Immingham Green Energy Terminal

TR030008

Volume 6

6.2 Environmental Statement

Chapter 24: Human Health and Well-being

Planning Act 2008

Regulation 5(2)(a)

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended)

September 2023

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended)

Immingham Green Energy Terminal

Development Consent Order 2023

6.2 Environmental Statement

Chapter 24: Human Health and Well-being

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24.1 Introduction

24.1.1 This chapter presents the findings of the assessment of the likely significant effects of the Project on human health and wellbeing during the construction, operation and decommissioning phases. For more details about the Project, refer to **Chapter 2: The Project [TR030008/APP/6.2]** of this Environmental Statement ("ES").

24.1.2 The assessment draws on technical assessments presented elsewhere within the ES which are of relevance to human health and wellbeing (and its wider determinants[1]). These include:

a. **Chapter 6: Air Quality [TR030008/APP/6.2].**

b. **Chapter 7: Noise and Vibration [TR030008/APP/6.2].**

c. **Chapter 11: Traffic and Transport [TR030008/APP/6.2].**

d. **Chapter 19: Climate Change [TR030008/APP/6.2].**

e. **Chapter 23: Socio-economics [TR030008/APP/6.2].**

f. **Equalities Impact Assessment [TR030008/APP/7.6].**

24.1.3 A number of other technical assessments across this ES assess impacts of potential relevance to human health but have been scoped out of this assessment, as measures will be established to manage risk and ensure there are no significant effects on human health and wellbeing. These aspects have been monitored during the preparation of the assessment, and where potential health effects are identified, these have been considered in the human health chapter as relevant and appropriate, including:

a. **Chapter 18: Water Use, Water Quality, Coastal Protection, Flood Risk and Drainage [TR030008/APP/6.2]**.

b. **Chapter 21: Ground Conditions and Land Quality [TR030008/APP/6.2].**

c. **Chapter 22: Major Accidents and Disasters [TR030008/APP/6.2]**.

24.2 Consultation and Engagement

24.2.1 A scoping exercise was undertaken in August 2022 to establish the form and nature of the human health and wellbeing assessment, and the approach and methods to be followed. The Scoping Report (**Appendix 1.A [TR030008/APP/6.4]**) records the findings of the scoping exercise and details the technical guidance, standards, best practice and criteria being applied in the assessment to identify and evaluate the likely significant effects of the Project on human health and wellbeing. A Scoping Opinion was adopted by the Secretary of State on 10 October 2022 **[TR030008/APP/6.4]**.

[1] Determinants of human health and wellbeing comprise the broad range of individual constitutional and behavioural factors, as well as broader environmental, social and economic factors.

24.2.2 Statutory Consultation took place between 9 January and 20 February 2023 in accordance with the Planning Act 2008 ("2008 Act"). The Applicant prepared a Preliminary Environmental Information Report ("PEI Report"), which was publicised at the consultation stage.

24.2.3 Through consideration of the responses to the first Statutory Consultation, the developing environmental assessments and through ongoing design-development and assessment, a series of changes within the Project were identified. A second Statutory Consultation took place between 24 May and 20 July 2023 in accordance with the 2008 Act and a PEI Report Addendum was publicised to support the consultation.

24.2.4 The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised via the formal scoping opinion (**Appendix 1.A [TR030008/APP/6.4]**) and in response to the formal consultation and other pre-application engagement is summarised in **Table 24-1**. The full responses to consultation comments are included within the Summary of Consultation Responses document **[TR030008/APP/5.1]**.

Table 24-1: Summary of consultation undertaken to date for Human Health and Wellbeing

Reference / Date	Consultee	Summary of Response	How comments are addressed in the ES
Scoping Report August 2022	Planning Inspectorate	The effect of odour during operation has not been scoped into the assessment or reasons provided why this has been scoped out. This matter should be considered as part of the assessment made for air quality effects, as well as part of the health and well-being assessment, should significant effects be likely to occur.	An assessment of human health and wellbeing impacts arising from emissions of dust, noise, vibration and odours during the construction, operation and decommissioning phases of the Project is set out in this Chapter and draws on assessments set out in **Chapter 6: Air Quality** and **Chapter 7: Noise and Vibration [TR030008/APP/6.2]**. This is presented in **Section 24.8**.
	Environment Agency	Emissions of dust, noise, vibration, and odours are only scoped in for assessment during construction and decommissioning. Odour during operation could potentially be an issue that needs to be scoped in; however, it may be appropriate to consider this under Chapter 5 Air Quality, as it does not appear to be covered elsewhere in the Report. The guidance that the Applicant will be expected to follow for environmental permitting can be accessed at Environmental permitting: H4 odour management - GOV.UK (www.gov.uk). We highlight the importance of the consideration of these issues in light of the close proximity of the residential properties mentioned under Chapter 3 above.	
	Planning Inspectorate	The Scoping Report seeks to scope out this matter [PRoW impacts during operation] on the grounds that no adverse effects are expected as no direct effects are anticipated on public rights of way (PRoW) and no open space has been identified in the vicinity of the Proposed Development. Given the user experience of the PRoW during project	Noted. The effects of any impact on human health and wellbeing arising from impacts on Public Rights of Way ("PRoW") during the construction and decommissioning phases is assessed in this chapter in **Section 24.8** and draws on the findings of

Reference / Date	Consultee	Summary of Response	How comments are addressed in the ES
		operation would not be dissimilar to what it is currently, the Inspectorate agrees that this matter can be scoped out of the assessment. See also impacts to PRoW during operation in Chapter 22: Socio-economics.	**Chapter 23: Socio-Economics [TR030008/APP/6.2]**.
	Planning Inspectorate	The Scoping Report does not refer to potential local public concern through perception of risk from the transportation of hydrogen gas from the site. The Inspectorate considers that this matter should be scoped in to the assessment of human health and well-being.	An assessment of potential human health and wellbeing impacts arising from local public concern and mental health issues relating to perception of risk is presented in **Section 24.8**.
	UK Health Security Agency / Office for Health Improvement and Disparities	The scoping report does not make reference to the potential for local public concern through understanding of risk / risk perception. It should be noted that HyNet North West Hydrogen Pipeline Project has this potential impact scoped-in under 'Concern over hydrogen safety'. The effects related to people and communities in the near vicinity of the Project should be identified and addressed through targeted communications and mitigation programmes. For the wider public, general communication programmes in relation to the Project should provide a source of clear and objective information to increase knowledge and awareness. This approach has been accepted by PINS in the SoS Scoping Opinion.	
	UK Health Security Agency / Office for Health Improvement and Disparities	The ES should consider potential effects on mental health through risk perception / understanding of risk posed by the handling and processing of hazardous materials. When estimating community anxiety and stress in particular, a qualitative assessment maybe most appropriate. Robust and meaningful consultation with the local community will be an important mitigation measure, in addition to informing the assessment and subsequent mitigation measures. This may involve conducting resident	

Reference / Date	Consultee	Summary of Response	How comments are addressed in the ES
		surveys but also information received through public consultations, including community engagement exercises. The Mental Well-being Impact Assessment Toolkit (MWIA) contains key principles that should be demonstrated in a project's community engagement and impact assessment. We would also encourage you to consult with the local authority's public health team who are likely to have Health Intelligence specialists who will have knowledge about the availability of local data. The Mental Well-being Impact Assessment Toolkit (MWIA), could be used as a methodology. The assessment should identify vulnerable populations and provide clear mitigation strategies that are adequately linked to any local services or assets. Baseline indicators the assessment would benefit from including social cohesion/connectedness, satisfaction with local area and quality of life indicators owing to their established links to mental health and wellbeing. In terms of sources, we would draw your attention to the following: •PHE Fingertips –Mental Health and Wellbeing JSNA-Area profiles with various indicators on common mental disorders (including anxiety) and severe mental illness which can be benchmarked with other local areas as well as regional and national data •Office for National Statistics -Wellbeing Indicators-Range of datasets related to wellbeing available including young people's wellbeing measures, personal wellbeing estimates and loneliness rates by local authority.	
	Immingham Town Council	The proximity of this hazardous site to existing premises seems too close.	An assessment of potential human health and wellbeing impacts of the Project on existing homes and business premises is assessed below, drawing

Reference / Date	Consultee	Summary of Response	How comments are addressed in the ES
			on findings of **Chapter 6: Air Quality**, **Chapter 7: Noise and Vibration**, **Chapter 22: Major Accidents and Disasters** and **Chapter 23: Socio-Economics [TR030008/APP/6.2]**. This is presented in **Section 24.8**.
	UK Health Security Agency / Office for Health Improvement and Disparities	Our position is that pollutants associated with road traffic or combustion, particularly particulate matter and oxides of nitrogen are non-threshold, i.e. an exposed population is likely to be subject to potential harm at any level and that reducing public exposure to non-threshold pollutants (such as particulate matter and nitrogen dioxide) below air quality standards will have potential public health benefits. We support approaches which minimise or mitigate public exposure to non-threshold air pollutants, address inequalities (in exposure) and maximise co-benefits (such as physical exercise). We encourage their consideration during development design, environmental and health impact assessment, and development consent.	An assessment of potential human health and wellbeing impacts arising from air quality impacts during the construction, operation, and decommissioning phases of the Project is set out in **Section 24.8**, drawing on **Chapter 6: Air Quality [TR030008/APP/6.2]**.
	UK Health Security Agency / Office for Health Improvement and Disparities	It is noted that the current proposals do not appear to consider possible health impacts of Electric and Magnetic Fields (EMF). We request that the ES clarifies this and if necessary, the proposer should confirm either that the proposed development does not impact any receptors from potential sources of EMF; or ensure that an adequate assessment of the possible impacts is undertaken and included in the ES.	An assessment of the potential impacts from Electric and Magnetic Fields ("EMFs") has been provided in **Section 24.8**. No major sources of EMF are anticipated to arise from the Project. All cabling associated with the Project will be 132kV or lower voltage cables, and underground. Research published by National Grid ('*Undergrounding high voltage energy transmission lines*') highlights that burying of cables results in noticeably lower EMF than overhead lines. Further information is provided in the relevant assessment in **Section 24.8**.

Reference / Date	Consultee	Summary of Response	How comments are addressed in the ES
	UK Health Security Agency / Office for Health Improvement and Disparities	The scoping report does not identify the approach to the identification of vulnerable populations. The impacts on health and wellbeing and health inequalities of the scheme may have particular effect on vulnerable or disadvantaged populations, including those that fall within the list of protected characteristics. The identification of vulnerable populations and sensitive populations should be considered. Baseline health data should be provided, which is adequate to identify any local sensitivity or specific vulnerable populations. The identification of vulnerable populations should be based on the list provided by the Welsh Health Impact Assessment Support Unit and the International Association of Impact Assessment (IAIA)	An assessment of the human health and wellbeing baseline, including analysis of health indicators among the population living locally, is set out in **Section 24.8** below. The human health and wellbeing baseline includes data on population, age, ethnicity, deprivation, health deprivation, self-assessment of health, and a number of wider health determinant indicators. These indicators align with Wales Health Impact Assessment Support Unit ("WHIASU") vulnerable populations list (age related groups, income related groups, groups who suffer discrimination or other social advantage, geographical groups). Additionally, Institute of Environmental Management and Assessment ("IEMA") guidance (Ref 24-1) on the typical sub-populations with vulnerability indicatively includes young age, older age, income or unemployment, health status, social disadvantage, and access or geographical factors has been used to inform the information presented in the baseline section. Additional socio-economic data relating to the local population is set out in **Chapter 23: Socio-Economics [TR030008/APP/6.2]**.
	UK Health Security Agency / Office for Health Improvement	It is noted that Chapter 23 is drafted with reference to the Healthy Urban Development Unit (HUDU) and the Welsh Health Impact Assessment Support Unit (WHIASU) guidance and as such no assessment of significance is provided for human health. 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	The assessment of human health and wellbeing impacts below uses Healthy Urban Development Unit ("HUDU") guidance to carry out the assessment in terms of identifying wider determinants of health.. The assessment methodology incorporates the latest IEMA guidance in order to assign significance of effects: "Determining Significance for Human

Reference / Date	Consultee	Summary of Response	How comments are addressed in the ES
	and Disparities	significance should form part of the Environmental Statement. HUDU and WHIASU are guidance to support health impact assessments and are not specifically designed to address health within an Environmental Impact Assessment (EIA). The ES must provide an assessment of significance for those health determinants scoped into the population and human health chapter. As there is currently not a defined approach to the assessment of significance for population and human health, it is strongly advised that any proposed approach is agreed with OHID/UKHSA and the local public health team. The guidance issued by the International Association of Impact Assessment (IAIA) could be used as a basis for the assessment of significance.	Health in Environmental Impact Assessment", recently published in November 2022 (Ref 24-1).
Statutory Consultation January 2022	North East Lincolnshire Council	The environmental protection team acknowledges the proposal and anticipates the submission of the relevant environmental assessments. The construction phase also needs to be considered and detailed construction management measures put in place. We do note that a Hazardous Substance Consent has been submitted to the LPA and is currently going through validation. However, the LPA have reservations over the potential impact of the development and its associated HSE Zones with particular regard to human health, residential amenity and the effect such zones may have on future development. We look forward to working with the applicant to further understand this issue and the impacts of the development.	From a human health perspective, perception of risk has been considered within the relevant paragraphs of the assessment (**Section 24.8**). The health assessment also makes reference to the findings of the socio-economics assessment (**Chapter 23: Socio-Economics [TR030008/APP/6.2]**) which considers impacts on residential receptors and development land.
	Polynt Composites	Other non-COMAH hazard risks to human health, such as worsening air quality, are also not dealt with adequately in the consultation documentation. Increased levels of harmful dioxins caused by both increased traffic (queuing traffic in particular), must be fully assessed and mitigated.	The assessment considers within **Section 24.8** impacts on air quality as regards human health, with reference to the findings of the Air Quality assessment within **Chapter 6: Air Quality [TR030008/APP/6.2]**. The impact of emissions from increased traffic movements and congestion is considered in Section

Reference / Date	Consultee	Summary of Response	How comments are addressed in the ES
			6.8 of **Chapter 6: Air Quality [TR030008/APP/6.2]**, with reference to relevant guidance published by the Institute of Air Quality Management, National Highways and Defra. In line with that guidance, the assessment focuses on the primary pollutants of concern from such emissions.
	UK Health Security Agency	The health of an individual or a population is the result of a complex interaction of a wide range of different determinants of health, from an individual's genetic make-up, to lifestyles and behaviours, and the communities, local economy, built and natural environments to global ecosystem trends. All developments will have some effect on the determinants of health, which in turn will influence the health and wellbeing of the general population, vulnerable groups and individual people. Although assessing impacts on health beyond direct effects from, for example emissions to air or road traffic incidents is complex, there is a need to ensure a proportionate assessment focused on an application's significant effects.	The human health and wellbeing assessment recognises the definition of health stated here. The definition is set out in the methodology (**Section 24.4)**. The human health and wellbeing assessment incorporates best practice guidance with respect to scoping and assessment of effects as described by IEMA, which also informs the assessment of significance within the chapter.
	Local Resident (living within approx. 10km of the project)	Concerned about the danger associated with the storage and transport of hydrogen. What noise will be made which may affect life in Immingham? Concern for noise at night-time disturbing sleep. Will wind power be used for electricity? Concern for disturbance from this, if so. Concern that the environmental effects of the project will only be known when it is too late.	From a human health perspective, noise has been considered in **Section 24.8** with reference to noise assessments conducted in **Chapter 7: Noise and Vibration [TR030008/APP/6.2]**. Moreover, perception of risk has been considered within **Section 24.8**. Similarly, the health assessment has considered socio-economic impacts, including on residential properties, with reference to **Chapter 23: Socio-Economics [TR030008/APP/6.2]**. An assessment to identify and describe potential, credible risk scenarios has been completed for the Project and associated risks will be managed by a comprehensive safety and environmental protection

Reference / Date	Consultee	Summary of Response	How comments are addressed in the ES
			programme implemented via engineering design, operational measures and management to reduce risk to achieve a level 'As low as reasonably practicable' ("ALARP"), as required by the applicable regulations. Risk management will be part of an ongoing process throughout the lifecycle of the Project and a requirement for compliance with applicable legislation including the Control of Major Accident Hazards Regulations ("COMAH"), Environmental Permitting, Hazardous Substances and Pipeline Safety Regulations. Further explanation is given in **Chapter 22: Major Accidents and Disasters [TR030008/APP/6.2]**. Wind turbines do not form part of the Application and will not be constructed as part of this Project. An assessment of Electric and Magnetic Fields is provided in **Section 24.8**.
	Local Resident (living within approx. 10 km of the project)	Environmental reports mention only wading birds and flight paths. I think potential for loss of life of Immingham residents due to explosion is a far higher priority.	From a human health perspective, perception of risk has been considered within **Section 24.8**. An assessment to identify potential, credible risk scenarios, including explosion or major fire, has been completed for the Project and associated risks will be managed by a comprehensive safety and environmental protection programme implemented via engineering design, operational measures and management to reduce risk to achieve a level ALARP, as required by the applicable regulations. Risk management, including risk assessment and consequence analysis, will be part of an ongoing process throughout the lifecycle of the Project and a

Reference / Date	Consultee	Summary of Response	How comments are addressed in the ES
			requirement for compliance with applicable legislation including COMAH, Environmental Permitting, Hazardous Substances and Pipeline Safety Regulations. Further explanation is given in **Chapter 22: Major Accidents and Disasters [TR030008/APP/6.2]**.
	Local Resident (living within approx. 10 km of the project)	I am concerned about the risk to the people of Immingham. Ammonia is highly toxic and the town is too close to the chemical works. Residents already undergoing legal aspects of CPO. Concerns about ammonia being dumped into the atmosphere and the sea. Concern that people will be at risk of chemical exposure. Suggested investing in Tidal power instead.	From a human health perspective, perception of risk has been considered within **Section 24.8**. The plant will be designed to comply with all applicable regulations and will require an environmental permit. The detailed design will ensure that ammonia is contained and appropriate measures will be taken to prevent emissions during maintenance and other periodic operations. A flare system will dispose of ammonia safely in the event of an emergency. Technical information about operation of the Project has been made available via the Project engagement activities to assist in developing understanding of the processes and help address concerns regarding safety. The reference to tidal power is noted. Government policy supports a range of technologies being used to achieve the transition to net zero. The Project would provide infrastructure designed to contribute towards the Government's aim of achieving 10GW of low carbon hydrogen production capacity by 2030, as defined in the British Energy Security Strategy, April 2022 (Ref 24-2).

Reference / Date	Consultee	Summary of Response	How comments are addressed in the ES
	Local Resident (living within approx. 10 km of the project)	The hydrogen plant is further development of the agricultural land which has historically provided a buffer between port/industry and residential town. The proposed development, handling & storing of dangerous and toxic chemicals, is within 500 m of housing estates in Immingham. Any large scale accident has potential for a domino effect with all of the existing high risk sites in the area.	From a human health perspective, perception of risk has been considered within the relevant paragraphs of **Section 24.8**. Domino scenarios are considered in **Chapter 22: Major Accidents and Disasters [TR030008/APP/6.2]** and will also be considered by the Health and Safety Executive ("HSE") during the COMAH notification process.
	Natural England	Rights of Way, Access land, Coastal access, and National Trails Paragraphs 100 and 174 of the NPPF highlight the important of public rights of way and access. Development should consider potential impacts on access land, common land, rights of way and coastal access routes in the vicinity of the development. Consideration should also be given to the potential impacts on the any nearby National Trails. The National Trails website www.nationaltrail.co.uk provides information including contact details for the National Trail Officer. Appropriate mitigation measures should be incorporated for any adverse impacts.	PRoW have been assessed from the impact on health perspective within this **Chapter 24: Human Health and Wellbeing [TR030008/APP/6.2]**. The impact on users of PRoWs has also been considered within **Section 23.5 of Chapter 23: Socio-Economics**, focusing on the impact of severance of existing routes and the resulting changes in journey lengths and times, and local travel patterns. Appropriate mitigation measures associated with the temporary diversion of Public Bridleway 36, as set out in the **Stopping Up Plan [TR030008/APP/4.7]**, will be implemented including providing notice and installation of adequate signage as included within the **Outline Construction Environmental Management Plan** ("CEMP") **[TR030008/APP/6.5]**.

Reference / Date	Consultee	Summary of Response	How comments are addressed in the ES
Second Statutory Consultation May 2023	Polynt	We are concerned that the inclusion of the southern part of the Long Strip woodland within the DCO will exacerbate the already detrimental impact the IGET Project could have on the health and wellbeing of our employees as a result of the removal of trees in the vicinity of our site. Further, the proposed diversions to existing public rights of way and informal access points are also likely to have adverse impacts on the health and wellbeing of employees, particularly those who live locally.	An assessment of the human health impact resulting from the loss of trees within the Long Strip is provided within **Section 24.8** below. An assessment of the human health impact of the temporary diversion of Public Bridleway 36 has been conducted in the assessment of 'accessibility to open space, and active travel within **Section 24.8** below.

24.3 Legislation, Policy and Guidance

Legislation, Policy and Guidance

24.3.1 **Table 24-2**: presents the legislation, policy and guidance relevant to the human health and wellbeing assessment and details how their requirements will be met.

Table 24-2: Relevant legislation, policy and guidance regarding human health and wellbeing

Legislation/Policy/Guidance	Consideration within the ES
National Policy Statement for Ports ("NPSfP")	
The NPSfP (Ref 24-3) provides the framework for decisions on proposals for new port development. It is recognized that ports have a vital role in the import and export of energy supplies. It states that ensuring security of energy supplies through our ports will be an important consideration and that ports need to be responsible both to changes in the types of energy supplies needed and changes in the geographical pattern of demand for fuel. Within the document, it recognises that ports have the potential to affect the health, well-being and quality of life of the population through direct impacts on health and indirect impacts resulting from alterations to local populations. It highlights that these impacts can result from: • waste management, whereby *'government policy on hazardous and non-hazardous waste is intended to protect human health by producing less waste and using it as a resource wherever possible…waste management regulation ensures that waste is disposed of in a way that is least damaging to human health'* (paragraph 5.5.1); • water quality and resources, whereby there may be an '*increased risk of spills and leaks of pollutants to the water environment. These effects could lead to adverse impacts on health…*' (paragraph 5.6.2); • air quality and emissions, whereby the '*construction, operation and decommissioning phases…of infrastructure development…can involve emissions to air, which could lead to adverse impacts on human health'* (paragraph 5.7.2); • noise and vibration, whereby '*excessive noise can have wide-ranging impacts on*	Provides the framework for decisions on proposals for new port development and guidance on the likely impact pathways between port development and operation, and human health impacts. These align with the themes considered in the assessment of effects (**Section 24.8**) which, as set out in **Section 24.4**, considers: a. Access to healthcare services and other social infrastructure. b. Emission of dust, noise, vibration, and odours. c. Air/noise pollution linked with traffic. d. Accessibility to open space, and on active travel. e. Access to employment and training, particularly for local residents. f. Contribution to social cohesion and engagement with existing communities to encourage social interaction and support mental health, including perception of risk.

Legislation/Policy/Guidance	Consideration within the ES
quality of human life and health…owing to annoyance or sleep disturbance…' (paragraph 5.10.1); • land use, whereby it is recognized that *'open spaces…help to underpin people's quality of life and have a vital role to play in promoting healthy living'* (paragraph 5.13.2); and • economic impacts, including access to public services, whereby '*economic benefits from port developments include regeneration and employment opportunities…ports can contribute to the enhancement of people's skills…*' (paragraph 4.3.2 and 4.3.3).	
National Planning Policy Framework ("NPPF2)	
The latest BPPF (Ref 24-4) was published and adopted in July 2021. The NPPF consolidates the Government's economic, environmental and social planning policies for England into a single document and describes how it expects these to be applied. It provides overarching guidance on the Government's development aims. The NPPF places emphasis on achieving sustainable development including by supporting *"strong, vibrant and healthy communities"*. Chapter 8: 'Promoting healthy and safe communities' outlines the key role that planning policy has in ensuring the health and wellbeing of communities through considerations such as the availability of school places, public safety and security, and the promotion of social interaction and community cohesion. Within this chapter, the NPPF identifies key principles that local planning authorities should ensure they consider in order to achieve this aim, including: Paragraph 92 c) which states policies should aim to *"enable and support healthy lifestyles, especially where this would address identified local health and well-being needs – for example through the provision of safe and accessible green infrastructure, sports facilities, local shops, access to healthier food, allotments and layouts that encourage walking and cycling"*; and Paragraph 185 illustrates that planning policies must conserve and enhance the natural and local environment and therefore, planning decisions on new developments should account for noise	Provides guidance on the promotion of safe and healthy communities, which aligns with the themes considered in the assessment of effects (**Section 24.8**).

Legislation/Policy/Guidance	Consideration within the ES
pollution. In doing so, planning policies and decisions should attempt to *"mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life".*	
NHS Long Term Plan (2019)	
The NHS Long Term Plan (Ref 24-5) sets out a ten-year programme of phased improvements to the NHS. The plan outlines how the NHS will attempt to reduce health inequalities through wider preventative action in deprived areas and improvements to integrated community-based care systems. This includes funding support to programmes which help to reduce smoking, obesity and air pollution in vulnerable communities. There will also be an increased focus on digital GP consultations to provide more options and better support for patients. Increases in NHS funding and the establishment of a new NHS Assembly are planned to help achieve better care quality and outcomes as well as helping to reduce workforce pressures. The NHS Long Term Plan stresses the importance of the NHS and the built environment sector continuing to work together to improve health and wellbeing.	Provides context to the assessment of the Project's impacts on access to local healthcare facilities, as set out in **Section 24.8**.
Health and Care Act (2022)	
In April 2022, the Government passed a new Health and Care Act 2022 (Ref 24-6). The new Act proposes health reforms in England, removes existing competition rules and formalises Integrated Care Systems (ICS). It also grants the health secretary authority over the health service. The Act also aims to support the development of ICS and integration of all health bodies, by requiring them to strive towards the collective aims of: better care for all patients; better health and wellbeing for everyone; and sustainable use of NHS resources. There are 42 ICSs across England and each has been established with four strategic purposes: • Improve population health and healthcare; • Tackling unequal outcomes and access; • Enhance productivity and value for money; and	Provides context to the assessment (**Section 24.8**) of access to local healthcare facilities (see **paragraphs 24.8.6 to 24.8.11, 24.8.58 to 24.8.62 and 24.8.101 to 24.8.102**).

Legislation/Policy/Guidance	Consideration within the ES
• Helping the NHS to support broader social and economic development.	
Levelling Up the United Kingdom (February 2022) White Paper	
The Levelling Up the United Kingdom document (Ref 24-7) contains 12 specific missions which are set out as key objectives for the Government to deliver against. One of these missions includes that: *'By 2030, the gap in Healthy Life Expectancy (HLE) between local areas where it is highest and lowest will have narrowed, and by 2035 HLE will rise by five years'.* The goal is for the Government to tackle the existing disparities in health outcomes across the UK, ensuring that people have the opportunity to have long healthy lives wherever they live. It is stated that *'on average, people living in the most deprived communities in England have over 18 years less of their lives in good general health than those living in the least deprived areas'.* There also appear to be disparities in access to healthcare in the most deprived areas, with longer waiting lists in more deprived areas. The policy programme is focused around three key areas: • Improving public health; • Supporting people to change their food and diet; and • Tackling diagnostic backlogs.	Provides context to stated governmental ambitions to reduce health disparities and provides justification for highlighting vulnerable groups and existing deprivation within the baseline conditions (**Section 24.6**).
Planning Practice Guidance ("PPG") (2019)	
The national PPG (Ref 24-8) was first produced in November 2016 and most recently updated in October 2019. It provides a web-based resource in support of the NPPF and offers guidance on health and wellbeing in planning and planning obligations. It covers both: • The role of health and wellbeing in planning; and • The links between health and wellbeing and planning. The PPG suggests that local authority planners should consult with the Director of Public Health on mitigation measures for any planning applications that are likely to have a significant impact on the health and wellbeing of the local population or	Health and wellbeing impacts have been assessed in **Section 24.8**.

Legislation/Policy/Guidance	Consideration within the ES
particular groups. A health impact assessment is a useful tool to use when assessing expected significant impacts. The guidance states that: *"plan-making authorities may work with public health leads and health organisations to understand and take account of the health status and needs of the local population, including the quality, quantity of and accessibility to healthcare and the effect any planned growth may have on this. Authorities should also assess quality, quantity of and accessibility to green infrastructure, sports, recreation and places of worship including expected future changes, and any information about relevant barriers to improving health and well-being".* The PPG for health and safe communities covers the role of positive planning on healthier communities and how the design and use of the built and natural environments, including green infrastructure, are major determinants of health and wellbeing. The guidance states that *"planning and health need to be considered together in two ways: in terms of creating environments that support and encourage healthy lifestyles, and in terms of identifying and securing the facilities needed for primary, secondary and tertiary care, and the wider health and care system".* The PPG for open space, sports and recreation facilities, PRoW (Public Rights of Way) and local green space provides additional guidance on those designation and how they should be taken into consideration in planning. The guidance mentions that planning should consider proposals that may affect existing open space as they provide health and recreational benefits to people living and working nearby. It is for local planning authorities to assess the need for open space and, when doing so, should have regard to the duty to cooperate where open space serves a wider area.	
Public Health England Strategy 2020 to 2025	
The Public Health England Strategy 2020 to 2025 (Ref 24-9) sets out how the organisation will work to improve public health and reduce health inequalities. The most relevant of the ten priorities for focus of PHE over the next five years are set out below: '1) Smoke free society: take steps towards a smoke-free society by 2030;	Provides guidance on the relationship between the development of the built environment and health improvement priorities. The impact of the Project on health and wellbeing is assessed in **Section 24.8**.

Legislation/Policy/Guidance	Consideration within the ES
2) Healthier diets, healthier weights: help make the healthy choice the easy choice to improve diets and rates of childhood obesity; 3) Cleaner air: Develop and share advice on how best to reduce air pollution levels and people's exposure to polluted air; 4) Better mental health: Promote good mental health and contribute to the prevention of mental illness; 5) Best start in life: work to improve the health of babies, children and their families to enable a happy, healthy childhood and provide the foundations of good health into adult life; 6) Effective responses to major incidents: Enhance the ability to respond to major incidents (including pandemic influenza), by strengthening our health protection system; 7) Reduced risk from antimicrobial resistance: work to help contain, control and mitigate the risk of antimicrobial resistance; 8) Predictive prevention: utilise technology to develop targeted advice and interventions and support personalised public health and care at scale; and 9) Enhanced data and surveillance capabilities: improve the data capability and strengthen the approach to disease surveillance using new tools and techniques. In 2020, Public Health England published 'Using the planning system to promote healthy weight environments'. This document provides strategic information on the use of the planning system to promote local healthy weight environments, supporting local businesses and workplaces to provide healthier food and drink to help enable people access to healthier food and active environments. Supporting healthy diets and a healthier weight is a priority in the PHE Strategic Plan 2020-2025.	
A Green Future: 25 Year Plan to Improve Our Environment (2018)	
The Government's 25-year Plan to Improve the Environment (Ref 24-10) outlines proposed action to protect the environment and economy simultaneously. Chapter 3 which focuses on government plans to improve the connection	Provides guidance on the relationship between the development of the built environment and health improvement priorities. The impact of the Project on health and wellbeing is assessed in **Section 24.8**.

Legislation/Policy/Guidance	Consideration within the ES
between people and the environment in order to promote health and wellbeing. This includes the following objectives: "*Helping people to improve their health and wellbeing by using green spaces"* – there will be a renewed reliance on green spaces to help address issues such as isolationism and loneliness, something which is becoming increasingly prevalent with an ageing population and increased reliance on technology. It will also help to tackle obesity and act as a preventative and therapeutic approach to mental health. Encouraging children to be close to nature, in and out of school, with a focus on disadvantaged areas. The government will launch 'Nature Friendly Schools Programmes' to help communities create *"the kind of school grounds that will support learning about the natural worlds and keep children happy and healthy".* There will also be greater support for pupil contact with local natural spaces by making it easier for schools to take pupils on regular trips.	
Health Equity in England: The Marmot Review 10 Years On (2020)	
A follow up Marmot Review, Health Equity in England 10 Years On (Ref 24-11), was published in February 2020. The report highlighted the growth in health inequality over the preceding 10 years, especially for people living in more deprived districts and regions, and that for the population as a whole, health is declining. The report argues that greater levels of government intervention are required and that those areas who are most deprived should receive investment first and at higher levels. As well as this, it calls upon the Government to create a health inequalities strategy with clear targets and to create a Cabinet-level cross-departmental committee. It calls upon the government to re-order national priorities and to make wellbeing a central goal of policy, which will in turn create a better society, with better health and health equity.	Provides context to stated governmental ambitions to reduce health disparities and provides justification for highlighting vulnerable groups and existing deprivation within the baseline conditions (**Section 24.6**).
Build Back Fairer: The COVID-19 Marmot Review (2020)	
An update to the Marmot Review 10 Years On report, Build Back Fairer: The COVID-19 Marmot Review (Ref 24-12) was published in December 2020 to investigate how the pandemic has affected health inequalities in England. The COVID-19	Provides context to stated governmental ambitions to reduce health disparities in the context of the COVID-19 pandemic, and provides justification for highlighting vulnerable groups and

Legislation/Policy/Guidance	Consideration within the ES
pandemic has exposed and amplified the inequalities highlighted in the Marmot Review 10 Years On report. The report proposes that commitment to social justice and equity of health and wellbeing is at the heart of all policy-making, nationally, regionally and locally and that the economic harm caused by measures to control the virus may cause further damage to health and widening of health inequalities.	existing deprivation within the baseline conditions (**Section 24.6**).
The Marmot Review (2010)	
The Marmot Review (2010) (Ref 24-13) argues that serious avoidable health inequalities exist across England and shows these inequalities to be determined by a wide range of socio-economic factors. Health is linked to both individuals and communities. The following policy objectives are identified: • "*Give every child the best start in life;* • *Enable all children, young people and adults to maximise their capabilities and have control over their lives;* • *Create fair employment and good work for all;* • *Ensure a healthy standard of living for all;* • *Create and develop healthy and sustainable places and communities; and* • *Strengthen the role and impact of ill health prevention".*	Provides context to stated governmental ambitions to reduce health disparities and provides justification for highlighting vulnerable groups and existing deprivation within the baseline conditions (**Section 24.6**).
Institute of Environmental Management and Assessment ("IEMA") Determining Significance for Human Health in Environmental Impact Assessment	
IEMA published guidance (Ref 24-1) on the process and methodology for assessing significance of human health effects as part of Environmental Impact Assessments in 2022.	This guidance has formed the basis of the methodology used to conduct the human health and wellbeing assessment.
Institute of Environmental Management and Assessment (IEMA) Effective Scoping of Human Health in Environmental Impact Assessment	
IEMA published additional guidance (Ref 24-14) in 2022 pertaining to the scoping of human health effects. It suggests a range of health determinants to be considered as part of the scoping of human health impacts.	This guidance has been considered with respect to reviewing the scoped in health determinants during the preparation of the ES.

Legislation/Policy/Guidance	Consideration within the ES
NHS England's Healthy Urban Development Unit ("HUDU") Rapid Health Impact Assessment ("HIA") Tool	
NHS England's HUDU HIA Tool (Ref 24-15) identifies eleven broad determinants of health that are likely to be influenced by specific development proposals and can be influenced through design and management measures. It provides an assessment checklist against which the likely impacts of new developments can be assessed.	The assessment of health and wellbeing has been conducted in line with this guidance.
Wales Health Impact Assessment Support Unit ("WHIASU") Health Impact Assessment (HIA): A practical guide	
WHIASU's guidance on HIA, including HIA: A practical guide (Ref 24-16), provides guidance on best practice approach to carrying out health impact assessment.	The assessment of health and wellbeing has been conducted with regard to this guidance.
Joint Health and Wellbeing Strategy for Lincolnshire	
The role of the Lincolnshire's Health and Wellbeing Board is to bring together key people from the health and care system to work together to reduce inequalities and improve the health and wellbeing of the people of Lincolnshire. The Health and Wellbeing Board has identified a number of common aims which emerged during the engagement process which form the basis of the overarching aspirations and aims for the Joint Health and Wellbeing Strategy for Lincolnshire (Ref 24-17). These include the need for the Joint Health and Wellbeing Strategy to: • have a strong focus on prevention and early intervention; • ensure a focus on issues and needs which will require partnership and collective action across a range of organisation to deliver; • deliver transformational change through shifting the health and care system towards preventing rather than treating ill health and disability; and • focus on tackling inequalities and equitable provision of services that support and promote health and wellbeing.	Provides local policy context for the consideration of health and wellbeing in the population likely to be affected by the Project. An assessment of the health and wellbeing impacts arising from the Project on local populations is shown in **Section 24.8**.

Legislation/Policy/Guidance	Consideration within the ES
North East Lincolnshire Local Plan 2013 to 2032	
The North East Lincolnshire Local Plan (Ref 24-18) sets out aspirations to address social inequality which may be caused by health disparities. The Plan makes reference to the development of the local authority area and how this is likely to, or is able to, positively influence health outcomes. 'Policy SO5: Social and health inequality' addresses promoting healthier lifestyles and providing access to healthcare and community facilities.	Provides local policy context for the consideration of health and wellbeing in the population likely to be affected by the Project. An assessment of the health and wellbeing impacts arising from the Project on local populations is shown in **Section 24.8**.
North Lincolnshire Local Development Framework	
The North Lincolnshire Local Development Framework (Ref 24-19) sets out aspirations to promote community health and wellbeing in the local authority area. Objective 8: Promoting Community Health and Wellbeing aspires to 'promote an improvement in health and wellbeing of North Lincolnshire's people by maintaining and providing quality open spaces, play and sports facilities, better access to the countryside and improved health facilities.	Provides local policy context for the consideration of health and wellbeing in the population likely to be affected by the Project. An assessment of the health and wellbeing impacts arising from the Project on local populations, including neighbourhood amenity and access to local facilities, is shown in **Section 24.8**.
Central Lincolnshire Local Plan	
The Central Lincolnshire Local Plan (Ref 24-20) adopted in April 2017 makes reference to health in the following policies: Policy LP9: Health and Wellbeing: this states that the potential for achieving positive and physical health outcomes will be taken into account when considering all development proposals; Policy LP13: Accessibility and Transport: this states that development proposals should contribute towards an efficient and safe transport network, where the use of sustainable transport modes are maximised; Policy LP15: Community Facilities: this states that all development proposals should recognise the community facilities as an integral component in achieving and maintaining sustainable, well integrated and inclusive development; Policy LP18. Climate Change and Low Carbon Living: this states that development proposals will be considered more favourably if the scheme would make a positive and significant contribution towards	Provides local policy context for the consideration of health and wellbeing in the population likely to be affected by the Project. An assessment of the health and wellbeing impacts arising from the Project on local populations, including neighbourhood amenity and access to local facilities, is shown in **Section 24.8.**

Legislation/Policy/Guidance	Consideration within the ES
one or more of the following: reducing demand; resource efficiency; energy production; and carbon off-setting; Policy LP19: Renewable Energy Proposals: this states that proposals for non-wind renewable technology will be assessed on their merits, with the impacts considered against the benefits of the Scheme; and Policy LP20: Green Infrastructure Network: this states that the Central Lincolnshire Authorities will aim to maintain and improve the green infrastructure network by enhancing, creating and managing multifunctional green space within and around settlements that are well connected to each other and the wider countryside.	

24.4 Assessment Methodology

Methodology

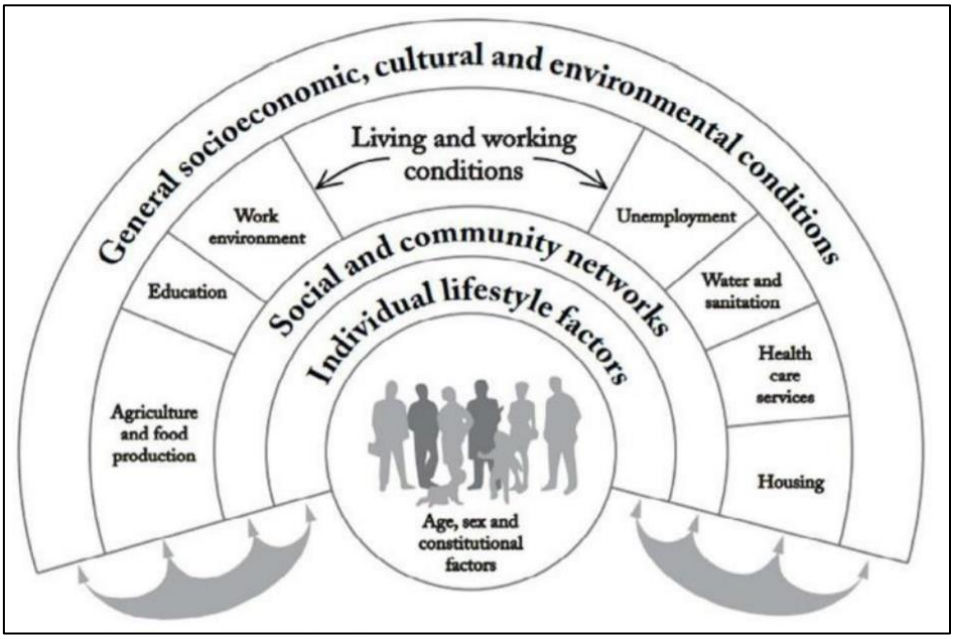
24.4.1 The IEMA guidance "Determining Significance For Human Health in Environmental Impact Assessment" forms the basis of the approach adopted to assess impacts on human health in this chapter (Ref 24-1). Consideration has also been given to supplementary IEMA guidance "Effective Scoping of Human Health in Environmental Impact Assessment" (Ref 24-14). In addition, consideration has been given to NHS England's HUDU Rapid Health Impact Assessment ("HIA") Toolkit 2019 (Ref 24-15) to assist with the identification of relevant health determinants and mapping of health pathways.

24.4.2 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 24-21). Public health therefore encompasses general wellbeing, not just the absence of illness.

24.4.3 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.

24.4.4 Dahlgreen and Whitehead's model of the main determinants of health (Ref 24-22) illustrates the breadth of possible influences on health, as shown in **Plate 24-1**. 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 socio-economic and cultural environment.

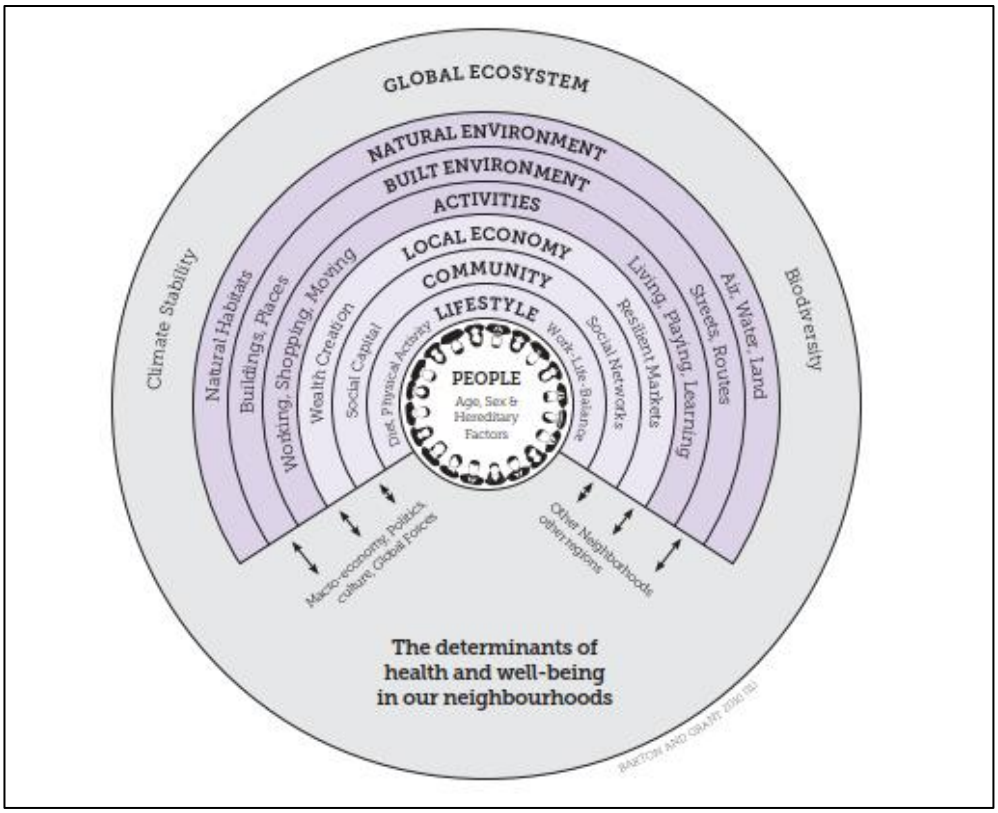
Plate 24-1: Determinants of health



Source: Ref 24-22

24.4.5 This model has been developed to show elements of the built environment and communities that are the most significant determinants of health, as shown in **Plate 24-2.**

Plate 24-2: Determinants of health and wellbeing in neighbourhoods



Source: Ref 24-23

24.4.6 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. For example, differences in mobility between elderly people and younger populations or differences in mortality rates between people from different social classes'* (Ref 24-21).

24.4.7 This qualitative[2] assessment of human health effects considers the following health and wellbeing determinants of relevance to the Project:

a. Access to healthcare services and other social infrastructure.

b. Emissions of dust, noise, vibration, and odours.

c. Air/noise pollution linked with traffic.

d. Accessibility to PRoW, open space, and on active travel.

e. Access to employment and training, particularly for local residents.

[2] The assessment of human health and wellbeing is qualitative in its conclusions of assigning significance of effect on determinants. However, it should be noted that some of the information used is derived from other assessments within this ES which are based on quantitative assessment methodologies. The human health and wellbeing assessment therefore inherently considers qualitative and quantitative information to inform a qualitative conclusion. This is an appropriate approach as detailed within the IEMA guidance (Ref 24-1).

f. Contribution to social cohesion and engagement with existing communities to encourage social interaction and support mental health, including perception of risk.

g. Climate change.

24.4.8 **Table 24-3** sets out a summary of the health determinants scoped into this assessment, and the source, pathway, and receptor links relevant to each.

Table 24-3: Health determinants: Source-Pathway-Receptor links

Determinant	Source	Pathway	Receptor	Project phase
Access to healthcare and other social infrastructure	Potential changes to access to healthcare arising from temporary or permanent closures, diversions or amenity impacts on PRoW or impacts on the local road network	Potential adverse impact on access to health services which could impact human health	Human receptors living within local communities	Construction, operation and decommissioning
	Potential changes to access to healthcare arising from an influx of workers to the local area	Potential adverse impact on access to health services due to effects of levels of provision resulting from additional workforce in the local area	Human receptors who use local healthcare services	Construction, operation and decommissioning
Emissions of dust, noise, vibrations and odours	Potential temporary changes in local air quality including increased dust and particulate matter emissions arising from the construction and decommissioning of the Project	Potential adverse human health impacts arising from increased exposure to dust and particulate matter emissions arising from the Project	Human receptors likely to be at risk of possible direct and indirect air quality impacts from the Project	Construction and decommissioning
	Potential temporary or permanent changes in noise levels arising from the construction and	Potential adverse human health impacts arising from increased exposure to noise due to the Project	Human receptors likely to be at risk of possible direct and indirect noise impacts from the Project	Construction and decommissioning

Determinant	Source	Pathway	Receptor	Project phase
	decommissioning of the Project			
Air/noise pollution linked with traffic	Potential temporary or permanent increases in traffic on the local road network	Potential adverse impacts on air quality and noise conditions, which could impact human health	Human receptors in the vicinity to the local road network	Construction, operation and decommissioning
Accessibility to open space, and on active travel	Potential changes to community connectivity and wider community services including open space arising from temporary or permanent closures, diversions or amenity impacts on public rights of way PRoW or impacts on the local road network	Potential adverse impacts on journeys made by active travel modes, and access to open spaces which could impact human health	Human receptors living within local communities	Construction and decommissioning
Access to employment and training	Potential temporary or permanent increase in employment and training opportunities, directly related to the Project, or within the wider supply chain	Potential beneficial economic impacts arising from employment, training and income opportunities for those working on the Project, or within the wider supply chain, which could impact human health	Human receptors who could potentially benefit from employment and training opportunities, directly related to the Project, or within the wider supply chain	Construction, operation and decommissioning
Contributions to social cohesion including perception of risk	Potential temporary or permanent changes to social cohesion including impacts on mental health and the perception of risk	Potential adverse impacts on human health resulting from disruption to community connectivity, or increases in perception of risk	Human receptors in communities near to the Project	Construction, operation and decommissioning

Determinant	Source	Pathway	Receptor	Project phase
		leading to mental health issues		
Climate change	Potential temporary or permanent changes to Greenhouse Gas (GHG) emissions	Potential human health impacts arising from increased exposure to GHG emissions arising from the Project	Human receptors likely to be exposed to increased or reduced GHG emissions arising from the Project	Construction and operation

24.4.9 The assessment has considered the potential consequences for health and wellbeing arising from construction, operation and decommissioning phases of the Project and draws upon the information and conclusions reported within the air quality assessment (**Chapter 6: Air Quality [TR030008/APP/6.2]**), noise and vibration assessment (**Chapter 7: Noise and Vibration [TR030008/APP/6.2]**), traffic and transport assessment (**Chapter 11: Traffic and Transport [TR030008/APP/6.2]**), climate change assessment (**Chapter 19: Climate Change [TR030008/APP/6.2]**), and socio-economic assessment (**Chapter 23: Socio-economics [TR030008/APP/6.2]**).

24.4.10 The assessment of human health considers the residual effects as reported in these chapters. The human health assessment therefore inherently takes into account the standard, embedded, and additional mitigation measures of the respective assessments, which are set out in further detail in **Section 24.7** of this chapter.

24.4.11 The following human health determinants assessed within other technical assessments across this ES report have been scoped out of the human health assessment, as measures have been established to manage risk and ensure effects on human health are unlikely. These aspects have been monitored during the preparation of the ES, and where potential health effects are identified these have been considered in the human health assessment as relevant:

a. Water quality or availability **(Chapter 18: Water Use, Water Quality, Coastal Protection, Flood Risk and Drainage [TR030008/APP/6.2]).**

b. Land quality **(Chapter 21: Ground Conditions and Land Quality [TR030008/APP/6.2]).**

c. Community safety **(Chapter 22: Major Accidents and Disasters [TR030008/APP/6.2]).**

24.4.12 An assessment of the risks associated with EMF has been included in the human health assessment. This has been included in order to fully respond to Scoping Opinion response from UK Health Security Agency/OHID. The assessment is based on advice provided by the UK Health Security Agency within their Scoping Opinion response (see **Table 24-1**). Additionally, the Electric and Magnetic Fields website has been used to gather information on the EMF risks associated with the types of infrastructure proposed (Ref 24-24). International Commission on Non-ionising Radiation Protection (“ICNIRP”) guidelines, in line with government

policy, have been used as a reference for the recommended limits of exposure of the general public to EMFs (Ref 24-25).

24.4.13 The assessment of potential EMF related effects does not follow the 'standard' Environmental Impact Assessment ("EIA") methodology of identifying the sensitivity of receptors and magnitude of impacts 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 EIA guidelines (Ref 24-26) advises that the Energy Networks Association ("ENA") will maintain a publicly available list of types of equipment which comply with the ICNIRP exposure guidelines. The 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.

Sources of Information

24.4.14 This chapter presents the assessment of the potential human health and wellbeing effects of the Project against the current human health baseline conditions (as determined at the time of publication of latest available data) within the study areas set out **Section 24.5** below.

Desktop survey

24.4.15 In order to understand the existing population health baseline, data illustrating the existing population health conditions has been collected through a desk-based research exercise using publicly available sources, documents and web-based applications.

24.4.16 Sources of information that have been used for this exercise include:

a. Office for National Statistics, (2022); Census 2021 (Ref 24-27).

b. Ministry of Housing, Communities and Local Government, (2019); Indices of deprivation (Ref 24-28).

c. Office for Health Improvements and Disparities, (2022); Local Authority Health Profiles (Ref 24-29)

d. Public Health England, (2015); Modelled Prevalence Estimates (Ref 24-30).

e. NHS Digital, (2023); General Practice Workforce (April 2023) (Ref 24-31).

Impact Assessment Methodology

24.4.17 The human health and wellbeing assessment was scoped in line with NHS England's HUDU *Rapid HIA Toolkit 2019* (Ref 24-15). This informed the identification and scoping of relevant determinants of health to be assessed. Although this guidance represented best practice principles at the time of scoping the assessment, no industry-recognised guidance for assigning significance of human health and wellbeing effects for the purposes of EIA was available.

24.4.18 IEMA guidance on health impact assessment has since been released which provides additional best practice principles that enable a robust assessment of the significance of human health and wellbeing effects for the purposes of EIA (Ref 24-1 and Ref 24-14). In order to incorporate this recently released guidance, and to address statutory consultation feedback regarding the methodology, the assessment in this chapter of the ES follows IEMA guidance to assign significance to human health effects.

24.4.19 The potential effects/health determinants identified at scoping have also been reviewed against the since published wider determinants of health given by IEMA to ensure alignment with this recognised guidance. To do this, the scoped in determinants have been compared against those in the IEMA guidance. This is shown in **Table 24-4**.

24.4.20 As a result of this exercise, it is deemed appropriate to retain the HUDU determinants as originally identified as they are seen to comply and align well with wider determinants of health given by IEMA guidance.

Table 24-4: Health determinants assessed

Assessment determinants	IEMA determinants covered
Access to healthcare and other social infrastructure	• Health and social care services • Community safety • Community identity, culture, resilience and influence • Physical activity • Diet and nutrition • Water quality or availability
Emissions of dust, noise, vibration and odours	• Air quality • Noise and vibration • Housing • Relocation • Land quality
Air/noise pollution linked with traffic	• Air quality • Noise and vibration • Physical activity • Transport modes, access and connections • Community safety

Assessment determinants	IEMA determinants covered
Accessibility to open space, and on active travel	• Open space, leisure, and play • Risk-taking behaviour • Transport modes, access and connections
Access to employment and training	• Education and training • Employment and income
Contributions to social cohesion	• Social participation, interaction and support • Built environment • Wider societal infrastructure and resources • Community safety • Community identity, culture, resilience and influence
Climate change	• Climate change mitigation and adaptation

24.4.21 The human health and wellbeing assessment follows the general impact assessment methodology set out in **Chapter 5: EIA Methodology [TR030008/APP/6.2]**. The specific magnitude and sensitivity criteria applied for the human health assessment are set out below, and reflect IEMA guidance, *Determining Significance for Human Health in EIA* (Ref 24-1).

24.4.22 For human health there is no accepted definition of what constitutes a significant (or not significant) effect. It is, however, recognised that effects are categorised based upon the relationship between the magnitude of effect and the sensitivity of the affected human receptor. As such the significance criteria of human health effects has been assessed based on expert judgement and professional experience of the author, and relies on the following considerations:

a. **Sensitivity of human health receptors including general populations and potentially vulnerable sub-populations**: specific values in terms of sensitivity are not attributed to population health due to the diverse range of determinants and indicators that can determine overall health. However, the assessment takes account of the qualitative (rather than quantitative) sensitivity of relevant populations and their likely ability to adapt to change.

b. **Magnitude of impact**: this entails consideration of: the scale of the exposure of the population to an impact; whether the impact is one-off or continuous; the likely nature of the human health impact; the permanence of the change; and, the proportion of the relevant study area population that would be affected.

24.4.23 The assessment aims to be objective and quantifies effects as far as possible. However, some effects can only be evaluated on a qualitative basis. Effects are defined as follows:

a. **Beneficial** classifications indicate an advantageous or beneficial effect on human health, which may be minor, moderate or major in significance.

b. **Adverse** classifications indicate a disadvantageous or adverse effect on human health, which may be minor, moderate or major in significance.

c. **Negligible** classifications of effect indicate imperceptible effects on human health.

d. **No effect** classifications of effect indicate that there are no effects on human health.

24.4.24 The geographical scales considered to assess significance for each human health effect considered are described in **Section 24.5**.

24.4.25 Duration of effect is also considered, with more weight given to longer-term or permanent changes than to shorter-term or temporary ones.

Sensitivity of receptor

24.4.26 Sensitivity of population health is driven by a number of factors which are set out in **Table 24-5**, and are based on guidance set out by IEMA guidance, *Determining Significance for Human Health in EIA.*

Table 24-5: Human health sensitivity criteria

Sensitivity level	Sensitivity criteria
High	High levels of deprivation (including pockets of deprivation); reliance on shared resources (between the population and the Project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependents; 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

Sensitivity level	Sensitivity criteria
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, (2022); IEMA Guide to Determining Significance for Health (Table 7.1) (Ref 24-1).

Magnitude of impact

24.4.27 Magnitude of impact is driven by a number of factors which are set out in **Table 24-6**:, based on guidance set out by IEMA guidance, *Determining Significance for Human Health in EIA* (Ref 24-1).

Table 24-6: 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, (2022); IEMA Guide to Determining Significance for Health (Table 7.2) (Ref 24-1).

Significance of effects

24.4.28 Human health effects reflect the relationship between the sensitivity of the relevant population health, and the magnitude of the impact, as set out in **Table 24-7**:

Table 24-7: Impact assessment and significance of effect

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

24.4.29 In accordance with the methodology set out in **Chapter 5: EIA Methodology [TR030008/APP/6.2]**, the following criteria is applied:

a. 'Moderate' or 'Major' effects are classed '**significant'**.

b. 'Minor' effects are classed as '**not significant**'.

c. 'Negligible' effects are classed as '**not significant**'.

Stakeholder Engagement

24.4.30 A range of stakeholders have been engaged as part of the scoping process to obtain their views on the Project and the scope of the human health and wellbeing assessment, the results of which are presented within the Scoping Opinion (**Appendix 1-A [TR030008/APP/6.4]**). Moreover, consultees were also engaged to obtain views on the findings of the PEI Report, and those views have been taken into account with regard to the ongoing human health and wellbeing assessment.

Limitations and Assumptions

24.4.31 This assessment is based on baseline conditions obtained and evaluated at timeframes set out in the relevant chapters which inform the assessment, and Project design parameters set out in Section 2.3 of **Chapter 2: The Project [TR030008/APP/6.4]** of this ES.

24.4.32 The assessment of likely human health effects has been carried out against a benchmark of current human health and wellbeing baseline conditions prevailing around the Project, 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 24.6** regarding human health and wellbeing are based on latest data available at the time of writing.

24.4.33 This assessment is based on professional judgement and considers both the adverse and beneficial impacts that the Project will have on the surrounding receptors. It provides an indication of human health and wellbeing effects on people and the local community.

24.4.34 Effects of human health and wellbeing during the construction, operation and decommissioning phases are based on assessments taking into consideration the results from the relevant environmental studies. These studies comprise **Chapter 6: Air Quality, Chapter 7: Noise and Vibration**, **Chapter 11: Traffic and Transport**, **Chapter 19: Climate Change**, and **Chapter 23: Socio-economics [TR030008/APP/6.2]**.

24.4.35 The transport assessment (as set out in **Chapter 11: Traffic and Transport [TR030008/APP/6.2]**) presents information obtained and evaluated at the time of reporting and is based on the proposed parameters for the Project and the maximum extents of land required for its construction and operation. The assessment is based on conservative assumptions in accordance with the Rochdale Envelope approach, and the assessment is based on the worst-case assumption of a peak construction commencing in 2026. The traffic data used for the assessment is based on secondary data from surveys undertaken on behalf of the Applicant as part of the proposed Immingham Eastern Ro-Ro Terminal development and an Automated Traffic Count ("ATC") undertaken on week commencing 5 January 2023. HGV construction vehicles are assumed to travel to and from the Site via the A1173 towards the A180 where they are distributed based upon existing patterns of movements. The assessment does not include the opening year of the Project due to the worst-case year being assessed. The assessment also does not include the decommissioning phase, owing to it being scoped out by agreement with the Planning Inspectorate ("The Inspectorate").

24.4.36 The noise and vibration assessment methodology set out in **Chapter 7: Noise and Vibration [TR030008/APP/6.2]** is based on the maximum likely extent of land required for the Project construction, operation and subsequent decommissioning (of the hydrogen production facilities alone). The Rochdale Envelope approach has been adopted, with the location of operational plant within the areas shown for the relevant Work Nos on the Works Plans assessed on the basis of the "reasonable worst-case scenario" for the Noise Sensitive Receptors ("NSRs"). Detailed information about the construction methods and plant requirements is not yet available, however the assessment is based on construction plant which is likely to be used and professional judgement and is therefore considered robust. Furthermore, detailed traffic predictions are not yet available. The construction and operational traffic noise assessment is based on the 18 AAWT traffic data provided in the relevant assessment.

24.4.37 The air quality assessment methodology set out in **Chapter 6: Air Quality [TR030008/APP/6.2]** is informed by the traffic data set out in **Chapter 11: Traffic and Transport [TR030008/APP/6.2]** and is to that extent subject to the limitations and assumptions within that chapter (see also above). The assessment is informed by onsite emissions source characteristics and data provided by the Project design team. Vessel emissions data is also provided by the Project design team. It is impossible to estimate the proportion of Tier II and Tier III vessels using the facility in 2028 or 2036, but it is a certainty that all vessels will be Tier II compliant as a minimum. Meteorological data has been sourced from the nearest and most representative monitoring site which is 13km from the Site. Due to inter-annual variation in meteorological conditions, five years of data have been used in modelling to account for that variability.

Department for Environment, Food & Rural Affa background data and Air Pollution Information Service ("APIS") background data has been used to represent background pollutant concentration data in the study area, and it is considered proportionate and not unreasonable that background concentrations have not had any sources removed and are therefore considered to include emissions associated with the neighbours of the Site.

24.4.38 The climate change assessment methodology pertaining to lifecycle greenhouse gas ("GHG") emissions assessment set out in **Chapter 19: Climate Change [TR030008/APP/6.2]** details that the assessment is based on assumptions regarding the materials used. Moreover, there is no guidance which gives quantified thresholds of carbon emissions which would result in a significant effect. Additionally, a number of quantitative assumptions were made for the purposes of calculating GHG emissions.

24.4.39 This assessment has also considered the socio-economic assessment which has been carried out against a benchmark of current socio-economic baseline conditions prevailing around the Project, as far as is possible within the limitations of such datasets, as set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]**. Baseline data is subject to a time lag between collection and publication and, as with any dataset, these conditions may be subject to change over time which may influence the findings of the assessments. Construction and operational employment figures have been based on assessment of anticipated employment figures, as determined by the Applicant, and subject to subsequent analysis of resulting indirect employment in line with appropriate guidance. With regard to PRoW, it is assumed that Public Footpath 32 (which is not in active use and abuts the boundary) will not be affected by the Project as the only relevant work in this area is the underground pipeline corridor which it is assumed will be constructed using Horizontal Directional Drilling. Public Bridleway 36, which runs north from Laporte Road to the Humber, along the east edge of the Long Strip woodland will be temporarily partially closed and diverted during the first phase of the construction phase of the Project as shown on the **Stopping Up and Restriction of Use of Streets and Public Rights of Way Plan [TR030008/APP/4.7]**. During this temporary diversion, recreational sea anglers, including any clubs, will no longer have access along the sea front shown in the area of **Figure 23-6 [TR030008/APP/6.3]**, although once Public Bridleway 36 reopens on its original alignment it is anticipated that access for sea anglers will be possible along the sea front, up to the point where Public Bridleway 36 enters the Long Strip woodland (see **Figure 23-1 [TR030008/APP/6.3]**). With regard to private assets within the Site Boundary, it is assumed that residential use of a number of residential or mixed residential/ commercial properties (ten residential units in total) will cease permanently before the commencement of the construction phase and that these properties will be acquired through agreement or using compulsory acquisition powers). Two of those properties include business premises at ground floor (7-8 Queens Road and 18 Queens Road) and will also be acquired, such that a loss of commercial floorspace is assumed. Other businesses adjacent to the Site Boundary are considered to be compatible with operation of the facility and will be able to trade during all phases of the Project. It is recognised that there is

potential for a cumulative effect on labour force availability if the construction period coincides with other Nationally Significant Infrastructure Projects ("NSIPs") in the Yorkshire and Humber region.

24.4.40 The temporary impacts during construction are assessed as occurring simultaneously and for the duration of the programme set out in **Chapter 2: The Project [TR030008/APP/6.2]**. The same approach is assumed for decommissioning for the terrestrial parts of the Project. Whilst there is a phased construction programme across the 11 year construction period, the likely 'worst case' is assessed reflecting the approach to this adopted in the relevant environmental studies considered as part of the human health and wellbeing assessment. This may result in the overestimate of predicted adverse health effects but is considered a robust approach to the assessment. Should the construction phase be extended or delivered in phases, as set out in **Chapter 2: The Project [TR030008/APP/6.2]**, the predicted effects would be the same or less than those outlined in the chapter.

24.4.41 It is assumed that the main elements of the Terminal (the jetty, jetty head, loading platforms and access ramps and the jetty access road) would become part of the long- term port infrastructure and would not be decommissioned. Decommissioning of the terrestrial elements of the Project (the hydrogen production facility comprised in the Associated Development) and the plant and equipment on the jetty topside is assessed as occurring after 25 years of operation and for the purposes of this assessment is treated as taking place no earlier than 2060, based on a 25-year design life. It is also possible that the hydrogen production facility will be operational for a longer period of time and or that certain elements of it may be decommissioned in advance of the main decommissioning phase and then the predicted effects would be the same or less than those outlined in this chapter.

24.5 Study Area

24.5.1 The study areas for the assessment of potential human health effects, as set out in **Table 24-8**, have been defined to include human populations likely to be at risk from the possible direct and indirect health impacts that might arise from the Project. The study areas for human health are therefore based on the extent and characteristics of the Project, and the populations assessed to be likely to be directly and indirectly affected by it.

24.5.2 The study areas therefore vary by the type of impact being assessed:

a. The population health profile baseline study area comprises a local ward area including the four local wards which the Project is located in or in close proximity to. This comprises: Immingham, and Wolds wards in North East Lincolnshire, Ferry in North Lincolnshire; and Yarborough in West Lindsey[3]. Where data is not available at the ward level, local authority level data is provided for North East Lincolnshire, North Lincolnshire, and West Lindsey.

b. The study areas for potential human health impacts arising from impacts on community connectivity, and access to healthcare services and other facilities, including human receptors that could be impacted by community severance or access impacts arising from the Project are as set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]** which includes human receptors residing or working within 500m of the Site, visiting community facilities within 1.5km of the Site, or accessing primary healthcare within 5km of the Site. As detailed in **Chapter 11: Traffic and Transport [TR030008/APP/6.2]**, this study area also takes into account the immediate road network and the route to the Strategic Road Network as set out in paragraph 11.5.3.

c. The study area for potential human health impacts arising from impacts on prioritisation of walking and cycling includes human receptors that could be at risk from possible direct and indirect impacts on access to PRoW or impacts arising from increased traffic on the local road network. As set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]**, this includes human receptors accessing PRoW within 500m of the Project, and as set out in **Chapter 11: Traffic and Transport [TR030008/APP/6.2]**, human receptors in the vicinity of the traffic and transport study area (comprising the immediate network and the route to the Strategic Road Network) including the A180 and along the A1173 and relevant road links, as set out in paragraph 11.5.3.

d. The study area for potential human health impacts arising from access to employment and training includes human receptors that could benefit from local economic and employment impacts. As set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]**, this includes human receptors within North East Lincolnshire.

e. The study area for potential human health impacts arising from air quality impacts includes human receptors that could be impacted by construction phase dust or particulate matter, or emissions generated by construction road traffic. As set out in **Chapter 6: Air Quality [TR030008/APP/6.2]**, this includes human receptors within 350m of the Site Boundary and/or 50m of a public road used by construction vehicles that is within 500m of a site access

[3] Depending on the human health indicator being analysed, ward level data is available from the 2011 Census wards or 2018 electoral wards. Whilst the geographical extent of the 2011 Census and 2018 electoral wards differ, both extents provide an indication of local health in proximity to the Project and are therefore considered suitable for assessing the existing baseline conditions for human health. Where ward level data is not available, the local authorities of North Lincolnshire, West Lindsey, and North East Lincolnshire have been used as the study area referenced in the text.

point, and where there are sensitive ecological receptors within 50m of the Site Boundary and/or 50m of a public road used by construction vehicles that is within 500m of a site access point. The study area also includes human receptors within 200m of an 'affected' road link as set out in paragraphs 6.5.3 and 6.5.4.

f. The study area for potential human health impacts arising from noise and vibration impacts as set out in **Chapter 7: Noise and Vibration [TR030008/APP/6.2]**, includes during the construction phase NSR's up to 300m from the Site Boundary (including NSRs on Queens Road) and, for completeness, residential receptors approximately 460m – 500m from the Site Boundary at the south-eastern edge of Immingham. During the operation phase, the study area includes NSRs up to approximately 500m from the Site Boundary (excluding residential NSRs on Queens Road), including the residential NSRs at the south-eastern edge of Immingham. Additionally, for the assessment of changes in road traffic noise, this study area includes NSRs within 50m of the roads which would be used by vehicles during the construction and operation activities (NSRs on Queens Road will be considered where appropriate and applicable).

g. The study area for potential human health impacts arising from climate change impacts includes human receptors that could by impacted by changes in GHG emissions. As set out in **Chapter 19: Climate Change [TR030008/APP/6.2]**, with respect to GHG emissions, this includes human receptors globally given the potential global locations from which construction materials will be sources, and as the effects of GHG emissions are not geographically constrained.

Table 24-8: Summary of potential human health impacts and study areas

Potential Impact	Study Area	Rationale for Study Area
Potential adverse impacts on community participation and interaction, and access to open spaces which could impact human health	Human receptors residing or working within 500m of the Site Visitors of community facilities within 1.5km of the Site Users of primary healthcare facilities within 5km of the Site Human receptors in the vicinity of the immediate road network and route to the Strategic Road Network	Study area includes human receptors that could be affected by impacts on PRoW or the local road network as a result of the Project, as set out in **Chapter 23: Socio-economics** and **Chapter 11: Traffic and Transport [TR030008/APP/6.2]**.
Potential adverse impacts on journeys made by active travel modes, which could impact human health	Users of ProW within 500m of the Site	Study area includes human receptors that could be affected by impacts on ProW or the local road network as a result of the Project, as set out in **Chapter 23: Socio-economics**

Potential Impact	Study Area	Rationale for Study Area
	Human receptors in the vicinity of the HGV route to the Strategic Road Network	and **Chapter 11: Traffic and Transport [TR030008/APP/6.2].**
Potential beneficial economic impacts arising from employment, training and income opportunities for those working on the Project, or within the wider supply chain, which could impact human health	North East Lincolnshire	Study area includes human receptors that could benefit from potential local economic and employment impacts, as set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]**.
Potential human health impacts arising from increased exposure to GHG emissions arising from the Project	Globally	Study area includes human receptors that could be impacted by changes in exposure to GHG emissions as a result of the Project, as set out in **Chapter 19: Climate Change [TR030008/APP/6.2]**.
Potential adverse human health impacts arising from increased exposure to dust and particulate matter emissions arising from the Project	350m from Site boundary and/or 50m from public road used by construction traffic (within 500m of site access point) 200m from an 'affected' road link	Study area includes human receptors that could be impacted by construction phase dust or particulate matter, or emissions generated by construction road traffic, as set out in **Chapter 6: Air Quality [TR030008/APP/6.2]**.
Potential adverse human health impacts arising from increased exposure to noise due to the Project	NSRs within 500m of Site boundary; or 50m of roads used by construction and operation vehicles	Study area includes NSRs that could be impacted by noise and vibration impacts, as set out in **Chapter 7: Noise and Vibration [TR030008/APP/6.2]**.
Potential adverse impact on access to health services which could impact human health	Users of primary healthcare facilities within 5km of the Site Human receptors in the vicinity of the immediate road network and route to the Strategic Road Network	Study area includes communities and road users that could be affected by severance or access impacts, or journey delay, as set out in **Chapter 23: Socio-economics** and **Chapter 11: Traffic and Transport [TR030008/APP/6.2]**.

24.6 Baseline Conditions

Current Baseline

24.6.1 This section describes the human health baseline environmental conditions within the human health and wellbeing study area, compared, where relevant, to wider geographical areas of the Yorkshire and the Humber region and England and Wales as a whole[4].

24.6.2 'Current baseline' in the context of this data is taken to reflect the conditions at the time of publication of the data sources referenced. It is deemed appropriate that the latest available and robust datasets are referenced, as these are considered to represent the baseline conditions most accurately. This is subject to the assumptions and limitations referenced in **Section 24.4**.

Demographic profile

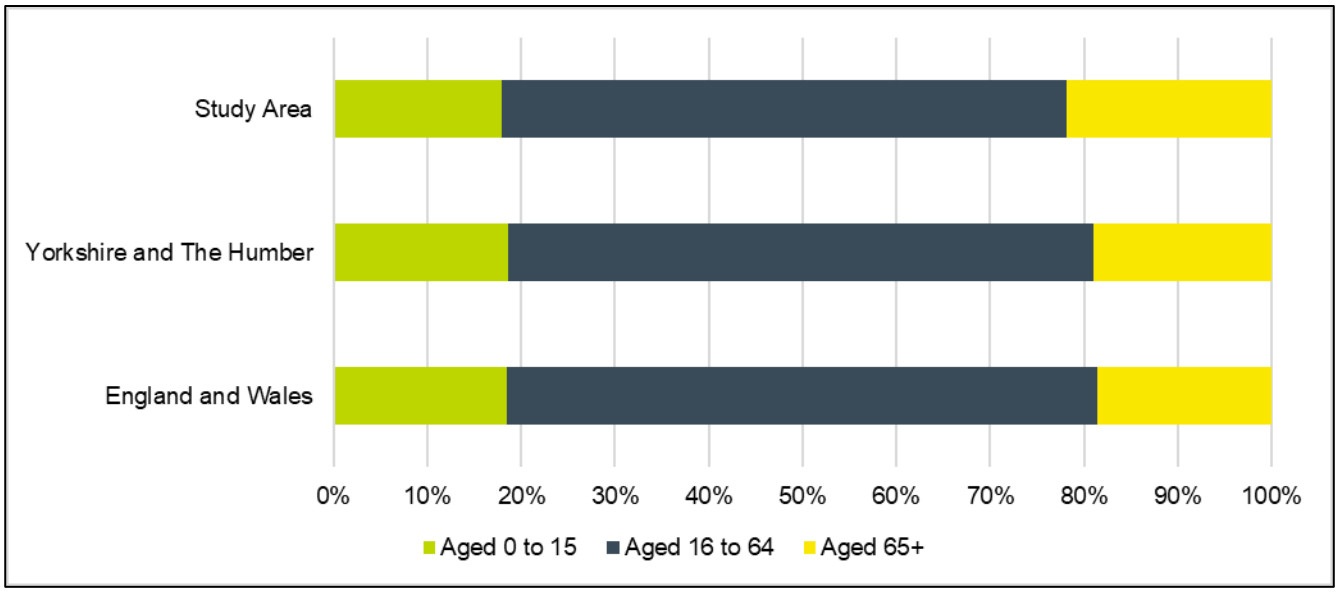
24.6.3 The total population of the study area, according to latest Census data, is 42,508, comprised of 11,428 in Ferry, 11,669 in Immingham, 7,789 in Wolds, and 11,622 in Yarborough (Ref 24-27).

24.6.4 In 2021, the proportion of working age residents (aged 16 to 64) in the study area was 60.3% which is slightly lower than is typical for the Yorkshire and The Humber region (62.4%) and across England and Wales as a whole (62.9%). This is shown in **Plate 24-3.**

24.6.5 Additionally, the average proportion of residents aged 65 and over in the study area is 21.8%, which is slightly greater than is typical for the Yorkshire and The Humber region (19.0%) and across England and Wales as a whole (18.6%).

[4] Data for the Yorkshire and the Humber region is presented for comparison purposes, and in order to contextualise the study area data, and thus does not form part of the assessment.

Plate 24-3: Age Breakdown by Geography



Source: Office for National Statistics, (2022); Census 2021 (Ref 24-27).

24.6.6 The proportion of residents who self identify as of White ethnicity within the study area (97.5%) is far greater than is typical for the Yorkshire and The Humber region (85.4%), and across England and Wales (81.7%). Accordingly, the proportion of residents of other ethnic groups is below the equivalent regional and national rate. For example, whereas Asian/Asian British/Asian Welsh residents comprise 0.9% of the study area population, this ethnic group represents 8.9% of the population of the Yorkshire and Humber region, and 9.3% of the population of England and Wales. A breakdown of self-identified ethnicity within the study area, and regional and national averages is shown in **Table 24-9** (Ref 24-27).

Table 24-9: Ethnic group by geography

Ethnic Group	Study Area	Yorkshire and The Humber region	England and Wales
Asian, Asian British or Asian Welsh	0.9%	8.9%	9.3%
Black, Black British, Black Welsh, Caribbean or African	0.2%	2.1%	4.0%
Mixed or Multiple ethnic groups	0.8%	2.1%	2.9%
White	97.5%	85.4%	81.7%
Other ethnic group	0.5%	1.4%	2.1%

Source: Office for National Statistics, (2022); Census 2021 (Ref 24-27).

Deprivation

24.6.7 The 2019 Indices of Deprivation (Ref 24-28) provide a set of relative measures of deprivation for local authorities and Lower Super Output Areas ("LSOAs")[5] across England. The indices are comprised of a number of sub-domains of deprivation, including 'health'. An overall indication of deprivation of an area, appreciating all domains, is also reported. The local authorities which are included in the study area are North East Lincolnshire, North Lincolnshire and West Lindsey. North East Lincolnshire is the 66th most deprived local authority of 317 in England (where 1st is most deprived). North Lincolnshire is the 120th most deprived in England. West Lindsey is the 146th most deprived local authority in England.

24.6.8 Further detailed breakdown of indices of deprivation in each of the considered local authorities is given in **Table 24-10**. This shows that, in terms of overall deprivation, half of the LSOAs within North East Lincolnshire are ranked amongst the 30% most deprived LSOAs nationally. In North Lincolnshire the incidence of overall deprivation is lower as only approximately 30% (28%) of LSOAs are ranked among the 30% most deprived nationally. In West Lindsey 24% of LSOAs are ranked among the 30% most deprived nationally.

24.6.9 Information is also provided in **Table 24-10** below regarding the incidence of deprivation in the health domain. It is shown that there is a high incidence of deprivation in the health domain in North East Lincolnshire whereby almost half (47%) of all LSOAs rank amongst the 30% most deprived LSOAs nationally. The equivalent incidence of deprivation in the health domain in North Lincolnshire is lower, whereby only 32% of LSOAs rank among the 30% most deprived nationally. In West Lindsey approximately 23% of LSOAs rank among the 30% most deprived nationally.

Table 24-10: Indices of deprivation

Decile	Relative Deprivation	North East Lincolnshire		North Lincolnshire		West Lindsey	
		Overall Index of Depriv-ation	Health domain	Overall Index of Depriv-ation	Health domain	Overall Index of Depriv-ation	Health domain
0-10%	Most deprived	30%	15%	11%	11%	8%	4%
10-20%	↑	8%	17%	9%	8%	10%	0%
20-30%		12%	15%	8%	13%	6%	17%
30-40%		8%	10%	9%	12%	10%	13%

[5] Lower Layer Super Output Areas (LSOAs) are small geographical units designed to improve the reporting of small area statistics in England and Wales. Lower Layer Super Output Areas are built from groups of contiguous Output Areas and have been automatically generated to be as consistent in population size as possible.

Decile	Relative Deprivation	North East Lincolnshire		North Lincolnshire		West Lindsey	
		Overall Index of Depriv-ation	Health domain	Overall Index of Depriv-ation	Health domain	Overall Index of Depriv-ation	Health domain
40-50%	↓	5%	12%	15%	14%	13%	12%
50-60%		5%	15%	11%	25%	13%	15%
60-70%		12%	9%	15%	11%	12%	13%
70-80%		7%	3%	11%	7%	8%	23%
80-90%		10%	2%	10%	0%	15%	2%
90-100%	Least deprived	3%	2%	3%	0%	6%	0%

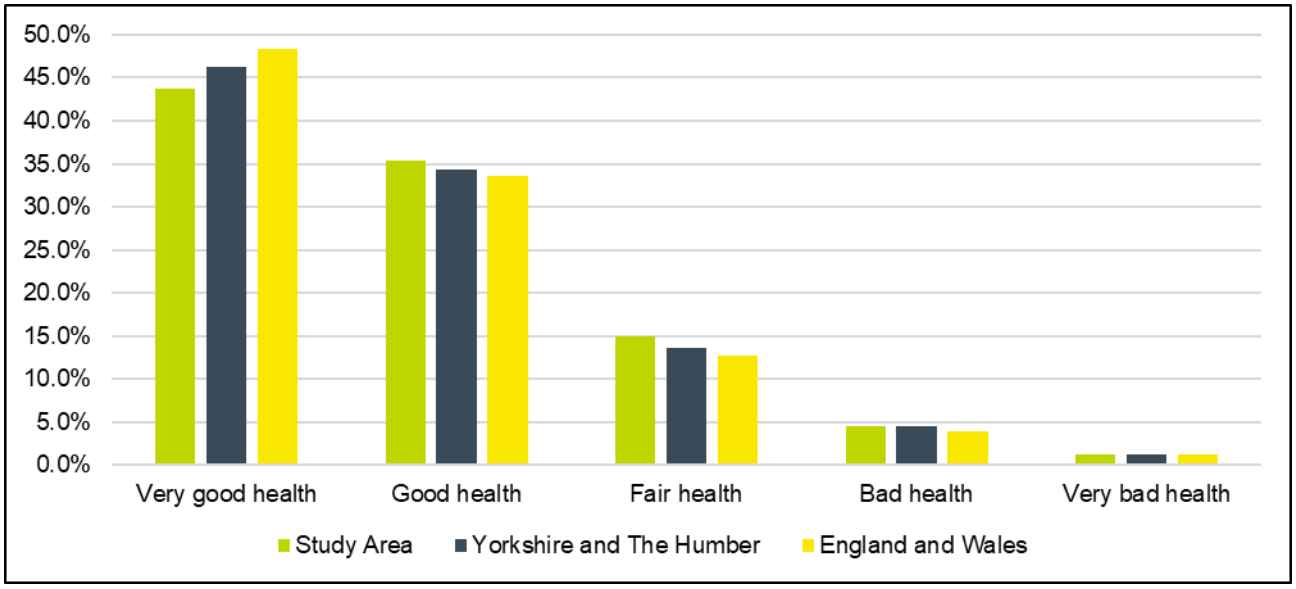
Source: Ministry of Housing, Communities and Local Government, (2019); Indices of deprivation (Ref 24-28).

Health Profile

24.6.10 This section provides a human health profile of the study area, focussing on key determinants of health relevant to the assessment criteria provided within the HUDU/NHS England guidance (Ref 24-15). This local health baseline will be used to inform the assessment of potential health effects of the Project.

24.6.11 Based on 2021 Census data (Ref 24-27), which is the latest dataset available for self-assessment of health, 5.9% of residents of the study area consider their health to be ‘bad’ or ‘very bad’. This is broadly in line with the equivalent proportion of residents in the Yorkshire and The Humber region (5.8%) and across England and Wales (5.2%). Self-reported health in each of the considered geographies is shown in **Plate 24-4**.

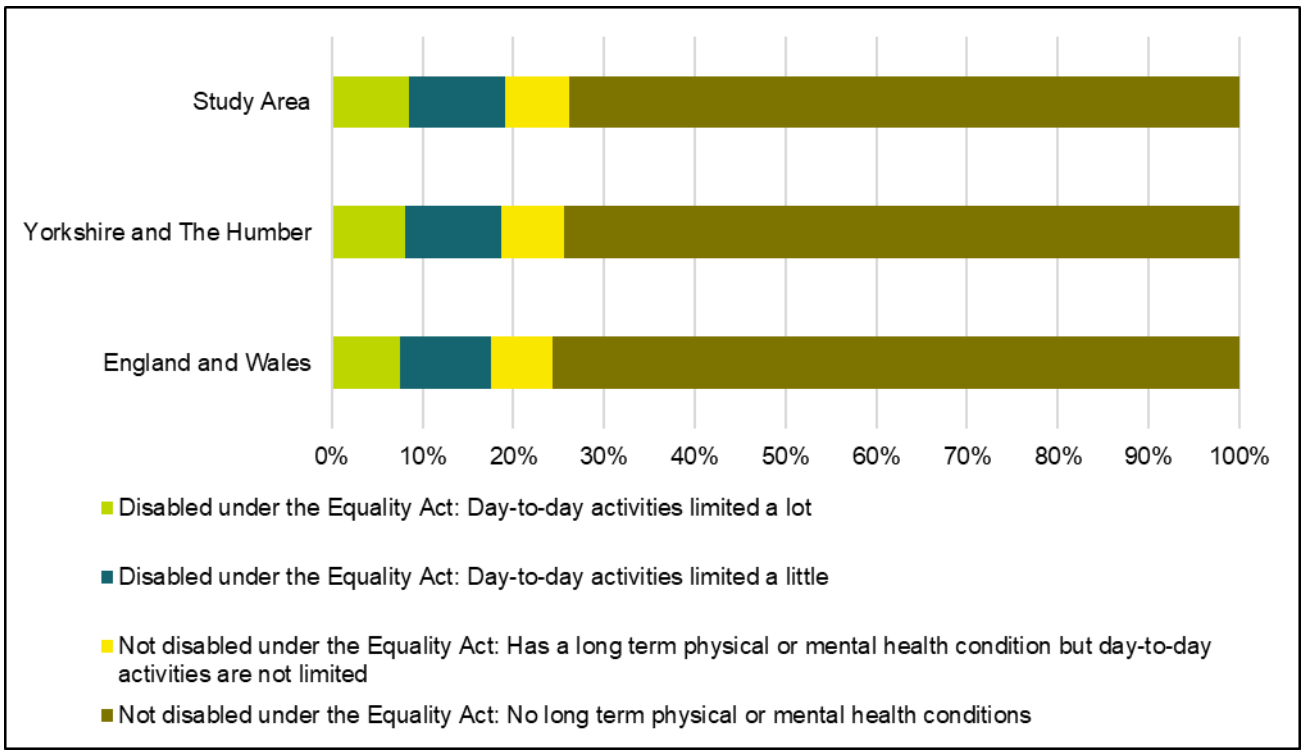
Plate 24-4: Self-assessment of Health



Source: Ref 24-27

24.6.12 Additionally, **Plate 24-5** illustrates a self-assessment of long-term health or disability, whereby a health problem limits a person's daily activities and has lasted at least 12 months. The proportion of residents within the study area who experience limitations to their daily activities arising from a long-term health condition or disability ('a little' or 'a lot') is 19.2%, which is marginally above the regional (18.6%) and national (17.5%) equivalent rates.

Plate 24-5: Self-assessment of Long-term Health or Disability



Source: (Ref 24-27)

24.6.13 Wider determinants of overall health can also provide insight into the health profile of an area. A number of indicators of health within the relevant local authority areas, derived from OHID (Office for Health Improvement and Disparities) data (Ref 24-29 and Ref 24-30) is provided in **Table 24-11**. A comparison with regional and national data is also provided, where applicable. In summary:

a. Male and female life expectancies in North Lincolnshire and North East Lincolnshire are broadly in line with the regional average, albeit slightly lower than the national average. Male and female life expectancies in West Lindsey are higher than the regional and national average (Ref 24-29).

b. The under 75 mortality rates from all causes is lower in North Lincolnshire and West Lindsey than the regional average, although in North East Lincolnshire the rate is higher; this is also true when considering the under 75 mortality rates from cardiovascular diseases and cancer (Ref 24-29).

c. In terms of risk determinants, there is a higher prevalence of smoking in the relevant local authority areas than is recorded regionally and nationally. A similar proportion of adults are physically active in North East Lincolnshire and West Lindsey when compared to the region and England as a whole, yet in North Lincolnshire the proportion is notably lower. A higher proportion of adults are classified as overweight or obese within the considered local authority areas than across Yorkshire and The Humber, and England as a whole (Ref 24-29).

d. Health outcomes in the relevant local authorities exhibit worse incidence and prevalence than is typical of England. For example, there is a greater prevalence of coronary heart disease ("CHD"), a greater prevalence of stroke, a greater prevalence of heart failure, and a greater prevalence of chronic obstructive pulmonary disease (Ref 24-30). However, the incidence of tuberculosis is notably lower in the relevant local authorities compared to the national rate.

Table 24-11: Wider determinants of health

Determinant of health	Year	Age Range	Unit	North Lincolnshire	North East Lincolnshire	West Lindsey	Yorkshire and The Humber	England
Life expectancy at birth - male	2018 - 2020	n/a	Years	78.7	78.0	79.5	78.4	79.4
Life expectancy at birth - female	2018 - 2020	n/a	Years	82.7	82.2	83.4	82.2	83.1
Under 75 mortality rates from all causes	2018 - 2020	<75 yrs	No. per 100,000	367.7	387.0	309.2	372.7	336.5
Under 75 mortality rates from all cardiovascular diseases	2017 - 2019	<75 yrs	No. per 100,000	72.2	92.0	66.3	80.2	70.4
Under 75 mortality rate from cancer	2017 - 2019	<75 yrs	No. per 100,000	136.9	152.6	125.8	137.5	129.2
Deaths from respiratory diseases	2016 – 2020	All ages	Standardised Mortality Ratio	113.4	106.4	83.5	n/a	100.0
Smoking Prevalence in adults (18+) - current smokers (APS)	2019	18+ yrs	%	17.8	16.5	15.5	12.9	12.1
Physically active adults	2020/21	19+ yrs	%	58.3	63.7	67.1	65.2	65.9

Determinant of health	Year	Age Range	Unit	North Lincolnshire	North East Lincolnshire	West Lindsey	Yorkshire and The Humber	England
Adults (aged 18+) classified as overweight or obese	2020/21	18+ yrs	%	67.6	67.6	67.3	66.5	63.5
TB incidence (three-year average)	2018 - 2020	All ages	No. per 100,000	3.5	1.7	1.1	5.9	8.0
Estimated prevalence of CHD	2015	55 – 79 yrs	No. per 100,000	8.1	8.2	7.6	n/a	7.9
Estimated prevalence of stroke	2015	55 – 79 yrs	No. per 100,000	3.9	3.9	3.7	n/a	3.7
Estimated prevalence of heart failure	2015	>16 yrs	No. per 100,000	1.6	1.6	1.9	n/a	1.4
Estimated prevalence of COPD	2015	All ages	No. per 100,000	3.5	3.9	3.4	n/a	3.0

Source: Ref 24-29,Ref 24-31 and Ref 24-32

Healthcare Facilities

24.6.14 As detailed in **Chapter 23: Socio-economics [TR030008/APP/6.2]**, the nearest hospitals (with an accident and emergency department) to the Project are St.Hugh's Hospital and Diana, Princess of Wales Hospital, located approximately 9km from the Project.

24.6.15 There are three GP surgeries within 5km of the Site, as set out in **Table 24-12**: The Roxton Practice in Immingham (1km from the Site Boundary), Killingholme Surgery in South Killingholme (approximately 4km from the Site Boundary), and Healing Partnership (around 4km from the Site Boundary). The latest General Practice data (April 2023) published by NHS Digital (Ref 24-31 and Ref 24-32). **Table 24-12** indicates that these GP surgeries have a total of 18.1 GPs (Full Time Equivalent ("FTE")) and provide care to 37,996 patients. This corresponds to 2,099 patients per GP, which exceeds the Royal College of General Practitioners target (Ref 24-33) of 1,800 patients per GP.

Table 24-12 GP surgery patient list size and workforce

General Practice surgery	Number of patients	Number of GPs (FTE)	GP:Patient Ratio
The Roxton Practice	34,065	15.9	2,142
The Killingholme Surgery	1,545	1.4	1,104
Healing Partnership	2,386	0.8	2,983
Total	**37,996**	**18.1**	**2,099**

Source: Ref 24-31 and Ref 24-32

24.6.16 As set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]**, the GP surgeries shown in **Table 24-13** are within the NHS Humber and North Yorkshire Integrated Care Board ("ICB"). Information on the ratio of patients to GPs (FTE) is shown in **Table 24-13**. It is shown that the ratio of patients to GPs (FTE) is below (i.e. better than) the Royal College of General Practitioners target of 1,800 patients per GP.

Table 24-13: ICB patient list size and workforce

Sub-ICB	Number of patients	Number of GPs (FTE)	GP:Patient Ratio
NHS Humber and North Yorkshire ICB	1,790,490	1,059	1,691

Source: Ref 24-31; Ref 24-32;

Social Infrastructure, Community and Recreational Facilities

24.6.17 There is one primary school within 1km of the Site Boundary. This is The Canon Peter Hall C of E Primary School located approximately 1km west of the Site.

24.6.18 There is one police station in proximity to the Site, located in Immingham, approximately 1.5km west of the Site Boundary. Additionally, Immingham East Fire Station is located less than 1km from the Site Boundary. In addition to the social infrastructure facilities outlined above, there are a range of community and recreational facilities within the study area. **Table 24-14** illustrates these facilities and their distances from the Site Boundary.

Table 24-14: Community and recreational facilities

Receptor	Description	Approximate distance from Site Boundary
Immingham Sea Wall	Sea wall for flood protection used by recreational sea anglers.	0m and adjacent
Community Recycling Facility	Utilities facility	<500m
Woodlands Sports Ground	Recreation facility	1.5km
Petrol Station	Community facility	1.0km
Immingham West Fire Station	Emergency Services facility	2.7km
Large supermarket	Community facility	1.5km
Homestead Park	Publicly accessible open space	1.5km
Eastfield Primary School	Primary school	1.5km
Killingholme Primary School	Primary school	5km
Goxhill Primary School	Primary school	11km
Keelby Primary Academy	Primary school	5.5km
Stallingborough C of E Primary School	Primary school	3km

Public Rights of Way

24.6.19 As set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]**, there are two PRoWs of relevance to the Project. These are shown in **Table 24-15**.

Table 24-15: Public Rights of Way within 500m of the Site

PRoW	Type	Approximate distance from Site Boundary (m)
Public Bridleway 36	Bridleway – forms part of the recreational route known as England's Coastal Path (which was established as a National Trail in 2020)	0m
Public Footpath 32	Footpath – not currently in active use	<100m

Residential Properties

24.6.20 As set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]**, the area is mostly industrial and relatively sparsely populated. The closest residential properties are located on Queens Road, which lie within the Site. This consists of a cluster of terraced properties (including flats) and a detached dwelling, totalling ten dwellings. Further residential properties are also located approximately 460 - 500m to the west of the Site Boundary on the edge of the town of Immingham.

24.6.21 As explained in **Table 22-2** of **Chapter 22: Major Accidents and Disasters [TR030008/APP/6.2]**, assessment of the consequences of the operation of the hydrogen production facility on surrounding land uses in terms of major hazard planning will be considered by NELC and the HSE in the context of an application for hazardous substances consent that has been submitted to and validated by NELC. It is considered that the residential use of ten properties on the west side of Queens Road (1-5, two flats at 6, an upper floor flat at 7-8, an upper floor flat at 18 and 31) will need to cease, as such residential uses are not compatible with the operation of the hydrogen production facility on the West Site and will be an impediment to the grant of hazardous substances consent. Negotiations are ongoing with the owners to acquire these properties and acquisition powers are included within the draft Development Consent Order ("DCO"). Two of those properties (7-8 and 18) are only in partial residential use. The ground floor at 7-8 Queens Road is vacant and the ground floor at 18 Queens Road is understood to be used as storage by the owner. It is intended that the entirety of these properties will be acquired. It is not considered that there will be any materially adverse effects on the operation of other businesses adjacent to the Site Boundary and within the vicinity.

Future Baseline

24.6.22 Based on observation of trends in population set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]**, it is shown that the population in North East Lincolnshire is projected to decrease by 2040, in contrast to the regional and national trend. The proportion of the population of working age in North East Lincolnshire is also projected to decrease by 2040, although this reflects the regional and national trend. Applicable future projections for other trends covered in the health baseline are not available given they are difficult to project due to a large number of influencing factors which are currently unknown.

24.6.23 The future human health and wellbeing baseline reflects, where applicable, that set out within other technical assessments, namely the:

a. Air quality assessment (**Chapter 6: Air Quality [TR030008/APP/6.2]**), which considers different air quality conditions in future, as described in paragraph 6.6.15.

b. Noise and vibration assessment (**Chapter 7: Noise and Vibration [TR030008/APP/6.2]**), which considers, as a worst case approach, the future baseline to be similar to at present.

c. Traffic and transport assessment (**Chapter 11: Traffic and Transport [TR030008/APP/6.2]**), which inherently considers in its assessment a modelled growth in traffic.

d. Climate change assessment (**Chapter 19: Climate Change [TR030008/APP/6.2]**), which considers for the purposes of the lifetime greenhouse gas emissions assessment the future baseline to reflect a 'business as usual' scenario.

e. Socio-economic assessment (**Chapter 23: Socio-economics [TR030008/APP/6.2]**), which considers an increase in population as described above.

24.7 Development Design and Impact Avoidance

Embedded Mitigation

24.7.1 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.

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

24.7.3 The Project has been designed, as far as possible, to avoid and minimise impacts and effects on health and wellbeing through the process of design development, and by embedding mitigation measures into the design. The design of the Project has been further developed to reflect the findings of ongoing engagement with stakeholders. As the design has developed, embedded mitigation measures have been refined as part of an iterative process.

24.7.4 Relevant design and mitigation measures have been identified in the relevant related chapters (**Chapter 6: Air Quality, Chapter 7: Noise and Vibration, Chapter 11: Traffic and Transport, Chapter 19: Climate Change**, and **Chapter 23: Socio-economics [TR030008/APP/6.2]**). No further design and mitigation measures have been identified which are solely related to health and wellbeing.

Standard Mitigation

24.7.5 There are no specific standard mitigation measures incorporated into the Project regarding human health and wellbeing. However, the assessment of human health and wellbeing is based on the relevant standard mitigation measures secured by the relevant chapters upon which the assessment is based (**Chapter 6: Air Quality, Chapter 7: Noise and Vibration, Chapter 11: Traffic and Transport, Chapter 19: Climate Change**, and **Chapter 23: Socio-economics [TR030008/APP/6.2]**). Additionally, these include standard measures set out within the Outline CEMP **[TR030008/APP/6.5]**, Construction Traffic Management Plan ("CTMP" and Construction Worker Travel Plan ("CWTP") **[TR030008/APP/6.7]** and Lighting Assessment **[TR030008/APP/6.4]**.

24.7.6 The human health and wellbeing assessment is presented in **Section 24.8** of this chapter. It is conducted on the basis that all applicable standard, embedded and additional mitigation measures, as set out in respective assessments of this ES, are implemented.

24.8 Assessment of Likely Impacts and Effects

24.8.1 This section presents the findings of the assessment of effects for each relevant health determinant assessed in each phase, with respect to the health impact pathway. For each health effect, significance of effect is assigned in line with methodology set out in **Table 24-7** above, whereby significance represents the relationship between sensitivity of receptor and magnitude of impact, also set out.

24.8.2 The following assessment considers residual effects as identified in the other technical assessments referenced in **paragraphs 24.4.9** and **24.4.10**.

Electromagnetic Fields

24.8.3 Electric and magnetic fields have the potential to impact on human health if recommended exposure limits are exceeded by human receptors. High-voltage underground cables can result in higher magnetic fields than overhead cables given the distance above them to the ground is typically smaller than the distance from the overhead cable to the ground. Overhead line cables can also nonetheless expose those in residential areas to EMFs.

24.8.4 With regard to human health impacts resulting from exposure to EMFs at the Project, there are no major sources of EMF anticipated to arise from the Project. All cabling associated with the Project will be 132kV (or lower) cables, and underground. The Applicant will ensure full compliance with relevant policies, and procedures on EMF exposure limits are in place at the design phase. This will include ensuring worker exposure to any EMF risks are managed through adherence to standard working practices during any cable installation and commissioning works as included within the Outline CEMP **[TR030008/APP/6.5]**.

24.8.5 As a result, there will be **no significant effect during all stages** of the Project arising in respect of human health and wellbeing in relation to EMF.

Construction

Access to healthcare services and other social infrastructure

24.8.6 Construction activities from the Project may restrict, or create severance temporarily to, the accessibility of hospitals, GPs and other social infrastructure for residents in the study area.

24.8.7 As identified within **Chapter 23: Socio-economics [TR030008/APP/6.2]**, the construction workers required to build the Project may place some demand on healthcare services temporarily if they move to the area during the construction phase, or if emergency treatment is required. The construction of the Project is anticipated to require an average of 351 workers at any time during the construction period (although in practice the number will vary). The current level of patients per GP located within 5km of the Project exceeds the recommended

level. However, **Chapter 23: Socio-economics [TR030008/APP/6.2]** concludes that additional demand arising from the Project would not be likely to significantly affect the current access to healthcare scenario in terms of GP:patient ratio and the effect on local healthcare would therefore be temporarily minor adverse (not significant). Additionally, workers who reside locally already are likely to be registered at a practice currently and will therefore not be expected to place additional demand on local GP services.

24.8.8 In terms of access to healthcare services, **Chapter 11: Traffic and Transport [TR030008/APP/6.2]** assesses the potential impact of construction traffic on the local road network. Residents in villages surrounding the Project are likely to use the same strategic roads (including the A180, A160, and A1173) as construction traffic associated with the Project and workers accessing the Site. **Chapter 11: Traffic and Transport [TR030008/APP/6.2]** concludes the presence of this additional traffic is expected to have negligible effects on severance, which will therefore not be significant. An Outline CTMP **[TR030008/APP/6.7]** includes mitigation measures which the CTMP will be based upon, including relevant mitigation measures to address potential severance issues during the construction phase, including but not limited to: minimisation of works outside of working hours, advanced warning signage, and designated routeing to the Site. These measures are set out in full in the outline CTMP, the final CTMP will be secured by a requirement of the DCO **[TR030008/APP/2.1]**.

24.8.9 On the basis that the baseline information presented suggests that the provision of healthcare locally is currently sub-optimal in terms of GP:patient ratio, the sensitivity of the population to human health effects on access to healthcare services is assessed to be medium.

24.8.10 As there is no severance arising from construction traffic, the Project will not affect local residents' ability to access healthcare facilities. The impact of an influx of workers to the local area on healthcare facilities will worsen the GP: Patient ratio slightly from the baseline, the additional workers requiring healthcare would be limited to those non-home based and those potentially requiring services would vary greatly across the construction period given that labour requirements will rise and fall. Overall, the magnitude of impact on access to healthcare services is assessed to be low.

24.8.11 Taking into account the sensitivity and magnitude, the effect on human health arising from impacts on access to healthcare services during the construction period is assessed to be **minor adverse (not significant).**

24.8.12 Details of community facilities and other social infrastructure within the study area are set out in **Table 24-14**: In terms of capacity of services, as set out in **Chapter 23: Socio-economics [TR030008/APP/6.2],** it is anticipated that construction workers will either already live within the local area, or will live temporarily within the area in temporary accommodation such as hotels (likely within Grimsby) during the construction phase. It is considered unlikely that a high proportion of workers will move to the local area with their families for the duration of the estimated 11 year construction period, and therefore there is unlikely to be an impact on the capacity of local social infrastructure.

24.8.13 In terms of access to social infrastructure, as outlined above, **Chapter 11: Traffic and Transport [TR030008/APP/6.2]** sets out an assessment of the likely impact of additional traffic on severance and concludes effects during the construction phase will be negligible (not significant). As above, the Outline CTMP includes measures, that will be included in the final CTMP, to manage construction traffic resulting from the Project in order to limit any potential disruptions and implications on the wider transport network, as well as for existing road users.

24.8.14 Public Bridleway 36, will be temporarily diverted for the duration of the first phase of construction, after which it would be re-instated on its current alignment and the temporary diversion would be closed. Details are set out in Section 23.8 of **Chapter 23: Socio-economics [TR030008/APP/6.2].** Whilst the temporary diversion is in place, users of Public Bridleway 36 who may be using that route to access healthcare services and social infrastructure will incur additional journey length in terms of distance and time. However, the additional journey length is short in nature, within the same surroundings and overall access will be maintained between the locations at either end of the diversion route.

24.8.15 As a result of the temporary diversion of Public Bridleway 36, as assessed in subsequent sections of the human health and wellbeing assessment, recreational sea anglers, including any clubs will no longer have access along the sea front shown in the area indicated on **Figure 23.6 [TR030008/APP/6.3]** (refer to **Chapter 23: Socio-economics [TR030008/APP/6.2]**). Once the PRoW has re-opened on its original alignment, it is anticipated that access for the sea anglers will be possible along the sea front up to the point where Public Bridleway 36 diverts into the Long Strip.

24.8.16 On the basis that the baseline information presented indicates that there is a range of community facilities and other social infrastructure and the sharing of resources between the population and the construction workers is anticipated to be limited, the sensitivity of the population with regard to access to social infrastructure is assessed to be low.

24.8.17 As there is no severance arising from construction traffic, the Project will not affect local residents' ability to access services. Any change in existing users' provision of social infrastructure arising from use by workers would be expected to be very slight, with any impact on health attributed to the Project being imperceptible, if there is any change at all. Overall the magnitude of the human health impact on access to social infrastructure is assessed to be low.

24.8.18 Taking into account the sensitivity and magnitude, the effect on human health arising from impacts on access to other social infrastructure during the construction period is assessed to be **negligible (not significant).**

Emissions of dust, noise, and vibration

24.8.19 The construction activities of the Project have the potential to reduce air quality, which could potentially lead to adverse health effects on residents and/or disrupt local amenities. An assessment of the risk of dust, site plant and Non-Road Mobile Machinery ("NRMM") emissions, vessel emissions and traffic emissions during the construction phase is provided in **Chapter 6: Air Quality [TR030008/APP/6.2]**. The assessment considers residual air quality effects on all

sensitive receptors are unlikely to be significant given the implementation of mitigation measures including those recommended by Institute of Air Quality Management ("IAQM"), as detailed in **Chapter 6: Air Quality [TR030008/APP/6.2]**.

24.8.20 Baseline data with respect to air quality indicates low concentrations of NO_2 and background pollutants in the local study area. Rates of deaths from respiratory diseases are however higher in the local area, relative to national average rates. Moreover, incidence of COPD is higher in the local area compared with the national incidence rate. Achieving good air quality is a local priority. The sensitivity of the local population with respect to air quality, owing to the relatively poor health status and limited capacity to adapt to variation in air quality, is assessed to be medium.

24.8.21 The air quality impacts arising from the construction phase of the Project would be temporary over the 132 month construction period. Based on the conclusions of the air quality assessment set out in **Chapter 6: Air Quality [TR030008/APP/6.2]**, local impacts are likely to be minimal, following mitigation best practice measures set out in the Outline CEMP **[TR030008/APP/6.5]**. Overall, the magnitude of change anticipated with respect to air quality impacts on human health during the construction phase is therefore assessed to be low.

24.8.22 Taking into account the sensitivity and magnitude, overall the likely effect on human health arising from impacts on air quality during the construction phase of the Project is assessed to be **minor adverse (not significant)**.

24.8.23 The construction activities of the Project have the potential to lead to increases in noise and vibration, which could potentially lead to adverse health effects on residents in terms of annoyance and/or disruption of local amenities. An assessment of the impact of the construction phase of the Project on noise and vibration is provided in **Chapter 7: Noise and Vibration [TR030008/APP/6.2]**. It is assessed that following impact avoidance measures and additional noise specific measures, the noise effects at residential Noise Sensitive Receptors ("NSRs") on Queens Road (in the worst case scenario that these properties remain occupied during the construction phase) may be minor adverse and not significant. Likewise, the assessment of construction vibration on residential NSRs with respect to annoyance is assessed to be minor adverse and not significant.

24.8.24 Baseline data with respect to noise indicates low levels of existing noise across the local study area. Given the industrial local setting and existing activities associated with the Port of Immingham and inward/outward road and marine traffic, the existing population is likely to be exposed to low levels of background noise consistently. The sensitivity of the population with respect to changes in noise and vibration, owing to high adaptation capacity is therefore assessed to be low.

24.8.25 Overall the magnitude of change anticipated with respect to noise and vibration impacts on human health during the construction phase is therefore assessed to be low.

24.8.26 Taking into account the sensitivity and magnitude, overall the effect on human health arising from impacts on noise and vibration during the construction phase of the Project is assessed to be **negligible (not significant)**.

Air/noise emissions linked with traffic

24.8.27 An assessment of construction phase road traffic emissions has been undertaken in **Chapter 6: Air Quality [TR030008/APP/6.2]**. Construction activities associated with the Project, namely material and worker transport, will introduce vehicles to the local road network. An increase in vehicle traffic has the potential to reduce air quality, which could potentially have an adverse impact on human health. Although these movements on the local road network have the potential to contribute to a significant effect, it is assessed that the annual daily average vehicle movements are not numerous enough to contribute to a significant effect. Furthermore, a review of background pollutant conditions for NO_2, PM_{10} and $PM_{2.5}$ shows that the existing air quality conditions are of a good standard in this location where there a limited number of sensitive residential receptors. The air quality effect of construction traffic is found to be not significant.

24.8.28 The sensitivity of the local population with respect to air quality is medium as described in **paragraph 24.8.20**.

24.8.29 Given that it is assessed that the air quality impact of the emission of airborne pollutants associated with construction traffic is not significant, and that the exposure is low, temporary, and affects a small minority of the population, the magnitude of this impact is therefore low.

24.8.30 Overall the effect on human health arising from air quality effects associated with traffic during the construction phase is assessed to be **minor adverse (not significant)**.

24.8.31 Construction activities associated with the Project, namely material and worker transport, will introduce vehicles to the local road network. An increase in vehicle traffic has the potential to increase noise locally, which could potentially have an adverse impact on human health. An assessment of noise emissions linked with traffic during the construction phase is provided in **Chapter 7: Noise and Vibration [TR030008/APP/6.2]**. It is assessed that at the location which is expected to experience the greatest percentage increase in traffic flows (Queens Road), the predicted change in traffic noise levels would be <1.5 dB(A), which would be considered to be of low magnitude in the short term.

24.8.32 The sensitivity of the local population with respect to changes in noise and vibration is as described in **paragraph 24.8.24** owing to high adaptation capacity is therefore assessed to be low.

24.8.33 It is assessed that there will be negligible noise impact due to construction traffic, even at the location with the highest proportional increase in traffic. There would also be minimal exposure to this noise for human receptors, and this would only affect a small minority of the population.

24.8.34 Therefore, with respect to human health, the magnitude of this impact is assessed to be low.

24.8.35 Overall, the effect on human health arising from noise effects associated with traffic during the construction phase is assessed to be **negligible (not significant).**

Accessibility to open space, and active travel

24.8.36 Construction activities associated with the Project may intersect, or otherwise impact upon, the accessibility of PRoW, open space and active travel networks in the study area.

24.8.37 As set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]**, there are two PRoW within 500m of the Site Boundary. Public Footpath 32, in addition to not being in active use, will be unaffected by the construction of the Project as the only relevant work in this area is the underground pipeline corridor which it is assumed will be constructed using Horizontal Directional Drilling, therefore there will be no interruption of access or the ability to use this route for active travel, such as walking. Public Bridleway 36 will be temporarily diverted for the first phase of the construction period, the details of which are set out in the **Section 23.8** of the chapter. Due to the temporary diversion in place, users of Public Bridleway 36 will incur additional journey length in terms of distance and time. However, the additional journey length (m) is short in nature, as set out in **Chapter 23: Socio-economics [TR030008/APP/6.2],** within the same surroundings and overall access will be maintained between the locations at either end of the diversion route. Additionally, informal access to the southern part of the Long Strip woodland will be prevented during construction to minimise pedestrian traffic near the construction works, although informal access is only currently used on an infrequent basis.

24.8.38 As set out in **Chapter 11: Traffic and Transport [TR030008/APP/6.2]**, it is concluded that during the construction phase (peak construction year) there will be no significant effects on pedestrian amenity, fear and intimidation, or highway safety.

24.8.39 Given the medium term duration of the impacts (132 month construction period), the minimal change in quality of life that could arise for cyclists and pedestrians affected by increased traffic flows, and the rapid reversal in the effect once the construction phase is completed, the overall magnitude of change anticipated on accessibility and active travel and the prioritisation of walking and cycling, including on Public Bridleway 36, during the construction phase is assessed to be low.

24.8.40 Supporting physical exercise is a key local health priority, as set out in local health strategies. As described in the baseline section above, there is limited PRoW provision in the local area, although the A1173 and Kings Road form part of the ‘Immingham to Grimsby Cycle Superhighway’ cycling route. Local residents are in relatively poor health overall, for example the percentage of physically active adults is lower than is typical for the region and nationally; likewise the proportion of adults who are overweight or obese is higher than the regional and national averages. The sensitivity of the local population with respect to prioritisation of walking and cycling is therefore assessed to be medium.

24.8.41 Based on above, the potential human health and wellbeing impact arising from potential impact on walking routes during the construction phase is assessed to be **minor adverse (not significant)**.

Climate change

24.8.42 Climate change poses a threat to the health, safety and security of the global population, both through direct hazards and indirectly due to damage to the living environment. **Chapter 19: Climate Change [TR030008/APP/6.2]** sets out the anticipated GHG emissions impacts associated with the construction phase of the Project, of which the majority of the adverse impact concluded will be associated with embodied carbon from construction materials.

24.8.43 Total emissions from the 11-year construction period are calculated to be 818,694 tCO_2e, with average annual emissions expected to be 67,422 tCO_2e for terrestrial construction and 25,609 tCO_2e for marine construction. This represents less than 0.02% of each of the applicable UK carbon budgets.

24.8.44 Baseline data with respect to GHG emissions indicates negligible levels of existing emissions generated across the existing Site Boundary (the baseline assumes zero emissions). As set out in **Chapter 19: Climate Change [TR030008/APP/6.2]**, due to the nature of GHG emissions, and their cumulative impact on the global climate, IEMA considers that all GHG emissions contribute to climate change. While temporary adverse impacts on GHG emissions levels are anticipated during the construction phase, this is to be considered in the context of the opportunity the Project represents to positively respond to the challenges of climate change, and reduce the UK's carbon footprint. Overall, the magnitude of change anticipated with respect to GHG emissions on human health during the construction phase is therefore assessed to be very low.

24.8.45 The local population has moderate levels of deprivation and generally poorer health status in comparison to wider geographies. Daily activities, however, are not limited, and there is only a slightly higher incidence of disability locally. Therefore, the sensitivity to the negative effects of climate change on human health amongst the local population is medium.

24.8.46 Overall the effect on human health arising from impacts on GHG emissions during the construction phase of the Project is assessed to be **negligible (not significant)**.

Access to employment and training

24.8.47 Construction activities associated with the Project will provide access to employment in this phase, which will provide a beneficial health impact to these workers. There is evidence that employment matters to health, not only from an economic perspective, but also in terms of quality of life (Ref 24-22 and Ref 24-23). Good quality work protects against social exclusion through the provision of income, social interaction, identity, and purpose.

24.8.48 As set out above, the construction period for the Project is expected to be approximately 132 months, with each of the six phases lasting approximately 24 months, with the exception of the first phase which is expected to last 36 months.

24.8.49 An assessment of the number of jobs created during the construction phase is provided in **Chapter 23: Socio-economics [TR030008/APP/6.2]**. It is estimated that during this phase the Project will support, on average, approximately 1,012 full-time jobs. Once existing employment on-site (ten FTE jobs which could be accommodated at 7-8 and 18 Queens Road), phasing, leakage, displacement, and multiplier effects have been accounted for, net job creation is 627jobs. Of these, 438 jobs will be expected to be taken up by residents within North East Lincolnshire. In practice, this number will vary across the construction period.

24.8.50 Broadly, at least some of the construction jobs created will be in the clean energy sector, specifically through the construction of hydrogen production facility. As such, they will contribute to the development of skills needed for the UK's transition to net zero. It is likely that the appointed contractors will employ trainees and apprentices as part of the construction workforce. The jobs arising from the construction phase of the Project would be temporary over the 132 month construction period. The anticipated 438 additional jobs within North East Lincolnshire would represent local jobs growth and a substantial increase in the context of the 2,500 construction employees in North East Lincolnshire (as set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]**). Overall, the magnitude of impact anticipated with respect to employment and income during the construction phase is therefore assessed to be high.

24.8.51 Baseline data with respect to employment indicates lower rates of economic activity, higher rates of unemployment and lower Gross Value Added ("GVA") per worker within North East Lincolnshire compared to national averages. The sensitivity of the local population with respect to employment and income is therefore assessed to be medium.

24.8.52 Overall the effect on human health arising from impacts on employment and income during the construction phase of the Project is assessed to be temporary **major beneficial (significant)** at the North East Lincolnshire scale.

Social cohesion and lifetime neighbourhoods

24.8.53 Roads bordering the Project may be used by construction traffic which could increase traffic and community severance between neighbourhoods. This could reduce access to community facilities and in turn reduce social cohesion.

24.8.54 Baseline data with respect to human health indicates that there are poorer than average health outcomes regarding some health factors amongst the local population, but others are in line with national averages. There are lower than average physical activity rates across the study area. Therefore, the population is assessed to have medium sensitivity.

24.8.55 As set out in **Chapter 11: Traffic and Transport [TR030008/APP/6.2]**, with embedded mitigation measures in place, there are no road links for which a significant effect is found. Through the adoption of the CTMP and CWTP,

measures will be put in place to limit any such impact as far as reasonably possible.

24.8.56 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 no significant effect arising in respect of traffic and transport is concluded. The duration of impact is medium term, but the number of residents and neighbourhoods affected is low. Therefore, overall the magnitude of impact is assessed to be low.

24.8.57 Overall, the human health impact on social cohesion and lifetime neighbourhoods during the construction phase is assessed to be **minor adverse (not significant).**

Operation

Access to healthcare and other social infrastructure

24.8.58 As a result of the operation of the Project and the associated employment, there is the potential for local healthcare services or other social infrastructure to be impacted due to restrictions to, or severance to, the accessibility of hospitals, GPs and other social infrastructure.

24.8.59 As identified in **Chapter 23: Socio-economics [TR030008/APP/6.2]**, the operational employment associated with the Project, in a worst-case scenario that all workers register at a local GP practice, would be likely to have a minor adverse effect on local provision, which would not be significant.

24.8.60 As set out above, as the provision of healthcare locally is currently sub-optimal in terms of GP:Patient ratio, the sensitivity of the population to human health effects on access to healthcare services is assessed to be medium.

24.8.61 On the basis that the service quality implications of additional workers registering or utilising local GP surgeries would be only very slight, the magnitude of the human health impact on access to healthcare is assessed to be very low.

24.8.62 Overall the health impact on access to healthcare services during the operational phase is assessed to be **negligible (not significant).**

24.8.63 During the operational phase, there are expected to be 134 full time staff working within the Site Boundary per day. These workers are expected to have a negligible impact on demand for social infrastructure (excluding healthcare) locally.

24.8.64 **Chapter 11: Traffic and Transport [TR030008/APP/6.2]** concludes that there will be negligible (not significant) effects in terms of severance during the operation phase.

24.8.65 As set out above, as there are a range of community facilities and other social infrastructure, and that the sharing of resources between the population and the operation workers is anticipated to be limited, the sensitivity of the population with regard to access to social infrastructure is assessed to be low.

24.8.66 Given that it is assessed that severance effects are expected to be negligible and any service quality implication regarding capacity of social infrastructure would be

expected to be very slight, if it all, the magnitude of the human health impact on access to social infrastructure is assessed to be very low.

24.8.67 Therefore, the potential health impact on access to social infrastructure during operation is assessed to be **negligible (not significant)**.

Air/noise pollution linked with traffic

24.8.68 Operational activities associated with the Project, namely goods and worker transport, will introduce vehicles to the local road network. An increase in vehicle traffic has the potential to reduce air quality, which could potentially have an adverse impact on human health.

24.8.69 An assessment of the air quality effects associated with operational road traffic is provided in **Chapter 6: Air Quality [TR030008/APP/6.2]**. It is concluded that the anticipated operational traffic would result in a negligible (not significant) air quality effect.

24.8.70 As set out above, the background concentrations of pollutants and the baseline air quality in the local area is good. However, the health of the local population typically is poor, particularly with regard to respiratory diseases, and therefore the sensitivity of the local population to air quality effects is considered to be medium.

24.8.71 Given the climate change and air quality assessments do not find significant effects with regard to operational road traffic emissions, and with respect to human health that the exposure of the local population will be very low and affect a small minority of the population, the magnitude of the impact is considered to be low.

24.8.72 Overall, the human health effect resulting from air quality effects associated with operational road traffic is assessed to be **minor adverse (not significant)**.

24.8.73 An increase in vehicle traffic also has the potential to increase noise locally, which could potentially have an adverse impact on human health. An assessment of the noise effects associated with the road traffic during the operational phase of the Project is provided in **Chapter 7: Noise and Vibration [TR030008/APP/6.2]**. This sets out that based on the implementation of impact avoidance measures, and following implementation of additional noise specific mitigation measures, only minor adverse effects are assessed to be likely, and therefore the Lowest Observable Adverse Effect Level (“LOAEL”) would not be exceeded.

24.8.74 On-site plant noise and operations also have the potential to increase noise locally which could potentially have an adverse impact on human health. An assessment of the noise effects associated with the this during the operational phase of the Project is provided in **Chapter 7: Noise and Vibration [TR030008/APP/6.2]**. This sets out that based on the implementation of impact avoidance measures, and following implementation of additional noise specific mitigation measures, only minor adverse effects are assessed to be likely.

24.8.75 Based on these conclusions, the magnitude of impact anticipated with respect to noise and vibration impacts on human health during the operation phase of the Project overall is assessed to be low.

24.8.76 As above, the sensitivity of the local population with respect to noise and vibration is assessed to be low.

24.8.77 Therefore, overall the effect on human health arising from noise and vibration impacts from road traffic during the operation of the Project is assessed to be **negligible (not significant).**

Access to employment and training

24.8.78 Operation activities at the Project will provide access to employment opportunities in this phase, which will provide a beneficial health impact to these workers.

24.8.79 An estimated 134 jobs will be directly generated by the Project when operational, which will potentially provide local employment opportunities in the form of permanent jobs. When additionality effects are accounted for, the total net employment generated during operation is assessed to be 189 FTE jobs.

24.8.80 As above, the implementation of local supply chain initiatives would maximise the potential for local benefits arising from the Project. For example, making sure that local businesses have the opportunity to tender for appropriate contracts. Whilst some of the services are specialised, a wide range of support services businesses already exist in the area.

24.8.81 The 134 net direct and indirect employment within North East Lincolnshire would represent local jobs growth in the context of the size of the workforce. Overall the magnitude of change anticipated with respect to employment and income during the operation of the Project is therefore assessed to be medium.

24.8.82 As above, the sensitivity of the local population with respect to employment and income is assessed to be medium.

24.8.83 Overall the potential human health effect on access to employment and training during the operation phase of the Project is assessed to be **moderate beneficial (significant).**

Social cohesion

24.8.84 In response to the EIA Scoping Report issued in August 2022, The Inspectorate raised the potential mental health impact among local communities during the operational phase of the Project, arising from potential public safety concerns relating to the transportation of hydrogen via road within the local area.

24.8.85 As explained in **Chapter 2: The Project [TR030008/APP/6.2]**, liquid hydrogen will be produced on site. Liquid ammonia will be shipped to the jetty and then converted within the new production facilities into gaseous hydrogen which will then be turned into liquid through a hydrogen liquefier so it is easier to safely store and transport.

24.8.86 With respect to potential public safety risks, **Chapter 22: Major Accidents and Disasters [TR030008/APP/6.2]** sets out an assessment of safety risk and states that all risks will be mitigated to be ALARP, all operations will be subject to authorisation by the Competent Authority (HSE and Environment Agency (“EA”)), and all safety and regulatory requirements will be met in full, including obtaining

of hazardous substance consent which will itself require local planning authority consent.

24.8.87 In terms of public perception of risk, statutory consultation was undertaken to facilitate public understanding of, and listen and respond to questions about, the Project, including the process of the production of hydrogen from ammonia. The consultation also included: in-person consultation events (which included materials setting out information about the proposed project, including safety and regulatory information), a public website and online consultation room; feedback forms, available both online and at in-person events; a freephone line; a postal address; and, an email address. This ensured specific concerns were provided with a response. The channels available throughout the Statutory Consultation period gave the public many opportunities to raise questions and concerns.

24.8.88 The Project will operate in line with best practice with regard to safety, and significant public information will be made available to respond to queries on the safety aspects of the Project. However, given perception and mental health are by their nature subjective, it is possible there could be negative impacts on local mental health arising from safety concerns during all phases of the Project.

24.8.89 On the basis that consultation responses from local residents indicates that the outlook of the community with regard to the Project is predominantly not unfavourable with some concern, taking into account that consultation responses are more likely from, and therefore more reflective of the views of, residents with stronger opinions, the sensitivity of the population to social cohesion and perception of risk effects is assessed to be low.

24.8.90 Given that the severity of perception of risk relates to a very limited population and could result in only very minor changes in quality of life, rather than mortality impacts, the magnitude of impact is assessed to be very low.

24.8.91 Overall the effect on human health resulting from social cohesion effects including the perception of risk during the operation phase is assessed to be **negligible (not significant)**.

24.8.92 The removal of trees in the Long Strip has the potential to impact on human health and wellbeing in terms of disruption to enjoyment of nature, or visual amenity effects. Consultation responses were received from a local employer that there is the potential for mental health impacts on employees relating to the removal of trees.

24.8.93 As set out in **Chapter 13: Landscape and Visual Amenity [TR030008/APP/6.2]**, there is the potential for a residual moderate adverse visual amenity impact to result on users of PRoW at representative viewpoints on the adjacent Public Bridleway 36. Workers of neighbouring businesses would however only observe the loss of some trees within the Long Strip woodland when outside and would likely only have limited views of this in such instances.

24.8.94 From a human health and wellbeing perspective, workers of nearby businesses are employed, and are not limited from undertaking daily activities. Given this is a location of work, the adaptation capacity of employees to a condition of the workplace, versus a residential receptor for example, is considered to be high or

very high. Therefore, the sensitivity of nearby workers to the loss of trees is considered to be low.

24.8.95 The impact of the loss of trees on nearby workers in terms of human health and wellbeing is an occasional event, and is only predominantly related to a minor change in morbidity/moderate change in quality of life in the context of the definition of one's health as contributed to by a range of determinants. Therefore, the magnitude of impact on the human health and wellbeing of these receptors is assessed to be low.

24.8.96 Overall, the human health and wellbeing impacts of the loss of some trees in the Long Strip woodland on nearby workers is assessed to be **negligible (not significant)**.

Climate change

24.8.97 One of the key drivers for the Project is to assist the UK in meeting its net zero targets through the handling and production of green hydrogen to help decarbonise heavy industry including the transportation sector and to help facilitate the use of carbon capture and storage. The purpose of the jetty (the NSIP) is to facilitate the import and export of liquid bulk materials which support the green energy and carbon capture sectors. The hydrogen production facility (associated development) will enable green hydrogen to be produced from imported ammonia to support the transition to net zero, by providing a zero carbon fuel including for the heavy transportation sector. The ammonia will be produced using renewable energy sources.

24.8.98 Climate change poses a threat to the health, safety and security of the global population, both through direct hazards and indirectly due to damage to the environment. As set out in **Chapter 19: Climate Change [TR030008/APP/6.2],** GHG emissions during the operational phase of the Project will be associated with utilities and transport, the majority of which will be associated with shipping emissions (although in the future, a gradual switch in the shipping fleet to the use of decarbonised fuel is expected). Embedded mitigation measures including the use of best available techniques for energy management as required in connection with the obtaining of the necessary Environmental Permit to operate the hydrogen production facility will be implemented to avoid or minimise operational emissions. Operational emissions should be considered in the context of the potential national emissions reductions the Project will facilitate including through decarbonisation of UK transport. It is assessed that the emissions resulting from the operations of the Project over its operational life would be significantly less than the avoided emissions of the Project. Moreover, the Project will displace fossil fuels and has the potential for future CO2 sequestration. As above, the sensitivity of the local population with respect to GHG emissions is assessed to be medium.

24.8.99 However, in the context of the overarching objective of the Project to contribute to the UK's drive to net zero, the magnitude of impact on human health is assessed to be very low.

24.8.100 Overall, the effect of the Project during the operation phase on human health due to climate change impacts is assessed to be **negligible (not significant).**

Decommissioning

Access to healthcare services and other social infrastructure

24.8.101 Decommissioning activities from the Project may restrict, or create severance to, the accessibility of hospitals, GPs and other social infrastructure for residents in the study area.

24.8.102 As identified in **Chapter 23: Socio-economics [TR030008/APP/6.2]**, the employment associated with the decommissioning of the Project is expected to be less than the construction phase, given that decommissioning will only be of the hydrogen production facility and potentially associated jetty topside infrastructure. Therefore, in a worst case scenario that all of the workers associated with this phase register at GP surgeries locally, the access to healthcare impact in terms of GP:patient ratio will be no worse than that resulting from the construction phase. As previously stated, the sensitivity of the population is medium and the magnitude of impact, based on the understanding that the impact will be lower than reported during the construction phase, remains very low. Therefore, the effect on access to healthcare during the decommissioning phase is expected to be **negligible (not significant)**. This assumption is based on current levels of provision and it is likely that both provision of healthcare and registered patients will be different in future.

24.8.103 **Chapter 11: Traffic and Transport [TR030008/APP/6.2]** explains that traffic flows cannot be accurately forecasted for over 25 years in the future (noting that despite the 25 year operation period it is likely that certain elements of the Project will be operational for a longer period of time). However, the Project's impact on local residents' ability to access healthcare facilities in the decommissioning phase is expected to be the same or less as during construction, based on the expected similar number of trips and duration of these phases.

24.8.104 As previously stated, the sensitivity of the population is medium, and the magnitude of impact, based on the understanding that the impact will be lower than reported during the construction phase, remains very low. Based on above, the potential health effect on access to healthcare facilities and other social infrastructure during decommissioning is therefore assessed to be **negligible (not significant).**

Emission of dust, noise, vibration and odours

24.8.105 The decommissioning activities of the Project have the potential to reduce air quality, which could potentially lead to adverse health effects on residents and/or disrupt local amenities. An assessment of the impact of the decommissioning of the Project on air quality has been scoped out of the assessment as no significant effects are considered likely, as set out in **Chapter 6: Air Quality [TR030008/APP/6.2]**.

24.8.106 The construction activities of the Project have the potential to lead to increases in noise, which could potentially lead to adverse health effects on residents and/or disrupt local amenities. An assessment of the impact of decommissioning of the Project on noise and vibration is provided in **Chapter 7: Noise and Vibration [TR030008/APP/6.2]**.

24.8.107 The assessment concludes that the impact of the decommissioning of the hydrogen production facility is likely to be similar to the construction period and therefore the assessment considers residual noise effects to be not significant.

24.8.108 As previously stated, the sensitivity of the population with respect to noise and vibration is low. Based on the understanding that the impact will be similar to the construction period, the magnitude is assessed to be low. Therefore, the potential health impact resulting from the decommissioning impacts such as noise and vibration is assessed to be **negligible (not significant).**

Air/noise pollution linked with traffic

24.8.109 Decommissioning activities associated with the Project, namely material and worker transport, will introduce vehicles to the local road network. An increase in vehicle traffic has the potential to reduce air quality, which could potentially have an adverse impact on human health and/or disrupt local amenities. An assessment of the impact of the decommissioning of the Project on air quality has been scoped out of the assessment as no significant effects are considered likely, as set out in **Chapter 6: Air Quality [TR030008/APP/6.2]**. Likewise, from a greenhouse gas perspective, **Chapter 19: Climate Change [TR030008/APP/6.2]** states that the UK will be achieving net zero by the time decommissioning activities commence and thus the relative and material impact will be much reduced, compared to the construction phase.

24.8.110 Therefore, the potential health effect in relation to air pollution linked with traffic resulting from the decommissioning activities is assessed to be **no effect**.

24.8.111 Decommissioning activities associated with the Project, namely material and worker transport, will introduce vehicles to the local road network. An increase in vehicle traffic has the potential to increase noise locally, which could potentially have an adverse impact on human health.

24.8.112 As set out in **Chapter 7: Noise and Vibration [TR030008/APP/6.2]**, the residual decommissioning effects relating to noise are assumed to be equivalent to those presented for the construction phase. As previously stated, the sensitivity of the population to effects from noise emissions linked with traffic is low. Based on the understanding that the impact will be equivalent to that assessed during the construction phase, the magnitude of impact is assessed to be low. Therefore, for the purposes of the human health and wellbeing assessment, the health effect with respect to noise pollution linked with traffic is assessed to be **negligible (not significant).**

Accessibility to open space, and active travel

24.8.113 Decommissioning activities associated with the Project may intersect, or otherwise impact upon, the accessibility of PRoW, open space and active travel networks in the study area. As set out in **Chapter 23: Socio-economics [TR030008/APP/6.2]**, it is assessed that in a worst case scenario Public Bridleway 36 will be temporarily diverted for the duration of the decommissioning of the hydrogen production facility. Thus, the effect on users of PRoW for active travel such as walking is assessed to be minor adverse, which is not significant.

24.8.114 As previously stated, the sensitivity of the population with respect to this determinant is medium, and based on the understanding that the impact will be at worst equivalent to that assessed during the construction phase, the magnitude of impact is assessed to be low. Therefore the potential human health and wellbeing effect arising from potential impact on walking routes during the decommissioning phase is assessed to be **minor adverse (not significant)**.

Access to employment and training

24.8.115 Decommissioning activities at the Project will provide access to employment opportunities in this phase, which will provide a beneficial health impact to these workers. An assessment of the number of jobs created during the decommissioning phase is provided in **Chapter 23: Socio-economics [TR030008/APP/6.2]**. The assessment concludes that employment generated will be lower in magnitude and of a shorter duration than during the construction phase. Although it is not possible to state the amount of employment generated per annum, a proportion of employment will be expected to be taken up by residents within North East Lincolnshire.

24.8.116 As previously stated, the sensitivity of the population with respect to access to employment and training is assessed to be medium. Based on the understanding that the impact will be lower than during the construction phase, the magnitude of impact is assessed to be low. Therefore, the potential human health and wellbeing effect associated with the employment opportunities during decommissioning is assessed to be **minor beneficial (not significant).**

Social cohesion

24.8.117 Roads bordering the Project may be used by decommissioning traffic which could increase traffic and community severance between neighbourhoods. This could reduce access to community facilities and in turn reduce social cohesion.

24.8.118 As set out in **Chapter 11: Traffic and Transport [TR030008/APP/6.2]**, traffic and transport effects arising from the decommissioning phase were scoped out of the relevant assessment on the basis that no significant effects were likely.

24.8.119 Therefore, the potential health and wellbeing effect associated with social cohesion during the decommissioning phase is assessed to be **no effect**.

24.9 Mitigation and Enhancement Measures

24.9.1 There are no specific additional mitigation, monitoring or enhancement measures required with respect to human health and wellbeing, given that no significant adverse effects are found within the assessment of potential impacts and effects.

24.10 Assessment of Residual Effects

24.10.1 Given that the assessment of likely impacts and effects in **Section 24.8** inherently appreciates the respective additional mitigation and enhancement measures outlined in the referenced other assessments, and that no additional mitigation measures are required with respect to human health and wellbeing as

no significant effects were found, the residual effects for the construction phase are as per those set out in **Table 24-16**.

24.10.2 Likewise, with respect to the likely human health and wellbeing impacts effects set out in **Section 24.8** during the operation phase, the residual effects are as per those reported in **Table 24-17**.

24.10.3 It is anticipated that the decommissioning phase will have a similar impact to the construction phase. However, with respect to the potential impacts and effects on human health during the decommissioning phase, it is assessed that the residual effects are as per those reported in **Table 24-18**.

24.11 Summary of Assessment

24.11.1 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 Project. In addition to this, a current and future baseline has been summarised and formed the basis of the assessment of potential health effects on the local population resulting from the Project.

24.11.2 The assessment of residual health effects, following the implementation of embedded, standard, and additional mitigation measures (as reported in the other relevant assessments of the ES including implementation of the Outline CTMP and noise specific impact avoidance measures), does not identify any significant adverse effects in either the construction, operation, or decommissioning phases.

Table 24-16: Summary of health effects during construction phase

Health determinant	Sensitivity	Description of potential impact	Magnitude	Significance	Additional mitigation measure(s)	Residual effect Significance
Access to healthcare services and other social infrastructure	Medium	Increased demand for healthcare services	Low	Minor adverse (not significant)	None required	Minor adverse (not significant)
	Medium	Increased traffic and severance reducing access to healthcare facilities	Very low	Negligible (not significant)	None required	Negligible (not significant)
	Low	Disruption of access to other social infrastructure	Low	Negligible (not significant)	None required	Negligible (not significant)
Emissions of noise, dust, and vibration	Medium	Reduction in air quality leading to adverse health outcomes	Low	Minor adverse (not significant)	None required	Minor adverse (not significant)
	Low	Increase in noise and vibration leading to adverse health effects	Low	Negligible (not significant)	None required	Negligible (not significant)

Health determinant	Sensitivity	Description of potential impact	Magnitude	Significance	Additional mitigation measure(s)	Residual effect Significance
Air/noise emissions linked with traffic	Medium	Reduction in air quality relating to increased traffic on the road network leading to adverse health effects	Low	Minor adverse (not significant)	None required	Minor adverse (not significant)
	Low	Increases in noise relating to increased traffic on the road network leading to adverse health effects	Low	Negligible (not significant)	None required	Negligible (not significant)
Accessibility and active travel	Medium	Disruption to access of PRoW, open space and access to active travel	Low	Minor adverse (not significant	None required	Minor adverse (not significant
Climate change	Medium	Threats to local population health	Very low	Negligible (not significant)	None required	Negligible (not significant)
Access to employment and training	Medium	Beneficial health and quality of life impacts relating to access to employment opportunities, for residents, locally	High	Major beneficial (significant)	None required	Major beneficial (significant)

Health determinant	Sensitivity	Description of potential impact	Magnitude	Significance	Additional mitigation measure(s)	Residual effect Significance
Social cohesion and lifetime neighbourhoods	Medium	Increased traffic or severance effects which could reduce access to community facilities and lead to social cohesion	Low	Minor adverse (not significant)	None required	Minor adverse (not significant)

Table 24-17: Summary of health effects during operation phase

Health determinant	Sensitivity	Description of potential impact	Magnitude	Significance	Mitigation measure(s)	Residual effect Significance
Access to healthcare and other social infrastructure	Medium	Increased demand for healthcare services	Very low	Negligible (not significant)	None required	Negligible (not significant)
	Low	Increased traffic and severance reducing access to healthcare facilities and other social infrastructure	Very low	Negligible (not significant)	None required	Negligible (not significant)
Air/noise emissions linked with traffic	Medium	Reduction in air quality leading to adverse health outcomes	Low	Minor adverse (not significant)	None required	Minor adverse (not significant)
	Low	Increase in noise leading to adverse health effects	Low	Negligible (not significant)	None required	Negligible (not significant)
Access to employment and training	Medium	Beneficial health and quality of life impacts relating to access to employment opportunities, for residents, locally	Medium	Moderate beneficial (significant)	None required	Moderate beneficial (significant)

Health determinant	Sensitivity	Description of potential impact	Magnitude	Significance	Mitigation measure(s)	Residual effect Significance
Social cohesion	Low	Contribution to social cohesion and engagement with existing communities to encourage social interaction and support mental health, including perception of risk	Very low	Negligible (not significant)	None required	Negligible (not significant)
	Low	Human health and wellbeing impacts on employees of Polynt Composites owing to tree loss within Long Strip woodland	Low	Negligible (not significant)	None required	Negligible (not significant)
Climate change	Medium	Threats to global population health	Very low	Negligible (not significant)	None required	Negligible (not significant)

Table 24-18: Summary of health effects during decommissioning phase

Health determinant	Sensitivity	Description of potential impact	Magnitude	Significance	Mitigation measure(s)	Residual effect Significance
Access to healthcare and other social infrastructure	Medium	Increased demand for healthcare services	Very low	Negligible (not significant)	None required	Negligible (not significant)
	Medium	Increased traffic and severance reducing access to healthcare facilities and other social infrastructure	Very low	Negligible (not significant)	None required	Negligible (not significant)
Emission of noise and vibration	Low	Increase in noise and vibration leading to adverse health effects	Low	Negligible (not significant)	None required	Negligible (not significant)
Noise emissions linked with traffic	Low	Increases in noise relating to traffic on the road network leading to adverse health effects	Low	Negligible (not significant)	None required	Negligible (not significant)
Accessibility to open space, and active travel	Medium	Disruption to access of PRoW, open space and access to active travel	Low	Minor adverse (not significant)	None required	Minor adverse (not significant)

Health determinant	Sensitivity	Description of potential impact	Magnitude	Significance	Mitigation measure(s)	Residual effect Significance
Access to employment and training	Medium	Beneficial health and quality of life impacts relating to access to employment opportunities, for residents, locally	Low	Minor beneficial (not significant)	None required	Minor beneficial (not significant)
Social cohesion	n/a	Contribution to social cohesion and engagement with existing communities to encourage social interaction and support mental health, including perception of risk	n/a	No effect	None required	No effect

24.12 References

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Ref 24-33 Royal College of General Practitioners, (2005); Information Paper. Royal College of General Practitioners.

Ref 24-34 Public Health England (2019). Health matters: health and work.