Outer Dowsing Offshore Wind

Preliminary Environmental Information Report

Volume 1, Chapter 30: Human Health

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OUTER DOWSING OFFSHORE WIND

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Abbreviations

Acronym	Expanded name
ALARP	As low as reasonably practicable
BEIS	Department for Business, Energy & Industrial Strategy, now Department for Energy Security and Net Zero
CIA	Cumulative Impact Assessment
CoCP	Code of Construction Practice
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
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)
DTI	Department of Trade and Industry
ECC	Onshore Export Cable Corridor
EIA	Environmental Impact Assessment
EMF	Electromagnetic field
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Technical Group
FTE	Full Time Employment
GP	General Practitioners
HAZID	Hazard Identification Study
HIA	Health Impact Assessment
HND	Holistic Network Design
ICB	Integrated Care Board
ICNIRP	International Commission Non-Ionising Radiation Protection
IEMA	Institute of Environmental Management and Assessment
IPC	Infrastructure Planning Commission
LN	Lincolnshire Node
LSE	Likely significant effects
LSOA	Lower Super Output Area
NGET	National Grid Electricity Transmission
NHS	National Health Service
NPPF	National Planning Policy Framework
NPS	National Policy Statements
NSIP	Nationally Significant Infrastructure Project
NVQ	National Vocational Qualification
O&M	Operations and Maintenance
ODOW	Outer Dowsing Offshore Wind

Acronym	Expanded name
OnSS	Onshore substation
OTNR	Offshore Transmission Network Review
PEIR	Preliminary Environmental Information Report
PHE	Public Health England
PPG	Planning Policy Guidance
PRoW	Public Rights of Way
UKHSA	United Kingdom Health Security Agency
WHO	World Health Organisation
WM	Weston Marsh
ZoI	Zone of Influence

Terminology

Term	Definition
Baseline	The status of the environment at the time of assessment without the development in place.
Cumulative effects	The combined effect of the Project acting cumulatively with the effects of a number of different 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.
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.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) for Department for Energy Security and Net Zero (DESNZ).
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of an impact with the sensitivity of a receptor, in accordance with defined significance criteria.
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 Environmental Impact Assessment (EIA) Regulations, including the publication of an Environmental Statement (ES).
EIA Directive	European Union Directive 2011/92/EU of 13 December 2011 (as amended in 2014 by Directive 2014/52/EU)
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
Environmental Statement	The suite of documents that detail the processes and results of the Environmental Impact Assessment (EIA).

Term	Definition
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.
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.
Landfall	The location at the land-sea interface where the offshore export cable will come ashore.
Lower Super Output Areas (LSOAs)	A geographic hierarchy designed to improve the reporting of small area statistics in England and Wales.
Mitigation	Mitigation measures, or commitments, 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 Policy Statement (NPS)	A document setting out national policy against which proposals for Nationally Significant Infrastructure Projects (NSIPs) will be assessed and decided upon.
Outer Dowsing Offshore Wind (ODOW)	The Project.
Onshore Export Cable Corridor (ECC)	The Onshore Export Cable Corridor (Onshore ECC) is the area within which the export cable running from the landfall to the onshore substation will be situated.
Onshore substation (OnSS)	The Project's onshore substation, containing electrical equipment to enable connection to the National Grid
Onshore Infrastructure	The combined name for all onshore infrastructure associated with the Project from landfall to grid connection.
Preliminary Environmental Information Report (PEIR)	The PEIR is written in the style of a draft Environmental Statement (ES) and provides information to support and inform the statutory consultation process in the pre-application phase. Following that consultation, the PEIR documentation will be updated to produce the Project's ES that will accompany the application for the Development Consent Order (DCO).
PEIR Boundary	The PEIR Boundary is outlined in Figure 3.1 of Volume 1, Chapter 3: Project Description and comprises the extent of the land and/or seabed for which the PEIR assessments are based upon.

Term	Definition
Pre-construction and post-construction	The phases of the Project before and after construction takes place.
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 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.
The Project	Outer Dowsing Offshore Wind including proposed onshore and offshore infrastructure.
Transboundary effects	Transboundary effects arise when impacts from the development within one European Economic Area (EEA) state affects the environment of another EEA state(s).
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.

30. Human Health

30.1 Introduction

Overview

30.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the results to date 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 and maintenance, and decommissioning phases.

30.1.2 GT R4 Limited, trading as Outer Dowsing Wind Farm (ODOW) 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 (wind farm), export cables to landfall, and connection to the electricity transmission network (see Volume 1, Chapter 3: Project Description for full details).

30.1.3 The aim of this chapter is to meet the requirements of the EIA Regulations (Regulation 5(2) and paragraph 4 of Schedule 4) by 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 PEIR and specific policies apply to specific topic areas and impacts. Where impacts have already been assessed in another chapter further policy information should be sought in the relevant chapter.

30.1.4 A Scoping Report (dated July 2022) was submitted to the Secretary of State on 1 August 2022 and a Scoping Opinion 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.

30.1.5 This chapter brings together the relevant information on health, including assessing the findings of other chapters within this PEIR in terms of population health. This approach aims to assist in identifying project factors which may affect human health and wellbeing.

30.1.6 This chapter should be read alongside the following chapters:

- Volume 1, Chapter 19: Onshore Air Quality;
- Volume 1, Chapter 23: Geology and Ground Conditions;
- Volume 1, Chapter 24: Hydrology and Flood Risk;
- Volume 1, Chapter 25: Land Use;
- Volume 1, Chapter 26: Noise and Vibration;
- Volume 1, Chapter 27: Traffic and Transport; and
- Volume 1, Chapter 29: Socio-Economics Characteristics.

30.1.7 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 and in the design process. 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.

30.1.8 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.

Purpose of the Health Chapter

30.1.9 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.

30.1.10 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, identifying ways in which negative impacts can be mitigated and benefits maximised.

30.1.11 Following best practice (Cave *et al*., 2017a), 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).

30.1.12 It is important to note that there is no fixed method for assessing human health in this context. 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)

30.1.13 Similarly, it 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)

30.1.14 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.

30.1.15 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

Legislative and Policy Context

30.2.1 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.

30.2.2 The following legislative context 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 1999 relate to the management of threshold quantities of dangerous substances identified in the regulations (UK Government, 1999);
- 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;
- 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 revised Bathing Water Directive 2006/7/EC safeguards public health and clean bathing waters (European Parliament and Council of the European Union, 2006). Bathing waters are also protected under the Water Framework Directive 2000/60/EC (European Parliament and Council of the European Union, 2000); and
- 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.

Nationally Significant Infrastructure Projects (NSIPs)

30.2.3 Planning policy on offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs) is provided by the National Policy Statements (NPSs) EN-1 'Overarching National Policy Statement for Energy' (Department of Energy and Climate Change (DECC) 2011a) and EN-3 'National Policy Statement for Renewable Energy Infrastructure' (DECC, 2011b) and 'National Policy Statement for Electricity Networks Infrastructure' (EN-5) (2011c).

30.2.4 The NPS are a series of principal decision-making documents to appropriately assess Nationally Significant Infrastructure Projects (NSIP). As such, this assessment has made explicit reference to the relevant NPS requirements.

30.2.5 It is noted that the process of updating these NPSs is currently underway. Public consultation on the revised NPSs EN1 to EN5 was initially held in 2021 by the Department for Business, Energy & Industrial Strategy (BEIS) (as of February 2023, the Department for Energy Security and Net Zero (DESNZ)), with a re-consultation opened in March 2023 running currently until the 25 May 2023. The current consultation is more focused and clarifies that offshore wind is now a critical national priority, including the related onshore and offshore network infrastructure. The PEIR refers to the draft NPSs when relevant throughout the application, thereby future proofing the ES as far as is practical .The three draft NPSs currently of relevance are:

- Draft Overarching National Policy Statement for Energy (EN-1 2023);
- Draft National Policy Statement for Renewable Energy Infrastructure (EN- 3 2023); and
- Draft National Policy Statement for Electricity Networks Infrastructure (EN-5 2023).

30.2.6 The relevant legislation and planning policy for offshore renewable energy NSIPs, specifically in relation to Human Health, is outlined in Table 30.1. These provide the primary basis for the recommendations made by the Planning Inspectorate (the Inspectorate) to the Secretary of State for DESNZ on applications for development consent for nationally significant renewable energy projects. Overarching guidance on nationally significant energy projects is provided in NPS for Energy (NPS EN-1) (DECC 2011a).

30.2.7 The National Planning Policy Framework (NPPF)[1] is also relevant to the policy context of renewable energy NSIPs and the relevant policy is 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

[1] Ministry of Housing, Communities & Local Government, *National Planning Policy Framework,* July 2021

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.

30.2.8 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.

30.2.9 Relevant policy is outlined in Table 30.1.

Table 30.1: Policy context

Legislation/policy	Key provisions	Section where comment addressed
NPS EN-1 Para 4.13 (DECC 2011a)	"Energy production has the potential to impact on the health and well-being ("health") of the population. Access to energy is clearly beneficial to society and to our health as a whole. However, the production, distribution and use of energy may have negative impacts on some people's health. As described in the relevant sections of this NPS and in the technology specific NPSs, where the proposed project has an effect on human beings, the PEIR should assess these effects for each element of the project, identifying any 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 and the [Infrastructure Planning Commission] IPC should consider the cumulative impact on health. The direct impacts on health may include increased traffic, air or water pollution, dust,	Impacts to health are assessed in section 30.7.

[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
	odour, hazardous waste and substances, noise, exposure to radiation, and increases in pests. New energy infrastructure may also affect the composition, size and proximity of the local population, and in doing so have indirect health impacts, for example if it in some way affects access to key public services, transport or the use of open space for recreation and physical activity. Generally, those aspects of energy infrastructure which are most likely to have a significantly detrimental impact on health are subject to separate regulation (for example for air pollution) which will constitute effective mitigation of them, so that it is unlikely that health concerns will either constitute a reason to refused consents or require specific mitigation under the Planning Act 2008. However, the IPC will want to take account of health concerns when setting requirements relating to a range of impacts such as noise."	
NPS EN-1 Para 5.10	"An energy infrastructure project will have direct effects on the existing use of the proposed site and may have indirect effects on the use, or planned use, of land in the vicinity for other types of development. Given the likely locations of energy infrastructure projects there may be particular effects on open space including green infrastructure. The Government's policy is to ensure there is adequate provision of high quality open space (including green infrastructure) and sports and recreation facilities to meet the needs of local communities. 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. Green infrastructure in particular will also play an increasingly important role in mitigating or adapting to the impacts of climate change. Although the re-use of previously developed land for new development can make a major	The embedded mitigation measures are detailed in section 30.5 and the impacts to health are assessed in section 30.7.

Legislation/policy	Key provisions	Section where comment addressed
	contribution to sustainable development by reducing the amount of countryside and undeveloped greenfield land that needs to be used, it may not be possible for many forms of energy infrastructure. Green Belts, defined in a local authority's development plan, are situated around certain cities and large built-up areas. The fundamental aim of Green Belt policy is to prevent urban sprawl by keeping land permanently open; the most important attribute of Green Belts is their openness. Green Belt land can play a positive role in providing access to sport and recreation facilities or access to the open countryside. For further information on the purposes of Green Belt policy see PPG2 or any successor to it."	
NPS EN-1 Para 5.14	"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, 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: a) prevention; b) preparing for reuse; c) recycling; d) other recovery, including energy recovery; and e) 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 hazardous and non-hazardous waste. The EA's Environmental Permitting (EP) regime	This is addressed in the CoCP for the Proposed Development as stated in the Scoping Opinion 2022)

Legislation/policy	Key provisions	Section where comment addressed
	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 EP requirements. Specific considerations with regard to radioactive waste are set out in section 2.11 and Annex B of EN-6. This section will apply to non-radioactive waste for nuclear infrastructure as for other energy infrastructure."	
NPS EN-1 Para 5.15	"Infrastructure development can have adverse effects on the water environment, including groundwater, inland surface water, transitional waters and coastal waters. During the construction, operation and decommissioning phases, it can lead to increased demand for water, involve discharges to water and cause adverse ecological effects resulting from physical modifications to the 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 Section 4.18) and could, in particular, result in surface waters, groundwaters or protected areas failing to meet environmental objectives established under the Water Framework Directive."	The embedded mitigation measures are detailed in section 30.5 and the impacts to health are assessed in section 30.7.
EN-1 Paragraph 5.11.9	The proposal should avoid and mitigate adverse impacts on health and quality of life from noise and if possible, contribute to improvements in the above.	The siting of the proposed OnSSs 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

Legislation/policy	Key provisions	Section where comment addressed
		mitigation measures that have reduced the noise to an acceptable level (see Section 30.7).
NPS EN-5 Para 2.10.2 (DECC 2011b)	"All overhead power lines produce Electric and Magnetic Fields (EMFs), and 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. 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 micro shock 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."	As per the Inspectorate's comments within the Scoping Opinion, 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.
Draft Overarching National Policy Statement for Energy (EN-1)	Draft EN-1 sets out the national policy for the delivery of energy infrastructure, including offshore renewable electricity generation. Part 4.3.1 advises that's energy infrastructure has the potential to impact on the health and well-being ("health") of the population. It highlights that access to energy is beneficial to society and to our health as a whole. However, the construction of energy infrastructure and the production, distribution and use of energy may have negative impacts on some people's health. Part 4.3.2 goes on to list potential health impacts. Part 4.3.6 advises that "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, i.e. those groups which may be differentially impacted by a development compared to wider society as a whole."	The embedded mitigation measures are detailed in Section 30.5 and the impacts to health are assessed in section 30.7.

Legislation/policy	Key provisions	Section where comment addressed
	It is highlighted in Part 4.3.7 that generally those aspects of energy infrastructure which are most likely to have a significantly detrimental impact on health are subject to separate regulation (for example for air pollution) which will constitute effective mitigation of them, so that it is unlikely that health concerns will either by themselves constitute a reason to refuse consent or require specific mitigation under the Planning Act 2008.	
Draft National Policy Statement for Renewable Energy Infrastructure (EN-3)	Draft EN-3, taken together with the Overarching National Policy Statement for Energy (EN-1), provides the primary policy for decisions by the Secretary of State on applications they receive for nationally significant renewable energy infrastructure. Part 3.8.13 states that "Where there are residual non-HRA impacts, of any sort other than those that present an unacceptable risk to, or unacceptable interference with, human health, national defence or navigation, these are unlikely, in all but the most exceptional cases, to outweigh the urgent need for this type of infrastructure and are therefore unlikely to result in an application being refused." Part 3.8.14 goes on to state: "As a result, the Secretary of State will take as the starting point for decision-making that such infrastructure is to be treated as if it has met any test requiring a clear outweighing of harm, exceptionality, or very special circumstances within EN-1, this NPS or any other planning policy." Part 3.8.18 then advises that: "In doing so, the Secretary of State will consider the particular circumstances of any application, but start from the position that energy security and decarbonising the power sector to combat climate change: • are capable of amounting to imperative reasons of overriding public interest (IROPI) for CNP Infrastructure, which relate to human	The embedded mitigation measures are detailed in section 30.5 and the impacts to health are assessed in section 30.7.

Legislation/policy	Key provisions	Section where comment addressed
	health, public safety, and/or beneficial consequences of primary importance to the environment."	
Draft National Policy Statement for Electricity Networks Infrastructure (EN-5)	Draft 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 (1.1.8). The infrastructure covered by the draft is confirmed as above ground electricity lines i) whose nominal voltage is expected to be 132kV or above, ii) whose length is greater than 2km, iii) that are not a replacement line within the meaning of Section 16(3)(ab) of the 2008 Act, and iv) that are not otherwise exempted for reasons set out in Sections 16(3)(b) and (c) of the 2008 Act. Other kinds of electricity infrastructure (including lower voltage overhead lines, underground or sub-sea cables at any voltage, and associated infrastructure as referred to above) will only be subject to the 2008 Act – and so be covered by this NPS – if it constitutes associated development for which consent is sought along with an NSIP such as a generating station or relevant overhead line or if the Secretary of State gives a direction under Section 35 of the 2008 Act that it should be treated as an NSIP and requires a development consent order (DCO) With regards to health, Part 2.9.45 advises that 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. Part 2.9.47 advises that to prevent effects, the International Commission on Non-Ionizing	The embedded mitigation measures are detailed in section 30.5 and the impacts to health are assessed in section 30.7. It should be noted that there are no overhead lines proposed as part of the Proposed Development, thus there are no impact to human health.

Legislation/policy	Key provisions	Section where comment addressed
	Radiation Protection (ICNIRP1418) developed health protection guidelines in 1998 for both public and occupational exposure. These are expressed in terms of the induced. Part 2.11.9 states that *"before granting consent to an overhead line application, the Secretary of State should be satisfied that the proposal is in accordance with the guidelines, considering the evidence provided by the Applicant and any other relevant evidence. It may also need to take expert advice from the Department of Health and Social Care."*	
NPPF Section 8. Promoting healthy and safe communities Para 92	*"92. Planning policies and decisions should aim to achieve healthy, inclusive, and safe places which:* *a) Promote social interaction, including opportunities for meetings between people who might not otherwise come into contact with each other – for example through mixed-use developments, strong neighbourhood centres, street layouts that allow for easy pedestrian and cycle connections within and between neighbourhoods, and active street frontages;* *b) are safe and accessible, so that crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion – for example through the use of clear and legible pedestrian routes, and high-quality public space, which encourage the active and continual use of public areas; and* *c) 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 shops, access to healthier food, allotments and layouts that encourage walking and cycling".*	The embedded mitigation measures are detailed in section 30.5 and the impacts to health are assessed in section 30.7.

Legislation/policy	Key provisions	Section where comment addressed
NPPF Section 8. Promoting healthy and safe communities Para 93	*"93. To provide the social, recreational and cultural facilities and services the community needs, planning policies and decisions should:* *a) plan positively for the provision and use of shared spaces, community facilities (such as local shops, meeting places, sports venues, open space, cultural buildings, public houses and places of worship) and other local services to enhance the sustainability of communities and residential environments;* *b) take into account and support the delivery of local strategies to improve health, social and cultural well-being for all sections of the community;* *c) guard against the unnecessary loss of valued facilities and services, particularly where this would reduce the community's ability to meet its day-to-day needs;* *d) ensure that established shops, facilities and services are able to develop and modernise, and are retained for the benefit of the community; and* e) ensure an integrated approach to considering the location of housing, economic uses and community facilities and services".	The embedded mitigation measures are detailed in section 30.5 and the impacts to health are assessed in section 30.7.
PPG Healthy and Safe Communities	*"It is helpful if the Director of Public Health is consulted on any planning applications (including at the pre-application stage) that are likely to have a significant impact on the health and wellbeing of the local population or particular groups within it. This would allow them to work together on any necessary mitigation measures. A health impact assessment may be a useful tool to use where there are expected to be significant impacts;* *Information gathered from this engagement should assist local planning authorities consider whether the identified impact(s) could be*	The embedded mitigation measures are detailed in section 30.5 and the impacts to health are assessed in section 30.7.

Legislation/policy	Key provisions	Section where comment addressed
	addressed through planning conditions or obligations. *Alternatively, local planning authorities may decide the identified need could be funded through the Community Infrastructure Levy".* *(…)* "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, secondary and tertiary care, and the wider health and care system (taking into account the changing needs of the population)."	

Local Planning Policy

30.2.10 NPS EN-1 states that the Inspectorate will also consider Development Plan Documents or other documents in the Local Development Framework to be relevant to its decision making.

30.2.11 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).

30.2.12 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*.'

30.2.13 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.

30.2.14 These are as follows:

- Mental Health & Emotional Wellbeing (Children & Young People);
- Mental Health (Adults);
- Carers;
- Physical Activity;
- Housing and Health;
- Healthy Weight; and
- Dementia.

Guidance

30.2.15 Regard has been given to the advice provided in the Institute of Environmental Management and Assessment, 2017: Health in Environmental Assessment, a primer for a proportionate approach (Cave *et al*., 2017a). Public Health England has also issued a briefing note on health in EIA for local public health teams (Cave *et al*., 2017b).

30.2.16 The approach to assessing health in EIA has also been informed by relevant UK guidance on Health Impact Assessment (HIA). In England there is no overarching guidance for HIA. However, generic principles are evident in specialist guidance such as that by the Department of Health in relation to HIA of government policy (Department of Health, 2010), or that by the London Healthy Urban Development Unit in relation to urban planning (NHS Healthy Urban Development Unit, 2015).

30.2.17 Guidance published by the World Bank Group (World Bank Group, 2015) advises that community health and safety hazards specific to wind include blade or ice throw, aviation impacts, marine navigation, electromagnetic radiation, public access, and abnormal load transportation. Due to the Project being offshore and located 54km east of the Lincolnshire coast at its closest point (see Volume 1, Chapter 3: Project Description), blade or ice throw and aviation issues are not a relevant concern for local populations to the onshore ECC.

30.2.18 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].

30.2.19 In addition to Cave *et al*. (2017), 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);

[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

- 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

30.3.1 Consultation is a key part of the Development Consent Order (DCO) application process. Consultation regarding issues related to Human Health has been conducted through the Evidence Plan Process (EPP) Expert Technical Group (ETG) meetings and the EIA scoping process (ODOW, 2022). An overview of the Project consultation process is presented within Volume 1, Chapter 6: Consultation.

30.3.2 A summary of the key issues raised during consultation to date, of relevance to Human Health, is outlined in Table 30.2, together with how these issues have been considered in the production of this PEIR.

30.3.3 As identified in Volume 1, Chapter 4: Site Selection and Alternatives and Volume 1, Chapter 3: Project Description, the Project design envelope has been refined and will be refined further prior to DCO submission. This process is reliant on stakeholder consultation feedback.

30.3.4 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 Volume 1, Chapter 4: Site Selection and Consideration of Alternatives. 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 (see Volume 1, Chapter 3: Project Description).

Table 30.2: Summary of 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.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
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 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.
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 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 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.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
09 September 2022 Scoping Opinion	Impacts from odour: "Considering the nature of the Proposed Development, the 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.
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 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 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 PEIR, 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 PEIR Chapters: Volume 1, Chapter 19: Onshore Air Quality; Volume 1, Chapter 23: Geology and Ground Conditions; Volume 1, Chapter 24: Hydrology and Flood Risk; Volume 1, Chapter 25: Land Use; Volume 1, Chapter 26: Noise and Vibration Volume 1, Chapter 27: Traffic and Transport; and Volume 1, Chapter 29: Socio-Economics Characteristics.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
		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 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 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."	This will be provided as part of the application submission.
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.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
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.

30.4 Baseline Environment

Study Area

30.4.1 The Project makes landfall at Wolla Bank, south of Anderby Creek. At the time of writing, two potential grid connection locations are being considered predominantly through the Offshore Transmission Network Review (OTNR)[6] with the final option being dependant on the outcome of the Holistic Network Design (HND) process (see Volume 1, Chapter 4: Site Selection and Consideration of Alternatives). Option one is for onshore ECC to travel inland in a general southwest direction to an OnSS (two substation options are presented in PEIR), which will be connected to a future National Grid Electricity Transmission (NGET) substation at Weston Marsh. Option two is for the onshore ECC to travel in a general northwest direction to an OnSS, which will be connected to a new NGET substation called Lincolnshire Node.

30.4.2 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.

30.4.3 A full description of the Project is provided in Volume 1, Chapter 3: Project Description.

30.4.4 The following geographic area classifications have been used within this chapter:

- Site-specific (the Project's PEIR Boundary);
- Local (East Lindsey, Boston and South Holland);
- Regional (Lincolnshire); and
- National (England).

30.4.5 The 'site specific' level considers localised effects with reference to routine statistics collected for Lower Super Output Areas (LSOAs). The following design elements are most likely to impact on health and will need to be considered as part of the assessment.

[6] https://www.gov.uk/government/groups/offshore-transmission-network-review

- 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 height of any buildings, amendments on the materials utilised for the construction of any buildings.

The Landfall

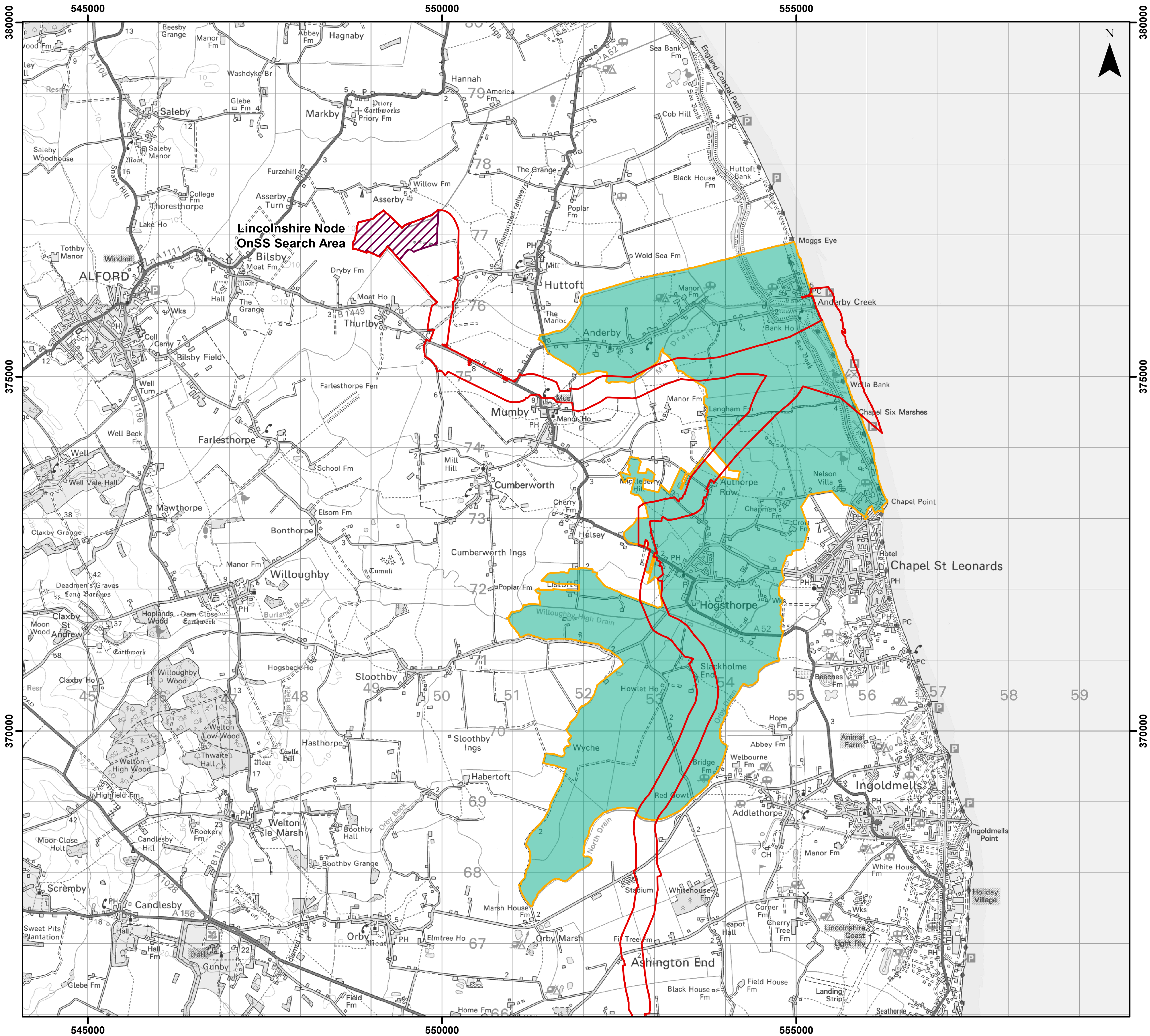
Study Area Description

30.4.6 The offshore ECC will make landfall at Wolla Bank, to the south of Anderby Creek. 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.

30.4.7 Specific consideration is given to the most representative LSOA:

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

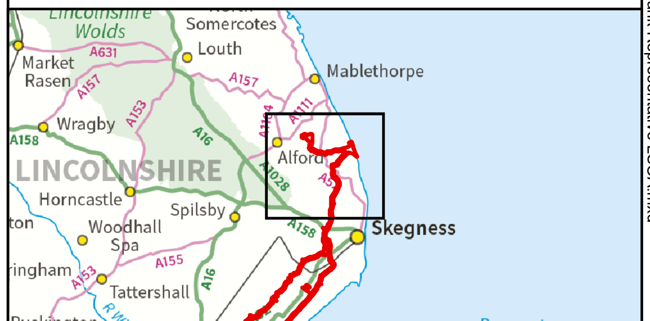
30.4.8 The LSOA is shown below in Figure 30.1.



Legend

- Onshore PEIR Boundary
- Lincolnshire Node OnSS Search Area
- East Lindsay 010B Lower Super Output Area (Representative of Population at Wolla Bank)

Sources:
Source: Office for National Statistics licensed under the Open Government Licence v.3.0



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

East Lindsay 010B Lower Super Output Area

Figure 30.1

OUTER DOWSING OFFSHORE WIND

Date: 06/05/2023
Produced By: JRS
Revision: 0.1

SLR

Document Path: P:\05356 - GoBe Consultants Ltd\00012 GTR4 Outer Dowsing\Tech\GIS\Dwgs\Wking\2023 01 PEIR\Human Health\05356.00012.0336.0 Wolla Bank Representative LSOA.mxd

Onshore ECC

Study Area Description

Lincolnshire Node Onshore ECC Study Area and Weston Marsh Onshore ECC Study Area

30.4.9 The Lincolnshire Node ECC extends in a westerly direction from the Landfall area at Anderby Creek, to the Lincolnshire Node OnSS located to the east of Alford.

30.4.10 The local environment within the study area can be characterised as predominantly rural, and includes the small village of Mumby, together with residential dwellings located individually or in hamlets along the onshore ECC.

30.4.11 The Lincolnshire Node ECC would have a length of approximately 11km.

30.4.12 The Western Marsh ECC would have a length of approximately 80km, extending from Anderby Creek in the north, to Western Marsh in the south.

30.4.13 The local environment in the vicinity of the Weston Marsh ECC can be characterised as predominantly rural and agricultural, avoiding the towns of Skegness and Boston.

30.4.14 Specific consideration is given to the most representative LSOA:

- East Lindsey 008D (representation of the population within the ECC).

30.4.15 The LSOA selected is not intended to indicate the area of effect, but rather the profile of the affected population. It is considered disproportionate to the assessment to include all LSOAs along the onshore ECC. Using East Lindsey 008D to characterise the population along the cable route is consistent with proportionately assessing the worst case.

30.4.16 The onshore ECC through East Lindsey 008D includes trenchless sections, mobilisation areas and a representative spread of dwellings.

30.4.17 The LSOA is shown below in Figure 30.2.

545000 550000 555000

375000 370000 365000

Lincolnshire Node OnSS Search Area

N

Legend

- Onshore PEIR Boundary
- Lincolnshire Node OnSS Search Area
- East Lindsay 008D Lower Super Output Area (Representative of Population at Wolla Bank)

Sources:
Source: Office for National Statistics licensed under the Open Government Licence v.3.0

Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

East Lindsay 008D Lower Super Output Area

Figure 30.2

OUTER DOWSING OFFSHORE WIND

Date: 06/05/2023
Produced By: JRS
Revision: 0.1

SLR

Document Path: P:\05366 - GoBe Consultants Ltd\00012 GTR4 Outer Dowsing\Tech\GIS\Dwgs\Wking\2023 01 PEIR\Human Health\05366_00012_0337_0 East Lindsay 008D Lower Super Output Area.mxd

Study Area Description

WMN OnSS

7.1.1 The WMN OnSS is located approximately 9km to the northwest of Spalding, and 4km to the east of Gosberton. The A16 is located to the northwest of the OnSS, with the River Welland located to the southeast.

30.4.18 The local environment within the study area can be characterised as rural, with land which is predominately used for agricultural purposes.

30.4.19 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.

WMS OnSS

30.4.20 The WMS OnSS is located approximately 7.5km to the northwest of Spalding, and 3.5km to the west of Moulton Seas End.

30.4.21 The River Welland and Marsh Road are located to the west of the OnSS, with Hall Gate Road located to the east. The local environment within the study area can be characterised as rural, with land which is predominately used for agricultural purposes.

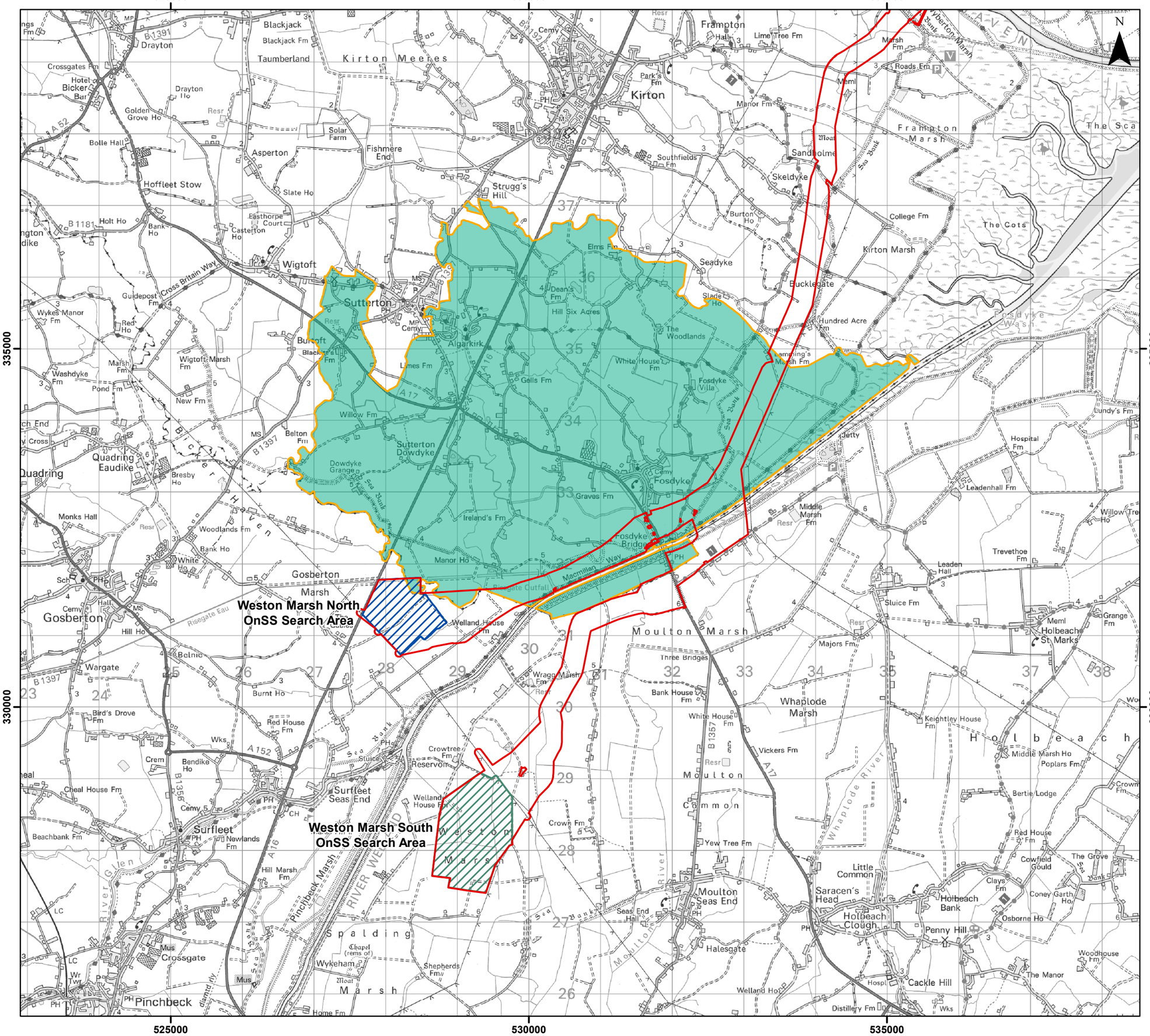
30.4.22 The study area extends to the residential dwellings located closest to the OnSS, to the north, east, south, and west. At its closest point, the OnSS will be located approximately 250m from the receptors.

30.4.23 The study area includes the residential dwellings located closest to the WMS OnSS, where construction and operational activities could have a potential impact.

30.4.24 Specific consideration is given to the most representative LSOA:

- Boston 007A (representative of the population at the OnSS).

30.4.25 The LSOA is shown below in Figure 30.3.



Legend

- Onshore PEIR Boundary
- Weston Marsh North OnSS Search Area
- Weston Marsh South OnSS Search Area
- Boston 007A Lower Super Output Area (Representative of Population at Wolla Bank)

Sources:
Source: Office for National Statistics licensed under the Open Government Licence v.3.0

Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Boston 007A Lower Super Output Area

Figure 30.3

OUTER DOWSING OFFSHORE WIND

Date: 06/05/2023
Produced By: JRS
Revision: 0.1

SLR

Document Path: P:\05356 - GoBe Consultants Ltd\00012 GTR4 Outer Dowsing\Tech\GIS\Dwgs\Wking\2023 01 PEIR\Human Health\05356.00012.0338.0 Boston 007A Lower Super Output Area.mxd

Population Groups

30.4.26 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.

30.4.27 The study areas used in other chapters of this PEIR 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.

30.4.28 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.

Data Sources

30.4.29 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.

Baseline Environment

30.4.30 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.

30.4.31 The population baseline has been appended to this chapter (Volume 2, Appendix 30.1). This section captures the main baseline comparisons and should be referred to alongside the data contained within Appendix A. In particular, Table 30.1 compares data from local to national groups that are most relevant to health.

Limitations

30.4.32 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 hard to reach groups along the proposed route, it is possible that not all specific cases have been captured.

General

30.4.33 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 olds, 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.

Baseline Comparisons

30.4.34 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		East Lindsey 008D		Boston 007A		Lincolnshire		England	
	No.	%	No.	%	No.	%	No.	%	No.	%
Age Structure (2020 Census data for local and 2021 Census data for regional-national)										

Population Group	Site-Specific (Local)						Regional		National	
Age 0 to 15- children and young people	176	11	234	12	260	11	128155	17	10483094	19
Age 16-64- working aged people	788	50	1048	52	1582	70	460058	60	35605651	63
Age 65 and over- older people	618	39	742	37	421	19	180151	23	10401300	23
Health (Nomis Data, 2021)										
Very good health	431	38	725	37	637	39	330873	43	27390829	49
Good health	477	43	690	35	578	35	278189	36	19040735	34
Fair health	164	15	398	20	292	18	114630	15	7147346	13
Bad health	38	3	123	6	99	6	35083	5	2248255	4
Provision of unpaid care (Nomis Data, 2021)										
Provides no unpaid care	1310	86	1645	90	1381	88	662159	90	48734833	91
Provides 1 to 19 hours unpaid care a week	60	4	97	5	78	5	32084	4	2303725	4
Provides 20 to 49 hours unpaid care a week	61	4	26	1	36	2	14097	2	969769	2
Provides 50 or more hours unpaid care a week	94	6	56	3	83	5	24206	3	1404771	3
Car or van availability (Nomis Data, 2021)										
No cars or vans in household	92	12	72	7.8	59	8	54834	16	5516098	24
One or more cars or vans in household	357	48	365	40	277	40	141075	42	967465	41
Distance travelled to work (Nomis Data, 2021)										
Less than 2km	19	4	17	2	35	5	49486	14	2898994	11
2km to less than 5km	43	8	45	6	35	5	36347	10	3335948	13

Population Group	Site-Specific (Local)						Regional		National	
5km to less than 10km	103	20	104	14	115	16	32596	10	3099302	12
10km to less than 20km	57	11	108	15	189	26	42241	12	2750302	10
20km to less than 30km	18	4	51	7	44	6	28835	8	1051967	4
40km to less than 60km	11	2	24	3	17	2	10970	3	439294	2
60 km and over	17	3	30	4	18	3	8713	3	336581	1
Works mainly from home	14	3	18	2	19	3	8157	2	355062	1
Households by deprivation dimensions (Nomis Data, 2021)										
Households is not deprived in any dimension	221	30	332	35	255	37	154886	46	11349737	48
Households is deprived in one dimension	334	45	400	44	283	41	117909	35	7842691	34
Households is deprived in two dimensions	157	21	159	17	123	18	49200	15	3320584	14
Households is deprived in three dimensions	35	5	39	4	37	5	10973	3	868104	4
Households is deprived four dimensions	3	0.3	0	0	1	0.1	584	0.2	54970	0.2
Economic activity status (Nomis Data, 2021)										
Economically active: Total	545	39	758	43	750	54	354237	55	26945252	59
Economically inactive: Total	837	60	1002	57	622	45	273744	43	18005455	39
Economically inactive: Retired	587	42	732	41	396	29	175243	27	9882054	22
Economically inactive: Looking after home or family	84	6	73	4	62	5	26812	4	2207738	5

Population Group	Site-Specific (Local)						Regional		National	
Economically inactive: Long-term sick or disabled	91	7	95	5	79	6	26882	4	1874300	4

30.5 Basis of Assessment

Scope of the Assessment

Geographic Population Groups

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 options (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).

Potentially Hard to Reach Groups

30.5.1 Hard to reach groups comprise sets of people who are more susceptible to the impact of the Project than the wider population, these include:

- 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.

Other Target Groups

30.5.2 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 which may impact on stress).

Temporal Scope

30.5.3 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);
- 'Long term' relates to effects measured in decades (e.g., the operational stage).

Topic Scope

30.5.4 In line with the Scoping Opinion (The Inspectorate, 2022), and based on the receiving environment, expected parameters of the Project (Volume 1, Chapter 3: Project Description) and expected scale of impact/potential for a pathway for effect on the environment, the following impacts have been scoped out of the assessment. This assessment has also been developed to comply with the EIA Regulations 2017.

30.5.5 The scope of the health chapter focuses on the onshore infrastructure associated with the Project. Following the principles outlined in section 30.6, factors relating to likelihood and factors relating to significance, the following potential effects have been scoped out:

- Operational windfarms should not produce dust and traffic emissions, nor should they produce emissions to water or soil (including hazardous waste and substances) ;

- Disruption to local road networks including reduced access to services and amenities, during operation;
- Exposure to EMFs (alone and cumulative); and
- Impacts due to pests and odours.

30.5.6 This list may be updated following the formal statutory consultation and review of comments received.

Health Determinants

30.5.7 The health determinants that pre-existing factors such as age, genetic make-up and gender are fixed and strongly influence a person's health status.

30.5.8 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 National Health Service (NHS), education, social services, transport, and leisure facilities influence the health of the population.

30.5.9 The Project may affect people who live and work within its locality, although hard to reach groups have the potential to be disproportionality affected. Hard to reach populations 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 the 'Health in Environmental Impact Assessment: A Primer for a Proportionate Approach' (Cave *et al*., 2017a).

30.5.10 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 PEIR 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,	Volume 1, Chapter 26: Noise and Vibration	The combined effect of noise and vibration, as predicted in the PEIR Volume 1, Chapter 26: Noise and Vibration 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; ▪ Hard to reach 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 ▪ Hard to reach 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 PEIR Chapter	Specific Assessment
	1995). Onshore construction phase noise effects have the potential to affect health, as does operational noise from the onshore substation.		
Air Quality and Emissions	Temporary inhalation of particulates or exposure to exhaust emissions and dust.	Volume 1, 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 Volume 1, Chapter 19 Onshore Air Quality. This information has been used to judge how the predicted change is likely to affect the population, including hard to reach 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	Volume 1, 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 increase access to more

Health Determinant	Potential Health Effect	Relevant Technical PEIR Chapter	Specific Assessment
	opportunities through construction activities and during operation.		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.	Volume 1, Chapter 23: Geology and Ground Conditions Volume 1, 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 Volume 1, Chapter 23: Geology and Ground Conditions. The assessment will look at conclusions within Volume 1, Chapter 24: Hydrology and Flood Risk, 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	Effects of Public Rights of Way (PRoW) causing changes in accessing the footpath, cycleway and bridleway network. Effects from increased traffic on safety/accidents, severance/connectivity	Volume 1, Chapter 25: Land Use Volume 1, 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 Volume 1, Chapter 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

Health Determinant	Potential Health Effect	Relevant Technical PEIR Chapter	Specific Assessment
Minimising car use	may arise due to connectivity. Loss of access to green space or diversions to access routes. Disruption of access to services and amenities.		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.

Realistic Worst Case Scenario

30.5.11 The full Project description is provided in Volume 1 Chapter 3: Project Description. 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.

30.5.12 Details of human health impacts associated with the following technical topics are detailed within the worst case tables within the relevant chapters:

- Volume 1, Chapter 19: Onshore Air Quality;
- Volume 1, Chapter 23: Geology and Ground Conditions;
- Volume 1, Chapter 24: Hydrology and Flood Risk;
- Volume 1, Chapter 25: Land Use;
- Volume 1, Chapter 26: Noise and Vibration;
- Volume 1, Chapter 27: Traffic and Transport; and
- Volume 1, Chapter 29: Socio-Economic Characteristics.

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	▪ 3 years ▪ 24-hour working may be required ▪ See Volume 3, Chapter 7: Noise and Vibration
Onshore ECC		
Construction	▪ Length ▪ Temporary Working Width ▪ Peak onshore construction employment ▪ Total ducting duration ▪ Total cable pull, joint and commission duration ▪ Total	▪ 80km ▪ 80m ▪ 654 daily employees ▪ 3-years ▪ 3-years ▪ 3-years
▪ OnSS		
Construction	▪ Maximum land take for temporary works area ▪ Maximum duration	▪ 270,000m^2 (520m x 520m) ▪ 36-months
Operation	▪ Maximum land take for permanent footprint ▪ Maximum height ▪ Access	▪ 180,000m^2 ▪ 19m building ▪ One visit per week, site lighting required during maintenance visits only.

Element	Worst Case Criteria	Worst Case Definition
	▪ Expected noise level	▪ See Volume 3, Chapter 7: Noise and Vibration

Embedded Mitigation

30.5.13 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 IAQM methodology. This would apply to all onshore construction activities.
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 Code of Construction Practice (CoCP). 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 Compunds 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. It also notably reduces the potential for the onshore ECC to contribute to significant landscape and visual cumulative effects. The construction works

Project phase	Mitigation measures embedded into the project design
	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 options	As far as reasonably practicable, OnSS options sited at locations to avoid key areas of sensitivity.
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

Approach

30.6.1 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).

30.6.2 Consistent with the objective of EIA (as set out in EIA Directive 2014/52/EC), 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.

30.6.3 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.

30.6.4 Effects are considered with regards the general population and hard to reach groups. Populations are considered at regional and local levels.

30.6.5 In line with best practice guidance from the WHO (WHO, 2012) and PHE (PHE, 2017c), "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: A Primer for a Proportionate Approach' (Cave *et al.*, 2017a).

30.6.6 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 hard to reach 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 30.5;
- 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.

30.6.7 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 PEIR; and
- Conduct the assessment and identify and incorporate mitigation measures, if any required, into the scheme design, construction activities and operational procedures.

30.6.8 The assessment has been conducted in line with the relevant sections of this NPS and in the technology specific NPSs to:

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

30.6.9 This chapter has drawn upon the studies undertaken for the PEIR 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.

Health Determinants

30.6.10 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 in Figure 30.4.

30.6.11 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.

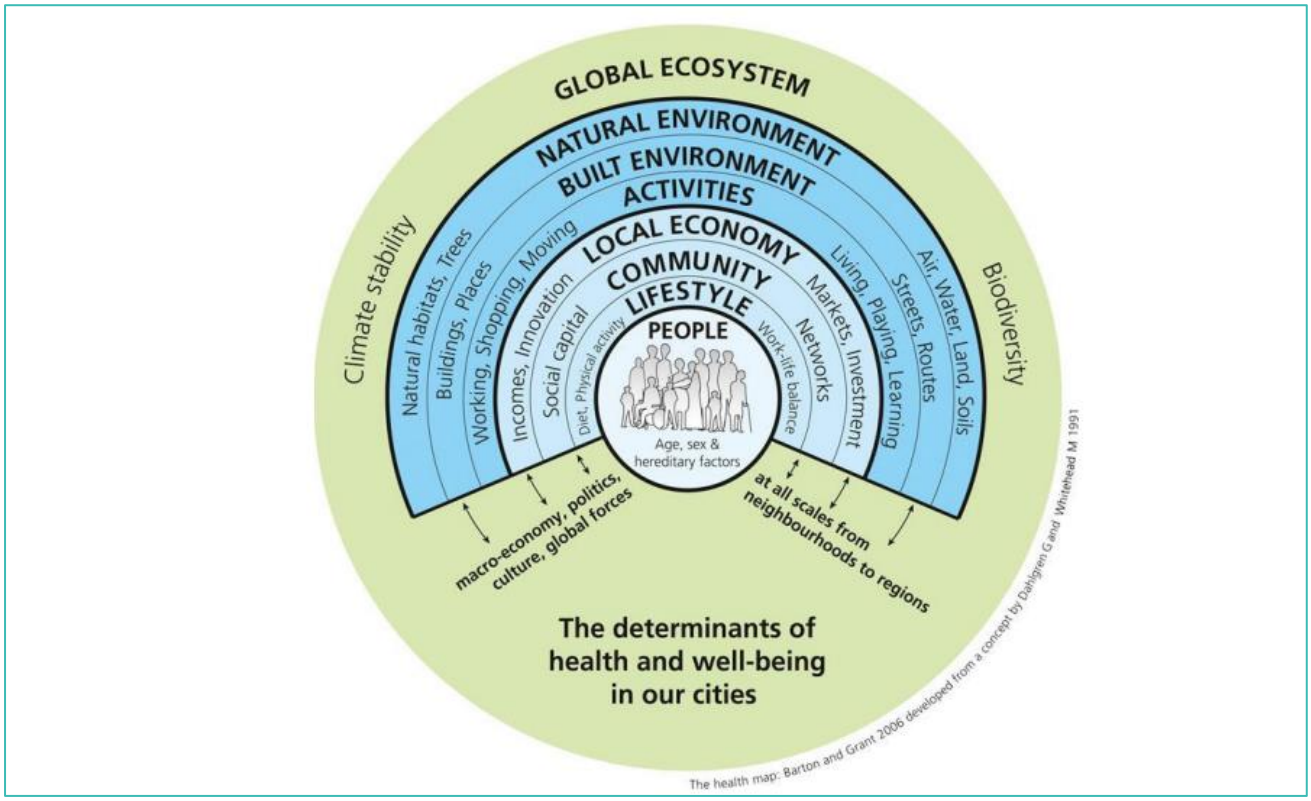


Figure 30.4: Wider determinants of health and well-being

Source: Based on the Dahlgren and Whitehead (1991) diagram as amended by Barton and Grant (2006) and advised by Cave *et al*. (2017)

Likelihood

30.6.12 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).

30.6.13 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'.

30.6.14 Table 30.7 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 hard to reach 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.

Significance

30.6.15 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. Instead, a Hazard Identification Study (HAZID), which will be informed by other relevant aspect chapters in the ES will be undertaken. 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.

30.6.16 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.

Sensitivity

30.6.17 Table 30.8 sets out factors characterising sensitivity for human health. 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 (Cave *et al.*, 2017a)

	Inequalities	Deprivation	Health status	Life stage	Outlook
Higher sensitivity	High levels of inequalities or inequities.	High levels of overall deprivation or a high level of deprivation for a relevant subdomain of the indices of multiple deprivation. High levels of poor access to financial, social or political resources.	High levels of poor health and/or disability (particularly multiple or complex long-term health conditions). High reliance on (or low capacity in) healthcare facilities, staff or resources.	Presence of dependants (particularly the elderly or children), pregnant women, shift workers or the economically inactive.	Presence of groups with strong views or high degrees of uncertainty about the project who may anticipate risks to their health and thus be affected by not only actual changes, but also by the possibility of change.
Lower sensitivity	Low levels of inequalities or inequities.	Low levels of overall deprivation or a low level of deprivation for a relevant sub-domain of the indices of multiple deprivation. Good access to financial, social or political resources.	Low levels of poor health and/or low levels of disability. Low reliance on (or high capacity in) healthcare facilities, staff or resources.	Predominantly a working age population in steady good quality employment.	No indication that strong views are held about the project. People are well informed of the issues and potential effects.

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 from Table 30.8 that informed the score.

Magnitude

30.6.18 Table 30.9 sets out factors characterising magnitude for human health. 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 (Cave *et al.*, 2017a)

	Severity	Extent	Frequency	Reversibility	Exposure
Larger Magnitude	Large change in the risk of developing a new health condition (or injury) or in the progression of an existing condition. Large change in symptoms, quality of life or day-to-day functioning. Large change in inequalities.	Most members of the relevant population affected. Substantial population displacement or influx.	Continuous or daily effects with chronic (long term) changes in health outcomes.	Permanent change in health outcomes once the project change ceases. Intergenerational effects.	A low (or high) concentration over a long time, or a high concentration over a short time. Low (or high) exposure to a large population or high exposure to a small population. A high degree of resource sharing with the project.
Smaller Magnitude	Small change in the risk of developing a new health condition (or injury) or in the progression of an existing condition. Small change in symptoms, quality of life or day-to-day functioning. Small change in inequalities.	Few members of the relevant population. Little change in population.	Monthly or yearly affects with acute (short term) changes in health outcomes.	Change in health outcomes reverses once the project change ceases. No intergenerational effects.	A low concentration over a short time. Low exposure to a small population. A low degree of resource sharing with the project.

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.

Judgement Framework for Significance

30.6.19 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.

30.6.20 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.

30.6.21 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.

30.6.22 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. In line with best practice a formulaic matrix approach to determining significance has been avoided.

Table 30.10: Human health guide questions for determining significance (Cave *et al*., 2017a)

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)?

30.6.23 The text of the assessment section provides a structured discussion that responds to each of these questions 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.

30.6.24 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.

30.6.25 For the purposes of this PEIR, 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.

30.6.26 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.

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

Population Conclusions

30.6.28 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 hard to reach groups (as a single defined class of sensitivities for that issue).

30.7 Impact Assessment

Construction

Noise

30.7.1 During construction, there is potential for noise to temporarily arise from construction works and movement of heavy goods vehicles across the onshore Project study area for both option one and two (see section 30.4).

30.7.2 The population groups relevant to this assessment, due to either proximity or other sensitivity, are defined in section 30.5.

30.7.3 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 30.5) outlined by Lincolnshire County Council, care for the elderly and support to young children.

30.7.4 The temporal scope for this effect (as described in section 30.5) 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. Works are proposed to be undertaken during the daytime;
- At the OnSS (option one and two), 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.

30.7.5 The conclusions of Volume 1, Chapter 26: Noise and Vibration can be summarised as follows:

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

30.7.6 The mitigation measures taken into consideration during the assessment are described in Volume 1, Chapter 26: Noise and Vibration. Details regarding mitigation are outlined within the Outline Noise and Vibration Management Plan (document reference 8.1.1).

30.7.7 The potential effect is considered likely because (based on the methods described in section 30.6) 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.

30.7.8 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 hard to reach groups (collectively as a single group) can be characterised as follows (based on the methods described in section 30.6). The general population is considered to be of low sensitivity. This reflects the baseline population profile in section 30.4.

30.7.9 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.

30.7.10 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.

30.7.11 Compared to the national average, there are a lower number of children (age 0-15) across all three LSOA's when compared nationally and with Lincolnshire.

30.7.12 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 consider itself to have worse health than compared with the rest of England. Some populations in Lincolnshire in the vicinity of the onshore study area are amongst the 20% most deprived neighbourhoods in the England.

30.7.13 In both East Lindsey LSOA, there are a higher number of people at retirement age by 14 – 16 per cent retrospectively. In Boston there is a lower percentage than regional and national.

30.7.14 The magnitude of the change due to the Project can be characterised as small (based on the methods described in section 30.6). 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.

30.7.15 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.

30.7.16 Volume 1, Chapter 26: Noise and Vibration describes how, following implementation of mitigation, residual impacts are assessed as not significant.

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

30.7.18 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 being slightly lower. The two East Lindsey LSOA populations have a marginally higher level of retirement aged people with Boston LSOA being marginally lower. This suggest that there is potential for more people to be at home during the day. But 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. Therefore, WMN and WMS shall have the same level of 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 Volume 1, Chapter 26: Noise and Vibration to comply with relevant standards and undertake appropriate consultation. Volume 1, Chapter 26: Noise and Vibration describes how, assuming mitigation is implemented, residual impacts are assessed as not significant.

30.7.19 In line with the NPS for Overarching Energy (EN-1) (Department of Energy and Climate Change, 2011c) it can be confirmed that (based on the assessment in Volume 1, Chapter 26: Noise and Vibration) 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 hard to reach groups. 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.

Air Quality

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

30.7.21 The population groups relevant to this assessment, due to either proximity or other sensitivity, are defined in section 30.5.

30.7.22 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).

30.7.23 The temporal scope for this effect (as described in section 30.5) 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 PEIR Volume 1, Chapter 3 Project Description) 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 (both option one and two), there is a medium-term temporal scope because the 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.

30.7.24 The conclusions Volume 1, Chapter 19: Onshore Air Quality of this PEIR 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**.

30.7.25 The mitigation measures taken into consideration during the assessment are as described in Volume 1, Chapter 19: Onshore Air Quality.

30.7.26 The potential effect is considered likely because (based on the methods described in section 30.6) 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.

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

30.7.28 The sensitivity of the general population and hard to reach groups (collectively as a single group) can be characterised as follows (based on the methods described in section 30.6):

- 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 hard to reach 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.

30.7.29 The magnitude of the change due to the Project can be characterised as low (based on the methods described in section 30.6). 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.

30.7.30 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.

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

30.7.32 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 Volume 1, Chapter 19: Onshore Air Quality 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. Therefore, option one and two shall have the same level of 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 Volume 1, Chapter 19: Onshore Air Quality follows regulatory guidance as required in the UK; and
- The NPS for Overarching Energy (EN-1) (Department of Energy and Climate Change, 2011c) 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.

30.7.33 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 hard to reach groups. 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.

Ground and / or Water Contamination

30.7.34 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.

30.7.35 The population groups relevant to this assessment, due to either proximity or other sensitivity, are defined in section 30.5.

30.7.36 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).

30.7.37 The temporal scope for these effects is (as described in section 30.5) 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.

30.7.38 The conclusions of Volume 1, Chapter 23: Geology and Ground Conditions and Volume 1, Chapter 24: Hydrology and Flood Risk 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 PEIR boundary 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 Volume 1, Chapter 23: Geology and Ground Conditions 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 incurrence 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.

30.7.39 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 assessment as minor adverse, and the resulting significance of the effect is minor adverse. This is **not significant** in EIA terms.

30.7.40 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.

30.7.41 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.

30.7.42 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.

30.7.43 Mitigation measures are described in Volume 1, Chapter 23: Geology and Ground Conditions and Volume 1, Chapter 24: Hydrology and Flood Risk, 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.

30.7.44 The sensitivity of the general population and hard to reach groups (collectively as a single group) can be characterised as follows (based on the methods described in section 30.6). The general population is considered to be of low sensitivity. This reflects the limited likelihood that people would interact with bodies of water for recreational purposes. Vulnerability in this case is particularly linked to age (both young people and older people), and existing poor health (e.g., long-term illness).

30.7.45 The magnitude of the change due to the Project can be characterised as very low (based on the methods described in section 30.6).

30.7.46 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. Therefore, WMN and WMS are considered to have the same level of impact.

30.7.47 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 hard to reach groups. 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.

Physical Activity

30.7.48 During construction, there is the potential for physical activity to be temporarily affected by the Project due to the potential to temporarily divert Public Rights of Way (PRoWs).

30.7.49 The population groups relevant to this assessment, due to either proximity or other sensitivity, are defined in section 30.5.

30.7.50 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).

30.7.51 The temporal scope for these effects is (as described in section 30.5) short term. During these periods there would be a change in the tranquillity and perceived quality of physical activity opportunities.

30.7.52 The conclusions of Volume 1, Chapter 25: Land Use 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;
- Land use impacts on the PRoWs could include the severance and closure or diversion of the routes due to trenching and / or other construction activities. This would change the purpose of the land temporarily and reduce amenity for the users. The impacts on PRoWs and the users are considered further in Volume 1, Chapter 27: Traffic and Transport and Volume 1, Chapter 29: Socio-Economic Characteristics;
- The 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. This leads to an overall impact of **minor adverse** and **not significant** level of effect;

- The embedded mitigation includes for the provision of an Access Management Plan (AMP) (document reference 8.1.7), which would be implemented in areas along the PEIR Boundary where potential sources of recreational routes, such as PRoWs and national cycle routes (NCRs), would be impacted. The AMP would give clear instructions, information, and timings of any impacts to the usage of the route, as well as allow for the planning of any potential closures or diversions;
- NCRs are considered to be of high sensitivity due to their national promotion. The onshore ECC crosses NCR1. The location of NCR1, close to the River Welland means that should the WMS OnSS be selected, the greatest level of impacts would be avoided through use of trenchless techniques beneath the River Welland, resulting in a **negligible** magnitude of impact;
- Where the cable route crosses close to the A17 (Washway Road), trenchless techniques are not proposed, however, as this is an A-road, further mitigations beyond the AMP, including those described within the Construction Environmental Management Plan to be submitted with ES, would be implemented, keeping the A17, and therefore the NCR1, open. This would result in a low magnitude of impact due to 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 on a 1,022km long route. The sensitivity and the magnitude of the impact would combine to create an overall **moderate adverse** level of effect that may be **significant** (in terms of Land Use). However, in terms of Human Health, because diversions are in place and provided that users are made well aware of the diversion routes, the overall magnitude is then considered to be minor resulting in **minor adverse** and **not significant** level of effect;
- Should WMN be selected as the OnSS site, the magnitude of the impact would also be low for the same reasons as described above; the cable route crosses NCR1 as it runs parallel with the A17 (Wash Road), resulting in a **moderate adverse** and **significant** level of effect (in terms of Land Use). However, in terms of Human Health, because diversions are in place and provided that users are made well aware of the diversion routes, the overall magnitude is then considered to be minor resulting in **minor adverse** and **not significant** level of effect; and
- The local PRoWs are considered together at this stage due to their extent over a large area. These are considered to be of local importance and low sensitivity. The proposed cable route crosses a number of PRoWs which would result in a direct impact. Accounting for this and the very localised and temporary nature of the impact, the magnitude is considered to be minor which results in a **minor adverse** and **not significant** level of effect.

30.7.53 Outdoor recreational land include:

- Local wildlife sites;
- Rivers;

- Public parks and gardens;
- Leisure parks; and
- Beaches.

30.7.54 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.

30.7.55 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**.

30.7.56 The potential effect is considered likely for outdoor activities (based on the methods described in section 30.6). 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.

30.7.57 The effects would be due to the sequential construction of the onshore ECC. The following PRoW network routes detailed throughout Section 25.5 to Section 25.7 of Volume 1, Chapter 25: Land Use have **moderate adverse** effects that can be considered **significant**:

- Ande/19/2, Chap/19/5 and Hogs/56/2 (summer only), due to the length of temporary diversion; and
- Fosd/2/1, due to the route being shared by construction traffic associated with the Project.

30.7.58 With the implementation of measures within the final AMP, theHM26 magnitude of impact can be reduced, resulting in a **minor adverse** impact which is **not significant** in terms of the EIA Regulations.

30.7.59 The sensitivity of the general population and hard to reach groups (collectively as a single group) can be considered to be of medium sensitivity (based on the methods described in section 30.6). 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.

30.7.60 Some people would be more sensitive to changes in physical activity.

30.7.61 For this population, sensitivity is considered high. 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.

30.7.62 The magnitude of the change due to the project can be characterised as low (based on the methods described in Section 30.6). 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.

30.7.63 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;
- In both East Lindsey LSOA, there are a higher number of people at retirement age by 14 – 16 per cent retrospectively. In Boston there is a lower percentage than regional and national.;
- 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. Interestingly a higher percentage of those people living in East Lindsey 010B consider themselves to have 'good' health (43%) which is higher than LSOA East Lindsey 008D (35%) and Boston 007A (35%) and regional (36%) and national areas (34%);
- 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.

30.7.64 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 hard to reach groups. There would be no residual long-term health outcome. The WMN and WMS OnSS would have a greater impact on health compared to Lincolnshire Node OnSS, given the length of the route and duration of works.

30.7.65 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.

30.7.66 Although there are slight differences in the LSOA's, it is considered that these are **not significant** enough to result in a different impact. Therefore, option one and two shall have the same level of impact.

Journey Times and / or Reduced Access

30.7.67 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.

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

- 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).

30.7.69 Travelling to, or accessing health care, 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.

30.7.70 The temporal scope for these effects is (as described in section 30.5) variable:

30.7.71 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 Volume 1 Chapter 3 Project Description) 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.

30.7.72 With regards traffic movement, the temporal scope would also be short term. Volume 1, Chapter 27: Traffic and Transport 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.

30.7.73 For the Leverton Marsh access road, 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**.

30.7.74 Implementation of mitigation, as outlined in Volume 1, Chapter 27: Traffic and Transport,

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.

30.7.75 The potential effect is considered likely because (based on the methods described in section 30.6) 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.

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

30.7.77 The sensitivity of the general population and hard to reach groups (collectively as a single group) can be characterised as follows (based on the methods described in Section 30.6):

- 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 is considered to be in generally worse health than the rest of England health hence requiring fewer visits to primary health care;
- A small number of hard to reach communities may be affected more than the general population. The sensitivity of hard to reach groups is considered high because deprivation indices show the LSOA's as being ranked as 6,265 and 6,747 out of 32,844 LSOAs in England, where one is the most deprived LSOA. This is amongst the 20% most deprived neighbourhoods in the country; and
- 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.

30.7.78 The magnitude of the change due to the project can be characterised as low as follows (based on the methods described in section 30.6):

- 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;
- In both East Lindsey LSOA, there are a higher number of people at retirement age by 14 – 16 per cent retrospectively. In Boston there is a lower percentage than regional and national;
- 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. Interestingly a higher percentage of those people living in East Lindsey 010B consider themselves to have 'good' health (43%) which is higher than LSOA East Lindsey 008D (35%) and Boston 007A (35%) and regional (36%) and national areas (34%); 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. Therefore, Option One and Two shall have the same level of impact.

30.7.79 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);
- Transportation barriers to health care access are common, and greater for hard to reach 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, 2011c) advises whether a need to determine if the change in population would increase demand on local services.

30.7.80 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 hard to reach 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.

Construction and Operation and Maintenance

Employment

30.7.81 Employment has been considered across both construction and operation because, as discussed in Volume 1, Chapter 29: Socio-Economics Characteristics, 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.

30.7.82 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.

30.7.83 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).

30.7.84 The temporal scope for these effects is (as described in section 30.5) 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.

30.7.85 The conclusions of Volume 1, Chapter 29: Socio-Economics Characteristics 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.

30.7.86 The potential effect is considered likely because (based on the methods described in section 30.6) 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).

30.7.87 The sensitivity of the general population and for hard to reach groups (collectively as a single

group) can be characterised as follows (based on the methods described in section 30.6). 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. Hard to reach 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.

30.7.88 The magnitude of the change due to the Project can be characterised (based on the methods described in section 30.6) 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.

30.7.89 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, 2011c) 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."

30.7.90 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 hard to reach groups. 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). Although there are slight differences in the LSOA's, it is considered that these are **not significant** enough to result in a different impact. Therefore, option one and two shall have the same level of impact.

Operation and Maintenance

Noise

30.7.91 The potential for noise impacts during operation of the onshore project substation has been considered in Volume 1, Chapter 26: Noise and Vibration.

30.7.92 The population groups relevant to this assessment, due to either proximity or other sensitivity, are defined in section 30.5.

30.7.93 The temporal scope for this effect is (as described in section 30.5) long term as it relates to the operational phase of the Project.

30.7.94 Volume 1, Chapter 26: Noise and Vibration 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.

30.7.95 Although there are slight differences in the LSOA's, it is considered that these are **not significant** enough to result in a different impact. Therefore, option one and two shall have the same level of impact.

Decommissioning

30.7.96 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 Volume 1, Chapter 3: Project Description.

30.7.97 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.

30.7.98 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.

30.7.99 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

30.8.1 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.

30.8.2 The overarching method followed in identifying and assessing potential cumulative effects in relation to the onshore environment is set out in Volume 2, Appendix 5.2: Onshore Cumulative Effects Assessment. The approach is based upon the Planning Inspectorate (the Inspectorate) Advice Note 17: Cumulative Effects Assessment (The Inspectorate, 2017). The approach to the CEA is intended to be specific to the Project and takes account of the available knowledge of the environment and other activities around the PEIR boundary.

30.8.3 By its nature, Health interacts with each of the other onshore topics assessed in this PEIR, 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 PEIR Chapters:

- Volume 1, Chapter 19: Onshore Air Quality;
- Volume 1, Chapter 23: Geology and Ground Conditions;
- Volume 1, Chapter 24: Hydrology and Flood Risk;
- Volume 1, Chapter 25: Land Use;
- Volume 1, Chapter 26: Noise and Vibration;
- Volume 1, Chapter 27: Traffic and Transport; and
- Volume 1, Chapter 29: Socio-Economics Characteristics.

30.8.4 At this stage, the Project does not anticipate any cumulative impacts on Health except from those mentioned within the relevant technical chapters detailed above.

30.9 Transboundary Effects

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

30.10 Conclusions

30.10.1 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).

30.10.2 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.

30.10.3 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 30.11.

Table 30.11: Summary of health effects

Potential effect	Temporal Scope	Probability of Effect	Sensitivity of General Population	Sensitivity of Hard to Reach Population	Magnitude of Effect	Significance of Effect on General Population (WMN/WMS and Lincolnshire Node OnSS)	Significance of Effect on Hard to Reach Population (WMN/WMS and Lincolnshire Node 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 probability	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.							

30.11 References

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