XLINKS MOROCCO-UK POWER PROJECT

Preliminary Environmental Information Report

Volume 4, Chapter 4: Human Health

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Glossary

Term	Meaning
Health	State of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.
Health outcome	Change in health status of an individual, group or population attributable to a planned intervention or series of interventions, regardless of whether such an intervention was intended to change health status.
Health risk factor	A social, economic or biological status, or behaviours or environments which are associated with or that cause increased susceptibility to a specific disease, ill health or injury.
Likely health effect	This effect is one that, with reference to the scientific literature, shows a plausible theoretical link between source-pathway-receptor; and the occurrence of which is judged as probable, in a specific context.
Mental health	State in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community.
Population health	The health outcomes of a group of individuals, including the distribution of such outcomes within the group.
Significant health effect	An effect triggered by the Proposed Development that is judged to be important for public health (a positive or negative effect), highly desirable for public health (a positive effect) or unacceptable for public health (a negative effect).
Vulnerable groups or subpopulations	Sensitive to changes in health determinant in a given context. Can include groups such as ethnic minorities, people with disabilities, people who are homeless, people living in poverty, those struggling with addiction and substance abuse, and isolated older people.
Wider determinants of health	Biological, behavioural, socio-economic, cultural or environmental factors which contribute to the health status of individuals or populations.

Acronyms

Acronym	Meaning
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
COCP	Code of Construction Practice
COPD	Chronic obstructive pulmonary disease
DESNZ	Department for Energy Security and Net Zero
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electric and magnetic fields
ES	Environmental Statement
HDD	Horizontal Direction Drilling
HM	Her Majesty’s Government
HNA	Health Needs Assessment
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IAIA	International Association for Impact Assessment

Acronym	Meaning
ICNIRP	International Commission on Non-ionizing Radiation Protection
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organization
IPH	Institute of Public Health
IAQM	Institute of Air Quality Management
JSNA	Joint Strategic Needs Assessment
KSI	Killed and seriously injured
MARPOL	The International Convention for the Prevention of Pollution from Ships
MMO	Marine Management Organisation
MPCP	Marine Pollution Contingency Plan
MPS	The UK Marine Policy Statements
NEET	Not in education, employment or training
NHS	National Health Service
NPPF	The National Planning Policy Framework
NPS	National Policy Statements
NSIP	Nationally Significant Infrastructure Planning
OEP	The Office for Environmental Protection
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
PEIR	Preliminary Environmental Information Report
PM	Particulate matter
PPG	Planning Practice Guidance
PRoW	Public Rights of Way
QOF	Quality and Outcomes Framework
SAR	Standardised Admission Rate
SSC	Suspended sediment concentrations
UK	United Kingdom
WHO	World Health Organization

Units

Unit	Meaning
dB(A)	A-weighted decibel
km	Kilometres

4 HUMAN HEALTH

4.1 Introduction

4.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary findings of the Environmental Impact Assessment (EIA) work undertaken to date for the United Kingdom (UK) elements of the Xlinks Morocco-UK Power Project. For ease of reference, the UK elements of the Xlinks Morocco-UK Power Project are referred to in this chapter as the 'Proposed Development'.

4.1.2 This chapter considers the potential impacts and effects of the Proposed Development on human health during the construction, operation and maintenance and decommissioning phases. Specifically, it relates to the onshore and offshore elements of the Proposed Development landward and seaward of the Mean Low Water Springs (MLWS) and Mean High Water Springs (MHWS) respectively.

4.1.3 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation undertaken to date;
- presents the likely environmental impacts and effects on all aspects of human health arising from the Proposed Development, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

4.1.4 This Human Health chapter identifies and assesses the potential likely significant effects (both adverse and beneficial) of the Proposed Development on human health.

4.1.5 Health is '*a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity'* (World Health Organization, 1948). Mental health is *'a state of mental well-being that enables people to cope with the stresses of life, to realize their abilities, to learn well and work well, and to contribute to their communities*' (WHO, 2022). 'Population health' refers to health outcomes within the group (Kindig and Stoddart, 2003).

4.1.6 The assessment considers how the Proposed Development affects different aspects of the environment that influence population health. This includes changes to the social, economic, behavioural, institutional and bio-physical environment.

4.1.7 Health in EIA takes a public health approach, meaning it reaches conclusions on the health outcomes to defined populations, rather than the health outcomes of individuals. The guidance that explains this is the correct approach to take in an assessment is set out in **section 4.4** (Relevant Guidance).

4.1.8 In this assessment the terms health and wellbeing are used interchangeably, and parity is given to considering both physical and mental health outcomes.

4.1.9 This chapter considers appropriate actions to avoid or mitigate health risks and promote health opportunities including targeting measures to respond to health inequalities for vulnerable groups.

4.1.10 This chapter also assesses the cumulative effects of the Proposed Development on health and wellbeing.

4.1.11 The chapter follows guidance and good practice, giving the public health perspective of impacts. In doing so, the chapter:

- takes a population health approach to assessing physical and mental health outcomes;
- considers the wider determinants of health that may be significantly affected directly or indirectly;
- assesses the potential for health inequalities to vulnerable groups; and
- considers opportunities to improve population health.

4.1.12 The assessment presented is informed by the following Volume 2, 3 and 4, technical chapters of the PEIR:

- Volume 2, Chapter 3: Hydrology and Flood Risk;
- Volume 2, Chapter 5: Traffic and Transport;
- Volume 2, Chapter 6: Noise and Vibration;
- Volume 2, Chapter 7: Air Quality;
- Volume 2, Chapter 8: Land Use and Recreation;
- Volume 3, Chapter 4: Commercial Fisheries;
- Volume 4, Chapter 3: Socio-economics

4.1.13 This chapter also draws upon information contained within Volume 1, Chapter 3: Project Description, of the PEIR.

4.1.14 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR and any refinements in design will be reviewed and taken into account, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

4.2 Legislative and Policy Context

Legislation

4.2.1 The following legislation has been considered in the human health assessment:

- The Environment Act 2021 (HM Government, 2021) establishes The Office for Environmental Protection (OEP) as a public body in England and Northern Ireland. The OEP sets targets and takes enforcement action to prevent, or mitigate, serious damage to the natural environment or to human health. This includes reducing adverse impacts on public health. The OEP objective (Office

for Environmental Protection, 2022) is for environmental law (including EIA legalisation) and its implementation to be well designed and delivered, so that positive outcomes for the environment and people's health and wellbeing are achieved.

- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (HM Government, 2017) sets out the topics to be assessed within the EIA process, including: *'The 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 the following factors – population and human health…'.*
- The Air Quality Standards Regulations 2010 (amended in 2016) set out statutory health protection standards on ambient air quality (HM Government, 2016).
- The Department for Environment Food and Rural Affairs (Defra) Environmental Improvement Plan 2023 (2023) amends the national fine particulate matter ($PM_{2.5}$) standards. The Environmental Improvement Plan includes a long-term target for reducing population exposure to $PM_{2.5}$ concentrations to meet an annual mean of 10 $\mu g/m^3$, as recommended by the World Health Organizations (WHO) 2005 guideline.
- The Environment Act 1995 sets provisions for protecting certain environmental conditions of relevance to health in the UK (HM Government, 1995). Part II covers contaminated land and Part IV covers air quality.
- The Environment Protection Act 1990 (as amended) part IIA covers contaminated land and Part III manages the control of emissions (including dust, noise and light) that may be prejudicial to health or a nuisance (HM Government, 1990).
- Control of Pollution Act 1974 (HM Government, 1974a) makes provisions in relation to waste disposal, water pollution, noise, atmospheric pollution and public health. It describes licencing of certain activities to avoid danger to public health or serious detriment to the amenity of the locality affected. It also covers control of, and consent for, noise on construction sites (sections 60 and 61), including defining 'best practicable means' (section 72).
- The Health and Safety at Work etc Act 1974 (HM Government, 1974b) places duties on employers to ensure, 'so far as is reasonably practicable': the health, safety and welfare at work of all their employees; and that persons not in their employment are not exposed to risks to their health or safety as a result of the activities undertaken.
- The Health and Social Care Act 2012 (as amended by the 2022 Act) HM Government, 2012; 2022). Sections 12 and 13 of the Act outline the responsibilities of Local Authorities regarding public health duties and the involvement of Integrated Care Boards (ICBs) in planning local healthcare services.

Planning Policy Context

4.2.2 The Proposed Development will be located within the UK Exclusive Economic Zone (EEZ) offshore waters (beyond 12 nm from the English coast) and inshore waters, with the onshore infrastructure located wholly within Devon, England. As

set out in Volume 1, Chapter 1: Introduction, of the PEIR, the Secretary of State for the Department for Energy Security and Net Zero (DESNZ) has directed that elements of the Proposed Development are to be treated as development for which development consent is required under the Planning Act 2008, as amended.

National Policy Statements

4.2.3 There are currently six energy National Policy Statements (NPSs), three of which contain policy relevant to the Proposed Development, specifically:

- Overarching NPS for Energy (NPS EN-1) (Department for Energy Security and Net Zero, 2023a)
- NPS for Renewable Energy Infrastructure (NPS EN-3) (Department for Energy Security and Net Zero, 2023c); and
- NPS for Electricity Networks Infrastructure (NPS EN-5) (Department for Energy Security and Net Zero, 2023c).

4.2.4 **Table 4.1** sets out key aspects from the NPSs relevant to the Proposed Development, with particular reference to the need for and approach to consenting such infrastructure.

Table 4.1: Summary of relevant NPS policy

Summary of NPS requirement	How and where considered in the PEIR
NPS EN-1	
'*4.3.4 To consider the potential effects, including benefits, of a proposal for a project, the applicant must set out information on the likely significant environmental, social and economic effects of the development, and show how any likely significant negative effects would be avoided, reduced, mitigated or compensated for, following the mitigation hierarchy. This information could include matters such as […]* ***health and well-being***.' (p. 60)	The effects to population health, including the potential for adverse effects and opportunities to enhance health and wellbeing, are considered in the assessment section, see **section 4.9** and **section 4.10**. Well-being is an integral consideration throughout this chapter, reflecting that the WHO define health in terms of states of wellbeing.

Summary of NPS requirement	How and where considered in the PEIR
'*4.4.1 Energy infrastructure has the potential to impact on the **health and well-being** ('health') of the population. Access to energy is clearly beneficial to society and to our **health** as a whole. However, the construction of energy infrastructure and the production, distribution and use of energy may have negative impacts on some people's **health**.* *4.4.2 The direct impacts on **health** may include increased traffic, air or water pollution, dust, odour, hazardous waste and substances, noise, exposure to radiation, and increases in pests.* *4.4.3 New energy infrastructure may also affect the composition and size of the local population, and in doing so have indirect **health impacts**, for example if it in some way affects access to key public services, transport, or the use of open space for recreation and physical activity.*' (p. 64)	The infrastructure benefits to public health, as well as potentially direct adverse transport, air quality, water quality, noise and vibration and radiation effects are considered in the assessment sections (see **section 4.9** and **section 4.10**). Indirect effects that could influence public open space, public rights of way (PRoW) and recreational activities are considered in **section 4.9**. Issues of odour, waste and pests are scoped out of the human health assessment as not having the potential for likely significant population health effects due to the Proposed Development (see **section 4.4**).
'*4.4.4 As described in the relevant sections of this NPS and in the technology specific NPSs, where the proposed project has an effect on **humans**, the ES should assess these effects for each element of the project, identifying any potential **adverse health impacts**, and identifying measures to avoid, reduce or compensate for these impacts as appropriate.* *4.4.5 The impacts of more than one development may affect people simultaneously, so the applicant should consider the **cumulative impact on health** in the ES where appropriate.* *4.4.6 Opportunities should be taken to mitigate indirect impacts, by promoting local improvements to encourage **health and wellbeing**, this includes potential impacts on vulnerable groups within society and impacts on those with protected characteristics under the Equality Act 2010, i.e. those groups which may be differentially impacted by a development compared to wider society as a whole.*' (p. 65)	The effects to population health, including the potential for adverse effects and opportunities to enhance health and wellbeing, are considered in the assessment sections (see **section 4.9** and **section 4.10**). Cumulative effects to population health are considered in **section 4.11**. Vulnerable groups, including relevant protected characteristics, are considered within this assessment (see **section 4.5** and **section 4.9**).

Summary of NPS requirement	How and where considered in the PEIR
'*4.4.7 Generally, those aspects of energy infrastructure which are most likely to have a significantly detrimental* ***impact on health*** *are subject to separate regulation (for example for air pollution) which will constitute effective mitigation of them, so that it is unlikely that* ***health*** *concerns will either by themselves constitute a reason to refuse consent or require specific mitigation under the Planning Act 2008.* *4.4.8 However, not all potential sources of* ***health impacts*** *will be mitigated in this way and the Secretary of State may want to take account of* ***health*** *concerns when setting requirements relating to a range of impacts such as noise.*' (p. 65)	Impacts that are governed by separate regulation have been considered. Where appropriate issues have been scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024). Mitigations have been considered throughout the assessment **section 4.9** and **section 4.10** and are set out in **section 4.8**. Non-threshold health effects of noise and air quality, i.e. those even within regulatory standards, are considered in the assessment sections (see **section 4.9** and **section 4.10**).
'4.12.2 Pollution control is concerned with preventing pollution through the use of measures to prohibit or limit the releases of substances to the environment from different sources to the lowest practicable level. It also ensures that ambient air, water, and land quality meet standards that guard against impacts to the environment or ***human health****.*' (p. 88)	Potential health effects relating to air quality, water quality and land quality are assessed in **section 4.9**
'5.2.1 Energy infrastructure development can have adverse effects on air quality. The construction, operation and decommissioning phases can involve emissions to air which could lead to ***adverse impacts on health'*** (p. 96).	Potential health effects relating to air quality are assessed in **section 4.9**
'5.2.3 For many air pollutants there is not a threshold below which there is no health impact so it is important that energy infrastructure schemes consider not just how a scheme may impact statutory air quality limits, objectives or targets but also measures to mitigate all emissions in order to minimise ***human exposure to air pollution****, especially for those who are more susceptible to the impacts of poor air quality'* (p. 96)	Potential health effects relating to air quality are assessed in **section 4.9**, including specific regard to non-threshold effects and vulnerable groups.
'5.11.7 Green and blue infrastructure can also enable developments to provide ***positive*** *environmental, social,* ***health*** *and economic* ***benefits****.'* (p. 150).	Effects that could beneficially influence public open spaces, public rights of way (PRoW) and recreational activities are considered in **section 4.9**.
'5.12.1 Excessive noise can have wide-ranging impacts on the ***quality of human life and, health such as annoyance, sleep disturbance, cardiovascular disease and mental ill-health.*** *It can also have an impact on the environment and the use and enjoyment of areas of value such as quiet places and areas with high landscape quality.'* (p. 155).	Potential health effects relating to noise and vibration are considered in assessments sections (see **section 4.9** and **section 4.10**).

Summary of NPS requirement	How and where considered in the PEIR
'5.12.6 Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment: an assessment of the effect of predicted changes in the noise environment on any noise-sensitive receptors, including an assessment of any likely impact on ***health and quality of life*** */* ***well-being*** *where appropriate, particularly among those disadvantaged by other factors who are often disproportionately affected by noise-sensitive areas; all reasonable steps taken to mitigate and minimise potential adverse effects on health and quality of life*' (p. 157).	Potential health effects relating to noise and vibration are considered in assessments sections (see **section 4.9** and **section 4.10**). Relevant vulnerable population groups are considered within the assessment (see **section 4.5**, Vulnerable Groups).
'5.12.17 The Secretary of State should not grant development consent unless they are satisfied that the proposals will meet the following aims, through the effective management and control of noise: avoid significant ***adverse impacts on health and quality of life*** *from noise; mitigate and minimise other adverse* ***impacts on health and quality of life*** *from noise; where possible, contribute to* ***improvements to health and quality of life*** *through the effective management and control of noise'* (p. 159).	Potential health effects relating to noise and vibration are considered in assessments sections (see **section 4.9 and section 4.10**).
'5.16.2 During the construction, operation, and decommissioning phases, development can lead to increased demand for water, involve discharges to water, and cause adverse ecological effects resulting from physical modifications to the water environment. There may also be an increased risk of spills and leaks of pollutants to the water environment. These effects could lead to adverse ***impacts on health*** *or on protected species and habitats (see Section 4.3) and could result in surface waters, groundwaters or protected areas failing to meet environmental objectives established under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and the Marine Strategy Regulations 2010.'* (p. 167-168).	Potential health effects relating to water quality are assessed in **section 4.9**
NPS EN-5	
'2.9.46 All overhead power lines produce EMFs. These tend to be highest directly under a line and decrease to the sides at increasing distance. Although putting cables underground eliminates the electric field, they still produce magnetic fields, which are highest directly above the cable. EMFs can have both ***direct and indirect effects on human health****, aquatic and terrestrial organisms.'* (p. 25).	This chapter considers public understanding of Electric and magnetic fields (EMF) exposure in terms of mental health outcomes associated with concern (see **Table 9.5.2** of the Scoping Report) (Xlinks 1 Limited, 2024), acknowledging that actual risks are unlikely to be significant for public health (see **section 4.10**)**.**

The National Planning Policy Framework

4.2.5 The National Planning Policy Framework (NPPF) was published in 2012 and updated in 2018, 2019, 2021 and 2023 (Department for Levelling Up, Housing &

Communities, 2023). The NPPF sets out the Government's planning policies for England.

4.2.6 **Table 4.2** sets out a summary of the NPPF policies relevant to this chapter.

Table 4.2: Summary of NPPF requirements relevant to this chapter

Policy	Key provisions	How and where considered in the PEIR
8. Promoting healthy and safe communities	*'96. Planning policies and decisions should aim to achieve **healthy, inclusive and safe** places which:* *a) promote social interaction, including opportunities for meetings between people who might not otherwise come into contact with each other – for example through… street layouts that allow for easy pedestrian and cycle connections;* *b) are **safe and accessible**, so that crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion – for example through the use of…pedestrian and cycle routes, and high quality public space; and* *c) enable and **support healthy lifestyles**, especially where this would address identified local health and well-being needs – for example through the provision of safe and accessible green infrastructure, sports facilities, local shops, access to healthier food, allotments and layouts that encourage walking and cycling.'* (p. 27)	Wider societal benefits have been assessed in **section 4.10**. Well-being is an integral consideration throughout this chapter, reflecting that the WHO define health in terms of states of wellbeing. Effects that could influence public open spaces, public rights of way (PRoW) and recreational activities are considered in **section 4.9**.
9. Promoting sustainable transport	*'108. Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:* • *the potential impacts of development on transport networks can be addressed;* • *opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised;* • *opportunities to promote walking, cycling and public transport use are identified and pursued;* • *the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account; and* • *patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places.' (p. 30).*	Transport effects are assessed in **section 4.9**.

4.2.7 The Planning Practice Guidance (PPG) (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government, 2021) supports the NPPF and provides guidance across a range of topic areas, including 'healthy and safe communities'. As stated in the NPPG, planning and

health need to be considered firstly in terms of creating environments that support and encourage healthy lifestyles, and secondly in terms of healthcare capacity. In addition, engagement with the Devon County Council (DCC) Director of Public Health was conducted to help ensure local public health strategies and any inequalities are considered appropriately. The guidance notes that National Health Service (NHS) England and Clinical Commissioning Groups (now Integrated Care Boards) have strategies to refurbish, expand, reduce or build new facilities to meet the health needs of the existing population as well as those arising as a result of new and future development.

Marine Policy

UK Marine Policy Statement

4.2.8 The UK Marine Policy Statement (MPS) is the framework for preparing Marine Plans and taking decisions affecting the marine environment (Department for Environment, Food & Rural Affairs, 2011). The MPS highlights objectives for a healthy marine environment: *'The UK vision for the marine environment is for 'clean, healthy, safe, productive and biologically diverse oceans and seas'* (p.10).

4.2.9 The MPS outlines high-level marine objectives including *'ensuring a strong, healthy and just society'* (p. 11):

- 'People appreciate the diversity of the marine environment, its seascapes, its natural and cultural heritage and its resources and act responsibly.
- The use of the marine environment is benefiting society as a whole, contributing to resilient and cohesive communities that can adapt to coastal erosion and flood risk, as well as contributing to physical and mental wellbeing.
- The coast, seas, oceans and their resources are safe to use.
- There is equitable access for those who want to use and enjoy the coast, seas and their wide range of resources and assets and recognition that for some island and peripheral communities the sea plays a significant role in their community.' (p.11).

4.2.10 The MPS highlights the impact of the marine environment of human health. Specifically, air quality, noise and vibration and recreational effects on human health are considered, these are assessed in **section 4.9** and **section 4.10**:

- '2.6.2.1 Activities and developments in the marine and coastal area can have adverse effects on air quality at various stages. The construction, operation and decommissioning phases of projects can involve emissions to air which could lead to adverse impacts on human health' (p. 19).
- '2.6.3.3 Noise from marine activities can also affect people. … Excessive noise can have wide ranging impacts on the quality of human life, health, and use and enjoyment of areas, including those with high visual quality. Its impact therefore needs to be considered and managed appropriately.' (p. 20).

South West Inshore and South West Offshore Marine Plans

4.2.11 **Table 4.3** sets out a summary of the specific policies set out in the South West Inshore and South West Offshore Marine Plans (Marine Management Organisation, 2021) relevant to this chapter.

Table 4.3: Summary of inshore and offshore marine plan policies relevant to this chapter

Policy	Key provisions	How and where considered in the PEIR
Objectives of the South West Marine Plan	'*Achieving a sustainable marine economy (Objectives 1-4): Infrastructure is in place to support and promote safe, profitable and efficient marine businesses; marine businesses respect environmental limits and are socially responsible.* *Ensuring a strong, healthy and just society (Objectives 5-10): The use of the marine environment is* ***benefitting society as a whole*** *[...]* ***contributing to physical and mental wellbeing****; the coast, seas, oceans and their resources are* ***safe to use****; there is* ***equitable access*** *for those who want to use and enjoy the coast, seas and their wide range of resources and assets and recognition that for some island and peripheral communities the sea plays a significant role in their community*.' (p. 18	Equitable access to health determinants is assessed throughout the assessment sections (see **section 4.9** and **section 4.10**). Health effects from temporary changes to marine businesses (offshore commercial fisheries) are discussed in **section 4.9**.
SW-WQ-1	*'Proposals that protect, enhance and restore* ***water quality*** *will be supported.'* (p. 43)	The water quality effects of the Proposed Development to population health are considered in **section 4.9** under 'Water quality'.
SW-REN-1	'*Proposals that* ***enable the provision of renewable energy technologies*** *and associated supply chains, will be supported.*' (p. 34)	Wider societal infrastructure and resources have been assessed in **section 4.10.**
SW-AIR-1	*'****Clean air*** *is essential for life, health, the environment and the economy. Air pollution and greenhouse gas emissions must be reduced to protect health.'* (p. 42)	The air quality effects of the Proposed Development on human health are discussed in **section 4.9.**
SW-TR-1	'*Proposals that promote or facilitate* ***sustainable tourism*** *and* ***recreation activities***.' (p.45)	Effects that could influence public open spaces, PRoWs and recreational activities are considered in **section 4.9**.
SW-SOC-1	'*Those bringing forward proposals should consider and demonstrate how their development shall* ***enhance public knowledge, understanding, appreciation and enjoyment of the marine environment*** *as part of (the design of) the proposal.'* (p. 46)	A summary of impacts, mitigation measures and monitoring is included, see **section 4.14**.

Local Planning Policy

4.2.12 The onshore elements of the Proposed Development are located within the administrative area of Torridge District Council. The relevant local planning policies applicable to human health based on the extent of the study areas for this assessment are summarised in **Table 4.4**.

Table 4.4: Summary of local planning policy relevant to this chapter

Policy	Key provisions	How and where considered in the PEIR
North Devon Council and Torridge District Council Local Plan 2011-2031		
Policy ST01: Principles of Sustainable Development	'*When considering development proposals the Councils will take a positive approach that reflects the presumption in favour of sustainable development […] secure development that improves the economic, social and environmental conditions in the area*.' (p. 16)	Wider societal infrastructure and resources, in terms of the public health benefit of sustainable development, has been assessed in **section 4.10**.
Policy ST10: Transport Strategy	'*The Transport Strategy for northern Devon will: (1) Provide good strategic connectivity […] (2) Meet the needs of local communities and visitors to the area […] (3) Reduce the environmental and social impacts of transport…' (p.42-43)*	Transport effects are assessed in in **section 4.9**.

4.3 Consultation and Engagement

4.3.1 In January 2024, the Applicant submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects for the construction and operational phases of the Proposed Development. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Proposed Development would not have the potential to give rise to significant environmental effects in these areas.

4.3.2 Following consultation with the appropriate statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 7 March 2024. Key issues raised during the scoping process specific to human health are listed in **Table 4.5**, together with details of how these issues have been addressed within the PEIR.

Table 4.5: Summary of Scoping Responses

Comment	How and where considered in the PEIR
Planning Inspectorate	
Human health matters: offshore	The listed offshore determinants are scoped out of the assessment, as set out

Comment	How and where considered in the PEIR
The Scoping Report proposes to scope out an assessment of the offshore effects on the following matters: • Health related behaviours - physical activities; risk-taking behaviour; diet and nutrition. • Social environment - housing; relocation; open space, leisure and play; transport modes, access and connections; community safety; community identity, culture, resilience and influence; social participation, interaction and support. • Economic environment - education and training; employment and income. • Bio-physical environment – climate change and adaptation; air quality; water quality and availability; land quality; noise and vibration; radiation. • Institutional and built environment – health and social care services; built environment; wider social infrastructure and resources. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that these matters as listed in Table 9.5.3 can be scoped out of the ES. The Inspectorate notes that any issues relating to shipping safety would be discussed within the Shipping and Navigation ES chapter and is content with this approach. The Inspectorate also notes that Table 9.5.2 scopes in in respect of offshore impacts an assessment of health effects from wider indirect economic impacts, for example temporary changes to commercial fishing, together with any potential unemployment or adverse economic implications. The Inspectorate is content with this approach.	in **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024). Offshore health effects from wider indirect economic impacts are scoped in, see **section 4.9**.
Health related behaviours – physical activity (all phases) The Scoping Report proposes to scope out an assessment of onshore physical activity health effects for all phases, as the potential impacts would be considered under the open space, leisure and play health determinant instead. The Inspectorate is content with this approach.	Physical activity is scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024). To avoid duplication, potential health effects related to physical activity are addressed under open space, leisure and play, see **section 4.9**.
Health related behaviours – risk taking activity (all phases) The Scoping Report proposes to scope out an assessment of the onshore health effects related to risk-taking behaviour for all project phases on the basis that the workforce will be comprised of professionals who would return to their usual place of residence during periods of leave and is unlikely to be large enough to affect local markets to an extent which could significantly affect community health. The Inspectorate agrees that this matter can be scoped out of the ES.	Health effects related to risk-taking behaviour are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Health related behaviours – diet and nutrition (all phases) The Scoping Report proposes to scope out an assessment of the onshore health effects related to diet and nutrition for all project phases on the basis that construction and operation of the Proposed Development would not change population diet or food prices. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Health effects related to diet and nutrition are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).

Comment	How and where considered in the PEIR
Social environment – housing (operation and decommissioning) The Scoping Report proposes to scope out an assessment of the onshore health effects related to housing for the operational phase on the basis that minimal workforce numbers are anticipated. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES. The Scoping Report proposes to scope out an assessment of the onshore health effects related to housing for the decommissioning phase on the basis that fewer workers would be required for a shorter duration than the construction phase. No further information is provided regarding likely numbers of workers during the decommissioning phase and so the Inspectorate considers that insufficient justification has been provided for scoping this matter out at this stage. The ES should include an assessment of this matter or evidence demonstrating agreement with the relevant stakeholders and the absence of likely significant effects.	During the construction phase, onshore health effects related to housing are scoped in, see **section 4.9**. During operation, minimal operational workforce numbers are anticipated to check and maintain the Proposed Development. The onshore infrastructure, is relatively low impact in terms of its built form, limiting the potential for any widespread adverse effect on housing value or affordability at a population level. This issue is therefore scoped out during the operational phase. Information regarding the likely number of workers during the decommissioning phase will be further examined at ES stage.
Social environment – relocation (all phases) The Scoping Report proposes to scope out an assessment of the onshore effects related to housing for all project phases on the basis that the Proposed Development would not involve compulsory purchases of homes or community facilities. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Health effects related to relocation are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Social environment – open space, leisure and play (operation) The Scoping Report proposes to scope out an assessment of the onshore effects on open space for the operational phase on the basis that the Proposed Development would not involve the acquisition of land used for community recreation. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Open space, leisure and play health effects are scoped out of the assessment for the operational phase, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Social environment – transport modes, access and connections (operation and decommissioning) The Scoping Report proposes to scope out an assessment of the onshore effects on transport modes, access and connections for the operational and decommissioning stages on the basis that the expected vehicle movements associated with the Proposed Development would have a minimal impact on road transport.	Transport modes, access and connections health effects are scoped out of the assessment for the operational and decommissioning phases, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).

Comment	How and where considered in the PEIR
Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	
Social environment – community safety (all phases) The Scoping Report proposes to scope out an assessment of the onshore effects on community safety for all phases on the basis that appropriate management plans and fencing would be in place to manage security and safety risks to the public. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Community safety health effects are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Social environment – community identity, culture, resilience and influence (all phases) The Scoping Report proposes to scope out an assessment of the onshore effects on community identity, culture, resilience and influence for all project phases on the basis that visual impacts associated with the Proposed Development are not expected to be of a scale that could affect population health or community identity. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Community identity, culture, resilience and influence health effects are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Social environment – social participation, interaction and support (all phases) The Scoping Report proposes to scope out an assessment of the onshore effects on social participation, interaction and support for all project phases on the basis that the Proposed Development would not directly affect land or areas used for community interaction. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Social participation, interaction and support health effects are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Economic environment – education and training (all phases) The Scoping Report proposes to scope out an assessment of the onshore effects on education and training opportunities for all project phases on the basis that the Proposed Development would not affect access to schools and would not involve a large influx of workers and their families which may affect educational capacity or quality. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Onshore health effects related to education and training opportunities are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Economic environment – employment and income (all phases) The Scoping Report proposes to scope out an assessment of the onshore effects on employment and income for all project phases on the basis that employment opportunities associated with the Proposed Development are not expected to be on a scale that could have significant population level effects. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this	Onshore health effects related to employment and income are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024). Information and evidence regarding likely employment numbers will be developed for the ES stage.

Comment	How and where considered in the PEIR
matter can be scoped out of the ES provided that information is included within the ES with regards to likely employment numbers and to evidence how this conclusion was reached.	
Bio-physical environment – climate change and adaptation (all phases) The Scoping Report proposes to scope out an assessment of the onshore effects on climate change and adaptation for all project phases on the basis that embodied carbon and climate altering pollutant emissions are not of a scale that could have population level effects. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES. The Inspectorate notes that the public health benefits of electrical infrastructure during operation and maintenance of the Proposed Development are assessed in the 'wider societal infrastructure and resources' determinant and is content with this approach.	Onshore health climate change effects are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024). Wider public health benefits of electrical infrastructure during operation and maintenance are assessed under wider societal infrastructure and resources, see **section 4.9**.
Bio-physical environment – air quality (operation and maintenance) and odour (all phases) The Scoping Report proposes to scope out an assessment of the onshore effects on air quality for the operation and maintenance phase on the basis that air emissions and odour from the Proposed Development are not expected to be on a scale that would affect population health. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Onshore air quality health effects during operation and maintenance are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Bio-physical environment – water quality and availability (operation and maintenance) The Scoping Report proposes to scope out an assessment of the onshore effects on water quality and availability for the operation and maintenance phase on the basis that impacts resulting from emissions to water are not expected to be on a scale that would affect population health. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Onshore water quality and availability health effects are scoped out for the operation and maintenance phase, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Bio-physical environment – land quality (operation and maintenance) The Scoping Report proposes to scope out an assessment of the onshore effects on land quality for the operation and maintenance phase on the basis that activities requiring land excavations are considered unlikely and any risks would be managed by industry best practice contamination avoidance and response measures. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Onshore land quality health effects during operation and maintenance are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Bio-physical environment – noise and vibration (maintenance only) The Inspectorate notes that while onshore effects on noise and vibration sensitive community receptors during the operational phase is scoped into the assessment, noise and vibration effects associated with maintenance checks and activities are not expected to be of a magnitude that could	Noise and vibration health effects during the maintenance phase are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).

Comment	How and where considered in the PEIR
impact on human health and so have been scoped out. The Inspectorate is content with this approach.	
Bio-physical environment – radiation (all phases) The Scoping Report proposes to scope out an assessment of the onshore effects on radiation for the construction and decommissioning phases on the basis that the Proposed Development would not use or make changes to major EMF producing electrical infrastructure, and for the operational phase on the basis that levels of exposure to EMF would not pose a risk to public health. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Onshore radiation health effects are scoped out during all phases, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Institutional and built environment – health and social care services (operation and decommissioning) The Scoping Report proposes to scope out an assessment of the onshore effects on health and social care services for the operation and maintenance and decommissioning phases on the basis that a minimal number of workers will be required and so demands on local healthcare will not be significant. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Onshore effects on health and social care services during the operation and maintenance and decommissioning phases are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024). Onshore effects on health and social care services during construction are scoped in, see **section 4.9**.
Institutional and built environment – built environment (all phases) The Scoping Report proposes to scope out an assessment of the onshore effects on the built environment for all project phases on the basis that significant population health implications associated with the Proposed Development are not anticipated, and long-term impacts on land use patterns are restricted to the converter stations. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Onshore built environment health effects are scoped out of the assessment, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).
Institutional and built environment – wider social infrastructure and resources (construction and decommissioning) The Scoping Report proposes to scope out an assessment of the onshore effects on wider social infrastructure and resources during the construction and decommissioning phases on the basis that the Proposed Development's energy infrastructure would not be operational. Given the nature of the Proposed Development and the information provided within the Scoping Report, the Inspectorate agrees that this matter can be scoped out of the ES.	Onshore effects on wider social infrastructure and resources during the construction and decommissioning phases are scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024). Onshore effects on wider social infrastructure and resources during the operation and maintenance phases are discussed in **section 4.9**.

Comment	How and where considered in the PEIR
Devon County Council	
Education Table 9.5.3 - Impacts proposed to be scoped out of the assessment for human Health states that *"During construction, the potential to adversely affect access to schools is limited by the use of trenchless techniques for major road crossings. A large influx for workers, including those bringing families, is not expected, so changes to educational capacity or quality, on a scale to affect population health, are unlikely and are scoped out"* but the County Council would like to also see consideration given to assessing the potential impacts of the routing of any cables and associated easement upon any new schools or extensions to existing schools which may come forward in the future.	No new schools or extensions to existing schools which may be impacted by the Proposed Development have been identified to date. The assessment of construction effects on schools and other receptors is provided at **section 4.9** 'transport modes, access and connections'. In terms of cumulative effects, the Volume 2, Chapter 5: Traffic and Transport, of the PEIR has not identified any new schools or extensions to existing schools within its cumulative assessment.
Public health We welcome the comprehensive assessment of human health effects in Section 9.5 of Chapter 9 as well as more detailed assessments around flood risk, traffic, noise, vibration, air quality, and recreation in Chapter 7, including potential inter-related effects (7.6.45). Also noted are assessments of effects on local economic activities, such as fishing (e.g. 4.7.38, and Chapter 8) and agriculture (Table 7.9.2, Chapter 7), recreation (Chapter 7), and climate change (Chapter 9). Each of these may influence local public health. It has been noted that National Policy Statements for Electricity Networks Infrastructure, particularly EN-5 applies. The following comments are made on the scope of the Environmental Statement: • Page 437 - The Joint Strategic Needs Assessment for Devon should be included with the Baseline data sources, alongside the Devon Health and Wellbeing Strategy, and Integrated Care System Strategy.	Health effects from wider indirect economic impacts, including temporary changes to commercial fishing are assessed in **section 4.9**. 'Diet and nutrition' has been scoped out for offshore activities that are neither expected to require agricultural land take, nor disrupt food related production or transport, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024). For onshore activities, reduction in availability or quality of agricultural land is not on a scale that could change population diet or food prices and significantly affect population health. This issue is scoped out, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024). Effects on agricultural land use are assessed in Volume 2, Chapter 8: Land use and recreation of the PEIR. Benefits accrued from renewable energy generation assets are assessed under

Comment	How and where considered in the PEIR
	'wider societal infrastructure and resources' in **section 4.9**. The Joint Strategic Needs Assessment for Devon, the Devon Health and Wellbeing Strategy and Integrated Care System Strategy are covered in **section 4.6**.
Public health • Page 447 - Scoping out electromagnetic fields; although these should be very low risk due to depth and location (sparse housing), the EN-5 guidance suggests evidence should be provided that they comply with International Commission on Non-Ionizing Radiation Protection (ICNIRP). Scoping out would suggest this evidence would not be presented. Although the guidance may be interpreted that it may be out of scope, there are reasons to keep this within scope. Given that there may be perceived health risks, which in themselves may generate health problems, provision of sufficient information to mitigate against these perceived risks should be provided. Evidence provided should include that the line complies with National Policy Statements, including at the nearest residential properties for assurance.	Electromagnetic fields are mitigated by adhering the International Commission on Non-ionizing Radiation Protection (ICNIRP) guidelines and Government voluntary Code of Practice on EMF public exposure (ICNIRP, 1998, 2010). Impacts arising from electric and magnetic fields (EMFs) in terms of public understanding of risks affecting mental health and wellbeing are scoped in, see **section 4.10**.
Other comments that may be useful at this stage include: • Page 88 (4.9.17) - It is recommended that the application assesses any impingement from light pollution, and directional lighting, on local properties and communities. It is not clear if the effects from lighting would be significant and should be scoped into the Environmental Statement, but it is likely that any significant effects could be mitigated to an acceptable level through the application process. • In relation to data collection, should the perceived concerns around the effects of dust, noise, or other factors be raised, further monitoring should be put in place in consultation with the local Environmental and Public Health teams (we note that early consultation has already made). Should concerns emerge, additional requests for information may be made. We note the general statement around identification of potential for significant harm and further investigation as highlighted in table 7.5.4, and would expect this as a general coverall.	Visual and light impacts are not on a scale to impact population health and are therefore scoped out of the assessment**,** see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024). A full assessment of visual and light impacts is provided in Volume 4, Chapter 2: Landscape, Seascape and Visual Resources. Dust control measures to be secured through Dust Management Plan (DMP), as an appendix to the Onshore CEMP which will be secured via a DCO requirement.
Natural England	
The One Northern Devon Group https://onenortherndevon.co.uk/about-us/ play a strategic role in building partnerships for health and wellbeing and tackling inequalities and could advise on the local need and connections.	Noted. One Northern Devon Group are being consulted as part of the consultation process for the Proposed Development.

4.3.3 Following scoping, consultation and engagement with interested parties specific to human health has continued. The Scoping Report has formed part of the stakeholder engagement process with the Director of Public Health.

4.3.4 A summary of the key issues raised during consultation activities undertaken to date is presented in **Table 4.6**, together with how these issues have been considered in the production of this PEIR chapter.

Table 4.6: Summary of consultation relevant to this chapter

Date	Consultee and type of response	Issues raised	How and where considered in the PEIR
May 2023	• Torridge District Council; • North Devon Council; • Devon County Council; • Affected Parish Councils; and • Local residents.	• There is a better, less disruptive and visually intrusive, location for the converter station at the Old Webbery Showground, which is closer to the National Grid substation and substantially screened.	Resolved. Responding to this consultation feedback the Proposed Development reviewed the design and study areas. A revised location was adopted for the Converter Station at the Old Webbery Showground.
		• The underground cable runs too close to homes and schools in Abbotsham.	Resolved. Responding to this consultation feedback the Proposed Development reviewed the design and study areas. A revised route was adopted to avoid underground cables adjoining schools in Abottsham.
		• We need more details on the construction plans and are particularly concerned about potential road closures and the volume of traffic on local roads.	Information regarding construction plans, potential road closures and volumes of traffic on local roads will form part of the DCO application.
February 2024	• Devon County Council Public Health Team	• The Proposed Development would benefit from joint communication with other electrical infrastructure in North Devon to account for cumulative effects especially for vulnerable populations.	Cumulative effects to population health are considered in **section 4.11**. The Applicant is engaged in ongoing discussions with Statutory Utilities.
		• The human health chapter should consider transport	Regional transport effects are assessed in in **section 4.9**. Volume 2, Chapter 5: Traffic and Transport,

Date	Consultee and type of response	Issues raised	How and where considered in the PEIR
		effects regionally (South-West).	of the PEIR has not identified regional transport effects.
		• The study area for human health should account for site-specific and Lower layer Super Output Areas (LSOAs) to account for deprivation.	The human health study area accounts for site-specific areas (see **section 4.4**) and throughout the assessment (see **section 4.9** and **section 4.10**). Particular regard has been given to Lower layer Super Output Areas (LSOAs) to account for deprivation, see **section 4.6**.
		• Housing and healthcare capacity are of significance to the North Devon Area. The process of housing construction workers and providing healthcare would need to be thoroughly managed.	Housing and health and social care services effects are addressed in the assessment (see **section 4.9**).
		• Visual and light impacts could affect the area, as extra light in rural areas can be perceived as actual impact.	Visual and light impacts are not on a scale to impact population health and are therefore scoped out of the assessment, see **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024). A full assessment of visual and light impacts is provided in Volume 4, Chapter 2: Landscape, Seascape and Visual Resources.
		• The assessment could incorporate discussion of the Proposed Development's effects both in the United Kingdom and North Africa.	Energy generation benefits in the UK are addressed in **section 4.10**. The geographic scope of the assessment is discussed in paragraph 4.1.1.
		The health assessment scope, study area and methodology were discussed and agreed in principle.	

4.4 Methodology for Baseline Studies

Relevant Guidance

4.4.1 The Human Health chapter has followed the methodology set out in Volume 1, Chapter 5: EIA Methodology, of the PEIR**.** Specific to human health impact assessment, the following guidance documents have also been considered:

- Institute of Environmental Management and Assessment (IEMA) 2022 guidance on health in EIA series: effective scoping (Pyper, Lamming, et al., 2022) and determining significance (Pyper *et al*., 2022).
- Institute of Public Health (IPH) Guidance, Standalone Health Impact assessment and health in environmental assessment, 2021 (Institute of Public Health, 2021).
- International Association for Impact Assessment (IAIA) and European Public Health Association. A reference paper on addressing Human Health in EIA (Cave et al., 2020) and academic discussion of the same (Cave *et al*., 2021).
- Public Health England. Advice on the content of Environmental Statements accompanying an application under the Nationally Significant Infrastructure Planning (NSIP) Regime (Public Health England, 2021).
- Public Health England. Health Impact Assessment in spatial planning (Public Health England, 2020)
- World Health Organization (WHO) guidelines on air quality and noise (Berglund *et al*., 1999; Guski *et al*., 2017; WHO, 2009; 2021).

Scope of the Assessment

4.4.2 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in **Table 4.5** and **Table 4.6**. The impacts scoped into the assessment for the construction and decommissioning phases are transport modes, access and connections; open space, leisure and play; air quality; water quality; land quality; and noise and vibration.

4.4.3 The Scoping Report (Xlinks 1 Limited, 2024) provides a comprehensive justification for the scoping of determinants in and out of the assessment (see **Table 9.5.2** and **Table 9.5.3** of the Scoping Report). The determinants scoped in are listed below and assessed in **section 4.9** and **section 4.10**:

- Transport Modes, Access and Connections;
- Open Space, Leisure and Play;
- Housing;
- Employment and Income – Offshore;
- Air quality;
- Water quality;
- Land quality;
- Noise and Vibration;

- Health and Social Care Services;
- Public Understanding of Risk (Converter Stations); and
- Wider Societal Infrastructure and Resources.

Study Area

4.4.4 The health study area is as shown in Volume 4, Figure 4.1.

4.4.5 The Proposed Development Draft Order Limits is approximately 207 km^2 in area.

4.4.6 The onshore elements of the Proposed Development are based within the Onshore Infrastructure Area, which lies within the local authority area of Torridge District Council in north Devon. This covers the Converter Site (including two converter stations), highway improvement works, High Voltage Alternating Current (HVAC) cables, HVDC cables, Biodiversity Net Gain (BNG offsetting) and Landfall.

4.4.7 The offshore elements of the Proposed Development includes the Offshore Cable Corridor, which would be located within the Bristol Channel and Celtic Sea, extending from the landfall to the limit of UK EEZ, south west of the UK.

4.4.8 The human health study area has been defined on the basis of relevant human populations that may be affected directly or indirectly by the Proposed Development.

4.4.9 Consistent with IEMA 2022 guidance (Pyper, Waples, *et al*., 2022), the health chapter uses study areas to determine the sensitivity of the populations in the areas, not set a limit on the extent of all health effects. This reflects that health study areas do not necessarily define the boundaries of all potential health effects, particularly mental health effects. The health study areas represent the locations that would drive any likely significant population health effect, i.e., where the great majority of the impact is anticipated to occur. Any effects beyond the study areas would not change the conclusions reached in relation to the likely significant population health effects of the Proposed Development. For this reason, and to maintain a proportionate assessment, the health assessment does not include every ward within the Proposed Development Draft Order Limits. The selected wards reflect a realistic worst case of the local health baseline to inform a conservative characterisation of population sensitivity.

4.4.10 The study area reflects relevant indirect and direct effects to onshore populations from the nearshore works, cable corridor and converter stations. Local populations are relevant for onshore/nearshore activities associated with the Proposed Development including employment and educational opportunities, transport disruption and recreation and leisure.

4.4.11 The following areas comprise the human health study area. The geographic range, with both small areas and wider areas, links with the relevant health assessment, e.g., site-specific air quality effects or wider national public health benefits of renewable energy and energy security.

- The site-specific population is defined using the wards of:
  - E05011926 Monkleigh & Putford (for landfall);

  - E05011917 Bideford East (for the Onshore HVDC Cable Corridor, representative of higher deprivation);
  - E5011919 Bideford South (for the Onshore HVDC Cable Corridor); and
  - E05011929 Two Rivers & Three Moors (for the converter stations, HVAC cables and Alverdiscott Substation Connection Development).
- The local population is defined using the local government district area of Torridge District Council (and North Devon in relation to aligned discussion with Volume 4, Chapter 3: Socio-economics and Tourism of the PEIR in relation to housing and healthcare).
- The regional population is defined using the area of the South West.
- The national population is defined with reference to England.

4.4.12 The site-specific wards have been selected to reflect the relevant geographic locations, but also the more deprived areas to ensure potential inequalities are reflected.

4.4.13 The local and regional study areas reflected a broad area from which the majority of the Proposed Development workforces are likely to be drawn and the transport routes used by the Proposed Development. The study area does not extend to port related activities and associated port transport.

4.4.14 The health assessment has regard to the topic specific study areas defined by other chapters listed in **paragraph 4.1.13**. Those chapters inform the consideration of impact magnitude, including the extent of effects in the health chapter.

4.5 Impact Assessment Methodology

Overview

4.5.1 The significance of an effect is an evidence-based professional judgement informed by the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on IEMA Guidance (Pyper, Waples, *et al*., 2022).

4.5.2 Judgments are based on most relevant criteria in **Table 4.7**, **Table 4.8** and **Table 4.9**. These are as set out by guidance (Pyper *et al*., 2022). It is likely in any given analysis that some criteria will span score categories.

Receptor Sensitivity/Value

4.5.3 The criteria for defining sensitivity in this chapter are outlined in **Table 4.7** below.

Table 4.7: Sensitivity criteria

Sensitivity	Definition
Very High	**High** levels of deprivation (including pockets of deprivation); **reliance** on resources shared (between the population and the Proposed Development); existing **wide** inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or **concern**; people who are **prevented** from undertaking daily activities; **dependants**; people with very poor health status; and/or people with a **very low** capacity to adapt.
Medium	**Moderate** levels of deprivation; **few alternatives** to shared resources; existing **widening** inequalities between the most and least healthy; a community whose outlook is predominantly **uncertainty** with some concern; people who are **highly limited** from undertaking daily activities; people providing or requiring **a lot of care**; people with **poor** health status; and/or people with a **limited** capacity to adapt.
Low	**Low** levels of deprivation; **many alternatives** to shared resources; existing **narrowing** inequalities between the most and least healthy; a community whose outlook is predominantly **ambivalence** with some concern; people who are **slightly limited** from undertaking daily activities; people providing or requiring **some care**; people with **fair** health status; and/or people with a **high** capacity to adapt.
Very low	**Very low** levels of deprivation; **no** shared resources; existing **narrow** inequalities between the most and least healthy; a community whose outlook is predominantly **support** with some concern; people who are **not limited** from undertaking daily activities; people who are independent (not a carer or dependant); people with **good** health status; and/or people with a **very high** capacity to adapt.

Magnitude of Impact

4.5.4 The criteria for defining magnitude in this chapter are outlined in **Table 4.8** below.

Table 4.8: Impact magnitude criteria

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

Significance of Effect

4.5.5 The significance of the effect upon human health has been determined by correlating the sensitivity of the receptor and the magnitude of the impact. The particular method employed for this assessment is presented in **Table 4.9**. Where a range of significance levels is presented in **Table 4.9**, the final assessment for each effect is based upon expert judgement.

4.5.6 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

4.5.7 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Table 4.9: Assessment Matrix

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

4.5.8 The IEMA guidance requires that the conclusions, reached using sensitivity and magnitude, are then explained for the public health audience with a suitable concise narrative. The narrative summarises key considerations and supporting evidence. The guidance sets out the criteria for doing so, see **Table 4.10**.

Table 4.10: Explanation of population health significance

Level	Indicative criteria
Major (significant)	The narrative explains that this is significant for public health because:

Level	Indicative criteria
	• Changes, due to the project, have a **substantial** effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size (magnitude and sensitivity scores), and as informed by consultation themes among stakeholders, particularly public health stakeholders, that show **consensus** on the importance of the effect. • Change, due to the project, could result in a regulatory threshold or statutory standard being **crossed** (if applicable). • There is likely to be a **substantial** change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a **causal relationship** between changes that would result from the project and changes to health outcomes. In addition, health priorities for the relevant study area are of **specific relevance** to the determinant of health or population group affected by the project.
Moderate (significant)	The narrative explains that this is significant for public health because: • Changes, due to the project, have an **influential** effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size, and as informed by consultation themes among stakeholders, which may show **mixed** views. • Change, due to the project, could result in a regulatory threshold or statutory standard being **approached** (if applicable). • There is likely to be a **small** change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a **clear** relationship between changes that would result from the project and changes to health outcomes. In addition, health priorities for the relevant study area are of **general relevance** to the determinant of health or population group affected by the project.
Minor (not significant)	The narrative explains that this is not significant for public health because: • Changes, due to the project, have a **marginal** effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size of limited policy influence and/or that **no relevant consultation themes** emerge among stakeholders. • Change, due to the project, would be **well within** a regulatory threshold or statutory standard (if applicable); but could result in a guideline being crossed (if applicable). • There is likely to be a **slight** change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is only a **suggestive relationship** between changes that would result from the project and changes to health outcomes. In addition, health priorities for the relevant study area are of **low relevance** to the determinant of health or population group affected by the project.
Negligible (not significant)	The narrative explains that this is not significant for public health because: • Changes, due to the project, are **not related** to the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size or lack of relevant policy, and as informed by the project having **no responses** on this issue among stakeholders. • Change, due to the project, would **not affect** a regulatory threshold, statutory standard or guideline (if applicable). • There is likely to be a **very limited** change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is an **unsupported relationship** between changes that would result from the project and changes to health outcomes. In addition, health priorities for the relevant study area are **not relevant** to the determinant of health or population group affected by the project.

4.5.9 The temporal scope of this chapter used the following summary terms:

- ‘Very short term’ relates to effects measured in hours, days or weeks
- ‘Short term’ relates to effects measured in months (up to 23 months duration)
- ‘Medium term’ relates to effects measured in years (2 years and more)
- ‘Long term’ relates to effects measured in decades (10 years or more).

4.5.10 Health and wellbeing are influenced by a range of factors, termed the ’wider determinants of health’. Determinants of health span environmental, social, behavioural, economic and institutional factors. Determinants therefore reflect a mix of influences from society and environment on population and individual health.

4.5.11 Impacts of the Proposed Development that result in a change in determinants have the potential to cause beneficial or adverse effects on health, either directly or indirectly. The degree to which these determinants influence health varies, given the degree of personal choice, location, mobility, and exposure.

4.5.12 A change in a determinant of health affects does not equate directly to a change in population health. Rather the change in a determinant alters risk factors for certain health outcomes. The assessment considers the degree and distribution of change in these pathways. The analysis of health pathways focuses on the risk factors and health outcomes that are most relevant to the determinants of health affected by the Proposed Development. As there are both complex and wide-ranging links between determinants of health, risk factors and health outcomes, it would not be proportionate or informative for an assessment to consider every interaction.

4.5.13 Typically, the change in a risk factor may need to be large, sustained and widespread within a population for there to be a significant influence on public health outcomes (Pyper *et al*., 2022).

4.5.14 Following IEMA (Pyper *et al*., 2022), regard has been given to a range of health determinants and scoping in or out based on relevance. The list of issues scoped into the assessment and justification for their inclusion is reported in **Table 9.5.2** of the Scoping Report (Xlinks 1 Limited, 2024). The issues scoped out of the assessment including justification, is reported in **Table 9.5.3** of the Scoping Report (Xlinks 1 Limited, 2024).

Vulnerable Groups

4.5.15 Of the vulnerable population groups identified in guidance *(*Pyper *et al*., 2022), the following relevant groups are considered within the assessment. People falling into more than one group may be especially sensitive. This section has regard to groups reported as vulnerable by the Devon Joint Strategic Health Needs Assessment (Devon County Council, 2023).

Table 4.11: Vulnerable Groups

Vulnerable Group	Description	HNAs that have informed the Devon JSNA
Young age	Children and young people (including pregnant women and unborn children).	Children and Young People with Neurological Conditions Associated with Physical Disability Needs Assessment 2016

Vulnerable Group	Description	HNAs that have informed the Devon JSNA
		JSNA for Children and Young People with Special Educational Needs and Disabilities, 2017 (Devon County Council, 2017)
Low income	People on low income, who are economically inactive or unemployed/workless.	N/A
Poor health	People with existing poor health; those with existing long-term physical or mental health conditions or disability that substantially affects their ability to carry out normal day-to-day activities.	Long Term Neurological Conditions and Associated Physical Disability Needs Assessment 2016 Long Term Conditions Health Needs Assessment 2015 Dementia Health Needs Assessment 2014 Care Home Residents Health Needs Assessment 2014 Mental Health and Wellbeing Health Needs Assessment 2013
Social disadvantage	People who suffer discrimination or other social disadvantage, including relevant protected characteristics under the Equality Act 2010 or groups who may experience low social status or social isolation for other reasons.	N/A
Access and geographical factors	People experiencing barriers in access to services, amenities and facilities and people living in areas known to exhibit high deprivation or poor economic and/or health indicators.	N/A

4.5.16 The following establishments in the site-specific area (see **section 4.4**) have been identified as facilities associated with relevant vulnerable groups:

- Education:
  - St Helens C Of E Primary School
  - Bideford East The Water Primary School
  - The Shoreline Academy (Primary School)
  - West Croft School (Nursery)
  - Maryland Secondary School
  - Kingsley School (Sixth Form College)

  - Kingsley Nursery
  - Bideford Baptist Preschool
  - Bideford College
- Health:
  - Bideford Medical Centre (GP surgery)
  - Wooda Surgery (GP surgery)
  - Northam Surgery (GP surgery)
  - Bideford Hospital
  - Torrington Hospital
  - North Devon District Hospital (including A&E services)
  - Abbotsvale (Mental health clinic in Bideford)
  - Torridgeside Link Resource Centre (Mental health clinic in Bideford)
  - Queen Annes Dental Practice
  - Tower House Dental Practice
  - Quay Dental Practice
  - ASDA Pharmacy
  - Boots Pharmacy
  - Well Pharmacy
  - Bideford Pharmacy

4.5.17 The following characterisations of how the general population may differ from vulnerable group populations were considered when scoring sensitivity:

- Heightened vulnerability is rarely due to a single cause and people may experience multiple forms of vulnerability due to intersecting social processes that result from inequalities (e.g., socio-economic status and income).
- As all development has the potential for adverse effects to some particularly vulnerable individuals, the 'role of determining EIA levels of effect on health (including identifying significant effects) is therefore not to set a threshold of 'no harm' from development, but to show where, at a population or sub-population level, the harm should weigh strongly in the balance alongside the development's benefits for health and other outcomes' (Pyper *et al*., 2022).
- In some situations, an effect may only be relevant to a few individuals, indicating that a population health effect would not occur. As stated by guidance: *'Where the effect is best characterised as only affecting a few individuals, this may indicate that a population health effect would not occur. Such individuals should still be the subject of mitigation and discussion, but in EIA and public health terms the effect may not be a significant population health change'* (Pyper *et al*., 2022).

4.5.18 The assessment covers these populations within two groups. The general population for the geographical area, notably local residents, and the vulnerable group population for the area. The latter is a sub-population comprised of the

vulnerabilities listed above. The differentiation of these two groups allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

4.5.19 For the purposes of the assessment the sensitivity score of the vulnerable group population is used to ensure that the potential for health inequalities is taken into account in the population health significance conclusions.

Assumptions and Limitations of the Assessment

4.5.20 This assessment is based on publicly available statistics and evidence sources. No new primary research or bespoke analysis of non-public data was undertaken for the assessment.

4.5.21 The health assessment partially draws from and build upon, the technical outputs from inter-related technical disciplines set out in paragraph **4.1.13**.

4.5.22 As a consequence, the assumptions and limitations of those assessments also apply to any information used in this chapter. It is, however, considered that the information available provides a suitable basis for assessment.

4.5.23 Whilst not all uncertainty can be removed, the following steps have been taken to allow confidence in the health assessment conclusions:

- Methods are used that triangulate evidence sources and professional perspectives.
- The scientific literature reviews undertaken give priority to high quality study design, such as systematic reviews and meta-analysis, and strength of evidence.
- Quantitative inputs for other assessments have been used, which included model validation, as described in other chapters.
- The health assessment has been cautious, with conservative assessments, for example in taking account of non-threshold effects and vulnerable group findings.
- The need for monitoring and adaptive management has been considered.
- The health assessment has been transparent in its analysis and follows good practice.

4.5.24 It is also noted that a number of assumptions have been made on the required workforce of the Proposed Development which are detailed in Volume 4, Chapter 3: Socio-economics and Tourism, of the PEIR.

4.6 Baseline Environment

Desk Study

4.6.1 Information on human health within the study area was collected through a detailed review of existing studies and datasets. These are summarised at **Table 4.12**.

Table 4.12: Summary of desk study sources used

Title	Source	Year	Author	Date accessed
Small area health mapping	Local Health	2011-2023	Office of Health Improvement and Disparities (OHID)	Accessed March 2024.
Public Health indicators, England	Fingertip's resource	2011-2023	OHID	Accessed March 2024.
The Joint Strategic Needs Assessment for Devon	NOMIS, Ordnance Survey, Office for National Statistics	2023	Devon County Council	Accessed April 2024.
Small area deprivation mapping	Index Of Multiple Deprivation	2019	Department for Levelling Up, Housing & Communities	Accessed April 2024.

Local health priorities

Devon Joint Health and Wellbeing Strategy

4.6.2 This assessment is informed by the Devon Joint Health and Wellbeing Strategy 2020-25 (Devon County Council, 2020). The aim of the strategy is to promote and support the health and wellbeing of the local population.

4.6.3 The strategy is structured around four key priorities which cover the wider determinants of health and the community's priorities for reducing health inequalities:

'1. Create opportunities for all

- *Inclusive economic growth, education and social mobility*
  a. *Narrow gaps in educational attainment and adult skills*
  b. *Reduce levels of child poverty*
  c. *Support economic growth in more disadvantaged areas*
  d. *Increase social mobility*

2. Heathy, safe, strong and sustainable communities

- *Creating conditions for good health and wellbeing where we live, work and learn*
  a. *Improve housing conditions, reduce homelessness, and increase supply of appropriate, high-quality housing*
  b. *Create conditions for good health, physical activity and social interaction*
  c. *Support healthy workplaces and schools*
  d. *Help keep communities and individuals safe*

3. Focus on mental health

- *Building good emotional health and wellbeing, happiness and resilience*
  a. *Reduce loneliness in all age groups*
  b. *Identify people at risk and intervene to improve poor mental health as soon as possible*
  c. *Proactively address the mental health consequences of trauma and adverse childhood experiences*
  d. *Promote a positive approach to mental health and wellbeing*

4. Maintain good health for all

- *Support people to stay as healthy as possible for as long as possible*
  a. *Prevent ill health by enabling people to live healthier lives*
  b. *Detect disease in the early stages to reduce impact on health*
  c. *Support those with long-term conditions to maintain a good quality of life*
  d. *Support carers to improve and maintain their own health & wellbeing'* (p. 5).

Integrated Care System Strategy

4.6.4 The purpose of Integrated Care Systems (ICSs) is to bring together local authorities, NHS organisations, voluntary, community and social enterprise, and others, to take collective responsibility for planning services, improving health and reducing inequalities across geographical areas for people and communities (NHS Devon and One Devon, 2023).

4.6.5 The Devon Integrated Care System Strategy sets out the assessed needs of the population and the priority strategic goals, focusing on the four core purposes of ICSs:

- 'Improving outcomes in population health and healthcare;
- Tackling inequalities in outcomes, experience and access;
- Enhancing productivity and value for money;
- Helping the NHS support broader social and economic development' (p. 4).

Deprivation

4.6.6 The Proposed Development is located within the four wards of Monkleigh & Putford, Bideford East, Bideford South, and Two Rivers & Three Moors. In the 2019 Index of Multiple Deprivation, the following Lower Super Output Areas (LSOAs) were classified as amongst the most deprived neighbourhoods in country:

- In Monkleigh & Putford (for landfall): Torridge 005C LSOA is classified amongst the 50% most deprived in the country. The neighbouring LSOA Torridge 002C in Westward Ho! Ward is classified as amongst the 40% most deprived in the country.
- In Bideford East (for the Onshore HVDC Cable Corridor): Torridge 004A is amongst the 20% most deprived neighbourhoods in the country.
- In Bideford South (for the Onshore HVDC Cable Corridor): 004E LSOA is classified as the 40% most deprived in the country. 00F LSOA is classified as the 30% most deprived in the country. 005D is classified as the 50% most deprived in the country. The neighbouring 003A and 003C in Bideford North are classified as the 20% and 30% most deprived in the country respectively.
- In Two Rivers & Three Moors: LSOA 004B is amongst the 40% most deprived in the country.

Deprivation breakdown

Table 4.13: Deprivation breakdown by indicator

Deprivation indicator	Monkleigh & Putford (005C LSOA)	Bideford East (004A LSOA)	Bideford South (004E LSOA)	Bideford South (004F LSOA)	Bideford South (005D LSOA)	Two Rivers & Three Moors (004B LSOA)
Overall	50%	20%	40%	30%	50%	50%
Income	40%	20%	40%	30%	30%	50%
Employment	30%	20%	30%	30%	30%	50%
Education	50%	10%	40%	10%	50%	40%
Health	50%	20%	30%	40%	20%	50%
Crime	10%	50%	40%	40%	10%	10%
Barriers to Housing and Services	10%	50%	30%	40%	10%	10%
Living Environment	10%	40%	40%	40%	10%	20%
Income deprivation affecting children	40%	20%	40%	30%	30%	50%
Income deprivation affecting older people	30%	30%	50%	30%	30%	40%
Legend						
		Least deprived				
		Most deprived				

4.6.7 All LSOAs in the site-specific area are amongst the 20-50% most deprived in the country.

4.6.8 Bideford East (004A LSOA) and Bideford South (004E and 004F LSOAs) are amongst the 20-40% most deprived in regard to income, 20-30% most deprived in regard to employment, 20-40% most deprived in regard to income deprivation affecting children, and 30-50% most deprived in regard to income deprivation affecting older people.

4.6.9 Bideford East (004A LSOA), Bideford South (004E and 004F LSOAs) and Two Rivers & Three Moors (004B LSOA) are amongst the 10-40% most deprived in regard to education.

4.6.10 Regarding health, all LSOAs except Bideford South (005D LSOA) are amongst the 20-50% most deprived in the country.

4.6.11 Monkleigh & Putford (005C LSOA), Bideford South (005D LSOA) and Two Rivers & Three Moors (004B LSOA) are in the 10% most deprived for barriers to housing and services.

4.6.12 All LSOAs except Bideford East (004A LSOA) are amongst the 10-40% most deprived in the country for living environment.

Baseline Indicators by Determinant of Health

Health and Wellbeing Effects Relevant to Air Quality

Table 4.14: Baseline - summary indicators relevant to air quality health outcomes for wards.

Population	Site specific (ward)				District	Regional	National
	Landfall	Onshore HVDC Cable Corridor		Converter Stations			
Indicator Name	Monkleigh & Putford	Bideford East	Bideford South	Two Rivers & Three Moors	Torridge	South West	England
Fraction of mortality attributable to particulate air pollution (new method) (30+ years)	NA	NA	NA	NA	3.0	4.6	5.8
Air pollution: fine particulate matter (new method – concentrations of total $PM_{2.5}$)	NA	NA	NA	NA	5.7	6.8	7.4
Emergency hospital admissions for Chronic Obstructive Pulmonary Disease (COPD) Standardised Admission Rate (SAR)	37.3	102.2	78.2	NA	58.3	NA	100.0

Population	Site specific (ward)				District	Regional	National
	Landfall	Onshore HVDC Cable Corridor		Converter Stations			
Indicator Name	Monkleigh & Putford	Bideford East	Bideford South	Two Rivers & Three Moors	Torridge	South West	England
Emergency hospital admissions for coronary heart disease (SAR)	106.7	152.6	150.8	110.6	119.9	95.6	100.0
Emergency hospital admissions for Myocardial Infarction (heart attack) (SAR)	99.2	112.1	158.9	125.8	113.6	95.2	100.0
Emergency hospital admissions for stroke (SAR)	106.5	136.8	149.0	82.5	119.3	97.5	100.0
Under 75 mortality rate from respiratory disease considered preventable (2021 definition)	NA	NA	NA	NA	12.2*	12.8	15.6
Under 75 mortality rate from cardiovascular diseases considered preventable (2021 definition)	NA	NA	NA	NA	21.7*	25.0	30.2
Legend							
	Significantly better than national average						
	Significantly worse than national average						
	Not significantly different to national average						
	Comparative analysis unavailable						

4.6.13 **Table 4.14** shows overall air quality related health outcomes in the wards are variable compared to the national averages. It is noted there are fewer statistics available for the site-specific wards.

4.6.14 For the population near to landfall in Monkleigh and Putford ward, emergency hospital admissions for coronary heart disease and stroke are slightly higher than the national average, albeit the difference is not statistically significant. Similarly, the rate of emergency hospital admissions for myocardial infarction (heart attack) is not significantly different to the national average. Emergency hospital admissions for COPD are significantly better than the national average. These indicators are influenced by ambient air quality but are also influenced by other

** This colour coding and determination of whether they are significantly different from the England average is a calculation undertaken by Office for Health and Improvement Disparities. Seeming differences between local and regional significance reflect the underlying basis for calculation rather than reporting error in this report.

factors, including diet, smoking and exercise. The data suggests generally average to lower sensitivity to changes in air quality at landfall.

4.6.15 For the populations near the Onshore HVDC Cable Corridor, the opposite trend is observed in Bideford East ward and Bideford South ward, with emergency hospital admissions for coronary heart disease and stroke significantly worse than the national average. Emergency hospital admissions for myocardial infarction (heart attack) in Bideford East are worse though not significantly different to the national average but are significantly worse than the national average in Bideford South ward. Emergency hospital admissions for COPD are not significantly different than the national average for the populations near the Onshore HVDC Cable Corridor. A notable difference can be observed however in Bideford South ward, showing better performance (78.2) than the national average (100). The data suggests generally average to higher sensitivity to changes in air quality along the Onshore HVDC Cable Corridor.

4.6.16 Regarding the population near the converter stations, the emergency hospital admissions for coronary heart disease, stroke, and myocardial infarction (heart attack) in Two Rivers and Three Moors ward are all not significantly different to the national average. However, a notable difference can be observed in these health indicators, with emergency hospital admissions in coronary heart disease and heart attack higher (worse) than the national average and those for stroke lower (better) than the national average. Data suggests average sensitivity to changes in air quality near the converter stations.

Health and Wellbeing Effects Relevant to Noise Exposure

Table 4.15: Baseline - summary indicators relevant to noise health outcomes.

Population	Site specific (ward)				District	Regional	National
	Landfall	Onshore HVDC Cable Corridor		Converter Stations			
Indicator Name	Monkleigh & Putford Ward	Bideford East Ward	Bideford South Ward	Two Rivers & Three Moors Ward	Torridge	South West	England
The rate of complaints about noise	NA	NA	NA	NA	1.6	5.4	12.0
The percentage of the population exposed to road, rail and air transport noise of 65dB(A) or more during the daytime	NA	NA	NA	NA	NA	3.7	5.5
The percentage of the population exposed to road, rail and air transport noise of 55 dB(A) or more during the night-time	NA	NA	NA	NA	NA	5.5	8.5

Population	Site specific (ward)				District	Regional	National
	Landfall	Onshore HVDC Cable Corridor		Converter Stations			
Indicator Name	Monkleigh & Putford Ward	Bideford East Ward	Bideford South Ward	Two Rivers & Three Moors Ward	Torridge	South West	England
Self-reported wellbeing: people with a high anxiety score (16+ years)	NA	NA	NA	NA	NA	22.0	22.6
Under 75 mortality rate from cardiovascular diseases considered preventable (2021 definition)	NA	NA	NA	NA	21.7*	25.0	30.2
Hypertension: Quality and Outcomes Framework (QOF) prevalence (all ages)	NA	NA	NA	NA	17.4	15.1	14.0
Depression: QOF prevalence (18+ years)	NA	NA	NA	NA	9.8	13.1	12.7
Emergency hospital admissions for intentional self-harm (SAR)	72.4	201.1	222.7	107.6	146.0	218.0	100.0 (163.7)
Legend							
	Significantly better than national average						
	Significantly worse than national average						
	Not significantly different to national average						
	Comparative analysis unavailable						

4.6.17 **Table 4.15** shows limited statistics for the site-specific wards in relation to noise and its health outcomes. Overall, the available health outcome(s) are more variable than the national average.

4.6.18 For the population near to the Landfall, the emergency hospital admissions for intentional self-harm, as a general small-area indicator relevant to mental health, is not significantly different to the national average, however, it is lower (better) than the national average. The data suggests a lower sensitivity to changes in noise near Landfall.

4.6.19 Regarding the population near the Onshore HVDC Cable Corridor, a significantly worse performance in emergency hospital admissions for intentional self-harm is observed in Bideford East ward and Bideford South ward with the rate being 100% higher than the national average in both wards. The data suggests generally higher sensitivity to changes in noise along the Onshore HVDC Cable Corridor.

4.6.20 For the population near the converter stations, the rate of emergency hospital admissions for intentional self-harm in Two Rivers and Three Moors ward is not significantly different to the national average. The rate, however, is slightly higher (107.6) than the national average (100). Data suggests average sensitivity to changes in noise near the converter stations.

4.6.21 Considering the health indicators not reported at the site-specific area, the rate of complaints about noise in the local and regional area is significantly lower than the national average showing better performance in the local area. The percentage of population exposed to exposed to road, rail and air transport noise of 65 dB(A) or more during daytime and 55 dB(A) or more during the night-time is also lower in the regional area as compared to the national average. Data generally suggests better performance in noise in the local and regional area.

Health and Wellbeing Effects Relevant to Transport

Table 4.16: Baseline - summary indicators relevant to transport health outcomes

Population	Site Specific Ward				District	Regional	National
	Landfall	Onshore HVDC Cable Corridor		Converter Stations			
Indicator Name	Monkleigh & Putford Ward	Bideford East Ward	Bideford South Ward	Two Rivers & Three Moors Ward	Torridge	South West	England
Killed and seriously injured (KSI) casualties on England's roads	NA	NA	NA	NA	NA	72.9	94.5
Percentage of adults cycling for travel at least three days per week (16+ years)	NA	NA	NA	NA	1.1	2.1	2.5
Percentage of adults walking for travel at least three days per week (16+ years)	NA	NA	NA	NA	15.4	14.8	15.1
Percentage of physically active children and young people (5-16 years)	NA	NA	NA	NA	49.1	49.1	47.2
Percentage of physically active adults (19+ years)	NA	NA	NA	NA	68.6	71.7	67.3
Depression: QOF prevalence (18+ years)	NA	NA	NA	NA	10.2	13.3	13.2
Legend							
	Significantly better than national average						
	Significantly worse than national average						
	Not significantly different to national average						
	Comparative analysis unavailable						

4.6.22 **Table 4.16** shows transport related health outcomes. Transport related health indicators are not reported at the ward level. As transport effects tend to relate to wider road network effects, the wider geographic areas are informative of sensitivity to change for the populations near the landfall, Onshore HVDC Cable Corridor and the converter stations.

4.6.23 In relation to indicators where data is only available at the district level and above, for the local population of Torridge District Council, the percentage of adults cycling for travel at least three days per week (16+ years) are significantly lower (worse) than nationally and the percentage of adults walking for travel at least three days per week (16+ years) is similar to the national average. The percentage of physically active children and young people (5 to 16 years) is significantly better than the national average, and the percentage of physically active adults (19+ years) though slightly higher, is not significantly different to the national average. This indicates generally average to lower sensitivity to changes in transport that could affect active travel.

4.6.24 Regionally, casualties on roads are slightly lower in the South West than the national average. The percentage of physically active children and young people (5 to 16 years) and the percentage of physically active adults (19+ years) are significantly better in the South West than nationally. The percentage of adults walking for travel at least three days per week (16+ years) and the percentage of adults cycling for travel at least three days per week (16+ years) are not significantly different to the national average. The prevalence of depression is however higher than the national average, noting that active travel is only one contributing factor to mental health. This suggests an average to lower sensitivity to changes in active travel in the health study area.

Health and Wellbeing Effects Relevant to Open space, Leisure and Play

Table 4.17: Baseline - summary indicators relevant to open space, leisure and play.

Population	Site specific (ward)				District	Regional	National
	Landfall	Onshore HVDC Cable Corridor		Converter Stations			
Indicator Name	Monkleigh & Putford Ward	Bideford East Ward	Bideford South Ward	Two Rivers & Three Moors Ward	Torridge	Southwest	England
Violent crime – violence offences per 1,000 population	NA	NA	NA	NA	20.4	33.0	41.9
Reception: Prevalence of overweight (including obesity) (4 to 5 years)	15.4*	21.9	23.8	23. 1	21.8	20.5	22.6
Year 6: Prevalence of overweight (including obesity) (10 to 11 years)	28.6	37.5	33.3	21.4	34.1	32.9	35.8
Percentage of adults classified as overweight or obese (19+ years)	NA	NA	NA	NA	68.8	71.7	67.3
Percentage of physically active children and young people (5 to 16 years)	NA	NA	NA	NA	46.2	50.8	47.0

Population	Site specific (ward)				District	Regional	National
	Landfall	Onshore HVDC Cable Corridor		Converter Stations			
Indicator Name	Monkleigh & Putford Ward	Bideford East Ward	Bideford South Ward	Two Rivers & Three Moors Ward	Torridge	Southwest	England
Percentage of physically active adults (19+ years)	NA	NA	NA	NA	68.6	71.7	67.3
Emergency hospital admissions for coronary heart disease (SAR)	106.7	152.6	150.8	110.6	119.9	95.6	100.0
Emergency hospital admissions for stroke (SAR)	106.5	136.8	149.0	82.5	119.3	97.5	100.0
Emergency hospital admissions for Myocardial Infarction (heart attack) (SAR)	99.2	112.1	158.9	125.8*	113.6	95.2	100.0
Emergency hospital admissions for intentional self-harm (SAR)	72.4	201.1	222.7	107.6	146.0	218.9	100.0 (163.7)
Legend							
	Significantly better than national average						
	Significantly worse than national average						
	Not significantly different to national average						
	Comparative analysis unavailable						

4.6.25 **Table 4.17** shows overall, open space and recreation related health outcomes in the site-specific wards are variable compared to the national averages. It is noted that there are fewer statistics at the ward level.

4.6.26 Regarding the population near landfall, the percentage of children in reception (4 to 5 years) classified as overweight or obese is lower (better) than the national average, albeit, statistically, the difference is not significant. Similarly, the prevalence of overweight including obesity in Year 6 (10 to 11 years) is lower than the national average, the difference is not significant. The rate of emergency admissions for coronary heart disease, stroke, myocardial infarction (heart attack) and intentional self-harm are not significantly different to the national averages. However, worse performance than the national average can be observed in emergency hospital admissions for coronary heart disease and stroke. On the other hand, better performance can be observed in emergency hospital admissions for intentional self-harm as the rate is lower (72.4) than nationally (100). A mixed picture is shown in sensitivity to changes in open space and recreation for the population along the landfall.

4.6.27 For the population near the Onshore HVDC Cable Corridor, the percentage of children aged 4 to 5 years and 10 to 11 years classified as overweight or obese is not significantly different to the national average. The rate of emergency hospital admissions for coronary heart disease, stroke and intentional self-harm are all

significantly worse than the national average. Emergency hospital admissions for myocardial infarction (heart attack) is not significantly different than the national average in Bideford East ward but significantly worse than the national average in Bideford South ward. Conservatively, informed by the Bideford East ward and Bideford South ward data, it is inferred that there is generally higher sensitivity to changes in open space and recreation close to the Onshore HVDC Cable Corridor.

4.6.28 For the population near the Onshore HVDC Cable Corridor, the rate of emergency hospital admissions for coronary heart disease, stroke and intentional self-harm are all significantly worse than the national average. Emergency hospital admissions for myocardial infarction (heart attack) is not significantly different than the national average in Bideford East ward but significantly worse than the national average in Bideford South ward. Conservatively, informed by the Bideford East ward and Bideford South ward data, it is inferred that there is generally higher sensitivity to changes in open space and recreation close to the Onshore HVDC Cable Corridor.

4.6.29 For the population near the converter stations, emergency hospital admissions for coronary heart disease, stroke, myocardial infarction, and intentional self-harm are all not significantly different to the national averages. Data suggests average sensitivity to changes in open space and recreation for the population near the converter stations.

Health and Wellbeing Effects Relevant to Socio-economic Factors

Table 4.18: Baseline - summary indicators relevant to socio-economic health outcomes.

Population	Site specific (ward)				District	Regional	National
	Landfall	Onshore HVDC Cable Corridor		Converter Stations			
Indicator Name	Monkleigh & Putford Ward	Bideford East Ward	Bideford South Ward	Two Rivers & Three Moors Ward	Torridge	South West	England
Inequality in life expectancy at birth (Male)	NA	NA	NA	NA	5.9	7.4	9.7
Inequality in life expectancy at birth (Female)	NA	NA	NA	NA	3.3	5.4	7.9
Children in absolute low-income families (under 16s)	NA	NA	NA	NA	18.0	13.1	15.3
16 to 17-year old's not in education, employment, or training (NEET) or whose	NA	NA	NA	NA	NA	5.3	4.7

Population	Site specific (ward)				District	Regional	National
	Landfall	Onshore HVDC Cable Corridor		Converter Stations			
Indicator Name	Monkleigh & Putford Ward	Bideford East Ward	Bideford South Ward	Two Rivers & Three Moors Ward	Torridge	South West	England
activity is not known (%)							
19 to 24-year old's not in education, employment, or training (%)	NA	NA	NA	NA	NA	13.6	13.2
Percentage of people in employment (16 to 64 years)	NA	NA	NA	NA	76.9	77.8	75.4
Average Attainment 8 score (15 to 16+ years)	NA	NA	NA	NA	46.4	NA	48.7
Population who cannot speak English well or at all (%)	0.2	0.1	0.1	0.1	0.2	0.6	1.7
Child Poverty Income Deprivation Affecting Children (%)	9.6	22.3	14.1	14.4	15.6	14.1	17.1
Older People in poverty: Income deprivation affecting older people (%)	7.6	14.3	14.2	14.2	11.8	11.4	14.2

Legend	
	Significantly better than national average
	Significantly worse than national average
	Not significantly different to national average
	Comparative analysis unavailable

4.6.30 **Table 4.18** shows overall socio-economic related outcomes at ward level are variable compared to the national average. It is noted that there are limited statistics available for socio-economic indicators at the ward level.

4.6.31 At the district level, inequality in life expectancy at birth in both males and females is lower than the national average. However, the proportion of children in absolute low-income families is significantly worse than the national average, and the percentage of people in employment in Torridge District is not significantly different to the national average. The data suggests generally higher sensitivity to changes in socio-economic opportunity at the district level.

4.6.32 For the population near the landfall, the percentage of children and older people living in income deprivation affecting children and older people is significantly better than the national average, indicating generally lower sensitivity to changes in socio-economic opportunity.

4.6.33 Socio-economic outcomes for the population near the Onshore HVDC Cable Corridor are variable. Child poverty income deprivation in Bideford East ward is significantly worse than the national average, but in Bideford South ward it is significantly better than the national average. The percentage of income deprivation affecting older people is not significantly different to the national average in both Bideford East ward and Bideford South ward. Conservatively, the data represents higher sensitivity to socio-economic changes in near the Onshore HVDC Cable Corridor.

4.6.34 For the population near the converter stations, the percentage of children living in income deprivation is not significantly different to the national average. The percentage of older people living in income deprivation is significantly better than the national average. The data indicates average to lower sensitivity to changes in socio-economic opportunity near the converter stations.

Health and Wellbeing Effects Relevant to Understanding of Risk (Risk Perception)

Table 4.19: Baseline - summary indicators relevant to understanding of risk health outcomes.

Population	Site specific (ward)				District	Regional	National
	Landfall	Onshore HVDC Cable Corridor		Converter Stations			
Indicator Name	Monkleigh & Putford Ward	Bideford East Ward	Bideford South Ward	Two Rivers & Three Moors Ward	Torridge	South West	England
Self-reported wellbeing: people with a high anxiety score (16+ years)	NA	NA	NA	NA	NA	22.6	24.0
Depression: QOF prevalence (18+ years)	NA	NA	NA	NA	10.2	13.3	13.2
Population who cannot speak English well or at all (%)	0.2	0.1	0.1	0.1	0.2	0.6	1.7
Emergency hospital admissions for intentional self-harm (SAR)	72.4	201.1	222.7	107.6	146.0	138.0	100.0
Suicide rate (10+ years)	NA	NA	NA	NA	13.0*	12.0	10.4
Legend							
	Significantly better than national average						
	Significantly worse than national average						
	Not significantly different to national average						
	Comparative analysis unavailable						

4.6.35 **Table 4.19** summarises indicators that are relevant and may be affected by the population's understanding of the Proposed Development's risks.

4.6.36 Regarding the population near the landfall, the rate of emergency hospital admissions for intentional self-harm, as a general indicator relevant to mental health, is not significantly different to the national average. The percentage of people who cannot speak English well or at all, an indicator relevant to the extent to which the actual risks of the Proposed Development may be understood by the population, is significantly better than the national average. The data suggests generally lower sensitivity to changes in mental health associated with public understanding of risk at Landfall.

4.6.37 Regarding the population near the Onshore HVDC Cable Corridor, the rate of emergency hospital admissions for intentional self-harm, as a general indicator relevant to mental health, is significantly higher than the national average. The percentage of people who cannot speak English well or at all, an indicator relevant to the extent to which the actual risks of the Proposed Development may be understood by the population, is significantly better than the national average. The data suggests generally higher sensitivity to changes in mental health associated with public understanding of risk at landfall.

4.6.38 For the population near the converter stations, the rate of emergency hospital admissions for intentional self-harm is slightly higher than the national average showing worse performance in the area in relation to mental health, noting that there are other contributing factors to this metric other than risk perception. The percentage of people who cannot speak English well or at all, is significantly better than the national average.

Health and Wellbeing Effects Relevant to Healthcare

Table 4.20: Baseline - summary indicators relevant to healthcare

Population	Site specific (ward)				District	Regional	National
	Landfall	Onshore HVDC Cable Corridor		Converter stations			
Indicator Name	Monkleigh & Putford Ward	Bideford East Ward	Bideford South Ward	Two Rivers & Three Moors Ward	Torridge	South West	England
Access to NHS dental services - successfully obtained a dental appointment (Persons, 18+ years)	NA	NA	NA	NA	NA	72.9	77.0
Percentage reporting good overall experience of making an appointment (Persons, 16+ years)	NA	NA	NA	NA	NA	NA	54.4
Percentage of people who have a positive experience of their GP practice (Persons, 16+ years)	NA	NA	NA	NA	NA	76.8	71.3
Emergency hospital admissions for all causes (SAR)	80.0	111.2	116.3	76.2	91.8	94.3	100
Legend							
	Significantly better than national average						
	Significantly worse than national average						
	Not significantly different to national average						
	Comparative analysis unavailable						

4.6.39 **Table 4.20** shows healthcare related health outcomes. Healthcare related health indicators are not reported at the ward level.

4.6.40 At the regional level, the percentage of people with access to NHS dental services and have successfully obtained a dental appointment is lower (worse) than the national average. On the other hand, the percentage of people who have a positive experience of their GP practice in Southwest England is higher (better) than nationally. Emergency hospital admissions for all causes are significantly lower in Monkleigh and Putford as compared to England, showing better performance in the population at landfall. Along the Onshore HVDC Cable Corridor, emergency hospital admissions for all causes are significantly higher (worse) near the Onshore HVDC Cable Corridor and significantly lower (better) near the Offshore Cable Corridor compared to the average of England. Better performance is also shown in the emergency hospital admissions for the population near the converter stations, with the rate significantly lower in Two Rivers and Three Moor compared to England.

Future Baseline Conditions

4.6.41 As a generality there is a trend of poor health outcomes in coastal communities in England. The pleasant environment attracts older, retired citizens to settle, who inevitably have more and increasing health problems. An oversupply of guest housing can lead to Houses of Multiple Occupation which lead to concentrations of deprivation and ill health. The sea is a benefit but attracting NHS and social care staff to peripheral areas can be harder. It can also be the case that catchment areas for health services are artificially foreshortened by the coastline and transport is also often limited, in turn limiting job opportunities. Many coastal communities were created around a single industry such as previous versions of tourism, or fishing, or port work that have since moved on, meaning work can often be scarce or seasonal. (Chief Medical Officer, 2021)

4.6.42 Population health data presents a snapshot at a particular time. It is well recognised that population health is subject to continuing influences, both at the individual and community level. It is well recognised that population health is subject to continuing influences, both at the individual and community level. Influences may be environmental, such as seasonal variation in wellbeing and communicable diseases, they may also respond to socio-economic factors, such as migration and the availability of jobs.

4.6.43 Longer term trends and interventions in population health may influence the future baseline. Health and social care, public health initiatives and government policies aim to reduce inequalities and improve quality of life. The historic success of such interventions is increasingly challenged by national trends such as an aging population, rising levels of obesity and the COVID-19 pandemic. The implications of COVID-19 for public health will take years to be reflected within statistical data releases, but it is expected that the pandemic will have exacerbated public health challenges. The pandemic disproportionately affected vulnerable groups, including due to age and ill-health.

4.6.44 Climate change may also exacerbate physical and mental health risk factors, particularly around flooding and extremes of temperature. The impacts of climate change including extreme temperatures, flooding, increase in atmospheric pollutants and drought are well documented. These noted impacts on the future human health baseline are summarised below and taken into account by the assessment.

- Without adaptation, heat and cold-related deaths are forecasted to rise in the UK due to climate change and sociodemographic factors. Mortality risk from extreme temperatures rises with age, and despite fewer cold days expected mortality due to moderate cold is projected to increase with the ageing population with heat-related mortality increasing over time (UKHSA, 2023a).
- Flood-affected individuals are prone to adverse health effects including death, injury, increased risk of infectious disease, and mental health effects including depression, anxiety and post-traumatic stress disorder. Increase in flood risk in the UK is largely driven by coastal flooding (UKHSA, 2023b).
- Weather pattern shifts, notably in temperature, rainfall, and wind speed, are anticipated to influence the dispersion and concentration of air pollutants like PM and O_3. Implementing climate change mitigation strategies to cut

greenhouse gas emissions will aid in lowering air pollution levels, thus enhancing health outcomes. While long-term exposure to $PM_{2.5}$ and NO_2 is forecasted to decrease by around 25% to 37% compared to 2018 levels, localized urban increases in O_3 could heighten health risks (UKHSA, 2023c).

- Climate has a significant impact on infectious diseases, influencing pathogen behaviour, human susceptibility, and transmission periods. Warmer temperatures can expand disease distribution and transmission windows. Weather and climate also play a significant role in influencing the presence and activity of disease-carrying ticks and mosquitoes. Rising temperatures are extending their range and activity periods, affecting the spread of pathogens and their habitats including potential expansion of tick species like *Ixodes ricinus*, which spread Lyme disease and tick-borne encephalitis, and invasive mosquitoes like *Aedes albopictus*, capable of transmitting diseases such as dengue and Zika. Climate change also increases the risk of diseases like West Nile virus in the UK, highlighting the need for collaborative efforts across sectors to address these climate-related public health challenges (UKHSA, 2023d).
- Climate change poses a threat to food supplies, increasing the risk of public health issues as the UK becomes more reliant on climate-vulnerable food-producing countries. This dependence on imports, especially plant-based foods, may lead to shortages of nutritious options and unhealthy dietary changes unless local production is strengthened. While initial benefits like crop diversification and extended growing seasons may occur due to warmer, drier conditions, inadequate adaptation measures could decrease overall yields in the long run. As climate impacts intensify, fluctuations in food imports and prices may make it challenging to access healthy foods and follow dietary guidelines (UKHSA, 2023e).

4.6.45 It would not be proportionate (or consistent with the qualitative assessment approach taken) to quantitatively model the population's future health. This reflects the complexities of interactions between the wider determinants of health, as well as the potential for macro-economic changes in the next decade that are hard to predict. Any predication would have such wide error margins that it would greatly limit the value of the exercise. Annual national population health trend forecasting is undertaken as a government public health activity (Department of Health and Social Care, 2023; Office for National Statistics, 2021) and has been taken into account by the health assessment.

Key Receptors

4.6.46 **Table 4.21** identifies the receptors taken forward into the assessment.

Table 4.21: Key receptors taken forward to assessment

Receptor	Description	Sensitivity/Value
General population of each study area	The general population comprises groups including: current and future residents; Proposed Development workforces; service providers; visitors to the area; road users; and users of the Proposed Development's electricity.	Assessed for each determinant of health in **section 4.9** and **4.10**, but indicatively of low sensitivity as explained in **section 4.5**.

Receptor	Description	Sensitivity/Value
Vulnerable group population of each study area	Vulnerability, or increased sensitivity, many be due to a factors including: young age; old age; low income; poor health; social disadvantage; and access and geographical factors.	See **section 4.5** (Vulnerable groups) for further details.

4.7 Key Parameters for Assessment

Maximum Design Scenario

4.7.1 The Human Health assessment uses the conclusions set out by the other technical chapters as the basis for assessment, as laid out in paragraph 4.1.12. As such, the maximum design scenarios described in the other technical chapters are inherent to the assessment for human health. To avoid duplication, the human health assessment does not repeat these here.

4.8 Mitigation Measures Adopted as Part of the Proposed Development

4.8.1 For the purposes of the EIA process, the term 'Measures adopted as part of the Proposed Development' is used to include the following types of mitigation measures (IEMA, 2016).

- Primary (inherent) mitigation - measures included as part of the Proposed Development design. IEMA describes these as 'modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project and do not require additional action to be taken'. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the Proposed Development and the parameters secured in the DCO and/or marine licences. For example, a reduction in footprint or height.
- Secondary (foreseeable) mitigation. IEMA describes these as *'actions that will require further activity in order to achieve the anticipated outcome'*. These include measures required to reduce the significance of environmental effects (such as lighting limits) and may be secured through environmental management plan.
- Tertiary (inexorable) mitigation. IEMA describes these as 'actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects. It may be helpful to secure such measures through a Construction Environmental Management Plan (CEMP) or similar.

4.8.2 For the purposes of this PEIR, mitigation measures set out are those considered to be appropriate for the Proposed Development at this time. They may evolve and/or be refined in response to the statutory consultation process and/or other considerations.

4.8.3 Where relevant, measures have been identified that may result in enhancement of environmental conditions. The mitigation measures relevant to this chapter are summarised in **Table 4.22**.

Table 4.22: Mitigation measures adopted as part of the Proposed Development

Measure Adopted	How the Measure Will be Secured
Primary Mitigation	
Compliance with exposure standards set out in Department for Energy and Climate Change (DECC) Voluntary Code of Practice (Department for Energy Security & Net Zero, 2012) including compliance with the International Commission on Non-Ionising Radiation Protection (ICNIRP) public exposure guidelines (ICNIRP, 1998, 2010).	In relation to construction: through the outline Code of Construction Practice at ES stage. In relation to operation: through DCO requirement secured through appropriate management plan.
An Outline Onshore Construction Environmental Management Plan (CEMP) has been developed and will submitted with the DCO application. An Onshore CEMP will be developed in accordance with the Outline Onshore CEMP. The Onshore CEMP will include best practice measures, as outlined in IAQM guidance (IAQM, 2024), in relation to air quality.	Dust control measures to be secured through Dust Management Plan (DMP), as an appendix to the CEMP which will be secured via a DCO requirement.
An Outline Construction Traffic Management Plan (CTMP) will be prepared and submitted with the DCO application. CTMP(s) will be developed in accordance with the outline CTMP prior to construction.	Outline CTMP to be provided as part of application for development consent. CTMP(s) to be developed in line with Outline CTMP and agreed with relevant stakeholders and will be secured as a DCO requirement.
An Onshore Decommissioning Plan will be developed prior to decommissioning and would be in line with the latest relevant available guidance.	To be a requirement of the DCO.

4.8.4 Primary and tertiary measures that are intended to form part of the final design (and/or are established legislative requirements/good practice) have been taken into account as part of the initial assessment presented in section 4.9 below (i.e., the initial determination of impact magnitude and significance of effects assumes implementation of these measures). This ensures that the measures that the Applicants are intending to commit to, are taken into account in the assessment of effects.

4.8.5 Where an assessment identifies likely significant adverse effects, further mitigation measures may be applied. These are measures that could further prevent, reduce and, where possible, offset these effects. They are defined by IEMA as actions that will require further activity in order to achieve the anticipated outcome and may be imposed as part of the planning consent, or through inclusion in the ES (referred to as secondary mitigation measures in IEMA, 2016). For further or secondary measures both pre-mitigation and residual effects are presented.

4.8.6 The Human Health chapter takes as the basis of its assessment the measures adopted as part of the Proposed Development (i.e., embedded mitigation) described in the technical chapters that it is informed by (as listed in paragraph 4.1.12). Secondary (i.e., additional) mitigation measures specific to human health are described in section 4.9 under each health determinant as relevant.

4.9 Assessment of Construction and Decommissioning Effects

4.9.1 The impacts of the construction of the Proposed Development have been assessed. The potential impacts arising from the construction phase of the Proposed Development are listed in **Table 4.25**, along with the maximum design scenario against which each impact has been assessed.

4.9.2 A description of the potential effect on receptors caused by each identified impact is given below.

Transport Modes, Access and Connections

4.9.3 This section considers how construction and decommissioning affects public health through changes in road safety and accessibility, including travel times for road users or emergency services, and access to health promoting goods and services. There is potential that construction works including construction vehicles and corridor construction may disrupt local vehicle traffic (private and public transport) as well as active travel along highways (pedestrians and cyclists). This includes road works, temporary diversions and traffic volumes required due to the Onshore HVDC Cable Corridor construction. This has the potential to affect active travel and physical activity. The potential for changes to public rights of way to affect public health is addressed under “Open Space, Leisure and Play” below.

4.9.4 The scientific literature identifies the following general points relevant to potential exposures and health outcomes. For road safety, health effects may be associated with the severity or frequency of road traffic incidents. For accessibility, health effects may be associated with emergency response times or non-emergency treatment outcomes associated with delays or non-attendance. For active/sustainable travel, health effects may relate to physical health (e.g. cardiovascular health) and mental health conditions (e.g. stress, anxiety or depression) associated with obesity and levels of physical activity.

4.9.5 Transportation barriers are important to healthcare access, particularly for those with lower incomes. Transportation barriers lead to rescheduled or missed appointments, delayed care, and missed or delayed medication use. These consequences may lead to poorer management of chronic illness and thus poorer health outcomes (Syed *et al*., 2013).

4.9.6 Walking and cycling for transportation (i.e. active transportation), provide substantial health benefits from increased physical activity. Active transport to work or school is significantly associated with improved cardiovascular health and lower body weight (Xu *et al*., 2013). The provision of convenient, safe and connected walking and cycling infrastructure is at the core of promoting active travel (Winters *et al*., 2017). Physically active transport (i.e. walking or cycling) has been directly related to increased residential density, street connectivity, mixed land use and amenities within a walkable distance (Thomson *et al*., 2008).

4.9.7 The health assessment has had regard to the population groups identified in the literature that may be particularly sensitive. For example, children, pregnant women and cyclists (particularly older cyclists) are generally more vulnerable in

terms of road safety. People with lower socio-economic status typically face more transportation barriers in accessing health care.

4.9.8 This section has been informed by Volume 2, Chapter 5: Traffic and Transport, of the PEIR, which sets out relevant assessment findings and mitigation measures that have been considered.

4.9.9 The construction stage is in total expected to take place over up to 84 months. The construction activities comprise several distinct activities. Some of these activities are sequential and some are concurrent. The effects at any given location are therefore typically of a much shorter duration. The assessment takes into account where different sections of a route may be affected at different times, with localised effects influencing the overall route.

4.9.10 A potential population health effect is considered plausible as there is a theoretical source-pathway-receptor relationship:

- The source is disruption and disturbance to roads, cycle routes and footpaths.
- The pathway is behavioural change in physical activity, transport delay, and road accidents and safety.
- Receptors are coastal and inland residents and visitors.

4.9.11 Furthermore, the theoretical effect is considered applicable in the context of this Proposed Development.

- The site-specific population of Monkleigh & Putford, Bideford East, Bideford South and Two Rivers & Three Moors;
- The local population of Torridge District Council;
- The regional population of the South West;
- The sub-population vulnerable due to:
  - Young age vulnerability (children and young people are potentially more vulnerable road users);
  - Old age vulnerability (older people are potentially more vulnerable road users);
  - Poor health vulnerability (people with existing poor physical and mental health in relation to health trip journey times); and
  - Access and geographical vulnerability (people who experience existing access barriers or who rely on the affected routes, including for healthcare and other amenities).

Sensitivity of the Receptor

4.9.12 The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in section 4.5 (Vulnerable Groups). This reflects that most people in the site-specific and local area would have many alternative routes in the road network to the affected sections. It also includes those who would only make occasional use of the affected sections of the road network. The general population comprise those members of the community with a high capacity to adapt to changes in access, including changes in healthcare

access, for example due to greater resources and good physical and mental health.

4.9.13 The sensitivity of the vulnerable group is **high**. The vulnerable sub-population includes dependants, such as children, elderly and those receiving care due to poor health. This sub-population may have *fewer resources and less capacity* to adapt to changes. The population may therefore be more *reliant on the affected routes* with greater likelihood that any disruption or disturbance could affect safety or access to health supporting services. Vulnerability is linked to mode of travel, including pedestrians and cyclists being more sensitive to road safety changes. It also relates to age (young people and older people) being more vulnerable to accident severity, as well as to those who are reliant on services accessed on affected sections of the road network (e.g. traveling to schools). Vulnerability may be increased in areas of higher deprivation. Deprived populations may already face more access barriers compared to the general population and therefore be more sensitive to access changes. Low incomes may compound access barriers by limiting the ability to adapt. Vulnerability also includes those accessing health services (emergency or non-emergency) at times and locations affected by congestion. Ambulance services (and the recipients of their care) are particularly sensitive to delays in response times (time taken to arrive and stabilise the patient). People in poor or very poor health may be more frequent users of healthcare service and therefore be more sensitive to access changes.

Magnitude of Impact

4.9.14 As reported in Volume 2, Chapter 5: Traffic and Transport, of the PEIR, a construction traffic management plan (CTMP) will be developed to form part of the CEMP and will be secured through the Development Consent Order. The CTMP will set out traffic management measures to maintain access and provide early notice of any route changes. Volume 2, Chapter 5: Traffic and Transport, of the PEIR concludes:

- The impact of driver delay at the Barnstaple Road/Manteo Way junction is minor adverse. The impact of driver delay at the A386/Littleham Road junction and along Gammaton Road is negligible.
- The impact on severance is negligible.
- The impact on Non-Motorised User Delay is negligible.
- The impact on Non-Motorised User Amenity and Fear and Intimidation is negligible.
- The impact on road safety is minor adverse.
- The impact of AILs (Abnormal Indivisible Loads) is negligible.

4.9.15 For population health, the magnitude of impact due to the Proposed Development is considered to be **low**.

4.9.16 In relation to active travel, as reported in Volume 2, Chapter 5: Traffic and Transport, of the PEIR, there would be appropriate diversions of active travel routes to maintain access and provide early notice of any route changes. Such measures would be secured through the OCTMP submitted with the DCO application. The scale of change is considered *small* and *medium-term*, albeit of

limited duration at any given location, including due to the transitory nature of construction works to lay cables. Only *minor* changes in *morbidity* for *cardiovascular* and *mental health* outcomes would be expected for a *small minority* of the population due to the temporary disruption during construction works. Most adverse effects on health behaviours and outcomes would be expected to *reverse* on completion of the construction works.

4.9.17 In relation to road safety at the population level the scale of change in accidents would be *small*. The frequency of any incidents would be *occasional*, with severity related to a *very minor change* in risk of injury or mortality (though with outcome reversal gradual or permanent). The expectation is that *very few* people would be affected, with *no or slight* implications for healthcare services. As noted in Volume 2, Chapter 5: Traffic and Transport, of the PEIR, there are currently identified to be a number of locations where accident risk is elevated by the Proposed Development during the construction, but mitigation is proposed. Reflecting the residual effects reported in Volume 2, Chapter 5: Traffic and Transport, of the PEIR, the health chapter identifies a **low** magnitude of change on this issue.

4.9.18 In relation to health-related travel times and accessibility the scale of change in delays is expected to be *small.* The frequency with which health related journeys may be affected is likely to be *occasional* for most people though for a few people, severity could relate to a *small change* in risk for morbidity or mortality. Ambulance services (and the recipients of their care) are particularly sensitive to delays in response times (time taken to arrive and stabilise the patient). Even with the delays described in Volume 2, Chapter 5: Traffic and Transport, of the PEIR, the priority given to ambulances travelling under blue lights would be expected to reduce any changes in journey times. Mitigation in terms of early and ongoing information sharing with emergency and healthcare services is secured within the OCTMP. Due to the temporary nature of the work and ability for people to adapt to known planned diversions or delays means there is a low magnitude of change in access to social infrastructure such as shops, employment and educational facilities. A **low** magnitude is assigned to active travel and health-related travel times.

Significance of the Effect

4.9.19 The significance of the population health effect due to the Proposed Development is **minor adverse,** which is not significant in EIA terms. The magnitude of the impact is low, and the sensitivity of the vulnerable group population is high.

4.9.20 In relation to active travel and health-related travel times, the significance of the population health effect is **minor adverse**, which is not significant in EIA terms. The professional judgment is that there would, at most, be a *slight adverse* change in the health baseline. This conclusion reflects that road safety and access to health supporting services are public health priorities and there is causal association that is supported by the scientific literature. However, the change due to the Proposed Development is appropriately *mitigated* by standard good practice measures that minimise disruption and disturbance. The change is unlikely to result in significant differential or disproportionate effects between the general population (low sensitivity) and the vulnerable sub-population (high

sensitivity). Consequently, *no widening of health inequalities* would be expected, and no influence is expected on the ability to deliver local or national health policy.

4.9.21 For road safety the significance of the population health effect is **minor adverse**, which is not significant in EIA terms. This conclusion reflects the potential for a slight change in the health baseline due to increased risk of high severity road accident outcomes. The change is not expected to widen inequalities and have marginal influence on the achievement of health policy relating to road safety.

Further Mitigation

4.9.22 Early and ongoing sharing of information with emergency and healthcare services with regard to any temporary road closures, diversions and lane closures

Future Monitoring

4.9.23 No additional future monitoring is proposed.

Open Space, Leisure and Play

4.9.24 There is potential that works associated with the construction and decommissioning for the Proposed Development may lead to temporary disturbance of public open spaces and disruption of public rights of way (PRoW), potentially affecting recreational activities. This may include disturbance or disruption in nearshore recreation (e.g., bathing, sailing and other water sports).

4.9.25 Time spent near green and blue space can positively affect mental wellbeing (Rojas-Rueda *et al*., 2021). The evidence suggests an inverse association between surrounding greenness and all-cause mortality (Yang *et al*., 2021). The health benefits of recreation and leisure include physical activity as well as mental wellbeing. Health outcomes include physical health (e.g., cardiovascular health) and mental health (e.g., decreased stress, anxiety or depression). Use of places of recreation may be affected by not only physical barriers but also changes in the amenity or setting of the destination. There are positive associations between access to green space and physical activity (Yang *et al*., 2021). The availability of a natural environment, attractive views of nature and people's experiences using greenspace can enhance attitudes toward physical activity and perceived behavioural control via stress-relieving effects, leading to firmer intentions to engage in physical activity (Calogiuri & Chroni, 2014).

4.9.26 This section has been informed by Volume 2, Chapter 8: Land Use and Recreation, of the PEIR, which sets out relevant assessment findings and mitigation measures that have been taken into account.

4.9.27 A potential population health effect is considered plausible as there is a theoretical source-pathway-receptor relationship:

- The source is disruption and disturbance including to open spaces and PRoW.
- The pathway is behavioural change in use of leisure and recreational activities affecting physical activity and mental wellbeing.
- Receptors are coastal and inland residents and visitors.

4.9.28 Furthermore, the theoretical effect is considered applicable in the context of this Proposed Development.

4.9.29 The population groups relevant to this assessment are:

- the site-specific populations near landfall, the Onshore HVDC Cable Corridor and the converter stations: Monkleigh & Putford, Bideford East, Bideford South and Two Rivers & Three Moors;
- the local population of Torridge District Council; and
- the sub-population vulnerable due to:
  - Young age vulnerability (specifically children who are overweight or who have low physical activity levels);
  - Old age vulnerability (specifically the elderly for whom familiar routes with appropriate mobility considerations play a part in regular exercise);
  - Low income vulnerability (specifically people with limited access to alternative physical activity opportunities or means of transport);
  - Poor health vulnerability (specifically conditions where physical activity would be beneficial to physical or mental health, including routes suited to additional mobility and sensory needs); and
  - Access and geographical vulnerability (specifically the population who have limited access to natural green space accessed by the routes affected by the Proposed Development).

Sensitivity of the Receptor

4.9.30 The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in **section 4.5** (Vulnerable Groups). Most people in the local area would only make occasional use of the affected marine, coastal and inland recreational and leisure opportunities. The general population also includes those with access to many alternatives that are not affected. The general population comprise those members of the community with a high capacity to adapt to changes, for example due to greater resources and good physical and mental health.

4.9.31 The sensitivity of the vulnerable group population is **high**. Vulnerability in this case is linked to having fewer resources and less capacity to adapt to changes. The population may be more reliant on the affected recreational and leisure opportunities with greater likelihood that any additional disruption or disturbance could affect use and behaviours.

Magnitude of Impact

4.9.32 Volume 2, Chapter 8: Land Use and Recreation, of the PEIR notes that mitigation measures to be included in the CEMP, submitted alongside the ES, would minimise potential impacts of construction works. Volume 2, Chapter 8: Land Use and Recreation, of the PEIR concludes:

- The temporary effects arising during the construction period on agricultural land quality are assessed to be of long term temporary minor adverse significance.
- The effect of disruption and reduced access to agricultural land during construction of the Proposed Development are assessed to be long term temporary minor adverse.
- The temporary impact to the use of recreational resources (coastal areas, long distance routes and national cycle routes, other PRoWs and other recreational resources) is assessed to be minor adverse.

4.9.33 For population health, the magnitude of change due to the Proposed Development is considered to be **low**. There is likely to be a small scale of change over the *medium-term* from construction activities, including shipping movements and land access, affecting marine, nearshore and onshore recreational and leisure activities. At a given location the effect is likely to be *short-term*, with affecting *occasional* usage of open spaces (e.g., at landfall or along the Onshore HVDC Cable Corridor). It is likely there would be *rapid* reversal of any effect once the given construction activity concluded, with limited potential to cause lasting behavioural change. The outcome is likely to be a *minor* change in quality of life and/or cardiovascular related morbidity for a *small minority* of the affected population. *No* effect on healthcare services would be expected.

Significance of the Effect

4.9.34 The significance of the population health effect due to the Proposed Development is **minor adverse**, which is not significant in EIA terms. The magnitude of the impact is deemed to be low and the sensitivity of the vulnerable group population is considered to be high.

4.9.35 The effect is characterised as being *adverse* in direction, *temporary* and *indirect*. Although the scientific literature supports a clear association between recreational and leisure activities and health outcomes, there is likely to be at most a *slight* change in the population health baseline. This would have at most a *marginal* effect on health policy delivery and is not expected to change population health inequalities.

4.9.36 The effect would, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Further Mitigation

4.9.37 No additional mitigation is considered to be required.

Future Monitoring

4.9.38 No additional future monitoring is proposed.

Housing

4.9.39 This section considers the effects of construction workforce housing needs during the construction phase of the Proposed Development. Housing quality is

considered, as well as potential for temporary housing market changes, affecting key worker recruitment and community cohesion. Housing demand may also have indirect impacts on economic outcomes, including seasonal tourism bedspaces.

4.9.40 Housing quality exerts one of the strongest directly measurable effects on physical and mental health (Ige *et al*., 2019). The influence of housing on population health, particularly mental health, is strongly linked to community and environmental factors. The World Health Organization specifies that dwellings must be large enough to comfortably accommodate people of different ages with sufficient space for privacy. The WHO found a strong positive association between crowded housing and respiratory infections (Shannon *et al*., 2018). The evidence also suggests that overcrowding may also be associated with poor mental health outcomes such as stress and depression (Shannon *et al*., 2018). Adaptable homes that meet the needs of residents at different stages of their life are especially health-promoting. The literature suggests that people with disabilities living in accessible home environments have better health and wellbeing than those living in conventional or inaccessible home environments (MacLachlan *et al*., 2018). Physical health benefits were also identified with adaptable homes, such as reductions in falls and injuries. Self-perceptions of increased quality of life and general wellbeing were found, along with psychological effects such as less fear of falling/accidents and reduced feeling of depression (MacLachlan *et al*., 2018). The literature highlights an association between housing conditions (including air quality, noise levels, thermal comfort, access to natural light, access to high quality, and safe outdoor space) and health and wellbeing.

4.9.41 This section has been informed by Volume 4, Chapter 3: Socio-economics and Tourism, of the PEIR, which sets out relevant assessment findings and mitigation measures that have been considered.

4.9.42 A potential population health effect is considered plausible as there is a theoretical source-pathway-receptor relationship:

- The source is housing quantum, type, quality and conditions.
- The pathway is housing availability, affordability and conditions affecting physical and mental health.
- Receptors are residents in the local communities.

4.9.43 Furthermore, the theoretical effect is considered applicable in the context of this Proposed Development.

4.9.44 The population groups relevant to this assessment are:

- the local population of Torridge District Council and North Devon Council; and
- the sub-population vulnerable due to:
  - Young age vulnerability (including those residing in poor housing that can have lasting health effects across their life course);
  - Disability and older age vulnerability (who have particular housing needs);
  - Low income vulnerability (with fewer resources to respond to changes in housing availability or prices, as well as those dependant on incomes linked to accommodation, e.g., tourism related); and

- Poor health vulnerability (for whom impacts on housing and relocation would be disadvantageous to their health, wellbeing and independence).

Sensitivity of the Receptor

4.9.45 The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in **section 4.5** (Vulnerable Groups). The general population comprise those members of the community in good physical and mental health, whose access to stable housing would not be influenced by Proposed Development workers in the local area. The general population also comprise those with greater resources to access good quality housing.

4.9.46 The sensitivity of the vulnerable group is **high**. The sub-population includes a high representation of dependants, including children, elderly, and those receiving care due to poor health. The sub-population also includes those experiencing high levels of deprivation and low incomes. This sub-population may have fewer resources and less capacity to access good quality housing. The population may therefore be more sensitive to changes in local housing availability, including affecting key worker recruitment, and to economic outcomes, such as those linked to seasonal tourism.

Magnitude of Impact

4.9.47 **Volume 4, Chapter 3**: Socio-economics and Tourism, of the PEIR reports on the constrained local housing market and that the Proposed Development would place additional demands on short-term rents in the leisure and tourism sector. As stated in Volume 1, Chapter 3: Project Description, of the PEIR, there are expected to be 400 (peak) full-time-equivalent (FTE) jobs during construction. The working assumption for a conservative assessment is that the construction workforce are expected to be non-home-based. The Volume 4, Chapter 3: Socio-economics and Tourism conclusion is that the Proposed Development's construction workforce would use bed-spaces from the tourism short-term rental sector, which limits health related accommodation effects for local residents, including affordable housing.

4.9.48 For population health, the magnitude of change due to the Proposed Development is considered to be **low**.

4.9.49 In relation to housing quality for local residents, the change is likely to be *small* scale *and* over the *medium-term*. The change in housing is likely to affect a *small minority* of the population, with potential for *minor* changes in physical and mental health morbidity linked to living environment. The magnitude of change on this issue is therefore expected to be **low**.

4.9.50 In relation to potential changes in key worker recruitment and community cohesion linked to the short-term-let and hospitality sector (B&B and hotel bedspaces) market, the scale of change in required capacity for accommodation is considered *small* over the *medium-term*. This reflects that most essential workers would be seeking long-term rental or home ownership. Where demand for short-term-lets restricts the long-term rental market there is the potential for accommodation pressures, which may *occasionally* affect the ability of local

communities to attract and retain essential workers, with implications for local public and voluntary services. The temporary effect is likely to have a *minor* influence on physical and mental health related morbidity for a *small* minority of the population. The magnitude of change on this issue is therefore expected to be **low**.

4.9.51 In relation to indirect economic outcomes, where Proposed Development workers use short-term-let or hospitality sector (B&B and hotel bedspaces) accommodation, this may provide benefits during the off-season when vacancies would be higher. During peak season, there may be some displacement of tourists, with indirect effects to other parts of the tourism economy. Both beneficial and adverse effects are considered *small* scale, albeit *frequent* over a *medium-term* duration. The changes are anticipated to result in *minor* changes in income related physical and mental health outcomes for a *small minority* of the population. Effects would be expected to reverse *rapidly* once the need for temporary accommodation ceased, without lasting changes to tourism or housing markets. The magnitude of change for this issue is expected to be **low**.

Significance of the Effect

4.9.52 The significance of the population health effect for this determinant of health is **minor adverse** (not significant). This score reflects that the literature establishes a clear relationship between housing availability, affordability, adaptability and health outcomes. Any change in the health baseline due to the Proposed Development is likely to be *slight*, with at most a *marginal* effect on health inequalities and delivery of health policy.

Further Mitigation

4.9.53 No additional mitigation is considered to be required.

Future Monitoring

4.9.54 No additional future monitoring is proposed.

Employment and Income – Offshore

4.9.55 The section considers the employment and income effects of the Proposed Development during the construction phase. The construction of the Proposed Development may lead to health effects from wider indirect economic impacts, including temporary changes to commercial fishing.

4.9.56 The scientific literature identifies the following general points relevant to potential effects and health outcomes. Employment is an important determinant of health and well-being both directly and indirectly by making health-promoting resources available to an employee and any dependants. The socio-economic benefits associated with employment are improved living conditions and the potential to make healthier choices, (e.g., eating a healthier diet and undertaking more physical activity). If members of the community are employed, this can also generate indirect economic activity.

4.9.57 There is strong evidence for a protective effect of employment on depression and general mental health. Statistics showed favourable effects on depression and psychological distress (van der Noordt *et al*., 2014). Unemployment is associated with poor health outcomes, with more negative health effects linked to lower socio-economic status and unemployment due to health reasons, whilst a strong social network is beneficial in reducing the health effects of unemployment (Norström *et al*., 2014).

4.9.58 This section has been informed by Volume 3, Chapter 4: Commercial Fisheries, of the PEIR, which sets out relevant assessment findings and mitigation measures that have been taken into account.

4.9.59 Potential effects on human health are considered plausible as there are theoretical source-pathway-receptor relationships:

- The source is changes in direct and indirect jobs and economic activity.
- The pathway is good quality employment and income providing more health supporting resources.
- Receptors are people of working age (and their dependants).

4.9.60 Furthermore, the theoretical effect is considered applicable in the context of this Proposed Development.

4.9.61 The population groups relevant to this assessment are:

- the regional populations of the South West; and
- the sub-population vulnerable due to:
  - Young age vulnerability (including children and young people who are dependants, as well as young adults early in their careers);
  - Old age vulnerability (older people who are dependants);
  - Poor health vulnerability (people with existing poor physical and mental health, including for employment opportunities and as dependants);
  - Low-income vulnerability (people living in deprivation, including those on low incomes for whom good quality employment may be particularly beneficial); and
  - Access and geographical vulnerability (people for whom other job opportunities may be limited due to access and geographical limitations).

Sensitivity of the Receptor

4.9.62 The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in **section 4.5** (Vulnerable Groups). This reflects that most people would already be within stable employment that would be unaffected by the Proposed Development (or being a dependant of such a person).

4.9.63 The sensitivity of the vulnerable group population is **high**. Vulnerability in this case relates to people and their dependants who are in affected commercial fisheries related employment, on low incomes, have poor job security, poor

working conditions or who are unemployed. Future young or older people may also come to rely on those employed.

Magnitude of Impact

4.9.64 As reported in Volume 3, Chapter 4: Commercial Fisheries, of the PEIR, the Proposed Development is not anticipated to have significant residual effects on commercial fisheries. This includes the following impacts:

- reduction in access to, or exclusion from established fishing grounds;
- displacement leading to gear conflict and increased fishing pressure on adjacent grounds;
- disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity;
- increased vessel traffic associated with the Proposed Development within fishing grounds leading to interference with fishing activity; and
- physical presence of infrastructure leading to gear snagging.

4.9.65 For population health, the magnitude of change due to the Proposed Development is considered to be **low**.

4.9.66 Changes in fishing access would be *temporary* and of *short-to-medium-term* duration. The effects are judged to relate to a *small scale* of change given access to alternative fishing grounds for most employers. A *frequent* or *continuous* effect on employment and/or income may occur to a very *small minority* of the population associated with fishing activity on the Cornish coast and the Scilly Isles. This is likely to relate to minor changes in physical and mental health morbidity associated with job insecurity. At most there may be slight healthcare service implications. The magnitude is therefore, considered to be low.

Significance of the Effect

4.9.67 The significance of the population health effect for this determinant of health is **minor adverse** (not significant). The changes to employment and income associated with some commercial fishing activities having loss or restricted access to fishing grounds or interrupted fishing activity near the Offshore Cable Corridor of the Proposed Development would have adverse physical and mental health effects (including to dependants). This conclusion is supported by a *clear* association between employment and health in the scientific literature. Consequently, there may be a *small* adverse change in localised health baselines where coastal community employment is strongly linked to commercial fisheries activity by smaller vessels. This could be associated with a *marginal* increase in health inequalities. More generally the regional and national health baseline effects would, at most, be *slight*; with *limited* potential to affect the delivery of health policy.

Further mitigation

4.9.68 No additional mitigation is considered to be required.

Future Monitoring

4.9.69 No additional future monitoring is proposed.

Air quality

4.9.70 This section discusses changes to local air quality during construction and decommissioning of the Proposed Development, and related effects on human health. Construction activities have the potential to result in localised dust emissions.

4.9.71 The scientific literature indicates that there is an association between air quality emissions and health and wellbeing effects. The link is primarily between particulate matter and health effects. Whilst the literature supports there being thresholds set for health protection purposes, it also acknowledges that for particulate matter (PM) there are non-threshold health effects (i.e. when there is no known exposure threshold level below which adverse health effects may not occur). There are population groups that may be particularly sensitive to air quality effects. For example, young children are particularly susceptible to air pollution because of their developing lungs, high breathing rates per bodyweight, and amount of time spent exercising outdoors. Other vulnerable groups include the sick (e.g. people with type 2 diabetes), the elderly, and pregnant women.

4.9.72 This section has been informed by Volume 2, Chapter 7: Air Quality, of the PEIR, which sets out the relevant assessment findings and mitigation measures that have been taken into account.

4.9.73 A potential population health effect is considered plausible as there is a theoretical source-pathway-receptor relationship:

- The source is air pollutants (dust) from construction emissions.
- The pathway is diffusion through the air.
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

4.9.74 Furthermore, the theoretical effect is considered applicable in the context of this Proposed Development.

4.9.75 The population groups relevant to this assessment are:

- the site-specific population of Monkleigh & Putford, Bideford East, Bideford South and Two Rivers & Three Moors;
- the local population of Torridge District Council; and
- the sub-population vulnerable due to:
  - Young age vulnerability (children and young people are more susceptible to air quality due to time spent outdoors and physiological conditions);
  - Old age vulnerability (older people are more susceptible due to physiological conditions);
  - Poor health vulnerability (people with one or more chronic conditions such as COPD or asthma); and

- Access and geographical factors (people in close proximity to the Proposed Development Draft Order Limits).

4.9.76 Construction activities that produce dust tend to relate to the coarser fractions of PM_{10} and potential nuisance from dust deposition on property. The great majority of anthropogenic $PM_{2.5}$ health effects relate to combustion related processes, particularly changes in transport patterns, solid fuel burning from space heating or industrial processes that use fossil fuels.

4.9.77 Whilst the focus of discussion in this health chapter differentiates between coarse PM during construction and fine PM during operation, the health outcomes of PM_{10} and $PM_{2.5}$ are not distinguished in this assessment. This reflects that both are typically present (though the relative proportions change) and that the evidence base does not consistently distinguish their effects particularly given that $PM_{2.5}$ is a subset of PM_{10}. However, generally, elevated concentrations of $PM_{2.5}$ are considered of greater concern due to their greater potential to interact within the body.

4.9.78 Environmental air pollution is associated with increased risk of respiratory and cardiovascular diseases. Environmental pollution exerts its detrimental effects on the heart by developing pulmonary inflammation, systemic inflammation, oxidative stress, endothelial dysfunction and prothrombotic changes (Meo & Suraya, 2015). The adverse effects on health of PM and NO_2 indicates that the effects occur at air pollution concentrations lower than those in guidelines (WHO, 2013). Long term exposure to particulate matter is associated with incidence of coronary events, and this association persists at levels of exposure below the current limit values (Cesaroni *et al*., 2014). The magnitude of the long-term effects of NO_2 on mortality is at least as important as that of $PM_{2.5}$.

4.9.79 For construction dusts, the main health outcomes are likely to relate to exacerbation of existing conditions, such as asthma or COPD (i.e., airway inflammation by coarse PM) and to reductions in wellbeing associated with annoyance or reduced amenity. Whilst other outcomes (e.g., cardiovascular events) may be relevant in the event of brief high concentrations, such elevated exposures are expected to be avoided though the use of standard good practice mitigation that would be secured through the Institute of Air Quality Management (IAQM) dust guidance as discussed in Volume 2, Chapter 7: Air Quality, of the PEIR.

Sensitivity of the Receptor

4.9.80 The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in **section 4.5** (Vulnerable Groups). The general population comprise those members of the community who live, work and study at a distance where high levels of dispersion and deposition would greatly limit the effects of any change in exposure due to the Proposed Development. Furthermore, most people enjoy good respiratory health (e.g., do not have asthma) and are not at a life stage (e.g., infant or frail elderly) with particular sensitivity to air quality.

4.9.81 The sensitivity of the vulnerable group population is **high**. This reflects that the sub-population includes a high representation of dependants, including both children, elderly and those receiving care due to poor health. For example, existing respiratory conditions including asthma, COPD and type 2 diabetes would increase sensitivity. People likely to be most affected by the Proposed Development are those living close to the construction works (see receptors listed in Volume 2, Chapter 7: Air Quality, of the PEIR).

Magnitude of Impact

4.9.82 Volume 2, Chapter 7: Air Quality, of the PEIR asserts that the results of the risk assessment of construction dust impacts undertaken using the IAQM dust guidance, indicates that before the implementation of mitigation and controls, the risk of dust impacts would be high. Implementation of mitigation measures described in the IAQM construction dust guidance would be expected to reduce the residual dust effects to a level categorised as not significant. The resulting air quality effect of the Proposed Development is therefore considered to be negligible.

4.9.83 For population health, the magnitude of change due to the Proposed Development is considered to be **low**. The potential for effects is expected to be *occasional* and limited in extent. Such changes during construction are expected to be *short-term* at any given location during the construction period, with a *minor* influence on quality of life and/or morbidity risk for respiratory and cardiovascular conditions for a *small minority* of the population. Most effects on wellbeing would *rapidly* reverse, with *no* discernible influence for healthcare services. The transitory nature of the works along the Onshore HVDC Cable Corridor is relevant and indicates that at any given location exposures would be of shorter duration.

Significance of the Effect

4.9.84 The effect is characterised as being *adverse* in direction, *temporary* and *direct*. For the health assessment, the construction air quality effects are considered **minor adverse** (not significant in EIA terms). This assessment conclusion reflects that whilst the scientific literature establishes a causal effect relationship between changes in air quality and health outcomes, the changes would result in a *very limited* effect in the health baseline of the local population. This finding takes into account potential for mobilisation of new or historic contaminants in construction dusts. The conclusion also takes account of non-threshold effects of some air pollutants. The temporary and slight reduction in air quality is not expected to affect health inequalities. All air quality changes are predicted to be well within statutory standards set for health protection.

Further Mitigation

4.9.85 No additional mitigation is considered to be required.

Future Monitoring

4.9.86 No additional future monitoring is proposed.

Water quality

4.9.87 This section considers water quality implications for population health from potential pollution releases during construction and decommissioning.

4.9.88 During construction, there is potential for the accidental release of lubricants, fuels and oils from construction machinery. This can occur because of spillages, leakage from vehicle storage areas and direct release from construction machinery working directly in or adjacent to water bodies, including land drainage channels. Bentonite, which is an inert clay-based material used at the drill head during the installation of trenchless crossings, can breakout during use and cause smothering of habitats, although it is inert and not a pollutant.

4.9.89 Pollution of surface water or groundwater bodies which are subsequently used as a potable source could pose a risk to public health. The Proposed Development Area is predominately agricultural and food safety could be compromised by contamination affecting agricultural land directly, or indirectly contaminating agricultural water sources. This includes contamination that occurs during flood events.

4.9.90 Bathing water quality at the nearshore of the possible landfall locations may be temporarily affected by activities of the Offshore Cable Corridor (including Horizontal Direction Drilling (HDD)). The key health outcomes relevant to this determinant of health arise from toxicological exposures by skin contract, accidental swallowing of water or inhalation and can cause a wide range of acute or chronic illnesses.

4.9.91 Changes to water quality onshore may be due to either new accidental pollutant spills or mobilisation of historic pollutants. In both cases standard good practice pollution control measures form part of construction management plans. Increased suspended sediment concentrations (SSC) that do not pose toxicological risk may discourage bathing but are not expected to pose direct risks to population health.

4.9.92 The scientific literature identifies the following general points relevant to potential exposures and health outcomes. Recreational exposure to natural toxins by skin contact, accidental swallowing of water or inhalation can cause a wide range of acute or chronic illnesses (Koreivienė *et al*., 2014). One of the main channels of human exposure to microorganisms and pollutants is through contact with polluted bathing water (Efstratiou, 2001). Several studies have concluded that a number of symptoms of ill health mainly affecting the gastrointestinal tract, ear, skin, eye and upper respiratory tract have been associated with direct contact with contaminated bathing water (Efstratiou, 2001; Eregno *et al*., 2016; Iñiguez-Armijos *et al*., 2020).

4.9.93 Drinking water supplies from both surface water and groundwater sources may also be contaminated during flooding events (Andrade *et al*., 2018) including irrigation water for agricultural purposes which is a risk factor for microbial and chemical contamination of fruits and vegetables (Park *et al*., 2012).

4.9.94 This section has been informed by Volume 2, Chapter 3: Hydrology and Flood Risk, of the PEIR, which set out relevant assessment findings and mitigation measures that have been taken into account.

4.9.95 A potential population health effect is considered plausible as there is a theoretical source-pathway-receptor relationship:

- The source is mobilisation of contaminants or sediment or new leaks or spills of pollutants.
- The pathway is transmission through marine or onshore waters. Exposure includes ingestion and dermal contact.
- Receptors are populations of residents and visitors.

4.9.96 Furthermore, the theoretical effect is considered applicable in the context of this Proposed Development.

4.9.97 The population groups relevant to this assessment are:

- the site-specific population of Monkleigh & Putford, Bideford East, Bideford South and Two Rivers & Three Moors. The local population of Torridge District Council; and
- the sub-population vulnerable due to:
  - Young age vulnerability (children and young people as more sensitive to contaminants);
  - Old age vulnerability (older people as more sensitive to contaminants); and
  - Poor health vulnerability (people with existing poor physical health or mental health, as more sensitive to contaminants).

Sensitivity of the Receptor

4.9.98 The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in **section 4.5** (Vulnerable Groups). This reflects many people would make limited use of coastal waters for bathing or related recreation. The potential for any effect to public water supplies is considered very limited. The general population includes those who are in good health and less likely to be adversely affected by contaminants.

4.9.99 The sensitivity of the vulnerable group population is **high**. Vulnerability in this case relates to people more sensitive due to life stage or health status. For example, children and young people may spend more time in coastal waters and due to developmental stage or relative body size have increased risks from a given toxin exposure. Increase sensitivity to exposure may also apply to older people and those with existing poor health (e.g. long-term illness).

Magnitude of Impact

4.9.100 Volume 2, Chapter 3: Hydrology and Flood Risk, of the PEIR concludes that following the integration of measures adopted in the outline CEMP and the Construction Drainage Strategy, effects in relation to:

- Contaminated runoff on the quality of surface water and ground receptors would be negligible.

- Increased flood risk arising from additional surface water runoff would be negligible adverse.
- Increased flood risk arising from damage to existing flood defences would be minor adverse.
- Damage to existing field drainage would be minor adverse.
- Damage to existing water pipelines would be negligible adverse.

4.9.101 For population health, the magnitude of change due to the Proposed Development is considered to be **low**.

4.9.102 This reflects that nearshore works would result in high dispersion in relation to bathing waters and the use of standard good practice mitigations to avoid and contain any spills or appropriately respond to historic contamination encountered. There would be the potential for some *localised* effects to a *limited number* of water courses. The level of exposure to any contaminants would likely be very *low*, *short-term* and associated with *one-off* events. The severity of health outcomes would likely relate to a *minor change* in morbidity related risk factors associated with toxin exposures for a *very few* people. At most there may be slight healthcare service implications.

Significance of the Effect

4.9.103 The effect is characterised as being *adverse* in direction, *temporary* and *direct*. The significance of the population health effect for this determinant of health is **minor adverse** (not significant in EIA terms). This conclusion reflects that although there are credible pathways in the scientific literature by which bathing waters and onshore waters (surface or ground) may be affected, these are addressed by mitigation and there is therefore potential for only a *very limited* effect on the population health baseline. Water quality is expected to be well within standards for bathing and drinking water and the changes are not expected to affect delivery of health policy or influence inequalities.

Further Mitigation

4.9.104 No additional mitigation is considered to be required.

Future Monitoring

4.9.105 No additional future monitoring is proposed.

Land quality

4.9.106 Linked to the issue of air and water quality discussed in the assessment sections (**section 4.9**, Air Quality and Water Quality) respectively, the source of contaminants may include new or historic soil-based pollutants or toxins. Occupational soil contamination exposures are governed by statutory health and safety requirements, appropriately avoiding or reducing risks to the construction workforce, including through working practices, management plans and personal protective equipment. For the community, the potential for exposures may either

be via water, as discussed in **section 4.9** Water Quality, or via construction dusts as discussed in the **section 4.9** Air Quality. Given restricted access to construction areas, it is unlikely that there is potential for the community to have direct contact with contaminated soils to an extent that could affect public health. The significance of effect would be **minor adverse**, which would not be significant. This is not assessed further as a separate issue.

4.9.107 A detailed Soil Management Plan will be prepared in general accordance with the Outline Soil Management Plan that will be submitted as part of the Environmental Statement. A detailed Soil Management Plan would be prepared as part of the wider CEMP, to be secured as a Requirement of the DCO.

Noise and Vibration

4.9.108 There is the potential for noise and vibration effects from onshore activities. Construction activities may result in changes to noise during the day and at night. Some specific activities such as concrete pouring require periods of night-time working, however the majority of works would occur during normal daytime construction working hours.

4.9.109 In general, the scientific literature suggests the potential for annoyance with an indication of further stress due to exposure to environmental noise (Guski *et al*., 2017). Annoyance describes negative reactions such as disturbance, irritation, dissatisfaction, and nuisance (Guski, 1999). Environmental noise can initiate physiological stress responses in an individual that leads to a cascade of effects including a rise in heart rate and in levels of stress hormones(Guski *et al*., 2017). These responses influence risk factors for cardiometabolic health issues including blood pressure, blood sugar and blood fats and long-term exposure may affect mental health and lead to diseases such as diabetes, heart attack, and stroke (Münzel *et al*., 2017; Münzel, Schmidt, *et al*., 2018; Münzel, Sørensen, *et al*., 2018).

4.9.110 Night-time noise may disrupt the total sleep time and the required physiological and mental restoration in an individual even at low levels (Guski *et al*., 2017). Evidence therefore suggests a relationship between environmental noise and annoyance (Guski *et al*., 2017), sleep disturbance (Basner & McGuire, 2018), cardiometabolic health (Van Kempen *et al*., 2018), learning outcomes (Clark *et al*., 2020) and mental health (Brink *et al*., 2008, 2008). Factors that can influence an observed annoyance response to exposure may include the source of the noise, sound level, perceived danger and fear associated with noise source, ability to cope, individual noise sensitivity, expectations, and individual factors that may increase vulnerability such as age, social disadvantage and employment status (Fenech *et al*., 2021; Notley, 2014; UK Civil Aviation Authority, 2021).

4.9.111 This section has been informed by Volume 2, Chapter 6: Noise and Vibration, of the PEIR, which sets out relevant assessment findings and mitigation measures that have been taken into account.

4.9.112 A potential population health effect is considered plausible as there is a theoretical source-pathway-receptor relationship:

- The source is noise and vibration generated by construction activities and vehicle movements.

- The pathway is pressure waves through the air and ground vibrations.
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

4.9.113 Furthermore, the theoretical effect is considered applicable in the context of this Proposed Development.

4.9.114 The population groups relevant to this assessment are:

- The site-specific population of Monkleigh & Putford, Bideford East, Bideford South and Two Rivers & Three Moors;
- The local population of Torridge District Council;
- The sub-population vulnerable due to:
  - Young age vulnerability (particularly with regard to educational and sleep disruption);
  - Old age vulnerability (particularly with regard to sleep disruption);
  - Poor health vulnerability (people with an existing physical or mental health condition);
  - Low income vulnerability (people on low incomes may have fewer resources to adapt e.g. seek respite or install insulation and people who are economically inactive may spend more time in affected dwellings); and
  - Access and geographical vulnerability (people for whom close proximity to the proposed changes increases sensitivity).

Sensitivity of the Receptor

4.9.115 The sensitivity of the general population is considered to be low. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in **section 4.5**, Vulnerable Groups. The general population comprise those members of the community in good physical and mental health and with resources that enable a high capacity to adapt to change. Additionally, most people live, work or study at a distance from the construction works where noise and vibration would be unlikely to be a source of concern.

4.9.116 The sensitivity of the vulnerable group population is **high**. The sub-population more sensitive to noise includes children, elderly and those receiving care due to poor health. This sub-population may experience existing widening inequalities due to living in areas with increased noise and elevated deprivation, with limited capacity to adapt to changes. Vulnerability particularly relates to those living close to the construction activities and converter stations, including those spending more time in affected dwellings, e.g., due to low economic activity, shift work or poor health. People who are concerned or have high degrees of uncertainty about noise and its effect on their wellbeing may be more sensitive to changes in noise. The small population living at the coastal edge may experience nearshore noise (noise can travel longer distances across water than land) as well as night-time landfall noise. Occupants of dwellings with less acoustic insulation, such as caravans, may be more sensitive to noise effects.

Magnitude of Impact

4.9.117 As reported in Volume 2, Chapter 6: Noise and Vibration, of the PEIR, construction along the Onshore HVDC Cable Corridor would involve activities that are mobile (i.e., only temporarily taking place at a given location during the construction period), such as trenching for cable laying. Mobile works would impact receptors for short periods of time.

4.9.118 Volume 2, Chapter 6: Noise and Vibration, of the PEIR, concludes:

- Noise and Vibration impacts due to the Onshore HVDC Cable at Landfall are assessed to be negligible adverse.
- With suitable measures in place, Noise and Vibration impacts due to the Onshore HVDC Cable Corridor Landward of the Transition Joint Bay are assessed to be minor adverse.
- Noise and Vibration impacts due to the construction of the Converter Stations are considered minor adverse.
- Noise impacts due to construction traffic on Local Highway Networks are assessed to be minor adverse.

4.9.119 Construction noise mitigation would be applied as best is reasonably practicable. Noise impacts from construction activities may be reduced via the implementation of a construction noise management plan. Temporary acoustic barriers, quieter equipment, and minimising the amount of night-time work required are possible measures which may reduce noise impacts.

4.9.120 Vibration impacts due to construction of the onshore export cable at Landfall would be minor adverse. This reflects that the nearest receptors are residential. Construction noise mitigation would be applied as best reasonably practicable. For population health, the magnitude of change due to the proposed construction works is considered to be **low**.

4.9.121 The *small* scale of change in noise and vibration levels is likely to predominantly relate to a *minor* change in quality of life and/or cardiovascular and mental wellbeing morbidity for a *small minority* of the community populations at landfall, along the Onshore HVDC Cable Corridor and near the converter stations. The changes would be *short-term* duration at any given location during the construction period, reflecting the transitory nature of works, with potential for *frequent* construction related noise exposures. The greatest potential for effects is likely for the few people close to either the landfall or the onshore substations. Prolonged periods of construction noise at night or daytime disruption of educational activities at schools are not anticipated.

Significance of the Effect

4.9.122 The significance of the population health effect due to the Proposed Development is **minor adverse**, which is not significant in EIA terms. The magnitude of the impact is deemed to be low and the sensitivity of the vulnerable population group is considered to be high.

4.9.123 Noise and vibration impacts from construction activities and construction traffic would be mitigated through the use of appropriate construction hours and best

practice measures set out in the Construction Noise Management Plan, as detailed in Volume 2, Chapter 6: Noise and Vibration, of the PEIR.

4.9.124 Based on these mitigation measures, the effect is characterised as being *adverse* in direction, *temporary, short-term* and *direct*. Although the scientific literature indicates a clear association between elevated and sustained noise and vibration disturbance and reduced health outcomes, the changes would result in a *very limited* effect in the health baseline of the population. The distribution of effects is not expected to affect health inequalities. The level of effect is not expected to affect the ability to deliver local or national health policy.

Further Mitigation

4.9.125 No additional mitigation is considered to be required.

Future Monitoring

4.9.126 No additional future monitoring is proposed.

Health and Social Care Services

4.9.127 This section considers the potential implications for NHS routine service planning, and any consequent population health effect of changes in demand associated with the Proposed Development's workforce.

4.9.128 Health service capacity may be affected by a non-permanent construction workforce in the area. These are people who are not usually residents in the area (so not registered with local NHS services). This group could include multinational workers. During construction of the Proposed Development, there is a potential for transient workers having an impact on the local healthcare capacity. The health assessment considers the current level of demand, including primary care capacity near the Proposed Development Draft Order Limits.

4.9.129 A potential population health effect is considered plausible as there is a theoretical source-pathway-receptor relationship:

- The source is changes in demand for medical and healthcare facilities as a result of unplanned need for NHS attendance.
- The pathway is change in capacity, staffing and resources of the local NHS.
- Receptors are local community populations accessing these services and facilities. This may include healthcare staff should they experience resource pressures.

4.9.130 Furthermore, the theoretical effect is considered applicable in the context of this Proposed Development.

4.9.131 The population groups relevant to this assessment are:

- The local population of Torridge District Council and North Devon Council;
- The sub-population vulnerable due to:
  - Young age vulnerability (including children, young people and pregnant mothers as higher users of healthcare).

- Old age vulnerability (including older people as higher users of healthcare).
- Poor health vulnerability (people with existing poor physical and mental health as higher users of healthcare).
- Access and geographical vulnerability (people who experience existing access barriers to healthcare).

4.9.132 Whilst there is the potential for a broad range of services to be affected, the assessment distinguishes between:

- demand that is identified and met through routine NHS service planning, which is funded through general taxation; and
- demand that is in addition to this.

4.9.133 In general, it can be assumed that home-based workers will continue to make use of community facilities, including healthcare, at their home location. It will therefore only be non-home-based workers that may generate regular additional demand for community facilities, including healthcare, in the area. Whilst there is the potential for additional healthcare demand from some members of the construction and decommissioning workforces, the scale is expected to be within normal health service planning margins and not a step-change in demand.

4.9.134 Volume 1, Chapter 3: Project Description, of the PEIR, estimates there would be 400 (peak) full-time-equivalent (FTE) jobs during construction. The working assumption for a conservative assessment is that all construction workers are expected to be non-home-based, i.e. from outside the North Devon and Torridge area. The expectation is that the non-home-based workforce would have either NHS entitlement or suitable medical insurance.

Sensitivity of the Receptor

4.9.135 The sensitivity of the general population is considered to be **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in **section 4.5**, Vulnerable Groups. There are a suitable range of existing primary healthcare services located in proximity to the Proposed Development. The majority of construction workers would have existing NHS entitlements and access healthcare services as usual close to their usual place of residence, without implications for healthcare capacity changes.

4.9.136 The sensitivity of vulnerable groups is considered **high**. This reflects the presence of people who require regular health care, e.g., older people with multiple long-term conditions. Members of the workforce, or their dependants, with particular health needs, e.g. chronic long-term conditions. Health professionals who are facing increased demand are also considered to be highly sensitive.

Magnitude of Impact

4.9.137 This section has been informed by the healthcare capacity analysis undertaken below.

4.9.138 An indicative reference point (postcode: EX39 2DR) from which workers, whilst at work, may access healthcare services has been selected. This is situated within the central section of the Proposed Development and is used as a conservative approach to analysing primary healthcare capacity, i.e. gives a catchment with fewer services. If measured from the site boundaries, work compounds or access roads, the distance to GP practices in the vicinity will be shorter, and a larger number of practices would likely be included in the catchment area.

4.9.139 Both local context and the scientific literature (Santos et al., 2017) are informative in determining appropriate distances over which to assess primary healthcare capacity. The 2017 study by (Santos et al., 2017) based in the East Midlands of England, found that the average (mean) distance to a patient's chosen practice was 1.877 km (1.2 mile), which was further than the average of the nearest GP practice, 1.197 km (0.74 mile). The difference reflected patient choices and preferences, including driven by clinical quality. Santos et al. note that 91.5% of those in urban areas choose a GP practice within 3 km (1.9 mile) and 91.9% of residents in rural areas choose a practice within 7 km (4.3 mile).

4.9.1 The NHS Digital General Practice Workforce February 2024 (NHS Digital, 2024) data release provides information on existing capacity. There are 3 GP practices within both the 3 km and 7 km distances identified by Santos et al., all are within 2.4 km of the aforementioned location* (**Table 4.23**). All three are currently accepting new patients and all are within the recommended patient to GP ratio of 1,800 patients per FTE GP (a commonly applied benchmark that is indicative but often exceeded in practice** (HUDU, 2019). It is noted that patient ratios may not always reflect particular local context in terms of capacity, however, the data does give a broad indication of sensitivity to any changes in demand.

Table 4.23: GP Primary care capacity close to the Proposed Development – February 2024 data release

GP Practice	Patients	GP FTE	GP Patient ratio	Distance (km)	Accepting new patients?	Accepting out of area registrations?
Bideford Medical Centre	15,386	11.91	1,292	0.32	Yes	Yes
Wooda Surgery	9,360	8.47	1,105	0.48	Yes	Yes
Northam Surgery	12,944	9.35	1,384	2.41	Yes	Yes
Total	**37,690**	**29.7**	**1,267**	-	-	-

4.9.2 Whilst the Proposed Development does not rely on local primary care capacity, the data suggests that 15,818 additional patients could be registered before reaching the 1,800 patients per GP ratio benchmark across these three practices.

* Using NHS service search for postcode EX39 2DR

** London's Healthy Urban Development Unit (HUDU) uses the 1,800 people per GP as a default benchmark, based on guidance from the Royal College of GPs.

4.9.3 This indicative capacity calculation is a worst case as it is likely that the construction workforce would be accommodated across a wider area and therefore any medical needs would be distributed across a larger range of primary care providers. The expectation is that for non-urgent medical care many workers would, in the first instance, use either the NHS 111 service or the contractor's occupational healthcare services. In the event of construction workers being signed-off work for health reasons and being fit to travel, the expectation is that they would return to their usual place of residence and receive medical care from their registered providers. Such measures would limit the potential for inappropriate attendance at local A&E or GP surgeries.

4.9.4 The magnitude of change due to the Proposed Development is **low**. There would be a *small* scale of change in NHS demand due to the presence of the construction workforce. There is likely to be some residual *occasional* access of services over the *medium-term*. Any impact on healthcare capacity is likely to equate to a *very minor* change in *morbidity* related outcomes for a *small minority* of the study area community populations. The effect on routine health service planning is likely *slight*.

Significance of the Effect

4.9.5 The professional judgement is that the significance of the population health effect would be up to **minor adverse** (not significant). The score reflects a clear association in the scientific literature as to the importance of appropriate health care access, but also that there is some uncertainty as to the efficacy of occupational health interventions in avoiding inappropriate A&E attendance and other healthcare service usage. The level of change in the study areas health baseline due to the Proposed Development is likely to be *very limited*, with at most a *marginal* effect on the delivery of health policy and inequalities.

Further Mitigation

4.9.6 Occupational health provision scaled with construction worker numbers to maintain compliance with relevant statutory requirements, as well as implementing a protocol to manage the first point of contact for health queries from construction workers and subsequent avenues for further healthcare support. The objective of the protocol is to minimise use of local NHS primary healthcare providers and inappropriate use of A&E services by construction workers. This would be secured through the CEMP.

Residual Effect

4.9.7 The residual effect, taking account of such mitigation, is expected be a **negligible** (not significant) population health effect.

4.10 Assessment of Operational Effects

4.10.1 The impacts of the operation and maintenance phase of the Proposed Development have been assessed. The potential impacts arising from the operation and maintenance phase of the Proposed Development are listed in

Table 4.25 along with the maximum design scenario against which each impact has been assessed.

4.10.2 A description of the potential effect on receptors caused by each identified impact is given below.

Noise and Vibration

4.10.3 This section discusses the operational changes in noise exposure from the Proposed Development that may be detrimental to population health. The converter stations include fixed plant such as transformers, which can cause community annoyance due to noise, including distinctive tonal characteristics. Noise effects from other operational activities are unlikely to have the potential to affect population health.

4.10.4 This section has been informed by Volume 2, Chapter 6: Noise and Vibration, of the PEIR, which sets out relevant assessment findings and mitigation measures that have been taken into account.

4.10.5 The potential population health effect is considered plausible as there is a theoretical source-pathway-receptor relationship:

- The source is noise generated by converter stations electrical infrastructure.
- The pathway is pressure waves through the air.
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

4.10.6 Furthermore, the theoretical effect is considered applicable in the context of this Proposed Development.

4.10.7 The population groups relevant to this assessment are the same as those listed in paragraph 4.9.114.

Sensitivity of the Receptor

4.10.8 The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in **section 4.5**, Vulnerable Groups. Most people in the study area live, work or travel at a distance from the Proposed Development's converter stations where noise effects would be imperceptible.

4.10.9 The sensitivity of the vulnerable group population is **high**. The sub-population is sensitive for reasons discussed in the **section 4.9** Transport modes, access and connections. Vulnerability relates to those living close to the converter stations, including those spending more time in affected dwellings e.g., due to low economic activity, shift work or poor health.

Magnitude of Impact

4.10.10 Volume 2, Chapter 6: Noise and Vibration, of the PEIR, states:

- As the design and specifications of on-site fixed plant at the onshore is not yet confirmed, the operational noise effects have not been quantitively assessed

at this stage. Volume 2, Chapter 6: Noise and Vibration, of the PEIR, does however explain the approach to assessment and the expectation that effects would be mitigatable to avoid significant adverse effects. Further assessment of operational substation noise would be reported in the ES.

- Operational noise limits will be derived and secured as a requirement of the DCO which will inform the design principles for the converter stations and Alverdiscott Substation Connection Development. These limits will be derived to ensure significant effects are avoided via the implementation of appropriate mitigation and design principles. As such, the effect will be minor adverse.

4.10.11 The magnitude of change due to the operational activities is expected to be no greater than **low**. In terms of population health, the expectation is that there would be a *small* scale of change in noise levels and, if this is the case, it would predominantly relate to a *minor* change in quality of life and/or cardiovascular and mental health morbidity for a very *few* people. This reflects the predominantly rural context of the converter stations setting away from population centres. That level of change at the individual level, whilst appropriate to mitigate, would be unlikely to constitute a population health effect. The change is expected to be *long-term* duration and *continuous*, potentially affecting daytime and night-time periods.

4.10.12 It is likely that much of the plant would be housed internally, either in one or multiple buildings. Plant noise may be controlled through robust façade sound insulation in the building design, acoustic barriers around the plant and/or site perimeter, and through the use of bespoke acoustic enclosures where each is appropriate.

Significance of the Effect

4.10.13 The significance of the population health effect due to the Proposed Development is **minor adverse**, which is not significant in EIA terms. This score reflects that noise and vibration impacts from construction activities and construction traffic will be mitigated through the use of appropriate construction hours and best practice measures agreed through the Construction Noise Management Plan, as detailed in Volume 2, Chapter 6: Noise and Vibration, of the PEIR. Although the scientific literature indicates a *clear association* between elevated and sustained noise and vibration disturbance and reduced health outcomes, the changes would result in a very *limited* effect in the health baseline of the population. The distribution of effects is not expected to affect health inequalities. The level of effect is not expected to affect the ability to deliver local or national health policy.

Further Mitigation

4.10.14 No additional mitigation is considered to be required.

Future Monitoring

4.10.15 No additional future monitoring is proposed.

Public Understanding of Risk (Converter Stations)

4.10.16 This section considers the potential operational population health effect due to electro-magnetic fields (EMF) exposure associated with the Proposed Development.

4.10.17 All electrical systems, including natural processes and living organisms, generate EMF. EMF effects diminish rapidly with distance, often requiring only a few metres, or less, to reach background levels (Gajšek et al., 2016).

4.10.1 In line with good practice, public understanding of risk in relation to operational EMF is assessed. This includes considering how mental health effects can be avoided or reduced through provisions of timely and non-technical information explaining how actual health risks are mitigated.

4.10.2 The scientific literature identifies the following general points relevant to potential effects and health outcomes. The way risks are understood has important influences on health behaviour (Ferrer and Klein, 2015). Awareness of risk can affect mental, physical and emotional wellbeing, and can be worse when it is accompanied by uncertainty (Luria *et al*., 2009).

4.10.3 The ultimate goal of dialogue between regulators and communities is to produce an informed public (Sinisi, 2004). Trust, credibility, competence, fairness and empathy are of great importance (Sinisi, 2004) and the routine monitoring and clear communication of results can greatly increase trust, empower people and reduce fear factors (WHO, 2013).

4.10.4 The views that people hold can be associated with low-grade illnesses (e.g. headaches or hypertension) and can be exacerbated when there is uncertainty (Luria *et al*., 2009).

4.10.5 As noted in **Table 4.22**, the Proposed Development would adopt and implement relevant design guidelines of the ICNIRP and UK Government voluntary code of practice (ICNIRP, 1998, 2010; Department for Energy and Climate Change, 2012). Such guidelines are deemed sufficient for avoiding actual EMF risk. The focus of this assessment section is therefore not on the actual risk, which is considered appropriately mitigated, but on people's understanding of risk (risk perception). This relates to the potential for community concern about their proximity to the electrical infrastructure, including cable corridors and the converter stations, to affect mental health, even where relevant public EMF exposure guideline limits are met.

4.10.6 The potential health effect is considered plausible as there is a theoretical source-pathway-receptor relationship:

- The source is electrical equipment introduced by the Proposed Development.
- The pathway is concern about EMF exposure, affecting mental health.
- Receptors are residents in the local community, particularly those living in close proximity to new electrical infrastructure.

4.10.7 Furthermore, the theoretical effect is considered applicable in the context of this Proposed Development.

4.10.8 The population relevant to this assessment are:

- The site-specific populations near landfall, the Onshore HVDC Cable Corridor, and the converter stations: Monkleigh & Putford, Bideford East, Bideford South and Two Rivers & Three Moors;
- The local population of Torridge District Council (reflecting potential for wider community concern);
- The sub-population vulnerable due to:
  - Low-income vulnerability (people with fewer resources may feel less able to adapt to changes that concern them);
  - Poor health vulnerability (people with existing poor mental health may be more sensitive to changes that concern them); and
  - Access and geographical vulnerability (people for whom close proximity increases sensitivity).

Sensitivity of the Receptor

4.10.9 The sensitivity of the general population is considered to be **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in **section 4.5**, Vulnerable Groups. Most people in the study area live, work or travel at a distance from the Proposed Development's electrical infrastructure where they would not be concerned about the potential for EMF risks. This group also includes that portion of the population who are ambivalent or not concerned about EMF as a risk factor.

4.10.10 The sensitivity of the vulnerable sub-population is **high**. The sub-population includes people who may be uncertain or concerned about EMF and this may exacerbate existing mental health conditions or be a source of stress and anxiety in itself. This may particularly be the case for people with near views and/or who live in close proximity to the convertor stations.

Magnitude of Impact

4.10.11 The magnitude of change due to the Proposed Development is considered to be **low**. The level of actual exposure is negligible, however the scale of change that may contribute to community concern about EMF *is medium, continuous and long-term*. The severity of health outcome relates to concern about risks of EMF, as no actual risks are anticipated. These relate predominantly to a *minor* change in mental health related morbidity for a *very few people* within the population. Such individual level effects are unlikely to have implications for health service capacity. For many people there is likely to be a *rapid* reversal of effects should their concerns be responded to and resolved to their satisfaction.

Significance of the Effect

4.10.12 The significance of the population health effect is **minor adverse** which is not significant in EIA terms. The magnitude of the impact is deemed **low** and the sensitivity of the vulnerable population group is considered to be **high**.

4.10.13 The professional judgement is that there could be a *slight adverse* change in the health baseline for the local population if concerns are widespread. This

conclusion reflects scientific understanding of the impact of *uncertainty* or *concern* about environmental risks on mental health. It also reflects that the actual risks would be *well within* regulatory standards for EMF and that most members of the public would expect this to be the case. The context that electrical transmission infrastructure and converter stations are relatively common features would also be expected to inform population risk perception.

Further Mitigation

4.10.14 The following additional mitigation and enhancements are proposed, to be secured through DCO mitigation measures:

- Avoid visible electrical infrastructure (other than arrays) close to PRoW to reduce perceptions of risk, and also encourage the uptake of active travel and physical activity. This may include siting and visual screening of electrical infrastructure to minimise any perceived risks and encourage use of PRoW. Visual cues are important in risk perception. Screening electrical infrastructure would support reducing the mental health risks and increasing physical activity use on PRoW.
- Continued community consultation and sharing of non-technical information relating to the Proposed Development (e.g., explaining compliance with public exposure guidelines, actual risks associated with the Proposed Development), to allow people to express concerns and gain awareness of actual health effects. This will partially be met through the application process, including PEIR and the EIA NTS. Non-technical information and a point of contact for community liaison can also be provided on the Proposed Development website.

Future Monitoring

4.10.15 No additional future monitoring is proposed.

Residual Effect

4.10.16 The residual effect, taking account of such mitigation, is expected be a **negligible** (not significant) population health effect.

Wider Societal Infrastructure and Resources

4.10.17 The electricity transmitted by the Proposed Development would enable many aspects of everyday life that either protect or promote good health.

4.10.18 UK energy security is important for maintaining continuous and affordable electricity which supports many aspects of public health. This includes power to safely cook and refrigerate food, regulate the temperature and lighting of homes and schools, operate health and social care services, maintain economic productivity and employment, and operate technologies that improve quality of life and social support. Sustained interruption of supply or rapid increases in costs would both be expected to result in reductions in health and well-being outcomes. Increases in the cost of electricity, particularly in the context of rising costs of

living, can cause some people to prioritise essential costs (e.g., food, shelter) over electricity demands (e.g., heating a home).

4.10.19 Energy insecurity is a public health concern particularly for vulnerable populations (e.g., low-income, children, elderly). It is associated with hazardous exposures, heat stress, cold stress, asthma, chronic disease, poor mental health, parental fear and stigma, family disruption and residential instability (Hernández, 2016). In children, energy insecurity has been shown to affect development, hospitalisation and overall child health (Cook *et al*., 2008).

4.10.20 The potential health effect is considered plausible as there is a theoretical source-pathway-receptor relationship:

- The source is renewable energy generation;
- The pathway is energy security whilst avoiding climate altering emissions; and
- Receptors are population connected to the national power grid.

4.10.21 Furthermore, the theoretical effect is considered applicable in the context of this Proposed Development.

4.10.22 The population group relevant to this assessment are:

- The 'national' populations of England and the wider UK.
- The vulnerable sub-populations including young and old people, people with low income and their dependants, people with poor health or disabilities, people experiencing social disadvantage and people with access and geographical vulnerability.

Sensitivity of the Receptor

4.10.23 The sensitivity of the general population is considered to be **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in **section 4.5**, Vulnerable Groups. The general population comprise those members of the community in good physical and mental health and with greater resources to respond to the costs of energy or to interruptions in supply.

4.10.24 The sensitivity of the vulnerable group population is considered to be **high**. The sub-population on low incomes, for whom energy security and interruption of energy supplies are more sensitive, pose a greater risk. This is particularly the case for dependants at risk during temperature extremes, including heatwaves and cold weather, as well as people in poor health, including when accessing healthcare.

Magnitude of Impact

4.10.25 The magnitude of change due to the Proposed Development is considered to be **medium**. The impact is predicted to be of *national spatial extent*, with *direct* and *indirect* effects to population health.

4.10.26 Proposed Development transmission of renewable electricity would have continuous public health benefits to energy security despite the scale of contribution being relatively *small* within the national energy generation context.

The effects are likely to provide a *minor reduction* in risks for population mortality (e.g. reducing excess winter deaths) and morbidity of physical and mental health outcomes related to standard of living and access to health supporting infrastructure. Such an effect may extend via the national grid to a *large minority* of the national population. Such effects may bring *small benefits* to healthcare service quality by reducing capacity burdens.

Significance of the Effect

4.10.27 The significance of the population health effect is **moderate beneficial**, which is significant in EIA terms.

4.10.28 The Proposed Development provides a protective effect on the health baseline and this would be important for public health. This conclusion reflects the scientific literature, which establishes a *clear association* between energy security and health outcomes. The Proposed Development is likely to be *influential to delivering health policy*, including in *narrowing inequalities* that are at risk of widening due to reduced national energy security and rising costs of living.

4.10.29 Whilst the public health effects are reliant on, and may extend to, other parts of the wider Xlinks Morocco-UK Power Project, i.e. in North Africa, consistent with the scope of this assessment, these are not assessed as part of this report.

Further Mitigation

4.10.30 No further enhancements or monitoring is considered necessary to increase the moderate beneficial effect.

Future Monitoring

4.10.31 No additional future monitoring is proposed.

4.11 Cumulative Environmental Assessment

4.11.1 The Cumulative Effects Assessment (CEA) takes into account the impact associated with the Proposed Development together with other projects and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see Volume 1, Appendix 5.4: CEA screening matrix). Each project has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

4.11.2 The human health CEA methodology has followed the methodology set out in Volume 1, Chapter 5: EIA Methodology, of the PEIR. As part of the assessment, all projects and plans considered alongside the Proposed Development have been allocated into ‘tiers’ reflecting their current stage within the planning and development process, these are listed below.

4.11.3 A tiered approach to the assessment has been adopted, as follows:

- Tier 1

- Under construction
- Permitted application
- Submitted application
- Those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact

• Tier 2

- Scoping report has been submitted

• Tier 3

- Scoping report has not been submitted
- Identified in the relevant Development Plan
- Identified in other plans and programmes.

4.11.4 This tiered approach is adopted to provide a clear assessment of the Proposed Development alongside other projects, plans and activities.

4.11.5 The specific projects, plans and activities scoped into the CEA, are outlined in **Table 4.26**.

Cumulative Effects Assessment

4.11.6 A description of the significance of cumulative effects upon population health arising from each identified impact is given below.

4.11.7 Cumulative health assessment extends the analysis of each determinant of health. This means for each determinant of health the relevant reasonably foreseeable cumulative projects are listed and a professional judgement is made as to the combined level of effect and its implications for public health. Following IEMA 2022 guidance, sensitivity of the relevant populations is unchanged from the main assessment in **section 4.9** and **section 4.10** (Pyper, *et al*., 2022). Magnitude is however appraised in light of the combined effect of multiple projects.

4.11.8 As set out in IEMA 2022 guidance for human health, a combined public health effect is most likely where a population is affected by multiple determinants of health and a large proportion of the same individuals within that population experience the combination of effects (Pyper, *et al*., 2022).

4.11.9 A high degree of spatial proximity is required for there to be the potential for cumulative effects for localised changes in determinants of health, e.g., dust from a construction site. In contrast, where there are more far-reaching effects in a determinant of health, e.g., job creation or noise along shared transport corridors, there is greater opportunity for cumulative interactions between projects.

4.11.10 For each of the determinants in the main assessment the cumulative assessment considers the potential for pathways to the same population from other large-scale developments that are similar in location and timing. The assessment is qualitative, following the approach set out in **section 4.5**, and considers the potential for combined magnitudes of effect to the same populations.

4.11.11 This chapter is informed by the cumulative assessment conclusions set out in other chapters (as listed in **section 4.1**). The health assessment does not duplicate detail set out in those chapters. Distinctions between Tier 1 and Tier 2 projects follow other assessment chapters. Tier 1 being those projects where levels of uncertainty are lower, due to being more advanced in the planning process.

4.11.12 The following sections provide a CEA on issues with sufficient information and the potential for likely significant population health cumulative effects.

Transport Modes, Access and Connections

Tier 1 and Tier 2 Projects

Construction and Decommissioning Phases

4.11.13 This section has been informed by Volume 2, Chapter 5: Traffic and Transport, of the PEIR which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account.

4.11.14 As noted in Volume 2, Chapter 5: Traffic and Transport, of the PEIR currently no specific projects, plans and activities have been scoped into the traffic and

transport CEA. However, a detailed CEA will be included in the ES, for the application in support of Development Consent if necessary.

4.11.15 On this basis, the population groups, sensitivity, magnitude and significance conclusions relevant to the cumulative health assessment are not new or materially different to those listed for the Proposed Development in **section 4.9** (Transport modes, access and connections).

Open Space, Leisure and Play

Tier 1 and Tier 2 Projects

Construction and Decommissioning Phases

4.11.16 This section has been informed by Volume 2, Chapter 8: Land Use and Recreation, of the PEIR, which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account.

4.11.17 As stated in Volume 2, Chapter 8: Land Use and Recreation, of the PEIR, a detailed CEA will be included in the ES for the application in support of Development Consent.

4.11.18 Volume 2, Chapter 8: Land Use and Recreation, of the PEIR, concludes:

4.11.19 During construction, the cumulative effect on agricultural land classification is assessed to be of major adverse.

4.11.20 During construction, the potential temporary cumulative impact on the farm holdings is assessed to be of temporary minor adverse.

4.11.21 Based on the location of the cumulative schemes and the implementation of the Public Rights of Way Management Strategy to be prepared as part of the ES for the proposed development, it is assessed that there would be no temporary cumulative effects arising between these cumulative schemes and the Proposed Development.

4.11.22 On this basis, the population groups, sensitivity, magnitude and significance conclusions relevant to the cumulative health assessment are not new or materially different to those listed for the Proposed Development assessment in **section 4.9**.

Housing

Tier 1 and Tier 2 Projects

Construction and Decommissioning Phases

4.11.23 This section has been informed Volume 4, Chapter 3: Socio-economics and Tourism, of the PEIR, which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account.

4.11.24 As stated in Volume 4, Chapter 3: Socio-economics and Tourism, of the PEIR, a detailed CEA will be included in the ES for the application in support of Development Consent.

4.11.25 For the purposes of this assessment, cumulative infrastructure developments within the CEA Longlist have been identified. These include other infrastructure projects as well as the following housing schemes:

- Dwellings At Land To The South Of Clovelly Road Bideford Devon;
- Dwellings At Land South Of Clovelly Road Littleham Devon;
- Dwellings At Land North Of Clovelly Road Bideford Devon;
- Dwellings At Land Off Cornborough Road Westward Ho! Devon;
- Dwellings At Land At Manteo Way Alverdiscott Road East The Water Devon;
- Dwellings At Land At Grid Reference 242647 125879 Clovelly Road Bideford Devon;
- Dwellings At Land At Caddsdown Industrial Park Bideford Devon;
- Dwellings At Land To The West Of Buckleigh Road Westward Ho! Devon;
- Dwellings At Land Off Cornborough Road Cornborough Road Westward Ho! Devon;
- Dwellings At Land North Of Abbotsham Road Abbotsham Bideford Devon;
- Dwellings At Daddon Hill Northam Devon;
- Dwellings At Land North Of Clovelly Road Abbotsham Devon;
- Dwellings At Brunswick Wharf Barnstaple Street Bideford Devon;
- Dwellings At Land At Honestone Street Bideford Devon;
- Dwellings At Land Between Tadworthy Road And Golf Links Road Westward Ho! Northam Devon;
- Dwellings At Land At Grid Reference 249644 119976 Torrington Devon;
- Dwellings At Land At Grid Reference 249583 119849 (Former Meat Factory Site) Torrington Devon;
- Dwellings At Land South of A39 Brynsworthy Barnstaple Devon;
- Dwellings At Land At Burwood Lane Torrington Devon; and
- Dwellings At Former Yelland Power Station Lower Yelland Barnstaple Devon.

4.11.26 The combined effect is driven by the interaction of the Proposed Development with other projects which contribute to changes in housing availability and affordability. This reflects both new permanent housing being brought forward, as well as the construction workforce needs of such cumulative projects. The cumulative schemes may act both to increase capacity in local long-term let and home ownership residential markets and temporarily place additional pressures on local short-term rental markets.

4.11.27 On this basis, the population groups, sensitivity, magnitude and significance conclusions relevant to the cumulative health assessment are not new or materially different to those listed for the Proposed Development assessment in **section 4.9**.

Air Quality

Tier 1 and Tier 2 Projects

Construction and Decommissioning Phases

4.11.28 This section has been informed by Volume 2, Chapter 7: Air Quality, of the PEIR, which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account.

4.11.29 It is noted that the combined effect is driven by the interaction of the Proposed Development with other projects which contribute to the reduction in air quality.

4.11.30 Volume 2, Chapter 7: Air Quality, of the PEIR, concludes there should be no residual cumulative air quality effect during construction and decommissioning, assuming that all developments implement suitable primary and tertiary mitigation, as recommended in the Guidance on the assessment of dust from demolition and construction (IAQM, 2014).

4.11.31 The population groups, sensitivity, magnitude and significance conclusions relevant to the cumulative health assessment are not new or materially different to those listed for the Proposed Development assessment in **section 4.9**.

Water Quality

Tier 1 and Tier 2 Projects

Construction and Decommissioning Phases

4.11.32 This section has been informed by Volume 2, Chapter 3: Hydrology and Flood Risk, of the PEIR which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account.

4.11.33 Volume 2, Chapter 3: Hydrology and Flood Risk, of the PEIR, concludes:

- The impact of contaminated runoff on the quality of surface water and ground receptors is deemed to be not significant.
- The impact of increased flood risk arising from additional surface water runoff is assessed to be minor adverse.
- No effect would arise increased flood risk arising from damage to existing flood defences

4.11.34 The population groups, sensitivity, magnitude and significance conclusions relevant to the cumulative health assessment are not new or materially different to those listed for the Proposed Development assessment in **section 4.9**.

Land Quality

Tier 1 and Tier 2 Projects

4.11.35 Construction and Decommissioning Phases

4.11.36 This section has been informed by Volume 2, Chapter 8: Land Use and Recreation, of the PEIR which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account.

4.11.37 Volume 2, Chapter 8: Land Use and Recreation, of the PEIR concludes:

4.11.38 Volume 2, Chapter 8: Land Use and Recreation, of the PEIR, concludes:

4.11.39 During construction, the cumulative effect on agricultural land classification is assessed to be of major adverse.

4.11.40 During construction, the potential temporary cumulative impact on the farm holdings is assessed to be of temporary minor adverse.

4.11.41 Based on the location of the cumulative schemes and the implementation of the Public Rights of Way Management Strategy to be prepared as part of the ES for the proposed development, it is assessed that there would be no temporary cumulative effects arising between these cumulative schemes and the Proposed Development.

4.11.42 On this basis, the population groups, sensitivity, magnitude and significance conclusions relevant to the cumulative health assessment are not new or materially different to those listed for the Proposed Development assessment in **section 4.9**.

Noise and Vibration

Tier 1 and Tier 2 Projects

Construction, Operations and Maintenance, and Decommissioning Phases

4.11.43 This section has been informed by Volume 2, Chapter 6: Noise and Vibration, of the PEIR, which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account. Volume 2, Chapter 6: Noise and Vibration, of the PEIR, concludes:

- The cumulative effects during construction and operations are considered to be of **minor** adverse

4.11.44 The population groups relevant to the cumulative health assessment are the same as those listed for the Proposed Development in **section 4.9** and **section 4.10**.

4.11.45 The cumulative effect for population health is predicted to be similar to the individual effect described in **section 4.9** and **section 4.10**. As such, no future health assessment CEA is undertaken at PEIR. The potential for cumulative effects will be kept under review and further reported in the ES health chapter.

Health and Social Care Services

Tier 1 and Tier 2 Projects

Construction and Decommissioning Phases

4.11.46 This section has been informed by the healthcare capacity analysis undertaken in **section 4.9**.

4.11.47 The population groups relevant to the cumulative health assessment are the same as those listed for the Proposed Development in **section 4.9.**

4.11.48 The cumulative effect for population health is predicted to be similar to the individual effect described in **section 4.9**. As such, no future health assessment CEA is undertaken at PEIR. The potential for cumulative effects will be kept under review and further reported in the ES health chapter.

Radiation (Converter Stations)

Tier 1 and Tier 2 Projects

Operations and Maintenance Phases

4.11.49 For the purposes of this assessment, cumulative electrical infrastructure developments within the CEA Longlist have been identified:

- White Cross Offshore Windfarm (Onshore Project);
- Solar Farm At Webbery Barton And Cleave Farm Bideford Devon; and
- Solar Farm At Litchardon Cross Newton Tracey.

4.11.50 The identified projects are not anticipated to include their own substations. On this basis, cumulative effects in terms of actual risks or public understanding of risk from visual or auditory stimuli, are not expected. The potential for cumulative effects will be kept under review and further reported in the ES human health chapter.

Wider Societal Infrastructure and Resources

Tier 1 and Tier 2 Projects

Operations and Maintenance Phases

4.11.1 In combination with other projects assessed cumulatively, the Proposed Development will provide enhanced energy security. The national context of such energy security has been considered and the individual effects are not expected to be collectively greater. Sensitivity of the population remains unchanged as does the overall magnitude. On this basis the cumulative effect would remain **moderate beneficial**, which is significant in EIA terms.

4.12 Transboundary Effects

4.12.1 The Proposed Development is unlikely to have a significant effect either alone or cumulatively on the environment in a European Economic Area State (EEA states) and therefore a transboundary assessment is not proposed in the PEIR.

4.13 Inter-related Effects

4.13.1 Inter-relationships are the impacts and associated effects of different aspects of the Proposed Development on the same receptor. These are as follows.

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Proposed Development (construction, operation and maintenance), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases (e.g., construction noise effects from piling and operational substation noise).
- Receptor led effects: Assessment of the scope for all effects (including inter-relationships between environmental topics) to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on human health may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects may be short term, temporary or transient effects, or incorporate longer term effects. For human health the receptors are the defined populations.

4.13.2 A description of the likely interactive effects arising from the Proposed Development on human health is provided in Volume 4, Chapter 5: Inter-related effects of the PEIR.

4.13.3 The population health effects identified in this chapter have the potential to interact with each other (receptor led effects). The areas of potential interaction between effects for a given geographic population are presented in **Table 4.24**. Vulnerable group effects are expected across all geographic populations, so are not listed separately.

Table 4.24: Interaction between health determinants by geographic populations.

	Site Specific	Local	Regional	National	
	Site-specific study area+	Torridge District Council	South West	England	
Transport modes, access and connections	✓	✓			
Open space, leisure and play	✓	✓			
Housing		✓			
Employment and income			✓		
Air quality	✓	✓			
Water quality	✓				
Land quality	✓				
Health and social care services		✓			
Noise and vibration	✓	✓			
Radiation (public understanding of EMF risk)	✓	✓			
Wider societal resources	✓	✓	✓	✓	
Key:	Positive (green)	Positive as a component within wider area assessment (light green)		Negative (blue)	Negative and positive (orange)

+Site-specific study area includes: Monkleigh & Putford (for landfall), Bideford East (for the Onshore HVDC Cable Corridor, representative of higher deprivation); Bideford South (for the Onshore HVDC Cable Corridor); Two Rivers & Three Moors (for the converter stations (see **section 4.4**).

4.13.4 Construction and decommissioning activities may create temporary changes in air quality, noise, recreation, water and land quality and transport access. These may be experienced in combination for the same site-specific and local geographic populations as transitory construction works occur within the Proposed Development Draft Order Limits. These populations may also experience pressures on housing and healthcare associated with the Proposed Development workforces. At a population level it is not expected that the combination of effects would interact in a way that would reinforce health outcomes or exacerbate health inequalities on a scale to affect public health. The same populations would also benefit from the improved energy security, whilst noted, the combined effect is not considered to change the assessment conclusions. No new or materially different population health effects are therefore likely.

4.14 Summary of Impacts, Mitigation Measures and Monitoring

4.14.1 Information on human health within the study area was collected through a review of relevant public health evidence sources, including scientific literature, baseline

data, health policy, local health priorities and health protection standards with reference to corresponding chapters as set out in **paragraph 4.1.12**.

4.14.2 **Table 4.25** presents a summary of the impacts, measures adopted as part of the Proposed Development and residual effects in respect to human health. The impacts assessed include:

- transport modes, access and connections;
- open space, leisure and play;
- housing;
- employment and income (Offshore);
- air quality;
- water quality;
- land quality;
- noise and vibration;
- health and social care services;
- public understanding of risk and
- wider societal infrastructure and resources.

4.14.3 Overall, it is concluded that there will be no significant adverse population health effects arising from the Proposed Development during the construction, operation and maintenance or decommissioning phases. A significant beneficial public health effect in relation to energy security is noted.

4.14.4 **Table 4.26** presents a summary of the potential cumulative impacts, mitigation measures and residual effects. The cumulative impacts assessed include:

- transport modes, access and connections;
- open space, leisure and play;
- housing;
- employment and income (Offshore);
- air quality;
- water quality;
- land quality;
- noise and vibration;
- health and social care services;
- radiation; and
- wider societal infrastructure and resources.

4.14.5 Overall, it is concluded that there will be no significant adverse population health cumulative effects from the Proposed Development alongside other projects/plans. The significant beneficial public health effect in relation to energy security remains.

4.14.6 No potential transboundary impacts have been identified in regard to effects of the Proposed Development on human health of populations in other states.

Table 4.25: Summary of potential environmental effects, mitigation and monitoring.

[a] C=construction, O=operational and maintenance, D=decommissioning

Description of impact	Phase[a]			Measures adopted as part of the Proposed Development	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Transport modes, access and connectivity	✓	×	✓	An Outline Construction Traffic Management Plan (CTMP) will be prepared and submitted with the DCO application. CTMP(s) will be developed in accordance with the outline CTMP prior to construction.	C: low D: low	C: high D: high	Minor adverse (not significant)	Early and ongoing sharing of information with emergency and healthcare services with regard to any temporary road closures, diversions and lane closures.	Unchanged.	None proposed.
Open space, leisure and play	✓	×	✓	None.	C: low D: low	C: high D: high	Minor adverse (not significant)	No further mitigation.	Unchanged.	None proposed.
Housing	✓	×	×	None.	C: low D: low	C: high D: high	Minor adverse (not significant)	No further mitigation.	Unchanged.	None proposed.
Employment and income (Offshore)	✓	×	×	None.	C: low D: low	C: high D: high	Minor adverse (not significant)	No further mitigation.	Unchanged.	None proposed.
Air quality	✓	×	✓	An Outline Onshore Construction Environmental Management Plan (CEMP) has been developed and will submitted with the DCO application. An Onshore CEMP will be developed in	C: low D: low	C: high D: high	Minor adverse (not significant)	No further mitigation.	Unchanged.	None proposed.

Description of impact	Phase[a]			Measures adopted as part of the Proposed Development	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
				accordance with the Outline Onshore CEMP. The Onshore CEMP will include best practice measures, as outlined in IAQM guidance (IAQM, 2024), in relation to air quality. Dust control measures to be secured through Dust Management Plan (DMP), as an appendix to the CEMP which will be secured via a DCO requirement.						
Water quality	✓	×	✓	None.	C: low D: low	C: high D: high	Minor adverse (not significant)	No further mitigation.	Unchanged.	None proposed.
Land quality	✓	×	✓	None.	C: low D: low	C: high D: high	Minor adverse (not significant)	No further mitigation.	Unchanged.	None proposed.
Noise and vibration	✓	✓	✓	None.	C: low O: low D: low	C: high O: high D: high	Minor adverse (not significant)	No further mitigation.	Unchanged.	None proposed.
Health and social care services	✓	×	×	None.	C: low D: low	C: high D: high	Minor adverse (not significant)	Occupational health provision scaled with construction worker numbers to maintain compliance with relevant statutory requirements, as well as implementing a	Negligible	None proposed.

Description of impact	Phase[a]			Measures adopted as part of the Proposed Development	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
								protocol to manage the first point of contact for health queries from construction workers and subsequent avenues for further healthcare support. This would be secured through the CEMP.		
Public Understanding of Risk (converter stations)	×	✓	×	Compliance with exposure standards set out in Department for Energy and Climate Change (DECC) Voluntary Code of Practice (Department for Energy Security & Net Zero, 2012) including compliance with the International Commission on Non-Ionising Radiation Protection (ICNIRP) public exposure guidelines (ICNIRP, 1998, 2010).	O: low	O: low	Minor adverse (not significant)	Avoiding visible electrical infrastructure (other than arrays) close to PRoW to reduce perceptions of risk, and also encourage the uptake of active travel and physical activity. This may include siting and visual screening of electrical infrastructure to minimise any perceived risks and encourage use of PRoW. Visual cues are important in risk perception. Screening electrical infrastructure would support reducing the mental health risks and increasing physical activity use on PRoW. Continued community consultation and sharing	Negligible.	None proposed.

Description of impact	Phase[a]			Measures adopted as part of the Proposed Development	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
								information relating to the Proposed Development, to allow people to express concerns and gain awareness of actual health effects.		
Wider societal infrastructure and resources	×	✓	×	None.	O: medium	O: high	Moderate beneficial (significant)	No further mitigation.	Unchanged.	None proposed.

Table 4.26: Summary of potential cumulative environmental effects

[a] C=construction, O=operational and maintenance, D=decommissioning

Description of effects	Phase[a]			Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D						
Tier 1 & 2									
Transport modes, access and connectivity	✓	×	✓	No change.	No change.	No change.	No further mitigation.	No change.	None proposed.
Open space, leisure and play	✓	×	✓	No change.	No change.	No change.	No further mitigation.	No change.	None proposed.
Housing	✓	×		No change.	No change.	No change.	No further mitigation.	No change.	None proposed.
Employment and income (Offshore)	✓	×	×	No change.	No change.	No change.	No further mitigation.	No change.	None proposed.
Air quality	✓	×	✓	No change.	No change.	No change.	No further mitigation.	No change.	None proposed.
Water quality	✓	×	✓	No change.	No change.	No change.	No further mitigation.	No change.	None proposed.

Description of effects	Phase[a]			Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D						
Land quality	✓	×	✓	No change.	No change.	No change.	No further mitigation.	No change.	None proposed.
Noise and vibration	✓	✓	✓	No change.	No change.	No change.	No further mitigation.	No change.	None proposed.
Health and social care services	✓	×	×	No change.	No change.	No change.	No further mitigation.	No change.	None proposed.
Radiation (converter stations)	×	✓	×	No change.	No change.	No change.	No further mitigation.	No change.	None proposed.
Wider societal infrastructure and resources	×	✓	×	No change.	No change.	No change.	No further mitigation.	No change.	None proposed.

4.15 Next Steps

4.15.1 Continuing consultation with stakeholders, including public health stakeholders. Continuing refinement of the design, assessment findings and mitigation and monitoring proposals.

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