



MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Volume 1, Annex 5.1: Human health



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Prepared by:

RPS

Prepared for:

**Morgan Offshore Wind Limited,
Morecambe Offshore Windfarm Ltd**

Errata

Errata document version	Deadline included	Document Number	Volume and Chapter	Document section	Description of errata	Correction
F05	D6	APP-068	Volume 1, Annex 5.1: Human health	Paragraph 1.12.8.7 First bullet and first sub bullet	The assessment of noise impacts due to construction and decommissioning of onshore cables at Landfall for Leach Lane (N)..	Following updates to Volume 1, Chapter 8: Noise and Vibration and Volume 1, Annex 8.2: Construction Noise and Vibration, noise impacts due to construction and decommissioning of onshore export cables at landfall (excluding trenchless techniques) are assessed to be minor adverse for residential receptors (except Leach Lane (N) and Century Care Home. For Leach Lane (N), the effect is assessed as moderate adverse. These changes come as a result of engagement and recommendations from Fylde Borough Council noise specialist inputs. However, following mitigation measures as set out in the Outline Construction Noise and Vibration Management Plan (document reference J1.3) and Onshore Decommissioning Plan (CoT36 as secured by DCO Schedules 2A & 2B, Requirement 22), the impact is assessed to be minor adverse.

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Glossary

Term	Meaning
400 kV grid connection cables	Cables that will connect the proposed onshore substations to the existing National Grid Penwortham substation.
400 kV grid connection cable corridor	The corridor within which the 400 kV grid connection cables will be located.
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL).
Code of Construction Practice	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
Commitment	This term is used interchangeably with mitigation and enhancement measures. The purpose of commitments is to avoid, prevent, reduce or, if possible, offset significant adverse environmental effects. Primary and tertiary commitments are taken into account and embedded within the assessment set out in this Environmental Statement. Secondary commitments are incorporated to reduce effects to environmentally acceptable levels following initial assessment.
Construction Traffic Management Plan	A document detailing the construction traffic routes for heavy goods vehicles and personnel travel, protocols for delivery of Abnormal Indivisible Loads to site, measures for road cleaning and sustainable site travel measures.
Cumulative Effects	The combined effect of the Transmission Assets in combination with the effects from other proposed developments, on the same receptor or resource.
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
EIA Scoping Report	A report setting out the proposed scope of the Environmental Impact Assessment process. The Transmission Assets Scoping Report was submitted to The Planning Inspectorate (on behalf of the Secretary of State) for the Morgan and Morecambe Offshore Windfarms Transmission Assets in October 2022.
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Export cable corridor	The specific corridor of seabed (seaward of Mean High Water Springs and land (landward of Mean High Water Springs) from the Generation Assets to the National Grid Penwortham substation.
Generation Assets	The generation assets associated with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm include the offshore wind turbines, inter-array cables, offshore substation platforms and platform link (interconnector) cables to connect offshore substations.

Term	Meaning
Green and blue open space	Blue spaces are dominated by a watery element, such as a lakeside, river or coast. Green spaces may include a watery element but are characterised by predominantly 'green' elements such as grass or trees.
Health and wellbeing	The World Health Organisation (WHO) define health in terms of states of wellbeing. Health is <i>"a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity"</i> (WHO, 1948). Mental health is <i>"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"</i> (World Health Organization, 2022).
Intertidal Infrastructure Area	The temporary and permanent areas between MLWS and MHWS.
Landfall	The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Lytham St. Annes between Mean Low Water Springs and the transition joint bays inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s).
Local Authority	A body empowered by law to exercise various statutory functions for a particular area of the United Kingdom. This includes County Councils, District Councils and County Borough Councils.
Maximum design scenario	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Transmission Assets.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mean Low Water Springs	The height of mean low water during spring tides in a year.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
National Policy Statement(s)	The current national policy statements published by the Department for Energy Security and Net Zero in 2023 and adopted in 2024.
Offshore Permanent Infrastructure Area	The area within the Transmission Assets Offshore Order Limits (up to MLWS) where the permanent offshore electrical infrastructure (i.e. offshore export cables) will be located.
Onshore export cables	The cables which would bring electricity from landfall to the onshore substations.
Onshore export cable corridor	The corridor within which the onshore export cables will be located.

Term	Meaning
Onshore Infrastructure Area	The area within the Transmission Assets Order Limits landward of Mean High Water Springs. Comprising the offshore export cables from Mean High Water Springs to the transition joint bays, onshore export cables, onshore substations and 400 kV grid connection cables , and associated temporary and permanent infrastructure including temporary and permanent compound areas and accesses. Those parts of the Transmission Assets Order Limits proposed only for ecological mitigation/biodiversity benefit are excluded from this area.
Onshore Order Limits	See Transmission Assets Order Limits: Onshore (below).
Onshore substations	The onshore substations will include a substation for the Morgan Offshore Wind Project: Transmission Assets and a substation for the Morecambe Offshore Windfarm: Transmission Assets. These will each comprise a compound containing the electrical components for transforming the power supplied from the generation assets to 400 kV and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid.
Order limits	The limits within which the Transmission Assets may be carried out.
Study area	This is an area which is defined for each environmental topic which includes the Transmission Assets Order Limits as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each topic is intended to cover the area within which an impact can be reasonably expected.
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Transboundary effects	Effects from a project within one state that affect the environment of another state(s).
Transmission Assets Order Limits	The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning.
Transmission Assets Order Limits: Onshore	The area within which all components of the Transmission Assets landward of Mean High Water Springs will be located, including areas required on a temporary basis during construction and/or decommissioning (such as construction compounds). Also referred to in this report as the Onshore Order Limits, for ease of reading

Acronyms

Acronym	Meaning
AIL	Abnormal Indivisible Loads
BEIS	The former Department for Business, Energy & Industrial Strategy
CEA	Cumulative Effects Assessment
CoCP	Code of Construction Practice
COPD	Chronic Obstructive Pulmonary Disease

Acronym	Meaning
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
EIA	Environmental Impact Assessment
EMF	Electric and Magnetic Fields
ES	Environmental Statement
EU	European Union
GVA	Gross Value Added
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
ICNIRP	International Commission on Non-ionizing Radiation Protection
IEMA	Institute for Environmental Management and Assessment
IPH	Institute of Public Health
LRN	Local Road Network
MARPOL	International Convention for the Prevention of Pollution from Ships
MLWS	Mean Low Water Springs
MHWS	Mean High Water Springs
NO2	Nitrogen dioxide
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OEP	The Office for Environmental Protection
OHID	Department of Health and Social Care's Office for Health Improvement and Disparities
PEIR	Preliminary Environmental Information Report
PM	Particulate Matter
PRoW	Public Rights of Way
QOF	Quality and Outcomes Framework
SAR	Standardised Admissions Rate
UK	United Kingdom
UKHSA	United Kingdom Health Security Agency
WFD	Water Framework Directive

Acronym	Meaning
WHO	World Health Organization

Units

Unit	Description
%	Percentage
km	Kilometres
µg	Microgram
m ³	Cubic metre

1 Human health

1.1 Introduction

- 1.1.1.1 This document forms Volume 1, Annex 5.1: Human health of the Environmental Statement (ES) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets. For ease of reference, the Morgan and Morecambe Offshore Wind Farms Transmission Assets are referred to in this annex as the ‘Transmission Assets’. The ES presents the findings of the Environmental Impact Assessment (EIA) process for the Transmission Assets.
- 1.1.1.2 This annex considers the potential impact of the onshore elements of the Transmission Assets upon human health arising from the construction, operation and maintenance, and decommissioning phases. Activities associated with the offshore elements of the Transmission Assets were considered in terms of their potential for likely significant public health effects (see **section 1.5**) concluding that significant effects were unlikely to occur for the offshore elements. Therefore, offshore elements are scoped out of the health assessment.
- 1.1.1.3 The purpose of the Transmission Assets is to connect the Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets (referred to collectively as the ‘Generation Assets’) to the National Grid. A description of the Transmission Assets can be found in Volume 1, Chapter 3: Project description of the ES.
- 1.1.1.4 It is noted that there are separate applications and associated EIA health assessments for the Generation Assets.
- 1.1.1.5 This annex provides the population health baseline and assessment. Human health is a broad topic. The assessment considers how the Transmission Assets affects different aspects of the environment that influence population health. This includes changes to the social, economic and bio-physical environment. This annex consolidates information relevant to human health, as presented in the EIA Scoping Report, agreed upon in the Scoping Opinion, and detailed in Volume 1: Annex 5.1: Human health of the PEIR. This annex also signposts where further details can be found within the ES. An EIA human health assessment in line with guidance has been undertaken. The assessment is presented as an annex rather than an EIA chapter to proportionately comply with Environmental Impact Assessment (EIA) Regulation (Annex 4) requirements on reporting the likely significant effects of a project. This reflects that the assessment has determined that the Transmission Assets do not give rise to significant population health effects, beneficial or adverse. Consequently, an annex rather than chapter approach to reporting has been taken in this case. This has been agreed with the Planning Inspectorate, see **Table 1.7**.
- 1.1.1.6 The annex presents the population health baseline established from desk studies and identifies assumptions and limitations encountered in compiling the environmental information. The annex also presents the assessment of impacts on human health arising from the Transmission Assets. The

assessment is informed by the results of other EIA technical disciplines (as discussed below), in conjunction with evidence based professional judgement, and highlights any necessary monitoring and/or mitigation measures to prevent, minimise, reduce or offset likely significant adverse effects of the Transmission Assets on human health. Opportunities to improve population health have also been considered, where appropriate and proportionate.

1.1.2 Health is “*a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*” (WHO, 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*” (World Health Organization, 2022). ‘Population health’ refers to health outcomes of a group of individuals, including the distribution of such outcomes within the group (Kindig & Stoddart, 2003).

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

1.1.2.2 The annex includes conclusions regarding the likely significant effects of the Transmission Assets on population health, in accordance with the EIA requirements in relation to human health. The assessment evaluates how changes in health determinants may manifest in health outcomes and effects for specific human health receptors.

1.1.2.3 The annex is informed by the following topic chapters where relevant:

- Volume 1, Chapter 3: Project description of the ES;
- Volume 2, Chapter 9: Other sea users of the ES;
- Volume 3, Chapter 1: Geology, hydrogeology and ground conditions of the ES;
- Volume 3, Chapter 2: Hydrology and flood risk of the ES;
- Volume 3, Chapter 6: Land use and recreation of the ES;
- Volume 3, Chapter 7: Traffic and transport of the ES;
- Volume 3, Chapter 8: Noise and vibration of the ES;
- Volume 3, Chapter 9: Air quality of the ES;
- Volume 3, Chapter 10: Landscape and visual resources of the ES; and
- Volume 4, Chapter 2: Socio-economics of the ES.

1.2 Legislation, policy and guidance

1.2.1 Legislation

1.2.1.1 The Environment Act 2021 established 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 (OEP, 2022)

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

- 1.2.1.2 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations 2017) – The EIA Regulations 2017 update of the EIA Regulations clarified that population and human health was to be included in the list of topics to be considered in an EIA: *'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 Project on the following factors – population and human health'*.
- 1.2.1.3 The Air Quality Standards Regulations 2010 – set out statutory health protection standards on ambient air quality.
- 1.2.1.4 Sections 12 and 13 of the Health and Social Care Act 2012, outline the responsibilities of Local Authorities regarding public health duties and the involvement of Integrated Care Boards in planning local healthcare services (HM Government, 2012).
- 1.2.1.5 The Environment Act 1995 sets provisions for protecting certain environmental conditions of relevance to health in the UK. Part II covers contaminated land and Part IV covers air quality.
- 1.2.1.6 Part IIA of the Environmental Protection Act 1990 - 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.
- 1.2.1.7 The Public Health (Control of Disease) Act 1984 – relates to disease control and establishing of port health authorities. Port health authorities carry out a range of health controls at the UK borders.
- 1.2.1.8 The Health and Safety at Work Act 1974 sets a duty on employers to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all their employees. Similarly, employers must also ensure, so far as is reasonably practicable, that persons not in their employment are not exposed to risks to their health or safety risks due to activities being undertaken.
- 1.2.1.9 The International Convention for the Prevention of Pollution from Ships (MARPOL) 1973 aimed at preventing and minimising, both accidental and operational, pollution from ships are included in the MARPOL.
- 1.2.1.10 The Bathing Water Regulations 2013 safeguards public health and clean bathing waters.
- 1.2.1.11 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 sets out a commitment to protecting water bodies, including bodies of water designated as recreational waters.

1.2.2 Planning policy context

- 1.2.2.1 The Transmission Assets will be located in English offshore waters (beyond 12 nautical miles (nm) from the English coast) and inshore waters (within 12 nm from the English coast) with the onshore infrastructure located wholly within England. As set out in Volume 1, Chapter 1: Introduction of the ES, the Secretary of State for the Department for Business, Energy and

Industrial Strategy (BEIS) (the department which preceded the Department for Energy Security and Net Zero) has directed that the Transmission Assets are to be treated as development for which development consent is required under the Planning Act 2008, as amended.

1.2.3 National Policy Statements

1.2.3.1 There are currently six energy National Policy Statements (NPSs), three of which contain policy relevant to offshore wind development and the Transmission Assets, specifically:

- Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (Department for Energy Security & Net Zero 2023a);
- NPS for Renewable Energy Infrastructure (NPS EN-3) (Department for Energy Security & Net Zero 2023b); and
- NPS for Electricity Networks Infrastructure (NPS EN-5) (Department for Energy Security & Net Zero 2023c).

1.2.3.2 **Table 1.1, Table 1.2 and Table 1.3** set out a summary of the policies within these NPSs, relevant to human health.

1.2.3.3 NPS EN-3 has been reviewed and it is considered that there are no relevant policy positions in relation to human health that need to be taken into account. NPS EN-1 includes guidance on what matters are to be considered in the assessment. These are summarised in **Table 1.1** below. NPS EN-1 also highlights a number of factors relating to the determination of an application and in relation to mitigation. These are summarised in **Table 1.2** below.

Table 1.1: Summary of the NPS EN-1 provisions relevant to human health

Summary of NPS EN-1 provision [emphasis added]	How and where considered in the annex
To consider the potential effects, including benefits, 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 employment, equality, biodiversity net gain, community cohesion, health and well-being. (paragraph 4.3.4 of NPS EN-1).	Employment is considered within this annex, informed by Volume 4, Chapter 2: Socio-economics of the ES. Well-being is an integral consideration throughout this annex, reflecting that the World Health Organisation (WHO) define health in terms of states of wellbeing. See paragraph 1.1.2 for the WHO definition of health adopted in this annex. The potential for employment and upskilling is covered in section 1.12.4 . Effects on wellbeing and equality are inherent to all the assessments in section 1.12 .

Summary of NPS EN-1 provision [emphasis added]	How and where considered in the annex
<p>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.</p> <p>(paragraph 4.4.1 of NPS EN-1).</p>	<p>The effects to population health, including the potential for adverse effects and opportunities to enhance health and wellbeing, are considered in section 1.12.</p>
<p>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.</p> <p>(paragraph 4.4.2 of NPS EN-1).</p>	<p>The potential direct impacts on health from the Transmission Assets are assessed in section 1.12.</p>
<p>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> <p>(paragraph 4.4.3 of NPS EN-1).</p>	<p>Indirect health impacts including access to green (land) and blue (water) public open spaces are assessed in section 1.12.3.</p> <p>Construction works may disrupt local vehicle traffic (private and public transport) as well as active travel (pedestrians and cyclists). These effects are assessed in section 1.12.2.</p> <p>Health and social care services are scoped out as set out in Table 1.21 within section 1.5.</p>
<p>[...] 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.</p> <p>(paragraph 4.4.4 of NPS EN-1).</p> <p>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.</p> <p>(paragraph 4.4.5 of NPS EN-1).</p> <p>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> <p>(paragraph 4.4.6 of NPS EN-1).</p>	<p>Relevant vulnerable population groups are considered within the assessment (sections 1.11.5 and 1.12).</p> <p>Cumulative and inter-related effects are assessed in section 1.13 and section 1.15.</p> <p>Adopted mitigation is referenced in section 1.9 (see Volume 1, Annex 5.3: Commitments register of the ES) and the need for further mitigation is considered throughout section 1.12.</p>

Summary of NPS EN-1 provision [emphasis added]	How and where considered in the annex
<p>The government's policy is to ensure there is adequate provision of high quality open space and sports and recreation facilities to meet the needs of local communities. Connecting people with open spaces, sports and recreational facilities all help to underpin people's quality of life and have a vital role to play in promoting healthy living. (paragraph 5.11.6 of NPS EN-1).</p> <p>Green and blue infrastructure can also enable developments to provide positive environmental social, health and economic benefits. (paragraph 5.11.7 of NPS EN-1).</p>	<p>Potential health effects relating to open space and recreation are considered in section 1.12.3 and informed by Volume 3, Chapter 6: Land use and recreation of the ES.</p> <p>Access to green and blue open space is scoped into the assessment of open space, leisure and play in section 1.12.3.</p>
<p>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. (paragraph 5.12.1 of NPS EN-1).</p> <p>The Government's policy on noise is set out in the Noise Policy Statement for England. It promotes good health and good quality of life through effective noise management. (paragraph 5.12.2 of NPS EN-1).</p> <p>Where noise impacts are likely to arise from the proposed development, the applicant should include the following... an assessment of any likely impact on health and quality of life/ wellbeing where appropriate, particularly among those disadvantaged by other factors who are often disproportionately affected by noise sensitive areas. (paragraph 5.12.6 of NPS EN-1).</p>	<p>Potential health effects relating to noise and vibration are considered in section 1.12.8 and informed by Volume 3, Chapter 8: Noise and vibration of the ES.</p>
<p>Government policy on hazardous and non-hazardous waste is intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. (paragraph 5.15.1 of NPS EN-1).</p>	<p>This issue has been scoped out as described in Table 1.21 within section 1.8. There will also be a detailed Site Waste Management Plan (document reference J1.6) that will be developed alongside the Code of Construction Practice (CoCP) as part of the DCO application.</p>
<p>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. (paragraph 5.16.2 of NPS EN-1).</p>	<p>Potential health effects relating to water are considered in section 1.12.6 and informed by Volume 3, Chapter 2: Hydrology and flood risk of the ES.</p>

Summary of NPS EN-1 provision [emphasis added]	How and where considered in the annex
<p>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> <p>(paragraph 5.2.1 of NPS EN-1).</p> <p>Proximity to emission sources can have significant impacts on sensitive receptor sites for air quality, such as education or healthcare sites, residential use or sensitive or protected ecosystems.</p> <p>(paragraph 5.2.7 of NPS EN-1).</p>	<p>Potential health effects related to air quality are considered in section 1.12.5 and informed by Volume 3, Chapter 9: Air quality of the ES.</p>

Table 1.2: Summary of NPS EN-1 policy on decision making relevant to human health

Summary of NPS EN-1 provision	How and where considered in the annex
<p>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.</p> <p>(paragraph 4.4.7 of NPS EN-1).</p> <p>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> <p>(paragraph 4.4.8 of NPS EN-1).</p>	<p>Impacts that are governed by separate regulations have been considered during the scoping stage of this project, see Table 1.20. Where relevant the health assessment has regard to non-threshold effects that occur even below regulatory standards.</p>

- 1.2.3.4 NPS EN-5 provides the primary basis for decisions regarding electricity networks infrastructure (DESNZ, 2023).
- 1.2.3.5 **Table 1.3** sets out a summary of the policies within NPS EN-5 relevant to human health.

Table 1.3: Summary of the NPS EN-5 requirements relevant to this chapter

Summary of NPS EN-5 requirement	How and where considered in the annex
Generic noise effects are covered in Section 5.11 of EN-1. In addition, there are specific considerations which apply to electricity networks infrastructure. (paragraph 2.9.1 of NPS EN-5).	Noise and vibration is covered in section 1.12.8 informed by Volume 3, Chapter 8: Noise and vibration of the ES.
This NPS does not repeat the detail of the ICNIRP 1998 guidelines on restrictions or reference levels. The government has developed with the electricity industry a Code of Practice, 'Power Lines: Demonstrating compliance with EMF public exposure guidelines – a voluntary Code of Practice', published in February 2011 that specifies the evidence acceptable to show compliance with ICNIRP 1998 guidelines and is also in line with the terms of the 1999 EU Council Recommendation on EMF exposure. (paragraph 2.11.9 of NPS EN-5).	As detailed in the EMF Compliance Statement (Volume 1, Annex 3.4: EMF Compliance Statement), the Transmission Assets will adopt the International Commission on Non-ionizing Radiation Protection (ICNIRP) guidelines and Government voluntary Code of Practice on EMF public exposure (Department for Energy and Climate Change, 2012; ICNIRP, 1998, 2010).
Industry currently applies optimal phasing to 275kV and 400kV overhead lines voluntarily wherever operationally possible, which helps to minimise the effects of EMF. The government has developed with industry a voluntary Code of Practice, 'Optimum Phasing of high voltage double-circuit Power Lines – A Voluntary Code of Practice', published in March 2012, that defines the circumstances where industry can and will optimally phase lines with a voltage of 132kV and above. (paragraph 2.11.11 of NPS EN-5).	As detailed in the EMF Compliance Statement (Volume 1, Annex 3.4: EMF Compliance Statement), the Transmission Assets will adopt the International Commission on Non-ionizing Radiation Protection (ICNIRP) guidelines and Government voluntary Code of Practice on EMF public exposure (Department for Energy and Climate Change, 2012; ICNIRP, 1998, 2010).
Where the applicant cannot demonstrate that the line will be compliant with the Electricity Safety, Quality and Continuity Regulations 2002, with the exposure guidelines as specified in the Code of Practice on compliance, and with the policy on phasing as specified in the Code of Practice on optimal phasing then the Secretary of State should not grant consent. (paragraph 2.11.12 of NPS EN-5).	As detailed in the EMF Compliance Statement (Volume 1, Annex 3.4: EMF Compliance Statement), the Transmission Assets will adopt the International Commission on Non-ionizing Radiation Protection (ICNIRP) guidelines and Government voluntary Code of Practice on EMF public exposure (Department for Energy and Climate Change, 2012; ICNIRP, 1998, 2010).
Undergrounding of a line would reduce the level of EMFs experienced, but high magnetic field levels may still occur immediately above the cable. It is the government's policy that power lines should not be undergrounded solely for the purpose of reducing exposure to EMFs. (paragraph 2.11.13 of NPS EN-5).	As detailed in the Volume 1, Chapter 3: Project Description of the ES (document reference F1.3), the Applicants have committed to undergrounding the onshore export cables and the 400 kV grid connection cables (CoT12) (Volume 1, Annex 5.3, document reference F1.5.3), to minimise potential impacts on local communities and avoid, where possible, key environmental and engineering constraints. It can be confirmed that the power lines are not to be undergrounded solely for the purpose of reducing exposure to EMFs. Furthermore, the Transmission Assets will adopt the International Commission on Non-ionizing Radiation Protection (ICNIRP) guidelines (2010, 1998).

Summary of NPS EN-5 requirement	How and where considered in the annex
In order to avoid unacceptable adverse impacts of EMFs from electricity network infrastructure on aviation, the Secretary of State will take account of statutory technical safeguarding zones defined in accordance with Planning Circular 01/03, or any successor, when considering recommendations for DCO applications. More detail on this issue can be found in Section 5.5 of EN-1. (paragraph 2.11.14 of NPS EN-5).	The Aviation Chapter of the ES (Volume 3, Chapter 11, document reference F3.11) considers potential impacts of EMFs from the Transmission Assets on aviation receptors. The Applicants are and will continue to engage with relevant stakeholders, to avoid unacceptable adverse impacts on aviation.
Where a statutory consultee on the safeguarding of technical facilities identifies a risk that the EMF effect of electricity network infrastructure would compromise the effective and safe operation of such facilities, the potential impact and siting and design alternatives will need to have been fully considered as part of the application. (paragraph 2.11.15 of NPS EN-5).	<p>The potential effects of EMF generated by electricity network infrastructure on the effective and safe operation of technical facilities is considered in Volume 3, Chapter 11: Aviation and radar of the ES (document reference: F3.11). Specifically, Volume 3, Chapter 11: Aviation and radar of the ES (document reference: F3.11) considers the potential impacts from EMFs of onshore export cable on Communication, Navigation and Surveillance (CNS) infrastructure at Blackpool Airport. The Applicants are, and will continue to engage with relevant stakeholders to minimise potential effects.</p> <p>Justification for the location of the Transmission Assets, including the design and/or environmental constraints considered is provided in Volume 1, Chapter 4: Site Selection and Consideration of Alternatives of the ES (document reference: F1.4).</p>
The diagram below shows a basic decision tree for dealing with EMFs from overhead power lines. (paragraph 2.11.16 of NPS EN-5).	The Transmission Assets do not include overhead lines within the application, therefore, this does not apply for this project.

1.2.4 National Planning Policy Framework

- 1.2.4.1 The National Planning Policy Framework (NPPF) was published in 2012 and updated in 2018, 2021 and 2023 (Department for Levelling Up, Housing and Communities, 2023). The NPPF sets out the Government's planning policies for England.
- 1.2.4.2 The Government has published proposed reforms to the NPPF for consultation on 30 July 2024, with the consultation period ending on 24 September 2024 (Ministry of Housing, Communities and Local Government, 2024). Following consultation, the NPPF will be updated.
- 1.2.4.3 **Table 1.4** sets out a summary of the NPPF policies relevant to this chapter.

Table 1.4: Summary of NPPF provisions relevant to human health

Policy	Key provisions	How and where considered in the annex
6. Building a strong, competitive economy	<i>“85. Planning policies and decisions should help create the conditions in which businesses can invest, expand and adapt. Significant weight should be placed on the need to support economic growth and productivity, taking into account both local business needs and wider opportunities for development.” (p.24)</i>	Economic effects are considered in section 1.12.3.20 informed by Volume 4, Chapter 2: Socio-economics of the ES.
8. Promoting healthy and safe communities	<p><i>“96. Planning policies and decisions should aim to achieve healthy, inclusive and safe places which:</i></p> <p><i>a) promote social interaction, including opportunities for meetings between people who might not otherwise come into contact with each other – for example through mixed-use developments, strong neighbourhood centres, street layouts that allow for easy pedestrian and cycle connections within and between neighbourhoods, and active street frontages;</i></p> <p><i>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 attractive, well-designed, clear and legible pedestrian and cycle routes, and high quality public space, which encourage the active and continual use of public areas; and</i></p> <p><i>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. 28)</i></p>	<p>Wider societal infrastructure and resources are scoped out, see Table 1.21 within section 1.8.</p> <p>Well-being is an integral consideration throughout this annex, reflecting that the WHO define health in terms of states of wellbeing, see section 1.12.</p> <p>Open space and recreation are considered in section 1.12.3 informed by Volume 3, Chapter 6: Land use and recreation of the ES and Volume 2, Chapter 9: Other sea users of the ES.</p>
9. Promoting sustainable transport	<p><i>“108. Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:</i></p> <p><i>a) the potential impacts of development on transport networks can be addressed;</i></p> <p><i>b) opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;</i></p> <p><i>c) opportunities to promote walking, cycling and public transport use are identified and pursued;</i></p> <p><i>d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and</i></p>	Construction works may disrupt local vehicle traffic (private and public transport) as well as active travel (pedestrians and cyclists). These effects are assessed in section 1.12.2 and informed by Volume 3, Chapter 7: Traffic and transport of the ES.

Policy	Key provisions	How and where considered in the annex
	<i>mitigating any adverse effects, and for net environmental gains; and e) patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places.” (p. 31).</i>	
11. Making effective use of land	<i>“123. Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or ‘brownfield’ land.” (p. 36).</i>	Land uses are considered in section 1.12.7 , informed by Volume 3, Chapter 2: Hydrology and flood risk of the ES and Volume 3, Chapter 9: Air quality of the ES.
14. Meeting the challenge of climate change, flooding and coastal change	<i>“157. The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.” (p. 46)</i>	Climate change is scoped out in terms of population health effects, see Table 1.21 within section 1.8 . The assessment of climate change is set out in Volume 4, Chapter 1: Climate change of the ES.

1.2.4.4 The consultation draft includes similar provisions as the designated NPPF. The consultation draft NPPF has been reviewed and there are no material updates for human health.

1.2.5 North West Inshore and North West Offshore Marine Plan

1.2.5.1 The assessment of potential changes to human health has also been made with consideration to the specific policies set out in the North West Inshore and North West Offshore Marine Plan (HM Government, 2021). Key provisions are set out in **Table 1.5** along with details as to how these have been addressed within the assessment.

Table 1.5: North West Inshore and North West Offshore Marine Plan policies of relevance to human health

Policy	Key provisions	How and where considered in the annex
Objectives of the North West Marine Plan	Objectives include: infrastructure to support and promote safe, profitable and efficient marine businesses; marine businesses respect environmental limits and are socially responsible; the use of the marine environment is benefiting 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>The effects on landscape and visual resources are scoped out in terms of population health effects (see Table 1.21 within section 1.8).</p> <p>The assessment of landscape and visual resources is set out in Volume 3, Chapter 10: Landscape and visual resources of the ES.</p> <p>Access by other sea users is discussed in Table 1.21 within section 1.8 informed by Volume 2, Chapter 9: Other sea users of the ES.</p> <p>Equitable access to health determinants is considered throughout the assessment in section 1.12.</p>
NW-WQ-1	Proposals that protect, enhance and restore water quality will be supported.	The water quality effects of the Transmission Assets to population health are discussed in section 1.12.6 informed by Volume 3, Chapter 2: Hydrology and flood risk of the ES.
NW-CO-1	Proposals that may have significant adverse impacts on, or displace, existing activities must demonstrate that they will, in order of preference: a) avoid; b) minimise; c) mitigate adverse impacts so they are no longer significant.	Sea transport access that could affect population health is discussed in section 1.12.2 informed by Volume 3, Chapter 7: Traffic and transport of the ES.
NW-REN-1	Proposals that enable the provision of renewable energy technologies and associated supply chains, will be supported.	Wider societal infrastructure and resources and climate change have been scoped out (see Table 1.21 within section 1.8). Further information on socio-economic considerations of the Transmission Assets are set out in Volume 4, Chapter 2: Socio-economics of the ES.
NW-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, habitats and species and reduce the impacts of climate change.	Potential health effects related to air quality are considered in section 1.12.5 and informed by Volume 3, Chapter 9: Air quality of the ES.

Local planning policy

- 1.2.5.2 The onshore elements of the Transmission Assets are located within the administrative areas of Fylde Council, Blackpool Council and Preston City Council (and Lancashire County Council at the County level).
- 1.2.5.3 The relevant local planning policies applicable to human health based on the extent of the study areas for this assessment are summarised in **Table 1.6**.

Table 1.6: Summary of local planning policy relevant to this annex

Policy	Key provisions	How and where considered in the annex
Fylde Local Plan (2011-2032)		
Strategic Policy HW1: Health and Wellbeing	<i>“The Council will integrate public health principles and planning to help reduce health inequalities by:... Working with the Lancashire Public Health Service and the Health and Wellbeing Board on planning and health issues, to take account of the... goals in the Lancashire Health and Wellbeing Strategy.... Better health – improve healthy life expectancy, and narrow the health gap.”</i>	Effects on health and wellbeing are inherent to all the assessments in section 1.12 .
Blackpool Council Local Plan (2012-2027)		
Policy NPPF1: Presumption in Favour Of Sustainable Development	<i>“When considering development proposals, the Council will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework. It will always work pro-actively with applicants jointly to find solutions which mean that proposals can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area.”</i>	Economic effects that could influence population health are discussed in section 1.12.4 informed by Volume 4, Chapter 2: Socio-economics of the ES.
Policy CS3: Economic Development and Employment	<i>“Sustainable economic development will be promoted to strengthen the local economy and meet the employment needs of Blackpool and the Fylde Coast Sub-Region to 2027.”</i>	Economic effects that could influence population health are discussed in section 1.12.4 informed by Volume 4, Chapter 2: Socio-economics of the ES.

Policy	Key provisions	How and where considered in the annex
Preston Local Plan (2012-2026)		
Catering for Sustainable Travel Policy ST2: General Transport Considerations	<i>“Policy ST2 – General Transport Considerations: All development proposals will need to show that: a) road safety and the efficient and convenient movement of all highway users (including bus passengers, cyclists, pedestrians and equestrians) is not prejudiced; b) appropriate provision is made for public transport services; c) appropriate measures are included to facilitate access on cycle or foot; d) where practicable, ensure existing pedestrian, cycle and equestrian routes are protected and extended; e) the needs of disabled people are fully provided for; f) corridors which could be developed as future transport routes (e.g. disused railway lines) are not prejudiced.”</i>	Transport effects, including disruptions to local vehicle traffic (private and public transport) and active travel (pedestrians and cyclists) during construction, are assessed in section 1.12.2 informed by Volume 3, Chapter 7: Traffic and transport of the ES.
Delivering Economic Prosperity Policy 9: Economic Growth and Employment	<i>“The long term sustainability of Preston depends on developing the local economy and providing enough jobs for existing and future generations. Economic growth is essential to assist with the restructuring of the local economy, to attract new firms to Preston, help existing companies expand, foster the creation of new firms and at the same time reduce dependence on the private car for work [...] In the interest of sustainable development, as well as economic, environmental and social well-being of Preston’s residents, it is important that greater employment opportunities are created or facilitated within the City. The creation of employment opportunities is strongly linked to the availability of suitable sites for employment.”</i>	Economic effects that could influence population health are discussed in section 1.12.4 informed by Volume 4, Chapter 2: Socio-economics of the ES.
Central Lancashire Adopted Core Strategy		
Policy 15: Skills and Economic Inclusion	<i>“Improve Skills and Economic Inclusion by: (a) Working with existing and incoming employers to identify skills shortages.”</i>	Health impacts arising from employment opportunities are assessed in section 1.12.4 informed by Volume 4, Chapter 2: Socio-economics of the ES.
Policy 23: Health	<i>“Integrate public health principles and planning, and help to reduce health inequalities by: (a) Working with health care commissioners to support health care infrastructure and particularly to improve</i>	The rationale behind Health in EIA is discussed in section 1.1 . Health and social care services are scoped out (see Table 1.21 within section 1.8).

Policy	Key provisions	How and where considered in the annex
	<p><i>primary care and mental health care access and facilities.</i></p> <p><i>(b) Where required by the priorities of health care commissioners, identifying sites for new facilities reflecting the spatial distribution of need, the importance of accessibility, and opportunities for different service providers to share facilities.</i></p> <p><i>(c) Seeking contributions towards new or enhanced facilities from developers where new housing results in a shortfall or worsening of provision.</i></p> <p><i>(d) Requiring Health Impact Assessment on all strategic development proposals on Strategic Sites and Locations.”</i></p>	
Policy 28: Renewable Resources and New Developments	<p><i>“Proposals for renewable and low carbon energy schemes will be supported and planning permission granted where the following criteria are met:</i></p> <p><i>(a) The proposal would not have an unacceptable impact on landscape character and visual appearance of the local area, including the urban environment;</i></p> <p><i>(b) The reason for the designation of a site with statutory protection would not be compromised by the development;</i></p> <p><i>(c) Any noise, odour, traffic or other impact of development is mitigated so as not to cause unacceptable detriment to local amenity;</i></p> <p><i>(d) Any significant adverse effects of the proposal are considered against the wider environmental, social and economic benefits, including scope for appropriate mitigation, adaptation and/or compensatory provisions.”</i></p>	<p>The effects on landscape and visual resources are considered in Table 1.21 within section 1.8 and informed by Volume 3, Chapter 10: Landscape and visual impact assessment of the ES.</p> <p>Transport effects are assessed in section 1.12.2).</p> <p>Wider societal infrastructure and resources and climate change have been scoped out (see Table 1.21 within section 1.8).</p> <p>Amenity effects are considered under several health determinants in this assessment, including sections 1.12.3, 1.12.4, 1.12.5, and 1.12.8, informed by Volume 3, Chapter 6: Land use and recreation of the ES; Volume 2, Chapter 9: Other sea users of the ES; Volume 4, Chapter 2: Socio-economics of the ES; Chapter 9: Air quality of the ES; and Volume 3, Chapter 8: Noise and vibration of the ES.</p>
Policy 29: Water Management	<p><i>“Improve water quality, water management and reduce the risk of flooding by:</i></p> <p><i>(d) Appraising, managing and reducing flood risk in all new developments, avoiding inappropriate development in flood risk areas particularly in Croston,</i></p>	<p>Potential health effects relating to water are considered in section 1.12.6 and informed by Volume 3, Chapter 2: Hydrology and flood risk of the ES.</p>

Policy	Key provisions	How and where considered in the annex
	<p><i>Penwortham, Walton-le-Dale and southwest Preston;</i></p> <p><i>(g) Encouraging the adoption of Sustainable Drainage Systems;</i></p> <p><i>(h) Seeking to maximise the potential of Green Infrastructure to contribute to flood relief.”</i></p>	
Policy 30: Air Quality	<p><i>“Improve air quality through delivery of Green Infrastructure initiatives and through taking account of air quality when prioritising measures to reduce road traffic congestion.”</i></p>	Potential health effects related to air quality are considered in section 1.12.5 and informed by Volume 3, Chapter 9: Air quality of the ES.

1.3 Relevant guidance

1.3.1.1 This annex has followed the methodology set out in Volume 1, Chapter 5: Environmental assessment methodology of the ES. Specific to human health impact assessment, the following guidance documents have also been considered.

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

1.4 Consultation

1.4.1 Scoping

- 1.4.1.1 On 28 October 2022, the Applicants submitted a EIA 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, operation and maintenance and decommissioning phases of the Transmission Assets.
- 1.4.1.2 Following consultation with the appropriate statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 8 December 2022, see **Table 1.7**.

1.4.2 Statutory consultation responses

- 1.4.2.1 The preliminary findings of the EIA process were published in the PEIR in October 2023. The PEIR was prepared to provide the basis for formal consultation under the Planning Act 2008. This included consultation with statutory and non-statutory bodies under section 42 and 47 of the Planning Act 2008 as presented in **Table 1.7**.

1.4.3 Summary of consultation responses received

- 1.4.3.1 A summary of the key items raised specific to human health are presented in **Table 1.7**, together with how these have been considered in the production of this annex. It should however be noted that formal responses are provided for all consultation responses received and can be accessed in the Consultation Report (document reference E1).

Table 1.7: Summary of key consultation topics raised during consultation activities undertaken for the Transmission Assets relevant to human health

Date	Consultee and type of response	Response to comment raised and/or where addressed in the ES
November 2023	St Annes Council, Section 42 feedback We also have concerns about the impact on the sand dunes where these cables come ashore and the eco systems that has been worked on over the years. We feel that there will need to be road closures as the building work is started in an area that has limited access in and out of St Annes. The town has suffered over the years when roads have been closed, snarling up the town. These construction times will be over years not weeks or months and will have a negative economic impact on our town.	The population health impacts associated with road closures and construction has been assessed within this human health annex, including potential effects to journey times for seeking medical care (see section 1.12.2).
November 2023	Explorer scouts, Section 42 feedback The main impact of noise from substations has not been properly (sic). Residents will have	The health and wellbeing effects of noise and vibration changes associated with the

Date	Consultee and type of response	Response to comment raised and/or where addressed in the ES
	detrimental effects to their health from this and it hasn't even been owned to be listed.	Transmission Assets are presented in section 1.12.8 .
December 2022	<p>The Planning Inspectorate, Scoping Opinion</p> <p>The Scoping Report states that a technical appendix to the ES would be provided to draw the information relevant to human health together and to signpost where further details can be found, including conclusions regarding likely significant effects. The Inspectorate is content that a technical appendix will summarise the findings of the human health assessment and set out conclusions regarding likely significant effects.</p> <p>The Applicants' assessment should take into account relevant best practice guidance on the assessment of human health effects, such as recent guidance issued by the Institute of Environmental Management and Assessment (IEMA) for 'Effective Scoping of Human Health in Environmental Impact Assessment (November 2022)' and 'Determining Significance for Human Health in Environmental Impact Assessment (November 2022)'.</p>	Noted. The human health impacts of the Transmission Assessments are set out in this annex. The methodology follows the IEMA 2022 guidance as set out in section 1.3 . The approach to reporting as an annex is consistent with the expectation of no likely significant effects from transmission works.
	<p>The Planning Inspectorate, Scoping Opinion</p> <p>The Scoping Report states that no new dust emissions would be generated during the operational phase and no significant traffic flows would be associated with operation or maintenance of the transmission assets.</p> <p>The Inspectorate agrees that health impacts from emissions to air during operation and maintenance as referred to under Table 8.18 (Air quality) can be scoped out of the assessment on the basis of the information presented in the Scoping Report.</p>	Noted. Operation and maintenance air quality effects are scoped out as agreed by the Planning Inspectorate, this is set out in Table 1.21 within section 1.8 .
	<p>The Planning Inspectorate, Scoping Opinion</p> <p>The Scoping Report states that no new emissions to land or soil would occur during the operational and maintenance phase.</p> <p>The Inspectorate agrees that health impacts resulting from emissions to water, land and soil, including runoff or spillages from construction areas during operation and maintenance can be scoped out of the assessment on the basis of the information</p>	<p>Operation and maintenance land or soil effects are scoped out as set out in Table 1.21 within section 1.8.</p> <p>An Outline Operational Drainage Management Plan (document reference J10) and an Outline Construction Noise and Vibration Management Plan (document reference J1.3) are being submitted with the ES alongside the application for development consent.</p>

Date	Consultee and type of response	Response to comment raised and/or where addressed in the ES
	presented in the Scoping Report. However, the ES should provide detail of any operational controls on maintenance works, for example in an Operational Management Plan.	
	<p>The Planning Inspectorate, Scoping Opinion</p> <p>The Scoping Report states that no new disturbance to land would be required during the operation and maintenance phase and, as such, no areas of contaminated land would be affected. The Inspectorate agrees that this matter can be scoped out of the assessment on the basis providing the ES sets out details of any operational controls on maintenance works, for example via a Remediation Method Statement or Contaminated Land Management Plan.</p>	<p>Operation and maintenance land or soil effects are scoped out as set out in Table 1.21 within section 1.8.</p> <p>The ES sets out details of any operational controls on maintenance works. Furthermore, an Outline Operational Drainage Management Plan (document reference J10), an Outline Construction Noise and Vibration Management Plan (document reference J1.3) and an Outline Contaminated Land and Groundwater Discovery Strategy (document reference J1.14) are being submitted with the ES alongside the application for development consent.</p>
	<p>The Planning Inspectorate, Scoping Opinion</p> <p>The Scoping Report states that once construction is completed, no further disruption to PRow or areas of land would be required.</p> <p>The Inspectorate agrees that health impacts arising from changes to access to PRow or open space during operation and maintenance can be scoped out of the assessment on the basis of the information presented in the Scoping Report.</p>	<p>As set out in the EIA Scoping Report and agreed by the Planning Inspectorate in the Scoping Opinion, once construction is completed, no further disruption to public rights of way (PRow) or areas of land would be required. As such, operation and maintenance effects for open space, leisure and play are scoped out as set out in Table 1.21 within section 1.8.</p>
	<p>The Planning Inspectorate, Scoping Opinion</p> <p>The Inspectorate agrees that health impacts arising from employment opportunities during operation and maintenance can be scoped out of the assessment on the basis of the information presented in the Scoping Report.</p>	<p>Operation and maintenance for employment opportunities are scoped out as set out in Table 1.21 within section 1.8.</p>
	<p>The Planning Inspectorate, Scoping Opinion</p> <p>The Scoping Report states that effects from health impacts arising from EMFs are not likely to be significant but the human health appendix will consider the effects of EMF through a 'risk perception' section within the technical appendix.</p>	<p>Actual risks of electric and magnetic fields (EMF) are scoped out, see Table 1.21 within section 1.8.</p> <p>Understanding of EMF risk is scoped in, see section 1.8.</p> <p>The design is compliant with the Control of Electromagnetic Fields at Work Regulations 2016, the Health and Safety Guidelines 281</p>

Date	Consultee and type of response	Response to comment raised and/or where addressed in the ES
	The Inspectorate agrees that this matter can be scoped out of the assessment on the basis that the ES demonstrates the design is compliant with the International Commission on Non-Ionizing Radiation Protection guidelines (1998) in ensuring that the threshold for impacts to humans is not met/exceeded.	and the International Commission on Non-Ionizing Radiation Protection guidelines (ICNIRP, 1998, 2010).
November 2022	UK Health Security Agency, Scoping Opinion We understand that the promoter will wish to avoid unnecessary duplication and that many issues including air quality, emissions to water, waste, contaminated land etc. will be covered elsewhere in the Environmental Statement (ES). We believe the summation of relevant issues into a specific section of the report provides a focus which ensures that public health is given adequate consideration. The section should summarise key information, risk assessments, proposed mitigation measures, conclusions and residual impacts, relating to human health. Compliance with the requirements of National Policy Statements and relevant guidance and standards should also be highlighted.	Noted. This assessment is set out in section 1.12
	UK Health Security Agency, Scoping Opinion UKHSA and OHID's predecessor organisation Public Health England produced an advice document 'Advice on the content of Environmental Statements accompanying an application under the NSIP Regime', setting out aspects to be addressed within the Environmental Statement. This advice document and its recommendations are still valid and should be considered when preparing an ES.	Noted, this advice note has been taken into account when preparing this ES Annex. Additionally, this assessment complies with the 2022 IEMA guidance which has been published after the PHE advice note, and is considered industry best practice.
	UK Health Security Agency, Scoping Opinion Please note that where impacts relating to health and/or further assessments are scoped out, promoters should fully explain and justify this within the submitted documentation.	Noted. A full description of issues scoped into the assessment along with their justification is provided in Table 1.20 . The justification for issues scoped out of the assessment is provided in Table 1.21 within section 1.8 .
	UK Health Security Agency, Scoping Opinion Our position is that pollutants associated with road traffic or combustion, particularly particulate matter and oxides of nitrogen are non-threshold; i.e., an exposed population is likely to be subject to potential harm at any level and that reducing public exposure to non-threshold pollutants (such as particulate matter	The health annex assesses exposure to non-threshold air pollutants while considering inequalities in exposure and reducing exposures as far as is reasonably practicable. The potential construction and decommissioning effects resulting from emissions to air, including dust emissions and other pollutants, such as emissions from traffic have been considered in section 1.12 . There

Date	Consultee and type of response	Response to comment raised and/or where addressed in the ES
	and nitrogen dioxide) below air quality standards will have potential public health benefits. We support approaches which minimise or mitigate public exposure to non-threshold air pollutants, address inequalities (in exposure) and maximise co-benefits (such as physical exercise). We encourage their consideration during development design, environmental and health impact assessment, and development consent.	are not considered to be operational air quality effects relevant to health and this issue has been scoped out as provided in Table 1.21 within section 1.8 .
	<p>UK Health Security Agency, Scoping Opinion</p> <p>The applicant should assess the potential public health impact of EMFs arising from any electrical equipment associated with the development. Alternatively, a statement should be provided explaining why EMFs can be scoped out.</p>	Justification for scoping out the actual public health risks of EMF effects is provided in Table 1.21 within section 1.8 . The good practice assessment of public understanding of operational EMF risk is set out in section 1.12.9 . Also see: Volume 1, Annex 3.4: EMF Compliance Statement of the ES.

1.5 Study area

- 1.5.1.1 Details on the Transmission Assets can be found within Volume 1, Chapter 3: Project description of the ES, which sets out the Project Design Envelope for the Transmission Assets.
- 1.5.1.2 The Offshore Permanent Infrastructure Area(s) is the area within the Offshore Order Limits (up to MLWS) where the permanent offshore electrical infrastructure (i.e., offshore export cables) will be located. The Offshore Permanent Infrastructure Area is remote from the nearest mainland receptor population and comprises the offshore export cables. For most offshore determinants of health, there is therefore not a localised population impact around which a study area can be defined. Offshore elements have been scoped out of the assessment, see **section 1.8**
- 1.5.1.3 The Intertidal Infrastructure Area (from MLWS to Mean High Water Springs (MHWS)) and Transmission Assets Order Limits: Onshore (referred to hereafter as the Onshore Order Limits) are located within the local authority areas of, Blackpool Council, Fylde Council, Preston City Council, South Ribble Borough Council and Lancashire County Council. During the construction phase, temporary construction facilities, including construction access roads and construction compounds, will be required and are considered within this annex.
- 1.5.1.4 Local populations in England are relevant for onshore/nearshore activities associated with the Transmission Assets including employment and educational opportunities, transport disruption, and recreation and leisure. Wider impacts of the project are relevant to national public health and climate change related effects extend to the global population.
- 1.5.1.5 The human health study area has been defined on the basis of relevant human populations that may be affected directly or indirectly by the intertidal and onshore elements of Transmission Assets. The human health study area

is based on administrative boundaries for the population groups relevant to the Onshore Order Limits.

- 1.5.1.6 As study areas do not necessarily define the boundaries of potential health effects, particularly mental health effects, the human health study area is defined in terms of representative population groups, which are informative of sensitivity, rather than to set boundaries on the extent of effects.
- 1.5.1.7 For this reason, and to maintain a proportionate assessment, the health baseline does not include every ward within the Onshore Order Limits. The selected wards reflect a realistic worst case of the local health baseline to inform a conservative characterisation of population sensitivity.
- 1.5.1.8 The following areas comprise the human health study area, as shown in **Figure 1.1**. The geographic range, with both small areas and wider areas, links with the relevant health assessments, e.g., site-specific air quality effects or regional employment effects.
- The site-specific population for landfall is defined using E05005202 St Leonards ward.
 - The site-specific population for the onshore export cable corridor and the 400 kV grid connection cable corridor is defined using E05005194 Kilnhouse ward (representing higher (worse) deprivation along the route).
 - The site-specific population for onshore substation sites is defined using E05005191 Freckleton East ward and E05012202 Lea and Larches (the latter representative of higher community deprivation).
 - The local population for the onshore export cable corridor and the 400 kV grid connection cable corridor is defined using the local authority area of Fylde.
 - The local population for the onshore substation sites is defined using the local authority area of Preston.
 - The regional population is defined using the area of the North West.
 - The national population is defined with reference to England.
- 1.5.1.9 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.
- 1.5.1.10 The local and regional study areas reflect a broad area onshore from which the majority of the Transmission Assets workforces are likely to be drawn. See Volume 3, Annex 7.5: Construction trip generation assumptions of the ES for the split of construction staff. The study area does not extend to port related activities and associated port transport.
- 1.5.1.11 As this annex draws from the relevant topic chapters of the ES, the health assessment has regard to the zones of influence defined by other topic chapters. Those chapters inform the consideration of impact magnitude, including the extent of effects in the health chapter.

1.6 Baseline methodology

1.6.1 Methodology for baseline data collection

Desk studies

1.6.1.1 Information on human health within the study area has been collected through a detailed desk study of existing studies and datasets. These sources are summarised in **Table 1.8** below.

Table 1.8: Summary of key desk study sources

Title	Source	Year	Author	Accessed
Public Health indicators, England	Fingertip's resource	2011 - 2023	OHID	June 2024
Small area health mapping	Local Health	2011 - 2023	OHID	June 2024
Small area deprivation mapping	Index of Multiple Deprivation	2023	Ministry for Housing, Communities and Local Government	June 2024

1.6.1.2 The baseline covers public health indicators relevant to:

- transport modes, access and connections;
- open space and recreation;
- socio-economic factors;
- air quality;
- noise and vibration;
- understanding of risk (risk perception); and
- public health indicators that reflect the determinants of health scoped into the assessment have been extracted from routinely collected health outcome statistics.

1.6.1.3 No baseline public health indicators relevant specifically to water quality, soil quality or contaminated land were identified. Therefore, a population health baseline for these issues has not been included. Baseline information on potential areas of contamination is discussed in Volume 3, Chapter 1: Geology, hydrogeology and ground conditions of the ES.

1.6.1.4 This annex has drawn from relevant topic chapters of the ES and has therefore utilised each topic's reference baseline information where relevant.

1.6.1.5 This document presents baseline data tables relating to each health determinant considered in the health assessment. The latest available data has been accessed and retrieved from the Office for Health Improvement and Disparities (OHID) Fingertips Public Health Data (OHID, 2022) in June 2024 (see **Table 1.8** and **section 1.7**).

1.6.1.6 This data relates to the populations relevant to the Transmission Assets. The baseline provides small area (site-specific) data based for the relevant wards. Local, regional, and national comparators are also provided.

Site-specific surveys

- 1.6.1.7 No site-specific surveys have been undertaken to inform the assessment for human health. This is because relevant population health data is publicly available and further data collection would not be proportionate.

1.7 Baseline environment

1.7.1 Overview

- 1.7.1.1 This annex presents baseline data tables relating to each health determinant considered in the health assessment. The latest available data has been retrieved from the Office for Health Improvement and Disparities (OHID) Fingertips Public Health Data (OHID, 2024), accessed and current as of June 2024.

1.7.2 Health and wellbeing effects from changes in transport modes, access and connections

- 1.7.2.1 The summary indicators relevant to transport related health outcomes in the study area are presented in **Table 1.9**.
- 1.7.2.2 Transport related health indicators are not reported at the ward level. As transport effects often relate to wider road network effects, the wider geographic areas are informative of sensitivity to change for the populations near landfall, the onshore export cable corridor or the 400 kV grid connection cable corridor and the onshore substations.

Table 1.9: Summary indicators relevant to transport health outcomes in districts and counties

Population	District		County/Unitary		Regional	National
	Landfall, Onshore cable corridor and Onshore substations ¹					
Indicator name	Fylde	Preston	Blackpool	Lancashire	North West	England
Killed and seriously injured (KSI) casualties on England's roads ²	NA ³	NA	369.8	121.1	94.0	94.5
Percentage of physically active children and young people (5-16 years)	NA	41.9	40.5	44.8	45.1	47.0
Percentage of physically active adults (19+ years)	70.2	61.4	59.2	65.8	65.7	67.1
Percentage of adults walking for travel at least three days per week (16+ years)	9.7	15.3	11.1	11.9	13.4	15.1

Population	District		County/Unitary		Regional	National
	Landfall, Onshore cable corridor and Onshore substations ¹					
Indicator name	Fylde	Preston	Blackpool	Lancashire	North West	England
Percentage of adults cycling for travel at least three days per week (16+ years)	1.5	1.5	1.2	1.6	1.8	2.3
Depression: Quality and Outcomes Framework (QOF) prevalence (18+ years)	16.5	17.2	21.6	16.4	16.4	13.2
Legend						
	Significantly better than national average					
	Significantly worse than national average					
	Not significantly different to national average					

¹ In this instance the term onshore cable corridor refers collectively to both the onshore export cable corridor and the 400 kV grid connection cable corridor.

² Annual crude rate per billion vehicle miles, 2021.

³ NA indicates that data is not available for a specific study area, this can be for a variety of reasons. This is the case for all of the baseline tables that follow.

1.7.2.3 **Table 1.9** summarises health and wellbeing outcomes related to changes in transport modes, access and connections.

1.7.2.4 For indicators where data is only available at the district level or higher the trends observed for the local population near landfall., the onshore export cable corridor and the 400 kV grid connection cable corridor vary. The percentage of physically active adults in Fylde is slightly higher than the national average (for England) but the percentage of adults who walk for travel for at least three days a week is lower (worse) in Fylde compared to the national average. Additionally, the proportion of the population with a primary care depression diagnosis is higher in Fylde than the national average. The data suggests higher sensitivity to changes in transport that could affect active travel in these areas.

1.7.2.5 For the local population near the onshore substations, the data suggests generally higher sensitivity to changes in transport that could affect active travel.

1.7.2.6 In relation to indicators where data is only available at the county level and above, the indicator for road safety (killed or seriously injured) is higher (worse) in Lancashire, and particularly higher in Blackpool, compared to the national average. The data suggests generally higher sensitivity to road safety related changes in transport for landfall, the onshore export cable corridor or the 400 kV grid connection cable corridor and the onshore substations.

1.7.2.7 Regionally, casualties on roads are similar to the national average. The percentage of adults who walk or cycle for travel for at least three days a week in the region is lower (worse) than 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.

1.7.3 Health and wellbeing effects from changes in open space and recreation

1.7.3.1 **Table 1.10** summarises open space and recreation related health outcomes that are relevant to this assessment at the ward level and **Table 1.11** summarises lifestyle related health outcomes for districts and counties.

Table 1.10: Summary indicators relevant to open space, leisure and play

Population	Site-specific				Local		National
	Landfall	Onshore cable corridor ¹	Onshore substations		Onshore cable corridor ¹	Onshore substations	
Indicator name	St Leonards	Kilnhouse	Freckleton East	Lea and Larches	Fylde	Preston	England
Violent crime - violence offences per 1,000 population	NA	NA	NA	NA	21.6	44.6	34.4
Reception: Prevalence of overweight (including obesity) (4-5 years) (percentage)	25.0	20.0	17.6	23.6	21.5	22.2	21.3
Year 6: Prevalence of overweight (including obesity) (10-11 years) (percentage)	29.2	33.3	31.2	39.1	36.0	40.0	36.6
Percentage of adults (aged 18+) classified as overweight or obese (18+ years)	NA	NA	NA	NA	64.6	64.6	64.0
Percentage of physically active children and young people (5-16 years)	NA	NA	NA	NA	NA	41.9	47.0
Percentage of physically active adults (19+ years)	NA	NA	NA	NA	70.2	61.4	67.1
Emergency hospital admissions for coronary heart disease (Standardised Admissions Rate)	81.4	103.6	95.6	151.7	95.4	153.2	100.0

Population	Site-specific				Local		National
	Landfall	Onshore cable corridor ¹	Onshore substations		Onshore cable corridor ¹	Onshore substations	
Indicator name	St Leonards	Kilnhouse	Freckleton East	Lea and Larches	Fylde	Preston	England
Emergency hospital admissions for stroke (SAR)	86.1	115.6	84.7	91.4	100.2		100.0
Emergency hospital admissions for Myocardial Infarction (heart attack) (SAR)	95.0	127.5	110.1	127.6	105.9		100.0
Emergency hospital admissions for intentional self-harm (SAR)	103.9	106.1	93.3	118.9	94.4		100.0
Legend							
			Significantly better than national average				
			Significantly worse than national average				
			Not significantly different to national average				

¹ In this instance the term onshore cable corridor refers collectively to both the onshore export cable corridor and the 400 kV grid connection cable corridor.

- 1.7.3.2 **Table 1.10** shows overall, lifestyle related health outcomes in the site-specific wards are slightly worse than the national averages. It is noted that there are fewer statistics at the ward level.
- 1.7.3.3 Regarding the population near landfall, the proportion diagnosed as overweight (including obese) in children aged 4-5 years and 10-11 years, is slightly higher for those aged 4-5 years and lower for those aged 10-11 years than the national average. Emergency hospital admissions for coronary heart disease, stroke and myocardial infarction are lower (better) than the national average. However, emergency hospital admissions for intentional self-harm are slightly higher (worse) than the national average.
- 1.7.3.4 For the population near the onshore export cable corridor or the 400 kV grid connection cable corridor (using Kilnhouse as a representative ward), the proportion diagnosed as overweight or obese in children aged 4-5 years and 10-11 years is lower (better) than the national average. Emergency hospital admissions for coronary heart disease, stroke, heart attacks and intentional self-harm are all higher (worse) in Kilnhouse than the national averages.
- 1.7.3.5 The data indicates that adults, particularly those residing along the onshore export cable corridor or the 400 kV grid connection cable corridor, are more responsive to variations in physical activity. This means that changes in their

physical activity levels are more likely to significantly impact their lifestyle-related outcomes, such as health status and overall well-being. Regarding the population near to the onshore substations the following has been noted.

- For emergency hospital admissions for coronary heart disease and intentional self-harm, the rate in Freckleton East (the site-specific population for onshore substation sites) is lower than the national average, while in Lea and Larches (representative of higher community deprivation), it is higher than the national average.
- For emergency hospital admissions for stroke, the rates in Freckleton East, and Lea and Larches are both lower than the national average.
- For emergency hospital admissions for myocardial infarction, the rates in Freckleton East and Lea and Larches are higher than the national average.

Table 1.11: Summary indicators relevant to lifestyle health outcomes for districts and counties

Population	District		County/ Unitary		Regional	National
	Landfall, onshore export and 400kV grid connection cable corridors, and onshore substations					
Indicator name	Fylde	Preston	Blackpool	Lancashire	North West	England
Violent crime - violence offenses per 1,000 population	21.6	44.6	69.7	32.0	43.3	34.4
Reception: Prevalence of overweight (including obesity) (4-5 years) (percentage)	21.5	22.2	27.4	22.9	23.1	21.3
Year 6: Prevalence of overweight (including obesity) (10-11 years) (percentage)	36.0	40.0	42.3	36.8	38.3	36.6
Percentage of adults (aged 18+) classified as overweight or obese (18+ years)	64.6	64.6	72.1	65.7	66.5	64.0
Percentage of physically active children and young people (5-16 years)	NA	41.9	40.5	44.8	45.1	47.0
Percentage of physically active adults (19+ years)	70.2	61.4	59.2	65.8	65.7	67.1

Population	District		County/ Unitary		Regional	National
	Landfall, onshore export and 400kV grid connection cable corridors, and onshore substations					
Indicator name	Fylde	Preston	Blackpool	Lancashire	North West	England
Emergency hospital admissions for coronary heart disease (SAR)	95.4	153.2	124.7	122.8	125.0	100.0
Emergency hospital admissions for stroke (SAR)	100.2	116.4	116.7	100.0	109.8	100.0
Emergency hospital admissions for Myocardial Infarction (heart attack) (SAR)	105.9	129.5	139.4	117.7	114.9	100.0
Emergency hospital admissions for intentional self-harm (SAR)	94.4	102.3	211.1	103	125.8	100.0
Legend						
	Significantly better than national average					
	Significantly worse than national average					
	Not significantly different to national average					

1.7.3.6 **Table 1.11** shows overall, the lifestyle related health outcomes in the districts and counties are variable compared to the national average.

1.7.3.7 In relation to indicators where data is only available at the district level or higher, for the local population near landfall and the onshore export cable corridor or the 400 kV grid connection cable corridor, the following has been noted.

- The number of violent offences, as an indicator of public space safety for physical activity, is lower (better) in Fylde than the national average. It is noted that perceived safety is only one factor influencing physical activity behaviour.
- Considering weight in children, the proportion of 4–5-year-olds diagnosed as overweight or obese is similar to the national average, suggesting there is average sensitivity to physical activity opportunity for young children.
- In relation to physical activity, the percentage of adults who are physically active is higher in Fylde than the national average.

1.7.3.8 For the local population near the onshore substations (Preston), the proportion of violent offences is higher than the national average. The proportion of children aged 4-5 years diagnosed as overweight or obese is higher in Preston than the national average. The percentage of physically active children and young people is lower (worse) in Preston than the national average and a similar trend is observed in the adult population. The data suggests generally higher sensitivity to changes in physical activity opportunity related to the onshore substations.

1.7.4 Health and wellbeing effects from changes in socio-economic factors

1.7.4.1 Socio-economic related health and wellbeing outcomes that are relevant to this assessment are summarised in **Table 1.12** for the wards and **Table 1.13** for the districts and counties.

Table 1.12: Summary indicators relevant to socio-economic health outcomes

Population	Site-specific				National England
	Landfall	Onshore cable corridor ¹	Onshore substations		
Indicator name	St Leonards	Kilnhouse	Freckleton East	Lea and Larches	
Inequality in life expectancy at birth (Male) (years)	NA	NA	NA	NA	9.7
Inequality in life expectancy at birth (Female) (years)	NA	NA	NA	NA	7.9
Children in absolute low-income families (under 16s) (%)	NA	NA	NA	NA	15.6
16-to-17-year olds not in education, employment, or training or whose activity is not known (%)	NA	NA	NA	NA	5.2
19–24-year olds not in education, employment, or training (%)	NA	NA	NA	NA	13.2
Percentage of people in employment (16-64 years)	NA	NA	NA	NA	75.7
Average Attainment 8 score (15-16+ years)	NA	NA	NA	NA	46.2
Population who cannot speak English well or at all (%)	0.0	0.4	0.1	0.7	1.7
Child Poverty Income Deprivation Affecting Children (%)	12.4	16.7	18.4	18.5	17.1

Population	Site-specific				National England
	Landfall	Onshore cable corridor ¹	Onshore substations		
Indicator name	St Leonards	Kilnhouse	Freckleton East	Lea and Larches	
Older People in poverty Income deprivation affecting older people (%)	12.1	12.0	7.7	17.4	14.2
Legend					
	Significantly better than national average				
	Significantly worse than national average				
	Not significantly different to national average				

¹ In this instance the term onshore cable corridor refers collectively to both the onshore export cable corridor and the 400 kV grid connection cable corridor.

- 1.7.4.2 **Table 1.12** shows overall, socio-economic related health and wellbeing outcomes at the ward level are variable compared to the national average. It is noted there are limited statistics available for socio-economic indicators at the ward level.
- 1.7.4.3 For the population near landfall and the onshore export cable corridor or the 400 kV grid connection cable corridor, the percentage of children and older people living in income deprivation affecting children and older people is lower than the national average. The data suggests generally lower sensitivity to changes in socio-economic opportunity.
- 1.7.4.4 For the population near the onshore substations, the percentage of children affected by income deprivation is higher in Freckleton East and Lea and Larches compared to the national average. The proportion of older people living in poverty is lower in Freckleton East; and higher in Lea Larches compared to the national average. The data suggests mixed local sensitivity to changes in socio-economic opportunity, with the greatest sensitivity in Lea and Larches ward.
- 1.7.4.5 It is noted that socio-economic effects are expected to be most relevant to the local and regional geographic levels, though localised effects would also be experienced within these areas.

Table 1.13: Summary indicators relevant to socio-economic health outcomes

Population	District		County/ Unitary		Regional	National
	Landfall, Cable Corridor ¹ and Onshore substations					
Indicator name	Fylde	Preston	Blackpool	Lancashire	North West	North West
Inequality in life expectancy at birth (Male) (years)	11.1	10.6	13.8	10.6	11.6	9.7
Inequality in life expectancy at birth (Female) (years)	8.4	7.6	11.8	8.3	10.0	7.9
Children in absolute low-income families (under 16s) (%)	12.5	22.2	23.9	19.7	20.5	15.6
16-to-17-year olds not in education, employment, or training or whose activity is not known (%)	NA	NA	11.1	5.3	5.3	5.2
19–24-year olds not in education, employment, or training (%)	NA	NA	NA	NA	12.6	13.2
Percentage of people in employment (16-64 years)	80.2	72.7	72.7	72.7	73.6	75.7
Average Attainment 8 score (15-16+ years)	45.3	47.5	36.1	44.7	44.5	46.2
Population who cannot speak English well or at all (%)	0.3	2.4	0.6	1.1	1.2	1.7
Child Poverty Income Deprivation Affecting Children (%)	10.9	20.4	30.7	16.7	20.1	17.1
Older People in poverty Income deprivation affecting older people (%)	10.5	19.4	23.1	14.1	16.8	14.2
Legend						
		Significantly better than national average				
		Significantly worse than national average				
		Not significantly different to national average				

¹ In this instance the term onshore cable corridor refers collectively to both the onshore export cable corridor and the 400 kV grid connection cable corridor.

1.7.4.6 **Table 1.13** shows overall, socio-economic related indicators in the site-specific districts and counties are variable compared to the national average.

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- 1.7.4.7 In relation to indicators where data is only available at the district level or higher, for the local population near landfall and the onshore export cable corridor or the 400 kV grid connection cable corridor (using Fylde as a representative area), inequality in life expectancy at birth in both males and females is higher than the national average. The proportion of children in absolute low-income¹ families is lower (better) in Fylde compared to the national average. The percentage of people in employment is higher (better) than the national average, but the average educational attainment score is lower (worse) than the national average. The data shows a mixed picture but suggests generally average sensitivity to changes in socio-economic opportunity at the local level most relevant to landfall and the onshore export cable corridor or the 400 kV grid connection cable corridor.
- 1.7.4.8 For the local population near the onshore substation sites, the following has been noted. With regard to Preston, inequality in life expectancy at birth is higher (worse) in males, but lower (better) in females, compared to the national average. The proportion of children living in absolute low-income families is higher (worse) than the national average. The percentage of people in employment is lower (worse) than the national average. The average educational attainment score of the district is higher (better) than the national average. Overall, the data suggests generally higher sensitivity to changes in socio-economic opportunity.
- 1.7.4.9 Regarding the county area, inequality in life expectancy in males and females is higher in both Blackpool and Lancashire compared to the national average. The percentage of people in employment and the average educational attainment score² are lower (worse) in both counties than the national average. The percentage of children and older people affected by income deprivation is higher in Blackpool, whilst it is lower in Lancashire. In relation to indicators where data is only available at the county and above level, the proportion of 16-17-year-olds not in education, employment or training is higher in Blackpool and similar in Lancashire compared to the national average. The data suggests generally higher sensitivity to changes in socio-economic opportunity at the county level.
- Regionally, inequality in life expectancy in both male and female populations, as well as the proportion of children in absolute low-income families, are higher (worse) compared to the national average. 16–17-year-old young people not in education, employment or training are similar in the region compared to the national average. The percentage of people in employment is lower in the region than nationally. The data suggests generally higher sensitivity to changes in socio-economic opportunity at the regional level.

¹ "Absolute low income is defined as a family in low income Before Housing Costs (BHC) in the reference year in comparison with incomes in 2010 to 2011. A family must have claimed one or more of Universal Credit, Tax Credits or Housing Benefit at any point in the year to be classed as low income in these statistics." (Public Health England, 2024).

² "Average Attainment 8 score for all pupils in state-funded schools, based on local authority of pupil residence." (Public Health England, 2024).

1.7.5 Health and wellbeing effects from changes to air quality

1.7.5.1 The summary indicators relevant to air quality related health outcomes in the study area are presented in **Table 1.14** and **Table 1.15**.

Table 1.14: Summary indicators relevant to air quality health outcomes for wards

Population	Site specific				National
	Landfall	Onshore cable corridor ¹	Onshore substations		
Indicator name	St Leonards	Kilnhouse	Freckleton East	Lea and Larches	England
Fraction of mortality attributable to particulate air pollution (new method) (30+ years) (%).	NA	NA	NA	NA	5.8
Air pollution: fine particulate matter (new method - concentrations of total PM _{2.5}) (µg/m³).	NA	NA	NA	NA	7.8
Under 75 mortality rate from cardiovascular diseases considered preventable (2016 definition).	NA	NA	NA	NA	45.3
Under 75 mortality rate from respiratory disease considered preventable.	NA	NA	NA	NA	17.0
Emergency hospital admissions for coronary heart disease (SAR).	81.4	103.6	95.6	151.7	100.0
Emergency hospital admissions for stroke (SAR).	86.1	115.6	84.7	91.4	100.0
Emergency hospital admissions for Myocardial Infarction (heart attack) (SAR).	95.0	127.5	110.1	127.6	100.0
Emergency hospital admissions for Chronic Obstructive Pulmonary Disease (COPD) (SAR).	102	89.2	80.2	162.7	100.0
Legend					
		Significantly better than national average			
		Significantly worse than national average			
		Not significantly different to national average			

¹ In this instance the term onshore cable corridor refers collectively to both the onshore export cable corridor and the 400 kV grid connection cable corridor.

1.7.5.2 **Table 1.14** 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.

1.7.5.3 For the population near landfall, in St Leonards, emergency hospital admissions for coronary heart disease, stroke and myocardial infarction (heart attack), are all lower than the national average. By contrast, emergency hospital admissions for COPD are higher than the national

average. These indicators are influenced by ambient air quality but are also influenced by other factors, including diet, smoking and exercise. The data suggests generally lower sensitivity to changes in air quality at landfall.

- 1.7.5.4 For the populations near the onshore export cable corridor or the 400 kV grid connection cable corridor, the opposite trend is observed in Kilnhouse, with emergency hospital admissions for coronary heart disease, stroke, and myocardial infarction (heart attack) all higher than the national average, and emergency hospital admissions for COPD lower than the national average. The data suggests generally higher sensitivity to changes in air quality along the cable corridor.
- 1.7.5.5 Regarding the populations near the onshore substations, the emergency hospital admissions for coronary heart disease in Freckleton East, are lower than the national average whilst Lea and Larches is relatively higher than the national average. Lea and Larches was selected as a worst-case population that is close to, but not directly adjacent to, the onshore substations. Lea and Larches has higher levels of deprivation than other baseline areas in proximity to the onshore substations, which is likely to be driving the worse than average baseline trend. Conservatively, informed by the Lea and Larches data, it is inferred that there is generally higher sensitivity to changes in air quality close to the substations, albeit the closest populations are likely to have lower sensitivity.

Table 1.15: Summary indicators relevant to air quality health outcomes for district and counties

Population	District		County/Unitary		Regional	National
	Landfall, onshore cable corridor ¹ and onshore substations					
Indicator name	Fylde	Preston	Blackpool	Lancashire	North West	England
Fraction of mortality attributable to particulate air pollution (new method) (30+ years).	5.0	4.9	6.5	5.1	5.6	5.8
Air pollution: fine particulate matter (new method - concentrations of total PM _{2.5}).	6.7	6.5	8.8	6.8	7.5	7.8
Under 75 mortality rate from cardiovascular diseases considered preventable (2016 definition).	24.3	55.3	85.3	52.9	56.7	45.3
Under 75 mortality rate from respiratory disease considered preventable.	17.1	26.3	37.2	21.3	23.4	17.0

Population	District		County/Unitary		Regional	National
	Landfall, onshore cable corridor ¹ and onshore substations					
Indicator name	Fylde	Preston	Blackpool	Lancashire	North West	England
Emergency hospital admissions for coronary heart disease (SAR).	95.4	153.2	124.7	122.8	125	100.0
Emergency hospital admissions for stroke (SAR).	100.2	116.4	116.7	100.2	109.8	100.0
Emergency hospital admissions for Myocardial Infarction (heart attack) (SAR).	105.9	129.5	139.4	117.9	114.9	100.0
Emergency hospital admissions for COPD (SAR).	74.2	133.9	200.0	118.2	128.1	100.0
Legend						
	Significantly better than national average					
	Significantly worse than national average					
	Not significantly different to national average					

¹ In this instance the term onshore cable corridor refers collectively to both the onshore export cable corridor and the 400 kV grid connection cable corridor.

- 1.7.5.6 **Table 1.15** shows overall the air quality related health outcomes in the districts and counties are variable compared to the national average.
- 1.7.5.7 In relation to indicators where data is only available at the district level or higher, for the local population relevant to landfall and cable corridor, the concentrations of fine particulate matter and the fraction of mortality attributable to particulate air pollution are both lower than the national average. This is the most direct indicator of air quality related health outcomes.
- 1.7.5.8 In terms of other indicators that are influenced by air quality, the under 75 mortality rate from cardiovascular diseases considered preventable is lower than the national average, noting air pollution is only one factor contributing to this health outcomes. Inversely, the under 75 mortality rate from respiratory disease considered preventable is slightly higher than the national average.
- 1.7.5.9 In relation to the local population near the potential substation(s), the fraction of mortality attributable to particulate air pollution and the concentrations of fine particulate matter are both lower in Preston compared to the national

average. However, the under 75 mortality rates from cardiovascular diseases and respiratory diseases considered preventable are higher in Preston compared to the national average.

- 1.7.5.10 In relation to Blackpool and Lancashire counties, the fraction of mortality attributable to particulate air pollution and the concentrations of fine particulate matter are higher in Blackpool and lower in Lancashire than the national average. However, the under 75 mortality rates from cardiovascular diseases and respiratory diseases considered preventable are higher than the national average. Similarly, emergency hospital admissions for coronary heart disease, stroke, myocardial infarction (heart attack), and COPD are higher in both counties compared to the national average with the exception of emergency hospital admissions for stroke in Lancashire County, which are similar to the national average.

1.7.6 Health and wellbeing effects from changes in noise exposure

- 1.7.6.1 The summary indicators relevant to noise related health outcomes in the study area are presented in **Table 1.16** and **Table 1.17**.

Table 1.16: Summary indicators relevant to noise health outcomes for wards

Population	Site-specific				National
	Landfall	Onshore cable corridor ¹	Onshore substations		
Indicator name	St Leonards	Kilnhouse	Freckleton East	Lea and Larches	England
The rate of complaints about noise.	NA	NA	NA	NA	12.0
The percentage of the population exposed to road, rail, and air transport noise of 65 dB(A) or more, during the daytime.	NA	NA	NA	NA	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	8.5
Self-reported wellbeing: people with a high anxiety score (16+ years).	NA	NA	NA	NA	23.3
Under 75 mortality rate from cardiovascular diseases considered preventable (2016 definition).	NA	NA	NA	NA	45.3

Population	Site-specific				National
	Landfall	Onshore cable corridor ¹	Onshore substations		
Indicator name	St Leonards	Kilnhouse	Freckleton East	Lea and Larches	England
Hypertension: QOF prevalence (all ages).	NA	NA	NA	NA	14.4
Depression: QOF prevalence (18+ years).	NA	NA	NA	NA	13.2
Emergency hospital admissions for intentional self-harm (SAR).	103.9	106.1	93.3	118.9	100.0
Legend					
		Significantly better than national average			
		Significantly worse than national average			
		Not significantly different to national average			

¹ In this instance the term onshore cable corridor refers collectively to both the onshore export cable corridor and the 400 kV grid connection cable corridor.

- 1.7.6.2 **Table 1.16** shows limited statistics for the site-specific wards in relation to noise and its health. Where data is available, the health outcomes show some differences compared to the national average. However, the overall assessment is constrained by the proportion of missing data.
- 1.7.6.3 For the population near to the landfall, the emergency hospital admissions for intentional self-harm, used as a small-area indicator relevant to mental health, are slightly higher than the national average. The data may reflect that this population may exhibit greater sensitivity to environmental changes, including potential increases in noise levels at landfall.
- 1.7.6.4 Regarding the population near the cable corridor, a higher rate in emergency hospital admissions for intentional self-harm is observed in Kilnhouse compared to the national average. This elevated rate may reflect a generally higher sensitivity to changes in noise along the cable corridor, which could impact mental health and contribute to increasing vulnerabilities to environmental stressors.
- 1.7.6.5 For the population near to the onshore substations, the rate of emergency hospital admissions for intentional self-harm in Freckleton East is lower than the national average whilst in Lea and Larches, it is higher than the national average. Conservatively, informed by the Lea and Larches data, it is inferred that there is generally higher sensitivity to changes in noise close to the substations, albeit the closest populations are likely to have lower sensitivity.

Table 1.17: Summary indicators relevant to noise health outcomes for district and counties

Population	District		County/ Unitary		Regional	National
	Landfall, onshore cable corridor and onshore substations					
Indicator name	Fylde	Preston	Blackpool	Lancashire	North West	England
The rate of complaints about noise.	5.4	7.9	10.4	4.7	6.0	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	4.4	4.6	5.5	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	5.7	8.5	9.4	8.5
Self-reported wellbeing: people with a high anxiety score (16+ years).	14.0	25.8	29.1	22.1	24.6	23.3
Under 75 mortality rate from cardiovascular diseases considered preventable (2016 definition).	24.3	55.3	85.3	52.9	56.7	45.3
Hypertension: QOF prevalence (all ages).	20.1	13.0	18.4	16.1	15.1	14.4
Depression: QOF prevalence (18+ years).	16.5	17.2	21.6	16.4	16.4	13.2
Emergency hospital admissions for intentional self-harm (SAR).	94.4	102.3	211.1	103.0	125.8	100.0
Legend						
	Significantly better than national average					
	Significantly worse than national average					
	Not significantly different to national average					

¹ In this instance the term onshore cable corridor refers collectively to both the onshore export cable corridor and the 400 kV grid connection cable corridor.

1.7.6.6 **Table 1.17** summarises noise related health outcomes in the districts and counties and overall they are variable when compared to the regional and national averages.

1.7.6.7 In relation to indicators where data is only available at the district level or higher, for the local population near landfall and the onshore export cable

corridor or the 400 kV grid connection cable corridor, the rate of complaints about noise in Fylde is lower than the national average.

- 1.7.6.8 Regarding noise and mental health and wellbeing, the prevalence of depression in Fylde is higher than the national average, whilst self-reported anxiety and the rate of emergency hospital admissions for intentional self-harm are both lower than national comparators. A contrast is also observed in the physiological effects of noise with the under 75 mortality rate for cardiovascular diseases being lower than the national average and the prevalence of hypertension being higher than the national average. All these indicators are influenced by a range of factors but indicate a mix of both higher and lower sensitivity relevant to noise effects.
- 1.7.6.9 For the local population near the onshore substation, the rate of complaints about noise in Preston is lower than the national average. Considering mental health and wellbeing outcomes; self-reported anxiety, depression prevalence and emergency hospital admissions for intentional self-harm are all higher in Preston than the national averages, indicating higher sensitivity regarding mental health outcomes.
- 1.7.6.10 The under 75 mortality rate for cardiovascular disease considered preventable is also higher in Preston than the national average. In contrast, the prevalence of hypertension is lower in Preston than the national average, showing a mixed picture regarding potential physiological sensitivity to noise in this area.
- 1.7.6.11 In relation to indicators where data is only available at the county and above level, the percentage of the population exposed to elevated transport noise, of either 65 dB(A) or 55 dB(A) during daytime and night-time respectively, are both lower than or similar to the national average. However, in terms of self-reported wellbeing, at the county level there is a higher proportion of people with a high anxiety score compared to the national average. Again, this suggests a mixed picture of sensitivity to changes in noise.

1.7.7 Health and wellbeing effects from understanding of risk (risk perception)

- 1.7.7.1 The summary indicators relevant to risk perception related health outcomes in the study area are presented in **Table 1.18** and **Table 1.19**.

Table 1.18: Summary indicators relevant to understanding of risk health outcomes

Population	Site-specific				National
	Landfall	Onshore cable corridor ¹	Onshore substations		
Indicator name	St Leonards	Kilnhouse	Freckleton East	Lea and Larches	England
Self-reported wellbeing: people with a high anxiety score (16+ years) (%).	NA	NA	NA	NA	23.3
Depression: QOF prevalence (18+ years).	NA	NA	NA	NA	13.2
Population who cannot speak English well or at all (%).	0.0	0.4	0.1	0.7	1.7
Emergency hospital admissions for intentional self-harm (SAR).	103.9	106.1	93.3	118.9	100.0
Suicide rate (10+ years).	NA	NA	NA	NA	10.3
Legend					
	Significantly better than national average				
	Significantly worse than national average				
	Not significantly different to national average				

¹ In this instance the term onshore cable corridor refers collectively to both the onshore export cable corridor and the 400 kV grid connection cable corridor.

- 1.7.7.2 **Table 1.18** summarises indicators that are relevant and may be affected by the population's understanding of the risks attributed to the Transmission Assets.
- 1.7.7.3 Regarding the population near landfall, the rate of emergency hospital admissions for intentional self-harm, as a general indicator relevant to mental health, is higher than the national average. The percentage of people who cannot speak English well or at all is an indicator that demonstrates the extent to which the actual risks of the Transmission Assets may be understood by the population, and it is much lower (0%) than the national average. The data suggests generally lower sensitivity to changes in mental health impacts that are related to the public's understanding of risk at landfall.
- 1.7.7.4 Similarly, for the population near the onshore export cable corridor or the 400 kV grid connection cable corridor, the rate of emergency hospital admissions for intentional self-harm is higher than the national average. The data suggests a heightened sensitivity to changes in mental health in this area. However, the percentage of people who cannot speak English well or at all is lower than the national average, which may lower risks associated with public understanding of health-related information. While language

barriers are generally a factor in health communication, this population's proficiency suggests that their understanding of risks related to the Transmission Assets might not be as compromised as in areas with higher language barriers.

- 1.7.7.5 For the population close to the onshore substations, the percentage of the population who cannot speak English well or at all is lower than the national average across the two wards. The rate of emergency hospital admissions for intentional self-harm is notably higher in Lea and Larches. Conservatively, informed by the Lea and Larches data, it is inferred that there is generally higher sensitivity to changes in mental health associated with public understanding of risk close to the onshore substations, albeit the closest populations are likely to have lower sensitivity. The dissemination of non-technical information in English to support local public understanding of the actual risks is likely to be effective without translation services.

Table 1.19: Summary indicators relevant to understanding of risk health outcomes

Population	District		County/ Unitary		Regional	National
	Landfall, onshore cable corridor and onshore substations					
Indicator name	Fylde	Preston	Blackpool	Lancashire	North West	England
Self-reported wellbeing: people with a high anxiety score (16+ years) (%).	14.0	25.8	29.1	22.1	24.6	23.3
Depression: QOF prevalence (18+ years).	16.5	17.2	21.6	16.4	16.4	13.2
Population who cannot speak English well or at all (%).	0.3	2.4	0.6	1.1	1.2	1.7
Emergency hospital admissions for intentional self-harm (SAR).	94.4	102.3	211.1	103.0	125.8	100.0
Suicide rate (10+ years).	9.8	16.9	16.4	12.5	11.4	10.3
Legend						
	Significantly better than national average					
	Significantly worse than national average					
	Not significantly different to national average					

¹ In this instance the term onshore cable corridor refers collectively to both the onshore export cable corridor and the 400 kV grid connection cable corridor.

- 1.7.7.6 **Table 1.19** summarises indicators that are relevant and may be affected by the population's understanding of the Transmission Assets risks.

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- 1.7.7.7 For indicators where data is only available at the district level or higher, for the local population near to the landfall, the onshore export cable corridor, the 400 kV grid connection cable corridor and onshore substations show varied trends. Mental health indicators largely perform better than the national average in Fylde, but perform worse in Preston and both counties, suggesting heightened mental health pressures. The proportion of the population who cannot speak English well or at all is lower than the national average in all districts and counties except Preston, where it is higher. This data suggests mixed to higher sensitivity within the wider population to changes in mental health associated with public understanding of risk.

1.7.8 Baseline environment summary

Landfall

- 1.7.8.1 For the site-specific population at landfall, the baseline data generally indicates higher sensitivity to changes in noise and transport and lower sensitivity to changes in air quality, socio-economic opportunity, healthcare demand and mental health associated with public understanding of risk.
- 1.7.8.2 For physical activity outcomes, the baseline data indicates lower localised sensitivity and higher sensitivity in the wider area, suggesting a mix of both low and high sensitivity at landfall.
- 1.7.8.3 Whilst air quality related health outcomes generally suggest low sensitivity, the data also suggests higher sensitivity on some measures.

The onshore export cable corridor or the 400 kV grid connection cable corridor

- 1.7.8.4 In relation to the site-specific population along the onshore export cable corridor and the 400 kV grid connection cable corridor, baseline data suggests higher sensitivity to changes in air quality, noise, transport, physical activity and mental health associated with public understanding of risk. In contrast, the population shows lower sensitivity to changes in socio-economic opportunity and healthcare demand.
- 1.7.8.5 There is a mixed picture of high and low sensitivities at the wider area in changes relating to air quality and noise.

Onshore substations

- 1.7.8.6 For the site-specific and wider population near to the onshore substations the data indicates higher sensitivity to changes in air quality, noise, transport, health care demand and mental health associated with public understanding of risk. In contrast, there is less sensitivity to changes in socio-economic opportunity.
- 1.7.8.7 The baseline shows high variation in levels of deprivation near to the onshore substations. Sensitivity is generally lower in close proximity to the onshore substations, but the neighbouring communities include those with high sensitivity, including in relation to public understanding of risk.

1.8 Scope of the assessment

1.8.1 Overview

1.8.1.1 Activities in offshore and inshore waters as part of the Transmission Assets were considered in terms of their potential for likely significant population health effects. It is concluded that there are unlikely to be significant public health effects, beneficial or adverse. With the exception of coastal recreation impacts, other marine (offshore) elements of the Transmission Assets, located in the east Irish sea, have therefore been scoped out of this health assessment.

1.8.1.2 The following determinants for health and wellbeing have been scoped in to this health assessment.

Construction and decommissioning phases

- Air quality: Impacts resulting from emissions to air, including dust emissions and other pollutants, such as emissions from traffic.
- Water quality: Impacts resulting from emissions to water, including runoff or spillages from construction areas to ground or surface water.
- Soil quality: Impacts resulting from emissions to land and soil, including runoff or spillages from construction areas.
- Contaminated land: Impacts arising from any contamination risk to construction workers or the public, such as existing areas of contaminated land.
- Noise exposure: Impacts resulting from noise emissions and vibration during construction and decommissioning.
- Transport nature and flow rate: Impacts arising from construction of any new or amended highways junctions and/or from changes in traffic flow (severance/disruption).
- Open space, leisure and play: Impacts arising from changes to access to PRoW or open space.
- Socio-economic factors: Impacts arising from employment and training opportunities and the impacts of the construction workforce.

Operation and maintenance phase

- Water quality: Impacts resulting from emissions to water (i.e., surface runoff) from the operation of the onshore substations.
- Noise exposure: Impacts resulting from noise emissions associated with operation of the onshore substations.
- Transport modes, access and connections: Impacts arising from operation of any new or amended highways junctions.

- Understanding of risk (risk perception): Impacts arising from electric and magnetic fields (EMFs) in terms of public understanding of risks affecting mental health and wellbeing.

1.8.1.3 The annex follows guidance and good practice, providing a public health perspective on impacts:

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

1.8.2 Topic scope

1.8.2.1 The proposed scope of the assessment for the Transmission Assets are represented in **Table 1.20**. Determinants of health scoped out of the assessment are set out in **Table 1.21**, for example offshore activities and infrastructure of the Transmission Assets are considered unlikely to have the potential to significantly affect population health.

Table 1.20: Impacts scoped into the assessment for human health

Health determinant	Summary
Social environment	
Transport modes, access and connections	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> • The impacts arising from construction of any new or amended highways junctions and from changes in traffic flow have been scoped in. There is the potential that construction works (construction site activities as well as vehicle traffic associated with construction activities) may disrupt local vehicle traffic (private and public transport) as well as active travel (pedestrians and cyclists). Effects to active travel from any temporary diversions and any new or amended highways junctions are scoped in.
Open space, leisure and play	<p>Construction and decommissioning phases</p> <ul style="list-style-type: none"> • Works may lead to temporary disruption of access to PRow and open spaces, potentially affecting recreational activities. Impacts arising from changes to access to PRow or open space are scoped in. Consideration has also been given to the influences on nearshore recreation, e.g., bathing, sailing and other water sports. Temporary construction disruption of access to green and blue open space is scoped in. This includes considering the need for any temporary or permanent provision for alternative space or access.
Economic environment	
Socio-economic factors	<p>Construction and decommissioning phases</p> <ul style="list-style-type: none"> • Health impacts arising from employment and training opportunities and the impacts of the construction workforce are considered.

Health determinant	Summary
Bio-physical environment	
Air quality	<p>Construction and decommissioning phases</p> <ul style="list-style-type: none"> The potential effects resulting from emissions to air, including dust emissions and other pollutants, such as emissions from traffic have been considered.
Water quality	<p>Construction, operation and maintenance and decommissioning phases</p> <ul style="list-style-type: none"> The impacts resulting from emissions to water, including runoff or spillages from construction areas to ground or surface water have been scoped in. During operation and maintenance of the onshore elements of the Transmission Assets, there is a potential for increased surface water flood risk as a result of higher rates of surface water runoff from increased impermeable areas. This impact is scoped in.
Land quality	<p>Construction and decommissioning phases</p> <ul style="list-style-type: none"> The potential effects of the Transmission Assets on land and soil, including historic contamination disturbance and spillages from construction areas are considered.
Noise and vibration	<p>Construction, operation and maintenance and decommissioning phases</p> <ul style="list-style-type: none"> The noise effects resulting from noise emissions and vibration during construction and decommissioning, and from the operation of the Transmission Assets, are scoped in. The health annex is informed by the noise and vibration assessment (Volume 3, Chapter 8: Noise and vibration of the ES) of changes to daytime and night-time noise.
Understanding of Risk (Risk Perception)	<p>Operation and maintenance phases</p> <ul style="list-style-type: none"> Impacts arising from electric and magnetic fields (EMFs) in terms of public understanding of risks affecting mental health and wellbeing are scoped in. Also see: Volume 1, Annex 3.4: EMF compliance statement of the ES.

1.8.2.2 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out is presented in **Table 1.21**, which follows the list of issues set out in guidance (IEMA, 2022a).

Table 1.21: Impacts scoped out of the assessment for human health

Potential impact	Justification
Health related behaviours	
Physical activity	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> Temporary disruption of access to PRoW and open spaces, potentially affecting recreational activities and physical activity levels are considered under 'Open space, leisure and play' as described in section 1.12.3. <p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> Community physical activity is an important determinant of health. However, to avoid duplication this issue is addressed in section 1.12.2, Transport modes, access and connections and section 1.12.3, Open space, leisure and play.

Potential impact	Justification
Risk taking behaviour	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> Issues of community health behaviours being detrimentally affected by the presence of the workforce are scoped out. This reflects a workforce of professionals who are assumed to return to their usual place of residence during periods of leave. The workforce is unlikely to be sufficiently large in number to affect local markets, e.g., for alcohol, cigarettes or gambling, to an extent which could significantly affect community health. <p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> The scale of operational workforce numbers to check and maintain the Transmission Assets infrastructure are not anticipated to affect risk taking behaviour to an extent that could influence population health effect for the same reasons as stated for construction and decommissioning phases. This impact is therefore scoped out.
Diet and nutrition	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> Construction may require some temporary reduction in availability or quality of agricultural land. This is however not considered to be on a scale that could change population diet or food prices and therefore significantly affect population health. This impact is therefore scoped out. <p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> No effects on diet and nutrition are expected from operation of the Transmission Assets infrastructure, as there would be no, or minimal, further disturbance of agricultural lands. This impact is therefore scoped out.
Social environment	
Housing	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> The majority of workers are assumed to be based in the regional area, returning to their usual place of residence when not working. Where temporary accommodation is required, this would be existing B&B/hotel bed spaces, as is typical for the construction industry. It is not expected that use of temporary accommodation would be on a scale to significantly displace local residents; adversely affect seasonal tourism; or otherwise affect housing availability. There is not expected to be a loss of residential housing or permanent loss of outdoor spaces associated with dwellings. Housing effects are scoped out. <p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> The scale of operational workforce numbers to check and maintain the Transmission Assets infrastructure are not anticipated to affect housing to an extent that could influence population health effects for the same reasons as stated for construction and

Potential impact	Justification
	decommissioning phases. This impact is therefore scoped out.
Relocation	<p>All phases.</p> <ul style="list-style-type: none"> Construction works would not involve compulsory purchases of homes or community facilities. This impact is therefore scoped out.
Open space, leisure and play	<p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> Permanent land take for Transmission Assets infrastructure, including the substations, is not within, or adjoining, land that is publicly accessible. Once construction is completed, no further disruption to PRoW or areas of land would be required. Therefore, the Transmission Assets change is unlikely to significantly affect physical, mental or social health aspects of community recreation. These impacts are therefore scoped out.
Transport modes, access and connections	<p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> The Transmission Assets infrastructure is expected to have minimal implications for road transport, with activity limited to checks and maintenance. It is unlikely that there would be the potential for significant population health effects due to changes in: routine or emergency health related journey travel times; access to health promoting goods and services; community severance; or road safety. Offshore infrastructure and activities associated with the Transmission Assets is not expected to change marine access on a scale that could affect population health.
Community safety	<p>All phases.</p> <ul style="list-style-type: none"> Where surface excavations are undertaken these would be within controlled work areas, including use of appropriate fencing and notifications as required. Best practice measures would be secured through suitable management plans. The risk to the public from accidental injury, e.g., falls or drowning is scoped out. There are not anticipated to be community safety or security issues associated with worker behaviour in ports or communities. The Transmission Assets will have appropriate safeguarding and modern slavery policies. The potential for widespread actual or perceived crime that could affect population health is unlikely. Electrical risks to the public would be avoided through the design, including fencing of above ground electrical infrastructure. These impacts are therefore scoped out.
Community identity, culture, resilience and influence	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> Transient effects along the cable corridor, including due to temporary lighting and temporary changes in views, are not expected to influence community identity or disrupt community gatherings to an extent

Potential impact	Justification
	<p>that could affect population health. This impact is therefore scoped out.</p> <p>Operation and maintenance phases.</p> <ul style="list-style-type: none"> Visual impacts of Transmission Assets infrastructure, including the substations, are not expected to be of a scale that could affect population health outcomes. Whilst there would be visual impacts, these are discussed in Volume 3, Chapter 10: Landscape and visual resources of the ES, which states that there would not be widespread near views of the substation from large numbers of dwellings, and the substation would also have appropriate screening and surface treatments to minimise visual impact over time. For public health, visual changes are not anticipated to be of a scale that could give rise to significant population health effects. This impact is therefore scoped out.
Social participation, interaction and support	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> The Transmission Assets will not directly affect land used for community interaction (e.g., meeting places, village greens, community centres, etc. that promote community voluntary, social, cultural or spiritual participation). Health impacts as a result of effects to the Blackpool Recreation Grounds are covered under the open space, leisure and play determinant. This impact is therefore scoped out. <p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> As for construction and decommissioning.
Economic environment	
Education and training	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> The potential to adversely affect access to schools is limited by the use of trenchless techniques for major road crossings, excluding Leech Lane. A large influx for workers, including those bringing families, is not expected, so changes to educational capacity or quality are unlikely and are scoped out. <p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> The scale of operational and maintenance road transport is not likely to affect journey times or access to schools. This impact is therefore scoped out. A large influx for workers, including those bringing families, is not expected, so changes to educational capacity or quality are unlikely and are scoped out.
Employment and income	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> Any international supply chain would be expected to operate appropriate policies that safeguard against significant population challenges to equality, health and safety, for both workers and, as appropriate, the public. These issues are scoped out. The Transmission Assets would operate appropriate employment equality policies but is not expected to influence how employment affects family structures and relationships in local populations. Occupational

Potential impact	Justification
	<p>working conditions include particular risks, which are appropriately managed through health and safety policies and practices. Transmission Assets activities are not expected to differ from industry norms (see Outline Employment and Skills Plan (document reference J31). These impacts are scoped out.</p> <p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> There are not anticipated to be employment opportunities during operation to an extent that would result in significant health effects. This impact is therefore scoped out.
Bio-physical environment	
Climate change and adaptation	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> Embodied carbon and climate altering pollutant emissions are not of a scale to have the potential for population level effects associated with climate change. This impact is scoped out. <p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> The electrical infrastructure facilitates the benefits accrued from the renewable energy generation assets. This is not separately assessed and is scoped out.
Air quality	<p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> Operational air quality effects (e.g., maintenance vehicle emissions) are not anticipated to be of a scale, even accounting for non-threshold effects, that could affect population health. This impact is therefore scoped out.
Water quality or availability	<p>All phases.</p> <ul style="list-style-type: none"> While water quality has been scoped in for the reasons outlined in Table 1.20 above, the specific issue of effects to public drinking water infrastructure is scoped out. This is on the basis that disruption of the existing water utilities network would be avoided, see discussion under 'built environment'.
Land quality	<p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> Operation and maintenance activities are unlikely to require excavations or result in land quality related risks to public health. Any risks would be managed through standard best practice contamination discover, avoidance and response measures that would be secured through management plans. This impact is therefore scoped out.
Noise and vibration	<p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> Checks and maintenance activities during operation are not expected to result in noise and vibration levels that could affect population health. This impact is therefore scoped out, with the exception of the onshore substations.
Radiation	Construction and decommissioning phases.

Potential impact	Justification
	<ul style="list-style-type: none"> While the majority of construction works would not include using or making changes to active major electrical infrastructure producing EMF, it is noted that there will be pre-construction diversion or undergrounding of overhead cabling as part of Morgan works (see further detail in Volume 1, Annex 3.4: Transmission Assets EMF Compliance Statement). Relevant public and occupational safeguards, secured through management plans, would be followed for these activities and any temporary electrical equipment used. Electric and magnetic fields strength reduce rapidly with distance, often requiring only a few meters separation between the source and receptor, to reach background levels. No ionising radiation sources are proposed. These impacts are scope out. <p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> For electrical infrastructure, the 'actual EMF' risks are scoped out on the basis that the project would adopt the International Commission on Non-ionizing Radiation Protection (ICNIRP) guidelines and Government voluntary Code of Practice on EMF public exposure (see further detail in Volume 1, Annex 3.4: Transmission Assets EMF Compliance Statement). Such considerations are inherent to the detailed engineering considerations of cable specification and routing. Relevant public EMF exposure guideline limits are noted in NPS EN-5 and would be complied with by the project. This is set out in the EMF Compliance Statement, which will be secured by CoT106 (see ES Volume 1, Annex 5.3: Commitments Register of the ES). These guidelines are long standing and have a high safety margin. The levels of exposure that they require would not pose a risk to public health. Also see: Volume 1, Annex 3.4: EMF compliance statement of the ES.
Institutional and built environment	
Health and social care services	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> Effects on health and social care are scoped out. The Transmission Assets workforce is assumed to include a high proportion of people who are resident in the regional area. The UK workforce would have National Health Service entitlement irrespective of place of residence. The Transmission Assets programme and workforce assumptions are set out in Volume 4, Chapter 2: Socio-economics of the ES. It is not expected that a high proportion of workers would move to the area with dependants requiring social care. Health protection measures such as screening and immunisations are expected to continue from the workers' usual place of residence. Similarly routine dental appointments are assumed to be with the worker's dental practice close to their usual place of residence. Other health services are not expected to be affected as no largescale in-migration is expected. This impact is therefore scoped out.

Potential impact	Justification
	<p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> Minimal operational workforce numbers are anticipated to operate and maintain the project infrastructure. There is not considered to be the potential for a likely significant population health effect, this impact is therefore scoped out.
Built environment	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> The potential for the project to affect existing features of the built environment that are supportive of population health has been considered and scoped out. The project would have a relatively low impact, including due to the use of trenchless techniques to avoid surface disruption at road crossings. Similarly, the position of existing services, such as water and sewer systems will be taken into account in planning the export cable corridor and techniques used. Appropriate diversions would occur to avoid disruption to such services. This impact is therefore scoped out. <p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> The project's infrastructure would have a very limited long-term impact on land use patterns, with the main change relating to the substations. Appropriate buffer zones would be maintained between infrastructure and communities and the design is resilient to accidents and disasters. These impacts are therefore scoped out.
Wider societal infrastructure and resources	<p>Construction and decommissioning phases.</p> <ul style="list-style-type: none"> The Transmission Assets' energy infrastructure would not generate public health benefits at this stage. This issue is scoped out. <p>Operation and maintenance phase.</p> <ul style="list-style-type: none"> The onshore electrical infrastructure facilitates the benefits accrued from the renewable energy generation assets. This is not separately assessed and is scoped out.

1.9 Measures adopted as part of the Transmission Assets (commitments)

- 1.9.1.1 This annex uses the residual effect of other technical chapters as the basis of the assessment. Therefore, any mitigation measures adopted as part of the Transmission Assets as stated in the technical chapters, within Volume 2, Volume 3 and Volume 4 of the ES have already been taken into account (see Volume 1, Annex 5.3: Commitments register of the ES). To avoid duplication, these measures have not been listed here.
- 1.9.1.2 Of note for the health assessment is the trenchless construction technique to crossing the Blackpool Road Recreation Grounds (comprising football playing fields and other amenities). A range of scenarios were considered which the health assessment inputted to. The adoption of a trenchless, rather

than trenched, approach minimises the period during which there is reduced use of the playing fields, which are considered an important public health asset for the surrounding community. This is discussed in **section 1.12.3**.

1.10 **Key parameters for assessment**

1.10.1 **Maximum design scenario**

- 1.10.1.1 This annex uses the residual effect of other technical chapters as the basis of the assessment. Therefore, any maximum design scenario as part of the Transmission Assets as stated in the technical chapters, within Volume 2, Volume 3 and Volume 4 of the ES, have already been taken into account. To avoid duplication, these maximum design scenarios have not been presented here.

1.11 **Assessment methodology**

1.11.1 **Impact assessment criteria**

- 1.11.1.1 The criteria for determining the significance of effects involves a two-stage process of defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this annex to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on the 2022 IEMA guidance on health in EIA (Pyper, Lamming, *et al.*, 2022; Pyper, Waples, *et al.*, 2022).
- 1.11.1.2 The health assessment methodology is topic specific and whilst it aligns with the overarching EIA methodology of determining significance with reference to magnitude and sensitivity, the health assessment method uses significance levels and definitions defined in the 2022 IEMA guidance (Pyper, Lamming, *et al.*, 2022; Pyper, Waples, *et al.*, 2022).
- 1.11.1.3 Professional judgements are based on most relevant criteria in **Table 1.22**, **Table 1.23**, **Table 1.24** and **Table 1.25**. As stated in the IEMA Guide to determining significance for human health in EIA, *"It will often be the case that relevant criteria span categories of level, e.g., a high scale of change, but over a short-term duration. In these instances, the narrative should reflect elements of multiple categories and a judgement made on the most appropriate level, taking into account all relevant criteria."* (Pyper, Waples, *et al.*, 2022).

1.11.2 **Receptor sensitivity/value**

- 1.11.2.1 The criteria for defining sensitivity in this annex are outlined in **Table 1.22**, below.

Table 1.22: Sensitivity criteria

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

1.11.3 Magnitude of impact

1.11.3.1 The criteria for defining magnitude in this annex are outlined in **Table 1.23**.

Table 1.23: 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.

1.11.3.2 The temporal scope of this annex 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 24 months duration);
- 'medium term' relates to effects measured in years; and
- 'long term' relates to effects measured in decades.

1.11.4 Significance of effect

- 1.11.4.1 The significance of the effect upon human health is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in **Table 1.24**. Where a range of significance of effect is presented in **Table 1.24**, the final assessment for each effect is based upon expert judgement.
- 1.11.4.2 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.
- 1.11.4.3 For the purposes of this assessment, any effects with a significance level of minor or less have been concluded to be not significant in terms of the EIA Regulations 2017.

Table 1.24: Assessment matrix

Sensitivity of receptor	Magnitude of impact			
	Negligible	Low	Medium	High
Very Low	Negligible	Negligible	Negligible or Minor	Minor
Low	Negligible or Minor	Minor	Minor	Minor or Moderate
Medium	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Minor or Negligible	Minor or Moderate	Moderate or Major	Major

- 1.11.4.4 The IEMA 2022 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 1.25**.

Table 1.25: Explanation of population health significance

Category/Score	Indicative criteria
Major (significant)	<p>The narrative explains that this is significant for public health because.</p> <ul style="list-style-type: none"> 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)	<p>The narrative explains that this is significant for public health because.</p> <ul style="list-style-type: none"> 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)	<p>The narrative explains that this is not significant for public health because.</p> <ul style="list-style-type: none"> 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.

Category/Score	Indicative criteria
Negligible (not significant)	<p>The narrative explains that this is not significant for public health because.</p> <ul style="list-style-type: none"> 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.

- 1.11.4.5 The annex uses the WHO definition of health, which states that health is a *‘state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity’* (WHO, 1948).
- 1.11.4.6 The annex also uses the WHO definition for mental health, which is a *‘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’* (WHO, 2022).
- 1.11.4.7 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.
- 1.11.4.8 Impacts of the Transmission Assets 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.
- 1.11.4.9 A change in a determinant of health 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 Transmission Assets. 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.
- 1.11.4.10 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.
- 1.11.4.11 Following IEMA (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 1.20**. The issues scoped out of the assessment including justification, is reported in **Table 1.21**.

1.11.5 Vulnerable groups

1.11.5.1 Of the vulnerable population groups identified in guidance, the following relevant groups are considered within the assessment. People falling into more than one group may be especially sensitive.

- Young age: Children and young people (including pregnant women and unborn children).
- Old age: Older people (particularly frail elderly).
- Low income: People on low income, who are economically inactive or unemployed/workless.
- 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.
- 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.
- 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.

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

- The general population can be characterised as including:
 - a high proportion of people who are independent, as well as those who are providing some care;
 - experiencing low deprivation;
 - comprising people with good health status;
 - rating their day-to-day activities as not limited;
 - having a high capacity to adapt to change (high resilience); and
 - less likely to rely on resources shared with the Transmission Assets.
- The vulnerable group population can be characterised as including:
 - a high proportion of people who are providing a lot of care, as well as those who are dependant;
 - experiencing high deprivation (including where this is due to pockets of higher deprivation within low deprivation areas);
 - reporting bad or very bad health status;
 - rating their day-to-day activities as limited;
 - having a low capacity to adapt to change (limited resilience); and
 - more likely to rely on resources shared with the Transmission Assets.

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- 1.11.5.3 Heightened vulnerability is rarely due to a single cause and people may experience multiple forms of vulnerability due to intersecting social processes that result in inequalities (e.g., socio-economic status and income).
- 1.11.5.4 As all development has the potential for adverse effects to some particularly vulnerable individuals, the role of EIA significance conclusions are not to set a threshold of 'no harm' from development, but to show where, at a population level, the harm should weigh strongly in the balance alongside the development's benefits for health and other outcomes.
- 1.11.5.5 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., 2022b, paragraph 8.18).
- 1.11.5.6 The particular context of populations close to the Onshore Order Limits have been considered and includes for example the communities of:
- Squires Gate;
 - Lytham St Annes;
 - Peel Lower Ballam;
 - Westby;
 - Wea Green;
 - Bryning;
 - Kirkham;
 - Hall Cross;
 - Freckleton;
 - Newton and Scales;
 - Clifton;
 - Bottom of Hutton;
 - Hutton;
 - Howick Cross; and
 - Penwortham.

Children and adults with complex health needs

- 1.11.5.7 The assessment has given consideration to vulnerable sub-populations within the vicinity of the Transmission Assets. These include children with complex needs, adults with intellectual disabilities, elderly residents, low-income families, and individuals with pre-existing health conditions.
- 1.11.5.8 Children with neurodevelopmental disorders (such as autism spectrum disorder, attention deficit hyperactivity disorder, and learning disorders) are at

higher risk of poor physical health, including asthma and obesity (Alabaf et al., 2019). They often face barriers to accessing healthcare services, which can exacerbate their health issues. Additionally, their specific health needs may require specialised medical and therapeutic interventions, which can be limited or disrupted by changes in the environment or availability of services.

- 1.11.5.9 Adults with intellectual disabilities also face significant health disparities. They are more likely to experience mental health issues, such as anxiety and depression, and have higher rates of chronic conditions like diabetes and cardiovascular disease (Hsieh et al., 2020).

1.12 Assessment of effects

1.12.1 Overview

- 1.12.1.1 The potential impacts arising from the construction, operation and maintenance and decommissioning phases of the Transmission Assets have been assessed for human health.
- 1.12.1.2 A description of the potential effect on human health receptors caused by each identified impact is given below.

1.12.2 Transport modes, access and connections

Construction and decommissioning phases

- 1.12.2.1 There is the potential that construction works may disrupt local vehicle traffic (private and public transport) as well as active travel (pedestrians and cyclists). This includes road works, temporary diversions and traffic volumes required due to the onshore cable corridor construction or in relation to the construction of the onshore substations. This has the potential to affect active travel and physical activity.
- 1.12.2.2 Active travel has many beneficial health effects for physical health (e.g., cardiovascular health) and mental wellbeing (e.g., reduced stress and anxiety) from increased physical activity (Mueller *et al.*, 2015). A recent systematic review of 23 studies suggests there is a positive association between pedestrian infrastructure and increased physical function in adults aged ≥ 45 years (Rachele *et al.*, 2019). The provision of convenient, safe and connected walking and cycling infrastructure is at the core of promoting active travel (Winters *et al.*, 2017). Certain population groups may be particularly sensitive to road safety and access. For example, children and cyclists are generally more vulnerable in terms of road safety. People with lower socio-economic status typically face more transportation barriers.
- 1.12.2.3 This section has been informed by Volume 3, Chapter 7: Traffic and transport of the ES, which set out relevant assessment findings and mitigation measures that have been considered. Volume 3, Chapter 7: Traffic and transport of the ES concludes the following.
- The impact on driver delays caused by construction works or construction traffic (including temporary delays to public transport services) is negligible to minor adverse.

- The impact on non-motorised delay caused by construction works or construction traffic is negligible to minor adverse.
- The impact on fear and intimidation (non-motorised user amenity) caused by construction works or construction traffic is negligible to minor adverse.
- The impact on severance caused by construction works or construction traffic is negligible to minor adverse.
- The impact on road safety caused by construction traffic is negligible to minor adverse.
- The impact of AILs on the safety of users of the Local Road Network, Strategic Road Network and other transport receptors is negligible to minor adverse.

1.12.2.4 A potential population health effect is considered likely because there is a plausible source-pathway-receptor relationship as set out in the following:

- 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.

1.12.2.5 Furthermore, the potential effect is probable as no highly unusual conditions are required for the source-pathway-receptor linkage. The population groups relevant to this assessment are as set out in the following.

- The 'site-specific' populations near landfall (close to St Leonards), the cable corridor (Kilnhouse) and near the substations (close to Freckleton East and Lea and Larches).
- The 'local' populations of Fylde and Preston.
- The sub-population vulnerable due to young age, old age, low income, poor health, social disadvantage, or access and geographical factors.

Sensitivity of receptor

1.12.2.6 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 1.11.5**.

1.12.2.7 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. Most residents would likely have a high capacity to adapt by selecting alternative routes and active travel opportunities to avoid any temporary disruption or disturbance.

1.12.2.8 The sensitivity of the general population is therefore considered to be **low**.

1.12.2.9 The vulnerable sub-population includes a high representation of dependants, both 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 sub-population may therefore be more reliant on the affected routes with greater likelihood that any disruption or disturbance could affect physical activity behaviours. 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 moderate 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 adaptive response. 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). Ambulances are generally less affected by congestion due to the priority given to them travelling under blue lights, but journey times may benefit from the road improvements. People in poor or very poor health may be more frequent users of healthcare service and therefore be more sensitive to access changes.

- 1.12.2.10 The sensitivity of the vulnerable group population is considered to be **high**.

Magnitude of impact

- 1.12.2.11 As reported in Volume 3, Chapter 7: Traffic and transport of the ES, an Outline CTMP has been developed and secured through the DCO. The Outline CTMP maintains access and provides early notice of any route changes.
- 1.12.2.12 Any scale of change in accidents would be small to negligible. The frequency of any incidents would be one-off or *occasional*, with severity related to a *very minor change* in risk of injury or mortality. The expectation is that very few people would be affected, with no or slight implications for healthcare services.
- 1.12.2.13 In relation to health-related travel times and accessibility, the scale of change in delays is expected to be *small*. Duration will be over the *medium-term* though there would be limited duration at any given location due to the transitory nature of construction works to lay cables. Whilst not transitory, the transport related to the substation works would not affect travel times or access to a degree that would affect public health. 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 *minor* 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 3, Chapter 7: Traffic and transport of the ES, 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 construction traffic

management plans. The temporary nature of the work and *ability for people to adapt* to known planned diversions or delays means there is unlikely to be a significant change to population health outcomes associated with access to social infrastructure such as shops, employment and educational facilities. Any health service implications are likely to be *slight*.

- 1.12.2.14 In relation to active/sustainable travel, the scale of change in use of active travel due to disruption on the roads and pavements is considered *small* and over the *medium-term*. This reflects the temporary nature of construction and decommissioning work, and relate to those making frequent or occasional use of active travel modes. Any changes disincentivising the use of these modes, would be expected to make only a *very minor* contribution to quality-of-life and morbidity for cardiovascular and mental health outcomes for a *small minority* of the population. Sustained behavioural change due to the project change is not expected. Outcome reversal may be *rapid* once services are reinstated.
- 1.12.2.15 It is predicted that the impact would affect the receptor directly and indirectly. The magnitude is considered to be **low**.

Significance of effect

- 1.12.2.16 The professional judgment is that there would, at most, be a *slight* adverse change in the health baseline. This conclusion reflects that active travel is a specific public health priority and there is causal association of the benefits of physical activity to health that is supported by the scientific literature. However, the scale of change due to construction of the Transmission Assets is *small* and as stated in Volume 3, Chapter 7: Traffic and transport of the ES, will be appropriately mitigated by standard good practice measures that minimise disruption and disturbance. An Outline CTMP has been prepared and submitted with the application for development consent. CTMP(s) will be developed in accordance with the Outline CTMP prior to construction. The detailed CTMP(s) will set out measures to include: managing the numbers and routing of Heavy Goods Vehicles (HGVs) during the construction phase; managing the movement of construction worker traffic during the construction phase; details of measures to manage the safe passage of HGV traffic via the local highway network; and details of localised road improvements if and where these may be necessary to facilitate safe use of the existing road network.
- 1.12.2.17 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.
- 1.12.2.18 Overall, the sensitivity of the general population is **low** and the vulnerable group population is considered to be **high**, and the magnitude of the impact is deemed to be **low**. The effect will therefore be of **minor adverse** significance, which is not significant.

1.12.3 Open space, leisure and play

Construction and decommissioning phases

- 1.12.3.1 There is the potential that construction and decommissioning activities associated with the intertidal and onshore elements of the Transmission Assets may lead to temporary disruption in access to green (land) and blue (water) public open spaces. Changes in availability of open spaces (including beaches) and PRow, have the potential to affect recreational activities. This may include disturbance or disruption in nearshore recreation (e.g., bathing, sailing and other water sports).
- 1.12.3.2 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). Users of places of recreation may be affected by not only physical barriers but also changes in the amenity or setting of the destination.
- 1.12.3.3 This section has been informed by Volume 3, Chapter 6: Land use and recreation of the ES and Volume 2, Chapter 9: Other sea users of the ES, which set out relevant assessment findings and mitigation measures that have been taken into account.
- 1.12.3.4 Volume 3, Chapter 6: Land use and recreation of the ES concludes the following.
- The landfall construction works may require an area of beach to be closed to public access temporarily, however recreational access to the beach will be maintained. The resulting effect on recreational access to the coast is assessed to be short term, temporary and minor adverse.
 - There would be no effect on an area of access land used for motor sport activities to the north of the River Ribble, as construction works are not proposed within these areas.
 - There will be temporary impacts to the northern parts of the Blackpool Road Recreation Grounds. The Recreation Grounds include land currently used for junior football pitches, a skateboard/scooter park, and a basketball facility. The area is also available for other recreational activity, but excluding cyclists, horses, golf and vehicular access. The resulting effect on Blackpool Road Recreation Ground is assessed to be short term, temporary and minor adverse.
 - The effect on national cycle routes and long-distance routes is short term, temporary and minor adverse.
 - The short term temporary effect on PRow and other linear routes is assessed to be minor adverse.
 - The temporary impact on the recreational use of the remaining recreational resources is assessed to be minor adverse.
- 1.12.3.5 Volume 2, Chapter 9: Other sea users of the ES concludes the following.

- The effect on displacement of recreational activities during construction and decommissioning such as motor cruising, recreational fishing and inshore water sports, is considered to be negligible.

1.12.3.6 These impacts across relevant input chapters have been considered in terms of both their individual and collective potential to affect population health. A potential population health effect is considered likely because there is a plausible source-pathway-receptor relationship as shown in the following.

- The source is disruption and disturbance including to PRoW and onshore and nearshore public open spaces.
- 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.

1.12.3.7 Furthermore, the potential effect is probable as no highly unusual conditions are required for the source-pathway-receptor linkage. The population groups relevant to this assessment are as shown in the following.

- The 'site-specific' populations near landfall (close to St Leonards), the cable corridor (Kilnhouse) and near the substations (close to Freckleton East and Lea and Larches).
- The local populations of Fylde and Preston.
- The sub-population vulnerable due to young age, old age, low income, poor health, social disadvantage, or access and geographical factors.

Sensitivity of receptor

1.12.3.8 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 1.11.5**. 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.

1.12.3.9 The sensitivity of the general population is considered to be **low**.

1.12.3.10 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. Additionally, individuals with existing physical and mental health conditions and/or who are older may exhibit heightened sensitivity to changes in access to open space and physical activity. These groups often depend more heavily on such opportunities for maintaining their health and wellbeing, and disruptions could lead to negative impacts on their physical and mental health.

1.12.3.11 The populations living near the Blackpool Road Recreation Grounds (LSOA Flyde 004B) are amongst the 10% most deprived neighbourhoods in the

country for general deprivation, and amongst the 20% most deprived in the country for income deprivation affecting children (IMD, 2019). The Blackpool Road Recreation Ground is a key local resource due to its scale and close proximity to the community. The number of sports pitches it provides, as well as other recreation and leisure facilities indicates it provide a substantive part of the physical activity opportunity locally, particularly for young people.

- 1.12.3.12 The sensitivity of the vulnerable group population is therefore considered to be **high**, which includes staff and users of the Blackpool Road Recreation Ground.

Magnitude of impact

- 1.12.3.13 As detailed above, there is likely to be a variety of small scale of changes over the medium-term from construction and decommissioning activities, including shipping movements and land access, affecting marine, nearshore and onshore recreational and leisure activities.
- 1.12.3.14 For public health the location of greatest potential for the Transmission Assets to affect population health relates to the cable corridor crossing of the Blackpool Road Recreation Grounds. The crossing is set out in Volume 3, Chapter 6: Land use and recreation of the ES and includes some temporary reduction in the available area for sports and the relocation of skateboard/scooter and basketball facilities within the same grounds.
- 1.12.3.15 The health assessment inputted to the refinement of construction techniques for crossing the Blackpool Road Recreation Grounds, which explored both trenched and trenchless options. Following this, the Transmission Assets have committed to the following.
- Adopt a trenchless, rather than open-cut trenching approach, minimising the land take and the duration over which there would be reduced use of the playing fields (reduced from over a year, reflecting time for grass pitch recovery, to approximately 2 months).
 - Utilise Hamlet Road instead of having a haul road through the playing fields.
 - Commitment to use visual screening where construction activity is occurring within the playing fields.
- 1.12.3.16 These commitments have avoided the potential for longer term behavioural change away from use of the football club and playing fields. This allows the grounds to have some flexibility as to where pitches are sited and the trenchless approach preserves the playing surface, allowing reinstatement of pitches to full use as soon as the works are complete. Volume 3, Chapter 6: Land use and recreation of the ES discusses wider mitigations to support and enhance the use of the grounds. This is important for public health as alternative provision of a similar scale is not available locally. The greatly reduced disruption to the grounds through use of trenchless techniques and the other commitments has a protective effect on physical activity and mental health outcomes for the local population.
- 1.12.3.17 The resulting construction and decommissioning effects, including at Blackpool Road Recreation Grounds, are characterised as temporary and

short-term effects on opportunities to be active at a given location, (e.g., due to transitory cable laying). 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 very 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.

- 1.12.3.18 The magnitude of change due to the Transmission Assets is therefore considered to be **low**.

Significance of effect

- 1.12.3.19 The effect is characterised as being adverse in direction, temporary and indirect. This conclusion reflects that being active is a specific local public health priority and there is causal association of the benefits of physical activity to health, including mental health, clearly established by the scientific literature. 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.
- 1.12.3.20 Overall, the sensitivity of the general population is **low** and the vulnerable group population is **high**, and the magnitude of the impact is **low**. The effect will therefore be of **minor adverse** significance, which is not significant.

1.12.4 Socio-economic factors

Construction and decommissioning phases

- 1.12.4.1 Changes in direct and indirect employment opportunities have socio-economic effects that impact upon health and mental well-being.
- 1.12.4.2 Employment is an important determinant of health and wellbeing both directly and indirectly through income making health-promoting resources accessible to employees and their dependants. Employment status and income have socio-economic benefits associated with improved living conditions, health-promoting behaviours and mental wellbeing. Decreased unemployment and underemployment is also associated with physical health and psychological wellbeing and can generate indirect economic activity.
- 1.12.4.1 This section has been informed by Volume 4, Chapter 2: Socio-economics of the ES, which sets out relevant assessment findings and mitigation measures that have been taken into account. Volume 4, Chapter 2: Socio-economics of the ES concludes the following.
- The potential expenditure on the onshore development and construction activities associated with the Transmission Assets could support employment and Gross Value Added (GVA) output in companies that are directly engaged in the development, fabrication, and installation supply chain. Assuming a four-year (48-month) onshore construction period, the potential onshore impacts of the Transmission Assets on employment

and GVA in development and construction activities are estimated at 260 (Full Time Employment years) (employment) and £17.9 m (GVA). The effect is of minor beneficial significance.

- Assuming a four-year (48-month) onshore construction period, the potential onshore impacts of the Transmission Assets on employment opportunities for local residents in development and construction activities are estimated at 85 (full-time equivalent years) per annum, and 255 (full-time equivalent years) for the total of 48 months. The effect is of negligible significance.

1.12.4.2 Furthermore, the Outline Employment and Skills Plan (document reference J31) details the Applicants' outline approaches that will be finalised following the granting of the DCO. The finalised approaches will be implemented to help generate and support the economic benefits associated with the Transmission Assets in relation to skills and employment within the offshore wind sector.

1.12.4.3 A potential population health effect is considered likely because there is a plausible source-pathway-receptor relationship, as shown in the following.

- 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).

1.12.4.4 Furthermore, the potential effect is probable as no highly unusual conditions are required for the source-pathway-receptor linkage. The population groups relevant to this assessment are as set out in the following.

- The 'regional' populations of North West England.
- The vulnerable sub-populations including young and old people, people with low incomes, people with poor health or disabilities, and people experiencing social disadvantage or access, and geographical factors.

Sensitivity of receptor

1.12.4.5 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 1.11.5**. This reflects that most people would already be within stable employment that would be unaffected by the Transmission Assets (or being a dependant of such a person).

1.12.4.6 The sensitivity of the general population is therefore, considered to be **low**.

1.12.4.7 Vulnerability in this case relates to people and their dependants who are on low incomes, have poor job security, poor working conditions or who are unemployed, as well as people and their dependants with existing poor health. Future young or older people may also come to rely on those employed.

1.12.4.8 The sensitivity of the vulnerable group population is therefore, considered to be **high**.

Magnitude of impact

- 1.12.4.9 There is expected to be a very small scale change in employment and socioeconomic status in the context of the local labour market. The opportunities would be of medium-term duration and reflect employment that is on a continuous basis whether full-time or part-time. Such jobs are likely to be associated with minor changes in morbidity and quality of life for a small minority of the population (including effects to dependants to those employed, as well as those receiving indirect economic benefits) due to improved socio-economic status and increased spending on health supporting resources and activities. It is predicted that the impact would affect the receptor directly and indirectly. The magnitude is therefore, considered to be **low**.

Significance of effect

- 1.12.4.10 The effect is characterised as being beneficial in direction, permanent and indirect. Employment has a clear association with positive health outcomes supported by the scientific literature. The Transmission Assets are likely to make a slight beneficial contribution to the local health baseline (in relation to increased job opportunities). Such effect is likely to have, at most, a marginal effect on delivering health policy and on health inequalities.
- 1.12.4.11 Overall, the sensitivity of the general population is **low** and the vulnerable population is **high**, and the magnitude of the impact is **low**. The effect will therefore be of **minor beneficial** significance, which is not significant.

1.12.5 Air quality

Construction and decommissioning phases

- 1.12.5.1 This section discusses changes to air quality related effects on population health during construction and decommissioning. Construction of the Transmission Assets has the potential to result in dust effects from construction and decommissioning activities and construction compounds, as well as vehicle emissions from construction traffic.
- 1.12.5.2 This section has been informed by Volume 3, Chapter 9: Air quality of the ES, which sets out relevant assessment findings and mitigation measures that have been taken into account. Volume 3, Chapter 9: Air quality of the ES concludes the following.
- The impact of dust and suspended particulates on human and ecological receptors has been assessed in Volume 3, Chapter 9: Air quality of the ES. The background PM₁₀ concentrations used for the purposes of the assessment was 14.8 µg.m⁻³. There are more than 100 high sensitivity receptors (residential properties) located within 20 m of the Onshore Order Limits. However, following the implementation of dust control measures on the Outline CoCP (document reference J1), Outline CTMP (document reference J5) and onshore decommissioning plan (to be produced prior to decommissioning), the dust impact risk for construction, earthworks and trackout associated with construction of the Transmission

Assets is categorised as negligible. In addition, the potential effects of construction dust are predicted to be of local spatial extent, intermittent in frequency and mostly reversible.

- The potential impacts during decommissioning of the Transmission Assets are expected to be similar to or less than the impacts during demolition, earthworks and construction. These effects are likely to be negligible. An onshore decommissioning plan will be developed prior to decommissioning. The onshore decommissioning plan(s) will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure (if and where relevant and practicable), and details relevant to flood risk, pollution prevention and avoidance of ground disturbance. The onshore decommissioning plan(s) will be in line with the latest relevant available guidance.
- There may be some potential effects on air quality as result of construction vehicle emissions. However, this is likely to present a worst case assessment. An Outline Construction Traffic Management Plan (CTMP) has been prepared and submitted with the application for development consent. CTMP(s) will be developed in accordance with the outline CTMP prior to construction. The detailed CTMP(s) will set out measures to include:
 - managing the numbers and routing of HGVs during the construction phase;
 - managing the movement of construction worker traffic during the construction phase;
 - details of measures to manage the safe passage of HGV traffic via the local highway network; and
 - details of localised road improvements if and where these may be necessary to facilitate safe use of the existing road network.

1.12.5.3 Potential effects on human health are considered plausible because there is a source-pathway-receptor relationship:.

- The source is air pollutants (particularly Nitrogen dioxide (NO₂), particulate matter (PM), including PM_{2.5} and PM₁₀ from construction emissions).
- The pathway is diffusion through the air.
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

1.12.5.4 Furthermore, the potential effect is probable as no highly unusual conditions are required for the source-pathway-receptor linkage. The population groups relevant to this assessment are as follows.

- The site-specific populations near landfall (close to St Leonards), the cable corridor (Kilnhouse) and near the onshore substations (close to Freckleton East and Lea and Larches). These are worst case

representative wards that include the highly sensitive residential receptors identified in Volume 3 Chapter 9: Air quality of the ES.

- The local populations of Fylde and Preston.
- The sub-population vulnerable due to young age, old age, low income, poor health, social disadvantage, or access and geographical factors.

- 1.12.5.5 Regard has been had to the potential for effects to the regional population of North West England. Whilst transport related air quality effects would extend to this area; there is not considered the potential to affect public health at a regional level from such impacts. The health assessment focus is on effects at the site-specific and local level.
- 1.12.5.6 Construction and decommissioning activities that produce dust tend to relate to the coarser fractions of PM₁₀ and potential nuisance from dust deposition on property. The great majority of anthropogenic PM_{2.5} health effects relate to combustion related processes, e.g., construction plant and transport.
- 1.12.5.7 The potential for dusts and PM to include mobilised soil contaminants is noted and taken into account. The use of standard good practice measures to avoid new contamination and appropriately manage any historic contamination encountered (see Volume 3, Chapter 1: Geology, hydrogeology and ground conditions of the ES and Volume 3, Chapter 6: Land use and recreation of the ES) would mitigate against a public health risk due to airborne mobilisation of soil contaminants.
- 1.12.5.8 Whilst the literature supports there being thresholds set for health protection purposes, it also acknowledges that for PM_{2.5} and NO₂ there are non-threshold health effects (i.e., when there is no known exposure threshold level below which adverse health effects may not occur). The health assessment has identified 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.
- 1.12.5.9 For construction dust, 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 through the use of standard good practice mitigation that would be secured through the Outline CoCP (document reference J1), as discussed in Volume 3, Chapter 9: Air quality of the ES. The Outline CoCP includes best practice measures in relation to air quality that will be applied where human receptors reside within 250 m of works, where required, as described in Institute of Air Quality guidance Management (IAQM, 2024) as appropriate. The Outline CoCP includes measures to maintain and address: flood protection and control measures; drainage; pollution prevention; geology and ground conditions; ecology and nature conservation (including protected species and invasive species); historic environment; soil management; traffic and transport; noise

management measures; air quality and dust management; landscape and visual; and a bentonite breakout plan.

Sensitivity of receptor

- 1.12.5.10 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 1.11.5**. 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 any change in exposure due to the Transmission Assets. Furthermore, most people enjoy good respiratory health (e.g., are not asthmatic) and are not at a life stage (e.g., infant or frail elderly) with particular sensitivity to air quality.
- 1.12.5.11 The sensitivity of the general population is **low**.
- 1.12.5.12 The sub-population includes a high representation of dependants including 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 Transmission Assets are those living close to the construction works.
- 1.12.5.13 The sensitivity of the vulnerable group population is **high**.

Magnitude of impact

- 1.12.5.14 The magnitude of change due to the Transmission Assets is **low**. As reported in Volume 3, Chapter 9: Air quality of the ES, the construction activity and construction compound dust impacts on the identified sensitive receptors are predicted to have very localised spatial extent, be short-term in duration and intermittent. Occasionally, weather conditions may coincide with construction and decommissioning activities to generate higher levels of dust. This can cause temporary annoyance, and for people with existing poor health, higher levels of coarse dust in the air can exacerbate some conditions (e.g., asthma). Coarse PM is larger and heavier and so it is deposited more quickly; this includes dusts containing any mobilised contaminants. This means that the concentration of coarse PM in the air reduces rapidly as it gets further from the source. The potential for polluting or nuisance-type dust effects is therefore expected to be occasional and limited in extent. Deposition rates are slower for finer PM and affect a wider area and thus, potentially, a greater number of people. However, exposure is expected to be very low due to the finer PM being typically a relatively small component of construction dusts and the effects of dispersion would reduce concentrations over distance. At these levels it is unlikely that there would be discernible changes in the risk of developing a new health condition or of exacerbating an existing condition. Such changes during construction would overall be medium-term, 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 cable corridor is relevant and indicates that at any given location exposures would be of shorter duration.

Significance of effect

- 1.12.5.15 The effect is characterised as being adverse in direction, *temporary* and *direct*. 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, as well as non-threshold effects of PM_{2.5} and NO₂, particularly for vulnerable sub-populations. 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.
- 1.12.5.16 Overall, the sensitivity of the general population is **low** and the vulnerable population is **high**, and the magnitude of the impact is **low**. The effect will therefore be of **minor adverse** significance, which is not significant.

1.12.6 Water quality

Construction, operation and maintenance and decommissioning phases

- 1.12.6.1 This section considers onshore and intertidal water quality, hydrology and flood risk implications for population health of potential pollution releases during all phases.
- 1.12.6.2 During construction and decommissioning of the Intertidal Infrastructure Area and Onshore Order Limits, there is a potential risk of accidental discharges of untreated runoff containing contaminants. Untreated runoff has the potential to eventually outfall to watercourses (Main Rivers and Ordinary Watercourses) located downstream. Untreated runoff also has the potential to infiltrate in situ into groundwater confined within superficial deposits and solid geology underlying the study area. Additionally, there are potential risks of increased flood risk as a result of damage to the existing flood defences, damage to existing field drainage and to existing water pipelines.
- 1.12.6.3 During operation and maintenance of the onshore elements of the Transmission Assets, there is a potential for increased surface water flood risk as a result of higher rates of surface water runoff from increased impermeable areas.
- 1.12.6.4 An Outline Pollution Prevention Plan (PPP) (document reference J1.4) forms part of the Outline CoCP (document reference J1), has been prepared and submitted with the application for development consent. The PPP will be developed in accordance with the Outline PPP and will include details of emergency spill procedures. Good practice guidance detailed in the Environment Agency's Pollution Prevention Guidance notes (including Pollution Prevention Guidance notes 01, 05, 08 and 21) will be followed where appropriate, or the latest relevant available guidance. Pollution measures will be secured by CoT04 (see ES Volume 1, Annex 5.3: Commitments Register of the ES).

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- 1.12.6.5 During construction, there is potential for the accidental release of lubricants, fuels and oils from construction machinery. This can occur because of spillages, leakages 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.
- 1.12.6.6 An Outline Bentonite Breakout Plan forms part of the Outline CoCP which has been prepared and submitted with the application for development consent (document reference J1.13).
- 1.12.6.7 The risk of pollution of surface water or groundwater bodies, which could be subsequently used as potable sources, has been thoroughly assessed and mitigated (see Volume 3, Chapter 2: Hydrology and flood risk of the ES). The Onshore Order Limits, predominantly agricultural, will be protected through contamination prevention measures (see section 2.8 of Volume 3, Chapter 2: Hydrology and flood risk of the ES).
- 1.12.6.8 Bathing water quality at the nearshore of the possible landfall locations is unlikely to be adversely affected by installation of the offshore cable corridor via trenchless techniques, for example direct pipe (see Volume 2, Annex 2.2: Water Framework Directive: Coastal waters assessment). Comprehensive mitigation strategies will minimise any potential contamination, thereby reducing the risk of toxicological exposure through skin contact, accidental swallowing of water or inhalation (see section 2.16 of Volume 3, Chapter 2: Hydrology and flood risk of the ES). Best practice with regard the use and storage of oils, chemicals and other wastes, to remove the risk of causing pollution during construction is outlined within the Outline CoCP (document reference J1).
- 1.12.6.9 Changes to water quality onshore and nearshore may be due to either new accidental pollutant spills or mobilisation of historic pollutants. In both cases, standard good practice pollution control measures will form part of construction management plans in place (see section 2.16 of Volume 3, Chapter 2: Hydrology and flood risk of the ES). 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.
- 1.12.6.10 This section has been informed by Volume 3, Chapter 2: Hydrology and flood risk of the ES, which set out relevant assessment findings and mitigation measures that have been taken into account. Volume 3, Chapter 2: Hydrology and flood risk of the ES concludes the following.
- During construction and decommissioning, the impact of contaminated runoff on the quality of surface water and ground receptors is minor adverse.
 - During construction, the impact of increased flood risk arising from additional surface water runoff is minor adverse.

- During construction and decommissioning, the impact of increased flood risk arising from damage to existing flood defences is minor adverse.
- During construction and decommissioning, the impact of increased flood risk arising from watercourse crossings is minor adverse.
- During construction and decommissioning, the impact of damage to existing field drainage is minor adverse.
- During construction and decommissioning, the impact of damage to existing water supply and drainage pipelines is minor adverse.
- During operation and maintenance, the impact of increased flood risk arising from additional surface water runoff is minor beneficial. The risk of flooding will be minimised during the operational phase as flows from within the site will be restricted to the 1 in 1-year greenfield runoff rate.

1.12.6.11 A potential population health effect is considered plausible because there is a source-pathway-receptor relationship.

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

1.12.6.12 Furthermore, the potential effect is probable as no highly unusual conditions are required for the source-pathway-receptor linkage. The population groups relevant to this assessment are as follows.

- The 'site-specific' populations near landfall (close to St Leonards), the cable corridor (Kilnhouse) and near the substations (close to Freckleton East and Lea and Larches).
- The local populations of Fylde and Preston.
- The sub-population vulnerable due to young age, old age, low income, poor health, social disadvantage, or access and geographical factors (for example, people for whom alternative opportunities may be limited).

Sensitivity of receptor

1.12.6.13 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 1.11.5**. This reflects that many people would make limited use of coastal waters and onshore waters for bathing or related recreation. The potential for any effect to public water supplies (surface or ground water sources) is considered very limited, with the great majority of people having water supplies that would be unaffected. The general population includes those who are in good health and less likely to be adversely affected by contaminants.

1.12.6.14 The sensitivity of the general population is **low**.

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- 1.12.6.15 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. Increased sensitivity to exposure may also apply to older people and those with existing poor health (e.g., long-term illness).
- 1.12.6.16 The sensitivity of the vulnerable group population is **high**.

Magnitude of impact

Construction and decommissioning

- 1.12.6.17 The construction and decommissioning magnitude of change due to the Transmission Assets is **low**. This reflects that nearshore works would result in high dispersion in relation to bathing waters and the use of standard good practice mitigation to avoid and contain any spills or appropriately respond to historic contamination encountered. Whilst Volume 3, Chapter 2: Hydrology and flood risk of the ES identifies the potential for some localised effects to a limited number of Main Rivers and Ordinary Watercourses, these are not considered to pose a risk to public health (see Table 2.20 in Volume 3, Chapter 2: Hydrology and flood risk of the ES which details the specific maximum design scenario, including measures to mitigate potential impacts such as contaminated runoff, flood risk, and disturbance to surface water of reaching levels that would pose a health hazard. 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 very minor change in mortality or morbidity related risk factors associated with toxin exposures for a very few people. At most there may be slight healthcare service implications.

Operation and maintenance

- 1.12.6.18 The operational and maintenance magnitude of change due to the Transmission Assets is **negligible**. Operational impacts are limited to the potential for changes in flood risk due to the impermeable areas, particularly at the substation. As set out in Volume 3, Chapter 2: Hydrology and flood risk of the ES, the Outline Operational Drainage Management Plan (document reference J10) will appropriately restrict flows from impermeable areas within each substation to the 1 in 1-year greenfield runoff rate. This mitigation addresses, and even slightly reduces, the local surface water flood risk. The very small scale of change in community flood risk, including contamination exposure related pathways, would relate to one-off events over the long term. These changes are not anticipated to have public health or health service implications, with no appreciable change to quality of life, morbidity or mortality risk factors for the population.

Significance of effect

Construction and decommissioning

- 1.12.6.19 The effect is characterised as being adverse in direction, *temporary* and *direct*. 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.
- 1.12.6.20 The Water Framework Directive (WFD) coastal waters assessment has considered the different activities associated with the Transmission Assets in the context of the environmental objectives of any affected WFD surface water body. This has considered the potential impact on WFD transitional and coastal receptors (see Volume 2, Annex 2.2: Water Framework Directive coastal waters assessment of the ES). Water quality is expected to be well within standards for bathing and drinking water (See section 2.6 of Volume 3, Chapter 2: Hydrology and flood risk of the ES which describes hydrology and flood risk baseline environmental conditions, specifically the water quality of surface water and groundwater informed by the WFD status), and the changes are not expected to affect delivery of health policy or influence inequalities.
- 1.12.6.21 Overall, the sensitivity of the general population is low and the vulnerable population is high, and the magnitude of the impact is low. The effect will therefore be of **minor adverse** significance, which is not significant.

Operation and maintenance

- 1.12.6.22 The effect is characterised as being *beneficial* in direction, *long-term* and *direct*. This conclusion reflects that although there are credible pathways in the scientific literature by which surface flood risk may be affected, these are addressed by mitigation and may result in occasional improvements in community flood risk. These changes are likely to have a *very limited* effect on the population health baseline, and are not anticipated to influence the delivery of public health policies.
- 1.12.6.23 Overall, the sensitivity of the general population is low and the vulnerable population is high, and the magnitude of impact is negligible. The effect will therefore be of **negligible** significance, which is not significant.

1.12.7 Land quality

Construction and decommissioning phases

- 1.12.7.1 Linked to the issue of air and water quality discussed in **sections 1.12.5** and **1.12.6** 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 1.12.6**, or via construction dusts as discussed in **section 1.12.5**. Given restricted access to the onshore transmission works construction areas, including due to fencing, it is unlikely that there is the potential for the community to have direct contact with contaminated soils to an extent that could affect public health. This issue is not assessed further as a separate issue.

1.12.8 Noise and vibration

Construction, operation and maintenance and decommissioning phases

- 1.12.8.1 There is the potential for noise and vibration effects from Transmission Assets activities. Construction and decommissioning activities may result in changes to noise during the day and at night. Some specific activities such as trenchless techniques and cable pull require periods of night-time working, however the majority of works would occur during normal daytime construction working hours. The impacts of noise and vibration generated by construction and decommissioning activities for the Transmission Assets on human receptors are assessed in Volume 3, Chapter 8: Noise and vibration of the ES. This includes impact of noise generated by additional vehicle movements on the local highway network.
- 1.12.8.2 As stated in Volume 1, Chapter 3: Project description of the ES, core construction hours will be:
- 07:00 to 19:00 Monday to Saturday;
 - up to one hour before and after core working hours for mobilisation (“mobilisation period”) i.e. 06:00 to 20:00; and
 - Activities carried out during the mobilisation period will not generate significant noise levels (such as piling, or other such noisy activities). In circumstances outside of core working practices, specific works may have to be undertaken outside the core working hours. This will include, but is not limited to, works being undertaken within and/or adjacent to Blackpool Airport and cable installation at landfall and at the River Ribble. Advance notice of such works will be given to the relevant planning authority.
- 1.12.8.3 There is also the potential for operational noise effects associated with the onshore substations. Volume 3, Chapter 8: Noise and vibration assesses operational noise at residential receptors during the night-time period; and recreational receptors during the daytime.
- 1.12.8.4 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).

- 1.12.8.5 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). 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). In this regard, noise effects can be considered to have non-threshold effects, with characteristics other than sound levels also determining the influence on health outcomes.
- 1.12.8.6 The health assessment has regard to the population groups identified in the literature that may be particularly sensitive. For example, children, the elderly, the chronically ill, people with a hearing impairment, shift-workers and people with mental illness (e.g., schizophrenia).
- 1.12.8.7 This section has been informed by Volume 3, Chapter 8: Noise and vibration of the ES, which sets out relevant assessment findings and mitigation measures that have been taken into account. Volume 3, Chapter 8: Noise and vibration of the ES concludes the following.
- For construction and decommissioning.
 - Noise impacts due to construction and decommissioning of onshore export cables at landfall (excluding trenchless techniques) are assessed to be minor adverse for residential receptors and Century Care Home.
 - With suitable measures in place, noise impacts due to construction of onshore export cables at landfall (trenchless techniques including night working) are assessed to be negligible to minor adverse for residential receptors, which at their nearest are 300 m away.
 - Noise impacts due to the decommissioning of onshore export cables at landfall are likely to be less than during construction and up to minor adverse. No night-time work is anticipated.
 - Noise impacts due to the onshore construction landward of the Transition Joint Bay (open-cut trenching) are assessed to be minor adverse for residential receptors. Users of the Quaker Wood Stables are considered sensitive to noise as horses may be startled by sudden sounds and may put riders at risk of injury. Such risk is addressed by site hoarding and localised screening to the compound in close proximity to Quaker Wood Stables, as well as measures covered in the Outline Construction Noise and Vibration Management Plan (document reference J1.3).

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- Noise impacts due to the onshore decommissioning landward of the Transition Joint Bay (open-cut trenching) are assessed to be minor adverse.
 - Noise impacts due to the onshore construction landward of the Transition Joint Bay (trenchless techniques) are assessed to be negligible to minor adverse. This includes having regard to potential for weekend and night-time work close to Blackpool Airport and Blackpool Road Recreation Ground. Whilst there would be periods of elevated noise at these locations the durations would not exceed the criteria in noise guidance for construction impacts.
 - Noise impacts due to the onshore decommissioning landward of the Transition Joint Bay (trenchless techniques) are assessed to be minor adverse.
 - Noise impacts due to the construction and decommissioning of the onshore substations are minor adverse for residential receptors. Users of the Quaker Wood Stables are considered sensitive due to proximity of the riding area to the Morecambe Onshore Substation temporary compound, however following mitigation measures as set out in the Outline Construction Noise and Vibration Management Plan (document reference J1.3) and Onshore Decommissioning Plan (CoT36 as secured by DCO Schedules 2A & 2B, Requirement 22), the impact is assessed to be minor adverse.
 - Vibration impacts due to the construction of the Transmission Assets are assessed to be minor adverse for residential receptors following measures set out in the Construction Noise and Vibration Plan (document reference J1.3).
 - The impact of noise generated by additional vehicle movements on the local highway network during construction and decommissioning is assessed to be minor adverse. A Construction Traffic Management Plan(s) (CTMP) will be prepared in accordance with the Outline CTMP submitted as part of the application (document reference J5) outlining methods to control construction traffic. The measures to be adopted to control construction traffic are presented in Volume 3, Chapter 7: Traffic and transport of the ES.
 - For operation and maintenance.
 - The final design will incorporate noise control measures necessary to ensure that the operational noise criteria secured as a requirement of the DCO, as referenced under CoT80 as secured by Requirement 18 of the DCO.
 - The impact of noise generated during operation and maintenance of the onshore substations is minor adverse for residential receptors and users of Quaker Wood Stables. The impact on recreational receptors on nearby PRow is negligible to minor adverse.

1.12.8.8 A potential population health effect is considered likely because there is a plausible source-pathway-receptor relationship.

- The source is noise and vibration generated by construction and decommissioning activities and vehicle movements and noise generated by operation of the onshore substations.
- The pathway is pressure waves through the air and ground vibrations.
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

1.12.8.9 Furthermore, the potential effect is probable as no highly unusual conditions are required for the source-pathway-receptor linkage. The population groups relevant to this assessment are as follows.

- The 'site-specific' populations near landfall (close to St Leonards), the cable corridor (Kilnhouse) and near the substations (close to Lea and Larches).
- The local populations of Fylde and Preston.
- The sub-population vulnerable due to young age, old age, low income, poor health, social disadvantage, or access and geographical factors (for example, people for whom alternative opportunities may be limited).

Sensitivity of receptor

1.12.8.10 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 1.11.5**. 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.

1.12.8.11 The sensitivity of the population is considered to be **low**.

1.12.8.12 The sub-population more sensitive to noise includes children and the elderly, including children and adults with complex health needs (see **1.11.5**); 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, which may include people living close to the Blackpool Road Recreation Ground. Vulnerability particularly relates to those living close to the construction and decommissioning activities and onshore substations, including those spending more time in affected dwellings (key receptors are set out in **section 8.6.4** of Volume 3, Chapter 8: Noise and vibration of the ES), e.g., due to low economic activity, shift work or poor health. For example, residents of Century Healthcare Care Home, as identified in Volume 3, Chapter 8: Noise and vibration of the ES, are particularly sensitive to noise.

1.12.8.13 The sensitivity of the vulnerable group population is **high**.

Magnitude of impact

Construction and decommissioning

- 1.12.8.14 As reported in Volume 3, Chapter 8: Noise and vibration of the ES, construction along the onshore export cable corridor and the 400 kV grid connection 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; and activities that are static such as construction of the onshore substations.
- 1.12.8.15 In terms of population health, 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 along the onshore cable corridor and near the substations. The changes would be *medium-term* duration in relation to frequent construction related noise exposures. The greatest potential for effects is likely for the few people close to areas where open-cut trenching techniques are being used, trenchless technique compounds, or the onshore substations (such as those mentioned in paragraph 1.12.8.12 above). There is also potential for disruption and risk of injury (linked to horses being startled) as detailed in paragraph 1.12.8.7 above, though this risk is addressed through mitigation set out in Volume 3, Chapter 8: Noise and vibration of the ES. The Prolonged periods of daytime disruption of educational activities at schools are not anticipated.
- 1.12.8.16 The magnitude of change due to the proposed construction works is therefore considered to be **low**.

Operation and maintenance

- 1.12.8.17 As reported in Volume 3, Chapter 8: Noise and vibration of the ES, noise associated with operation and maintenance of the onshore substations would be static. Mobile works would impact receptors for short periods of time, whereas static works would last longer.
- 1.12.8.18 In terms of population health, 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 near the substations. The changes would be long-term for noises from the onshore substations. The greatest potential for effects is likely for the few people close to the onshore substations (such as those mentioned in paragraph 1.12.8.12 above). Prolonged periods of daytime disruption of educational activities at schools are not anticipated.
- 1.12.8.19 The magnitude of change due to the operation and maintenance of the Transmission Assets is therefore considered to be **low**.

Significance of effect

Construction and decommissioning

- 1.12.8.20 Noise and vibration impacts from construction and decommissioning activities and construction traffic would be mitigated through the use of appropriate construction hours and best practice measures, as detailed in Volume 3, Chapter 8: Noise and vibration of the ES (see Table 8-13 for construction hours) and secured by CoT18 (see ES Volume 1, Annex 5.3: Commitments Register of the ES). Equivalent mitigation measures are anticipated to be implemented during decommissioning. Measures to manage construction noise and vibration are set out in the Outline Construction Noise and Vibration Management Plan (document reference J1.3) which forms part of the Outline CoCP (document reference, J1). Example measures and the typical noise reduction losses achievable by these measures have been included in the assessment based on the guidance presented in Annex B of BS 5228-1:2009+A1:2014. The inclusion of these mitigation measures results in noise levels being suitably controlled at receptors.
- 1.12.8.21 Based on these mitigation measures, the effect is characterised as being adverse in direction, *temporary to long-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. The trenchless technique compounds near Blackpool Road Recreation Ground are noted as potentially a source of night-time disturbance. The good management and mitigation at these sites, as will be set out in the Detailed CoCP (under CoT35), as well as the temporary durations of the works, means that no significant adverse public health impact is anticipated.
- 1.12.8.22 Overall, the sensitivity of the general population is **low** and the vulnerable population group is **high**, and the magnitude of the impact is **low**. The effect will therefore be of **minor adverse** significance, which is not significant.

Operation and maintenance

- 1.12.8.23 Noise impacts from operation and maintenance of the onshore substations would be mitigated through best practice measures implemented through design of the onshore substations, as detailed in Volume 3, Chapter 8: Noise and vibration of the ES. This includes measures such as noise barriers, set working hours, quieter equipment, and acoustic enclosures for continuously operating plant such as generators.
- 1.12.8.24 The final design will incorporate noise control measures necessary to ensure that the operational noise criteria secured as a requirement of the DCO, as referenced under CoT80, are achieved at all receptors. Such measures may include positioning plant items with higher noise emission levels away from receptors and/or within sound insulated buildings, selecting low-noise plant

options where available, and mitigation measures such as acoustic enclosures or barriers. Operations and maintenance staff will attend site to undertake mainly non-intrusive inspections of the equipment during daytime hours and infrequent works to remedy any potential defects noted. The personnel will be trained appropriately on the potential health hazards of excessive noise to ensure that impacts are minimised during any works required. Example measures include the use of quieter equipment and undertaking works away from receptors where possible.

- 1.12.8.25 Based on these mitigation measures, the effect is characterised as being adverse in direction, *temporary* impacts over a *long-term* duration 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.
- 1.12.8.26 Overall, the sensitivity of the general population is **low** and the vulnerable population is **high**, and the magnitude of the impact is **low**. The effect will therefore be of **minor adverse** significance, which is not significant.

1.12.9 Understanding of risk (risk perception)

Operation and maintenance

- 1.12.9.1 This section considers the potential onshore operational population health effect due to EMF exposure associated with the Transmission Assets.
- 1.12.9.2 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.
- 1.12.9.3 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.
- 1.12.9.4 As noted in **Table 1.21**, the Transmission Assets would implement relevant design guidelines of the ICNIRP and UK Government voluntary code of practice (ICNIRP, 1998, 2010). The EMF compliance statement (Volume 1, Annex 3.4 of the ES) contains further detail on this. 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 risks (risk perception). This relates to the potential for community concern about their proximity to the electrical infrastructure, including buried cables and onshore substations, to affect mental health, even where relevant public EMF exposure guideline limits are met.

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- 1.12.9.5 The potential health effect has a plausible source-pathway-receptor relationship are set out in the following.
- The source is electrical equipment introduced by the Transmission Assets.
 - The pathway is concern about EMF exposure, affecting mental health.
 - Receptors are residents in the local community, particularly those living in close proximity to the new electrical infrastructure, and users of PRow located near the substations.
- 1.12.9.6 Furthermore, the potential effect is probable as no highly unusual conditions are required for the source-pathway-receptor linkage. The population groups relevant to this assessment are as follows.
- The ‘site-specific’ populations near landfall (close to St Leonards), the cable corridor (Kilnhouse) and near the substations (close to Freckleton East and Lea and Larches).
 - The local populations of Fylde and Preston.
 - The sub-population vulnerable due to young age, old age, low income, poor health, social disadvantage, or access and geographical factors.

Sensitivity of receptor

- 1.12.9.7 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 1.11.5**. Most people in the study area live, work or travel at a separation distance from the Transmission Assets’ 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.
- 1.12.9.8 The sensitivity of the general population is therefore **low**.
- 1.12.9.9 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 (including users of nearby PRow) and/or who live in close proximity to the substations.
- 1.12.9.10 The sensitivity of the vulnerable sub-population is **high**.

Magnitude of impact

- 1.12.9.11 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.

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- 1.12.9.12 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 magnitude of change due to the Transmission Assets is therefore **low**.

Significance of effect

- 1.12.9.13 The professional judgment 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 substations are relatively common features would also be expected to inform population risk perception.
- 1.12.9.14 Overall, the sensitivity of the general population is low and the vulnerable population group is **high**, and the magnitude of the impact is **low**. The effect will therefore be of **minor adverse** significance, which is not significant.
- 1.12.9.15 Non-technical information sharing with affected communities has the potential to further reduce this effect.

1.13 Cumulative effect assessment methodology

1.13.1 Overview

- 1.13.1.1 The Cumulative Effects Assessment (CEA) takes into account the impact associated with the Transmission Assets together with other projects and plans. The projects and plans selected as relevant to the CEA presented within this annex are based upon the results of a screening exercise (see Volume 1, Annex 5.5: CEA screening matrix). Each project has been considered on a case by case basis for screening in or out of this annex's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.
- 1.13.1.2 The human health CEA methodology has followed the methodology set out in Volume 1, Chapter 5: Environmental assessment methodology of the ES. As part of the assessment, all projects and plans considered alongside the Transmission Assets have been allocated into 'tiers' reflecting their current stage within the planning and development process, these are listed below.
- 1.13.1.3 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 and is in the public domain.
- Tier 3.
 - Scoping report has not been submitted and is not in the public domain.
 - Identified in the relevant Development Plan.
 - Identified in other plans and programmes.

1.13.1.4 This tiered approach is adopted to provide a clear assessment of the Transmission Assets alongside other projects, plans and activities.

1.13.1.5 For offshore receptors, the CEA methodology includes and additional three scenarios to account for cumulative impacts of the Transmission Assets and the Generation Assets. These are scenarios 1-3 (paragraph 5.4.9.11 of Volume 3, Chapter 5: Environmental assessment methodology). Scenario 4 then includes the cumulative assessment scenarios 1-3, together with all other relevant screened-in projects from the cumulative effects assessment long list (Tiers 1-3).

1.13.1.6 The projects, plans and activities scoped into the CEA are informed by:

- Volume 2, Chapter 9: Other sea users of the ES;
- Volume 3, Chapter 2: Hydrology and flood risk of the ES;
- Volume 3, Chapter 6: Land use and recreation of the ES;
- Volume 3, Chapter 7: Traffic and transport of the ES;
- Volume 3, Chapter 8: Noise and vibration of the ES;
- Volume 3, Chapter 9: Air quality of the ES; and
- Volume 4, Chapter 2: Socio-economics of the ES.

1.13.2 Transport modes, access and connections

Tier 1

1.13.2.1 This section has been informed by Volume 3, Chapter 7: Traffic and transport of the ES which sets out relevant assessment findings and mitigation measures that have been taken into account.

1.13.2.2 The projects and plans selected as relevant to the transport CEA presented within Volume 3, Chapter 7: Traffic and transport of the ES are based upon the results of a screening exercise (see Volume 1, Annex 5.5: Cumulative screening matrix and location plan of the ES).

1.13.2.3 The specific projects, plans and activities scoped into the CEA are:

- Mill Farm Sports Village; and
- Cowells Farm.

1.13.2.4 Volume 3, Chapter 7: Traffic and transport of the ES concludes the following.

- The impact on non-motorised user delay caused by cumulative development traffic is negligible adverse.
- The impact on fear and intimidation (non-motorised user amenity) caused by cumulative development traffic is negligible adverse.
- The impact on severance caused by cumulative development traffic is negligible adverse.
- The impact on road safety caused by cumulative development traffic is negligible adverse.

1.13.2.5 The population groups relevant to the cumulative health assessment are the same as those listed in **section 1.12.2**.

1.13.2.6 As no significant cumulative effects are identified, the cumulative effect is predicted to be similar to the individual effect described in **section 1.12.2**.

1.13.3 Open space, leisure and play

Tier 1

1.13.3.1 There is considered limited potential for cumulative project effects to influence use of outdoor space.

1.13.3.2 This section has been informed by Volume 3, Chapter 6: Land use and recreation of the ES and Volume 2, Chapter 9: Other sea users of the ES, which set out relevant assessment findings and mitigation measures that have been taken into account.

1.13.3.3 The specific projects, plans and activities considered in Volume 2, Chapter 9: Other sea users of the ES are the following.

- Generation Assets.
 - Morecambe Offshore Windfarm: Generation Assets (Scenario 1).
 - Morgan Offshore Windfarm: Generation Assets (Scenario 2).
 - Morgan Offshore Windfarm: Generation Assets and Morecambe Offshore Windfarm: Generation Assets (Scenario 3).
- Tier 1 Projects (Scenario 4).
 - Awel y Môr.
 - Mona Offshore Wind Project.
- Tier 2 Projects (Scenario 4).
 - Eni Hynet – Carbon Capture Project.
 - Mooir Vannin.
- Tier 3 Projects (Scenario 4).
 - MaresConnect.
 - Morecambe Net Zero Cluster.

1.13.3.4 Volume 2, Chapter 9: Other sea users of the ES concludes the following.

- The cumulative effect of the Transmission Assets alongside other projects on the reduction or restriction of other offshore energy activities is not significant.

1.13.3.5 The specific projects, plans and activities considered in Volume 3, Chapter 6: Land use and recreation of the ES are the following.

- Tier 1.
 - Planning Reference: 06/2022/117.
 - Planning Reference: 22/0188.
 - Planning Reference: 21/0904.
 - Planning Reference: 19/0552.
 - Planning Reference: 07/2018/3907/SCE.
 - Planning Reference: 19/0461.
 - Planning Reference: 22/0267.
 - Planning Reference: 08/0058.
 - Planning Reference: 22/0939.
 - Planning Reference: 06/2023/0245.
 - Planning Reference: 23/0739.
 - Planning Reference: 22/0204.
 - Planning Reference: 24/0295.
 - Planning Reference: 06/2024/0767.

1.13.3.6 Volume 3, Chapter 6: Land use and recreation of the ES concludes.

- The temporary and permanent disruption to the recreational use of Access Land is no change.
- The cumulative effect regarding the temporary and permanent disruption to the recreational use of PRow will be minor adverse.

1.13.3.7 The population groups relevant to the cumulative health assessment are the same as those listed in **section 1.12.3**.

1.13.3.8 As no significant cumulative effects are identified, the cumulative effect is predicted to be similar to the individual effect described in **section 1.12.3**.

1.13.4 Socio-economic factors

1.13.4.1 This section has been informed by Volume 4, Chapter 2: Socio-economics of the ES, which set out relevant assessment findings and mitigation measures that have been taken into account.

1.13.4.2 The specific projects, plans and activities considered in Volume 4, Chapter 2: Socio-economics of the ES are the following.

Tier 1.

- LCC/2022/0049 Construction of new railway station at Cottam.

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- LCC/2016/0046 Preston Western Distributor and East West Link Road.
 - 06/2020/0888 Preston Western Relief Road and residential development up to 1,100 dwellings.
 - 06/2021/0174 Proposed employment park and associated infrastructure.
 - 22/00019/DIS Erection of buildings, engineering operations and related development, within the curtilage of existing Class B2 production complex.
 - LCC/2019/0029 Energy recovery facility (erf) fuelled by household, commercial and industrial waste.
 - LCC/2020/0014 Improvement of existing a582 and b5253 in Leyland to four lane dual carriageway.
 - LCC/2016/0046 Development of new highways including Preston Western Distributor, Cottam link road and east west link road.
 - A585 Windy Harbour to Skippool Improvement Scheme (No planning application reference number).
 - 23/0739 Scoping opinion in respect of a 49.9mw solar farm.
 - 07/2024/00013/VAR Development of a 49.99 MW Battery Storage Facility, with associated infrastructure and landscaping. Erection of a new waste treatment building, siting of portacabin style offices and welfare facilities and installation of a soil washing plant for waste processing to treat up to 250,000 tonnes of construction, demolition and excavation waste per annum to produce recycled aggregates with associated access, parking, electrical vehicle charging points and cycle store.
 - 24/0003 Erection of a new waste treatment building, siting of portacabin style offices and welfare facilities and installation of a soil washing plant for waste processing to treat up to 250,000 tonnes of construction, demolition and excavation waste per annum to produce recycled aggregates with associated access, parking, electrical vehicle charging points and cycle store.
 - Blackpool Airport Enterprise Zone (No planning application reference number).

1.13.4.3 Volume 4, Chapter 2: Socio-economics of the ES concludes there will be no significant cumulative effects from employment related impacts arising from the Transmission Assets alongside other projects/plans.

1.13.4.4 The population groups relevant to the cumulative health assessment are the same as those listed in **section 1.12.4**.

1.13.4.5 As no significant cumulative effects are identified in Volume 4, Chapter 2: Socio-economics of the ES, the cumulative effect is predicted to be similar to the individual effect described in **section 1.12.4**. As such, no further health assessment CEA is undertaken at ES.

1.13.5 Air quality

Tier 1

- 1.13.5.1 There is considered limited potential for cumulative project effects to influence use of outdoor space.
- 1.13.5.2 This section has been informed by Volume 3, Chapter 9: Air quality of the ES, which set out relevant assessment findings and mitigation measures that have been taken into account.
- 1.13.5.3 The specific projects, plans and activities considered in Volume 3, Chapter 9: Air quality of the ES are the following:
- Tier 1
 - Construction of an agricultural building.
 - Erection of twelve dwellings with associated access road, garages and parking spaces.
 - Erection of stable block, storage barn and creation of outdoor ménage.
 - Erection of new storage building and sub-station.
 - Erection of timber framed animal shelter/store.
 - Residential development of 37 dwellings comprising 100% affordable housing with associated infrastructure.
 - Erection of a detached dwelling house with first floor balcony to rear elevation.
 - Detached two storey dwelling with integral garage.
 - Outline application for erection of four x two storey dwellings in two pairs of semi-detached dwellings (layout and scale applied for with other matters reserved) following demolition of existing carpet shop building.
 - Residential development of four no. Dwellings following demolition and removal of all buildings and structures.
 - Erection of stables for commercial use including construction of access track and vehicle parking area.
 - Three storey extension to form a 23 bedroom annex to rear following demolition of 70 Marsden street with widened footpath to Marsden street.
 - Outline application for the erection of one detached dwelling with access via existing access off Blackpool Road (all other matters reserved).
 - Outline application for residential development of 30 dwellings including 10 affordable dwellings (access and layout applied for and other matters reserved).

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- 1.13.5.4 Volume 3, Chapter 9: Air quality of the ES concludes there will be no significant cumulative effects from dust and construction traffic related emissions arising from the Transmission Assets alongside other projects/plans.
- 1.13.5.5 The population groups relevant to the cumulative health assessment are the same as those listed in **section 1.12.5**.
- 1.13.5.6 As no significant cumulative effects are identified in Volume 3, Chapter 9: Air quality of the ES, the cumulative effect is predicted to be similar to the individual effect described in **section 1.12.5**. As such, no further health assessment CEA is undertaken at ES.
- 1.13.6 Water quality**
- Tier 1**
- 1.13.6.1 This section has been informed by Volume 3, Chapter 2: Hydrology and flood risk of the ES which sets relevant cumulative assessment findings and mitigation measures that have been taken into account.
- 1.13.6.2 The specific projects, plans and activities considered in Volume 3, Chapter 2: Hydrology and flood risk of the ES are the following.
- 06/2022/1177.
 - 20/0114.
 - 19/0461.
 - 22/0267.
 - 15/0400 (reserved matters application).
 - 17/0862.
 - 19/0815.
 - 17/0957.
 - LCC/2019/0003.
 - 06/2023/0245.
 - 23/0589.
- 1.13.6.3 Volume 3, Chapter 2: Hydrology and flood risk of the ES concludes that there will be no significant cumulative effects from the Transmission Assets due to no potential interactions given the nature of the projects and the nature of receptors relevant to Volume 3, Chapter 2: Hydrology and flood risk of the ES.
- 1.13.6.4 The population groups relevant to the cumulative health assessment are the same as those listed in **section 1.12.6**.
- 1.13.6.5 As no significant cumulative effects are identified in Volume 3, Chapter 2: Hydrology and flood risk of the ES, the cumulative effect is predicted to be similar to the individual level effect described in **section 1.12.6**. As such no further health assessment is undertaken at ES.

1.13.7 Land quality

Tier 1

- 1.13.7.1 No additional cumulative effects have been identified in Volume 3, Chapter 1: Geology, hydrogeology and ground conditions. Therefore, the cumulative effect is predicted to be similar to the individual level effect described in **1.12.7**.

1.13.8 Noise and vibration

Tier 1

- 1.13.8.1 This section has been informed by Volume 3, Chapter 8: Noise and vibration of the ES which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account.
- 1.13.8.2 The projects and plans selected as relevant to the noise and vibration CEA presented within Volume 3, Chapter 8: Noise and vibration of the ES are based upon the results of a screening exercise (see Volume 1, Annex 5.5: Cumulative screening matrix and location plan of the ES).
- 1.13.8.3 The specific projects, plans and activities scoped into the CEA are.
- 06/2022/1177.
 - 07/2018/3907/SCE.
 - 20/0365.
 - 06/2023/0245.
 - 23/0739.
 - 23/0589.
 - 23/0634.
 - 22/0204.
- 1.13.8.4 Volume 3, Chapter 8: Noise and vibration of the ES concludes the following.
- The cumulative impact of noise and vibration generated by construction and decommissioning activities for the Transmission Assets on human receptors is assessed to be minor adverse.
 - The cumulative impact of noise generated during operation and maintenance of the onshore substations is assessed to be minor adverse.
- 1.13.8.5 The population groups relevant to the cumulative health assessment are the same as those listed in **section 1.12.8**.
- 1.13.8.6 As no significant cumulative effects are identified, the cumulative effect is predicted to be similar to the individual effect described in **section 1.12.8**.

1.13.9 Understanding of risk (risk perception)

Tier 1

Operation and maintenance phase

- 1.13.9.1 The following developments have been identified from Volume 1, Annex 5.5: Cumulative screening matrix and location plan of the ES as having the potential to result in cumulative effects. Developments have been chosen based on distance from the Transmission Assets, and those involving electrical infrastructure that can contribute to public understanding of risk:
- 17/0822: Land Opposite Sub Station, Peel Road (gas powered grid support and battery storage facility)
 - 07/2022/00021/FUL: Electricity Sub Station Howick Cross Lane
 - 07/2018/3907/SCE: Land North of Penwortham Sub Station
 - 07/2021/00252/FUL: Penwortham Storage Limited: Proposed Battery Storage Facility
 - 23/0125: Land at Peel Road Opposite Sub Station (20 MW battery energy storage facility)
 - 21/0904: Land to the East Of Peel Road Lawns Farm (solar farm and associated infrastructure)
 - 23/0739: Clifton Marsh Farm (solar farm and associated electrician infrastructure)
- 1.13.9.2 While visual and auditory stimuli from electrical infrastructure such as substations have the potential to result in public concern regarding EMF risks, it is unlikely that the same individuals will have the same visual and auditory cues as a result of the developments identified above. Additionally, the public will expect that relevant public EMF exposure guideline limits (as detailed in **section 1.12.9**) will be met by these developments, further alleviating concern.
- 1.13.9.3 There is a potential for a slightly greater effect relating to public concern around EMF than that identified in **section 1.12.9** of this annex, however it would not be of a scale that would change the individual effects of each project, or result in significant public health effects.

1.14 Transboundary effects

- 1.14.1.1 A screening of transboundary effects has been carried out and has identified that there was no potential for significant transboundary effects with regard to human health from the Transmission Assets upon the interests of other states.

1.15 Inter-related effects

- 1.15.1.1 Inter-relationships are considered to be the impacts and associated effects of different aspects of the Transmission Assets on the same receptor. These are considered to be as set out in the following:
- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Transmission Assets (construction, operation and maintenance, and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases (e.g., subsea noise effects from piling, operational wind turbines, vessels and decommissioning).
 - Receptor led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on human health, such as changes in access and in employment, may interact to produce a different, or greater effect on a given population than when the effects are considered in isolation. Receptor-led effects may be short term, temporary or transient effects, or incorporate longer term effects.
- 1.15.1.2 A description of the likely interactive effects arising from the Transmission Assets on human health is provided in Volume 4, Chapter 3: Inter-relationships of the ES.
- 1.15.1.3 The population health effects identified and assessed in this annex have the potential to interact with each other. The areas of potential interaction between effects for a given geographic population are presented in Volume 4, Chapter 3: Inter-relationships of the ES. Vulnerable group effects are expected across all geographic populations, so are not listed separately.

1.16 Summary of impacts, mitigation measures and monitoring

- 1.16.1.1 Information on human health within the human health study area was informed by 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 1.1.2.3**.
- 1.16.1.2 This annex finds that the Transmission Assets as proposed for ES will have beneficial and adverse health effects. These are summarised in **Table 1.26**. This annex concludes the following.
- As set out in **section 1.12.2**, transport modes, access and connections in relation to the construction and decommissioning of the Transmission Assets will have a **minor adverse** effect for population health, which is not significant in EIA terms.
 - As set out in **section 1.12.3**, open space, leisure and play, construction and decommissioning works leading to disruption of recreation and leisure will have a **minor adverse** effect, which is not significant in EIA terms.

- As set out in **section 1.12.4**, employment and socio-economic opportunities in relation to construction and decommissioning activities associated with the Transmission Assets will have a **minor beneficial** effect, which is not significant in EIA terms.
- As set out in **section 1.12.5**, air quality construction and decommissioning related effects will have a **minor adverse** effect (not significant).
- As set out in **section 1.12.6**, water quality effects in relation to the construction decommissioning of the Transmission Assets are **minor adverse** (not significant), for operation and maintenance the effects are **minor beneficial** (not significant).
- As set out in **section 1.12.7**, land quality construction and decommissioning related effects are not assessed, seeing that it is unlikely there is potential for the community to have direct contact with contaminated soils to an extent that could affect public health.
- As set out in **section 1.12.8**, noise exposure related to the construction, operation and maintenance and decommissioning of the Transmission Assets are assessed to be **minor adverse**.
- As set out in **section 1.12.9**, radiation in relation to risk perception of EMF is expected to produce a **minor adverse** (not significant) effect on population health.

- 1.16.1.3 **Table 1.26** presents a summary of the potential impacts, mitigation measures and residual effects. Overall, it is concluded that there will be no significant adverse effects arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.
- 1.16.1.4 Overall, it is concluded that there will be no significant cumulative or inter-related effects from the Transmission Assets alongside other projects, plans and activities.
- 1.16.1.5 No potential transboundary impacts have been identified in regard to effects of the Transmission Assets.

Table 1.26: Summary of potential environmental effects, mitigation and monitoring

Description of impact	Phase ^a			Sensitivity of the receptor	Magnitude of impact	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D						
Transport modes, access and connections	✓	✗	✓	C: high D: high	C: low D: low	Minor adverse (Not significant)	No additional mitigation.	No change.	None.
Open space, leisure and play	✓	✗	✓	C: high D: high	C: low D: low	Minor adverse (Not significant)	No additional mitigation.	No change.	None.
Socio-economic	✓	✗	✓	C: high D: high	C: low D: low	Minor beneficial (Not significant)	No additional mitigation.	No change.	None.
Air quality	✓	✗	✓	C: high D: high	C: low D: low	Minor adverse (Not significant)	No additional mitigation.	No change.	None.
Water quality	✓	✓	✓	C: high O: high D: high	C: low O: negligible D: low	C&D: Minor adverse (Not significant) O: Negligible (Not significant)	No additional mitigation.	No change.	None.
Land quality	✓	✗	✓	Assessed through air quality and water quality pathways.		Not assessed further.	No additional mitigation.	No change.	None.
Noise and vibration	✓	✓	✓	C: high O: high D: high	C: low O: low D: low	Minor adverse (Not significant)	No additional mitigation.	No change.	None.
Understanding of risk (Risk perception)	✗	✓	✗	O: high	O: low	Minor adverse (Not significant)	No additional mitigation.	No change.	None.

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