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22.0 HUMAN HEALTH

22.1 Introduction

22.1.1 This chapter of the Preliminary Environmental Information (PEI) Report identifies the potential impacts and effects on human health as associated with construction, operation (including maintenance) and decommissioning the Proposed Development. This preliminary assessment has been undertaken in accordance with guidance from the Institute of Environmental Management (IEMA) Determining Significance for Human Health in Environmental Impact Assessment (IEMA, 2022).

22.1.2 This chapter highlights key aspects of the technical assessments completed and presented within Chapter 8: Air Quality, Chapter 11: Noise and Vibration, Chapter 15: Traffic and Transport, Chapter 18: Socio-economics and Land Use, Chapter 19: Climate Change, and Chapter 20: Major Accidents and Disasters (PEI Report, Volume I), which are all relevant to human health.

22.2 Legislation and Planning Policy Context

Legislative Background

EIA Directive (2014) and Infrastructure Planning Regulations (2017)

22.2.1 The EIA Directive 2014 (Directive 2014/52/EU of the European Parliament and of the Council) and the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 provide the legislative background regarding the assessment of the effects of certain public and private projects on the environment. These specifically include a requirement that the Environmental Impact Assessment (EIA) must identify, describe, and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on human health (Regulation 5(2)(a)).

Health and Care Act (2022)

22.2.2 In April 2022, the Government passed a new Health and Care Act 2022 (HM Government, 2022)). The new Act proposes new 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. It emphasises the importance of health and care for the future and development of the country.

22.2.3 The Act 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 for everyone; and sustainable use of National Health Service (NHS) resources.

22.2.4 There are 42 ICSs across England (previously in April 2021, over 100 Clinical Commissioning Groups (CCGs) existed across the country), 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
- helping the NHS to support broader social and economic development.

Control of Electromagnetic Fields at Work Regulations (2016)

22.2.5 Electromagnetic Field (EMF) effects must be controlled in accordance with the Control of Electromagnetic Fields at Work Regulations 2016, which sets out how employers must make and implement action plans to ensure compliance with the defined exposure limits (in Part 2 of the Schedule). Regulation 7(2) states that *"the action plan must include consideration of, where relevant –*

- *other working methods that entail lower exposure to electromagnetic fields;*
- *replacement equipment designed to reduce the level of exposure;*
- *technical measures to reduce the emission of electromagnetic fields, including, where necessary, the use of interlocks, screening or similar health protection mechanisms;*
- *demarcation and access control measures;*
- *maintenance programmes for work equipment, workplaces and workstation systems;*
- *the design and layout of workplaces and workstations;*
- *limitations on the duration and intensity of exposure; and*
- *the availability of suitable personal protective equipment."*

Planning Policy Context

National Planning Policy

National Policy Statement for Energy (EN-1) (2011)

22.2.6 Planning policy for Nationally Significant Infrastructure Projects (NSIPs) is primarily contained in National Policy Statements (NPSs). The NPS for Energy (EN-1) (Department for Energy and Climate Change (DECC), 2011a) requires the decision maker to consider potential benefits of development proposals including '*the potential to impact on the health and well-being of the population'*.

22.2.7 Section 4.13 'Health' states that an assessment should consider all relevant human health impacts, which may include the following:

- the direct impacts on health including increased traffic, air or water pollution, dust, odour, hazardous waste and substance, noise, exposure to radiation, and increases in pests; and
- the indirect health impacts of new energy infrastructure, such as if it in some way affects access to key public services, transport, or the use of open space for recreation and physical activity.

Draft Overarching National Policy Statement for Energy (EN-1) (2023)

22.2.8 In March 2023, the Department for Energy Security and Net Zero (previously the Department for Business, Energy, and Industrial Strategy) published an update of the existing statement (NPS EN-1). In addition to the health impacts of energy infrastructure development outlined in the 2011 NPS EN-1, the 2023 NPS EN-1 at paragraph 4.3.3 notes that "*New energy infrastructure may also affect the composition and size of the local population, and in doing so have indirect health impacts, for example if it in some way affects access to key public services, transport, or the use of open space for recreation and physical activity*".

Draft National Policy Statement for Gas Supply Infrastructure and Oil and Gas Pipelines (EN-4) (2023)

22.2.9 In 2023, an update was made to NPS EN-4 (originally published in 2011). Taken together with the 'Overarching National Policy Statement for Energy' (EN-1), it provides the primary policy for decisions by the Secretary of State on applications it receives for natural gas supply infrastructure and gas and oil pipelines.

22.2.10 In regard to human health, it advises that developments should follow generic considerations on gas emissions set out in EN-1. In particular, Section 5.2 of EN-1 which provides guidance on the effects of emissions on air quality (which can have implications for human health).

Draft National Policy Statement for Electricity Networks Infrastructure (EN-5) (2023)

22.2.11 In 2023, an update was made to NPS EN-5 (originally published in 2011). NPS EN-5 provides specific policy in relation to EMF resulting from electricity networks and their known and potential effects on health, stating in EN-5 at paragraph 2.9.46 and 2.9.47: *"All overhead power lines produce EMFs, and these tend to be highest directly under a line, and decrease to the sides at increasing distance. Although putting cables underground eliminates the electric field, they still produce magnetic fields, which are highest directly above the cable (see para 2.10.12). EMFs can have both direct and indirect effects on human health. The direct effects occur in terms of impacts on the central nervous system resulting in its normal functioning being affected. Indirect effects occur through electric charges building up on the surface of the body producing a microshock on contact with a grounded object, or vice versa, which, depending on the field strength and other exposure factors, can range from barely perceptible to being an annoyance or even painful."*

National Planning Policy Framework (2021)

22.2.12 The National Planning Policy Framework (NPPF) (MHCLG, 2021) sets out the national government planning policies for England and how these are expected to be applied. This revised framework replaces the previous NPPF published in March 2012, revised in July 2018, and updated in February 2019 and July 2021. It provides a framework within which local people and their relevant councils produce their own local and neighbourhood plans. The NPPF contains policies that are applicable to human health.

22.2.13 Section 8 of the NPPF 'Promoting healthy and safe communities' states that policies should aim to achieve healthy, inclusive, and safe places which: promote social inclusion; are safe and accessible; and enable and support healthy lifestyles. In order to do this, paragraphs 93 and 97 of the NPPF says that planning policies and decisions should:

- *"plan positively for the provision of… local services to enhance the sustainability of communities and residential environments;*
- *take into account and support the delivery of local strategies to improve health, social and cultural well-being for all sections of the community;*
- *guard against the unnecessary loss of valued facilities and services, particularly where this would reduce the community's ability to meet its day-to-day needs;*
- *ensure that established shops, facilities, and services are able to develop and modernise, and are retained for the benefit of the community;*
- *ensure an integrated approach to considering the location of housing, economic uses and community facilities and services; and*
- *promote public safety and take into account wider security and defence requirements by anticipating and addressing possible malicious threats and natural hazards…This includes appropriate and proportionate steps that can be taken to reduce vulnerability, increase resilience and ensure public safety and security ."*

NHS Long Term Plan (2019)

22.2.14 The NHS Long Term Plan (NHS, 2019) sets out a ten-year programme of phased improvements to the NHS. It provides an insight into the priorities of the country regarding health (such as reducing health inequalities, obesity, smoking, and air pollution) which can also be used to guide development decisions.

22.2.15 The plan outlines how the NHS will attempt to reduce health inequalities through wider preventative action in deprived areas and improved 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 General Practice (GP) consultations to provide more options and better support for patients.

22.2.16 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. There will be a focus on population health which involves a new system hierarchy involving primary care networks, local authorities and larger integrated care systems. The NHS Long Term Plan stresses the importance of the NHS and the built environment sector continuing to work together to improve health and wellbeing.

Public Health England Strategy 2020 to 2025 (2020)

22.2.17 Public Health England (PHE) (now the UK Health Security Agency (UKHSA)) released the PHE Strategy 2020 to 2025 (PHE, 2020) in 2020. It sets out how the organisation

will work to improve public health and reduce health inequalities. The key aims for the five-year period are as follows:

- build and embed universal approaches to programme and project pipeline planning, reporting, and resource planning for use across PHE;
- improve governance structures around projects and programmes to support decision making, help identify barriers to progressing projects and ensuring that projects are properly evaluated throughout and closed when complete; and
- embed capacity planning within all programmes across PHE and, where relevant, agile approaches to bring greater flexibility and innovation to the work they do.

Spatial Planning for Health (2017)

22.2.18 In 2017, PHE published 'Spatial Planning for Health: An Evidence Resource for Designing Healthier Places' (PHE, 2017). The resource is an evidence base to explore the link between spatial planning and health in the current available literature. The review provided public health planners and local communities with evidence informed principles for designing healthy places.

22.2.19 The review addresses the relationship which exists between public health and the built environment. It identifies five aspects of the built and natural environment which can be influenced by local planning policy:

- neighbourhood design;
- housing;
- healthier food;
- natural and sustainable environment; and
- transport.

22.2.20 For each aspect identified above, the review provides the evidence base underpinning why they are important determinants of public health. It also sets out principles which public health professionals and planners should follow to ensure healthier places.

22.2.21 The two aspects deemed most relevant to the Proposed Development are 'neighbourhood design' and 'natural and sustainable environment'. For 'neighbourhood design', the review states that:

"neighbourhoods are places where people live, work, and play and have a sense of belonging. The design of a neighbourhood can contribute to the health and well-being of the people living there. Several aspects of neighbourhood design (walkability and mixed land use) can also maximise opportunities for social engagement and active travel. Neighbourhood design can impact on our day-to-day decisions and therefore have a significant role in shaping our health behaviours."

22.2.22 For the 'natural and sustainable environment', the review states that:

"there is a very significant and strong body of evidence linking contact and exposure to the natural environment with improved health and wellbeing. For the purpose of

this review, the natural and sustainable environment is comprised of neighbourhood ecosystems and the resulting co-benefits between the environment and health. Protecting the natural environment is essential to sustaining human civilization."

Local Planning Policy

Redcar and Cleveland Local Plan (2018)

22.2.23 The Redcar and Cleveland Local Plan (Redcar and Cleveland Borough Council (RCBC), 2018) sets out the vision and overall development strategy for the Redcar and Cleveland, and how it will be achieved for the period until 2032. The borough has faced significant challenges, such as the decline in its traditional employment base and the cessation of steel making in Redcar, a reducing population and increasing urban disadvantage. The Local Plan provides the policy framework to meet these challenges and to deliver sustainable development across the borough.

22.2.24 Under Policy SD 4 (General Development Principles), the Plan states that development will be permitted where it avoids locations that would put the environment, or human health or safety, at unacceptable risk. Development should also be designed, constructed and managed in ways that improve health and promote healthy lifestyles to help to reduce health inequalities.

22.2.25 The Plan also states at paragraph 2.31 that where a development is anticipated to have significant implications for people's health and wellbeing, a Health Impact Assessment (HIA) should be considered. The findings of a HIA are used to make recommendations as to how any positive health impacts of a development may be increased and any negative impacts reduced.

Stockton-on-Tees Local Plan (2019)

22.2.26 The Local Plan sets out the Stockton-on-Tees Borough Council's (STBC) policies and proposals to guide planning decisions and establishes the framework for the sustainable growth and development of the Borough up to 2032.

22.2.27 Within the Plan, a number of Strategic Priorities are established to work towards. Priorities relevant to human health are as follows:

- Strategic Priority 6: To promote equality and diversity whilst ensuring all of STBC's residents live in strong, prosperous, cohesive and sustainable communities in a safe, healthy and attractive environment; and
- Strategic Priority 10: To achieve a healthy, vibrant and successful low carbon community, resilient to the challenges of climate change and resource pressures.

22.2.28 In addition, it is noted at paragraph 4.75 that public safety is of key importance in the development process. This should be considered in terms of the impact on human health from new development, in particular installations in the North Tees and Billingham areas.

Hartlepool Local Plan (2018)

22.2.29 The Hartlepool Local Plan (Hartlepool Borough Council (HBC), 2018) sets out the spatial vision and strategic objectives for the Borough for the next 15 years. The plan

contains a suite of policies to assist in delivering the spatial vision and objectives - all of the policies contained within the plan are considered to be strategic policies.

22.2.30 Although no policies in the Plan relate directly to human health, one of the 'Hartlepool's Ambition' themes is "*Strengthening Communities, Community Safety, Housing, Health and Wellbeing*". The objectives within this theme include: to encourage healthier and more sustainable lives; to strengthen social cohesion and reduce inequalities; and to make Hartlepool a safer place.

Guidance

Determining Significance for Human Health in Environmental Impact Assessment (IEMA, 2022)

22.2.31 Where a project is subject to statutory or voluntary EIA, a health impact assessment may be merged into the EIA or undertaken as a stand-alone reporting process.

22.2.32 In November 2022, IEMA published guidance on assessing human health as part of EIA. Previously, there was no consolidated methodology or practice for the assessment of effects on human health. If a change in a wider determinant of health is likely due to a proposed development, it should be scoped into the human health assessment. The assessment must present the 'likely significant' human health effects of the applicable development.

22.2.33 The human health assessment undertaken for the Proposed Development is based on IEMA guidance and considers the potential effects for each phase of the development – construction, operation and decommissioning.

22.3 Assessment Methodology and Significance Criteria

Study Area

22.3.1 The Study Area for the human health assessment is defined to include features likely to be at risk from possible direct and indirect impacts that might arise from the Proposed Development. The Study Area is based on the extent and characteristics of the Proposed Development and the communities/wards directly and potentially indirectly affected by the Proposed Development. It is determined that human health impacts are likely to occur in an area which is composed of the following seven wards, which are together referred to as the 'Study Area':

- Fens and Greatham, and Seaton, in Hartlepool District;
- Billingham East and Billingham South, in Stockton-on-Tees District; and
- Dormanstown, Grangetown, and South Bank, in Redcar and Cleveland District.

22.3.2 Dependent on the human health indicator being analysed, some ward level data is available from the 2021 Census which has been used as the preferred dataset where possible. It is important to note that the electoral ward boundaries have changed in recent years and although the geographic extents of these may differ, both types of wards provide an indication of local health in proximity to the Proposed Development Site and are therefore considered suitable for assessing the existing baseline conditions for human health.

22.3.3 Where ward level data is not available, land within the boundaries of RCBC, STBC and HBC have been used as the Study Area, as referenced in the text.

Impact Assessment Methodology

22.3.4 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*" (WHO, 2022). Public health therefore encompasses general wellbeing, not just the absence of illness.

22.3.5 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, whilst others are indirect.

22.3.6 The determinants scoped into the assessment are as follows:

- risk-taking behaviour;
- open space, leisure, and play;
- transport modes, access, and connections;
- community safety;
- community identity, culture, resilience, and influence;
- social participation, interaction, and support;
- education and training;
- employment and income;
- climate change mitigation and adaptation;
- air quality;
- noise and vibration;
- health and social care services;
- built environment;
- housing[1]; and
- radiation[1].

22.3.7 The following determinants were scoped out of the EIA in the Scoping Report as they are deemed not relevant to the Proposed Development:

- diet and nutrition; and
- relocation.

22.3.8 Although previously being scoped in as determinants at Scoping Report stage, the following determinants will either be captured within the assessment of other

[1] Please note that this determinant was sought to be scoped out in the Scoping Report. After due consideration and consultation, it has been included as a determinant of human health and will be assessed further in the ES (see Table 22-4).

determinants or Chapters (in line with IEMA guidance) or are considered to unlikely have a significant effect on the environment:

- Physical activity: effects relate most directly to open space and transport and so are captured within the assessment of those determinants.
- Water quality or availability: water environment is assessed within Chapter 9: Surface Water, Flood Risk and Water Resources (PEI Report, Volume I), however, as noted in Chapter 9, the Proposed Development Study Area is not within a Drinking Water Protected Area or Drinking Water Safeguard Zone and consequently there is no prospect of human health receptor impacts.
- Land quality: ground conditions are assessed within Chapter 10: Geology, Hydrogeology and Contaminated Land (PEI Report, Volume I). There are no prospect of human health receptor impacts and therefore no prospect of significant impacts to human health.
- Wider societal infrastructure and resources: considerations such as wider contributions to economic development are assessed under the 'employment and income', and 'education and skills' determinants.

Electromagnetic Fields (EMF)

22.3.9 The Electric and Magnetic Fields and Health website provides information on the EMF risks associated with the types of infrastructure proposed by the Proposed Development. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines (ICNIP, 2020) is the reference for the recommended limits of exposure of the general public, following current government policy.

22.3.10 It is likely that all electrical and control system cables will be installed below ground or at ground level with no new overhead transmission lines proposed. Therefore, it is considered that with appropriate Proposed Development design, significant effects associated with EMFs will be avoided. This will be assessed further in the Environmental Statement.

Significance Criteria

22.3.11 The assessment of potential human health effects uses the effect significance terms and definitions as described within IEMA guidance.

22.3.12 The human health assessment follows the general impact assessment methodology as set out in Chapter 2: Assessment Methodology (PEI Report, Volume I). However, the specific impact magnitude and impact sensitivity criteria for this assessment have been set out below.

22.3.13 Effects are defined as follows:

- Beneficial classifications of significance indicate an advantageous or positive effect on an area, which may be Minor, Moderate or Major;
- Negligible classifications of significance indicate imperceptible effects on an area;
- Adverse classifications of significance indicate a disadvantageous effect on an area, which may be Minor, Moderate or Major; and

- No effect classifications of significance indicate that there are no effects on an area.

22.3.14 Duration of effect is also considered, with more weight given to permanent changes than to temporary ones.

22.3.15 'Significance' reflects the relationship between the scale of effect (impact magnitude) and the sensitivity of the affected receptor. As such, the significance criteria of human health effects have been assessed based on the expert judgment and professional experience of the authors, and relies on the following considerations:

- Sensitivity of receptors: specific values in terms of sensitivity are not attributed to human health receptors due to their diverse nature and scale; however, the assessment takes account of the qualitative (rather than quantitative) sensitivity of relevant populations and sub-populations and their ability to respond to change; and
- Magnitude of impact: this entails consideration of the size of the impact on people or receptors in the context of the area in which impacts will be experienced.

22.3.16 The following criteria have been set to assess the effects on human health receptors. Table 22-1 identifies the sensitivity criteria that have been used.

Table 22-1: Sensitivity Criteria

SENSITIVITY	DESCRIPTION
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependants; people with very poor health status; and/or people with a very low capacity to adapt.
Medium	Moderate levels of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care; people with poor health status; and/or people with a limited capacity to adapt.
Low	Low levels of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and/or people with a high capacity to adapt.

SENSITIVITY	DESCRIPTION
Very low	Very low levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a community whose outlook is predominantly support with some concern; people who are not limited from undertaking daily activities; people who are independent (not a carer or dependant); people with good health status; and/or people with a very high capacity to adapt.

22.3.17 Table 22-2 identifies the magnitude of impact criteria which have been used.

Table 22-2: Magnitude Criteria

MAGNITUDE	DESCRIPTION
High	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/injury outcomes; majority of population affected; permanent change; substantial service quality implications.
Medium	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications.
Low	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications.
Very low	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life; very few people affected; immediate reversal once activity complete; no service quality implication.

22.3.18 Human health effects reflect the relationship between the sensitivity of the affected receptor (Table 22-1) and the magnitude of the impact (Table 22-2) in accordance with Table 22-3.

Table 22-3: Classification of Effect Matrix

		SENSITIVITY			
		HIGH	MEDIUM	LOW	VERY LOW
MAGNITUDE	HIGH	Major	Major	Moderate	Minor
	MEDIUM	Major	Moderate	Minor	Negligible
	LOW	Moderate	Minor	Negligible	Negligible
	VERY LOW	Minor	Negligible	Negligible	Negligible

22.3.19 In accordance with the methodology set out in IEMA guidance (IEMA, 2022) and Chapter 2: Assessment Methodology (PEI Report, Volume I), Major and Moderate effects are classed as Significant, whilst Minor and Negligible effects are classed as Not Significant.

Sources of Information/Data

22.3.20 Baseline data illustrating the existing health conditions surrounding the Proposed Development Site have been collected through a desk-based research exercise using publicly available sources, documents, and web-based applications. These sources include:

- Census 2021 (ONS, 2022a);
- Claimant Count (ONS, 2022b);
- Population Estimates (ONS, 2022c);
- Indices of Multiple Deprivation 2019 (MHLGC, 2019); and
- Local Health Profiles (PHE, 2022).
- The Electric and Magnetic Fields and Health website
- The International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines (ICNIP, 2020)

Consultation

22.3.21 An EIA Scoping Opinion was requested from the Planning Inspectorate (the Inspectorate) in April 2023. A response was received on 17th May 2023. A high-level summary of responses to the Scoping Opinion relevant to human health is outlined in Table 22-4.

Table 22-4: Responses to Scoping Comments

CONSULTEE	DATE AND METHOD OF CONSULTATION	SUMMARY OF CONSULTEE COMMENTS	SUMMARY OF RESPONSE/HOW COMMENTS HAVE BEEN ADDRESSED
The Inspectorate	17th May 2023 – Scoping Opinion	If significant effects are likely to arise from the requirement to temporarily accommodate construction workers, then then ES should also consider the effects on human health from reduced housing availability and increased housing costs.	The effect of temporary accommodation for construction workers has been considered under the 'housing' determinant of this assessment. Significant effects are not likely; however, this will be further assessed and reported in the ES.
The Inspectorate	17th May 2023 – Scoping Opinion	Potential health impacts, hazards and public health receptors surrounding private drinking water supplies during the construction phase, including the potential for contamination or disruption, should be scoped into further assessment work and reported upon within the human health chapter of the ES, where significant effects are likely.	As noted in Chapter 9: Surface Water, Flood Risk, and Water Resources (PEI Report, Volume I), the Proposed Development Study Area is not within a Drinking Water Protected Area or Drinking Water Safeguard Zone. Therefore, no significant effects are likely.
The Inspectorate	17th May 2023 – Scoping Opinion	Effects on mental health, including the potential for local public concern through understanding of risk/ risk perception for local communities and for the wider public in respect of the proposed hydrogen pipeline should be assessed and reported upon within the ES, where significant effects are likely.	IEMA guidance suggests the 'radiation' assessment should *"consider the mental health effects of widespread concerns about exposure from major electrical infrastructure or radiation sources.* Therefore, the assessment of impacts on mental health is considered under the 'radiation' determinant. Impacts have the potential to be Minor Adverse, which is Not Significant. This is discussed in Section 22.6. However, this will be further assessed and reported in the ES.

CONSULTEE	DATE AND METHOD OF CONSULTATION	SUMMARY OF CONSULTEE COMMENTS	SUMMARY OF RESPONSE/HOW COMMENTS HAVE BEEN ADDRESSED
The Inspectorate	17th May 2023 – Scoping Opinion	The Scoping Report seeks to scope out a standalone assessment of EMF on the basis that these will be considered in the human health assessment.	EMF impacts to human health are assessed under the 'radiation' determinant. Impacts have the potential to be Minor Adverse, which is not Significant. This is discussed in Section 22.6. However, this will be further assessed and reported the ES.

Use of the Rochdale Envelope

22.3.22 To ensure a robust assessment of the likely significance of the environmental effects of the Proposed Development, the EIA is being undertaken adopting the principles of the 'Rochdale Envelope' approach where appropriate in line with The Inspectorate's Advice Note Nine: Rochdale Envelope (The Planning Inspectorate, 2018). This involves assessing the maximum (or where relevant, minimum)/worst case parameters for the elements where flexibility needs to be retained (building dimensions or operational modes for example).

22.4 Baseline Conditions

Existing Baseline

22.4.1 This section describes the baseline environmental characteristics for the Proposed Development Site and the defined Study Area, with specific reference to human health.

22.4.2 Firstly, a demographic and health profile of the local population is set out. Secondly, existing local infrastructure relevant to the health assessment is summarised; this draws largely on Chapter 18: Socio-economics and Land Use (PEI Report, Volume I) and includes residential properties, community facilities and recreational routes such as Public Rights of Way (PRoW).

Demographic Profile

Age

22.4.3 According to the most recent Census, the total population of the Study Area in 2021 was 43,145. Within this population, the proportion of working age residents (aged 16 to 64) was 59.8%, slightly lower than in the North East (61.9%) and England as a whole (63.0%). The Study Area has a slightly higher proportion of children (20.4%) compared to regional (17.7%) and national (18.6%) levels. However, the share of residents aged 65 and over in the Study Area (19.8%) is broadly in line with the comparator geographies (20.4%, and 18.4%). This is illustrated in Plate 22-1.

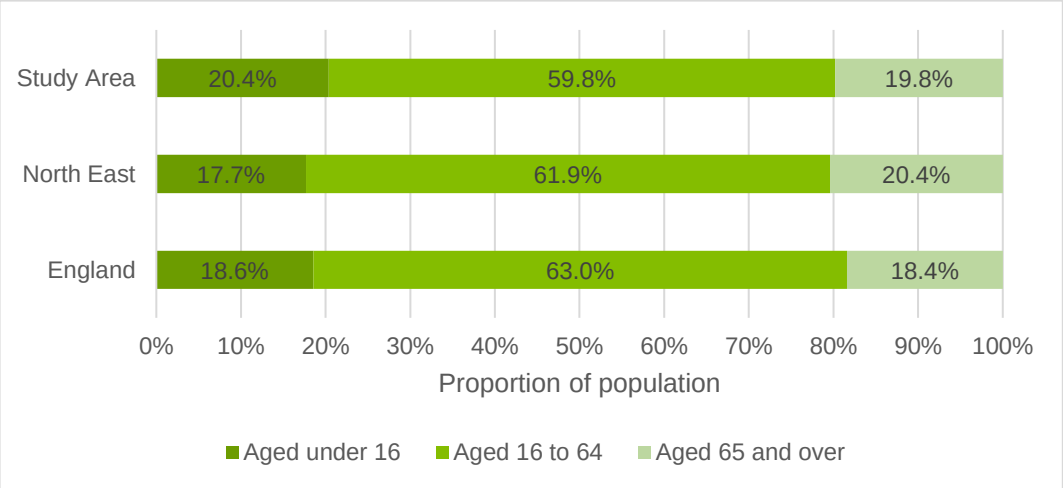

Plate 22-1: Age Breakdown (%) for the Study Area, North-East Region and England

Ethnic Group

22.4.4 In regard to ethnic group, Table 22-5 shows that 96.9% of residents in the Study Area are White, a higher proportion than the North East (93.0%), and considerably higher than in England (81.0%). There is also a lower proportion of all ethnic minority groups in the Study Area compared to regional and national figures. For example, 1.5% of residents in the Study Area are within the Asian, Asian British, or Asian Welsh group, compared to 3.7% in the North East, and 9.6% in England. People from minority ethnic groups may have a higher sensitivity to health effects arising from changes to social cohesion.

Table 22-5: Ethnic Group Breakdown (%) for the Study Area, North-East Region and England

ETHNIC GROUP (%)	STUDY AREA	NORTH EAST	ENGLAND
Asian, Asian British or Asian Welsh	1.5	3.7	9.6
Black, Black British, Black Welsh, Caribbean or African	0.3	1.0	4.2
Mixed or Multiple ethnic groups	0.8	1.3	3.0
White	96.9	93.9	81.0
Other ethnic group	0.5	1.0	2.2

Education

22.4.5 In 2021, the proportion of residents aged 16 or over who had gained a level 4 qualification (degree-level or equivalent) or above in the Study Area was 21.6%. This was lower than the proportion seen in the North East (28.6%) and particularly lower than the average for England (33.9%). In addition, 24.7% of residents in the Study Area have no qualifications, a higher rate than in the North East (20.3%) and nationally (18.1%).

Economic Activity

22.4.6 According to the Census, in 2021 the economic activity rate (amongst 16-to-64-year-olds) was 54.5% in the Study Area, similar to the rate in the North East (55.9%), but slightly lower than that across England as a whole (60.9%).

22.4.7 Claimant count data measures of the number of people claiming benefits principally for the reason of being unemployed. In January 2023, the claimant count for residents (as a proportion of residents aged 16 to 64) in the Study Area was 5.5%, higher than the rates in the North East (4.2%) and nationally (3.7%).

Income

22.4.8 Gross Disposable Household Income (GDHI) is the amount of money that individuals in the household sector can spend or save after income distribution measures. Data at ward level is unavailable for GDHI and so, the local authorities of Hartlepool,

Redcar and Cleveland, and Stockton-on-Tees have been used to form the Study Area for this indicator. GDHI in the Study Area in 2020 was £17,205, in line with the average for the North East (£17,416) but lower than the national average (£21,962).

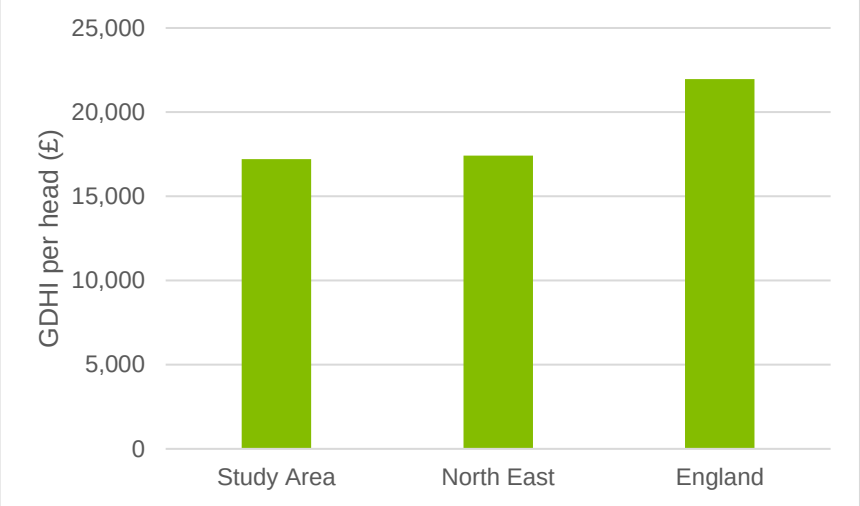

Plate 22-2: Gross Disposable Household Income (GDHI) per head (£) for the Study Area, North-East Region and England

Deprivation

22.4.9 The 2019 Indices of Deprivation (IoD) provide a set of relative measures of deprivation for local authorities across England. Ward level data is not available within this dataset and therefore, the local authorities of Hartlepool, Redcar and Cleveland, and Stockton-on-Tees have been used as the Study Area for deprivation.

22.4.10 In terms of overall deprivation (multiple deprivation), Hartlepool is the 25th most deprived, Redcar and Cleveland is the 62nd most deprived, and Stockton-on-Tees is the 113th most deprived local authority in England (where 1st is most deprived). This places all of these local authorities within the top 40% most deprived in the country.

22.4.11 The IoD also assess health deprivation as a domain. This domain measures the risk of premature death and the impairment of quality of life through poor physical or mental health. In regard to this, Hartlepool is the 21st most deprived, Redcar and Cleveland is the 26th most deprived, and Stockton-on-Tees is the 48th most deprived local authority in England. This places each local authority within the top 20% most health deprived in the country.

22.4.12 Further, the IoD contains data relating to barriers to housing and services as a domain. This measures the physical and financial accessibility of housing and local services. Hartlepool is the 284th most deprived, Redcar and Cleveland is the 283rd most deprived, and Stockton-on-Tees is the 286th most deprived local authority. This means that each local authority is within the top 15% least deprived in England in regard to this domain.

22.4.13 More granular deprivation data is available at Lower Super Output Area (LSOA) level[2]. Chapter 18: Socio-economics and Land Use (PEI Report, Volume I) selects a best fit LSOA Study Area to assess deprivation around the Proposed Development Site. This Study Area comprises the following LSOAs: E01012107, E01032560, E01032561, E01012114, E01012109, E01012198, and E01012279. Of these seven LSOAs, four are within the top 10% most deprived nationally (for overall deprivation), representing a high level of deprivation in the Study Area.

Community Cohesion

22.4.14 According to the Community Life Survey (Department for Digital, Culture, Media & Sport, 2020), in the North East (the most granular level of data) 69% of respondents felt like they belonged strongly or fairly strongly to their immediate neighbourhood. This is higher than the average for England (63%).

Health Profile

22.4.15 This section provides a human health profile of the Study Area, focusing on key determinants of health relevant to the assessment criteria. This local health baseline has been used to assess the potential health effects of the Proposed Development.

General Health

22.4.16 As part of the Census, respondents are asked to self-assess the state of their health, both physical and mental. Data for this shows that 76.0% of residents in the Study Area believed that they were living in 'good' or 'very good' health, a similar proportion to that in the North East (78.0%), but slightly lower than in England (82.8%). Further, 7.8% of the population in the Study Area rated their health as 'bad' or 'very bad', again similar to that in the North East (7.8%) but higher than nationally (5.2%). This is illustrated in Plate 22-3.

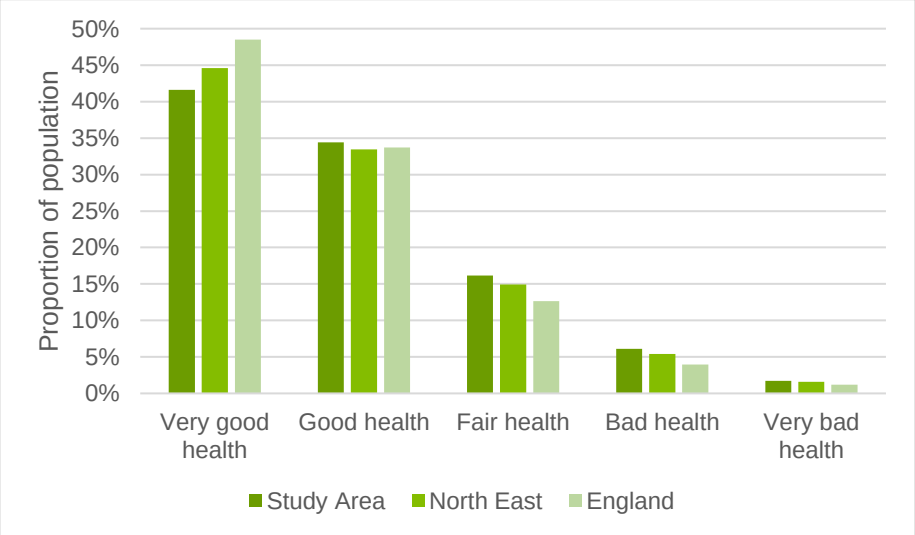

Plate 22-3: Self-Assessed Health for the Study Area, North-East Region and England

[2] LSOAs are ONS-defined small geographic areas across England designed to allow data reporting across small areas. Each LSOA in England is of a similar population size, with an average of 1,500 residents of 650 households.

Mental Health

22.4.17 Mental health and well-being profiles produced by PHE provide a summary of the mental health of people within local authority areas and a comparison of local mental health with average values for all areas of England. The most recent data published is from 2017 and is detailed in Table 22-6. Data at ward level is unavailable for this indicator and so, the local authorities of Hartlepool, Redcar and Cleveland, and Stockton-on-Tees have been used to form the Study Area.

22.4.18 Table 22-6 shows that the prevalence of mental health problems in the Study Area is higher than the average for both the North East and England.

Table 22-6: Mental Health Disorder Prevalence in the Study Area, North-East Region and England

LOCAL AUTHORITY	PEOPLE ESTIMATED TO HAVE ANY COMMON MENTAL HEALTH DISORDER (%)
Study Area	18.1
North East	16.9
England	16.9

Disability

22.4.19 The Census contains information relating to disability – refer to Table 22-7. In 2021, 22.6% of residents in the Study Area were classed as disabled under the Equality Act (2010), a similar proportion to that in the North East (21.4%), and higher than that in England as a whole (17.3%). 11.1% of residents believed that their day-to-day activities were limited a lot, a higher rate than regionally (9.9%) and nationally (7.3%).

Table 22-7: Disability Information for the Study Area, North-East Region and England

	STUDY AREA	NORTH EAST	ENGLAND
Disabled under the Equality Act (%)	**22.6**	**21.4**	**17.3**
Disabled under the Equality Act: Day-to-day activities limited a lot (%)	11.1	9.9	7.3
Disabled under the Equality Act: Day-to-day activities limited a little (%)	11.5	11.5	10.0
Not disabled under the Equality Act (%)	**77.4**	**78.6**	**82.7**
Not disabled under the Equality Act: Has long term physical or mental health condition but day-to-day activities are not limited (%)	6.3	7.1	6.8

	STUDY AREA	NORTH EAST	ENGLAND
Not disabled under the Equality Act: No long term physical or mental health conditions (%)	71.1	71.5	75.9

Wider Determinants of Health

22.4.20 Wider determinants of health can also be insightful in building the health profile of an area. The following indicators are also compared to regional and national figures to illustrate how the Study Area performs:

- Life expectancy: Between 2016 and 2020, the average life expectancy at birth in the Study Area for females was 80.2 years and for males it was 76.2. This was slightly lower than life expectancy in the North East (81.5 and 77.6) and lower than in England (83.2 and 79.5 respectively).
- Childhood obesity: The average proportion of children in reception school year who were obese in the Study Area in 2021 was 12.4%. This was slightly higher than the proportions in the North East (11.4%) and England (9.9%).
- Smoking prevalence: In the Study Area, an average of 14.4% of adults were regular smokers in 2021, compared to 14.8% in the North East, and 13.0% for England as a whole.
- Mortality rate from Chronic Obstructive Pulmonary Disease (COPD)[3]: In 2019, the mortality rate was on average 73.3 per 1,000 people, higher than the rate for the North East (54.8) England as a whole (52.8).
- Physically inactive adults[3]: On average, 29.2% of adults in the Study Area were 'physically inactive' in 2021. This was a higher proportion than in the North East (25.0%) and across England (23.4%).

Healthcare Facilities

22.4.21 The nearest hospital (with an accident and emergency department) to the Proposed Development Site is James Cook University Hospital, located approximately 5 km south of the Proposed Development Site.

22.4.22 There are multiple GP surgeries within proximity of the Proposed Development Site, the majority of which are located in Middlesbrough and Redcar. Those within 2 km of the Proposed Development Site are detailed in Table 22-8.

[3] Please note that ward level data is not available for this indicator. The Study Area has been formed of Hartlepool, Redcar and Cleveland, and Stockton-on-Tees.

Table 22-8: General Practice (GP) Surgeries within 2 km of the Proposed Development Site

GP SURGERY	DISTANCE FROM THE PROPOSED DEVELOPMENT SITE (APPROX. KM)
The Eston Surgery	1.6
South Grange Medical Centre	1.6
Normanby Medical Centre	1.6
Kingsway Medical Centre	1.7
Bentley Medical Practice	1.9
The Green House Surgery	2.0

22.4.23 The latest GP data published by NHS Digital (NHS Digital, 2022) indicates that the total patients registered at the GP surgeries in Table 22-8 was 61,689 in December 2022. Across these GP surgeries, there were 32 GPs working, averaging at 1,928 patients per GP, which is slightly above the Royal College of General Practitioners target of 1,800 patients per GP.

Social Infrastructure

22.4.24 Chapter 18: Socio-economics and Land Use (PEI Report, Volume I) details the educational facilities located in proximity of the Proposed Development Site (refer to Section 18.4 therein). These are clustered in Redcar, Middlesbrough, Billingham, and Stockton-on-Tees.

22.4.25 Police stations in the vicinity of the Proposed Development Site include:

- Cleveland Police Redcar, located approximately 0.8 km east of the Proposed Development Site;
- Cleveland Police South Bank Station, located approximately 1.5 km south-west of the Proposed Development Site;
- Cleveland Police Redcar Town Station, located approximately 2.5 km east of the Proposed Development Site; and
- Cleveland Police Middlesbrough HQ located approximately 2.9 km south of the Proposed Development Site.

22.4.26 There is one fire station located adjacent to the Proposed Development Site Boundary, namely Billingham Community Fire Station. Grangetown Community Fire Station is located approximately 1 km south-east of the Proposed Development Site, whilst Redcar Community Fire Station is located approximately 1.1 km east of the Proposed Development Site, with Cleveland Fire Brigade Headquarters located approximately 1.5 km north-west of the Proposed Development Site.

Community and Recreational Facilities

22.4.27 There is a range of community and recreational facilities located in proximity to the Proposed Development Site, including churches, greenspaces, public houses and hotels. These are detailed in Chapter 18: Socio-economics and Land Use (PEI Report, Volume I).

Public Rights of Way

22.4.28 Information relating to PRoWs located within the vicinity of the Proposed Development Site can be found in Chapter 18: Socio-economics and Land Use (PEI Report, Volume I).

Future Baseline

Age

22.4.29 According to ONS population projections, the Study Area is projected to experience a slight net age increase of 0.08% between 2021 and 2041 – refer to Table 22-9. Proportional losses are expected within the 0-15 age group, whilst the elderly population is expected to grow. These trends reflect both regional and national projections for which the total populations are likely to experience a slight net age increase, with decreases in younger populations and increases in the 65 and over category.

Table 22-9: Population Projections in the Study Area, North-East Region, and England

GEOGRAPHY	AGE GROUP	2021	2026	2031	2036	2041	COMPOUND ANNUAL GROWTH RATE (%)
STUDY AREA	All ages	430,610	433,983	435,171	435,894	437,074	0.08
	Aged 0 to 15	82,475	79,073	74,041	72,032	72,546	-0.67
	Aged 16-64	259,969	257,848	253,675	249,439	248,799	-0.23
	Aged 65+	88,167	97,065	107,459	114,421	115,727	1.44
NORTH EAST	All ages	2,681,149	2,709,320	2,731,853	2,747,811	2,761,406	0.16
	Aged 0 to 15	478,426	464,573	444,960	438,689	444,895	-0.38
	Aged 16-64	1,655,303	1,644,688	1,627,470	1,609,950	1,610,401	-0.14
	Aged 65+	547,424	600,060	659,431	699,167	706,105	1.35
ENGLAND	All ages	56,989,572	58,297,239	59,389,107	60,377,811	61,353,966	0.39
	Aged 0 to 15	10,913,822	10,739,627	10,387,050	10,307,811	10,524,366	-0.19
	Aged 16-64	35,406,739	35,880,054	36,056,306	36,052,368	36,228,027	0.12
	Aged 65+	10,668,992	11,677,597	12,945,733	14,017,594	14,601,606	1.67

22.5 Proposed Development Design and Impact Avoidance

22.5.1 The EIA process aims to avoid, prevent, reduce or offset potential environmental effects through design and/or management measures. These are measures that are inherent in the design and construction of the Proposed Development (also known as 'embedded measures'). Embedded mitigation measures as applicable to this assessment includes minimising impacts on the PRoW that cross the Proposed Development Site.

22.5.2 As the human health assessment draws upon the information and conclusions reported in various chapters within this PEI Report, development design and impact avoidance measures, relevant to human health have been set out in each of these respective chapters as detailed below:

- Chapter 8: Air Quality (PEI Report, Volume I): adhering to the CEMP; covering vehicles leaving the construction site that are carrying waste materials; using water suppression and regular cleaning to control dust during earth moving activities; and prohibiting open fires on site.
- Chapter 11: Noise and Vibration (PEI Report, Volume I): abiding by agreed noise limits; avoidance of working in the more sensitive evening and night times where possible; and ensuring that a modern plant is used, complying with the latest European noise emission requirements.
- Chapter 15: Traffic and Transport (PEI Report, Volume I): implementation of the Construction Worker Travel Plan to encourage construction workers to reduce reliance on single occupancy car use; and implementation of the Construction Traffic Management Plan to control impacts of HGVs.
- Chapter 18: Socio-economics and Land Use (PEI Report, Volume I): minimising impacts on the PRoWs that cross the Proposed Development Site.
- Chapter 19: Climate Change (PEI Report, Volume I): minimising leakage of hydrogen and using trace systems; use of energy efficient lighting; and optimisation of overall auto thermal reforming process.

22.5.3 The human health assessment assumes that the construction works would be undertaken in accordance with a Construction Environmental Management Plan (CEMP) which will set out the key measures to be employed during the Proposed Development construction phase to control and minimise the impacts on the environment. A Framework CEMP will accompany the DCO Application, whilst and Outline Construction Environmental Management Plan (OCEMP) will be prepared as a supporting document to the ES. A Final CEMP will be prepared by the construction contractor in accordance with the Framework CEMP prior to construction. The submission, approval, and implementation of the Final CEMP will be secured by a Requirement of the draft DCO.

22.5.4 The human health assessment assumes that the Production Facility will require an Environmental Permit and will comply with this under the Environmental Permitting (England and Wales) Regulations 2016. In addition, the Proposed Development will

be operated in line with appropriate standards, whilst the operator will implement and maintain an Environment Management System (EMS) which will be certified to International Standards Organisation (ISO) 14001. The EMS will outline requirements and procedures required to ensure that the Proposed Development Site is operating to the appropriate standard.

22.5.5 The human health assessment also assumes that a Decommissioning Environmental Management Plan (DEMP) would be prepared which would consider in detail all potential environmental risks on the Proposed Development Site and contain guidance on how risks can be removed or mitigated. The DEMP would consider potential environmental risks on the Proposed Development Site and contain guidance on how risks can be removed or mitigated.

22.6 Likely Impacts and Effects

22.6.1 This section sets out the potential health and wellbeing impacts associated with the Proposed Development during its construction, operation and decommissioning. These effects are described in accordance with the methodology as set out in Section 22.3.

Construction

22.6.2 Construction of the Proposed Development is anticipated to commence in 2025 and be split into two phases. Phase 1 will last no more than approximately three years, and Phase 2 will commence thereafter, with overall construction expected to be completed by 2030. However, allowing for flexibility, there is potential for there to be a slight overlap in construction phases. For the purposes of this assessment, the worst-case scenario has been considered which is continuous construction on the Main Sites and Connection Corridors over the anticipated 6-year construction period.

Risk Taking Behaviour

22.6.3 Construction activity has the potential to lead to risk taking behaviour by its workforce. It is expected that the construction workforce will be employed by contractors who hold high health and safety standards which employees are required to follow. Therefore, the sensitivity of these receptors is assessed to be Low.

22.6.4 As detailed in Section 22.5, the construction works would be undertaken in accordance with a CEMP which will set out how construction activities will be managed and controlled in compliance with accredited health and safety and environmental management systems, relevant legislation and environmental permits, consents and licences. In addition, Chapter 20: Major Accidents and Disasters (PEI Report, Volume I) indicated that no significant effects are expected during construction of the Proposed Development. Therefore, the magnitude of impact for risk taking behaviour by the workforce is assessed as Low.

22.6.5 Overall, the likely effect on human health arising from impacts on risk taking behaviour during the Proposed Development construction phase is assessed as Minor Adverse (Not Significant).

Open Space, Leisure and Play

22.6.6 The population of the Study Area contains a high proportion of children, and a higher-than-average proportion of 'physically inactive' adults. These groups may be more sensitive to changes to open space and therefore, sensitivity of the local population is assessed to be Medium.

22.6.7 Construction activities on-site may cross, or otherwise impact upon, the accessibility and safety of PRoW and active travel networks in the area. As indicated in Chapter 18: Socio-economics and Land Use (PEI Report, Volume I), the effect of the Proposed Development on recreational routes and PRoW during the construction phase has the potential to be Minor Adverse, but Not Significant. As such, it is anticipated that knock on human health effects will have a Low magnitude. This would produce a Minor Adverse effect (Not Significant). However, a full assessment regarding impacts on PRoW will be undertaken and reported in the ES.

Transport Modes, Access and Connections

22.6.8 A preliminary assessment of transport impacts during the Proposed Development's construction phase is provided in Chapter 15: Traffic and Transport (PEI Report, Volume I).

22.6.9 The Proposed Development has the potential to impact access to healthcare services, educational facilities and other social infrastructure. As noted in the baseline conditions section, there are seven GP surgeries and multiple schools and community facilities in proximity to the Proposed Development Site. In addition, the Study Area presents lower than average rates of good health and educational attainment levels. Therefore, the local population may be more reliant on access to these services. Due to this, sensitivity is assessed as Medium.

22.6.10 As noted in Chapter 15: Traffic and Transport (PEI Report, Volume I), additional traffic predicted to be generated by the construction activities associated with the Proposed Development (both the Main Site and the Connection Corridors) will result in small, temporary increases of traffic flows which are unlikely to affect access to services and social infrastructure. In addition, a number of traffic management measures will be implemented during construction of the Proposed Development to minimise traffic impacts upon the local road network. Therefore, the magnitude of impact is assessed as Low.

22.6.11 Therefore, the overall likely effect on human health arising from impacts on transport modes, access and connections during the Proposed Development construction phase is assessed to be Minor Adverse, which is Not Significant.

Community Safety

22.6.12 As noted in Section 22.4, there are multiple police and fire stations in proximity to the Proposed Development Site, plus one hospital with an accident and emergency department within 5 km. The population of the Study Area in general has poorer health than the rest of the country and therefore, may rely on emergency services to a greater extent. Therefore, sensitivity is assessed as Medium.

22.6.13 Impacts to roads during construction are expected to be limited and temporary due to the appropriate use of traffic management measures. It is unlikely that impacts on access to services, road users, and accidents and safety would occur. Therefore, the magnitude of impact is assessed as Low.

22.6.14 Therefore, the overall likely effect on human health arising from impacts on community safety during the Proposed Development construction phase is assessed to be Minor Adverse, which is Not Significant.

Community Identity, Culture, Resilience and Influence

22.6.15 Baseline data shows that a higher proportion of people in the North East feel like they belong strongly or fairly strongly to their immediate neighbourhood, compared to the proportion in England. This suggests a stronger than average sense of community in the area, compared to the rest of the country. Due to this, the sensitivity of the local population in relation to community identity, culture, resilience, and influence is assessed as Medium.

22.6.16 Through the Proposed Development, the Applicant aims to support local people and help to reverse the impact of recent industrial closures in the region. The Applicant is currently working with local councils, authorities and educators to support social mobility and enable a just transition that engages the local community. This includes establishing a community fund that will provide grants annually for net zero-focused community projects, offering scale and business development services to local businesses focused on net zero and launching a low carbon community hub (bp, 2022). The magnitude of the impact is therefore assessed as Low. This is due to the level of community engagement expected by the Applicant during construction of the Proposed Development, which will be temporary.

22.6.17 The overall likely effect on human health arising from impacts on community identity, culture, resilience and influence during the Proposed Development construction phase is assessed to be Minor Beneficial (Not Significant).

Social Participation, Interaction and Support

22.6.18 The sensitivity of the local population in relation to social participation, interaction and support is assessed as Medium.

22.6.19 Roads bordering the Proposed Development Site may be used by construction traffic which could impact on travel between settlements and cause community severance (e.g., PRoW). Severance could affect access to community and other social facilities. However, as discussed in Chapter 15: Traffic and Transport (PEI Report, Volume I), changes in traffic during construction would be limited and severance impacts on all links are unlikely. In addition, Chapter 18: Socio-economics and Land Use (PEI Report, Volume I), reports that the effect of the Proposed Development on recreational routes and PRoWs during the construction phase has the potential to be Minor Adverse, but Not Significant. Therefore, the magnitude of impact on this determinant of human health is assessed as Low.

22.6.20 The overall likely effect on human health arising from impacts on social participation, interaction and support during the Proposed Development construction phase is assessed to be Minor Adverse, which is Not Significant.

Employment and Income

22.6.21 An assessment of the number of jobs created during the Proposed Development's construction phase is provided in Chapter 18: Socio-economics and Land Use (PEI Report, Volume I). It is estimated that the Proposed Development will support, on average, a minimum of 900 full-time employment construction jobs per annum[4]. Once leakage, displacement and multiplier effects have been accounted for, this results in a net total of 675 jobs during the construction phase, 506 of which are expected to be taken up by residents within the Travel to Work Area (TTWA).

22.6.22 There is evidence that employment matters to health, not only from an economic standpoint, but also in terms of quality of life (PHE, 2019). Good quality work protects against social exclusion through the provision of income, social interaction, a core role and identity and purpose. Therefore, the generation of jobs is assessed to be a beneficial outcome.

22.6.23 The sensitivity of the local workforce to employment and income changes has been assessed as Medium, due to the higher-than-average claimant count and lower-than-average GDHI in the area.

22.6.24 The jobs arising from the construction phase of the Proposed Development will be temporary, over the six-year construction period. This will represent local job growth (creating an estimated 506 jobs for workers living with a 60-minute drive time), although the overall change will be small in the context of the overall number of jobs available locally. Therefore, the magnitude of impact is assessed to be Low.

22.6.25 Overall, the likely effect on human health arising from impacts on employment and income during the construction phase of the Proposed Development is assessed to be Minor Beneficial (Not Significant).

Housing

22.6.26 As noted in Chapter 18: Socio-economics and Land Use and under the 'Employment and Income' assessment above, it is expected that the majority of construction employment will be sourced from within the study area and so, most workers will not require temporary accommodation.

22.6.27 Therefore, based on professional judgement, the impact on housing is currently assessed as Minor Adverse, but Not Significant. As such, it is anticipated that knock on human health effects will also be Not Significant as these are related to housing impacts. A full assessment regarding impacts on temporary accommodation will be undertaken and reported in the ES. This will include an assessment of the availability of temporary accommodation.

[4] As stated in Chapter 5: Construction Programme and Management (PEI Report, Volume I), Section 5.3 peak construction workforce numbers will be approximately 1,300 people per day for both Phases 1 and 2.

Education and Training

22.6.28 Jobs created by the Proposed Development will be in the energy sector. As such, they will contribute to the development of skills needed for the UK's transition to net zero (PWC, 2022). Where possible, there will be a preference for local staffing. It is likely that the appointed contractors will employ trainees and apprentices as part of the Proposed Development construction workforce.

22.6.29 Baseline data shows that the population of the Study Area is generally educated to a lower level than regional and national levels, suggesting a need for local education and training provision. Therefore, sensitivity is assessed as Medium.

22.6.30 The Applicant will invest in green skills by launching a dedicated education skills programme for the Proposed Development. The programme aims to reach more than 5,000 people, ensuring that local people benefit from job opportunities and advancing social mobility (bp, 2022).

22.6.31 The Applicant already has a partnership with Redcar and Cleveland College, which aims to support education initiatives in Teesside, and will provide funding for the development of the new Clean Energy Education Hub at the College. The Hub will specialise in clean energy and renewable industry training for school leavers, apprentices and adult learners (bp, 2022).

22.6.32 The Proposed Development will create a substantial number of jobs and training opportunities, with a considerable proportion going to people in the local area. However, these will be temporary during the construction period. Therefore, the magnitude of change anticipated with respect to education and training during the construction phase is assessed as Low.

22.6.33 Overall, the likely effect on human health arising from impacts on education and training during the Proposed Development construction phase is assessed as Minor Beneficial (Not Significant).

Health and Social Care Services

22.6.34 As discussed in Chapter 18: Socio-economics and Land Use (PEI Report, Volume I), in a worst case scenario, the Proposed Development will create an average of 900 gross direct full-time equivalent (FTE) jobs during construction at. This results in a net total of 675 jobs during the construction phase (after considering leakage and indirect employment), 506 of which are expected to be taken up by residents within the TTWA. In Chapter 5: Construction Programme and Management (PEI Report, Volume I), Section 5.3 indicates that it is likely that construction workforce peak numbers will be approximately 1,300 people per day for both Phases 1 and 2. The construction workers working on the Proposed Development may place extra demand on health and social care services if they move to the area, or if emergency treatment is required.

22.6.35 Baseline analysis shows that GP practices local to the Proposed Development Site are, on average, operating in line with benchmark patient to GP ratios. The Study Area also generally experiences low levels of deprivation with respect to the IMD barriers to housing and services domain. Despite this, levels of poor health among

the local population are higher than average. Therefore, existing healthcare services and their users have been assessed as Medium sensitivity.

22.6.36 Workers already residing locally will be registered at a local GP and will not therefore place additional demand for services upon local GPs. It is not expected that many workers will move to live in the immediate area and access the surgeries located within 2 km of the Proposed Development Site (Table 22-8). Due to the limited impact expected upon healthcare services, the magnitude of these impacts is assessed to be Low.

22.6.37 Overall, the likely effect on human health arising from impacts on health and social care services during the Proposed Development construction phase is assessed as Minor Adverse (Not Significant).

Climate Change Mitigation and Adaptation

22.6.38 A preliminary assessment of potential climate change effects of the Proposed Development during construction is provided in Chapter 19: Climate Change (PEI Report, Volume I).

22.6.39 As discussed in the baseline conditions section, the Study Area contains a higher-than-average mortality rate from COPD and higher than average proportion of residents who are in poor health generally. Therefore, the local population may be more susceptible to impacts arising from greenhouse gas (GHG) emissions and so has been assessed as having Medium sensitivity.

22.6.40 As detailed in Chapter 19: Climate Change (PEI Report Volume I), the Proposed Development construction phase would result in some GHG emissions. Such emissions need to be further quantified and further broken down into relevant construction activities such as worker commuting, transport of materials, fuel and electricity use. However, GHG emissions during the construction phase are limited such that the magnitude of impact is assessed as Low.

22.6.41 Therefore, the overall likely effect on human health arising from impacts on climate change, mitigation and adaptation during the Proposed Development construction phase is assessed to be Minor Adverse, which is Not Significant.

Air Quality

22.6.42 A preliminary assessment of potential air quality effects during the construction of the Proposed Development is provided in Chapter 8: Air Quality (PEI Report, Volume I).

22.6.43 As discussed in the baseline conditions section, the Study Area contains a higher-than-average COPD mortality rate which affects breathing and the respiratory system. Therefore, the sensitivity of the general population is assessed as Medium.

22.6.44 Chapter 8: Air Quality (PEI Report, Volume I) assesses that there is the potential for construction dust to have a Low to Medium impact on human health. However, with the application of appropriate mitigation measures, such as those outlined in the Framework CEMP in accordance with the Institute of Air Quality Management (IAQM) guidance, dust impacts are expected to be of Low magnitude.

22.6.45 Therefore, the overall likely effect on human health arising from impacts on air quality during the Proposed Development construction phase is assessed to be Minor Adverse, which is Not Significant. There may be a slightly greater effect on some of the more vulnerable members of the population (children and the elderly) given these groups are likely to be more sensitive to air quality changes.

Noise and Vibration

22.6.46 A preliminary assessment of potential noise and vibration effects during the construction of the Proposed Development is provided in Chapter 11: Noise and Vibration (PEI Report, Volume I).

22.6.47 The Study Area contains a high proportion of children and proportionally suffers more from poor health than the wider region and country. Therefore, the general population is assessed to have a Medium sensitivity in regard to noise and vibration effects.

22.6.48 Chapter 11: Noise and Vibration (PEI Report, Volume I) finds that there is potential for significant noise effects during construction of the Connection Corridors. However, following the application of additional mitigation, these effects become Not Significant. Further detailed assessment will be undertaken and reported in assessment of noise during the EIA. Therefore, it is expected that the magnitude of impact from a health perspective will be Low.

22.6.49 Therefore, the overall likely effect on human health arising from impacts on noise and vibration during the Proposed Development construction phase is assessed to be Minor Adverse (Not Significant). There may be a slightly greater effect on some of the more vulnerable members of the population (children and the elderly) given these groups are likely to be more sensitive to noise and vibration changes.

Built Environment

22.6.50 As set out in Section 22.4, social infrastructure in the local area includes schools, churches and community centres. Construction workers (net total of 1,702 on average each day, 426 of which are likely to come from outside of the TTWA, with peak numbers being approximately 1,300 people per day for both Phases 1 and 2) may place extra demand on these facilities if they move to the area, though in reality, many will likely stay in temporary accommodation and travel back to their permanent residence at the weekend.

22.6.51 There are generally low levels of deprivation in the Study Area with respect to the IMD barriers to housing and services domain, however, there are higher than average levels of poor health among the local population. Therefore, existing social infrastructure services and their users have been assessed as having a Medium sensitivity.

22.6.52 It is possible that local residents could experience adverse impacts due to increased demand for services and increased traffic flows. However, the construction of the Proposed Development will result in small, temporary increases of traffic flows which is unlikely to affect access to services and infrastructure. Therefore, the magnitude of impact is assessed as Low.

22.6.53 Therefore, the overall likely effect on human health arising from impacts on the built environment during the Proposed Development construction phase is assessed to be Minor Adverse, which is Not Significant.

Radiation

22.6.54 It is likely that all electrical and control system cables will be installed below ground or at ground level with no new overhead transmission lines proposed. Therefore, it is considered that with an appropriate design, effects associated with EMFs (including those related to mental health) have the potential to be Minor Adverse, but Not Significant. This will, however, be assessed further in the ES.

Operation

22.6.55 The Phase 1 and Phase 2 Production Facilities will each have a design life of 25 years. For the purposes of this assessment, the worst-case scenario has been considered which is the full 50-year operational life of the Proposed Development plus flexibility in case the operational life is longer due to potential changes in market conditions and plant condition.

Risk Taking Behaviour

22.6.56 Once the Proposed Development is operational, it is expected that the workforce required will be much smaller than in the construction phase. It is expected that the operational workforce will be employed with contracts that hold high health and safety standards which employees are required to follow. Therefore, the sensitivity of this receptor is assessed as Very Low.

22.6.57 Chapter 20: Major Accidents and Disasters (PEI Report, Volume I) states that no significant effects are expected during the operational phase of the Proposed Development, therefore, the magnitude of impact is assessed as Low.

22.6.58 Overall, the effect on human health arising from impacts on risk taking behaviour during the operational phase of the Proposed Development is assessed as Negligible, which is Not Significant.

Open Space, Leisure and Play

22.6.59 The sensitivity of the local population with respect to access to open space, leisure, and play is assessed to be Medium.

22.6.60 There is potential for the Proposed Development to impact PRoWs and active travel networks in the surrounding area. As indicated in Chapter 18: Socio-economics and Land Use (PEI Report, Volume I), the effect of the Proposed Development upon recreational routes and PRoWs during its operational phase is likely to be Minor Adverse, but not Significant. As such, it is anticipated that knock on human health effects will have a Low magnitude. This would produce a Minor Adverse effect (Not Significant). However, a full assessment regarding impacts on PRoWs will be undertaken and reported in the ES.

Transport Modes, Access and Connections

22.6.61 A preliminary assessment of the risk of transport impacts during the operational phase of the Proposed Development is provided in Chapter 15: Traffic and Transport (PEI Report, Volume I).

22.6.62 The Proposed Development has the potential to impact on access to healthcare services, educational facilities, and other social infrastructure. There are seven GP surgeries and multiple schools and community facilities in proximity to the Proposed Development Site. In addition, the Study Area presents lower than average rates of good health and educational attainment levels. Therefore, the local population may be more reliant on access to these services. Due to this, sensitivity is assessed as Medium.

22.6.63 Chapter 15: Traffic and Transport (PEI Report, Volume I) states that the generation of traffic during the operation of the Proposed Development is not considered to be severe and has not been assessed within this PEI Report. Therefore, the magnitude of impact is assessed as Very Low.

22.6.64 Overall, the effect on human health arising from impacts on transport modes, access, and connections during the Proposed Development operational phase is assessed to be Negligible, which is Not Significant.

Community Safety

22.6.65 There are multiple police and fire stations in proximity to the Proposed Development Site, and the population of the Study Area in general has poorer health than the rest of the country and therefore, may rely on emergency services more. Therefore, sensitivity to change is assessed to be Medium.

22.6.66 Impacts on road users, accidents and safety are unlikely during the operation of the Proposed Development due to very low traffic flows and vehicle numbers generated. Therefore, it is not likely that emergency services would be less accessible for the population. The magnitude of impact is therefore assessed as Very Low.

22.6.67 Overall, the likely effect on human health arising from impacts on community safety during the operational phase of the Proposed Development is assessed to be Negligible, which is Not Significant.

Community Identity, Culture, Resilience and Influence

22.6.68 The sensitivity of the local population in relation to community identity, culture, resilience and influence is assessed as Medium, due to the stronger than average sense of community in the area compared to the rest of the country.

22.6.69 The magnitude of impact is assessed as Low, due to the commitment of the Applicant to supporting local communities through various activities.

22.6.70 Therefore, the overall likely effect on human health arising from impacts on community identity, culture, resilience and influence during the operational phase of the Proposed Development is assessed to be Minor Beneficial (Not Significant).

Social Participation, Interaction and Support

22.6.71 The sensitivity of the local population to changes in social participation, interaction and support is assessed as Medium, due to the stronger than average sense of community in the Study Area.

22.6.72 As discussed in paragraph 22.6.10, it is expected that the Proposed Development will not affect current access to community assets and meeting places during operation. Therefore, the magnitude of impact is assessed as Very Low.

22.6.73 Overall, the likely effect on human health arising from impacts on social participation, interaction, and support, during the Proposed Development operational phase is assessed to be Negligible, which is Not Significant.

Employment and Income

22.6.74 As set out in Chapter 18: Socio-economics and Land Use (PEI Report, Volume I), the Proposed Development will support, on average, an estimated minimum of 60 full-time employment jobs per annum during the operational phase. Once leakage, displacement and multiplier effects have been accounted for, this results in a net total of 58 jobs during the construction phase, 44 of which are expected to be taken up by residents within the Travel to Work Area (TTWA).

22.6.75 The sensitivity of the local population with respect to employment and income is assessed to be Medium.

22.6.76 Direct jobs created will represent local job growth, although the overall change will be small in the context of the total number of jobs available locally. Therefore, the magnitude of impact is assessed as Low.

22.6.77 Overall, the likely effect on human health arising from impacts on employment and income during the Proposed Development operational phase is assessed to be Minor Beneficial (Not Significant).

Housing

22.6.78 As discussed in Chapter 18: Socio-economics and Land Use (PEI Report, Volume I) and under the assessment of 'employment and income' above, the Proposed Development is expected to generate a small number of operational jobs. Based on professional judgement, it is likely that workers will mostly be sourced from the local area. Due to this small number of workers and the large housing market, it is anticipated that there will not be a significant effect on housing. This will however be assessed further in the ES.

Education and Training

22.6.79 The Proposed Development will create employment and training opportunities during its operation. Many of these employment and training opportunities are expected to be taken by local residents.

22.6.80 The sensitivity of the local population to education and training changes has been assessed as Medium, due to the lower-than-average educational attainment levels in the area.

22.6.81 Due to the small number of jobs and training opportunities created in the context of the wider job market, the magnitude of impact is assessed to be Low.

22.6.82 Overall, the likely effect on human health arising from impacts on education and training during the Proposed Development operational phase is assessed to be Minor Beneficial, which is Not Significant.

Health and Social Care Services

22.6.83 With respect to health and social care services, GP practices are operating in line with benchmark patient to GP ratios and the Study Area experiences low levels of barriers to housing and services deprivation. However, there are higher than average levels of poor health in the Study Area. Therefore, sensitivity is assessed as Medium.

22.6.84 The Proposed Development will generate an estimated peak of 130 jobs during the operational phase. It is unlikely that all operational staff will relocate to the Study Area and so there will be minimal additional demand placed on health and social care services. Therefore, the magnitude of the impact is assessed as Very Low.

22.6.85 Overall, the likely effect on human health arising from impacts on health and social care services during the Proposed Development operational phase is assessed to be Negligible, which is Not Significant.

Climate Change Mitigation and Adaptation

22.6.86 The Study Area contains a higher than regional and national average mortality rate from COPD and higher than average proportion of residents who are in poor health generally. Therefore, the local population may be more susceptible to impacts arising from GHG emissions and so has been assessed as Medium sensitivity.

22.6.87 As detailed in Chapter 19: Climate Change (PEI Report, Volume I), the GHG emissions from the Proposed Development could produce an adverse effect when viewing the Proposed Development Site in isolation. However, when looking at the hydrogen product and its ability to enable a transition to a lower carbon economy however, the Proposed Development has a benefit due to its reduced footprint vs natural gas or other fuels such as diesel or coal. Therefore, the magnitude of impact is assessed as Low.

22.6.88 Overall, the likely effect on human health arising from impacts on climate change mitigation and adaptation during the Proposed Development operational phase is assessed to be Minor Adverse, which is Not Significant.

Air Quality

22.6.89 During the construction phase of the Proposed Development, the general population is assessed as having Medium sensitivity with respect to changes in air quality.

22.6.90 As stated in Chapter 8: Air Quality (PEI Report, Volume I), operational traffic flows are not anticipated to produce significant air quality impacts on human health receptors. The chapter also states that guidance on emerging techniques for hydrogen production with carbon capture has been released (EA, 2023) and will be considered as the environmental permit required for the operation of the Proposed

Development is developed. Confirmation of air quality effects during the operational phase will be confirmed in the ES. However, magnitude is likely to be Low.

22.6.91 Overall, the likely effect on human health arising from impacts on air quality during the operational phase is assessed to be Minor Adverse, which is Not Significant.

Noise and Vibration

22.6.92 As with the construction phase, the general population is assessed as having Medium sensitivity with respect to changes in noise and vibration due to levels of poor health and a high proportion of children in the Study Area.

22.6.93 Chapter 11: Noise and Vibration (PEI Report, Volume I) contains a preliminary assessment of noise and vibration associated with the operation of the Proposed Development. It states that the Proposed Development has the potential to produce significant effects on some residential properties. However, following the application of appropriate mitigation including limits on noise emissions from plant equipment, and further detailed design effects are likely to reduce to not significant. Therefore, magnitude of impact from a health perspective is assessed to be Low.

22.6.94 Overall, the likely effect on human health arising from impacts on noise and vibration during the Proposed Development operational phase is assessed to be Minor Adverse (Not Significant).

Built Environment

22.6.95 There are generally low levels of deprivation in the Study Area with respect to the IMD barriers to housing and services domain, however, there are higher than average levels of poor health compared to regional and national levels. Therefore, existing social infrastructure services and their users have been assessed as Medium sensitivity.

22.6.96 The Proposed Development will generate an estimated maximum of 130 FTE jobs during the operational phase. This is expected to place a minimal level of additional demand on the roads and is unlikely to impact access to services. The magnitude of impact has therefore been assessed to be Very Low.

22.6.97 Overall, the likely effect on the built environment during the Proposed Development operation phase is assessed to be Negligible, which is Not Significant.

Radiation

22.6.98 It is likely that all electrical and control system cables will be installed below ground or at ground level with no new overhead transmission lines proposed. Therefore, it is considered that with an appropriate design, effects associated with EMFs (including those related to mental health) have the potential to be Minor Adverse, but Not Significant. This will be assessed further in the ES.

Decommissioning

22.6.99 As outlined in Chapter 8: Air Quality, Chapter 11: Noise and Vibration, Chapter 15: Traffic and Transport, Chapter 18: Socio-economics and Land Use and Chapter 19: Climate Change (PEI Report, Volume I), effects during the decommissioning phase of

the Proposed Development are anticipated to be no worse than those experienced during the construction phase. The same applies to human health effects.

22.7 Mitigation and Enhancement Measures

22.7.1 Additional mitigation measures as set out in Chapter 8: Air Quality, Chapter 11: Noise and Vibration, Chapter 15: Traffic and Transport, Chapter 18: Socio-economics and Land Use and Chapter 19: Climate Change (PEI Report, Volume I) to reduce other environmental effects as applicable, will in turn mitigate the impacts on the local community and existing facilities from a human health perspective.

22.7.2 Where there are assessed to be adverse health impacts in the assessment, the implementation of additional mitigation measures has been considered to avoid or minimise the human health impact.

22.8 Limitations and Difficulties

22.8.1 This assessment is based on baseline and design information available at the time of writing this PEI Report. A full assessment will be undertaken and reported in the ES.

22.8.2 The assessment of the significance of effects has been carried out against a benchmark of current human health baseline conditions in the vicinity of the Proposed Development Site, as far as is possible within the limitations of such a dataset. Baseline data is also 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.

22.8.3 The assessment of likely health effects arising from the Proposed Development is based on professional judgement, drawing on relevant guidance as set out in Section 22.2.

22.8.4 Effects on human health draw upon other PEI Report chapters, namely Chapter 8: Air Quality, Chapter 11: Noise and Vibration, Chapter 15: Traffic and Transport, Chapter 18: Socio-economics and Land Use and Chapter 19: Climate Change (PEI Report, Volume I). Relevant assumptions and limitations are set out in the respective chapters and as such are not repeated here.

22.9 Residual Effects and Conclusions

22.9.1 There are no anticipated significant residual human health effects associated with the Proposed Development following the application of additional mitigation, as detailed in Table 22-10.

Table 22-10: Residual Effects and Conclusions – Human Health

HEALTH DETERMINANT	SENSITIVITY	MAGNITUDE OF IMPACT	SIGNIFICANCE OF EFFECT
CONSTRUCTION (AND DECOMMISSIONING)			
Risk taking behaviour	Low	Low	Minor Adverse (Not Significant)
Open space, leisure and play	Medium	Low	Effects not anticipated to be significant – likely Minor Adverse. Will be further assessed and reported in the ES.
Transport modes, access and connections	Medium	Low	Minor Adverse (Not Significant)
Community safety	Medium	Low	Minor Adverse (Not Significant)
Community identity, culture, resilience and influence	Medium	Low	Minor Beneficial (Not Significant)
Social participation, interaction, and support	Medium	Low	Minor Adverse (Not Significant)
Employment and income	Medium	Low	Minor Beneficial (Not Significant)
Housing	This will be further assessed and reported in the ES.	It is anticipated that construction workers would not require temporary accommodation, as most will be sourced from within	Effects not anticipated to be significant. Likely Minor Adverse but this will be assessed during the EIA and reported in the ES.

HEALTH DETERMINANT	SENSITIVITY	MAGNITUDE OF IMPACT	SIGNIFICANCE OF EFFECT
		the Study Area. This will be further assessed and reported in the ES.	
Education and training	Medium	Low	Minor Beneficial (Not Significant)
Health and social care services	Medium)	Low	Minor Adverse (Not Significant)
Climate change and adaptation	Medium	Low	Minor Adverse (Not Significant)
Air quality	Medium	Low	Minor Adverse (Not Significant)
Noise and vibration	Medium	Low	Minor Adverse (Not Significant)
Built environment	Medium	Low	Minor Adverse (Not Significant)
Radiation	This will be further assessed and reported in the ES.	Potential for EMF effects (including those related to mental health) due to major electrical infrastructure required however this will be assessed and reported in the ES.	Effects not anticipated to be significant. Likely Minor Adverse but this will be further assessed and reported in the ES.
OPERATION			
Risk taking behaviour	Very Low	Low	Negligible (Not Significant)
Open space, leisure and play	Medium	Low	Effects not anticipated to be significant. Likely to be Minor Adverse but this will be further assessed and reported in the ES.

HEALTH DETERMINANT	SENSITIVITY	MAGNITUDE OF IMPACT	SIGNIFICANCE OF EFFECT
Transport modes, access, and connections	Medium	Very Low	Negligible (Not Significant)
Community safety	Medium	Very Low	Negligible (Not Significant)
Community identity, culture, resilience and influence	Medium	Low	Minor Beneficial (Not Significant)
Social participation, interaction and support	Medium	Very Low	Negligible (Not Significant)
Employment and income	Medium	Low	Minor Beneficial (Not Significant)
Housing	This will be further assessed and reported in the ES.	Small number of operational workers expected who will likely be sourced from the local area, and so it is unlikely that accommodation will be required for workers however this will be assessed further in the ES.	Effects not anticipated to be significant. This will be further assessed and reported in the ES.
Education and training	Medium	Low	Minor Beneficial (Not Significant)
Health and social care services	Medium	Very Low	Negligible (Not Significant)
Climate change and adaptation	Medium	Low	Minor Adverse (Not Significant)
Air quality	Medium	Low	Minor Adverse (Not Significant)

HEALTH DETERMINANT	SENSITIVITY	MAGNITUDE OF IMPACT	SIGNIFICANCE OF EFFECT
Noise and vibration	Medium	Low	Minor Adverse (Not Significant)
Built environment	Medium	Very Low	Negligible (Not Significant)
Radiation	This will be further assessed and reported in the ES.	Potential for EMF and mental health impacts due to major electrical infrastructure required however this will be assessed further in the ES.	Effects not anticipated to be significant. Likely to be Minor Adverse but this will be further assessed and reported in the ES.

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