

Viking CCS Pipeline

**Environmental
Statement Volume II -
Chapter 17: Health and
Wellbeing**

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17 Health and Wellbeing

17.1 Introduction

17.1.1 This chapter of the Environment Statement (ES) presents the assessment of the likely significant effects of the *Viking CCS Pipeline* (hereafter referred to as '*the Proposed Development*') on Human Health during construction, operation and decommissioning. This is in line with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref 17-1) which requires the consideration of the likely significant direct or indirect effects of projects on 'population and human health'. The assessment includes consideration of impacts to the following:

- Access to healthcare services and other social infrastructure;
- Air quality, noise, and neighbourhood amenity;
- Accessibility and active travel;
- Access to work and training; and
- Social cohesion and neighbourhoods.

17.1.2 The findings of this chapter are interrelated with other environmental effects and so this chapter should be read in conjunction with the following other ES chapters as included in ES Volume II:

- Chapter 7: Landscape and Visual;
- Chapter 12: Traffic and Transport;
- Chapter 13: Noise and Vibration;
- Chapter 14: Air Quality; and
- Chapter 16: Socio-economics.

17.2 Legislation, Policy and Guidance

Introduction

17.2.1 The Legislation, Policy and Guidance section of this chapter provides an overview of the relevant legislation, planning policy and technical guidance relevant to the health and wellbeing assessment.

Legislation

17.2.2 The Health and Social Care Act 2022 (Ref 17-2) proposes health reforms in England, removes existing competition rules and formalises Integrated Care Systems (ICS). Each ICS has been established with four strategic purposes:

- Improve population health and healthcare;
- Tackling unequal outcomes and access;
- Enhance productivity and value for money; and
- Helping the NHS to support the broader social and economic development.

National Planning Policy

17.2.3 National Planning Policy relevant to health and wellbeing is detailed in **Table 17-1**. An overview of how relevant national planning policy has been complied with is provided within the *Planning Statement (Application Document 7.1)*.

Local Planning Policies

17.2.4 Local Planning Policies relevant to health and wellbeing is detailed in **Table 17-2**. An overview of how relevant local planning policy has been complied with is provided within the *Planning Statement (Application Document 7.1)*.

Guidance

17.2.5 In November 2022, the Institute of Environmental Management and Assessment (IEMA) published new guidance on assessing human health as part of an Environmental Impact Assessment (Ref 17-14 and Ref 17-15). Previous to this, there was no consolidated methodology or practice for the assessment of effects on human health. The human health assessment is based on this guidance and it considers the potential impacts for each phase of the development. Wherever possible, the impacts identified in the assessment have been appraised against relevant national standards. Where relevant standards do not exist, professional experience and expert judgement has been applied and justified.

17.2.6 Alongside this, the health and wellbeing assessment has been carried out in accordance with the following:

- National Planning Practice Guidance (NPPG) (2021) (Ref 17-8);
- Institute of Environmental Management and Assessment (IEMA), Determining Significance for Human Health in Environmental Impact Assessment (EIA) (2022) (Ref 17-14);
- IEMA, Effective Scoping of Human Health in EIA (2022) (Ref 17-15);
- NHS Healthy Urban Development Unit (HUDU) Rapid Health Impact Assessment (HIA) Tool (2019) (Ref 17-16);
- Wales Health Impact Assessment Support Unit (WHIASU) Health Impact Assessment Guide (Ref 17-17);
- Public Health England (PHE) guidance Spatial Planning for Health: An evidence resource for designing healthier places (2019) (Ref 17-18);
- PHE Strategy 2020 to 2025 (2019) (Ref 17-19);
- The Marmot Review: Fair Society Healthy Lives (2010) (Ref 17-20); Health Equity in England 10 Years On (2020) (Ref 17-21); Build Back Fairer – the Covid-19 Marmot Review (2020) (Ref 17-22);
- NHS Long-Term Plan (Ref 17-23); and
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines (1998) (Ref 17-24).

Table 17-1: National Planning Policy Relevant to Health and Wellbeing

Policy Reference	Policy Context
<p>National Policy Statement for Energy (EN-1) (2011) (previous edition)</p>	<p>Planning policy on Nationally Significant Infrastructure Projects (NSIPs) is primarily contained in Overarching National Policy Statements (NPS). The previous NPS for Energy was approved in July 2011 (Ref 17-4).</p> <p>The Overarching National Policy Statement (NPS) for Energy (EN-1) requires the decision maker to consider potential benefits of development proposals including ‘the potential to impact on the health and well-being of the population’.</p> <p>Section 4.13 ‘Health’ states that the assessment should consider all relevant human health impacts, which may include the following:</p> <ul style="list-style-type: none"> • The direct impacts on health including increased traffic, air or water pollution, dust, odour, hazardous waste and substance, noise, exposure to radiation, and increases in pests; and • The indirect health impacts of new energy infrastructure, through access to key public services, transport, or the use of open space for recreation and physical activity. <p>It also states that applicants should describe the existing human health conditions in the areas surrounding schemes and refer to how their human health impacts correlate with local planning policies.</p>
<p>Draft Overarching National Policy Statement for Energy (EN-1) (2023)</p>	<p>The Overarching NPS for Energy (EN-1) was published in March 2023 (Ref 17-5), which places a greater emphasis on net zero, following the release of the Energy White Paper, published in December 2020, and updates the existing Statement. In addition to the health impacts of energy infrastructure development outlined in the existing Statement, the Draft Statement notes the potential health impacts to be considered:</p> <ul style="list-style-type: none"> • The direct impacts on health may include increased traffic, air or water pollution, dust, odour, hazardous waste and substances, noise, exposure to radiation, and increases in pests; and • New energy infrastructure may also affect the composition and size of the local population, and in doing so have indirect health impacts, for example if it in some way affects access to key public services, transport or the use of open space for recreation and physical activity.
<p>National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2011) (previous edition)</p>	<p>The previous NPS for Gas Supply Infrastructure and Gas and Oil Pipelines was approved in July 2011 (Ref 17-6) and should be read in conjunction with EN-1. The NPS for Gas Supply Infrastructure and Gas and Oil Pipelines provides the primary basis for decisions by the Infrastructure Planning Commission (IPC) on applications it receives for gas supply infrastructure and gas and oil pipelines. This NPS considers the effects on human health through the impacts of gas emissions. These could lead to effects on air quality, which in turn could have implications for human health.</p>
<p>National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2023)</p>	<p>The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines was published in March 2023 (Ref 17-7) and should be read in conjunction with the March 2023 EN-1 publication. With regard to the impacts of Natural Gas Reception Facilities, any applicant for an NSIP should follow the generic considerations on these issues set out in EN1. In particular: Section 5.2 of EN-1 which provides guidance on the effects of emissions on air quality, which can have implications for human health.</p>

Policy Reference	Policy Context
<p>National Planning Policy Framework (2023)</p>	<p>The National Planning Policy Framework (NPPF) (Ref 17-8) was revised on 05 September 2023 and sets out the national government planning policies for England and how these are expected to be applied. This revised Framework replaces the previous National Planning Policy Framework published in March 2012, revised in July 2018, and updated in February 2019. It provides a framework within which local people and their relevant councils produce their own local and neighbourhood plans. The NPPF contains policies that are applicable to human health, as per the below.</p> <p>Section 8 of the NPPF “Promoting healthy and safe communities” states that policies should aim to achieve healthy, inclusive, and safe places which: promote social inclusion; are safe and accessible; and enable and support healthy lifestyles. In order to do this, planning policies and decisions should:</p> <ul style="list-style-type: none"> • Plan positively for the provision of local services to enhance the sustainability of communities and residential environments; • Take into account and support the delivery of local strategies to improve health, social and cultural well-being for all sections of the community; • Guard against the unnecessary loss of valued facilities and services, particularly where this would reduce the community’s ability to meet its day-to-day needs; • Ensure that established shops, facilities, and services are able to develop and modernise, and are retained for the benefit of the community; • Ensure an integrated approach to considering the location of housing, economic uses and community facilities and services; and • Steps should also be sought to promote public safety and take into account wider security and defence in developing planning policy.

Table 17-2: Local Planning Policies Relevant to Health and Wellbeing

Policy Reference	Policy Context
North East Lincolnshire Local Plan 2013 to 2032 (2018)	<p>The North East Lincolnshire Local Plan was officially adopted in 2018 (Ref 17-9). As part of the Local Plan, strategic objectives were set for the local authority, including for health. Strategic Objective 5 focuses on Social and Health Inequality, in which North East Lincolnshire Council (NELC) aim to narrow the gap for social and health inequality by ‘addressing issues of housing choice, providing accessible employment and training opportunities, promoting healthier lifestyles, providing healthcare and community facilities, improving educational attainment and cultural facilities; and establishing protecting and maintaining a network of accessible good quality open space, sport and recreation facilities’.</p> <p>For NELC, the key critical success factors to achieve this are as follows:</p> <ul style="list-style-type: none"> • To reduce deprivation; and • To safeguard and develop open space and sport and recreation facilities to maintain or exceed local accessibility standards, promoting healthy lifestyles.
North Lincolnshire Core Strategy Local Plan (2011)	<p>The North Lincolnshire Core Strategy Local Plan (Ref 17-10) was originally adopted in June 2011 and sets out the long-term spatial planning framework for the development of North Lincolnshire up to 2026. It details 27 strategic policies, of which CS24: Health Care Provision is the most relevant. The strategic policy aims to:</p> <ul style="list-style-type: none"> • Improve the health of residents through safeguarding and enhancing open space, facilities for sports and recreation and improving walking and cycling routes. <p>The relevant excerpt from the policy states that:</p> <p><i>“Developers will be expected to make an appropriate contribution towards necessary improvements, additional provision improvements or additional provision for health care services and facilities arising from their development proposals, in accordance with the Planning Obligations policy and Developer Contributions SPD. The implementation of new facilities supported by this policy will be permitted subject to other relevant plan policies.”</i></p>
North Lincolnshire Draft Local Plan 2020 to 2038 (2021)	<p>North Lincolnshire Council is currently preparing a new Local Plan (Ref 17-11) that will replace the current Local Plan and Core Strategy once formally adopted. The following aspects of the policies in the draft Local Plan are of specific relevance to this chapter:</p> <p><i>Policy CSC1: Health and Wellbeing</i></p> <ul style="list-style-type: none"> • Make the potential for achieving positive mental and physical health outcomes a priority when considering all development proposals; • Promote improvements and enhancing accessibility to the historic environment, nature, accessible natural greenspaces and green infrastructure corridors and blue and green infrastructure; • Recognise the vital role heritage and nature plays in people’s lives by safeguarding and enhancing the quality of our surroundings to ensure positive impacts on individuals and communities; • Use the ten principles of Active Design to support development in North Lincolnshire;

Policy Reference	Policy Context
	<ul style="list-style-type: none"> • Ensure development does not have an adverse impact on the environment or residential amenity through air, noise, vibration, and water pollution; and • Work with relevant stakeholders to reduce geographical inequalities in health through maximising the provision of affordable housing and regenerating poorer neighbourhoods within the area. <p><i>Policy CSC2: Health Care Provision</i></p> <ul style="list-style-type: none"> • Where appropriate, developers should consult with health care commissioners at an early stage in order to understand the need for new or enhanced health care infrastructure and improved access to primary and mental health care facilities; and • That the healthcare infrastructure implications of any relevant proposed development have been considered and addressed.
<p>East Lindsey District Council Core Strategy Local Plan (2018)</p>	<p>East Lindsey District Council (ELDC) adopted their Local Plan in 2018 (Ref 17-12). Within it, there is a key priority placed on health and wellbeing. ELDC state that by 2031, the district will be ‘a network of thriving, safer and healthy sustainable communities, where people can enjoy a high quality of life and an increased sense of well-being and where new development simultaneously addresses the needs of the economy, communities and the environment.’</p> <p>In order to achieve a higher quality of life in the local communities, the following relevant objectives have been identified from the Local Plan:</p> <ul style="list-style-type: none"> • Protect and enhance the vitality and viability of our town centres; • Require new development to contribute to improving the environmental quality of our spaces and places; and • Protect and commit to improve essential community facilities in towns and villages.
<p>Central Lincolnshire Local Plan (2023)</p>	<p>West Lindsey District Council (WLDC) joined with three other local authorities (City of Lincoln Council, North Kesteven District Council and Lincolnshire County Council) in 2009 to form the Central Lincolnshire Joint Strategic Planning Committee (CLJSPC).</p> <p>The Central Lincolnshire Local Plan (Ref 17-13), adopted in 2023, prioritises health as a local planning authority strategic priority, prioritising the provision of “<i>safe and healthy environments, reduce health inequalities and help everyone live healthy lifestyles</i>”.</p> <p>The Key Policy 54 also addresses public health in Central Lincolnshire, stating that “<i>The potential for achieving positive mental and physical health outcomes will be taken into account when considering all development proposals. Where any potential adverse health impacts are identified, the applicant will be expected to demonstrate how these will be addressed and mitigated.</i>” Proposals are expected to promote support and enhance physical and mental health and wellbeing, and reduce health inequalities, with Health Impact Assessments expected to be commensurate with the size of the development.</p>

17.3 Scope of Assessment and Consultation

Introduction

17.3.1 The following section details the scope of the scheme, utilising stakeholder engagement and the Scoping Opinion resulting from the Scoping Report for *Viking CCS Pipeline* (Ref 17-25).

Scoping Report and Scoping Opinion

17.3.2 A summary of stakeholder engagement specific to Health and Wellbeing, including the Scoping Opinion, has been provided in **Table 17-3**.

Table 17-3: Health and Wellbeing Scoping Opinion

Stakeholder	Date	Summary of discussions	Response
Planning Inspectorate	6 May 2022	The Applicant should engage with the relevant stakeholders, in particular the UK Health Security Agency and local public health teams, to ensure it is appropriate to the construction, operation and decommissioning of the Proposed Development.	Agreement has been sought with the relevant stakeholders and this is detailed within <i>Section 17.3</i> in the Health and Wellbeing ES chapter.
		The ES should consider the potential health impacts caused by the permanent loss or change to formal PRoWs and accessible open space as a result of the construction, operation and decommissioning of the Proposed Development.	This has been noted and has been assessed in <i>Section 17.7</i> of this ES chapter.
North East Lincolnshire County Council	6 May 2023	At the Health and Well-being section 16.2.1 (of the Scoping Report) The NELC Local Plan is referenced as 2013 as opposed to 2018.	This has been amended.
UK Health Security Agency	6 May 2023	The applicant should assess the potential public health impact of EMFs arising from the electrical equipment associated with the development. For more information on how to carry out the assessment, please see the accompanying reference for details.	The impact of EMFs has been considered negligible for this assessment. This is because the structure of the <i>Proposed Development</i> will not interfere with the current state of EMFs within the DCO Site Boundary. This is supported by information from EMFs.info (Ref 17-26) which states that the main sources of EMFs are overhead lines, high-voltage underground cables and substations. Given that the Proposed Development and its subsequent components do not rely on such design elements, the effect of the Proposed Development is likely to be negligible. This is covered within <i>Section 17.4</i> of this ES.
		The final ES must provide an assessment of significance for those health determinants scoped into the population and human health chapter. As there is no UK national approach to	In line with IEMA guidance <i>IEMA Guide to Determining Significance for Health</i> (Ref 17-14) published in November 2022, this chapter sets out a significance assessment of the

Stakeholder	Date	Summary of discussions	Response
		the assessment of significance for human health it is strongly advised that any proposed approach is agreed with OHID/UKHSA and the local public health teams.	potential human health impacts of the Proposed Development.
		The PRoW should be surveyed to assess usage in order to identify the need for mitigation and to assist in the determination of sensitivity of each PRoW.	The sensitivity of users to individual PRoWs has been assigned as part of the assessment of socio-economic effects in <i>ES Volume II Chapter 16: Socio-economics</i> . This accounts for designation, condition of the routes and likely usage levels sufficient to identify whether mitigation is required.
		The impacts on health and wellbeing of the scheme will have particular effects on vulnerable or disadvantaged populations, including those that fall within the list of protected characteristics. The report does not comprehensively identify a potential list of vulnerable populations, some of which are also within the protected characteristics. The list of vulnerable populations should be reviewed and include data on the Indices of Multiple Deprivation. Guidance is available from the IAIA3.	Baseline health data is presented in <i>Section 17.5</i> of this ES chapter. This identifies vulnerable populations via the presentation of data relating to population, age, ethnicity, deprivation, health deprivation, self-assessment of health, and a number of wider health determinant indicators. These indicators align with WHIASU vulnerable populations list (age related groups, income related groups, groups who suffer discrimination or other social advantage, geographical groups). Additional socio-economic data relating to the local population is set out in <i>ES Volume II: Chapter 16: Socio-economics</i> . Within this chapter, a more detailed baseline section is presented, drawing on the most recent data available to inform the full assessment of Human Health and Wellbeing effects.
		The final report should include scheme wide assessments supported by logically bounded community impact reports. These community impact reports should draw together relevant findings that relate to health.	Baseline conditions for each route section include relevant health, socio-economic and community receptors are set out in <i>Section 17.5</i> of this ES chapter. These are considered within the assessment.

Feedback on the Preliminary Environmental Information Report

17.3.3 As part of the ES process, a Preliminary Environmental Information Report (PEIR) was prepared and publicised for consultation. Feedback was sought at this stage, of which a summary of stakeholder engagement specific to health and wellbeing has been provided in Table 17-4.

17.3.4 This feedback and subsequent recommendations have now been incorporated where relevant in this ES.

Table 17-4: Health and Wellbeing Feedback on PEIR

Stakeholder	Date of meeting / communication	Summary of discussions	Response
North Lincolnshire Council	20 th January 2023	Having considered <i>Chapter 17: Health and Wellbeing</i> of the PEIR, NLC do not have any objections to the approach set out in the PEIR at this stage.	Comment noted.
UKHSA	24 th January 2023	<p>We note that for the operation of the development, emissions to air have been scoped out of further assessment. The CCS pipeline, once operational, will generate impurities and periodic venting may be required for maintenance or emergency situations.</p> <p>The current submission does not consider any risks or impacts from electric and magnetic fields (EMF) associated with the connections to the electricity network. We understand that the assessment for EMF will be considered in the Health and Wellbeing Environmental Statement chapter.</p> <p>The lack of an assessment of significance does not conform to the requirements of The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (2017 Regulations) and as such an assessment of significance should form part of the Environmental Statement.</p>	<p>The assessment of air emissions from the venting system is covered in <i>ES Volume II Chapter 14: Air Quality</i>. This effect was scoped out of the subsequent assessment as the venting system will only comprise of CO2 emissions which will not directly impact human health.</p> <p>The assessment includes the likely public health impact of EMFs arising from the electrical equipment associated with the Proposed Development.</p> <p>The final ES has provided an assessment of significance for those health determinants scoped into the population and human health chapter.</p>

Additional Consultation

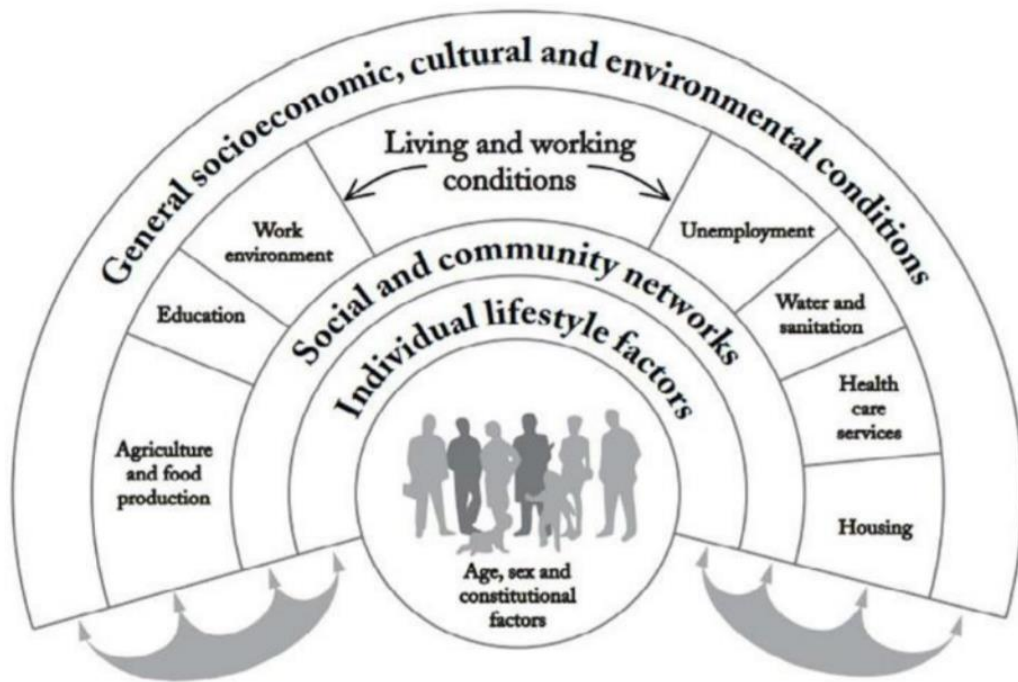
17.3.5 No additional consultation was undertaken as part of the preparation of the ES on the basis that scoping and statutory consultation outcomes did not necessitate further Consultation.

Scope of Assessment

17.3.6 The IEMA guidance “*Determining Significance for Human Health in Environmental Impact Assessment*” (Ref 17-14) forms the basis of the approach adopted to assess impacts on human health in this chapter. In addition, consideration has been given to NHS England’s Healthy Urban Development Unit’s (HUDU) Rapid Health Impact Assessment (HIA) Toolkit 2019 (Ref 17-16) to help with the identification of relevant health determinants and mapping of health pathways (the route through which changes to health determinants would be expected to lead to changes in health outcomes).

- 17.3.7 The World Health Organisation (WHO) Europe defines health as a ‘state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity’ (Ref 17-27). Public health therefore encompasses general wellbeing, not just the absence of illness.
- 17.3.8 The health and wellbeing of individuals is determined by a broad range of individual constitutional and behavioural factors (or “determinants”), as well as broader environmental, social and economic factors. Some factors are direct and obvious, others are indirect.
- 17.3.9 Dahlgreen and Whitehead’s model of the main determinants of health illustrates the breadth of possible influences on health, as shown in **Figure 17-1**. At the centre of the illustration are factors that are largely fixed, including individual age, sex, constitutional and genetic factors. Outside of this are factors generally described as the wider or broader determinants of health. The model emphasises interactions between the layers. Moving outwards from the centre, individual lifestyle choices are embedded in social norms and community networks, and in living and working conditions, which in turn are shaped by and related to the wider socioeconomic and cultural environment.

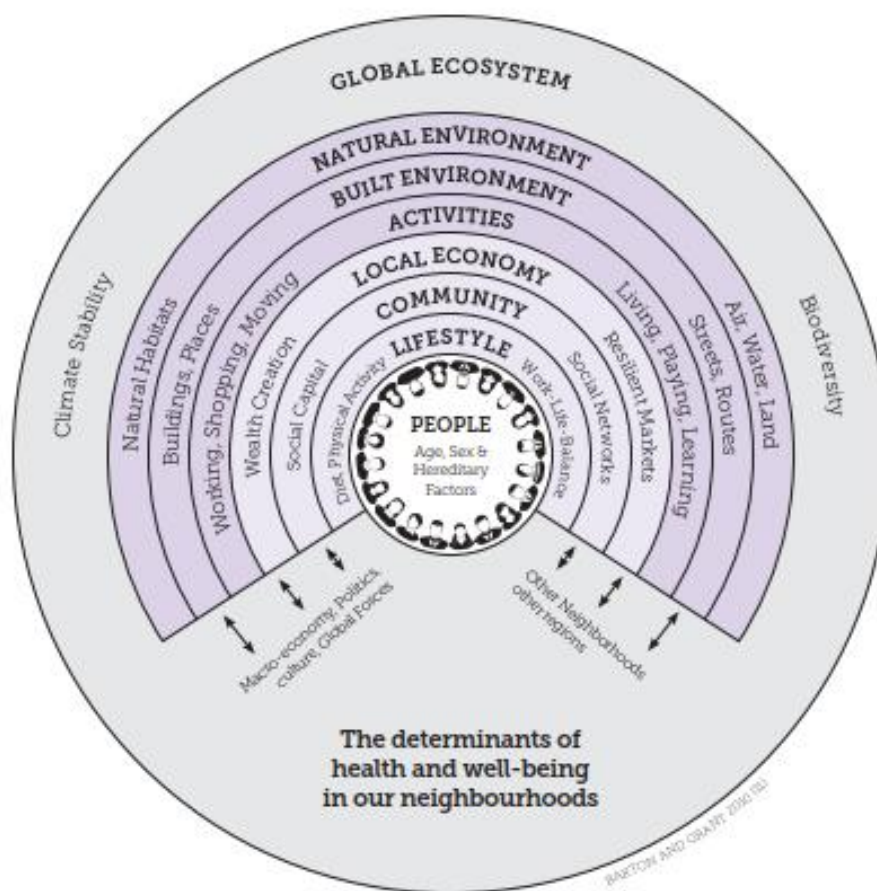
Figure 17-1: Determinants of Health



Source: Dahlgreen and Whitehead, 1993)

- 17.3.10 This model has been developed to show elements of the built environment and communities that are the most notable determinants of health, as shown in **Figure 17-2**.

Figure 17-2: Determinants of Health in Neighbourhoods



Source: Barton and Grant (2006)

17.3.11 Within a population there can also be health inequalities, defined by the WHO as “differences in health status or in the distribution of health determinants between different population groups (Ref 17-27). For example, differences in mobility between elderly people and younger populations or differences in mortality rates between people from different social classes”.

Aspects scoped into the assessment

17.3.12 Drawing on the IEMA guidance (Ref 17-14 and Ref 17-15), this assessment considers the following human health determinants of relevance to the *Proposed Development*. The scope of the assessment was agreed at scoping stage and was applied in the assessment in the PEIR. This occurred prior to the publication of the IEMA guidance. The assessment determinants scoped into the assessment have therefore been compared against those in the IEMA guidance to confirm which ones are considered relevant and to provide appropriate alignment with this guidance. This comparison is set out in **Table 17-5**.

Table 17-5: Health Determinants Assessed

Assessment Determinants	IEMA Determinants covered
Access to healthcare services and other social infrastructure	<ul style="list-style-type: none"> • Health and social care services • Community safety • Community identity, culture, resilience, and influence • Physical activity • Diet and nutrition • Water quality or availability
Air quality, noise, and neighbourhood amenity	<ul style="list-style-type: none"> • Air quality • Noise and vibration • Housing • Relocation • Land quality
Accessibility and active travel	<ul style="list-style-type: none"> • Open space, leisure, and play • Risk taking behaviour • Transport modes, access, and connections
Access to work and training	<ul style="list-style-type: none"> • Education and training • Employment and income
Social cohesion and neighbourhoods.	<ul style="list-style-type: none"> • Social participation, interaction, and support • Built environment • Wider societal infrastructure and resources • Climate change mitigation and adaptation

17.3.13 The impacts of the *Proposed Development* on these determinants of human health are assessed using professional judgement, best practice, and drawing on other assessments within the ES. The *ES Volume II Chapters* and the determinants they relate to are:

- *Chapter 7: Landscape and Visual* – Air quality, noise, and neighbourhood amenity;
- *Chapter 11: Water Environment* – Access to healthcare services and other social infrastructure;
- *Chapter 12: Traffic and Transport* – Accessibility and active travel;
- *Chapter 13: Noise and Vibration* – Air quality, noise, and neighbourhood amenity;
- *Chapter 14: Air Quality* – Air quality, noise, and neighbourhood amenity;
- *Chapter 15: Climate Change* – Social cohesion and neighbourhoods; and
- *Chapter 16: Socio-economics* – Access to work and training, Access to healthcare services and other social infrastructure.

Aspects scoped out of the assessment

17.3.14 In relation to the IEMA guidance determinants which indirectly inform the assessments, no assessment of impacts on radiation is proposed. As detailed in *Chapter 3: Description of the Proposed Project*, in some limited circumstances, radiographic methods may still be required and if so, all radiographic testing will be carried out in strict compliance with the Ionising Radiation Regulations 2017 (Ref 17-28) and measures such as local shielding and exclusion zones will be in place to ensure that the workforce and members of the public are protected. Because of this, there are not expected to be substantial changes to radiation levels through the construction, operation and decommissioning stages of the *Proposed Development* based on the activities proposed.

17.4 Assessment Methodology

Overview

- 17.4.1 The Human Health assessment follows the general assessment methodology set out in *Chapter 5: EIA Assessment Methodology*. However, the specific impact magnitude and impact sensitivity criteria for this assessment have been set out in this section. This reflects a change in approach from that which was set out in the PEIR and follows the release of new guidance from the IEMA regarding significance. The specific magnitude and sensitivity criteria applied for the human health assessment are set out below, and reflect the IEMA guidance, *Determining Significance for Human Health* (Ref 17-14) and *Effective Scoping of Human Health in Environmental Impact Assessment* (Ref 17-15), released in 2022.
- 17.4.2 Best practice principles for assessing impacts on human health are also provided in NHS England's Healthy Urban Development Unit's (HUDU) Rapid HIA Toolkit 2019 (Ref 17-16), which alongside IEMA guidance, has also been drawn on to assess impacts on human health in this chapter. The approach also reflects relevant HIA guidance from the local authorities affected by the *Proposed Development*.
- 17.4.3 Prior to IEMA's guidance being issued in November 2022 there was no guidance which provided a justified definition of, or methodology for, determining the significance for health effects. The Scoping Report and PEIR therefore presented a proposed methodology for an assessment based upon HUDU's Rapid HIA Toolkit which would identify positive, neutral, negative or uncertain effects without a judgement as to whether these effects were significant. The IEMA guidance (developed by IEMA and specialists in the human health field) provides a methodology for determining the significance of health effects and therefore has been adopted in preference to the methodology proposed at Scoping.
- 17.4.4 The impacts of the *Proposed Development* on Human Health are assessed qualitatively using professional judgement, best practice, and drawing upon other assessments within the ES. The assessment of effects on human health draws on other EIA topic assessments of relevance to human health and its wider determinants, as set out above.
- 17.4.5 Effects are defined as follows:
- **Beneficial** classifications of significance indicate an advantageous or beneficial effect on human health, which may be minor, moderate or major in effect;
 - **Adverse** classifications of significance indicate a disadvantageous or adverse effect on human health, which may be minor, moderate or major in effect;
 - **Negligible** classifications of significance indicate imperceptible effects on human health; and
 - **No effect** classifications of significance indicate that there are no effects on human health.
- 17.4.6 Duration of effect is also considered, with more weight given to longer-term or permanent changes than to shorter-term or temporary ones. Typically, short-term effects will be those considered less than two years in length, medium term effects are between two to five years in length, and long-term effects are considered longer than five years in length.
- 17.4.7 'Significance' reflects the relationship between the magnitude of the impact and the sensitivity of the affected receptor. As such, the significance criteria of human health effects has been assessed based on the expert judgment and professional experience of the author, and relies on the following considerations:
- **Sensitivity of receptors:** specific values in terms of sensitivity are not attributed to human health receptors due to their diverse nature and scale; however, the

assessment takes account of the qualitative (rather than quantitative) sensitivity of relevant populations and sub-populations and their ability to respond to change; and

- **Magnitude of impact:** this entails consideration of the size of the effect on people or receptors in the context of the area in which effects will be experienced.

17.4.8 Criteria for receptor sensitivity and impact magnitude have been set out below. The significance of effect matrix has been provided following the receptor sensitivity and impact magnitude criteria.

Receptor Sensitivity

17.4.9 Sensitivity of population health is driven by a number of factors which are set out in **Table 17-6**, and are based on guidance set out by IEMA.

Table 17-6: Human Health Sensitivity Criteria – Population Health

Sensitivity level	Sensitivity criteria
High	High levels of deprivation (including pockets of deprivation); reliance on shared resources (between the population and the 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 dependent); people with good health status; and/or people with a very high capacity to adapt.

Source: Adapted from: IEMA Guide to Determining Significance for Health (Table 7.1).

Magnitude

17.4.10 Magnitude of impact is driven by a number of factors which are set out in **Table 17-7**, based on guidance set out by IEMA.

Table 17-7: Human Health Magnitude of Impact Criteria

Magnitude level	Magnitude criteria
High	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) or 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 moderate 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
Very Low	Negligible exposure or small scale; very short-term duration; one off frequency; severity predominantly relates to minor change in quality of life; very few people affected; immediate reversal once activity complete; no service quality implications.

Source: Adapted from: IEMA Guide to Determining Significance for Health (Table 7.2).

Significance Criteria

17.4.11 Human Health effects are a reflection of the relationship between the sensitivity of the affected receptor and the magnitude of the impact. **Table 17-8** below shows how the assessment of the significance of effects is arrived upon. Significant effects are shown by the shaded cells. Where two options are shown for the assessment of significance (e.g., minor/negligible), professional judgement is used to determine which of the two options is most appropriate.

Table 17-8: Impact Assessment and Significance

Magnitude of Impact	Sensitivity of Receptor			
	High	Medium	Low	Very Low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

17.4.12 In accordance with the methodology set out in *Chapter 5: EIA Methodology*, the following criteria is applied:

- ‘Moderate’ or ‘Major’ effects are classed as ‘**significant**’;
- ‘Minor’ effects are classed as ‘**not significant**’, although they may be a matter of local concern; and
- ‘Negligible’ effects are classed as ‘**not significant**’.

Assumptions and Limitations

17.4.13 The assessment of the significance of human health effects has been carried out against a benchmark of current human health baseline conditions prevailing around the *Proposed Development*, as far as is possible within the limitations of such a dataset. Baseline data is subject to a time lag between collection and publication. As with any dataset, these

conditions may be subject to change over time which may influence the findings of the assessment. Baseline conditions reported in *Section 17.5* regarding human health are based on latest data available at the time of writing.

- 17.4.14 The assessment of likely health effects arising from the *Proposed Development* is based on professional judgement, drawing on relevant guidance, from public bodies such as the IEMA, as set out in *Section 17.4*. It considers both the potential beneficial and adverse impacts that the *Proposed Development* is likely to have on human health.
- 17.4.15 At the time of writing, COVID-19 is no longer leading to restrictions in the UK and is having a reduced impact on daily life. However, the COVID-19 pandemic may influence the discussion on health in this chapter. This is because the data used in this section varies by year, with some data being derived from 2020, when the UK was impacted by the COVID-19 pandemic. However, the construction, operation and subsequent decommissioning of the *Proposed Development* is not expected to have any direct and indirect impacts in relation to COVID-19.
- 17.4.16 Relevant assumptions and limitations in related assessments are set out in their respective topic chapters.

17.5 Baseline Conditions and Study Area

- 17.5.1 This section describes the baseline environmental characteristics for the *Proposed Development* and surrounding areas with specific reference to human health. First, a demographic and health profile of the local population is set out. Secondly, existing local infrastructure relevant to the health assessment is summarised; this draws largely on *Chapter 16: Socio-Economics of ES Volume II* and includes residential properties, community facilities and recreational routes such as Public Rights of Way (PRoW).

Study Area

- 17.5.2 At present, a wide definition of the spatial area for consideration for the health assessment applies. This includes the DCO Site Boundary, along with the surrounding areas based on administrative boundaries to align with how the Government publishes official data and with the boundaries of health service planning areas, which are typically at district / unitary level.
- 17.5.3 For the purposes of the assessment, the Baseline environment section is split into two sections reflecting that they have different Study Areas: Health Profile; and Sensitive Receptors.
- 17.5.4 In respect of the Health Profile, the Local Authorities areas (North East Lincolnshire Council, North Lincolnshire Council, as well as East Lindsey District Council, and West Lindsey District Council which are within Lincolnshire County Council), are regarded as the 'Study Area', and the data for this area are compared to the relevant regions (East Midlands and Yorkshire and the Humber) and England as a whole, with no segregation to reflect the different route sections.
- 17.5.5 For Sensitive Receptors, the Study Area is defined based on that defined by other topics for each environmental aspect of relevance to health and wellbeing (namely socio-economics, air quality, noise and vibration, and traffic and transport) and are as set out in the relevant chapters of this ES.

Health Profile Baseline

- 17.5.6 The baseline data takes account of relevant local authority, regional and national statistics. These describe the characteristics of people and households by area and are built on information including age, ethnicity, deprivation, and population change.

17.5.7 The local Study Area statistics that are discussed in the following sections show, where available, Census (2021) data for the above areas, and from Public Health England (2017-2020) for characteristics where Census 2021 data is yet to be released. Given the large number of unitary level areas under consideration, tables have been used to display the relevant data as follows.

Population

17.1.1 **Table 17-9** below shows the total population of the Wards and Counties considered for the community profile based on the 2021 Census from the ONS (Ref 17-30). There are 564,200 people in the four local authorities, which cross the regional borders of the East Midlands and Yorkshire and the Humber.

Table 17-9: Population of Study Area

Council areas / Regions / National	Total population
Unitary Council areas	
North East Lincolnshire	157,000
North Lincolnshire	169,700
East Lindsey	142,300
West Lindsey	95,200
Regions	
East Midlands	4,880,100
Yorkshire and The Humber	5,480,800
National	
England	56,490,000

Source: Census, ONS, 2021

Age breakdown

17.1.2 The age profile of a community or population can help to indicate any future trends, any signs of an ageing population and sets out the requirements of future generations.

17.1.3 As shown in **Table 17-10**, data from the 2021 Census (Ref 17-30) shows that all of the local authorities considered (North East Lincolnshire, North Lincolnshire, East Lindsey and West Lindsey) have a lower percentage of working age population cohorts (aged between 16-64) compared to the national average of 63.0%, with East Lindsey the lowest at 54.9%. This is also true when compared to regional proportions. Conversely, all four local authorities have larger proportions of people aged 65 and over than the national average of 18.4%. This is a theme that is consistent when also comparing to regional averages.

Table 17-10: Percentage of population in Age Range

District/ Regional / National level	Percentage of population in age range	
	16-64 (%)	65+ (%)
North East Lincolnshire	60.3%	20.9%
North Lincolnshire	60.2%	22.0%
East Lindsey	54.9%	30.5%
West Lindsey	57.9%	25.2%
East Midlands	62.4%	19.5%
Yorkshire and The Humber	62.4%	19.0%

District/ Regional / National level	Percentage of population in age range	
	16-64 (%)	65+ (%)
England	63.0%	18.4%

Source: Census, ONS, 2021.

Ethnicity

17.1.4 **Table 17-11** below, from the 2021 Census (Ref 17-30), shows the number of people stating their ethnicity as non-White (not any White category) as a percentage of the total number of respondents to the survey.

Table 17-11: Ethnicity

District/ Regional / National level	Ethnicity (% of population not White)
North East Lincolnshire	3.8%
North Lincolnshire	5.7%
East Lindsey	2.2%
West Lindsey	3.0%
East Midlands	14.3%
Yorkshire and The Humber	14.6%
England	19.0%

Source: Census 2021, ONS

17.5.8 The four local authorities in the Study Area each have substantially smaller proportions of non-White residents compared to the national average of 19.0% of the population. This is also true at a regional level.

Education, Skills and Training

17.5.9 Education, skills, and training are important socio-economic factors with potential to influence a person’s lifestyle, self-efficacy, employment, income and quality of housing and health. Baseline data for the education, skills and training are provided in *Chapter 16: Socio-economics*.

Employment and Economic Activity

17.5.10 The 2021 Census also provides data on economic activity (Ref 17-30), which can indicate trends in employment, unemployment, and economic inactivity within an area.

17.5.11 In 2021, the proportion of economically active working age people in the Study Area averaged between 47.6% (East Lindsey) and 55.9% (North Lincolnshire). All of the local authorities in the Study Area presented a lower proportion of economically active working age people than nationally (58.6%).

17.5.12 As seen in the economically active trends in **Table 17-12**, unemployment varies among the local authorities in the Study Area. This ranges from as low as 2.2% in West Lindsey to 2.8% in North East Lincolnshire. All of the local authorities in the Study Area have a lower proportion of unemployment than recorded nationally (2.9%).

Table 17-12: Economic Activity

District/ Regional / National level	Economically Active	
	16-64 economically active	16-64 unemployed
North East Lincolnshire	55.4%	2.8%
North Lincolnshire	55.9%	2.6%

District/ Regional / National level	Economically Active	
	16-64 economically active	16-64 unemployed
East Lindsey	47.6%	2.7%
West Lindsey	54.4%	2.2%
East Midlands	57.5%	2.4%
Yorkshire and The Humber	56.2%	2.7%
England	58.6%	2.9%

Source: Census 2021, ONS.

Indices of Multiple Deprivation

17.5.13 The Index of Multiple Deprivation (2019) Deprivation Score (IMD score) (Ref 17-31) is an overall measure of multiple deprivation experienced by people living in an area. The 2019 Indices of Deprivation are based on 37 indicators across seven domains of deprivation. These are combined using appropriate weighting to give an overall IMD score. Using a standardised scoring system like this allows areas to be compared based on their overall deprivation.

17.5.14 Baseline data for the Indices of Multiple Deprivation are provided in *Chapter 16: Socio-economics*.

Life Expectancy

17.5.15 The most recent life expectancy data, shown in **Table 17-13** considers a three-year period from 2018 to 2020, sourced from the latest published Public Health England (now UKHSA) data (Ref 17-32). There is a relatively low spread of life expectancy by gender across the unitary local authorities in the Study Area, ranging from 78.0 to 79.5 for males and 81.6 to 83.4 for females. Only West Lindsey represents a higher life expectancy for both males and females than the national average (79.4 for males, 83.1 for females) however, this is only marginally different.

Table 17-13: Life Expectancy

Local / Regional / National level	Life Expectancy Males	Life Expectancy Females
North East Lincolnshire	78.0	82.2
North Lincolnshire	78.7	82.7
East Lindsey	78.2	81.6
West Lindsey	79.5	83.4
East Midlands region	79.2	82.7
Yorkshire and the Humber region	78.4	82.2
England	79.4	83.1

Source: Life expectancy at birth, Public Health England, 2018-2020

Health, Wellbeing and Mortality

17.5.16 **Table 17-14** provides a profile of health and wellbeing in the area surrounding the *Proposed Development*, focusing on key indicators identified by Public Health England (Ref 17-33) at local authority level including a comparison of these to regional and national averages.

Table 17-14: Key Health Indicators

Indicator	North East Lincolnshire	North Lincolnshire	East Lindsey	West Lindsey	East Midlands region	Yorkshire and the Humber	England
Under 75 mortality rates from all cardiovascular diseases, 2021	86.9	93.7	110.5	67.4	81.9	86.8	76.0
Admission episodes for alcohol-related conditions (Narrow), 2021/22	493.6	474.7	566.0	435.5	535.6	532.8	494.0
Percentage of physically active adults, 2020/21, %	63.7	58.3	62.5	67.1	64.5	65.2	65.9
Percentage of adults (aged 18+) classified as overweight or obese, 2020/21	67.6	67.6	62.4	67.3	66.6	66.5	63.5
Under 75 mortality rate from cancer, standardised rate, per 100,000, 2021	159.9	125.8	132.2	111.1	125.8	131.0	121.5

Source: Local Authority and Regional Health Profiles, Public Health England, 2017-2020.

17.5.17 Due to the length of the *Proposed Development*, the pipeline route has been split into five sections along the route, based on key road intersections, to aid in providing clear, concise descriptions of the existing baseline. This follows the structure also detailed in *ES Volume II Chapter 16: Socio-economics (Application Document 6.2.16)*; see this chapter for full details on relevant socio-economic and community receptors definition.

Section 1 – Immingham to A180

17.5.18 Section 1 describes the portion of the *Proposed Development* between the Immingham Facility near South Killingholme and the town of Immingham. This portion is within North Lincolnshire and North East Lincolnshire. Section 1 consists primarily of agricultural land, lying close to the residential units and the town centre of Immingham, and is traversed by public footpaths, local access roads and two major roads. Within this section, receptors are described as they are found within the Study Area following a transect from the Immingham Facility southwards.

Healthcare facilities

17.5.19 There are no hospitals within the DCO Site Boundary in Section 1. There are two GP surgeries within the DCO Site Boundary, which are Pilgrim Primary Care Centre and the Killingholme Surgery.

Public Rights of Way (PROW)

17.5.20 Two PROWs, serving South Killingholme, Immingham and Habrough, traverse Section 1 and there are also a number of other PROWs outside of, but close to, the DCO Site Boundary.

17.5.21 The DCO Site Boundary is also within the proposed Protected Landscape Impact Risk Zone of the English Coastal Path – Mablethorpe to Humber Bridge.

Private assets

17.5.22 There are a number of community facilities within the Study Area in Section 1, including primary schools, a secondary school and a library. See *Chapter 16: Socio-economics* for further details. There are no residential properties within the DCO Site Boundary in Section 1, however, there are a number of rural properties and farmhouses, with associated

agricultural buildings, in the Study Area. The residential properties closest to the DCO Site Boundary are on Immingham Road (B1210), near the junction with Mill Lane, approximately 50m from the DCO Site Boundary. The large residential settlement of Immingham is approximately 1km south east of the DCO Site Boundary.

17.5.23 There are a number of industrial buildings, adjacent to the Immingham Facility, as detailed in *Chapter 16: Socioeconomics*.

Section 2 – A180 to A46

17.5.24 Section 2 describes the portion of the *Proposed Development* between the town of Immingham and the village of Laceby. This portion is within North East Lincolnshire and West Lindsey. Section 2 consists primarily of agricultural land and is traversed by public footpaths, local access roads and three major roads. Within this section, receptors are described as they are found within the Study Area following a transect from the town of Immingham southwards.

Healthcare facilities

17.5.25 There are a number of healthcare facilities in the Section 2 Study Area. These include the following GP surgeries all located in Grimsby:

- Stirling Medical Centre;
- Quayside Medical Centre;
- Weelsby View Health Centre;
- Birkwood Surgery;
- Cromwell Primary Care Centre;
- Church View Health Centre;
- Freshney Green Primary Care Centre; and
- Little Coates Road Medical Surgery.

17.5.26 There are also two hospitals within Section 2. These are Diana, Princess of Wales Hospital and St Hugh's Hospital both located in Grimsby.

Public Rights of Way (PROW)

17.5.27 Five PROW, serving Habrough, Stallingborough, Keelby, Laceby, and Irby upon Humber, traverse the Section 2 route alignment. There are also a number of other PROW within the Study Area.

Private assets

17.5.28 There are a number of community facilities within the DCO Site Boundary of Section 2, including primary schools, secondary schools, and a library. See *Chapter 16: Socioeconomics of ES Volume II* for further details. There are no residential properties within the DCO Site Boundary in Section 2, however, there are a number of rural properties and farmhouses, with associated agricultural buildings, in the Study Area. The residential properties closest to the DCO Site Boundary are on Keelby Road, Stallingborough, approximately 50m from the DCO Site Boundary. The villages of Aylesby (0.5km east), and Laceby (1km east) are also located within the Study Area. There are no business premises within the DCO Site Boundary in Section 2. However, there are a number of business premises serving agricultural, commercial and tourism purposes in the Study Area.

Section 3 – A46 to Pear Tree Lane

17.5.29 Section 3 describes the portion of the *Proposed Development* between the village of Laceby and the village of Ludborough. This portion is within North East Lincolnshire and East Lindsey. Section 3 consists primarily of agricultural land and is traversed by public footpaths, local access roads and two major roads. Within this section, receptors are described as they are found within the Study Area following a transect from the village of Laceby south-eastwards.

Healthcare facilities

17.5.30 There are three hospitals, namely, Diana Princess of Wales Hospital, St Hugh's Hospital (mentioned above), and Bradley Woodlands Independent Hospital all located in Grimsby. There are GP Surgeries located within the Study Area in Section 3, which are North Thoresby Practice, Holton-Le-Clay Practice and Scartho Medical Centre. There is one hospice; St Andrew's Hospice.

Public Rights of Way (PROWs)

17.5.31 Eight PROW, serving Irby upon Humber, Barnoldby le Beck, Brigsley, Ashby cum Fenby, and North Thoresby, are located within the DCO Site Boundary in the Section 3 route alignment. There are also a number of other PROW within the Study Area.

17.5.32 The DCO Site Boundary is also within the proposed Protected Landscape Impact Risk Zone of the English Coastal Path – Mablethorpe to Humber Bridge.

Private assets

17.5.33 Section 3 is located in close proximity to a number of small villages and hamlets, where there are some community facilities and social infrastructure in close proximity to the Study Area.

17.5.34 There are no residential properties within the DCO Site Boundary in Section 3, however, there are a number of rural properties and farmhouses, with associated agricultural buildings, in the Study Area. The residential properties closest to the DCO Site Boundary are at Moorhouse Farm, Ashby cum Fenby, approximately 50m from the DCO Site Boundary. The villages of Irby upon Humber (0.5km west), Barnoldby le Beck (0.5km north east), Brigsley (0.5km north east), Ashby cum Fenby (0.5km east), and Ludborough (1km west) are also located in the Study Area.

Section 4 – Pear Tree Lane to B1200

17.5.35 Section 4 describes the portion of the *Proposed Development* between the village of Ludborough and the village of Grimoldby. This portion is wholly within East Lindsey. Section 4 consists primarily of agricultural land and is traversed by public footpaths and local access roads. Within this section receptors are described as they are found within the Study Area following a transect from the village of Ludborough south-eastwards.

Healthcare facilities

17.5.36 There is one hospital within the Study Area in Section 4, which is the County Hospital for Louth. There are two GP Surgeries; James Street Surgery and Newmarket Medical Practice, both located in Louth. There is also Louth Hospice, located to the north of Louth.

Public Rights of Way (PROWs)

17.5.37 Seven PROWs, serving Covenham St Bartholomew, Covenham St Mary, Little Grimsby, Alvingham, North Cockerington, and Louth, traverse the DCO Site Boundary in Section 4. There are also a number of other PROWs outside of, but close to, the DCO Site Boundary in Section 4.

17.5.38 The DCO Site Boundary also lies within the proposed Protected Landscape Impact Risk Zone of the English Coastal Path – Mablethorpe to Humber Bridge.

Private assets

17.5.39 There are a number of community facilities within the Study Area, including primary schools, two secondary schools and a library. See *Chapter 16: Socio-economics* for further details. There are no residential properties within the DCO Site Boundary in Section 4, however, there are a number of rural properties and agricultural buildings in close proximity in the Study Area. There are no business premises within the Study Area in Section 4.

Section 5 – B1200 to reception facility at Theddlethorpe

17.5.40 Section 5 describes the portion of the *Proposed Development* between the B1200 Manby Middlegate south of the village of Grimoldby and the Theddlethorpe Facility. This portion is wholly within East Lindsey District Council. Section 5 consists primarily of agricultural land and is traversed by public footpaths and local access roads. Within this section receptors are described as they are found within the Study Area following a transect from south of the village of Grimoldby eastwards.

Healthcare facilities

17.5.41 There are no hospitals within the Study Area in Section 5. There is one GP Surgery, the Marisco Medical Practice, located in Louth.

Public Rights of Way (PROW)

17.5.42 Four PROW, serving Gayton le Marsh, Theddlethorpe All Saints, Theddlethorpe St Helen, and Mablethorpe, traverse Section 5. There are also a number of other PROWs within the Study Area of Section 5. For all Sections 1-5, the DCO Site Boundary also lies within the proposed Protected Landscape Impact Risk Zone of the English Coastal Path – Mablethorpe to Humber Bridge.

Private assets

17.5.43 There are a number of community facilities within the Study Area, including a primary school, as detailed in *Chapter 16: Socio-economics*. There is one residential property and one agricultural building within the Study Area in Section 5, as well as a number of rural properties and agricultural buildings in the Study Area. The villages of Theddlethorpe All Saints (0.5km north) and Theddlethorpe St Helen (1km north) are located within the Study Area. The town of Mablethorpe is also within the Study Area, adjacent to the south of the DCO Site Boundary at the Theddlethorpe Facility. There are no business premises within the DCO Site Boundary.

Sensitive receptors

17.5.44 An overview of the sensitive receptors relevant to the assessment is provided for the following chapters of the *ES Volume II*:

- Chapter 7: Landscape and Visual;
- Chapter 12: Traffic and Transport;
- Chapter 13: Noise and Vibration; and
- Chapter 14: Air Quality.

Sensitive Receptors Baseline

Landscape and Visual

17.5.45 *Chapter 7: Landscape and Visual* of this ES identifies a general study area of 1km from the DCO Site Boundary for the landscape and visual assessments. In proximity to the Immingham Facility and the Theddlethorpe Facility the Study Area has been extended to 2

km from the DCO Site Boundary. The Lincolnshire Wolds Area of Outstanding Natural Beauty (AONB) and an area identified as an Area of Great Landscape Value (AGLV) lies within the western part of the pipeline route (Section 3) study area for landscape and visual.

17.5.46 At the national level, the landscape and visual study area falls within parts of the following Natural England National Character Areas (NCAs):

- NCA 41: Humber Estuary;
- NCA 42: Lincolnshire Coast and Marshes; and
- NCA 43: Lincolnshire Wolds.

17.5.47 The Study Area also encompasses several regional level Regional Character Areas (RCA) and Local Character Areas (LCA). These include a variety of marshland features, the Wolds, shallow coastal waters, and fens.

17.5.48 As part of the assessment of the Visual baseline, a number of Zones of Theoretical Visibility (ZTV) have been produced. The ZTV for the Immingham Facility and both options for the Theddlethorpe Facility (option 1 and option 2) has been prepared based upon the tallest structures, i.e., the single permanent vent at both sites, at up to 25 m above ground level (AGL). ZTV for the Block Valve Stations have been produced using the height of the largest anticipated structures at 4 m. AGL. A ZTV for the pipeline route has been produced using the height of the anticipated construction vehicles at 3.5 m AGL. These present a worst-case scenario, in order to identify the likely maximum extent of theoretical visibility of the *Proposed Development*. More information on the ZTVs can be found in *Chapter 7: Landscape and Visual*.

Traffic and Transport

17.5.49 Within *Chapter 12: Traffic and Transport*, the Study Area includes key roads that will be regularly used through the construction and operational phases of the project. *Chapter 12: Traffic and Transport*, details the baseline highway conditions across each of the five sections of the chapter's Study Area, according to the following sub-categories:

- Surrounding Highway Network;
- Surrounding Public Rights of Way (PRoW) and National Cycle Network (NCN);
- Baseline Traffic Flows; and
- Personal Injury Collision (PIC) Analysis.

17.5.50 The following strategic and primary links will likely be used by construction vehicles to access the *Proposed Development*:

- A160 and the A1173 which is a continuation of the A160;
- A180;
- A18;
- A46;
- A16;
- A157;
- A1104;
- A1031.
- B1200;

- B1203;
- B1210;
- Wells Road;
- Thoroughfare;
- Pear Tree Lane; and
- Three Bridge Lane.

17.5.51 Alongside these, a variety of smaller routes are also included in *Chapter 12: Traffic and Transport* for assessment purposes to account for proposed routing to the spread. The main baseline data considered fundamental to the assessment of traffic and transport effects is traffic flow data and road safety analysis through Personal Injury Accident (PIA) data. The details of these studies can be seen from *Table 12-8* to *Table 12-26* in *Chapter 12: Traffic and Transport*. In general, the majority of the roads in the baseline study are heavily trafficked by HGVs, given the industrial nature of the businesses within the surrounding area.

Noise and Vibration

17.5.52 The Study Area for construction and operational noise effects includes receptors within 500m of the Theddlethorpe Facility, Block Valve Stations and within 300m of the DCO Site Boundary. There are no identified Noise Important Areas and Noise Action Plan Priority Areas within the Study Area.

17.5.53 As noted in *Chapter 13: Noise and Vibration*, the nearest sensitive receptor to operational facilities are 120 m away. At this distance, it is unlikely that operational vibration would be perceptible. Consequently, potential operational vibration would not result in likely significant effects and an assessment has been scoped out of the assessment in this chapter.

17.5.54 The likely sensitive receptors to noise associated with the construction and operation of the Project include the following:

- Residential: Individual dwellings and private open spaces; and
- Non-residential: community facilities such as schools, hospitals, places of worship, and noise sensitive commercial properties.

17.5.55 A number of receptors that may potentially be affected have been considered in this assessment. The sensitive receptors considered are the nearest receptors to the Project (i.e., the receptors that will experience the highest levels of noise and vibration). Although noise and vibration may be perceivable at other receptors in the area around the Project, effects will not be significant if they are suitably controlled at the identified receptors. Baseline noise monitoring will be carried out to establish the existing noise climate in the area.

17.5.56 In addition to this, the baseline also covers the Meteorological conditions of the area, and notes the survey results and observations, the findings of which can be found in *Chapter 13: Noise and Vibration*.

Air Quality

17.5.57 Air pollution is deemed to be one of the greatest environmental risks to the health of the UK public. Where an air quality objective set by the government is exceeded and identified at a receptor point, an Air Quality Management Area (AQMA) is declared. As outlined in *Chapter 14: Air Quality* of this PEIR. The methodological approach to defining the spatial extent of the Study Area for air quality has been informed by Institute of Air Quality Management

(IAQM) guidance documents. Using this, an area within 10 km of the Draft Order Limits has been considered with respect to published baseline information on existing air quality.

17.5.58 The following Study Areas have been used where an assessment of dust emissions generated by construction activities is required:

- An amenity or human health sensitive receptor within:
 - 350 m of the limits of construction activity within the DCO Site Boundary; or
 - 50 m of the construction route on the public highway, up to 500 m from the site entrance(s).
- An ecological receptor within:
 - 50 m of the limits of construction activity within the Draft Order Limits; or
 - 50 m of the construction route on the public highway, up to 500 m from the site entrance(s).

17.5.59 As a result of this, the Study Area is effectively 350m from the DCO Site Boundary.

17.5.60 For the Project, there are three Air Quality Management Areas (AQMA), and as part of Local Air Quality Management (LAQM) duties, local authorities are required to monitor pollutant concentrations. More information on pollutant concentrations in these areas can be found in *Chapter 14: Air Quality*.

Future Baseline

17.5.61 Observing trends in population from *Chapter 16: Socio-economics* shows that the population for the socio-economics study area, at a national level, is trending towards a smaller working age population and a growing elderly (65+) population. Other trends covered in the health baseline do not have future projections and are difficult to project due to a large number of influencing factors which are currently unknown. Therefore, in lieu of this information, the current baseline factors have been assumed to be the same for the future baseline.

17.6 Development Design and Embedded Mitigation

17.6.1 EIA is an iterative process which informs the development of the project design. Where the outputs of the preliminary assessment identify likely significant effects, changes to the design can be made or mitigation measures can be built-in to the proposal to reduce these effects.

17.6.2 This type of mitigation is defined as embedded mitigation, as mitigation measures which have been identified and adopted as part of the evolution of the project design (“embedded” into the project design).

17.6.3 The design of the *Proposed Development* has been further developed to reflect the findings of ongoing environmental studies, comments raised during the statutory consultation and ongoing engagement with stakeholders. As the design has developed, embedded mitigation measures have been refined as part of an iterative process. In terms of the Human Health assessment in this ES, the *Proposed Development* has been designed to take into account sensitive receptors, including human receptors, such as by positioning infrastructure to avoid receptors such as PRow, residential properties and communities as far as possible.

17.6.4 Embedded mitigation measures are incorporated and secured into the *Proposed Development* as set out in the respective chapters to reduce other construction and operational effects (such as noise and vibration, air quality, transport and access and socio-economics and land use). In turn will mitigate the effects on the local community and existing facilities from a human health and wellbeing perspective. This has been considered for both

the potential impacts considered in *Section 17.7* and the assessment of residual effects in *Section 17.9*.

17.6.5 The health assessment is presented in *Section 17.7* of this ES chapter. Where there are assessed to be adverse health impacts in the assessment, the implementation of additional mitigation measures has been considered in order to avoid or minimise the human health impact.

17.7 Potential Impacts and Assessment of Effects

Introduction

17.7.1 The *Proposed Development* as outlined in *Chapter 3: Description of the Proposed Development of ES Volume II* has been considered in assessing the likely impacts and effects, whilst also considering the embedded mitigation described in the previous section.

17.7.2 The *Proposed Development* has the potential to impact human health during construction, operation and during decommissioning, due to impacts on the following health receptors, as outlined in *Section 17.4*:

- Access to healthcare services and other social infrastructure;
- Air quality, noise, and neighbourhood amenity;
- Accessibility and active travel;
- Access to work and training; and
- Social cohesion and neighbourhoods.

17.7.3 The *Proposed Development* also has the potential to impact human health through the risks of interference with Electromagnetic Fields. The assessment of this is also covered within this section, across the three stages of the *Proposed Development*; construction, operation and decommissioning.

Assessment of Potential Impacts: Construction Phase

17.7.4 As stated in *Chapter 3: Description of the Proposed Development*, the construction period will begin in early 2025, and finish by early 2027. During this period, the gross construction workforce is anticipated to be approximately 720 gross construction workers during the peak period of construction and ranging from 21 to 677 gross construction workers during the off-peak. The *Proposed Development* is expected to be operational from early 2027. Given this, all potential impacts in this section are considered to be medium term, as the construction period is less than 24 months.

Access to healthcare services and other social infrastructure

17.7.5 Construction activities from the *Proposed Development* may restrict, or create severance to, the accessibility of hospitals, GPs and other social infrastructure for residents in the Study Area.

17.7.6 Given the peak workforce noted above, it is assumed that 720 gross construction workers will travel to the *Proposed Development* at the peak of the construction phase. For the human health effect, this is considered the maximum possible value for the workforce size and would represent the greatest possible 'worst case' effect on access to healthcare services and social infrastructure. The construction workers required to build the *Proposed Development* may place extra demand on healthcare services if they move to the area, or if emergency treatment is required.

17.7.7 As noted in *Chapter 16: Socio-economics*, the area covered by the *Proposed Development* crosses areas of high deprivation in North East Lincolnshire and East Lindsey in particular.

Alongside this, all four local authorities in the Study Area have higher proportions of an elderly population than nationally, with this age cohort relying on health services more than other age cohorts. Therefore, this health receptor is assessed to have a **high** sensitivity to effects on healthcare services.

- 17.7.8 If workers reside locally already, they will be registered at a local practice currently and will not therefore place additional demand for services on local GPs. It is unlikely that many workers would move to live in the immediate area and access the GPs noted along the Study Area. However, assuming a worst-case scenario for the human health effect assessment, whereby all of the approximate 720 peak gross construction workers required for the *Proposed Development* live locally and require places at local GPs, then this demand would be facilitated by the existing facilities. This is because of the large number of GPs noted in the Study Area, which means that the provision of healthcare services will not be affected by the increase in demand through the *Proposed Development*. The effect on healthcare services would be limited. Based on this the magnitude of impact is assessed to be **very low**.
- 17.7.9 Therefore, the likely effect on human health arising from impacts on access to healthcare services during the construction phase of the *Proposed Development* is assessed to be **minor adverse**. This is considered not significant.
- 17.7.10 Residents of properties in the villages surrounding the *Proposed Development* attempting to access healthcare facilities are likely to use the same strategic roads as construction traffic associated with the *Proposed Development*. Increased traffic flows and severance effects may inhibit local residents' ability to access healthcare facilities.
- 17.7.11 For this impact, the sensitivity of the receptor is also assessed to be **high**. This is because of the high levels of deprivation and high proportions of elderly residents noted within the Study Area, which typically leads to a higher reliance on healthcare services than average.
- 17.7.12 *Chapter 12: Traffic and Transport* sets out that only one significant increase in traffic flows is expected as a result of the *Proposed Development*, at link 35 Thacker Bank where a moderate, significance effect is predicted. However, through the adoption of the Construction Traffic Management Plan (CTMP) and Construction Worker Travel Plan (CWTP), measures will put in place to limit any such impact as far as reasonably possible. Furthermore, the effect itself is attributable to the low baseline traffic flows, thus artificially increasing the percentage increase.
- 17.7.13 Given that, as detailed in *Chapter 12: Traffic and Transport*, there is only one road identified as significantly affected by the construction activities of the *Proposed Development*, only a small proportion of residents in the transport study area are likely to be affected by the increase in traffic, which is not likely to be sustained throughout the construction phase. The duration of the effect is less than 2 years, which is considered a medium-term effect. As mentioned previously, the adoption of the CTMP and the CWTP will also act to manage the congestion of the affected road and mitigate impacts where possible. Based on these factors, the magnitude of impact is expected to be **very low**.
- 17.7.14 The likely effect on human health arising from impacts on healthcare infrastructure during the construction phase of the *Proposed Development* is assessed to be **minor adverse**. This is considered not significant.

Air quality, noise, and neighbourhood amenity

- 17.7.15 Through the construction activities of the *Proposed Development*, there could be an increase in noise, and a reduction in air quality, leading to potential adverse health effects on residents, and disruption to local amenities.
- 17.7.16 As above for assessing the access to healthcare services and other social infrastructure, the sensitivity of this health receptor is assessed to be **high**. This is because of the high

deprivation in North East Lincolnshire and East Lindsey, and the higher proportion of elderly population age cohorts than nationally.

17.7.17 *Chapter 7: Landscape and Visual* provides an assessment of the potential disruption to landscape and visual receptors as a result of the construction phase of the *Proposed Development*. There are several receptors identified for both the landscape and visual assessment; for landscape, a moderate adverse impact is identified for Lincolnshire Wolds AONB, which is significant. For visual, there are four moderate adverse impacts, at the following locations:

- Viewpoint 6: PRoW NELC 16 Walk Lane, Irby Upon Humber (Lincolnshire Wolds AONB)
- Viewpoint 7: PRoW NELC 17 Welbeck Hill, Irby Upon Humber (Lincolnshire Wolds AONB)
- Viewpoint 8: PRoW NELC 122 Welbeck Hill, Irby Upon Humber (Lincolnshire Wolds AONB)
- Viewpoint 17: Station Road, Ludborough.

17.7.18 For these visual impacts, mitigation measures are proposed through the CEMP Policy C6 however these would not result in changes to the significance of effects. The Irby Upon Humber effects lie within the local authority of North East Lincolnshire, with the significant effect at Ludborough lying within the local authority of East Lindsey.

17.7.19 *Chapter 13: Noise and Vibration* provides an assessment on the potential disturbance to local ecological and heritage receptors from noise and vibration during the construction phase. Through construction activities, there are noted to be a number of noise impacts that exceed Significant Observed Adverse Effect Level (SOAEL) and therefore have the potential to be significant. To reduce construction noise, a number of mitigation measures will be used, including the use of acoustic fencing, a good communication strategy with local residents, and obtaining Section 61 consents if necessary. Consequently, there are anticipated to be no significant residual effects in respect of noise and vibration due to the construction activities.

17.7.20 *Chapter 14: Air Quality* assesses the risk of dust and particulate matter impacts during the construction stage, as well as potential air quality effects. The chapter demonstrates that existing air quality within the Study Area is of a good standard, with pollutant concentrations well within the objective values set for the protection of human health. It also details that there are some dust and air quality sensitive receptors close enough to the route corridor in Section 5 that have the potential to be significantly affected by the construction of the *Proposed Development*. However, all well managed construction sites across the UK will implement best practice dust control measures as standard and effects would be mitigated such that they are not significant. As such there are anticipated to be no significant residual effects in respect of air quality due to the construction of the *Proposed Development*.

17.7.21 The findings of the relevant chapters detailed above suggest that there will be no residual significant effects on air quality, noise and vibration receptors through the construction phase. For landscape and visual impacts, significant residual effects will occur in the Lincolnshire Wolds AONB and Ludborough area, which could affect neighbourhood amenity in these two areas. All but one of these effects are from PRoWs, with the additional visual receptor being of low visual value according to the respective chapter. Impacts on quality of life arising from these would be limited to users of these whose use and experience of views would be transitory or for shorter periods of time. All visual impacts are medium-term in duration and likely to be intermittent in nature over the construction phase. Taking into account that residents across the Study Area would experience no air quality, noise or vibration, and significant landscape and visual effects would be limited in extent with

mitigation proposed to minimise effects wherever possible, the magnitude of impact is expected to be **very low**.

17.7.22 Therefore, the likely effect on human health arising from impacts on Air quality, noise, and neighbourhood amenity during the construction phase of the *Proposed Development* is assessed to be **minor adverse**. This is considered not significant.

Accessibility and active travel

17.7.23 Construction activities from the *Proposed Development* may intersect, or otherwise impact upon, the accessibility of PROW, open space and active travel networks in the Study Area.

17.7.24 As set out in the baseline section above, there is an extensive existing network of PROW in the area. Multiple PROW traverse the route alignment, including five in section 2, eight in Section 3, seven in Section 4 and four in Section 5. The PROW in the Study Area do not connect rural areas to more urban areas or business parks and are therefore unlikely to be used for commuting. Given this, in combination with the adequate to good health of the population in the surrounding local authorities, the sensitivity of the local population with regard to access to open space and travel is assessed to be **medium**.

17.7.25 The *Proposed Development* has been designed to have minimal to no impact on PROW and should not require any PROW closures or diversions. Within the DCO Site Boundary, The Public Rights of Way Management Plan (PROW MP, *Application Document 6.11*) includes measures such as fencing and a minimum 15 m buffer from the path centreline, which will be implemented to ensure that PROW access is unaffected throughout construction.

17.7.26 Where PROW impacts are not covered by this mitigation, PROW routes may be temporarily slightly altered (for example, moving from one side of a road to another). In a worst-case scenario, where PROW require diversions, these will be short-term in duration.

17.7.27 It is possible that local residents could experience adverse impacts related to their access to open space and PROW for active travel due to changes in traffic driven by the construction of the *Proposed Development*. This would only have the potential occur in one location across all sections, link 35 Thacker Bank as identified in *Chapter 12: Traffic and Transport* where there is a significant effect arising due to an increase in traffic flows where there is a low flow currently. The duration of impact would be short-term (given the approximate 12 month construction period), and rapidly reversed once the construction phase is completed. Based on this, the proportion of the population of the Study Area affected by delay in accessing open space or PROW by road would be very small. Mitigation measures will also limit any impacts as far as reasonably possible.

17.7.28 Based on these considerations, any impacts arising on users of open space and PROWs will be experienced by a very small proportion of the population and for a limited time. Therefore, the magnitude of the effect is expected to be **very low**.

17.7.29 Therefore, the effect on accessibility and active travel in respect of human health during the construction phase of the *Proposed Development* is assessed to be **minor adverse**, which is not significant.

Access to work and training

17.7.30 Construction activities at the *Proposed Development* will provide access to employment and training opportunities in this phase, which will provide a beneficial health impact to workers from the Study Area.

17.7.31 There is evidence that employment matters to health, not only from an economic standpoint but also in terms of quality of life (Ref 17-34). Good quality work protects against social exclusion through the provision of income, social interaction, a core role and identity and purpose. Therefore, the generation of jobs is assessed to be a positive outcome for health.

- 17.7.32 The sensitivity of the local workforce to employment and training changes has been assessed as **low**, due to the low number of construction jobs within the Study Area and the relatively low unemployment rate in the area.
- 17.7.33 The construction of the *Proposed Development* is anticipated to require less than 2 years, with a peak of 720 gross construction workers and an average of 317 over the construction period. As covered in *Chapter 16: Socio-economics*, taking account of displacement, indirect and induced employment, the *Proposed Development* could result in an average of 66 net additional construction jobs per annum that will be taken up by local residents living within the 60-minute Study Area and 156 by residents outside of the Study Area.
- 17.7.34 The construction jobs created will be in the renewable energy sector, specifically through the construction of low carbon capture infrastructure. As such, they will contribute to the development of skills needed for the UK's transition to net zero. Where possible, there will be a preference for local staffing, although a main driver will be hiring staff with the required skills to deliver the *Proposed Development*. It is likely that the appointed contractors will employ trainees and apprentices as part of the construction workforce.
- 17.7.35 The jobs arising from the construction phase of the *Proposed Development* would be temporary over the construction period. These would represent local jobs growth (with an estimated 66 jobs for workers living with a 60-minute drive time), although the change would be small in the context of the overall number of jobs locally. Whilst the nature of the *Proposed Development* involves the provision of infrastructure for net zero, the number of jobs created locally means that training opportunities generated will be limited in scale.
- 17.7.36 Considering the leakage level for employment, and the subsequent small size of the workforce originating from the Study Area the extent of the positive human health impact for construction employees is considered to be relatively limited. The duration of this health impact is also medium and temporary in nature. Taking these factors into consideration, the magnitude of change in health outcomes anticipated with respect to employment and income during the construction phase is therefore assessed to be **low**.
- 17.7.37 Overall, the likely beneficial effect on human health arising from changes in employment and training opportunities during the construction phase of the *Proposed Development* is assessed to be **negligible**, which is not significant.
- 17.7.38 Increased traffic flows and severance effects as a result of construction activities could also inhibit local residents' ability to access employment and training generally in the Study Area. *Chapter 12: Traffic and Transport* outlines only one significant increase in traffic flows as a result of the *Proposed Development*, at link 35 Thacker Bank where a moderate, significance effect is predicted for the duration of the construction phase. However, through the adoption of the CTMP and CWTP, measures will put in place to limit any such impact as reasonably possible, with the effect being attributable to the low baseline traffic flows, thus artificially increasing the percentage increase.
- 17.7.39 Given the traffic and transport impacts outlined, only a small proportion of residents in the Study Area are likely to be affected by the increase in traffic, which is not likely to be sustained throughout the construction phase. The duration of the overall construction phase including the pre-construction activities and site preparation work as well as the main construction period is less than 2 years; however, it is unlikely that the impacts will be sustained across the whole construction phase, and the traffic flows will also vary by hour according to the demands of the construction programme each week. As detailed above, the adoption of the CTMP and CWTP will also provide mitigation for these effects. As a result, the proportion of residents within the Study Area, that will be affected in accessing employment and training will be very small at most.
- 17.7.40 Given this, the magnitude of increased traffic flows on residents accessing employment and training opportunities is expected to be **very low**.

17.7.41 Therefore, the effect on access to employment and training opportunities in respect of human health during the construction phase of the Proposed Development is assessed to be **negligible**, which is not significant.

Social cohesion and neighbourhoods

17.7.42 Roads bordering the *Proposed Development* may be used by construction traffic which could increase traffic and community severance between neighbourhoods. This could reduce access to neighbourhood community facilities and in turn, reduce social cohesion.

17.7.43 Baseline data with respect to human health indicates that there are poorer than average health outcomes across some health factors among the local population, but others are in line with national averages. Therefore, the population is assessed to have a **medium** sensitivity.

17.7.44 As set out in *Chapter 12: Traffic and Transport*, with embedded mitigation in place, there is one road where increased traffic flows are expected, at Thacker Bank, where a moderate, significance effect is predicted. However, through the adoption of the CTMP and CWTP, measures will put in place to limit any such impact as reasonably possible, with the effect being attributable to the low baseline traffic flows, thus artificially increasing the percentage increase.

17.7.45 Increased traffic flows and severance effects may inhibit local residents' ability to access neighbouring communities and social contacts, however, the extent of this will be very limited, given that only one road is significantly affected by the *Proposed Development* across all sections and intermittently. This is given that the significant effect is driven partly by low baseline data and therefore the predicted increase in traffic per hour/minute is relatively low. The duration of impact is medium term, but the number of residents and neighbourhoods affected is low. As previously mentioned, mitigation is also in place for this effect. Given this, the resulting health impact on community severance is assessed to have a **very low** magnitude of impact.

17.7.46 Therefore, the effect on social cohesion and neighbourhoods in respect of human health during the construction phase of the Proposed Development is assessed to be **negligible**, which is not significant.

Assessment of Potential Impacts: Operational Phase

Air quality, noise, and neighbourhood amenity

17.7.47 Through the operational activities of the *Proposed Development*, there could be an increase in noise, and a reduction in air quality, leading to potential adverse health effects on residents, and disruption to local amenities.

17.7.48 As noted in the construction phase effects, the sensitivity of users to this health receptor is expected to be **high** for the operational phase. This is because of the high deprivation in North East Lincolnshire and East Lindsey, and the higher proportion of elderly population age cohorts than nationally.

17.7.49 *Chapter 7: Landscape and Visual* provides detail on the operational phase impacts, which are not expected to be significant for either the landscape or visual assessments relating to the *Proposed Development*.

17.7.50 *Chapter 12: Traffic and Transport* details that the operational phase will generate only a negligible amount of traffic, and therefore, this aspect of the assessment has been scoped out.

17.7.51 *Chapter 16: Socio-economics* details that through the *Proposed Development*, employment and training opportunities are expected to be limited in the operational phase, and therefore, the assessment of these effects was also scoped out.

17.7.52 Given this, traffic generation from operational staff is not expected to induce significant changes to traffic flows on the local road network and is therefore not expected to cause significant air pollution.

17.7.53 *Chapter 13: Noise and Vibration* has scoped out operational effects from the assessment, because the new pipeline itself would be installed below ground and would not produce any operational noise emissions that would be perceptible at ground level.

17.7.54 Given these assessments, there will be **no effect** on human health associated with air quality, noise, and neighbourhood amenity during the operational phase of the Scheme.

Accessibility and active travel

17.7.55 Through the operation phase activities of the *Proposed Development*, there may be severance to PROW, open space and active travel networks in the Study Area, leading to worsened health outcomes for users of these paths.

17.7.56 As above, the sensitivity of the local population with respect to access to open space and active travel is assessed to be **medium**.

17.7.57 The *Proposed Development* has been designed to ensure that there is no requirement for temporary or permanent diversions to PROW during operation.

17.7.58 As mentioned previously, the operational phase of *Chapter 12: Traffic and Transport* has been scoped out of the assessment, as there is not expected to be an increase in traffic as a result of this phase.

17.7.59 On the basis of these considerations, the magnitude of change anticipated on human health arising from impacts associated with access to open space and active travel is assessed to be **very low**.

17.7.60 Therefore, the likely effect on access to active travel in the operational phase is **negligible**, which is not significant.

Social cohesion and neighbourhoods

17.7.61 In the operational phase, roads bordering the *Proposed Development* may be used by operational staff, which could increase traffic and community severance between neighbourhoods. This could reduce access to neighbourhood community facilities and in turn, reduce social cohesion throughout this phase.

17.7.62 As before, the sensitivity of the receptor to this effect is the same as in the construction phase, which is **medium**, as the human health factors for the Study Area are largely in line with national averages.

17.7.63 Through *Chapter 16: Socio-economics*, no recreational routes or PROWs will be permanently redirected during the construction phase of the Proposed Development. Any temporary diversions will be reinstated to their original route on completion of the construction works. As previously mentioned in this section, the operational effects of the scheme covered by *Chapter 12: Traffic and Transport* have also been scoped out, and as such there would be no severance during this phase.

17.7.64 Therefore, it is concluded that there is likely to be **no effect** on human health associated with social cohesion/neighbourhoods arising from the *Proposed Development* during operation.

Assessment of Potential Impacts: Decommissioning Phase

17.7.65 The decommissioning phase of the *Proposed Development* is assumed to follow the same pattern of effects as in the construction phase. Therefore, these findings have not been re-stated here.

Electromagnetic Fields Assessment of Potential Impacts

- 17.7.66 Risks associated with EMF have been based on advice provided by the UK Health Security Agency within their Scoping Opinion response (see *Section 17.3* of this ES). Additionally, the Electric and Magnetic Fields and Health website has been used in order to gather information on the EMF risks associated with the types of infrastructure proposed (Ref 17-26). ICNIRP guidelines have been used as the reference for the recommended limits of exposure of the general public, following current government policy.
- 17.7.67 The assessment of potential EMF related effects does not follow the 'standard' EIA methodology of identifying the sensitivity of receptors and magnitude of effects to classify the effect using a matrix. The former Department for Energy and Climate Change (DECC, now Department for Energy Security and Net Zero) Voluntary Code of Practice on compliance with EMF guidelines (Ref 17-24 and Ref 17-26) advises that the Energy Networks Association (ENA) will maintain a publicly available list of types of equipment where the design is such that it is not capable of exceeding the ICNIRP exposure guidelines on its website. This methodology requires that all human receptors located within the potential electrical field are identified and, with reference to the identified impact avoidance measures, effects are qualitatively either considered to be significant or not significant, based on professional judgement.
- 17.7.68 The nearest residential receptors are located within Section 5 of the baseline (as noted in *Section 17.5* of this ES Chapter). This includes one residential property and one agricultural building within the Study Area in Section 5, as well as a number of rural properties and agricultural buildings in the Study Area.
- 17.7.69 High-voltage underground cables can produce higher magnetic fields directly above them than an overhead line would produce at ground level, because the physical distance from the underground cable is smaller. Overhead line cables can also expose those in nearby residential areas to EMFs.
- 17.7.70 The design of the *Proposed Development* does not include either high-voltage underground cables or overhead line cables within its design. As a result, there will be **no effect during all stages** of the *Proposed Development* arising in respect of human health and wellbeing in relation to EMF.

Sensitivity analysis

- 17.7.71 For the future baselines covered in other chapters, the following assumptions have been made.
- 17.7.72 *Chapter 7: Landscape and Visual* predicts that small amounts of development within existing settlement boundaries would have been constructed in the future, but the general landscape character and features would remain in a similar condition as they are now.
- 17.7.73 In *Chapter 12: Traffic and Transport*, there will be increases in traffic due to projected growth, which has been included within the assessment of traffic and transport effects.
- 17.7.74 In *Chapter 14: Air quality*, an improvement in air quality is expected in the future baseline, but climate change may lead to more unstable weather conditions by the 2040s. Overall, this is not expected to alter the outcome of any assessment of the *Proposed Development* effects.
- 17.7.75 In *Chapter 16: Socio-economics*, the future baseline is anticipated to be largely the same as the current scenario, but population growth is anticipated in all local authorities in the socio-economics study area, with the exception of North East Lincolnshire. It is expected that employment and GVA would increase in a future baseline, associated with the expected increase in population. It is expected that PRoWs will continue to be used. Businesses and

community facilities may open and close. Ultimately, these changes are not considered to constitute significant changes to baseline findings.

17.7.76 Given these factors, and the assessments of the future baselines by the relevant chapters, it is assumed that the findings of this assessment will remain relevant in any future assessment of the *Proposed Development*. This is because there are not likely to be significant changes in the baseline for socio-economics, air quality, landscape and visual. For the traffic and transport effects, increases in traffic have been incorporated into the assessment of effects, so will subsequently be reflected in any health effects within this chapter. This will be monitored in future years should this scenario change for any of the relevant topic areas set out above.

17.8 Additional Mitigation and Enhancement Measures

Additional Mitigation and Enhancement – Construction Phase

17.8.1 The Draft Construction Environmental Management Plan (CEMP) *ES Volume IV: Appendix 3.1 (Application Document 6.4.3.1)* sets out the additional mitigation measures identified in this assessment of likely significant effects within the Mitigation Register. This section summarises the types of mitigation measures that are considered to mitigate against the effects on health and wellbeing where required. Each entry in the Mitigation Register has an alpha-numerical reference e.g., “B1” to provide a cross reference to the secured commitment. These measures have been adopted for the construction phase.

17.8.2 For all receptors covered in the previous section (listed above), providing that all construction activities adhere to the mitigation measures listed in this chapter and within the *Draft CEMP (ES Volume IV: Appendix 3.1 (Application Document 6.4.3.1))*, the potential magnitude of impacts will be lowered so the residual significance will be negligible to minor adverse. Therefore, any impacts associated with these receptors are classed as not being significant.

Table 17-15: Additional Mitigation from Respective Chapters

ES Chapters	Paragraph reference	Summary
<i>Chapter 7: Landscape and Visual</i>	7.6.8	<ul style="list-style-type: none"> • C6: Reinstatement of hedgerows/ field boundaries crossed by the route, with native (and species-rich where appropriate) species planted to reduce or mitigate effects on landscape character and the visual awareness of the pipeline route within and across the landscape in the short to medium term. • C7: Landscape maintenance will be put in place to maintain any new planting. • C9: Opportunities to reduce impacts of nearby highly sensitive visual receptors should be sought through sensitive design of construction compounds e.g., organising compound features and using earthworks / fencing to screen internal activities during the construction phase.
<i>Chapter 12: Traffic and Transport</i>	12.7.5	<ul style="list-style-type: none"> • H1: Produce a Detailed Traffic Management Plan to establish construction vehicle routing, safe access and egress to construction compounds and pipe storage areas in consultation with the Highways Authorities. This will be based upon ES Volume IV Appendix 12-5 Outline CTMP (<i>Application Document 6.4.12.5</i>) and include such items as: <ul style="list-style-type: none"> – The necessary agreements and timing restrictions for construction traffic for example Monday – Saturday working, prohibition during school drop-off and pick-up times (this will be

ES Chapters	Paragraph reference	Summary
		<p>managed by appropriate measures in the Construction Traffic Management Plan (CTMP) which will likely prohibit movements during busy network periods), and prohibition during loading times at commercial premises;</p> <ul style="list-style-type: none"> - Proposals for monitoring and agreeing maintenance costs; - Escort arrangements for abnormal loads; - Route signing; - Details of the advanced notification to the general public, warning of any construction transport movements, specifically AILs; - Details of information and road signage warning road users of forthcoming AIL transport and construction traffic movements; - Arrangements for regular road maintenance and cleaning, e.g., road sweeping in the vicinity of the site access point as necessary, drain clearing, wheel cleaning / dirt control arrangements; - Arrangements for winter road maintenance e.g., de-icing and snow clearing; - Construction Contractor speed limits; and - Community and emergency services liaison details. <ul style="list-style-type: none"> • H2: Produce a Construction Logistics Plan to manage sustainable delivery of goods and materials. • H3: Implement a Travel Plan that supports and encourages sustainable travel by workers (public transport, cycling, walking and car-sharing) • H6: Heavy Goods Vehicle (HGV) movements to and from the site (excluding abnormal loads) during construction of the pipeline will be limited to 07.00 to 19.00 Monday to Friday, and 07.00 to 16.00 on Saturdays, with no HGV movements taking place on Sundays or on national public holidays, unless agreed in advance with the relevant Local Authority.
<p>Chapter 13: <i>Noise and Vibration</i></p>	<p>13.6.9</p>	<ul style="list-style-type: none"> • I1: Pre-construction noise monitoring surveys will be undertaken as agreed with the relevant local authorities to establish a pre-construction baseline for the derivation of construction noise limits. • I2: Following any changes to the design, the Contractor would ensure that an updated noise assessment has been carried out to ensure there would be no additional or increase in negative effects on nearby receptors. • I3: The majority of works activities would be completed under normal working hours/ restrictions as follows: Monday to Saturday: 07:00 to 19:00 and no working on Sundays, or Bank Holidays unless otherwise agreed with the relevant local authority. The agreed working hours will be set out in the Final CEMP. • I4: The Contractor would be responsible for notifying the local residents of particularly noisy work prior to commencement of those works. Effective communication should be established, keeping residents informed of the type and timing of works involved. • I6: Closed board fencing would be installed around the construction compounds. • I7: Provision of contact details for a site representative in the event that disturbance due to noise or vibration from the construction

ES Chapters	Paragraph reference	Summary
		<p>works occurs; ensuring that any complaints are dealt with pro-actively and that subsequent resolutions are communicated to the complainant.</p> <ul style="list-style-type: none"> • I11: Silenced equipment would be used where possible, in particular silenced power generators and pumps. • I14: Static noisy plant, including generators, would be located as far away from noise sensitive receptors as is feasible for the particular activity. • I15: On site speed limits would be in place to reduce the effect of construction traffic noise. Speed limits would be enforceable within the main works sites, with all non-surfaced roads restricted to 10 miles per hour (mph) and any surfaced roads restricted to 15 mph. • I16: To minimise vibration from HGV movements, there would be monthly condition assessments to inspect for defects such as pot holes which could cause an increase in noise levels. Existing potholes would need to be considered by a condition assessment prior to the commencement of works. • I17: As part of the plant selection process the contractor should adopt a procedure to ensure the quietest plant and equipment, techniques and working practices available would be selected and used. • I18: No music or radios would be played on site. • I19: The applicant will submit an application for prior consent to carry out noisy work under Section 61 of the CoPA to demonstrate that noise and vibration has been minimised as far as reasonably practicable. The Section 61 application will set out the specific method of working, calculations of noise levels at nearby receptors, the actual working hours required, noise monitoring locations, details of communication measures and the mitigation measures implemented to minimise noise and vibration impacts. • I20: Where practicable, avoid HDD works within 200 m (the distance at which significant effects are predicted at night) of residential receptors (although this will depend on the results of the GI survey). • I21: The potential for the use of quieter equipment than listed in <i>ES Volume IV: Appendix 13-2 (Application Document 6.4.13.2)</i> will be explored by the Contractor. • I22: Depending on the location, plant and timing of works, acoustic fencing will be installed around the HDD site boundary to screen receptors from noise emission. This mitigation could provide up to 10 dB of attenuation when the fencing screens the sources from the receiver. • I23: Where practicable, avoid hydrostatic pump testing works within 200 m (the distance at which significant effects are predicted at night) of residential receptors. • I25: Depending on the location, plant and timing of works, acoustic fencing will be installed around the hydrostatic pump test site boundary to screen receptors from noise emission. This mitigation could provide up to 10 dB of attenuation when the fencing screens the sources from the receiver.

ES Chapters	Paragraph reference	Summary
<i>Chapter 14: Air Quality</i>	14.6.6	<ul style="list-style-type: none"> • A3: Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. • J1: Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. • J2: Develop a Dust Management Plan, which includes measures to control other emissions. This will form part of the Final CEMP. • J5: 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. • J7: 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 log book. • J8: Undertake daily on-site and off-site inspection (including roads), where receptors are nearby, to monitor dust, record inspection results, and make the log available to the Local Authority when asked. • J10: Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. • J19: No bonfires and burning of waste materials. • J21: Avoid dry sweeping of large areas. • J27: Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. • J34: Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. • J43: Access gates to be located at least 10 m from receptors where possible.
<i>Chapter 16: Socio-economics</i>	16.6.4	<ul style="list-style-type: none"> • L1: The Contractor will develop a Skills, Employment and Supply Chain Plan in liaison with the four Local Authorities, which will identify measures by which the potential economic benefits of the Proposed Development for local people and businesses might be maximised. This will include seeking to develop links with education and employment establishments in the locality if appropriate (for example, schools, colleges, employment agencies, and business groups). This will increase the potential for the Proposed Development to have a beneficial effect on the provision of training and apprenticeships and the local workforce

17.8.3 This assessment has been undertaken based on the assumption that the embedded and additional mitigation measures are in place during the construction period.

17.8.4 A schedule of aforementioned environmental commitments is presented as *ES Volume IV: Appendix 3.1 (Application Document 6.4.3.1)*.

Additional Mitigation and Enhancement – Operational Phase

17.8.5 No further mitigation or enhancement measures are required with respect to human health effects arising from the operational phase of the *Proposed Development*, due to no significant adverse effects associated with human health being identified.

Additional Mitigation and Enhancement – Decommissioning Phase

17.8.6 It is anticipated that the decommissioning phase will have a similar impact to the construction phase. Due to the decommissioning phase taking place, at the earliest, in 2052, the CEMP may not remain relevant to the decommissioning practices that take place. As a result, at an appropriate time, an updated CEMP will be prepared for each Chapter to cover the respective measures to mitigate the adverse effects of the decommissioning phase. In turn, this will then support the mitigation of any adverse health effects through the *Proposed Development*.

17.9 Residual Effects

Assessment of Residual Effects: Construction Phase

17.9.1 Given the potential effects identified in *Section 17.7* and the additional mitigation and enhancement measures outlined in *Section 17.8*, the residual effects for the construction phase are outlined in **Table 17-16**.

Assessment of Residual Effects: Operational Phase

17.9.2 Given no further mitigation or enhancement measures have been proposed in the Operational phase, the potential effects identified in *Section 17.7* remain valid.

17.9.3 The residual effects in the Operational phase therefore remain the same as stated in the preliminary assessment, with no significant effects identified on human health, as shown in **Table 17-17**.

Assessment of Residual Effects: Decommissioning Phase

17.9.4 It is anticipated that the decommissioning phase will have a similar impact to the construction phase. Therefore, to avoid repetition, **Table 17-16** is used as a reference point for both the construction and the decommissioning residual effects of the *Proposed Development*.

Table 17-16: Summary of Construction and Decommissioning Phase Residual Effects

Receptor	Sensitivity	Description of Potential Impact	Potential Effect		Mitigation Measure(s)	Residual Effect	
			Magnitude	Significance		Magnitude	Significance
Access to healthcare services and other social infrastructure.	High	<ul style="list-style-type: none"> Increased demand for healthcare services. 	Very Low	Minor Adverse (not significant)	None	Negligible	Negligible
		<ul style="list-style-type: none"> Increased traffic and severance, reducing access to healthcare facilities. 	Very Low	Minor Adverse (not significant)	CTMP and CEMP	Very Low	Minor Adverse (not significant)
Air quality, noise, and neighbourhood amenity.	High	<ul style="list-style-type: none"> Reduced air quality, providing risk to residents. Potential disturbance to local ecological, heritage and human receptors through noise impacts. 	Very Low	Minor Adverse (not significant)	CEMP	Low	Minor Adverse (not significant)
Accessibility and active travel.	Medium	<ul style="list-style-type: none"> Reduced access and severance to PROWs, open space and active travel networks. 	Low	Minor Adverse (not significant)	Implementation of the PROW Management Plan and the CEMP.	Very Low	Negligible (not significant)
Access to work and training.	Low	<ul style="list-style-type: none"> Increased access to work, training and apprenticeship 	Low	Negligible (not significant)	None required	Low	Negligible (not significant)

Receptor	Sensitivity	Description of Potential Impact	Potential Effect		Mitigation Measure(s)	Residual Effect	
			Magnitude	Significance		Magnitude	Significance
		opportunities for residents.					
		<ul style="list-style-type: none"> Reduced access to other employment and training opportunities. 	Very Low	Negligible (not significant)	None required	Very Low	Negligible (not significant)
Social cohesion and neighbourhoods.	Medium	<ul style="list-style-type: none"> Construction and decommissioning activities leading to increased traffic and severance. Reduced access to neighbourhoods, community facilities. Reduced social cohesion. 	Very Low	Negligible (not significant)	Implementation of the PROW Management Plan, the CEMP, the Construction Traffic Management Plan and the Construction Worker Travel Plan.	Very Low	Negligible (not significant)

Table 17-17: Summary of Operational Phase Residual Effects

Receptor	Sensitivity	Description of Potential Impact	Potential Effects		Mitigation Measure(s)	Residual Effect	
			Magnitude	Significance		Magnitude	Significance
Air quality, noise, and neighbourhood amenity	High	<ul style="list-style-type: none"> Reduced air quality, providing risk to residents. 	No effect.	No effect.	None required	No effect	No effect

Receptor	Sensitivity	Description of Potential Impact	Potential Effects		Mitigation Measure(s)	Residual Effect	
			Magnitude	Significance		Magnitude	Significance
		<ul style="list-style-type: none"> Potential disturbance to local ecological, heritage and human receptors through noise impacts. 					
Accessibility and active travel	Medium	<ul style="list-style-type: none"> Reduced access and severance to PROWs, open space and active travel networks. 	Very low	Negligible (not significant)	None required	Very low	Negligible (not significant)
Social cohesion and neighbourhoods	Medium	<ul style="list-style-type: none"> Construction and decommissioning activities leading to increased traffic and severance. Reduced access to neighbourhoods, community facilities. Reduced social cohesion. 	No effect.	No effect	None required	No effect	No effect

17.10 Cumulative Effects

17.10.1 This section presents a preliminary assessment of cumulative effects between the *Proposed Development* and other proposed and committed plans and projects that fall within the *Proposed Development Boundary*.

Assessment of Intra-Project Effects

17.10.2 Following on from the residual effects identified in *Section 17.9*, this section assesses the cumulative effects that may be possible for the *Proposed Development*. Multiple effects upon one or more common receptors could theoretically interact or combine, to result in a combined effect which is more or less significant than the effects individually.

17.10.3 Table 20-11 of *Chapter 20: Cumulative Effects* details the following receptors that share a technical topic area:

- Human health: Noise and Vibration, Air Quality and Health and Wellbeing
- Communities: Landscape and Visual, Noise and Vibration, Air Quality, Socio-economics and Health and Wellbeing
- Public Rights of Way: Landscape and Visual, Traffic and Transport, Socio-economics and Health and Wellbeing

17.10.4 Throughout the assessment of effects in this Chapter, the findings of other topic areas have been considered, due to the direct relationship between the effects of other chapters and the subsequent impacts on health receptors that follow. Within the noted topic areas, no significant intra-project impacts were identified for these receptors. Therefore, the receptors noted above will not result in significant cumulative effects for health. This is for all activities in the construction, operation and decommissioning activities from the *Proposed Development*.

Assessment of Inter-Project Effects

17.10.5 *Chapter 20: Cumulative Effects* provides a summary of the identified developments which could lead to a significant cumulative effect on a shared receptor. These developments, combined with the effects identified in *Section 17.9*, may lead to a more pronounced effect on the health receptors in the study area.

17.10.6 Given that health and wellbeing effects are dependent on the findings of other chapters, the findings of the cumulative inter-project assessments have been summarised in the following paragraphs:

- *Chapter 7: Landscape and Visual*: This chapter identified 13 cumulative developments that could affect the findings of the residual effects of the chapter. The chapter has considered the worst-case scenario whereby all of the shortlisted developments are constructed simultaneously and therefore all are present in the landscape. Landscape receptors that have been assessed as having negligible adverse effects from the *Proposed Development* alone were not included in this assessment of cumulative effects, and therefore only construction stage impacts were assessed. In summary, the residual cumulative effects for all relevant receptors in this chapter were assumed to be minor adverse, and therefore remain not significant.
- *Chapter 12: Traffic and Transport*: In this chapter, the cumulative assessment considers the cumulative flows of traffic across all routes affected by the *Proposed Development*, given the cumulative developments noted in *Chapter 20: Cumulative Assessment*. This was assessed for all 5 sections of the route in the construction phase. The assessment concluded that there are no residual cumulative effects that

are significant, as no cumulative effect is considered worse than a minor adverse effect across all routes.

- *Chapter 13: Noise and Vibration:* The assessment of inter-project effects in this chapter is considered for the construction and operational phases at distances of 500m from the *Proposed Development*. Assuming that the CEMP mitigation measures are adopted and other developments are required to adopt similar practices, the cumulative disruption from the developments is expected to be reduced. In conclusion, there are anticipated to be no significant residual effects due to construction and decommissioning activities from the Proposed Development, and it is considered that cumulative effects will not be significant. For operational effects, effects from the Proposed Development will remain unchanged from the residual effects stated previously and therefore remain negligible to minor adverse, and not significant.
- *Chapter 14: Air Quality:* This chapter provides a concise summary that states there are anticipated to be no significant inter-project or intra-project cumulative effects. This is because the potential cumulative increase in any baseline pollutant effects is not likely to be large enough to result in an exceedance of the relevant air quality objectives.
- *Chapter 16: Socio-economics:* For the inter-project effects of this chapter, the residual effects were reassessed in the context of the cumulative developments. Operational effects were not considered for the cumulative assessment. The following cumulative effects remained not significant in the construction phase:
 - Cumulative construction employment (minor beneficial);
 - GVA from construction activities (minor beneficial);
 - Disruption to PRoW (minor adverse);
 - Disruption to residential properties, business premises, community facilities, visitor attractions and open space (negligible); and
 - Disruption to development land (negligible).
- For the decommissioning phase, it was deemed unlikely that decommissioning periods of respective cumulative developments will overlap with the decommissioning of the Proposed Development. Therefore, the cumulative decommissioning effects are likely to mirror that of the cumulative construction effects listed above.

17.10.7 Given these findings from other chapters, there is no evidence to suggest that the cumulative developments will lead to the cumulative health effects being different from the residual effects stated in *Section 17.9*. Therefore, there are no resulting cumulative health effects across all stages of the *Proposed Development*.

17.11 Summary

- 17.11.1 This chapter has provided a summary of the relevant legislation, policy and guidance for assessing health effects, and summarised the current consultation held with stakeholders on the outcomes of the *Proposed Development*. In addition to this, A current and future baseline has been developed to provide context for the sensitivity of the local population to any health effects resulting from the *Proposed Development*.
- 17.11.2 The assessment of residual health effects in *Section 17.9*, following the implementation of additional mitigation measures, has identified **no significant residual effects** in the construction, operational or decommissioning phases. Where health effects are envisaged to be minor adverse, mitigation measures ensure that this effect is reduced to negligible.
- 17.11.3 This chapter has also considered the relevant intra-project and inter-project effects resulting from combined effects across receptors, and cumulative developments. The dependent chapters for health did not identify any effects that would change from their residual effects as a result of these cumulative effects. Therefore, this chapter has assumed that there will be no additional intra-project or inter-project effects on the health and wellbeing receptors.

17.12 References

Ref 17-1 HM Government (2017); The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. Available at:

<https://www.legislation.gov.uk/ukxi/2017/572/contents/made>

Ref 17-2 HM Government (2022); Health and Care Act 2022. Available at:

<https://www.legislation.gov.uk/ukpga/2022/31/contents/enacted>

Ref 17-3 Health and Safety Executive (2016); The Control of Electromagnetic Fields at Work Regulations 2016. Available at: <https://www.hse.gov.uk/radiation/nonionising/emf-regulations.htm>

Ref 17-4 Department for Energy and Climate Change, (2011); Overarching National Policy Statement for Energy (EN-1). Available at:

<https://assets.publishing.service.gov.uk/media/5a79522de5274a2acd18bd53/1938-overarching-nps-for-energy-en1.pdf>

Ref 17-5 Department for Energy Security and Net Zero, (2023); Overarching National Policy Statement for Energy (EN-1). Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf

Ref 17-6 Department for Energy and Climate Change, (2011); National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). Available at:

<https://assets.publishing.service.gov.uk/media/5a78c52140f0b62b22cbcaa4/1941-nps-gas-supply-oil-en4.pdf>

Ref 17-7 Department for Energy Security and Net Zero, (2023); National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147383/NPS_EN-4.pdf

Ref 17-8 Ministry of Housing, Communities and Local Government (MHCLG), (2023); National Planning Policy Framework (NPPF). Available at: [National Planning Policy Framework \(publishing.service.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/1147383/NPPF.pdf). Accessed 13/09/2023.

Ref 17-9 North East Lincolnshire Council, (2018); North East Lincolnshire Local Plan 2013 to 2032. Available at: <https://www.nelincs.gov.uk/assets/uploads/2020/10/The-NEL-Local-Plan-adopted-2018.pdf>

Ref 17-10 North Lincolnshire Council, (2011); North Lincolnshire Core Strategy Local Plan. Available at: <https://www.northlincs.gov.uk/planning-and-environment/planning-policy-local-development-framework/#:~:text=The%20Core%20Strategy%2C%20which%20was,North%20Lincolnshire%20Local%20Development%20Framework.>

Ref 17-11 North Lincolnshire Council, (2021); North Lincolnshire Draft Local Plan 2020 to 2038. Available at:

[https://m.northlincs.gov.uk/public/localplan/evidence/LDS%20\(Second%20Draft\)%20\(Update%20Oct%202021\)%20Final.pdf](https://m.northlincs.gov.uk/public/localplan/evidence/LDS%20(Second%20Draft)%20(Update%20Oct%202021)%20Final.pdf)

Ref 17-12 East Lindsey Council, (2018); East Lindsey Core Strategy Local Plan. Available at: https://www.e-lindsey.gov.uk/media/9791/Core-Strategy/pdf/Core_Strategy_adopted_version_for_web.pdf

Ref 17-13 Central Lincolnshire Joint Strategic Planning Committee, (2023); Central Lincolnshire Adopted Local Plan. Available at: <https://www.n-kesteven.gov.uk/central-lincolnshire/adopted-local-plan-2023>

Ref 17-14 IEMA, (2022); Determining Significance for Human Health in Environmental Impact Assessment. [Available online to IEMA members].

Ref 17-15 IEMA, (2022); Effective Scoping of Human Health in Environmental Impact Assessment. [Available online to IEMA members].

Ref 17-16 NHS England's Healthy Urban Development Unit's (HUDU) Rapid Health Impact Assessment (HIA) Toolkit (2019). Available at:
<https://www.healthyrbandevelopment.nhs.uk/wp-content/uploads/2019/10/HUDU-Rapid-HIA-Tool-October-2019.pdf>

Ref 17-17 Wales Health Impact Assessment Support Unit (WHIASU), (2022). Available at:
<https://phwwhocc.co.uk/whiasu/>

Ref 17-18 Public Health England (2017), Spatial Planning for Health. An evidence resource for planning and designing healthier places. Available at:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/729727/spatial_planning_for_health.pdf.

Ref 17-19 Public Health England, PHE Strategy 2020 to 2025 (2019). Available at:
<https://www.gov.uk/government/publications/phe-strategy-2020-to-2025/>

Ref 17-20 Institute of Health Equity (2010), The Marmot Review: Fair Society, Healthy Lives. Available at: <https://www.instituteofhealthequity.org/resources-reports/fair-society-healthy-lives-the-marmot-review>

Ref 17-21 Institute of Health Equity (2020), The Marmot Review: 10 Years On. Available at: <https://www.instituteofhealthequity.org/resources-reports/marmot-review-10-years-on>

Ref 17-22 Institute of Health Equity (2020), Build Back Better: The COVID-19 Marmot Review. Available at: <https://www.instituteofhealthequity.org/resources-reports/build-back-fairer-the-covid-19-marmot-review>

Ref 17-23 NHS, Long Term Plan (2019). Available at: <https://www.longtermplan.nhs.uk/>

Ref 17-24 International Commission on Non-Ionizing Radiation Protection (ICNIRP) (1998); ICNIRP Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300 GHz).

Ref 17-25 AECOM (2022); V Net Zero Pipeline Project Scoping Report. Available at:
https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN070008/EN070008-000018-V%20Net%20Zero%20Pipeline_EIA%20Scoping%20Report.pdf

Ref 17-26 EMFs.info (2023), Electric and magnetic fields and health. Available at:
<https://www.emfs.info/>

Ref 17-27 World Health Organisation, (2023), Constitution. Available at:
<https://www.who.int/about/governance/constitution#:~:text=Health%20is%20a%20state%20of,belief%2C%20economic%20or%20social%20condition.>

Ref 17-28 HM Government, 2017. Ionising Radiation Regulations 2017. Available at:
<https://www.legislation.gov.uk/uksi/2017/1075/contents/made>

Ref 17-29 Department for Energy and Climate Change, (2012), Demonstrating compliance with EMF public exposure guidelines: voluntary code of practice. Available at:
<https://www.gov.uk/government/publications/demonstrating-compliance-with-emf-public-exposure-guidelines-voluntary-code-of-practice>

Ref 17-30 Office for National Statistics (2021); Census 2021. Available at:
<https://www.ons.gov.uk/census>

Ref 17-31 Ministry of Housing, Communities and Local Government (MHCLG) (2019); English Indices of Deprivation. Available at:

<https://www.gov.uk/government/collections/english-indices-of-deprivation>

Ref 17-32 Public Health England (2020); Life Expectancy at birth. Available at:

<https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data>

Ref 17-33 Public Health England (2017-2020); Local Authority Health Profiles. Available at: <https://fingertips.phe.org.uk/profile/health-profiles>

Ref 17-34 Public Health England (2019). Health matters: health and work. Available at: [Health matters: health and work - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/publications/health-matters-health-and-work)

