The Great Grid Upgrade

Eastern Green Link 5 (EGL 5)

Preliminary Environmental Information Report

Volume 1
Part 2
Chapter 16 Health and Wellbeing

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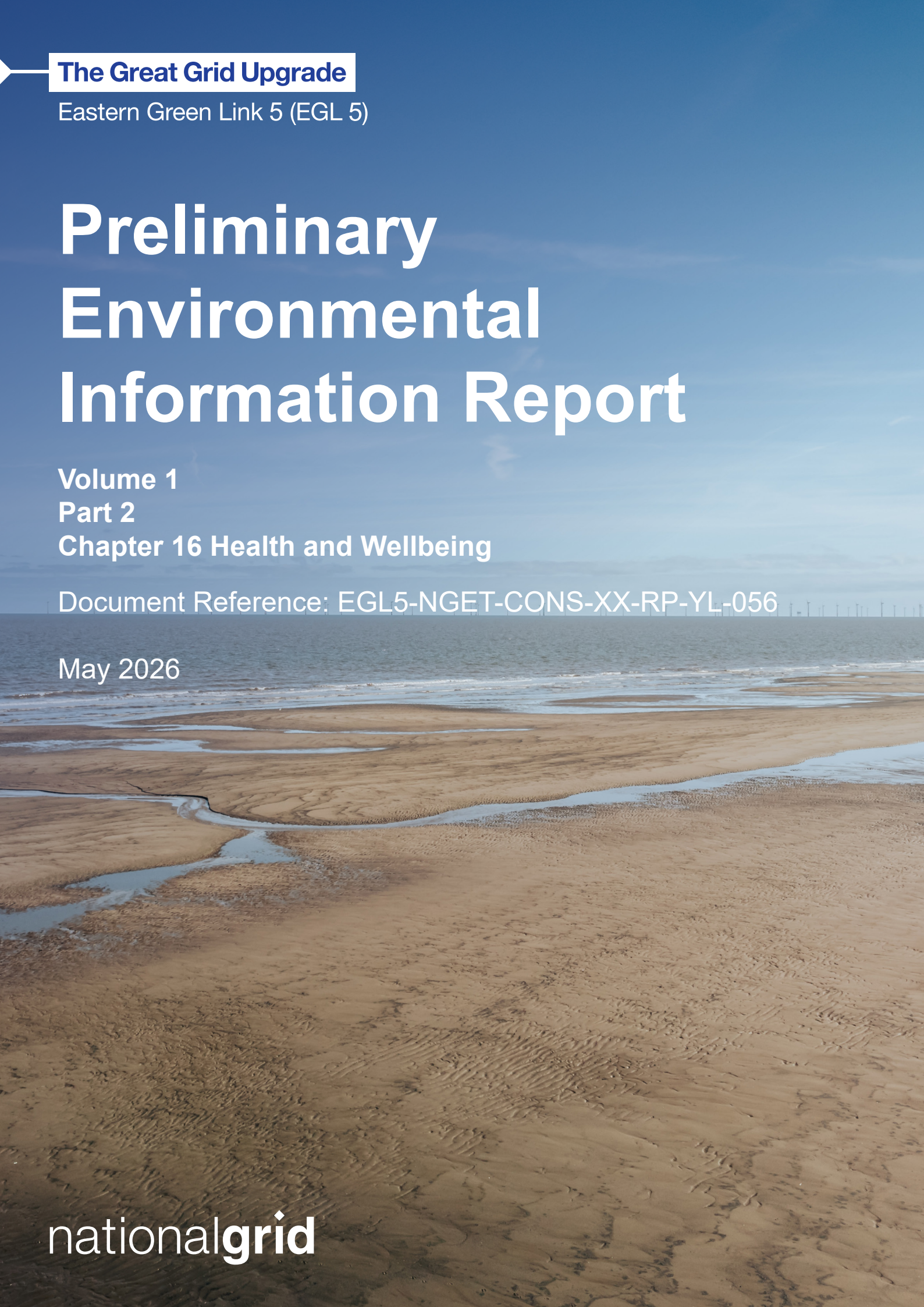

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16. Health and Wellbeing

16.1 Introduction

16.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the Eastern Green Link (EGL) 5 English Onshore Scheme, with respect to health and wellbeing including physical and mental health in relation to both the general population and vulnerable populations. The preliminary assessment is based on information obtained to date. It should be read in conjunction with the description of the Project provided in **Volume 1, Part 1, Chapter 4: Description of the Project**.

16.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, current baseline conditions, current environmental measures, and the preliminary health and wellbeing effects that could result from the English Onshore Scheme during the construction and operation (and maintenance) and at a high level, decommissioning phases. Specifically, it relates to the English onshore elements of the Project landward of Mean Low Water Springs (MLWS).

16.1.3 This chapter should be notably read in conjunction and considered alongside the following technical aspect chapters found in **Volume 1:**

- **Part 2, Chapter 7: Cultural Heritage;**
- **Part 2, Chapter 8: Landscape and Visual Amenity;**
- **Part 2, Chapter 9: Water Environment;**
- **Part 2, Chapter 10: Geology and Hydrogeology;**
- **Part 2, Chapter 12: Traffic and Transport;**
- **Part 2, Chapter 13: Noise and Vibration;**
- **Part 2, Chapter 14: Air Quality,** and;
- **Part 2, Chapter 15: Socioeconomics, Recreation and Tourism.**

16.1.4 This chapter is supported by **Volume 2, Part 2, Appendix 16.A: Health and Wellbeing Baseline Data** and **Volume 3, Part 2, Figure 16-1: Health and Wellbeing Study Area.**

16.1.5 Reference should be given to **Volume 2, Part 2, Appendix 4.A: Electromagnetic Field (EMF) Study.**

Limitations

16.1.6 The information provided in this Preliminary Environmental Information Report (PEIR) is preliminary, the final assessment of likely significant effects will be reported in the Environmental Statement (ES). The PEIR has been produced to fulfil National Grid Electricity Transmission plc (NGET)'s consultation duties in accordance with Section 42 of the PA2008 and enable consultees to develop an informed view of the preliminary likely significant effects of the English Onshore Scheme.

16.1.7 This assessment has been undertaken as a desk-based study, using publicly available information. No site survey has been undertaken for the purpose of this chapter. However, this is not considered to affect the robustness of the assessment supporting the PEIR given the required datasets have been obtained from public datasets such as those maintained by government.

16.1.8 This assessment has relied, in part, on data provided by third parties (e.g., Ordnance Survey Mapping, Office for National Statistics (ONS)), which are the most up-to-date data available at the time of writing. No significant changes or limitations in these datasets have been identified that would affect the robustness of the assessment. Baseline data will be kept under review throughout the production of the EIA to ensure that (where practicable) the most recently published data is utilised.

16.1.9 Any assumptions and limitations related to the assessment and data collection for other topic chapters included in this chapter, are also applicable.

Preliminary significance conclusions

16.1.10 For ease of reference, a summary of the potentially significant effects from the preliminary health and wellbeing assessment is provided in **Table 16-1**. All other effects in relation to health and wellbeing have been assessed as not significant. Further details of the methodology behind the assessment, and a detailed narrative of the assessment itself, are provided within the sections below. The assessment will be reviewed and refined as part of the Environmental Statement (ES) process.

Table 16-1 Preliminary summary of significance of effects

Receptor and summary of predicted effects	Sensitivity / importance / value of receptor	Magnitude of change	Significance	Summary rationale
Construction Phase - Physical health of the general population. For the general population, any changes to air, land or water quality, or any other changes to the environment, can lead to adverse physical health impacts, even where people were previously considered 'healthy'.	Low	Low	Minor – Not Significant	No significant effects have been identified for the water environment, geology and hydrogeology or air quality at this stage. The preliminary noise assessment contains the potential for significant noise effects. It is expected that all potential construction effects will be managed in line with **Volume 2, Part 1, Appendix 5.B: Outline Code of Construction Practice (CoCP)**, and as such no adverse effects will occur to human health as a result of construction. The Outline PRoW Management Plan and Outline CTMP shall be developed further.
Operational Phase – physical health of the general population. The converter station has the potential to impact 27 noise sensitive receptors within the operational phase.	Low	Medium	Minor – Not Significant	It is expected that there will be some minor permanent realignments to PRoW, which are not expected to affect the use of the PRoW, and therefore would not affect potential use or access to physical activity for the general population.
Construction Phase - Physical health of vulnerable groups. For vulnerable groups, any changes to air, land or water quality can lead to adverse physical health impacts, which are likely to be felt more acutely than in the general population. The study area contains a higher proportion of older people than the England	Medium	Low	Minor – Not Significant	No significant effects have been identified for the water environment, geology and hydrogeology or air quality at this stage. The preliminary noise assessment contains the potential for significant noise effects. The Outline PRoW Management

Receptor and summary of predicted effects	Sensitivity / importance / value of receptor	Magnitude of change	Significance	Summary rationale
average, which may mean the study area is more sensitive to change than other areas could be.				Plan and Outline CTMP shall be developed further.
Operational Phase – physical health of vulnerable groups.	Medium	Medium	Moderate - Significant	It is expected that there will be some minor permanent realignments to PRoW, which are not expected to affect the use of the PRoW, and therefore would not affect potential use or access to physical activity for any vulnerable groups. The converter station has the potential to impact 27 noise sensitive receptors within the operational phase. While the impacts are unmitigated at this time, the potential magnitude of the impact, particularly relating to changes in baseline noise levels could be significant.
16.1.11 Mental health – perceived risk from EMFs – general population. Although the English Onshore Scheme will be designed to have no physical effects on human health from EMFs, the public perception and understanding of EMFs can lead to concern relating to the operational phase and this has the potential for impacts to mental health outcomes.	Low	Low	Minor – Not Significant	Recognising that concerns about EMF may adversely impact some people's mental health, NGET provides open and transparent information about EMFs on the website, www.emfs.info, including what EMFs are, exposures from electricity infrastructure, research into health effects and the policies and guidelines in place to protect against EMF.
16.1.12 Mental health – perceived risk from EMFs – vulnerable groups. Although the English Onshore Scheme will be designed to have no physical effects on human health from EMFs, the public perception and understanding	Medium	Low	Minor – Not Significant	Recognising that concerns about EMF may adversely impact some people's mental health, NGET provides open and transparent information about EMFs on the website, www.emfs.info, including what

Receptor and summary of predicted effects	Sensitivity / importance / value of receptor	Magnitude of change	Significance	Summary rationale
of EMFs can lead to concern relating to the operational phase and this has the potential for impacts to mental health outcomes.				EMFs are, exposures from electricity infrastructure, research into health effects and the policies and guidelines in place to protect against EMF.
Mental health – health-related environmental change to neighbourhoods for general population	Low	Low	Minor – Not Significant	Environmental change throughout the construction phase could occur as a result of changes to landscape and visual amenity, the water environment, geology and hydrogeology, agriculture and soils, traffic and transport, noise and vibration and socio-economics, recreation and tourism. It is the combination of any or all of these potential effects that can impact the mental wellbeing of the general population. Effects of fear and intimidation, as identified within **Volume 1, Part 2, Chapter 12: Traffic and Transport** could reduce PRoW use as a result of the presence of HGVs and a potential reduction of safe walking routes. The ongoing consultation and opportunity to provide feedback to the construction teams, as set out within the CoCP, will help to reduce feelings of uncertainty.
Mental health – health-related environmental change to neighbourhoods for vulnerable groups	Medium	Low / Medium	Minor – Not Significant	Environmental change throughout the construction phase could occur as a result of changes to landscape and visual amenity, water environment, geology and hydrogeology, agriculture and soils, traffic and transport, noise and vibration and

Receptor and summary of predicted effects	Sensitivity / importance / value of receptor	Magnitude of change	Significance	Summary rationale
				socio-economics, recreation and tourism. It is the combination of any or all of these potential effects that can impact the mental wellbeing of vulnerable groups. As air quality assessment of vehicle emissions, and noise monitoring are yet to be undertaken. The study area contains the same proportion of people with mental health disorders as England, although the study area performs better than England as a whole in terms of happiness and anxiety scores. The study area does however have a higher proportion of older and disabled people than England as a whole, with these demographic groups more likely to negatively experience effects to changes.
Mental Health – participation in consultation and the consenting process for general population	Low	Low	Minor – Not Significant	For the general population, it is expected that the sensitivity is low, due to their predominantly positive outlook and fair health status, with a low impact magnitude due to the expected short duration and slight change in quality of life from perceived stress.
Mental Health – participation in consultation and the consenting process for vulnerable groups	Medium	Low	Minor	Those with existing mental health conditions would have a medium sensitivity, with a low magnitude of impact due to the minor change in quality of life and the provided opportunity to be involved with the engagement process.

16.2 Relevant Technical Guidance

16.2.1 Relevant technical guidance, specific to health and wellbeing, that has informed this PEIR and will inform the assessment within the ES is summarised below. Relevant legislation and planning policy are set out in **Volume 1, Part 1, Chapter 2: Regulatory and Policy Overview** and **Volume 2, Part 1, Appendix 2.A: Regulatory and Planning Context**.

Technical guidance

16.2.2 A summary of the technical guidance for the health and wellbeing is given in **Table 16-2**.

Table 16-2 Technical guidance relevant to the health and wellbeing assessment

Technical guidance document	Context
Healthy Lives, Healthy People: Our Strategy for Public Health in England, HM Government, (2011) (Ref 16.1).	This white paper sets out the approach to reduce inequalities in health and address the root causes of poor health and wellbeing.
A Green Future: Our 25 Year Plan to Improve the Environment, Department for Environment, Food and Rural Affairs, (2018) (Ref 16.2).	The plan sets out the proposals to open up the mental and physical health benefits of the natural world through the 25-year plan for improving the environment.
Planning Practice Guidance (PPG) – Healthy and Safe Communities, Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government, (2014, as amended 2022) (Ref 16.3).	The guidance sets out the importance of considering planning and health together by creating healthy environments that support and encourage healthy lifestyles and by identifying and securing facilities for primary, secondary and tertiary care.
Putting Health into Place, Public Health England (PHE) (2019) (Ref 16.4).	The guidance explains the relationship between health and development, including key actions for developers to align approaches to address the root causes of preventable health conditions and poor wellbeing.
Health Impact Assessment in spatial planning A guide for local authority public health and planning teams, PHE (2020) (Ref 16.5).	This guide illustrates the process for conducting Health Impact Assessments to address local health and wellbeing needs and tackle inequalities.
Advice on the content of Environmental Statements accompanying an application under the NSIP Regime, Planning Inspectorate (2025) (Ref 16.6).	PHE explains the required methodology for assessing impacts within this advice note, alongside defining potential significant effects and vulnerable groups.
Health in Environmental Impact Assessment A Primer for a Proportionate Approach, Institute of Environmental Management and	The IEMA guidance aims to guide EIA coverage of population and human health, focusing on proportionality and the opportunities and challenges presented.

Technical guidance document	Context
Assessment (IEMA)[1] (2017) (Ref 16.7).	
Effective Scoping of Human Health in Environmental Impact Assessment, IEMA (2022) (Ref 16.8).	This scoping guidance explains when an EIA chapter should be prepared and when a standalone Health Impact Assessment (HIA) would be required. The expectation is that the EIA Report will include a chapter on human health where: • Wider determinants of health not covered by other EIA technical topics have been scoped in; • or if other EIA technical topics have been scoped in to assess likely and potentially significant effects to human receptors, community amenities or services; • and there are likely and potentially significant population health implications from such assessments. "*If the implications of other EIA technical topics for population health are not clear at the scoping stage, then an EIA Report health chapter should be included, and once the further assessment detail for those topics is available, explain whether or not there are likely and significant population health effects.*" Additionally, the guidance outlines the relationship of HIA and EIA where there is a policy or validation requirement to undertake HIA. The guidance explains that "*EIA projects should normally meet this through the EIA Report health chapter where significant health effects are likely to occur. Where the EIA follows IEMA guidance the health chapter will align to HIA principles, including considering wider determinants of health and health inequalities.*"
Determining Significance for Human Health in Environmental Impact Assessment, IEMA (2022) (Ref 16.9).	This guidance promotes greater consistency in the assessment process, including how EIA health conclusions are reached, interpreted and used by all parties. This guidance explains how the magnitude of effect and sensitivity of receptors is applied to human health. Methodologies are set out and significance criteria established.

[1] IEMA is now known as the Institute of Sustainability and Environmental Professionals (ISEP)

Technical guidance document	Context
Mental Wellbeing Impact Assessment (MWIA) – a toolkit for wellbeing, National MWIA Collaborative (England), (2011) (Ref 16.10).	This MWIA toolkit for wellbeing provides an evidence-based framework for improving wellbeing. The MWIA screening toolkit has been designed to assist policies, services, programmes or projects, to begin to find out how they might make a difference through using MWIA.
Guidelines For Limiting Exposure to Time-Varying Electric, Magnetic And Electromagnetic Fields (EMF) (Up To 300 GHz), International Commission on Non-Ionizing Radiation Protection (ICNIRP), (1998) (Ref 16.11).	The ICNIRP establishes guidelines for limiting EMF exposure that will provide protection against known adverse health effects. The guidance presents basic restrictions on exposure and reference levels for compliance.

16.3 Consultation and Engagement

Overview

16.3.1 This assessment has been informed by consultation responses and ongoing stakeholder engagement. An overview of the approach to consultation is provided in Section 5.9 of **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**.

Scoping Opinion

16.3.2 An EIA Scoping Opinion was adopted by the Secretary of State, administered by the Planning Inspectorate, on 13 October 2025 (Ref 16.12). A summary of the relevant responses received in relation to health and wellbeing, and confirmation of how these have been addressed within the assessment to date, is presented in **Table 16-3.**

16.3.3 The information provided in the PEIR is preliminary and, as such, not all Scoping Opinion comments have been addressed at this stage. All comments will be addressed within the ES.

Table 16-3 Summary of EIA scoping opinion responses for health and wellbeing

Consultee	Consideration	How addressed in this PEIR
Planning Inspectorate (3.11.1)	Physical health effects to the general population and vulnerable groups from electric and magnetic fields (EMF) during operation - The Scoping Report proposes to scope this matter out on the basis that the onshore scheme will ensure that policies and procedures are in place at the design phase to ensure that all equipment will comply with public	Noted and agreed that this issue is scoped out in line with the comments from the Planning Inspectorate. A summary of the evidence of compliance with the EMF exposure limits will be presented in the ES.

Consultee	Consideration	How addressed in this PEIR
	EMF exposure limits. It states that evidence of compliance with exposure requirements would be summarised in the ES. The Inspectorate agrees that an assessment of physical effects from EMF during operation can be scoped out of further assessment in the ES.	
Planning Inspectorate (3.11.2)	Study Area - The Scoping Report states that where assessment of health-related environmental change relies on data from other aspect chapters, the study area for that chapter will be referred to. It is unclear how the study area for the human health assessment would be consistent with study areas for other aspect chapters such as traffic, air quality or noise as it is based on all wards within the onshore scoping boundary. This should be explained in the ES. For example, the assessment of effects arising from an increase in vehicle movements during construction should be undertaken for a study area that reflects the Affected Road Network (ARN).	Where the Health and Wellbeing assessment relies on data from other topic chapters, the study area for those chapters has been used. This is referenced throughout this PEIR chapter.
Planning Inspectorate (3.11.3)	Baseline surveys - The Scoping Report states that no baseline surveys would be undertaken and that the assessment would be informed by surveys from other aspect chapters and stakeholder engagement. The Inspectorate agrees that bespoke surveys are not required for the ES. The ES should include information about the baseline from relevant public data sources, for example any joint strategic needs assessment, to inform the assessment of likely significant effects LSE.	As agreed, bespoke surveys are not required for the ES and therefore will not be undertaken. This PEIR chapter and the ES will utilise information from relevant public data sources, including joint strategic needs assessments, where appropriate.
Planning Inspectorate (3.11.4)	A separate HIA is not proposed as it is stated that the health and wellbeing ES chapter would meet	As noted, a separate HIA is not required and so has been scoped out of further assessment within this PEIR or the ES.

Consultee	Consideration	How addressed in this PEIR
	this requirement and consider wider determinants of health and health inequalities. The Inspectorate agrees that a separate HIA is not required on that basis	

Technical engagement

16.3.4 Engagement with local planning authorities, Parish Councils and the communities will continue to inform the ES through the formal consultation process. Statements of Common Ground will be used to record engagement and ongoing discussions with these stakeholders throughout the DCO process.

16.4 Data Gathering Methodology

Study area

16.4.1 The known and predicted current and future baseline environment described in this section has been characterised by a desk study. The data sources used are detailed in **Table 16-5** below.

16.4.2 The study area for the health and wellbeing assessment has been defined using professional judgement and experience of similar linear projects. The study area comprises all wards located within 500 m of the English Onshore Scheme draft Order Limits. Health data has been collected for Lower Layer Super Output Areas (LSOA) within the study area, where available. The LSOAs within each ward are set out within **Table 16-4** below.

Table 16-4 - LSOAs within Ward Boundaries

Local Planning Authority	Ward	LSOA
East Lindsey	Alford (E05009873)	East Lindsey 008C
		East Lindsey 008B
	Chapel St. Leonards (E05009876)	East Lindsey 010B
	Willoughby with Sloothby (E05009905)	East Lindsey 008D
		East Lindsey 009B
	Withern & Theddlethorpe (E05009907)	East Lindsey 008E
	Legbourne (E05009887)	East Lindsey 008A
	Sutton on Sea (E05006393)	East Lindsey 006B

16.4.3 Whilst the potential for effects on physical health arising from EMF has been scoped out, it is recognised that there remains the potential for effects on mental health arising from perceived risk. Due to the nature of mental health effects, it is not possible to apply a study area.

Desk study

16.4.4 A summary of the organisations that have supplied data, together with the nature of that data is outlined in **Table 16-5**.

Table 16-5 Data sources used to inform the health and wellbeing assessment

Organisation	Data source	Data provided
Office for National Statistics (ONS).	Census 2021	Demographics data, including age, population densities, ethnicity and income deprivation.
Office for Health Improvement and Disparities (OHID).	Public Health Profiles	Local health profiles for local authorities and populations
Department of Health and Social Care.	Fingertips Public Health Data	Local health profiles for local authorities and populations
Lincolnshire County Council.	Joint Strategic Needs Assessment	Local health and policy data

16.4.5 The assessment of health-related environmental change relies on data collected from other technical chapters, and therefore also relies on the data referenced within those technical aspect chapters. Where the assessment of health-related environmental change relies on data from other topic chapters, the study area for that chapter will be referred to in the assessment. These include **Volume 1:**

- **Part 2, Chapter 7: Cultural Heritage;**
- **Part 2, Chapter 8: Landscape and Visual Amenity;**
- **Part 2, Chapter 9: Water Environment;**
- **Part 2, Chapter 10: Geology and Hydrogeology;**
- **Part 2, Chapter 12: Traffic and Transport;**
- **Part 2, Chapter 13: Noise and Vibration;**
- **Part 2, Chapter 14: Air Quality**, and;
- **Part 2, Chapter 15: Socio-economics, Recreation and Tourism.**

Survey work

16.4.6 No surveys are proposed for the health and wellbeing assessment at this stage. This preliminary assessment has been conducted as a desk-based study using publicly available information, with no site survey undertaken for this chapter.

16.5 Overall Baseline

16.5.1 The World Health Organisation defines health as a '*state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'* (Ref 16.13). 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
- And housing.

16.5.2 The wider determinants of health comprise a range of social, economic and environmental factors that influence mental and physical wellbeing. Systematic differences in these factors create social inequality and drive health inequalities, here, "systematic variation" means consistent, patterned differences across groups or places (for example by income, ethnicity or neighbourhood) rather than random one-off differences. Baseline or proxy data for each determinant have been compiled; the dataset is provided in **Volume 2, Appendix 16.A: Health and Wellbeing Baseline Data**.

16.5.3 The baseline sets out the wider health context required to inform the assessment, covering both physical and mental health. This information has been used as a basis for determining the sensitivity of receptors to changes in health determinants arising from the English Onshore Scheme.

Current baseline

Health-related Environmental Change

16.5.4 Population, recreation and deprivation data are presented in **Volume 1, Part 2, Chapter 15: Socio-economics, Recreation and Tourism.** Baseline information relating to health-related environmental change is set out in **Volume 1:**

- **Part 2, Chapter 8: Landscape and Visual Amenity;**
- **Part 2, Chapter 9: Water Environment;**
- **Part 2, Chapter 10: Geology and Hydrogeology;**
- **Part 2, Chapter 12: Traffic and Transport;**
- **Part 2, Chapter 13: Noise and Vibration;** and
- **Part 2, Chapter 14: Air Quality.**

Local Health – Demographic and Socio-economics

16.5.5 The health and wellbeing study area has been gathered and shows varying characteristics and challenges. The baseline sets out the wider health context required to inform the assessment, covering both physical and mental health. This information has

been used as a basis for determining the sensitivity of receptors to changes in health determinants arising from the English Onshore Scheme.

Age and Sex

16.5.6 Overall, the study area has an older population when compared to England as a whole and has a smaller percentage of the population aged 0 - 4 years old. East Lindsey 008C, 008D, 008E and 010B, which are LSOAs, have the lowest proportion of children under four years old, each with 2 per cent. This trend continues through to adolescence, where every ward in the study area, with the exception of East Lindsey 008A and 008B, has a lower proportion of those aged 5 - 18 when compared to England (Ref 16.14).

16.5.7 England has on average 17.5 per cent of the population aged over 68 years; the study area has an average of 31 per cent. The ward with the lowest proportion of those aged over 68 is East Lindsey 008B in Alford (26 per cent), and the LSOA with the highest proportion is East Lindsey 010B in Chapel St Leonards and East Lindsey in 008E in Withern and Theddlethorpe (38 per cent). This may be indicative of people moving to the area to retire, or conversely, younger people and families moving out of the area for educational and employment opportunities (Ref 16.15).

16.5.8 The study area performs similarly when compared to England for the proportion of men and women. England has 51 per cent women and 49 per cent men; Chapel St Leonards has the same proportion. Each of the other wards is within 1 per cent, with the exception of East Lindsey 008C and 008E, each of which have 49 per cent women, and East Lindsey 006B, which has 53 per cent women (Ref 16.15).

Race and Ethnicity

16.5.9 In terms of ethnic diversity, the whole of the study area has a less diverse population than England as a whole. Each of the wards are 97 – 99 per cent white, whereas England as a whole is, in contrast, 81 per cent white. Similarly, the study area overwhelmingly has English as its first language, with 99 per cent of each ward reporting that English is the main language (Ref 16.14).

Education

16.5.10 The study area shows a similar level of education across each ward and LSOA, but worse when compared to England. Within Willoughby with Sloothby, there are two LSOAs within the study area. One of these (East Lindsey 008D) has a population where 60 per cent have 5 GCSEs at A*-C as their highest qualification, where the other LSOA (East Lindsey 009B) has 52 per cent with qualifications at GCSE or less. East Lindsey 008A in Legbourne has the highest proportion of people with five or more GCSEs as their highest qualification within the study area, at 65 per cent. East Lindsey 009B has the lowest proportion of people with their highest qualification as GCSEs, with 52 per cent. This is in line with England as a whole, which also has 52 per cent of the population with GCSEs or lower as their highest qualification, reflecting greater educational attainment (Ref 16.15).

Employment

16.5.11 England as a whole is 57 per cent economically active, including those in full and part-time employment, self-employed, and seeking work. Each ward within the study area is less economically active than England, with the highest proportion of economically active

people in East Lindsey 009B (47 per cent) and East Lindsey 008E (42 per cent). East Lindsey 010B in Chapel St Leonards (36 per cent) and East Lindsey 006B in Sutton on Sea (25 per cent) are the least economically active neighbourhoods within the study area (Ref 16.16).

16.5.12 The long-term claimants of job seeker's allowance is in line with the England average (0.9 people per 1,000), suggesting that in the majority of cases for economic inactivity, this is due to retirement (Ref 16.17).

Deprivation

16.5.13 Indices of Multiple Deprivation (IMD) rank all of the LSOAs in England, allowing for a comparison between neighbourhoods, where 1 is the most deprived neighbourhood out of the 32,844 LSOAs. The IMD rank scores have been collated for each of the LSOAs within the study area. All of the wards that make up the study area fall within the 35 per cent most deprived LSOAs in England, with East Lindsey 008C being the least deprived neighbourhood in both 2019 and 2025. East Lindsey 010B is the most deprived neighbourhood in both 2019 and 2025, with roughly half the study area now described as more deprived than in 2019, and half as less deprived than in 2019. East Lindsey 008E is at approximately the same ranking in 2019 and 2025 (Ref 16.18 and 16.19).

16.5.14 **Table 16-6** provides a detailed summary of the Indices of Multiple Deprivation (IMD) rankings and corresponding percentile positions for each LSOA within the study area, comparing data from 2019 and projected figures for 2025. This table highlights changes in relative deprivation levels across the neighbourhoods, illustrating which areas have become more or less deprived over time.

Table 16-6 - LSOA and IMD Ranking

LSOA	2019 IMD Ranking	2025 IMD Ranking	2025 IMD Percentile
East Lindsey 006B	6,573	8,338	More deprived than 75% of neighbourhoods
East Lindsey 008C	10,348	11,698	More deprived than 65% of neighbourhoods
East Lindsey 008B	9,852	7,100	More deprived than 79% of neighbourhoods
East Lindsey 010B	5,204	4,721	More deprived than 86% of neighbourhoods
East Lindsey 008D	6,265	8,312	More deprived than 75% of neighbourhoods

LSOA	2019 IMD Ranking	2025 IMD Ranking	2025 IMD Percentile
East Lindsey 009B	9,610	10,390	More deprived than 69% of neighbourhoods
East Lindsey 008E	8,674	8,610	More deprived than 74% of neighbourhoods
East Lindsey 008A	7,609	5,200	More deprived than 85% of neighbourhoods

Local Health – Health and Wellbeing Status

Life Expectancy and General Health

16.5.15 Life expectancy rates within the study area are slightly lower than the England average (77.8 years for men and 80.8 years for women in East Lindsey, and 78.9 for men and 81.8 years for women in England). This shows an inequality between men and women in East Lindsey, and between East Lindsey and England. The average life expectancy across all regions of England has dropped since the 2017 to 2019 period, possibly reflecting COVID-19 mortality figures (Ref 16.20).

16.5.16 Across childhood weight indicators, where there is data available, the study area performs in line with England as a whole for healthy weight prevalence (62.9 per cent to England's 62.2 per cent). Lincolnshire as a county has a similar percentage of Year 6 pupils at a healthy weight to England (61 per cent). This indicates that opportunities for exercise, active travel and outdoor recreation, as well as accessing healthy foods, is as challenging for this area as in England as a whole (Ref 16.17).

Disability

16.5.17 The number of people across the study area living with a disability (as defined under the Equality Act 2010) is higher than the England average. 17.7 per cent of the population in England identify themselves as disabled, whereas each of the LSOAs within the study area are higher by at least 4 percentage points. The LSOA with the lowest proportion of disabled people is East Lindsey 009B in Willoughby with Sloothby (21 per cent), and the LSOA with the highest is East Lindsey 010B in Chapel St Leonards (30 per cent). This is likely to be as a result of the population being older than average (Ref 16.16).

Happiness and Life Satisfaction

16.5.18 The study area generally performs better than England as a whole with regards to self-reported happiness and life satisfaction. For happiness scores, East Lindsey as a whole has a score of 7.7 compared to England's 7.38 (each out of ten), and for life satisfaction East Lindsey scores 7.5 compared to England's 7.44. This suggests a resilient community within the wider local authority area (Ref 16.21).

Mental health

16.5.19 While statistics for the estimated prevalence of common mental disorders is not available at ward or LSOA level, the rate of prevalence for Lincolnshire is roughly in line with England. The Department of Health and Social Care estimates that 15.8 per cent of those in Lincolnshire aged 16 and over experience a mental health condition; the same figure is estimated to be 16.9 per cent for England (Ref 16.21).

Local Health – Natural and Built Environment

Population Density and Green Space

16.5.20 The study area has a mixed picture for population density. East Lindsey 008B in Alford has the highest population density of the study area, with 1,127 people per square kilometre, while the two wards in Willoughby with Sloothby (East Lindsey 008D and East Lindsey 009B) and East Lindsey 008E in Withern and Theddlethorpe have the lowest population densities of 28, 22 and 25 people per square kilometre respectively. East Lindsey 008A in Legbourne is the most similar to the England average, with 274 compared to England's 450 (Ref 16.17).

16.5.21 Access to green and blue infrastructure (natural and semi natural areas integrating water (blue) and vegetation (green), can be a key indicator for mental health and increasing resilience. Across England, the average area of green space per person is 30 m^2; in East Lindsey this figure falls to 18.2 m^2 (Ref 16.17).

Crime Deprivation

16.5.22 The IMD Crime rankings show that East Lindsey 008A and East Lindsey 008B are the most deprived within the study area (Ref 16.18). The Crime Domain measures the risk of personal and material victimisation at local level using eight indicators, including violence with or without injury, harassment, theft and criminal damage. East Lindsey 008A in Legbourne is more deprived than 69 per cent of LSOAs in England, and East Lindsey 008B in Chapel St Leonards are the most deprived within the study area. These are the only two neighbourhoods in the study area that fall within the bottom 50 per cent of neighbourhoods in England. This could be due to the less rural nature of these neighbourhoods, as both East Lindsey 008A and East Lindsey 008B cover the town of Alford. The least deprived LSOA is East Lindsey 008E in Withern and Theddlethorpe, which is less deprived than 88 per cent of neighbourhoods in England.

Future baseline

16.5.23 The future baseline relates to known or anticipated changes to the current baseline in the future which is assessed as part of the English Onshore Scheme in this PEIR.

16.5.24 Following the COVID-19 pandemic, public spending cuts have reduced the access to healthcare across England. The pandemic and subsequent cost of living crisis has further impacted people's lives by reducing the access to recreational spaces and opportunities for adequate income. The pandemic has additionally increased the number of people living with limiting illnesses or disabilities, and while these impacts have been witnessed nationwide, the study area is no exception. An aging population will similarly create new challenges for the existing health services within Lincolnshire and East Lindsey throughout the life of the English Onshore Scheme.

16.5.25 A number of policies and strategies are in place across the study area, aiming to address health and wellbeing inequalities and ensure the provision of health services, access to outdoor recreational facilities and improve the mental health and resilience of the population. Opportunities for improving skills and qualifications feature as aims across the East Lindsey Local Plan, highlighting the focus on creating resilient and economically active populations, reducing unemployment levels. Similarly, the Lincolnshire Joint Strategic Needs Assessment (Ref 16.22) identifies challenges facing Lincolnshire and the study area. A number of initiatives, including partnering with the Centre for Aging Better (Ref 16.23) and the Let's Move Lincolnshire website (Ref 16.24) aim to support local populations with healthy lifestyles and provide opportunities for employment and fair housing throughout their lives.

16.5.26 Mental health, healthy weight and physical activity are each recognised as priorities for improvement within the Lincolnshire Joint Health and Wellbeing Strategy (Ref 16.25), with aims including reducing inequalities in access, experience and outcome, developing a 'whole system approach' to address factors that make it easy to gain weight and address barriers to enabling activity, and supporting excellence in welfare, safeguarding, safety, and inclusivity. Through the Start Well, Live Well and Age Well aims within the Health and Wellbeing Strategy, the strategy intends to support the local population from birth through to old age.

16.6 Environmental Measures

16.6.1 As set out in **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**, the environmental measures are characterised as design measures or control and management measures. A range of environmental measures would be implemented as part of the English Onshore Scheme and will be secured in the DCO as relevant.

16.6.2 **Table 16-7** outlines how these design and control measures will influence the health and wellbeing assessment. In addition to the measures listed in **Table 16-7,** standard mitigation measures, comprising management activities and techniques, would be implemented during the construction of the Project to limit effects through adherence to good site practices and achieving legal compliance. Further details on these measures can be cross-referenced in **Volume 2, Part 1, Appendix 5.B: Outline Code of Construction Practice (CoCP).**

Table 16-7 Summary of the environmental measures

Receptor	Potential changes and effects	Environmental measures	ID reference
Physical health of the general population and vulnerable groups.	Changes to the physical health of the general population and vulnerable groups resulting from environmental change.	Construction workers would undergo training where appropriate, particularly in relation to working hours and to increase their awareness of environmental issues as applicable to their role on the Project. Topics would include but not be limited to: • Pollution prevention and pollution incident response; • Dust management and control measures; • Location and protection of sensitive environmental sites and features; • Adherence to protected environmental areas around sensitive features; working hours and noise and vibration reduction measures; • Working with potentially contaminated materials; • Waste management and storage; • Flood risk response actions; and • Agreed traffic routes and access points. Construction working would be undertaken within the agreed working hours set out within the DCO. Best practicable means to reduce construction noise would be set out within the CoCP.	GG04 (C)
		Any activity carried out or equipment located within a construction compound agreed via the submission of a DCO application that may produce a noticeable nuisance, including but not limited to dust, noise, vibration and lighting, would be located away from sensitive receptors such as residential properties or ecological sites where practicable. For example, locate dust causing activities away from receptors, barriers,	GG06 (C)

Receptor	Potential changes and effects	Environmental measures	ID reference
		cleaning, enclosed specific operations with high potential for dust production, cover stockpiles, etc.,	
		The Contractor would prepare a construction phase Safety Health and Environment (SHE) Plan prior to construction works commencing. A construction phase SHE Plan would be prepared by the Contractor for each element of the Project. The Plan would ensure that adequate arrangements and welfare facilities are in place to cover.	GG16 (C)
		Best Practicable Means (BPM) as defined under Section 72 of the Control of Pollution Act (CoPA) (1974) (e.g., screening, alternative plant, working methods etc) (Ref 1.5) would be employed during the construction phase to reduce noise and vibration nuisance respectively from potentially significant construction activities. Implementation of BPM measures as defined in Section 72 of the CoPA (1974) and Section 79 (9) of the Environmental Protection Act (1990) (Ref 1.6) would include measures such as, but not limited to: • Use of temporary noise screens to disrupt line of sight between activities and receptors. • Plant to consist of modern, well-maintained machinery fitted with efficient silencers, where possible, designed to minimise noise levels that are generated during operations. • All compressors and generators to be 'sound reduced' models. • Ancillary pneumatic percussive tools to be fitted with mufflers or suppressers. • Machines in intermittent use shall be shut down between work or, where this is impracticable, throttled down to a minimum. • Where practicable, plant with directional noise characteristics to be positioned to minimise noise at nearby properties.	MT01 (C)

Receptor	Potential changes and effects	Environmental measures	ID reference
		• Static equipment and machinery to be sited as far as is practicable from inhabited buildings. Use of temporary noise screens to disrupt line of sight between activities and receptors.	
		Preparing and maintaining the site • Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. • Erect solid screens or barriers around dusty activities or the site boundary so that they are at least as high as any stockpiles on site. • Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period. • Avoid site runoff of water or mud. • Keep site fencing, barriers and scaffolding clean using wet methods including use of harvested rainwater where practicable. Alternative wet methods will also be used as necessary to maintain effective dust suppression. • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site, cover as described below. • Cover, seed or fence stockpiles to prevent wind whipping.	AQ06 (C)
		An intrusive ground investigation and risk assessment will be undertaken. Remediation strategy will be prepared (if required). A Contamination Discovery Strategy and Watching Brief Protocol developed (and agreed with the relevant Environmental Health Officers (EHO) / Regulators) in advance of the construction works commencing to establish the areas where contamination is present (with remediation	GH01 (C)

Receptor	Potential changes and effects	Environmental measures	ID reference
		strategies as required) and agree protocols to manage prior to the works. Appropriate Personal Protective Equipment (PPE) to be utilised during the construction works. A Materials Management Plan (MMP) will be developed for the reuse of materials during the construction works. The MMP will be developed in line with the CL:AIRE Definition of Waste Code of Practice (DoWCoP) (Ref 1.12) to make sure that material generated is reused appropriately and sustainably (ensuring material is re-used as opposed to entering the waste hierarchy) reducing the risk to receptors. If remedial measures are considered to be necessary across the Site, then additional verification reporting of the remediation undertaken will be required. Use of appropriate occupational health and safety measures e.g., task / site specific risk assessments, PPE, in addition to the Dust Control measures outlined within **Volume 1, Part 2, Chapter 14: Air Quality.** Compliance would be through the Outline CoCP, secured via a DCO requirement.	
		A ground gas risk assessment carried out in areas where ground gases sources are identified to assess the risks and develop appropriate mitigation measures that are incorporated during construction and into the design of structures, where appropriate. Correct PPE / monitoring to be utilised during the construction works and adherence to the appropriate regulations (i.e., The Confined Spaces regulations 1997) where required.	GH03 (C)
		Alternative access would be provided if access would be inhibited during construction.	S02 (C)
		All designated PRoW crossing the working area would be managed in discussion with the relevant local authority, with access only closed for	S04 (C)

Receptor	Potential changes and effects	Environmental measures	ID reference
		short periods while construction activities occur. Any required temporary diversions or closures of PRoW, footways or carriageways undertaken during construction would be clearly marked at both ends with signage explaining the diversion, the duration of the diversion and a contact number for any concerns. The signage will display the temporary diversion routes in place. This will be outlines and secured in the PRoWMP to accompany the ES.	
		All PRoW which have the potential to be impacted by the Project would be identified in an Outline PRoWMP. The Outline PRoWMP would set out the measures required (including any potential temporary closures applied for / detailed in the DCO) to ensure that PRoW remain safe to use and that any potential disruption to PRoW is minimised. All designated PRoW crossing the working area would be managed in discussion with the relevant local authority, with access only closed for short periods while construction activities occur. Any required temporary diversions or closures of PRoW, footways or carriageways undertaken during construction would be clearly marked at both ends with signage explaining the diversion, the duration of the diversion and a contact number for any concerns. The signage will display the temporary diversion routes in place.	TT05 (C)
Mental health of the general population and vulnerable groups.	Changes to the mental health of the general population and vulnerable groups resulting from environmental change.	Working areas would be appropriately fenced. The type of fencing installed would depend on the area to be fenced and would take into consideration the level of security required in relation to the surrounding land and public access, rural or urban environment and arable or stock farming. For some locations the fence used may also serve to provide acoustic and visual screening of the work sites and reduce the potential for disturbance of users in the surrounding areas. Fencing would be regularly inspected and maintained and removed as part of the demobilisation unless otherwise specified.	GG19 (C)

Receptor	Potential changes and effects	Environmental measures	ID reference
		Members of the community and local businesses would be kept informed regularly of the works through active community liaison. This would include notification of noisy activities, heavy traffic periods and start and end dates of key phasing. A contact number would be provided which members of the public can use to raise any concerns or complaints about the Project. All construction-related complaints would be logged by the Contractor in a complaints register, together with a record of the responses given and actions taken.	GG20 (C)
		Communications • Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager / engineer or the site manager. • Display the head or regional office contact information.	AQ02 (C)
		Site Management • Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. • Make the complaints log available to the local authority when asked. • Record any exceptional incidents that cause dust and / or air emissions, either on- or off-site, and the action taken to resolve the situation in the logbook. • Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport /	AQ04 (C)

Receptor	Potential changes and effects	Environmental measures	ID reference
		deliveries which might be using the same strategic road network routes.	
		The change in views would be managed through both sensitive design to avoid views from nearby settlements, Public Rights of Way (PRoWs), and the Lincolnshire Wolds National Landscape, as well as various good practice measures captured within the CoCP and additional mitigation measures to be considered at the ES stage e.g., placement of topsoil and subsoil adjacent to the trench where possible. All Public Rights of Way (PRoW) which have the potential to be impacted by the Projects will be identified in an Outline PRoW Management Plan (PRoWMP). The PRoWMP set out the measures required (including any potential temporary closures applied for/detailed in the DCO) to ensure that that PRoW remains safe to use and any that any potential disruption PRoW is minimised.	LV03 (C)
		Access to tourism assets would be maintained, where practicable, along their current alignments during construction.	S01 (C)
		Alternative access would be provided if access would be inhibited during construction.	S02 (C)

16.7 Scope of the Assessment

Spatial scope and study area

16.7.1 The spatial scope of the assessment of health and wellbeing covers the area of the English Onshore Scheme contained within the draft Order Limits, and each of the wards the English Onshore Scheme passes through. The study area additionally comprises the maximum study areas of each of the technical chapters as presented in Section 16.1.

Temporal scope

16.7.2 The temporal scope of the construction assessment of health and wellbeing is consistent with the period over which the construction of the English Onshore Scheme would be carried out. It covers the construction period (2029 to 2035).

16.7.3 The English Onshore Scheme is expected to have a minimum life span of approximately 40 years. If decommissioning is required at this point in time, then activities and effects associated with the decommissioning phase are expected to be of a similar level to those during the construction phase works, albeit with a lesser duration of two years. Acknowledging the complexities of completing a detailed assessment for decommissioning works up to 40 years in the future, it is considered that the significance of effects relating to the decommissioning phase would be no greater than those from the construction phase and decommissioning effects are not discussed in detail in this chapter; however, **Table 4-19** in **Volume 1, Part 1, Chapter 4: Description of the Project** provides a high level summary assessment of the likely significant effects associated with decommissioning. Furthermore, should decommissioning take place it is expected that an assessment in accordance with the legislation and guidance at the time of decommissioning would be undertaken.

Identification of receptors

16.7.4 The World Health Organisation defines health as a ‘state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’. 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.

16.7.5 The English Onshore Scheme has the potential to give rise to changes in health status by influencing health determinants as a result of health-related environmental change. Such change can affect the health of receptors, identified as the ‘general population’ and ‘vulnerable groups’, both physically and mentally, by influencing activities, provision of or access to resources, or protective factors that contribute to health and wellbeing. A vulnerable group may have a higher sensitivity to these changes in health status, by virtue of factors such as age (for example older people or children), ethnicity, economic factors, disability, sex, or gender.

16.7.6 Health-related environmental change will be identified in the following chapters, with the corresponding physical and mental health effects assessed in the health and wellbeing chapter, **Volume 1:**

- **Part 2, Chapter 8: Landscape and Visual Amenity;**
- **Part 2, Chapter 9: Water Environment;**

- **Part 2, Chapter 10: Geology and Hydrogeology;**
- **Part 2, Chapter 12: Traffic and Transport;**
- **Part 2, Chapter 13: Noise and Vibration;**
- **Part 2, Chapter 14: Air Quality,** and;
- **Part 2, Chapter 15, Socio-economics, Recreation and Tourism.**

16.7.7 The principal health and wellbeing receptors that have been identified as being potentially subject to significant effects are summarised in **Table 16-8**.

16.7.8 It should be noted that not all technical chapters have finalised the assessment for this PEIR as limited details are available at this stage and will be assessed at ES stage. The health and wellbeing assessment will be updated when additional information is received.

Table 16-8 Health and wellbeing receptors subject to potential effects

Receptor	Reason for consideration	Wider determinants of health
Physical health of the general population. Mental health of the general population. Physical health of vulnerable groups. Mental health of vulnerable groups.	Physical health can be affected by a number of factors resulting from the design of the Project or resulting from environmental change. Similarly, the mental health of the general population may be worsened through the perceived loss of control over their environment and loss of opportunity for recreation and access to community facilities. Affects to mental or physical health can result in a reduction of quality of life for residents, workers and visitors to the study area. Vulnerable populations may experience disproportionate or differential adverse effects when compared to the population as a whole. The National MWIA Collective identifies that vulnerable groups can be more susceptible to distress through differences in perception, interpretation or presentation of effects, and may also develop differing responses for coping with stressors. Vulnerable groups include: • Age – Early years, adolescence and old age. Social capital, isolation, physical health and participation each contribute to mental health in each of these categories. • Sex – Women are much more vulnerable to poverty, unemployment and abuse, and mental	The wider determinants of health are the social, economic, environmental, and structural factors that affect health, well-being, and health inequalities. This Health and Wellbeing assessment will further identify changes to the wider determinants of health, which act as proxies for identifying areas of social and health inequalities, whereby the most disadvantaged in society experience poorer health outcomes, leading to health inequalities. These include: (Ref 16.10) • Physical security – access to safe housing, safety at home and in the neighbourhood; • Environment – access to green space, safe play space and quality of the built environment;

Receptor	Reason for consideration	Wider determinants of health
	health conditions such as depression and anxiety are more prevalent in women. • Race and ethnicity – Racial and ethnic differences in levels of mental well-being and prevalence of mental disorders are due to a complex combination of socio-economic factors, racism, diagnostic bias, and cultural and ethnic differences. • Socio-economic position and class – Socio-economic position shapes access to material resources, to every aspect of experience in the home, neighbourhood, and workplace and is a major determinant of health inequalities. • Disability – Life chances, inclusion and support are often key factors in influencing mental health of disabled people. • Sexuality and transgender – LGBTQ+ people are more vulnerable to risk factors (e.g., bullying and discrimination) and are at increased risk for some mental health problems. • Physical health – Poor physical health is a significant risk factor for poor mental health; conversely, mental well-being protects physical health and improves health outcomes and recovery rates, notably for coronary heart disease, stroke and diabetes.	• Social participation – employment opportunities; • Good quality food – accessible and affordable; • Leisure – participation in arts, sport and culture; • Education – lifelong learning and school; • Transport – affordable, accessible, sustainable; and • Financial security – income and assets.

Potential effects considered within this assessment

16.7.9 The effects on health and wellbeing receptors, which have the potential to be significant and have been taken forward for detailed assessment are summarised in **Table 16-9**.

Table 16-9 Health and wellbeing receptors scoped in for further assessment

Receptor	Likely significant effects	Wider determinants
Physical health of the general population and of vulnerable groups	Physical health impacts can result from changes to the environment during construction and operation, such as: • Increased noise; • Emissions of dust; • Temporary or permanent visual changes; • Ground contamination; • Pollution of water resources; • Increased journey times; • Increases in flood occurrence; • Changes to employment; • Temporary or permanent severance of PRoW; and • Increases in pollution or contamination.	All wider determinants of health, as detailed in **Table 16-8**, are scoped in for assessment.
Mental health of the general population and of vulnerable groups.	Changes to the environment (as above) can have an adverse or beneficial effect on mental health, where residents feel more or less attached to their environment. These changes in feelings can influence how much time residents spend outdoors, which can further affect physical and mental health. Changes to noise levels, air quality, water quality, traffic levels, ground contamination and feelings of safety can each influence use of the environment. These impacts have the potential to disproportionately or differentially affect vulnerable groups. Access to services and to social infrastructure, including workplaces, green space, and public space, as well as health and educational facilities are each an important aspect for influencing community and individual resilience. Social inclusion is both a cause and consequence of mental health problems and therefore has the potential to lead to significant effects. Whilst the English Onshore Scheme will comply with EMF exposure limits and therefore avoid physical health impacts, there remains a perception of risk associated with EMF, which has the potential to impact mental health.	

16.7.10 The receptors / effects detailed in **Table 16-10** have been scoped out from being subject to further assessment because the potential effects are not considered likely to be significant.

Table 16-10 Summary of effects scoped out of the health and wellbeing assessment

Receptors / potential effects	Justification
Physical health effects resulting from EMFs.	The English Onshore Scheme will ensure that policies and procedures are in place at the design phase to ensure that all equipment will comply with public EMF exposure limits. Evidence of compliance of the Project with EMF exposure requirements will be provided for context and to aid understanding with regards the lack of physical health impacts. The onshore HVDC circuit proposed for the project consisting of two cables which operate as a bipole system. As the cables operate as a bipole system, the current in each cable runs in opposition to the other leading to a significant cancellation of the magnetic field. The magnetic field for each design has been calculated using the maximum current rating of the cable and at 1 m above ground. The maximum magnetic fields produced is less than the relevant ICNIRP exposure limit. Two 400 kV 50 Hz underground cable circuits will be installed. Magnetic fields reduce quickly with distance from source. All of the HVAC electrical connection options assessed produced magnetic fields significantly below the ICNIRP public exposure limits in worst-case conditions. All other operating conditions result in lower magnetic fields. All magnetic fields produced by the Project will be significantly below the interference thresholds for active implantable medical devices, such as pacemakers.

16.8 Key Parameters for Assessment

Realistic worst-case design scenario

16.8.1 The assessment has followed the Rochdale Envelope approach as outlined in **Volume 1, Part 1, Chapter 4: Description of the Project** and **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**. The assessment of effects has been based on the description of the Project and parameters outlined in **Volume 1, Part 1, Chapter 4: Description of the Project**. Where there is uncertainty regarding a particular design parameter, the realistic worst-case design parameters are provided with regards to health and wellbeing along with the reasons why these parameters are considered worst-case. The preliminary assessment for health and wellbeing has been undertaken on this basis. Effects of greater adverse significance are not likely to arise should any other development scenario, based on details within the Rochdale Envelope (e.g., different

infrastructure layout within the draft Order Limits), to that assessed here be taken forward in the final design of the English Onshore Scheme.

16.8.2 As the health and wellbeing assessment relies on data from other technical chapters, the worst-case design scenario for each of these topics should be applied to the assessment of health and wellbeing:

- **Volume 1, Part 2, Chapter 7: Cultural Heritage;**
  - With regards to the converter station height, it is assumed that the maximum building height is 30 m and the assessment has been done on this basis. The converter station height may be reduced. In addition, the converter station platform would be 1.7 m from the existing ground level.
  - Overnight, external lighting would be installed on the perimeter of the converter station, for safety and security purposes and to facilitate maintenance or repair works during the hours of darkness or low light.
  - It is assumed that there is a potential for the disturbance of archaeological remains anywhere within the draft Order Limits. However, not all areas would be impacted e.g., areas of horizontal direction drilling (which would be below the depths of archaeological remains), so later assessment will consider where impacts are avoided through construction techniques once verified.
  - Proposed planting to mitigate visual effects of the converter station would be in place during the operation of the English Onshore Scheme, although it is noted that this would take time to mature.
- **Volume 1, Part 2, Chapter 8: Landscape and Visual Amenity;**
  - As set out in **Volume 1, Part 1, Chapter 4: Description of the Project**, and specifically in Sections 4.4 - 4.6, at this stage in the design process, the converter station may be sited anywhere within the indicative zone for new converter station siting area considered, with the final footprint being likely smaller in comparison to the indicative zone for the new converter station. The ZTVs generated for the indicative converter station are based on the maximum height of the converter station (30 m), excluding potential platform height, as shown in **Volume 3, Part 2, Figure 8-6: Screened ZTV - Converter Station**. Furthermore, other proposed features within the indicative zone of the converter station would be of considerably lower height.
  - It is envisaged that there will be embedded landscape environmental measures (specifically, 'design measures') introduced as part of the detailed design consideration for the converter stations. These will be developed at the ES stage, once the final design for the converter station is available.
  - Any specific architectural approaches/rationale for the converter station structures will be subject to further design refinement; none have been referenced for the preliminary assessment, which is based on an assumption of maximum height and massing and not the detail of the built form.
  - The full extent and arrangement of proposed trenchless crossing locations is to be determined. A worst-case assumption has been made for areas where the cable corridor will cross field boundaries or drainage channels, where, unless trenchless crossings are confirmed at this stage, the open-cut installation will take place, resulting in the likely loss of vegetation corresponding to the 'worst case scenario' of working widths associated with the HVDC cable (49 m) and the HVAC

cable (84 m). It is envisaged that the inclusion of trenchless crossings will ultimately reduce vegetation loss and any localised alterations to the working width of the construction corridors, minimising such losses where operational and safety considerations allow.

  - At this stage, it has been assumed that cable could be laid anywhere within the indicative zone of underground cable assets.
  - Regarding the indicative zone for construction compounds, it has been assumed that their quantity of compounds, location and footprint may change.
  - It has been assumed that reinstatement of vegetation lost to construction along the indicative zone for underground cable assets would be reinstated, with some trees planted further away from the cable corridor due to the operational requirements, while sections of hedgerow crossing the cable corridor would be replanted using shallow-rooted species.

- **Volume 1, Part 2, Chapter 9: Water Environment;**
  - Installation of the cables via a trenchless crossing technique has been assumed at all crossings of main rivers and at the Anderby Creek Landfall site. Where the cable installation needs to cross ordinary watercourses, whilst a trenchless crossing technique may be adopted in some locations, this initial preliminary assessment has assumed an open cut crossing technique, representing the reasonable worst case. Lateral deviation of the route within the draft Order Limits would not be expected to result in a change in significance of reported effects. No new receptors would be impacted and although watercourses may be crossed at a different location, the same watercourses would be affected in the same reach lengths.
  - Temporary crossings are required where the construction haul road crosses existing watercourses. It has been assumed that ditches, field drains, and small watercourses would be temporarily culverted. Works associated with culverting would be undertaken in line with the environmental measures previously described in Table 9-6 and documented in **Volume 2, Part 1, Appendix 5.B: Outline Code of Construction Practice (CoCP)**. Where the construction haul road crosses a watercourse for which a culvert solution is not reasonably practicable or where specified by the relevant stakeholder as unsuitable, bridges would be used. For the preliminary assessment it has been assumed that all ordinary watercourse construction haul road crossings would use culverts and all main river construction haul road crossings would use bridges and that temporary crossings would be removed once construction works were complete unless replacing an existing structure in a poor state of repair. Watercourses should be reinstated to at least baseline conditions and planting re-established where practicable.
  - Where watercourse diversions cannot be avoided, this preliminary assessment is based on the current design and assumes that diversion channels would satisfy the environmental measures described in Section 9.6 and documented in **Volume 2, Part 1, Appendix 5.C: Outline Code of Construction Practice (CoCP).**
  - With regard to land drainage and management of construction worksite runoff and operational drainage, detailed information is not currently available with regard to how land drainage routes would be maintained and how runoff would be managed, the preliminary assessment is therefore based on the initial principles set out in **Volume 2, Part 2, Appendix 9.B: Preliminary Water Environment Design Principles**.

- With regards to the location of the converter station, it is assumed that the current proposed location is carried forward, as laid out in **Volume 1, Part 1, Chapter 4: Description of the Project**, and specifically in Section 4.4.

- **Volume 1, Part 2, Chapter 10: Geology and Hydrogeology;**
  - Ground investigation data and assessments for the preliminary Indicative Cable Alignment, trenchless crossings, and the proposed converter station were not available for this PEIR assessment. As such ground conditions, soil contamination, groundwater and ground gas regime are not currently known. Therefore, the reasonable worst case for Geology is based on the assumption that contamination, ground gas and aggressive soil conditions are present where a potential source has been identified.
  - Intrusive investigations are proposed to be carried out. Assessments and remediation strategies will be prepared (if required) and recommendations incorporated into the design and embedded mitigation measures. Therefore, it is considered that no new receptors would be impacted or pathways would be created.
  - The cable trench could represent a potential preferential pathway if not effectively designed or mitigated against in areas where potential contamination is present. These effects are to be mitigated through appropriate risk assessments, remedial measures (if required) and the engineered design of the cable installation, and converter station construction.
  - Unforeseen ground conditions may impact the scheme and proposed construction technique such as locally thicker poor / unsuitable ground conditions or contamination requiring significantly deeper excavations. However, ground investigations are proposed for the scheme and potential contaminative sources identified will be targeted; the data will be used to inform the design and embedded mitigation measures.
  - Trenchless crossings are proposed (e.g., horizontal directional drilling [HDD]) across the route to avoid significant obstructions. This technique is technically more challenging than the open cut trenching technique used to install the majority of the cable routeing. As such, where they are proposed, their inclusion is considered to represent the reasonable worst case for the geology and hydrogeology chapter.
  - Trenchless installation is proposed for Anderby Creek Landfall which passes beneath the Lincolnshire Coast Submerged Forest LGS. Sufficient investigation information will be collected to inform design in order to avoid damage of the significant geological feature.
  - A watching brief and procedures for encountering unforeseen contamination will be in place during construction. This approach was set out in the EGL 5 Scoping Report (Ref 10.1), and the Planning Inspectorate was in agreement with the approach with the expectation that these procedures will be prepared and included as part of the DCO application.
  - An assessment for the worst-case scenario in relation to the maximum depths of excavation is to be undertaken following a review of geological investigation information. This is to be conducted for the ES.

- **Volume 1, Part 2, Chapter 12: Traffic and Transport;**

- The assessment presented in the PEIR includes the latest design information available at the time of the submission.
- Where design information is not available, reasonable worst-case assumptions have been applied.

- **Volume 1, Part 2, Chapter 13: Noise and Vibration;**
  - As accepted by the Planning Inspectorate in the EIA Scoping Opinion, the operational noise from underground HVAC and HVDC cables do not present the potential for any likely significant effects as all noise sources will be underground and as such propagation and emission of noise into the environment will not occur. This was accepted by the Planning Inspectorate through the EIA Scoping Opinion and therefore operational noise from the cables is not considered further.
  - Through the Scoping Opinion the Planning Inspectorate have agreed that the issue of construction traffic vibration can be scoped out of the EIA, with clauses necessary in the Outline Code of Construction Practice to ensure road surfaces are suitably managed and maintained.
  - Due to the rural setting of the English Onshore Scheme, baseline noise monitoring will not be conducted for the undergrounding sections of the HVAC and HVDC cable routes. With this regard the lowest threshold criterion from BS 5228-1 has been concluded, unless emerging local factors suggest otherwise and these will be considered within the ES. This ensures a proportionate but robust evaluation, as limits at the lowest BS 5228-1 thresholds present a worst-case assessment regarding the potential for significant adverse effects.
  - Data regarding road traffic associated with the construction works is not complete at the PEIR stage due to ongoing development of the construction programme and the incomplete nature of the existing baseline traffic surveys. A detailed analysis and all necessary information will be provided at the ES stage.
  - During the operational (and maintenance) phase the converter station would be operated by a small team (10 staff) and maintenance will be limited to routine activities. During maintenance (planned and unplanned) the number of personnel present on site would increase with the number of staff proportionate to the nature of the maintenance works being undertaken. Occasional Heavy Goods Vehicles (HGV), and potentially Abnormal Indivisible Loads (AIL) will be required at the converter Station site. Assuming converter station staff all drive this typically would equate to a maximum of 20 No. car / LGV trips per day (10 arrivals, 10 departures), also accounting for occasional maintenance vehicles and visitors, and
  - In relation to the inspection and maintenance of the cable route, vehicle movements would be limited to a small number of maintenance and staff vehicles.

- **Volume 1, Part 2, Chapter 14: Air Quality;**
  - With regards to construction activities leading to construction dust emissions, it is assumed that these could take place anywhere within the draft Order Limits, including at the edge of the draft Order Limits. This is considered to be worst case as it reflects the shortest separation distance to the nearest sensitive receptors.
  - It has been assumed that construction phase NRMM emissions would occur at the boundary of the indicative zone for construction compounds, owing to uncertainty and lack of information regarding the actual position and duration during the

construction phase. It is assumed that emissions from construction phase NRMM would be temporary and transient in nature and as such, impacts and significance are provisionally deemed to be negligible.

- **Volume 1, Part 2, Chapter 15: Socio-economics, Recreation and Tourism;**
  - Through the Scoping Opinion, the Planning Inspectorate have agreed that the construction and operational phase assessment of amenity effects on all socio-economic, recreation and tourism receptors can be scoped out of the EIA, with amenity assessed in other topic aspect chapters where relevant and appropriate;
  - During the operational (and maintenance) phase the converter station would be operated by a small permanent staff (8-10 FTE employees) and maintenance will be limited to routine activities. As such, the Planning Inspectorate have agreed that the operational phase assessment of employment generation can be scoped out of the EIA.

Consideration of construction scenarios

16.8.3 As detailed in **Volume 1, Part 1, Chapter 4: Description of the Project**, the timing of construction activities set out within this PEIR is indicative. It has been identified that elements of the Project could be constructed sequentially or concurrently.

16.8.4 It has been identified that elements of the Project could be constructed concurrently including civils works (e.g., indicative zone for construction compounds, haul roads) and works at the landfall, or sequentially.

16.8.5 As the health and wellbeing assessment relies on data from other technical chapters, the worst-case design scenario for each of these topics should be applied to the assessment of health and wellbeing. A peak traffic year of 2030 or 2031 has been assumed.

16.9 Assessment Methodology

Overview

16.9.1 The generic project-wide approach to the assessment methodology is set out in **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**, and specifically in Sections 5.4 - 5.6. However, whilst this has informed the approach that has been used in this health and wellbeing assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this health and wellbeing assessment.

16.9.2 The assessment is based on published IEMA guidance on Determining Significance for Human Health in EIA and Effective Scoping of Human Health in EIA (Ref 16.9). The assessment identifies and assesses the change in environmental conditions, along with physical and mental health, because of the English Onshore Scheme. The significance of the effect on a receptor will be presented for construction and operation, when considered in relation to the sensitivity or value of the receptor and the magnitude of the potential impact.

16.9.3 Where impacts are identified, additional information will be incorporated to understand population receptors in more detail, particularly vulnerable groups, how they will be

impacted and to identify disproportionate / differential effects and inequalities. This would include information at Ward level.

16.9.4 As set out in the IEMA guide to 'Effective Scoping of Human Heath in Environmental Impact Assessment', and agreed within the Scoping Report, the requirement to undertake a HIA will be met through the EIA by aligning the chapter to the HIA principles, including the consideration of wider determinants of health and health inequalities.

Receptor sensitivity / value

16.9.5 **Table 16-11** sets out the indicative criteria that will be used to define the sensitivity of receptor populations.

Table 16-11 Health sensitivity methodology criteria

Category / level	Indicative criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories) (Ref 16.9)
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the English Onshore Scheme); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependants; people with very poor health status; and / or people with a very low capacity to adapt.
Medium	Moderate levels of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care; people with poor health status; and / or people with a limited capacity to adapt.
Low	Low levels of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and / or people with a high capacity to adapt.
Very Low	Very low levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a community whose outlook is predominantly support with some concern; people who are not limited from undertaking daily activities; people who are independent (not a carer or dependant); people with good health status; and / or people with a very high capacity to adapt.

Magnitude of impact

16.9.6 **Table 16-12** sets out the indicative criteria that will be used to define the magnitude of impacts on a receptor population.

Table 16-12 Health magnitude methodology criteria

Category / level	Indicative criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories) (Ref 16.9)
High	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness / injury outcomes; majority of population affected; permanent change; substantial service quality implications.
Medium	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications.
Low	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications.
Negligible	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life; very few people affected; immediate reversal once activity complete; no service quality implication.

Significance of effect

16.9.7 **Table 16-13** and **Table 16-14** set out the indicative EIA significance matrix used to define a level of significance from receptor sensitivity and impact magnitude, as well as the criteria and reasoning used to determine whether an effect is significant for public health.

Table 16-13 Indicative EIA significance matrix

		Sensitivity			
		High	**Medium**	**Low**	**Very low**
Magnitude	**High**	Major (significant)	Major / Moderate (significant)	Moderate (significant) / Minor (not significant)	Minor / Negligible (not significant)
	Medium	Major / Moderate (significant)	Moderate (significant)	Minor (not significant)	Minor / Negligible (not significant)
	Low	Moderate (significant) / Minor (not significant)	Minor (not significant)	Minor (not significant)	Negligible (not significant)
	Negligible	Minor / Negligible (not significant)	Minor / Negligible (not significant)	Negligible (not significant)	Negligible (not significant)

Table 16-14 Significance conclusion and reasoning related to public health

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

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

Category / level	Indicative criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories)
	or lack of relevant policy, and as informed by the English Onshore Scheme having no responses on this issue among stakeholders. • Change, due to the English Onshore Scheme, would not affect a regulatory threshold, statutory standard or guideline (if applicable). • There is likely to be a very limited change in the health baseline of the population, including as evidenced by the effect size and / or scientific literature showing there is an unsupported relationship between changes that would result from the English Onshore Scheme and changes to health outcomes. • In addition, health priorities for the relevant study area are not relevant to the determinant of health or population group affected by the English Onshore Scheme.

Preliminary assessment of cumulative effects

16.9.8 The assessment of health and wellbeing is inherently cumulative with respect to intra-project effects, with the health and wellbeing assessment drawing on the assessment of the other technical aspect chapters. This ensures that the combination of effects, for instance as a result of environmental change, is identified and the appropriate level of significance is assigned to each Ward and vulnerable population. For further information these impacts, please refer to the chapters listed in Section 16.7.

16.9.9 At the current stage PEIR stage design information is insufficient to allow for a robust cumulative assessment to be undertaken.

16.9.10 Therefore, a cumulative assessment has not been undertaken at this stage; however, **Volume 1, Part 4, Chapter 27: Cumulative Effects** and **Volume 2, Part 4, Appendix 27.A Long List of other Developments** present the long and short lists of 'other developments' for the inter-project cumulative effects which will be considered at the ES stage (with updates as necessary), and the methodology which allowed for the identification of these other developments, to allow consultation bodies to form a view and provide comment on the other developments included. The long list will be reviewed and if necessary, updated, in the lead up to the ES, as the English Onshore Scheme's design further evolves and in response to any comments raised at statutory consultation.

16.10 Preliminary Assessment of Health and Wellbeing Effects

Ward sensitivity

16.10.1 A preliminary sensitivity assessment has been undertaken to assign each of the Wards a sensitivity level based on the existing baseline health information (See **Table 16-15**). Further information on the baseline can be found in **Volume 2, Part 2, Appendix 16.A: Health and Wellbeing Baseline Data**. For the ES, this will be utilised to assess the English Onshore Scheme against the potential effects for each Ward and performance

against the wider determinants of health. At this stage, with many effects and locations of these effects yet to be identified, the assessment has been undertaken at a population level.

Table 16-15 Ward and LSOA Sensitivity

Ward	LSOA	Sensitivity
Alford (E05009873)	East Lindsey 008C	Medium
	East Lindsey 008B	Low
Chapel St. Leonards (E05009876)	East Lindsey 010B	High
Willoughby with Sloothby (E05009905)	East Lindsey 008D	Medium
	East Lindsey 009B	Low
Withern & Theddlethorpe (E05009907)	East Lindsey 008E	Medium
Legbourne (E05009887)	East Lindsey 008A	Low
Sutton on Sea (E05006393)	East Lindsey 006B	High

Physical health – health-related environmental change to baseline environmental conditions

16.10.2 Effects on human health can result from any residual effects associated with other environmental technical topics, if not properly controlled through mitigation. **Table 16-16** provides a summary of health effects related to environmental change to the baseline, with further assessment of the changes on the physical and mental health of the general population and vulnerable populations below.

Table 16-16 Physical health – health-related environmental change to baseline environmental conditions

Topic	Element	Effect
Volume 1, Part 2, Chapter 9: Water Environment	Watercourses	While trenchless crossings would avoid physical disturbance to the flow regime and form of channel and riparian corridors, the technique is not without risk of pollution, associated with inadvertent releases of drilling fluids / muds. Any potential adverse effects on water quality would be temporary and localised. No significant effects have been identified at this stage.
	Flood Risk and Land Drainage.	The English Onshore Scheme would introduce new areas of temporary impermeable land cover, such as construction compounds and haul routes, along with topsoil stripping and earthworks which could disrupt the current land drainage regime. This could locally reduce rainfall infiltration rates, increase runoff rates, and induce overland flow during construction. During operation (and maintenance), interactions with Flood Zone 3 occur across the location of the converter station and in the wider draft Order Limits. The FRA will outline the proposed mitigation measures / commitments to ensure the Project is safe from flooding over its lifetime and that there are no detrimental effects on flood risk from rivers and the sea because of these interactions. No significant effects have been identified at this stage.
Volume 1, Part 2, Chapter 10: Geology and Hydrogeology	Construction workers	Risks posed to construction workers during construction are predominantly from encountering Made Ground / contamination during the excavation works and the physical dermal contact and inhaling of contaminants and dusts. No significant effects have been identified at this stage.
	Public open space users and neighbouring residents.	Risks posed to public open space users (within the study area) during the construction phase are related to the mobilisation of

Topic	Element	Effect
		contamination predominantly in the form of dust, however there is the potential for dermal contact to occur for these receptors. No significant effects have been identified at this stage.
	Trenchless technology	The use of trenchless technologies is proposed at up to nine locations including crossings of watercourses and roads. The nature of the technology proposed is not known at this stage but may include the use of drilling fluids such as bentonite and associated additives. If not properly controlled, drilling fluid loss can occur resulting in impacts to controlled waters. No significant effects have been identified at this stage.
Volume 1, Part 2, Chapter 12: Traffic and Transport	Severance and pedestrian delay.	The preliminary assessment indicates that there are potentially significant effects in relation to severance and pedestrian delay (incorporating delay to all non-motorised users) on two links (Link 3 and Link 12). The potentially affected links form part of the construction access route (A16 London Road and A52 Sutton Road).
	Non-motorised user amenity.	The preliminary assessment indicates that there are potentially significant effects in relation to non-motorised user amenity on two links (Link 3 and Link 12). The potentially affected links form part of the construction access route (A16 London Road and A52 Sutton Road).
	Road safety	It is considered that the frequency, severity, and spatial distribution of collisions do not represent a pattern that indicates there are inherent road safety issues within the study area. A full review, including an analysis of clusters, HGV movements and Killed or Seriously Injured would be undertaken in the ES.
Volume 1, Part 2, Chapter 13: Noise and Vibration	Construction noise	The unmitigated calculations indicate a potential for significant adverse effects during core construction hours. The preliminary noise modelling results are unmitigated, and do not include any reduction in noise associated with the inclusion of BPM which would be employed on this Project.

Topic	Element	Effect
	Construction traffic	At the time of the production of the PEIR, data regarding road traffic on the existing network associated with the construction works is not yet available due to the ongoing development of the construction programme and routeing options.
	Construction vibration	For ground compaction activities, one sensitive receptor is predicted to experience potential vibration impacts of moderate or greater, without the inclusion of any BPM mitigation measures.
	Static plant facilities	At the time of the production of the PEIR, the detailed location of the proposed converter station, and layouts of any noise emitting plant have not been finalised. As such it has not been possible to quantify the potential noise impacts. There are 27 potential noise sensitive receptors in the vicinity of the proposed converter station. These include dwellings, community, educational and health facilities, and PRoW.
Volume 1, Part 2, Chapter 14: Air Quality	Dust Effects	The preliminary effect for dust risk on human health has been assessed as low risk for earthworks, construction and track out. No significant effects have been identified at this stage.
Volume 1, Part 2, Chapter 15: Socio-economics, Recreation and Tourism	Walkers, cyclists and horse riders.	It is anticipated that during construction, there are a number of PRoW which have the potential to experience disruption as a result of delays or diversions to access, or severance of access.

Assessment for general population

Construction phase

16.10.3 No significant effects have been identified for the water environment, geology and hydrogeology or air quality at this stage.

16.10.4 The preliminary noise assessment contains the potential for significant noise effects. At this stage, the impacts are unmitigated, and it is expected that the implementation of Best Practicable Means (BPM) would reduce any potential effect. It is expected that for works that require 24-hour working, five noise sensitive receptors would experience significant effects, which would likely be reduced following the implementation of BPM.

16.10.5 At this stage, it is not yet possible to identify significant effects to PRoW, as discussed in **Volume 1, Part 2, Chapter 15: Socioeconomics, Recreation and Tourism**. Temporary disruption to PRoW is expected through the construction phase, with any effects managed through the implementation of a PRoW management plan. In **Volume 1, Part 2, Chapter 12: Traffic and Transport**, Table 12-8 lists recreational PRoW routes that have initially been identified as having the potential for high usage. These routes and any others identified through discussions with PRoW officers will be assessed as part of the Traffic and Transport ES chapter, with effects relating to physical and mental health assessed within the Health and Wellbeing ES chapter.

16.10.6 As discussed within **Volume 1, Part 2, Chapter 12: Traffic and Transport**, further usage surveys of PRoW will be undertaken, if required, to assess potential effects on PRoW.

16.10.7 The assessment of physical health as a result of changes to the PRoW networks will therefore be undertaken as part of the ES chapter. As the design progresses, separation distances between individual receptors and the construction swathe may increase, which will reduce the likelihood of significant effects.

16.10.8 For the general population, any changes to air, land or water quality, or any other changes to the environment, can lead to adverse physical health impacts, even where people were previously considered ‘healthy’. It is expected that all potential construction effects will be managed in line with **Volume 2, Part 1, Appendix 5.B: Outline Code of Construction Practice (CoCP)**, and as such no adverse effects will occur to human health as a result of construction.

16.10.9 The general population is assessed as low sensitivity, and as effects will be limited to the construction phase and are transient in nature, the magnitude of impact is Low. The significance of effect is therefore **minor** and **not significant**.

Operational Phase:

16.10.10 It is expected that there will be some minor permanent realignments to PRoW, which are not expected to affect the use of the PRoW, and therefore would not affect potential use or access to physical activity for the general population.

16.10.11 The converter station has the potential to impact 27 noise sensitive receptors within the operational phase. At this stage, no mitigation has been proposed, so this is likely to be reduced once mitigation options and the design of the converter station have been finalised. The updated noise information will be considered and the results presented within the ES.

16.10.12 The general population is assessed as low sensitivity, with the potential effects, particularly resulting from noise, although this is currently unmitigated, being Medium magnitude due to the frequency of the event and potential change in quality of life. The significance is therefore **minor** and **not significant.**

Assessment for vulnerable populations

Construction phase

16.10.13 No significant effects have been identified for water environment, geology and hydrogeology or air quality at this stage.

16.10.14 The preliminary noise assessment contains the potential for significant noise effects. At this stage, the impacts are unmitigated, and it is expected that the implementation of BPM would reduce any potential effect. It is expected that for works that require 24-hour working, five noise sensitive receptors would experience significant effects, which would likely be reduced following the implementation of BPM.

16.10.15 For vulnerable groups, any changes to air, land or water quality can lead to adverse physical health impacts, which are likely to be felt more acutely than in the general population. The study area contains a higher proportion of older people than the England average, which may mean the study area is more sensitive to change than other areas could be. Older people, children and disabled people are more sensitive to changes of air quality, which would be associated with construction dust, and are more vulnerable road users, and are therefore at a greater risk if more traffic, including HGVs and AILs are on the roads.

16.10.16 As the design progresses, separation distances between individual receptors and the construction swathe may increase, which will reduce the likelihood of significant effects.

16.10.17 As the study area has a higher proportion of the population living with a limiting illness or disability, the sensitivity of this receptor is assessed as Medium, due to the generally poorer health status. As effects will be limited to the construction phase and are transient in nature, the magnitude of impact is Low. This would result in a **minor** impact to vulnerable groups, which is **not significant.**

Operational phase:

16.10.18 It is expected that there will be some minor permanent realignments to PRoW, which are not expected to affect the use of the PRoW, and therefore would not affect potential use or access to physical activity for any vulnerable groups. PRoW will be reinstated to the level as before construction and therefore would be unlikely to have any accessibility impacted.

16.10.19 The converter station has the potential to impact 27 noise sensitive receptors within the operational phase. At this stage, no mitigation has been proposed, so this is likely to be reduced once mitigation options and the design of the converter station have been finalised. The updated noise information will be considered and the results presented within the ES. Vulnerable groups, including those with existing cardiovascular diseases, can be more at risk from increases in the background noise levels.

16.10.20 As the study area has a higher proportion of the population living with a limiting illness or disability, the sensitivity of this receptor is assessed as Medium, due to the generally poorer health status. While the impacts are unmitigated at this time, the potential magnitude of the impact, particularly relating to changes in baseline noise levels at the

convertor station are Medium. The significance of effect is therefore **moderate** and **significant**.

Physical and mental health – provision of and access to facilities

16.10.21 During construction, there is the potential for journey times and access to be temporarily affected by an increase in the number of heavy goods vehicles 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, including healthcare facilities, educational facilities and social facilities, which both the general population and vulnerable groups rely on. **Volume 1, Part 2, Chapter 15: Socioeconomics, Recreation and Tourism** presents an initial list of facilities, which will be updated for the ES.

16.10.22 Emergency response times or non-emergency treatment outcomes associated with delays or non-attendance caused by increased traffic and journey times can be affected by changes to the road network caused by the English Onshore Scheme. Effects can be considered most prevalent for people living in deprived areas within close proximity to the construction areas, particularly people with long-term illnesses and carers, as well as users of ambulance services. A full assessment of journey times will be undertaken and presented within the Traffic and Transport ES chapter. The Health and Wellbeing ES chapter will utilise this information to identify vulnerable communities that may be disproportionately affected by the construction of the English Onshore Scheme.

16.10.23 The study area performs better when compared to the national average for happiness scores and anxiety, suggesting a higher level of resilience when compared to the England average. The effect of increasing journey times can lead to stress and frustration, which may lead to worsening mental health in users of the road network. Reducing access or making it harder to access educational, healthcare and social facilities removes opportunities to release stress. It is considered that the study area is more resilient to this change than other areas of England could be.

16.10.24 For the general and vulnerable populations, journey times could increase during the construction phase, and increases in stress resulting from the increased journey times may reduce mental health resilience. This is however considered to be limited. Suitable alternative routes will be in place to minimise any diversion lengths and to minimise disruption and delay. The Outline PRoW Management Plan and Outline CTMP shall be developed further prior to the submission of the ES and shared with the highway authorities in advance for review, comment, and agreement to ensure the most suitable diversions are in place.

16.10.25 As such, the sensitivity of the general population is considered low, and with a low magnitude of impact, resulting in a **minor** and **not significant** effect.

16.10.26 The proportion of people within the study area living with a limiting illness or disability is higher than the England average and therefore would be considered high sensitivity. The effects would be limited to the construction period and with a minor change to quality of life, but would affect all users of the road network, and would therefore be considered to be low magnitude. The significance is therefore **moderate / minor** and **not significant** as changes will be within the regulatory threshold for journey times and limited policy interference.

16.10.27 The English Onshore Scheme will not permanently alter access to any educational, health or community facility within the operational phase.

Mental health – perceived risk from EMFs

16.10.28 Concerns about the potential health effects are often raised when new electricity infrastructure is proposed in an area. The UK has a set of policies for protecting against physical health impacts arising from EMFs, the main component of which is exposure guidelines. Those exposure guidelines are set by independent scientific bodies and are based on decades-long studies into the effects of EMFs and ill health. After those decades of research, the weight of evidence is against there being any health risks of EMFs below the guideline limits. These policies are incorporated into the decision-making process for Development Consent in National Policy Statement (NPS) EN-5. These policies and guidelines are set to ensure human health is protected against the effects of EMF. All the equipment which forms part of this Project, will be fully compliant with these polices set. This will be fully and publicly documented in the DCO submission.

16.10.29 Although the English Onshore Scheme will be designed to have no physical effects on human health from EMFs, the public perception and understanding of EMFs can lead to concern relating to the operational phase and this has the potential for impacts to mental health outcomes.

16.10.30 Additional mitigation measures to strengthen protective factors to promote mental wellbeing include clear and non-technical information about electrical infrastructure and its compliance with UK guidance. This information demonstrates that any potential EMF risks will have been assessed and do not pose a risk to public health. This information will be presented in the ES and discussed with the public at consultation events. By facilitating engagement and providing opportunities for feedback and to ask questions, the English Onshore Scheme will promote inclusion and enhance control, in line with the protective factors in the MWIA toolkit (Ref 16.10).

16.10.31 Recognising that concerns about EMF may adversely impact some people's mental health, NGET provides open and transparent information about EMFs on the website, www.emfs.info, including what EMFs are, exposures from electricity infrastructure, research into health effects and the policies and guidelines in place to protect against EMF. An EMF helpline is also available to answer any questions or concerns about the subject. In addition, EMF specialists will be present at all public consultation events, to address any concerns. These measures are aimed at providing information on EMFs and the measures in place to protect, helping to provide information and inform risk perception around the subject. This is in combination with the report provided in **Volume 2, Part 1, Appendix 4.A: Electromagnetic Field (EMF) Study**.

16.10.32 The English Onshore Scheme will not be able to fully mitigate these potential mental health impacts, though the consultation and information sharing will go a long way to minimise any potential impacts.

16.10.33 The general population would be considered Low sensitivity, with a Low magnitude of impact due to the minor change in quality of life, with a small minority of the population affected. This would be a **minor** significance of effect and **not significant**.

16.10.34 Vulnerable groups within the study area, particularly those with existing mental health conditions, would be considered medium sensitivity as they are more likely to have an outlook that is predominantly uncertainty with some concern and with a poor health status. The magnitude of impact across the population is judged to be low due to the minor expected change in morbidity or quality of life. The significance of effect is therefore expected to be **minor** and **not significant**.

Mental health – health-related environmental change to neighbourhoods

16.10.35 **Table 16-17** below identifies the individual temporary and / or permanent changes identified within other technical chapters. Combined impacts to specific areas as a result of effects identified in other chapters (significant or otherwise) may alter people's levels of satisfaction and potential engagement with their living environment. This will be continually monitored through the ES.

Table 16-17 Mental health – health-related environmental change to neighbourhoods

Topic	Element	Effect
Volume 1, Part 2, Chapter 7: Cultural Heritage	Impacts to designated and non-designated heritage assets.	Disturbance of, or removal of, heritage assets (including historic landscape character) could result in an effect resulting from harm to historic interests of heritage assets.
Volume 1, Part 2, Chapter 8: Landscape and Visual Amenity	Recreational and Residential Receptors	Significant adverse effects on views and visual amenity for residential receptors would be mostly perceptible to visual receptors located close to the draft Order Limits, such as Bilsby, Alford, Asserby, Anderby Creek and Saleby. Upon completion, the most visible aspect of the proposed scheme would be the converter station, as the cable corridor would be largely restored to agricultural use. The converter station would be primarily visible from the settlements located closest to the draft Order Limits. In many locations, including visual receptors at Mumby, Sutton-on-Sea, Hannah, Markby, Ailby, Huttoft, Alford, Anderby Creek, Rigsby, Farlesthorpe, Cumberworth, and Althorpe Row, filtered views of the upper sections of the converter station would be available. At operation year 0, potential mitigation planting will not have established and therefore is unlikely to provide full landscape integration for the Landfall Area and within cable corridor, with a low degree of change still experienced by visual receptors at Anderby Creek. By year 15, the proposed mitigation would increase screening of views of the upper parts of the converter station, with the change reducing for receptors in many locations including Anderby Creek, Mumby, Thoresthorpe and Markby. Many PRoW within 1 km of the draft Order Limits would experience views of construction activity associated with the cable corridor, particularly around Asserby, Huttoft, south of Sutton-on-Sea and to the north and west of Anderby Creek, filtered by field boundary vegetation and occasionally by built form in nearby settlements. Views of the converter station from locations closer to the coast would be either fully screened or there would be distant views of the construction of the upper sections of the converter station, but more frequently, the views would be restricted to the temporary presence of a crane. For recreational receptors located further inland views are more enclosed due to the rising landform, and an increase in woodland cover further acts to help screen views

Topic	Element	Effect
		towards the draft Order Limits. Recreational receptors in these locations are still likely to experience filtered views of construction activity within the cable corridor. Distant views of the upper sections of the converter station would be visible to approximately half of the users of PRoW within 2-3 km of the corridor, and the change would be substantial from PRoW near the converter station, including PRoW east and southeast of Bilsby, east of Thurlby, and close to Asserby. Mitigation planting would not provide effective screening at Year 0.
Volume 1, Part 2, Chapter 9: Water Environment	Watercourses	Any potential adverse effects on water quality would be temporary and localised.
Volume 1, Part 2, Chapter 12: Traffic and Transport	Severance and pedestrian delay.	The preliminary assessment indicates that there are potentially significant effects in relation to severance and pedestrian delay (incorporating delay to all non-motorised users) on two links (Link 3 and Link 12). The potentially affected links form part of the construction access route (A16 London Road and A52 Sutton Road).
	Non-motorised user amenity.	16.10.36 The preliminary assessment indicates that there are potentially significant effects in relation to non-motorised user amenity on two links (Link 3 and Link 12). The potentially affected links form part of the construction access route (A16 London Road and A52 Sutton Road).
	Fear and intimidation.	The significance of effect in relation to fear and intimidation is classified as not significant on all eight links, due to there being no step change between the without and with development scenarios in relation to the increase in vehicles on the ARN.
	Road safety	It is considered that the frequency, severity, and spatial distribution of collisions do not represent a pattern that indicates there are inherent road safety issues within the study area. A full review, including an analysis of clusters, HGV movements and Killed or Seriously Injured would be undertaken in the ES.
Volume 1, Part 2, Chapter 13: Noise and Vibration	Construction noise and vibration.	The unmitigated calculations indicate a potential for significant adverse effects during core construction hours. The preliminary noise modelling results are unmitigated, and do not include any reduction in noise associated with the inclusion of BPM which would be employed on this Project.

Topic	Element	Effect
		Preliminary vibration calculations suggest one sensitive receptor is predicted to experience potential vibration impacts of moderate or greater, without the inclusion of any BPM mitigation measures.
Volume 1, Part 2, Chapter 14: Air Quality	Dust risk	The preliminary effect for dust risk on human health has been assessed as low risk for earthworks, construction and track out.
Volume 1, Part 2, Chapter 15: Socio-economics, Recreation and Tourism	Walkers, cyclists and horse riders.	It is anticipated that during construction, there are a number of PRoW which have the potential to experience disruption as a result of delays or diversions to access, or severance of access. It is expected that during operation all PRoWs will be restored, with minimal changes to PRoW alignment.

Cumulative effect on the general population

Construction Phase

16.10.37 Environmental change throughout the construction phase could occur as a result of changes to landscape and visual amenity, the water environment, geology and hydrogeology, agriculture and soils, traffic and transport, noise and vibration and socio-economics, recreation and tourism. It is the combination of any or all of these potential effects that can impact the mental wellbeing of the general population. As air quality assessment of vehicle emissions, and noise monitoring are yet to be undertaken, the assessment presented here is incomplete and will be updated at the ES stage.

16.10.38 For the general population, it is possible that witnessing the construction creates an effect, particularly where dust or traffic is visible to users of the road network or PRoW, or those who are close to construction work. These risks will be monitored and mitigated through the provisions of the Outline CoCP and Construction Environmental Management Plan (CEMP).

16.10.39 Additionally, effects of fear and intimidation, as identified within **Volume 1, Part 2, Chapter 12: Traffic and Transport** could reduce PRoW use as a result of the presence of HGVs and a potential reduction of safe walking routes. The ongoing consultation and opportunity to provide feedback to the construction teams, as set out within the CoCP, will help to reduce feelings of uncertainty.

16.10.40 The general population is assessed as low sensitivity in line with the IEMA guidance. As effects are limited to the construction phase, the magnitude of impact is therefore low and the significance of effect is expected to be **minor** and **not significant.**

Operational Phase

16.10.41 Significant effects have been identified at a large number of residential and recreational receptors across the route. The convertor station presents the most significant change in the landscape. At year 0, although the land will have been restored to agriculture, mitigation planting will not have established, although this will develop through to year 15. At year 15, a number of receptors will still experience significant effects. At this stage, there are no further topics identifying operational phase effects, and therefore there will be no cumulative effect on neighbourhood quality for the general population.

Cumulative effect on the vulnerable populations

Construction Phase

16.10.42 Environmental change throughout the construction phase could occur as a result of changes to landscape and visual amenity, water environment, geology and hydrogeology, agriculture and soils, traffic and transport, noise and vibration and socio-economics, recreation and tourism. It is the combination of any or all of these potential effects that can impact the mental wellbeing of vulnerable groups. As air quality assessment of vehicle emissions, and noise monitoring are yet to be undertaken, the assessment presented here is incomplete and will be updated at the ES stage.

16.10.43 The study area contains the same proportion of people with mental health disorders as England, although the study area performs better than England as a whole in terms of happiness and anxiety scores. The study area does however have a higher proportion

of older and disabled people than England as a whole, with these demographic groups more likely to negatively experience effects to changes in the PRoW network during construction, due to a higher reliance on these for opportunity for exercise and wellbeing.

16.10.44 The vulnerable groups within the study area are of Medium sensitivity in line with the IEMA guidance.

16.10.45 Effects are expected to be low in frequency and small-scale, however, the magnitude of effect felt by the vulnerable populations may be greater than felt by the general population. As such, the magnitude of impact is expected to be low / medium, with a significance of effect to be **minor** and **not significant**.

Operational Phase

16.10.46 Significant effects have been identified at a large number of residential and recreational receptors across the route. The convertor station presents the most significant change in the landscape. At year 0, although the land will have been restored to agriculture, mitigation planting will not have established, although this will develop through to year 15. At year 15, a number of receptors will still experience significant effects. At this stage, there are no further topics identifying operational phase effects, and therefore there will be no cumulative effect on neighbourhood quality for vulnerable groups. Any identified cumulative effect can have a more adverse impact on vulnerable groups, and this will be explored and assessed further within the ES.

Mental health – participation in consultation and the consenting process

16.10.47 Throughout the planning stage of the English Onshore Scheme, there will be opportunity for consultation and engagement between the general population, vulnerable populations, local planning authorities and the design team, through formal consultation channels, such as email and public events.

16.10.48 All representatives of the English Onshore Scheme will be well informed of the Project at consultation events, and any concerns raised through consultation or via email will be adequately and appropriately responded to. This will go some way to allay fears by communicating the relevant information effectively and suitably informing consultees, allowing for more control and influence over the English Onshore Scheme and facilitating inclusion and participation.

16.10.49 For the general population, it is expected that the sensitivity is low, due to their predominantly positive outlook and fair health status, with a low impact magnitude due to the expected short duration and slight change in quality of life from perceived stress. As such, the significance of the effect is **minor** and **not significant.**

16.10.50 For more vulnerable groups within the study area, particularly those with existing mental health conditions would have a medium sensitivity, with a low magnitude of impact due to the minor change in quality of life and the provided opportunity to be involved with the engagement process. This would result in a **minor** significance of effect which is **not significant**.

16.11 Further Work to be Undertaken

16.11.1 The information provided in this PEIR is preliminary, the final assessment of potential significant effects will be reported in the ES. This section describes the further work to be undertaken to support the health and wellbeing assessment presented in the ES.

Baseline

16.11.2 The baseline data will be reviewed and updated for the ES stage to ensure that the baseline data is as up to date as possible. This will include a review of all available online data, including the relevant joint strategic needs assessment update.

Assessment

16.11.3 The assessments undertaken for the PEIR will be reviewed following stakeholder consultation feedback, and further design refinement. Where the assessments set out in the following chapters are updated or where they have not been undertaken for this PEIR, the assessment for health-related environmental change will be reviewed and updated, **Volume 1:**

- **Part 2, Chapter 8: Landscape and Visual Amenity;**
- **Part 2, Chapter 9: Water Environment;**
- **Part 2, Chapter 10: Geology and Hydrogeology;**
- **Part 2, Chapter 11: Agriculture and Soils;**
- **Part 2, Chapter 12: Traffic and Transport;**
- **Part 2, Chapter 13: Noise and Vibration;**
- **Part 2, Chapter 14: Air Quality,** and;
- **Part 2, Chapter 15: Socio-economics, Recreation and Tourism.**

16.11.4 A full assessment of the wider determinants of health and wellbeing and how they are impacted by the English Onshore Scheme will be presented in the ES. Further consultation with relevant statutory consultees will be undertaken. If, following consultation feedback, further design refinement and further assessment is required these will be detailed and will form part of the ES.

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National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United

Registered in England and Wales
No. 4031152
nationalgrid.com