of non-respirable size, coarser (larger and heavier) fractions of dust are expected to rapidly reduce in concentration with distance from source due to precipitation.

161. The potential for nuisance-type dust effects is therefore expected to be occasional and limited. For finer fractions of dust precipitation rates would be slower, affecting a wider area and thus more people. However, exposure is expected to be low due to the finer dust particles dispersing (reducing in concentration) with increased distance. At these levels it is unlikely that there would be changes in the risk of developing a new health condition or of exacerbating an existing condition. It is unlikely that there would be a significant change in population health outcomes for the neighbouring community during these periods.

162. The significance of the potential effects has been informed by the guide questions in Table 30.10.

- The following discussion sets out the reasoned conclusions for the professional judgement reached:
- Scientific literature does indicate a causal link between air pollution due to dust, particulate, and various gases, including those associated with internal combustion engines with health impacts. Whilst the literature supports there being thresholds set for health protection purposes, it also acknowledges that for some air pollutants there are non-threshold health effects (i.e., when there is no known exposure threshold level below which adverse health effects may not occur). The assessment has identified population groups that may be particularly sensitive to air quality effects. The assessment in Chapter 19 (document reference 6.1.19) shows that the concentration of pollutants is not likely to exceeded thresholds set for health protection (i.e., UK AQOs);
- Baseline conditions show that there is a marginally higher proportion of people that are likely to be at home, i.e., closer to the construction area, for more of the day;
- These populations align with the Health Priority areas of Lincolnshire County Council who have a particular focus on older age people and people suffering from long term illness;
- Although there are slight differences in the LSOA's, it is considered that these are not significant enough to result in a different impact.
- The air quality assessment is summarised above and indicates that with mitigation and control measures implemented the onshore construction works would be within statutory requirements (UK AQOs) and would be unlikely to result in nuisance from widespread dust deposition. The assessment undertaken in Chapter 19 (document reference 6.1.19) follows regulatory guidance as required in the UK; and
- The NPS for Overarching Energy (EN-1) (Department of Energy and Climate Change, 2023a) does require projects to consider air pollution, which has been undertaken, but notes that projects with significantly detrimental impacts on health are subject to separate regulations which will constitute effective mitigation.

163. The conclusion of the assessment for population health is that the significance of the effect would be **negligible** for the general population and **minor adverse** for vulnerable groups. This is considered **not significant** in terms of the EIA Regulations. Vulnerability in this case relates to people living adjacent to the onshore ECC with existing poor respiratory health (such as asthma or chronic obstructive pulmonary disease), as well as carers, young children, retirement aged population, those with long term illness, and those who are unemployed or shift workers who are most likely to spend more of their time at home. All effects would be short-term, temporary and would cease on completion of the works. Therefore, there would be no residual long-term health outcome.

30.7.1.3 Ground and / or Water Contamination

164. During construction, water quality has the potential to be temporarily affected by construction site run-off, or temporary impoundment of water courses. Drinking water is not likely to be affected because the population of Lincolnshire is supplied by piped drinking water and do not abstract water directly from surface or ground water sources without treatment.

165. The population groups relevant to this assessment, due to either proximity or other sensitivity, are defined in section 30.1.

166. The key health outcomes relevant to this determinant of health relate to potential toxicological exposure associated with contaminated bathing water. Effects may relate to either biological toxins (e.g., associated with eutrophication) or chemical toxins (e.g., associated with mobilisation of historic contamination).

167. The temporal scope for these effects is (as described in section 30.1) short term because the most likely pathways are at points where the cable makes landfall, or where the onshore cable route crosses small scale watercourses.

168. The conclusions of Chapter 23 Geology and Ground Conditions (document reference 6.1.23) and Chapter 24 Hydrology and Flood Risk (document reference 6.1.24) can be summarised as follows:

- There will be a short-term risk to construction workers and offsite human receptors during development of onshore ECC and associated infrastructure, including the OnSS. The impacts to human health from the construction stages of the Project were considered in the context of existing identified contaminated sources and how the Project is likely to interact with these, based on significant pollution linkages;
- The Order Limits is not anticipated to contain significant sources of contamination. However, several localised sources of potential contamination have been identified;
- The baseline data as set out in Chapter 23 (document reference 6.1.23) has indicated that historic landfill areas are mapped within three sections; Landfall to A52-Hogsthorpe, A52 – Hogsthorpe to Marsh Lane, A158 Skegness Road to Steeping River. These historic landfills are thought to be small scale, isolated areas within farmland, and of inert nature with very low risk. Within all other route sections there are no identified sources of potential contamination; and
- The occurrence of contaminated land is predicted to be minor but ground conditions for each section would be assessed by the Principal Contractor as part of the detailed design of the Project.

169. Following implementation of mitigation measures to prevent ground and groundwater pollution, the Project is predicted to have only negligible and minor adverse effects in relation to geology and ground conditions. Within the four sections (Landfall to A52- Hogsthorpe, A52 – Hogsthorpe to Marsh Lane, A158 Skegness Road to Steeping River) where the historic landfill areas have been identified the sensitivity is considered to be moderate, the magnitude of impact is assessed as minor adverse, and the resulting

significance of the effect is minor adverse. This is **not significant** in EIA terms.

170. Within all other route sections, the sensitivity is considered to be moderate, the magnitude of impact is assessed as negligible, and the resulting significance of the effect is negligible. This is **not significant** in EIA terms.

171. Based on the methods described in section 30.6 there is a plausible but unlikely source-pathway-receptor relationship:

- Sources include the potential for accidental fuel spill, or mobilisation of historic contamination;
- The pathway would be contaminants in bathing waters; and
- Receptors include users of the beach at landfall and users of watercourses.

172. The plausibility of the potential effect occurring largely depends on unusual conditions to make the source-pathway-receptor linkage. The sources relate to accidental releases of pollutants or the unexpected encountering of historic contamination. Potential for water quality impacts from works around the landfall is negligible as any excavations is likely to only have potential to mobilise sands and any direct pollution from spills will be very small relative to the receiving environment. This is considered **not significant** in terms of the EIA Regulations.

173. Mitigation measures are described in Chapter 23 (document reference 6.1.23 and Chapter 24 (document reference 6.1.24), to reduce the probability of a risk occurring, and should it occur, further mitigation to reduce the risk of widespread contamination that could affect the public.

174. The sensitivity of the general population and vulnerable groups (collectively as a single group) can be characterised as follows.

- The sensitivity of the general population is considered to be low which reflects the limited likelihood that people would interact with bodies of water for recreational purposes; and
- The sensitivity of the vulnerable population is considered to be medium given there are vulnerable age groups near the Project infrastructure (both young people and older people) and people with existing poor health (e.g. long-term illness) which would be most affected from contamination.

175. The magnitude of the change due to the Project can be characterised as very low.

176. The significance of the potential effects has been informed by the guide questions in Table 30.10. The following discussion sets out the reasoned conclusions for the professional judgement reached:

- Scientific literature indicates sufficient strength of evidence from sufficiently high-quality scientific studies to establish that clean and sufficient drinking water is required to remain healthy. Children may be particularly sensitive to toxicological effects due to developmental stage and more time spent outdoors, including use of bathing waters. The baseline indicates that the areas affected by the Project typically

have a lower-than-average percentage of young people (compared to national comparators) and lower population density (compared to national comparators);

- Whilst a review of regional public health needs assessments and strategies indicates that water quality, as a determinant of health, is not a key public health priority issue, health priorities for Lincolnshire County Council do focus on young people generally; and
- Although there are slight differences in the LSOA's, it is considered that these are not significant enough to result in a different impact.

177. The conclusion of the assessment for population health is that the significance of the effect would be **negligible** for the general population and **negligible** for vulnerable groups. This is considered **not significant** in terms of the EIA Regulations. Vulnerability in this case may particularly relate to disruption in the unlikely event of a serious contamination event that may require bathing waters to be temporally closed or temporary use of alternative emergency water sources. All effects would be short-term, temporary and would cease on completion of the works. Therefore, there would be no residual long-term health outcome. Table 30.13 Health baseline comparisons local to national.

30.7.1.4 Physical Activity

178. During construction, there is the potential for physical activity to be temporarily affected by the Project.

179. The population groups relevant to this assessment, due to either proximity or other sensitivity, are defined in section 30.1.

180. The key health outcomes relevant to this determinant of health are physical health conditions (e.g., cardiovascular health) and mental health conditions (e.g., stress, anxiety or depression) associated with levels of physical activity and obesity levels. For example, due to the level of active travel (such as road cycling), leisure activities (such as team sports on public facilities) or outdoor activities (such as hiking or mountain biking).

181. The temporal scope for these effects is (as described in section 30.1) short term. During these periods there would be a change in the tranquillity and perceived quality of physical activity opportunities.

182. The conclusions of Chapter 25 Land Use (document reference 6.1.25) can be summarised as follows, assuming mitigation is implemented:

- There are several onshore receptors that may be affected by onshore construction activity, including the England Coast Path which is crossed by the onshore ECC near the landfall and local PRoWs which are located throughout the onshore study area;
- The King Charles III England Coast Path is considered to be a high sensitivity receptor due to its national promotion and ability to draw in visitors to the area. Its location at the landfall site is advantageous due to the usage of trenchless techniques which would negate the magnitude of the impact to negligible, as open trenching would be avoided. The path is on the edge of the dunes and the HDD will pass underneath it. There should be no interruption to the path or any impact on the users. In addition,

whilst no beach access is planned, if in an emergency situation where access is required, warning signage of vehicles crossing and a Banks Person would be implemented at the location where vehicles requires crossing the path. This leads to an overall impact of **minor adverse** and **not significant** level of effect;

- The local PRoWs are considered together due to their extent over a large area. These are considered to be of local importance and low sensitivity. The proposed ECC crosses a number of PRoWs which could result in a direct impact. There are 38 PRoWs identified within the site boundary. It should be noted that:
  - None will be permanently closed;
  - Five will be temporarily diverted;
  - 23 will receive open, managed crossings;
  - Five will be open with no impact (above trenchless crossings).
- The embedded mitigation includes for the provision of an Outline Public Access Management Plan (PAMP) (document reference 8.1.7), which would be implemented in areas along the Order Limits where potential sources of recreational routes, such as PRoWs, would be impacted. The outline PAMP would ensure that during construction, temporary disruption to any PRoW will be managed by the Principal Contractors and durations of disruption will be kept to a minimum. Temporary management measures include: appropriately fenced crossing points, manned crossing points and temporary closures with formal diversion. Accounting for this and the very localised and temporary nature of the impact, the magnitude is considered to be minor adverse which results in a level of effect that is **minor (not significant)** in EIA terms.
- The Macmillan Way is a 463km long distance footpath, comprising of local PRoWs, and is considered a medium sensitivity receptor. It initially crosses the route of the ECC as it follows the southwestern bank of the River Haven, whereby impacts would be avoided through the usage of trenchless techniques, resulting in no change. The Macmillan Way then re-enters the study area as it follows the northern bank of the River Welland, where it would by directly impacted by the construction of a temporary access track. As the route comprises PRoWs, it would be subject to the same mitigations implemented in the outline PAMP; when considering this, as well as the temporary nature of the impacts and the small 1.8km section of the 463km footpath impacted, the magnitude of impact is considered to be minor adverse, resulting in a **l**evel of effect that is **minor (not significant)** in EIA terms.
- Similarly, the Greenwich Meridian Trail is a 439km long distance footpath which predominately comprises PRoWs and is considered a medium sensitivity receptor. It initially crosses the ECC south of the River Haven, at Wyberton Roads, as well as further south as the ECC passes over the Sea Bank. For both of these locations any impacts are avoided through the usage of trenchless techniques, resulting in no change.
- The Greenwich Meridian Trail also enters the study area at Clough Lane, where it is overlapped by a proposed temporary access track. To the south in the Trail passes

through two further proposed temporary access tracks as it crosses over Thompsons Lane and at the joining of Cravens Lane and Pot Lane. The final overlap between the Trail and a temporary access track is south of the River Welland, with the temporary access track associated with the proposed temporary construction compound east of the A17.

- As the route comprises predominately of local PRoWs, it would be subject to the same mitigations implemented in the PAMP. When considering this, as well as the temporary nature of the impacts and the small sections of the 439km footpath impacted, the magnitude of impact is considered to be minor adverse, resulting in a level of effect that is **minor (not significant)** in EIA terms.
- The route enters the study area on Wash Road, where it is crossed by the ECC, which is a road proposed to be passed underneath by the cable route through the usage of trenchless techniques. This would result in no direct impacts to the usage of the road and, therefore, **no effect**.
- An off-road cycle route which, is not on the NCN and considered to be of regional importance and medium sensitivity, is overlapped by a proposed temporary access track is south of the River Welland, with the temporary access track associated with the proposed temporary construction compound east of the A17.
- Due to the need for the ES to slightly overestimate borders to account for all potential receptors, it is possible this cycle route may not be impacted by the Project. However, if it is impacted, mitigation measures set out in the PAMP would be implemented. In particular, warning signage will be installed where it is shared with a construction access route or crosses a construction access route. When considering these measures, along with the temporary nature of the disturbance, the ability for the continuation or diversion of the usage of the route and the localised nature of the impact, the magnitude of the impact is assessed to be minor adverse, with the resultant level of effect considered **minor (not significant)** in EIA terms.

183. Outdoor recreational land include:

- Local wildlife sites;
- Rivers;
- Public parks and gardens;
- Leisure parks; and
- Beaches.

184. The potential impacts on these receptors due to construction of the onshore ECC would be the severance of the land which reduces the amenity, the disruption of normal activities of the land, the impedance of access to the recreational usage of the land, restrictions to the usage of the land and temporary change in the land's current use.

185. There are no local or designated wildlife sites, public parks, public gardens, leisure parks and dog parks within the Land Use study area. Rivers are considered to be of high sensitivity, owing to their importance as a land use feature with opportunities for a range

of activities including recreation. The magnitude of the impact on the rivers is considered to be negligible due to the usage of trenchless techniques. This results in an overall effect of **minor adverse** effect that is **not significant in EIA terms**.

186. The potential effect is considered likely for outdoor activities. This is because there is a plausible source-pathway-receptor relationship between the Project and PRoWs (including recreational use of coastal waters/beaches):

- The source is trenching activity and vehicles/plant operations increasing emissions and disturbance on the PRoWs (including recreational use of coastal waters/beaches);
- The pathway is gases and dust particulates travelling through the air reducing amenity; and
- Receptors are users of the PRoWs (including uses of coastal waters/beaches), resulting in a lower level of active travel or outdoor recreation.

187. The sensitivity of the general population and vulnerable groups (collectively as a single group) can be considered to be of medium sensitivity. This reflects the site-specific baseline population profile. This indicates that on some measures the population is less healthy and more deprived than national comparators. Physical activity is known to be an important factor for many health and quality of life outcomes.

188. Overall, the general population is considered to have a low sensitivity whilst vulnerable groups are considered to have a high sensitivity. Vulnerability in this case is particularly linked to people who are less able to adapt to changes and who have limited access to alternatives (e.g., walking routes with a tranquil setting). These people may undertake less exercise during the period that they are affected by active project works and therefore forgo the benefits to physical and mental health. Young or older people may have higher levels of dependence on carers or public transport to access alternative physical activity opportunities. People (adults and children) who are already overweight or obese would be particularly sensitive to fewer opportunities to be physically active.

189. The magnitude of the change due to the project can be characterised as low. The reduction in the quality of the environment would be temporary, reversible, and localised. Temporary diversions may marginally increase the length of a PRoW, which may disincentivise use by some people. However, the temporary diversions would be unlikely to affect population physical activity levels to the extent of changes in the risk of developing new health conditions or of exacerbating existing conditions. Any short-term changes in physical activity levels would be unlikely to have a lasting influence on population health.

190. The significance of the potential effects has been informed by the guide questions in Table 30.10. The following discussion sets out the reasoned conclusions for the professional judgement reached:

- Scientific evidence draws a strong link between levels of physical activity and physical and mental health outcomes. The evidence also indicates that nearly half of people aged over 60-years may be inactive;

- East Lindsey and Boston LSOA populations have a marginally higher level of retirement aged people. This suggest that there is potential for more people to be at home during the day. With the exception of South Holland LSOA, the proportion of children is relatively low by a comparable amount;
- People considering their health to be 'bad' is considered consistent throughout local, regional, and national areas. However, those rating themselves as having 'very good' health is lower over all three LSOA's than national and regional data.
- However, all representative neighbourhoods show a lower level of childhood obesity than the average for England. There are also marginally fewer children as a proportion of the population; and
- Lincolnshire County Council includes obesity reduction, improvements in mental health and creating a healthier physical environment as key health priorities.

191. The conclusion of the assessment for population health is that any changes in health outcomes associated with disruption of, or reduced environmental quality (noise, dust, air quality and views) along, PRoWs (including recreational use of coastal waters/beaches) would be **minor adverse** for the general population and **minor adverse** for vulnerable groups. There would be no residual long-term health outcome.

192. Vulnerability in this case relates to people who currently make frequent use of the routes primarily due to their current tranquillity and for whom there are access barriers to alternate routes in the area. People over the age of 60 and those with existing health conditions may particularly benefit from physical activity, so would also be particularly sensitive to any change.

193. Although there are slight differences in the LSOA's, it is considered that these are **not significant** enough to result in a different impact.

30.7.1.5 Journey Times and / or Reduced Access

194. During construction, there is the potential for journey times and access to be temporarily affected by an increase in the number of HGVs or employee vehicles on the road and temporary traffic management at certain locations. These have the potential to lead to temporary delays and temporarily reduce access to local services.

195. The population groups relevant to this assessment, due to either proximity or other sensitivity are (as defined within section 30.6 above):

- The population of East Linsey, Boston, and South Holland (local);
- People living in deprivation, including those on low incomes; and
- People with existing poor health (physical and mental health).

196. Travelling to, or accessing healthcare, underpins management of illness or injury. The key health outcomes relevant to this determinant of health are emergency response times or non-emergency treatment outcomes associated with delays or non-attendance caused by increased traffic and journey times arising from additional Project traffic.

197. The temporal scope for these effects, as described within section 30.1, is variable.

198. With regards delays due to traffic management along routes:

- At landfall, there is a short-term temporal scope due to use of trenchless techniques and presence of a temporary onshore works area;
- Along the onshore ECC there is a very short-term temporal scope because (as described in Chapter 3 (document reference 6.1.3)) the cable route will be constructed sequentially; and
- At the OnSS, there is a short-term temporal scope because the works are planned across several weeks.

199. With regards traffic movement, the temporal scope would also be short term. Chapter 27 (document reference 6.1.27) concludes the majority of the highway links, the temporary adverse effects on driver severance and delay would cause **minor adverse** impacts, which is **not significant** in terms of the EIA Regulations.

200. For the Frampton Roads and Marsh Road, if the cable crossing works were undertaken during the summer when tourism is at its' peak, the effect would be **moderate adverse** and therefore **significant**.

201. Implementation of mitigation, as outlined in Chapter 27 (document reference 6.1.27), will reduce the magnitude of impacts to low, resulting in the temporary adverse effect on driver severance and delay reducing to **minor adverse impacts**, which is **not significant** in terms of the EIA Regulations.

202. The potential effect is considered likely because this is a potential source-pathway-impact relationship as follows:

- The source relates to an increased number of vehicles on the road network or temporary traffic management measures due to the Project;
- The pathway is journey times or accessibility to amenities/services, particularly healthcare (emergency and non-emergency); and
- The receptor is local road users.

203. Furthermore, the potential effect is probable as no unusual conditions are required for the source-pathway-receptor linkage.

204. The sensitivity of the general population and vulnerable groups (collectively as a single group) can be characterised as follows:

- The sensitivity of the general population is considered to be **moderate** because journey times to work are similar to the average in England and the population consider themselves to be in generally better health than the average for England, as a result, this would likely require fewer visits to primary health care;

As with noise, the sensitivity of vulnerable groups is considered high. This is because there is a marginally higher proportion of households where nobody is in employment, of retirement aged people, and where people have long term illness. The deprivation of some neighbourhoods in Lincolnshire is amongst the 20% most deprived in England; and

- Within East Lindsey and Boston, there are schools and nurseries that lie within 500m of the site boundary.
- Deprived populations may already face more access barriers than the general population and therefore be more sensitive to access changes. The more sensitive population particularly includes those accessing health services (emergency or non-emergency) at times and locations where there may be some increase in congestion. Ambulance services (and the recipients of their care) are particularly sensitive to delays. Disruption to roads will need to be discussed with ambulance services in advance of any closure or diversion.

205. The magnitude of the change due to the project can be characterised as low as follows:

- Only small changes in journey times would be expected, largely relating to short delays at key junctions;
- The frequency of any delays is likely to be low because works are sequential, and delays would be temporary. Any change is considered unlikely to be of a scale that would affect quality of life or receipt of time-critical healthcare;
- Any change in journey times would be reversible as the project does not make any permanent change to the road network;
- Although a large number of people may be affected, the change experienced by people is expected to be small. The general exposure profile would be one of low exposure to a large population;
- East Lindsey and Boston LSOA populations have a marginally higher level of retirement aged people. This suggest that there is potential for more people to be at home during the day. With the exception of South Holland LSOA, the proportion of children is relatively low by a comparable amount.
- People considering their health to be 'bad' is considered consistent throughout local, regional, and national areas. However, those rating themselves as having 'very good' health is lower over all three LSOAs than national and regional data.
- Although there are slight differences in the LSOA's, it is considered that these are not significant enough to result in a different impact.
- The significance of the potential effects has been informed by the guide questions in Table 30.10. The following discussion sets out the reasoned conclusions for the professional judgement reached:
- Scientific literature shows an association between access and healthcare outcomes. The evidence base shows a correlation between areas with greater access to primary health care and lower hospitalization rates for ambulatory care sensitive conditions (conditions which are potentially avoidable by well-functioning primary care) (Rosano *et al*., 2013). Disruption to roads is to be discussed with ambulance services in advance of any closure or diversion;
- Transportation barriers to health care access are common, and greater for vulnerable populations. Patients with a lower socio-economic status have higher rates of

transportation barriers to ongoing health care access than those with a higher socio-economic status. Transportation barriers can also affect access to pharmacies and thus medication adherence (*Syed et al.,* 2013);

- Baseline conditions shows that some communities in the vicinity of the onshore project area may have a lower socio-economic status and therefore face higher rates of transportation barriers. Generally, there is less car ownership when compared with England;
- Although transportation is not a specific health priority of the Lincolnshire County Council it underpins other health priorities such as support to children under the age of 5, and support to carers of the long term ill such as older people with dementia; and
- The NPS for Overarching Energy (EN-1) (Department of Energy and Climate Change, 2023a) advises whether a need to determine if the change in population would increase demand on local services.

206. The conclusion of the assessment for population health is that the significance of the effect would be **minor adverse** for the general population and **minor adverse** for vulnerable groups. Vulnerability in this case relates to people living in deprived areas in the vicinity of the landfall, onshore cable route, and onshore project substation, particularly people with long-term illnesses (and their carers) and users of ambulance services.

30.7.2 Construction and Operation and Maintenance

30.7.2.1 Employment

207. Employment has been considered across both construction and operation because, as discussed in Chapter 29 Socio-economics and Tourism (document reference 6.1.29), the development of the Project is part of a wider process of developing an offshore wind supply chain in the region. Therefore, from a human health point of view, creating a demand for transferable skills (both between construction projects and on to operation of projects) has a multiplying effect on employment. Direct employment by the project also creates indirect employment in the supply chain and induced employment due to expenditure.

208. The population groups relevant to this assessment, due to either proximity or other sensitivity, are (as defined in section 30.6):

- The population of Lincolnshire County (regional); and
- People living in deprivation, including those on low incomes.

209. The key health outcomes relevant to this determinant of health are indirect influences on physical health (e.g., cardiovascular conditions) and mental health conditions (e.g., stress, anxiety, or depression) due to improvements in social determinants, such as improved socio-economic position, greater job security and facilitating beneficial lifestyle choices (e.g., healthier eating and recreational physical

activity, including for dependants).

210. The temporal scope for these effects is (as described in section 30.1) is variable:

- During construction the temporal effect is measured in years, but individuals may only be directly employed for months at a time. However, the overall effect on direct and indirect employment would be considered across the duration of the construction phase and is therefore medium term; and
- During operation it is expected that people would be permanently employed, and that this employment could last for decades. Therefore, the temporal scope is long term.

211. The conclusions of Chapter 29 (document reference 6.1.29) concludes that the Project will have **significant beneficial** effects on the economy of the LEA during the development and construction. The assessment has identified positive effects on the economy of the LEA, the Regional Area and the UK during both the O&M and decommissioning phases.

212. The potential effect is considered likely because there is a potential source-pathway-impact relationship:

- The source is direct and indirect job creation due to the development of the Project;
- The pathway is through employment, with increased probability of effect due to supply chain and skills development being undertaken by the Project; and
- The receptor is people of working age in the regional labour market (and their dependants).

213. The sensitivity of the general population and for vulnerable groups (collectively as a single group) can be characterised as follows. Sensitivity in this case is related to how likely it is a population could benefit from being employed:

- The regional population also has below average income deprivation compared to national comparators. As shown in the baseline (section 30.4), education deprivation is relatively low compared to the rest of England. People with a lower educational attainment may find it harder to gain employment in technical areas required by the offshore wind industry. The sensitivity of the general population is therefore considered to be medium; and
- For some groups, there is the potential for high levels of sensitivity. Vulnerable populations include young people choosing their careers, people on low incomes or who are unemployed and future young or older people who may rely on those employed by the Project.

214. The magnitude of the change due to the Project can be characterised as there would be direct and indirect employment opportunities both during construction and during operation. Construction jobs would be short- to medium-term but include upskilling that would have longer term benefits. Operational jobs could provide many years of benefit to those employed and their dependants. The majority of the jobs are expected to be drawn from the regional level, providing benefits to those employed as well as their dependants. Compared to national comparators, the higher proportion of retired people (and lower

proportion of young people) close to the actual project sites suggests that fewer direct economic benefits would be experienced in these areas. The Project's relatively small contribution to direct employment (as a proportion of the regional labour market) suggests the change, whilst positive, is unlikely to be associated with a widespread reduction in inequalities or a widespread increase in prosperity or quality of life. The magnitude (from the health perspective) is considered positive but low, driven by the longer-term regional benefits to upskilling and employment.

215. The significance of the potential effects has been informed by the guide questions in Table 30.10. The following discussion sets out the reasoned conclusions for the professional judgement reached:

- Scientific literature shows that good quality employment is generally associated with better health. Employment can have a protective effect on depression and general mental health (van der Noordt *et al*., 2014). Unemployment may occur due to poor health, it may also cause poor health (Herbig *et al*., 2013);
- There are more deprived areas close to landfall, onshore ECC, and OnSS that may struggle to benefit from employment opportunities;
- There are no regulatory standards with regards employment as a determinant of health; and
- The NPS for Overarching Energy (EN-1) (Department of Energy and Climate Change, 2023a) recommends:

  "considering the potential effects, including benefits, of a proposal for a project, the IPC will find it helpful if the applicant sets out information on the likely significant social and economic effects of the development, and shows how any likely significant negative effects would be avoided or mitigated. This information could include matters such as employment, equality, community cohesion and well-being."

216. The conclusion of the assessment for population health is that the significance of the effect would be **negligible** for the general population and **minor beneficial** for vulnerable groups. This is considered **not significant** in terms of the EIA Regulations. Vulnerability in this case relates to direct and indirect employment opportunities for people living in deprivation or who are of working age (including their dependants).

30.7.3 Operation and Maintenance

30.7.3.1 Noise

218. The potential for noise impacts during operation of the onshore project substation has been considered in Chapter 26 Noise and Vibration (document reference 6.1.26).

219. The population groups relevant to this assessment, due to either proximity or other sensitivity, are defined in section 30.1.

220. The temporal scope for this effect is (as described in section 30.1) long term as it relates to the operational phase of the Project.

221. Chapter 26 (document reference 6.1.26) considers the operational noise associated with OnSS. It is considered that the mitigation measures recommended would be sufficient to reduce the noise from the OnSS so a negligible magnitude of impact would be experienced upon all the high sensitivity receptors considered, resulting in a level of effect of a permanent **minor adverse** which is considered **not significant** in terms of the EIA Regulations.

30.7.4 Decommissioning

222. This section describes the potential impacts of the decommissioning of the onshore infrastructure with regards to effects on Human Health. Further details on decommissioning are provided in Chapter 3(document reference 6.1.3).

223. No decision has been made regarding the final decommissioning plan for the Project, as it is recognised that industry best practice, rules and legislation change over time. The detailed activities and methodology would be determined later within the Project lifetime.

224. Whilst details regarding the decommissioning of the OnSS are currently unknown, considering the worst-case scenario which would be the removal and reinstatement of the current land use at the site, it is anticipated that the effects would be similar to or less than those during construction.

225. The decommissioning methodology would need to be finalised nearer to the end of the lifetime of the Project so as to be in line with current guidance, policy and legislation at that point. Any such methodology would be agreed with the relevant authorities and statutory consultees.

30.8 Cumulative Impacts Assessment and Inter-Relationships

226. Cumulative effects can be defined as effects upon a single receptor from the Project when considered alongside other proposed and reasonably foreseeable projects and developments. This includes all projects that result in a comparative effect that is not intrinsically considered as part of the existing environment.

227. The overarching method followed in identifying and assessing potential cumulative effects in relation to the onshore environment is set out in Volume 3, Appendix 5.3: Onshore Cumulative Effects Assessment Approach (document reference 6.3.5.3).

228. By its nature, health interacts with each of the other onshore topics assessed in this ES, due to its direct involvement as a receptor for other impacts. As it is important avoid duplication of the assessment, the effects considered in the other chapters of the ES are not repeated here. See paragraph 6.

229. The Project is not anticipated to result in any cumulative impacts on health except from those already mentioned within the relevant technical chapters of the ES.

30.9 Transboundary Effects

230. There are no transboundary implications with regards to Health; transboundary effects have been scoped out of the assessment from the consultation and Planning Inspectorate comments shown in Table 30.2.

30.10 Conclusions

231. The main drivers of potential human health effect are the construction process and the associated construction traffic. These activities may lead to increased noise levels, dust and emissions. However, a combination of embedded mitigation (described in this chapter) and additional mitigation (detailed in the relevant technical chapters) can be used to control these impacts to an acceptable level (not significant in EIA terms).

232. Human health effects due to changes in noise, air quality, ground or water contamination, physical activity, reduced access to health services, employment and the perception of risk have been assessed. This assessment finds that for the general population there would be no significant (in EIA terms) effect on human health as a result of the Project.

233. After consideration of potential health effects during the construction and operation phases of the Project, it is concluded that there will be no significant effects on physical or mental health as a result of the Project. The results of the human health assessment are summarised Table 30.13.

Table 30.13: Summary of health effects

Potential effect	Temporal Scope	Probability of Effect	Sensitivity of General Population	Sensitivity of Vulnerable Populations	Magnitude of Effect	Significance of Effect on General Population (OnSS)	Significance of Effect on Vulnerable Populations (OnSS)
Construction							
Noise	Mainly short term	Plausible	Low	High	Low	Negligible	Minor adverse
Air Quality	Mainly short term	Plausible	Low	High	Low	Negligible	Minor adverse
Ground/Water Contamination	Short term	Plausible but improbable	Medium	High	Low	Negligible	Negligible
Physical Activity	Short term	Likely	Medium	High	Low	Negligible	Minor adverse
Journey Times / Reduced Access	Short term	Likely	Low	High	Low	Negligible	Minor adverse
Construction and Operation							
Employment	Long term	Likely	Medium	High	Medium	Negligible	Minor beneficial
Operation and Maintenance							
Noise	Long term	Low	Low	High	None	No effect	No effect
Decommissioning							
The possible health effects arising from the decommissioning of the project are considered to be similar in scale and nature to those considered here for construction.							

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