

# MORGAN OFFSHORE WIND PROJECT GENERATION ASSETS

Preliminary Environmental Information Report

Volume 2, chapter 19: Human Health



April 2023  
FINAL

Image of an offshore wind farm

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## Glossary

Term	Meaning
Applicant	Morgan Offshore Wind Limited.
landfall	The area in which the offshore export cables make contact with land and the transitional area where the offshore cabling connects to the onshore cabling.
The Planning Inspectorate	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
Relevant Local Planning Authority	The Relevant Local Planning Authority is the Local Authority in respect of an area within which a Morgan Generation Assets are situated, as set out in Section 173 of the Planning Act 2008. Relevant Local Planning Authorities may have responsibility for discharging requirements and some functions pursuant to the Development Consent Order, once made.
Statutory consultee	Organisations that are required to be consulted by an applicant pursuant to the Planning Act 2008 in relation to an application for development consent. Not all consultees will be statutory consultees (see non-statutory consultee definition).
the Secretary of State for Business, Energy and Industrial Strategy	The decision maker with regards to the application for development consent for the Morgan Offshore Wind Project. The decision maker with regards to the application for development consent for the Morgan Offshore Wind Project.
maximum design scenario	The scenario within the design envelope with the potential to result in the greatest impact on a particular topic receptor, and therefore the one that should be assessed for that topic receptor.
NPS	The current national policy statements published by the Department of Energy and Climate Change in 2011.

## Acronyms

Acronym	Description
DCO	Development Consent Order
HIA	Health impact assessment
IEMA	Institute of Environmental Management and Assessment
NPS	National Policy Statement
NSIPs	Nationally Significant Infrastructure Projects
UKHSA	United Kingdom Health Security Agency
OHID	Department of Health and Social Care's Office for Health Improvement and Disparities

Acronym	Description
PEIR	Preliminary Environmental Information Report
PHE	Public Health England
IAIA	International Association for Impact Assessment
WHO	World Health Organisation
NEET	Not in education employment or training

## 19 Human Health

### 19.1 Introduction

#### 19.1.1 Overview

- 19.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the assessment of the potential impact of the Morgan Offshore Wind Project Generation Assets (Hereafter referred to as the Morgan Generation Assets) on Human Health. Specifically, this chapter considers the potential impact of Morgan Generation Assets during the construction, operations and maintenance, and decommissioning phases.
- 19.1.1.2 Human health is a broad topic. The assessment considers how the Morgan Offshore Wind Project Generation Assets affects different aspects of the environment that influence population health. This includes changes to the social, economic and bio-physical environment, as well as how the electricity generated by the windfarm is a resource that supports society.
- 19.1.1.3 The assessment presented is informed by the following technical chapters:
- Volume 2, chapter 6: Physical processes of the PEIR
  - Volume 2, chapter 7: Benthic subtidal ecology of the PEIR
  - Volume 2, chapter 11: Commercial fisheries of the PEIR
  - Volume 2, chapter 12: Shipping and navigation of the PEIR
  - Volume 2, chapter 14: Other sea users of the PEIR
  - Volume 2, chapter 15: Seascape, landscape and visual resources of the PEIR
  - Volume 2, chapter 17: Climate change of the PEIR
  - Volume 2, chapter 18: Socio-economics and community of the PEIR.
- 19.1.1.4 The health assessment also considers wider determinants of health not covered by other EIA chapters. The scope of the health chapter is summarised in Table 19.1 with issues scoped out of the assessment explained in Table 19.14.
- 19.1.1.5 In this chapter the terms health and wellbeing are used interchangeably, and parity is given to considering both physical and mental health outcomes.

**Table 19.1: Impacts scoped into the assessment for human health.**

Health determinant	Summary
<b>Social environment</b>	
Transport modes, access and connections	Construction, Operations and maintenance and Decommissioning phases: The potential impact of changes in shipping access to the Isle of Man is scoped in. Disruption of routine and or emergency access has the potential to affect the availability of goods and services that support health promotion, health protection and healthcare services.

Health determinant	Summary
Community identity, culture, resilience and influence	Operational and maintenance phase: The visual impact of the wind farm is scoped in to consider the potential for the introduction of visual change in the seascape, which may affect community wellbeing. This takes into account a context that includes other windfarm projects.
<b>Economic environment</b>	
Employment and income	Construction, Operational and maintenance and Decommissioning phases: Health effects from wider indirect economic impacts are considered. Any potential unemployment or adverse economic implications are scoped in, for example, the project's effects on commercial fisheries
<b>Bio-physical environment</b>	
Climate change and adaptation	Operational and maintenance phase: Health effects of climate change are scoped in. The generating assets of the project would be a part of a wider energy sector transition that reduces the severity of climate change. The benefits to population health are discussed.
<b>Institutional and built environment</b>	
Wider societal infrastructure and resources	Operational and maintenance phase: During operation, the project's wider societal contribution to supporting public health is scoped in. The project would provide energy infrastructure that supports many aspects of public health.

#### 19.1.2 Purpose of chapter

- 19.1.2.1 The primary purpose of the PEIR is outlined in volume 1, chapter 1: introduction of the PEIR. In summary, the primary purpose of an Environmental Statement is to support the Development Consent Order (DCO) application for Morgan Generation Assets under the Planning Act 2008 (the 2008 Act). The PEIR constitutes the Preliminary Environmental Information for Morgan Generation Assets and sets out the findings of the EIA to date to support the pre-application consultation activities required under the 2008 Act. The EIA will be finalised following completion of pre-application consultation and the Environmental Statement will accompany the application to the Secretary of State for Development Consent.
- 19.1.2.2 The PEIR forms the basis for statutory consultation which will last for 47 days and conclude on 04 June 2023 as outlined in volume 1, chapter 2: Policy and legislation of the PEIR. At this point, comments received on the PEIR will be reviewed and incorporated (where appropriate) into the Environmental Statement, which will be submitted in support of the application for Development Consent scheduled for quarter four of 2023.
- 19.1.2.3 In particular, this PEIR chapter:
- Presents the existing population health baseline established from desk studies
  - Identifies any assumptions and limitations encountered in compiling the environmental information

- Presents the potential environmental effects on human health arising from the Morgan Generation Assets, based on the information gathered and the analysis and assessments undertaken
- Highlights any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible environmental effects of the Morgan Generation Assets on human health.

### **19.1.3 Study area**

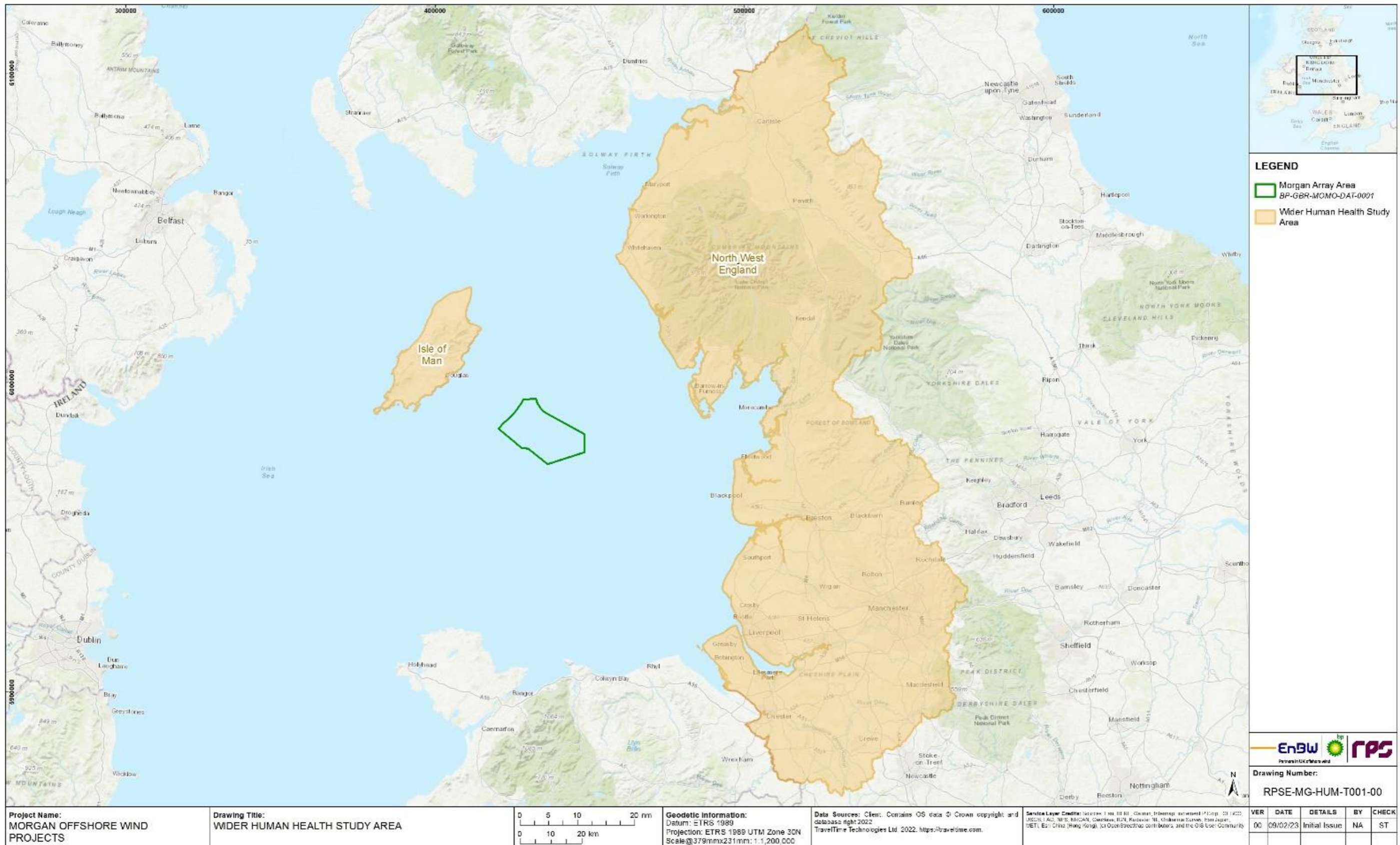
19.1.3.1 The Morgan Generation Assets array boundary is located approximately 22.3 km from the Isle of Man and 36.3 km from the northwest coast of England. The Morgan Generation Assets are thus remote from the nearest mainland receptor population. For most determinants of health there is therefore not a localised population impact around which a study area can be defined. The closest population is on the Isle of Man. As discussed later in this chapter the sea transport connections between the mainland and the Isle of Man are of interest, as are coastal communities associated with Commercial Fisheries. Wider impacts of the project are relevant to national public health and climate change related effects extend to the global population. To be proportionate the Human Health study area for PEIR is therefore comprised of:

- The local populations of Isle of Man (offshore access and visual impacts, see sections 19.8.2 and 19.8.3)
- The regional populations of North West England (visual impacts and commercial fishing impacts, see sections 19.8.3 and 19.8.4).
- The national populations of England and the United Kingdom (offshore asset electricity generation impacts and climate change). See sections 19.8.5 and 19.8.6)
- The global populations, particularly low- and middle-income countries (LMIC) (offshore asset climate change impacts). See section 19.8.5.

19.1.3.2 The Human Health study area is used to define representative population groups, including in relation to sensitivity, rather than to set localised boundaries on the extent of potential effects. The broader areas are designed to encompass all effects, including fishing communities outside of North West England.

19.1.3.3 The health assessment has regard to the topic specific study areas defined by other PEIR chapters listed in paragraph 19.1.1.3. Those chapters inform the health chapter's consideration of effect magnitude, including the extent of effects.

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**Figure 19.1 Wider Human Health study area.**

## 19.2 Policy context

### 19.2.1 National Policy Statements

- 19.2.1.1 Planning policy on renewable energy infrastructure is presented in volume 1, chapter 2: policy and legislation of the PEIR. Planning policy on offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to human health, is contained in the Overarching National Policy Statement (NPS) for Energy (EN-1) (DECC, 2011a) and the NPS for Renewable Energy Infrastructure (EN-3) (DECC, 2011b).
- 19.2.1.2 EN-3 has been reviewed and it is not considered that there are relevant policy positions in relation to human health that need to be taken into account.
- 19.2.1.3 NPS EN-1 includes guidance on what matters are to be considered in the assessment. These are summarised in Table 19.2 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 19.3 below.
- 19.2.1.4 Table 19.3 refers to the current NPSs, specifically NPS EN-1 (DECC, 2011a). If the NPSs are updated prior to the application for Development Consent, the revised NPSs will be fully considered in relation to human health within the Environmental Statement.

**Table 19.2: 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 PEIR
EN-1 paragraph 1.7.2: The energy NPSs are likely to contribute positively towards improving the vitality and competitiveness of the UK energy market by providing greater clarity for developers which should improve the UK's security of supply and, less directly, have <b>positive effects for health and well-being in the medium to longer term</b> through helping to secure affordable supplies of energy and minimising fuel poverty; <b>positive medium and long term effects are also likely for equalities.</b>	Wider societal benefits have been assessed in Section 19.8.6. These consider the positive effects to health and equalities from access to renewable energy.
EN-1 paragraph 4.2.2: To consider the potential effects, including benefits, of a proposal for a project, the Secretary of State will find it helpful if the applicant sets out information on the <b>likely significant social and economic effects</b> of the development, and shows how any likely significant negative effects would be avoided or mitigated. This <b>information could include matters such as employment, equality, community cohesion and well-being.</b>	Employment is considered within this chapter, informed by volume 2, chapter 18: socio-economics and community of the PEIR. Well-being is an integral consideration throughout this chapter, reflecting that the WHO define health in terms of states of wellbeing. The potential for employment and upskilling is covered in Sections 19.8.2, and 19.8.4. The potential for effects relating to healthy lifestyles and safe and cohesive communities are covered in Section 19.6.2. Effects on wellbeing and equality are inherent to all the assessments in Section 19.8.

Summary of NPS EN-1 provision [emphasis added]	How and where considered in the PEIR
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Energy production has the potential to impact on the <b>health and well-being (“health”) of the population.</b> Access to energy is clearly beneficial to society and to our health as a whole. However, the production, distribution and use of energy may have negative impacts on some people's health.  ... where the proposed project has an effect on human beings, the ES should assess these effects for each element of the project, <b>identifying any adverse health impacts</b> , and identifying measures to avoid, reduce or compensate for these impacts as appropriate. The impacts of more than one development may affect people simultaneously, so the applicant and the Secretary of State should <b>consider the cumulative impact on health.</b>	The effects to population health are considered in Section 19.8. For example, benefits of access to energy are covered in Section 19.8.6. The potential for adverse effects is covered in Sections 19.8.2, 19.8.3 and 19.8.4. Cumulative effects to population health are considered in Section 19.10.
EN-1 paragraph 4.13.3: The direct impacts on health may include increased traffic, air or <b>water pollution</b> , dust, odour, hazardous waste and substances, noise, exposure to radiation, and increases in pests.	Given the Morgan Generation Assets are remote to human health receptors the main pathway is water pollution, which is considered within this chapter (Section 19.6.2) and informed by volume 2, chapter 7: benthic subtidal ecology of the PEIR.  Given the project's ports, and thus localised receptors, have not been identified at this stage, there is not a specific assessment at PEIR. The assumption is however that ports would operate within their consented levels of activity or would apply for planning permission or additional permits, e.g. discharges to water, if they required additional approvals. Such consents would be separate from this application, so are not included within the scope of this assessment.  Port expansion is not part of the scheme being proposed. Any potential environmental effects are expected to be considered in accordance with any consents and permits that may be required by the ports themselves.
EN-1 paragraph 4.13.4: New energy infrastructure may also affect the composition, size and proximity of the local population, and in doing so have indirect health impacts, for example if it in some way affects access to <b>key public services</b> , transport or the use of open space for recreation and physical activity.	Given the Morgan Generation Assets are remote to human health receptors the main pathway is potential effects to health and other services on the Isle of Man should water-based transport be disrupted. This is considered within this chapter (Section 19.8.2), informed by volume 2, chapter 12: shipping and navigation of the PEIR and volume 2, chapter 18: socio economics and community of the PEIR.
EN-1 paragraph 5.15.1: During the construction, operation and decommissioning phases, developments can lead to ... increased risk of spills and leaks of pollutants to the water environment. These effects could lead to adverse impacts on health.	Potential health effects relating to water are considered in Section 19.6.2 and informed by volume 2, chapter 7: benthic subtidal ecology of the PEIR.



**Table 19.3: 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 PEIR
EN-1 paragraph 4.13.5: 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 air pollution) which will constitute effective mitigation of them, so that it is unlikely that health concerns will either constitute a reason to refuse consents or require specific mitigation under the Planning Act 2008. However, the Secretary of State will want to take account of health concerns when setting requirements relating to a range of impacts such as noise.	Impacts that are governed by separate regulation (for example air pollution) have been considered. Where appropriate issues have been scoped out, see section 19.6.2.

### 19.2.2 North West Inshore and North West Offshore Marine Plans

19.2.2.1 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 Plans (Marine Management Organisation, 2021). Key provisions are set out in Table 19.4 along with details as to how these have been addressed within the assessment.

**Table 19.4: North West Inshore and North West Offshore Marine Plan policies of relevance to human health.**

Policy	Key provisions	How and where considered in the PEIR
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 <b>benefiting society as a whole... contributing to physical and mental wellbeing</b> ; the coast, seas, oceans and their resources are <b>safe to use</b> ; there is <b>equitable access</b> 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.	The effects on seascape, landscape and visual resources are considered in section 19.8.3. Access by other sea users is considered in section 19.6.2 Equitable access to health determinants is considered throughout the assessment in section 19.8.
NW-WQ-1	Proposals that protect, enhance and restore water quality will be supported.	The water quality effects of the Morgan Generation Assets to population health are discussed in section 19.6.2.
NW-FISH-2	Proposals that may have significant adverse impacts on access for fishing activities must demonstrate that they will, in order of preference: a) avoid; b) minimise; c) mitigate adverse impacts so they are no longer significant.	Economic effects that could influence population health area discussed in section 19.8.4.

Policy	Key provisions	How and where considered in the PEIR
NW-SCP-1	Proposals should ensure they are compatible with their surroundings and should not have a significant adverse impact on the character and visual resource of the seascape and landscape of the area.	Visual effects that could influence population health area discussed in section 19.8.3.
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 between the Isle of Man and the mainland that could affect population health is discussed in section 19.8.2.
NW-EMP-1	Proposals that result in a net increase in marine-related employment will be supported.	Economic effects that could influence population health area discussed in section 19.8.4
NW-REN-1 NW-AIR-1	Proposals that enable the provision of renewable energy technologies and associated supply chains, will be supported.  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.	The renewable energy benefits of the Morgan Generation Assets to population health are discussed in section 19.8.6.  The population health benefits of renewable energy for reduction of greenhouse gas emissions is discussed in section 19.8.5.
NW-SOC-1	Those bringing forward proposals should consider and demonstrate how their development shall enhance public knowledge, understanding, appreciation and enjoyment of the marine environment as part of (the design of) the proposal.	Public information sharing is discussed in section 19.8.2 and section 19.8.3.
NW-TR-1	Proposals that promote or facilitate sustainable tourism and recreation activities.	Economic effects that could influence population health area discussed in section 19.8.2 (in relation to access) and section 19.8.4 (in relation to any adverse economic impacts).

### 19.3 Consultation

19.3.1.1 A summary of the key issues raised during consultation activities undertaken to date specific to human health is presented in Table 19.5 below, together with how these issues have been considered in the production of this PEIR chapter.

**Table 19.5: Summary of key consultation issues raised during consultation activities undertaken for the Morgan Generation Assets relevant to human health.**

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
22 July 2022	The Planning Inspectorate Scoping Opinion	<p>The Applicant proposes to scope out a standalone aspect chapter on Human health on the basis that potential impacts on human health will be assessed within other aspect chapters of the Environmental Statement and an overall conclusion of the significance of effects on human health will be included within a technical appendix. The Inspectorate is content that Human health does not need to be considered as a standalone aspect chapter.</p> <p>The Scoping Report states that potential impacts on health arising from the generation assets would be considered in the following Environmental Statement topics:</p> <ul style="list-style-type: none"> <li>• Physical processes</li> <li>• Commercial fisheries</li> <li>• Shipping and navigation</li> <li>• Socio-economics and community</li> <li>• Other sea users.</li> </ul> <p>However, these Chapters do not reference human health and there is no explanation of how human health will be assessed in these Chapters. The ES should set out what impacts on human health are assessed and effort should be made to agree the approach with the relevant consultees.</p>	November 2022 guidance on human health in EIA by the Institute of Environmental Management and Assessment (IEMA) states that good practice is to include a chapter on human health within the Environmental Statement to facilitate discussions with public health stakeholders and to ensure there is a consistent methodology applied in explaining the public health implications of various effects described in other chapters.
22 July 2022	Marine Management Organisation (MMO) in Scoping Opinion	<p>As a prescribed consultee under the 2008 Act, the MMO advises developers during preapplication on those aspects of a project that may have an impact on the marine area or those who use it. In addition to considering the impacts of any construction, deposit or removal within the marine area, this also includes assessing any risks to <b>human health</b>, other legitimate uses of the sea and any potential impacts on the marine environment from terrestrial works.</p> <p>“The MMO defers to the Local Authority and Public Health England on the suitability of the scope of the assessment with regards to population and human health impacts.”</p>	Noted. See response to UKHSA and OHID below.
22 July 2022	United Kingdom Health Security Agency (UKHSA) and the Department of Health and Social Care’s Office for Health Improvement and Disparities (OHID) in Scoping Opinion. Collectively UKHSA and OHID were previously known as Public Health England (PHE).	<p>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. 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.</p> <p>UKHSA and OHID’s predecessor organisation Public Health England produced an advice document ‘Advice on the content of ESs accompanying an application under the Nationally Significant Infrastructure Planning (NSIP) Regime’, setting out aspects to be addressed within the Environmental Statement (PHE, 2021). This advice document and its recommendations are still valid and should be considered when preparing an ES.</p> <p>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.</p>	<p>This Human Health chapter brings together the conclusions relevant to public health and provides relevant context in terms of compliance with standards, guidance and National Policy Statements.</p> <p>The PHE NSIP advice note has been referenced and taken into account.</p>

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Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
		<p>It is noted that population and human health will be considered using existing chapters to generate a technical annex and not form a separate chapter within the ES. Given the current knowledge of the scheme and potential impacts this appears to be a proportionate approach. This should be kept under review as more information becomes available and a separate population and human health chapter may be justified as the assessments develop.</p> <p>The impacts on health and wellbeing and health inequalities of the scheme may have particular effect on vulnerable or disadvantaged populations, including those that fall within the list of protected characteristics. The identification of vulnerable populations and sensitive populations should be considered.</p> <p>The identification of vulnerable populations should be based on the list provided by the Welsh Health Impact Assessment Support Unit. and the International Association of Impact Assessment (IAIA).</p> <p>Baseline health data should be provided, which is adequate to identify any local sensitivity or specific vulnerable populations.</p>	<p>The topic has been kept under review and a human health chapter has been included to ensure appropriate coverage of likely and potentially significant population health effects, beneficial and adverse.</p> <p>This human health chapter considers relevant vulnerable groups in line with IEMA 2022 guidance.</p> <p>A baseline is set out for the purpose of identifying local sensitivity and relevant vulnerable population groups. See section 19.4.</p>
11 August 2022	Isle of Man Government scoping response	<p>As an island nation, any significant risk of interference with marine navigation is of concern to the TSC with regard to transport to and from the island, and the shipping lands in our Territorial waters which are used to connect the UK and Ireland. These are strategic, lifeline routes that the Island depends on and it is essential that these are not impacted upon as part of these proposals, particularly Morgan.</p> <p>The economy of the Island is highly reliant on the regular, safe shipping for its goods, and any deviations from well established timetables and routes would not support the Island's business community relying on daily deliveries via the Isle of Man Steam Packet Company.</p>	This human health chapter considers the public health implications associated with any change of access to the Isle of Man. See sections 19.8.2 and 19.8.3.

**19.4 Baseline environment**

**19.4.1 Methodology to inform baseline**

**Desktop study**

19.4.1.1 Information on human health within the human health study area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 19.6 below.

19.4.1.2 The following data sources have informed the health baseline assessment:

- Office for Health Improvement and Disparities. Fingertips Public Health Data (OHID, 2022).
- Isle of Man Cabinet Office. Public Health Outcomes Framework. (Isle of Man Cabinet Office, 2018)
- Google Earth Pro 2021 aerial and street level photography review.

**Table 19.6: Summary of key desktop reports.**

Title	Source	Year	Author
Public Health Outcomes Framework, England	Fingertip's resource	2011 - 2022	Office of Health Improvement and Disparities (OHID)
Public Health Outcomes Framework, Isle of Man	Health Intelligence	2016 - 2021	Isle of Man Cabinet Office

**Site specific surveys**

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

**19.4.2 Baseline environment**

**Isle of Man**

19.4.2.1 Public health data as recent as 2018 demonstrate slightly poorer health outcomes on the Isle of Man compared to England averages. These are summarised in Table 19.7. Healthy life expectancy at birth is similar to England for males (63.8 years vs 63.4 years) but slightly lower for females compared to England (57.9 years vs 63.8 years). Excess weight in children (4-5 years old) is slightly higher than the England average (25.2% vs 22.4%). Mortality rates from all causes considered preventable are higher than in England (206.4 per 100,000 v. 181.5 per 100,000). Infant mortality and excess winter deaths (all ages) rates are very low on the Isle of Man. Emergency hospital admissions for intentional self-harm (a mental health indicator), shows higher rates for the Isle of Man compared to England (206.5 per 100,000 v. 185.5 per 100,000).

**Table 19.7 Selection of Public Health Outcomes – Isle of Man.**

Description	Sex	Period	Unit	Isle of Man	England
Healthy Life Expectancy at birth	Male	2015-2017	Years	63.8	63.4
Healthy Life Expectancy at birth	Female	2015-2017	Years	57.9	63.8
Child Excess weight - 4-5 year olds	All	2017/18	%	25.2	22.4
Infant mortality	All	2015-2017	per 1000	0.9	3.9
Mortality rate from causes considered preventable	All	2015-17	per 100,000	206.4	181.5
Under 75 mortality rate from all cardiovascular diseases considered preventable	All	2015-17	per 100,000	54.3	45.9
Under 75 mortality rate from cancer considered preventable	All	2015-17	per 100,000	86.1	78.0
Under 75 mortality rate from liver disease considered preventable	All	2015-17	per 100,000	11.5	16.3
Under 75 mortality rate from respiratory disease considered preventable	All	2015-17	per 100,000	13.7	18.9
Excess Winter Deaths Index (single year, all ages)	All	2016/17	%	14.4	21.6
Emergency Hospital Admissions for Intentional Self-Harm	All	2017/18	per 100,000	206.5	185.5

**North West England**

19.4.2.2 Recent public health data indicates poorer health outcomes in the North West region than the rest of England. These are summarised in Table 19.8. Healthy life expectancy is lower compared to the rest of England.

19.4.2.3 Socio-economic conditions and other health determinants are typically worse in the North West compared to England. There is a higher percentage of children in relative and absolute low-income families compared to the England average. The percentage of people in employment is lower than the England average. However, there is a slightly lower percentage of 16-17 year olds not in education, employment or training (NEET) compared to England. Fuel poverty also affects a higher percentage of the North West population (14.4% compared to 13.2% national average).

Table 19.8 Selection of Public Health Outcomes – North West Region England

Indicator	Sex	Period	North West	England
A01a - Healthy life expectancy at birth	Male	2018 - 20	61.53	63.14
A01a - Healthy life expectancy at birth	Female	2018 - 20	62.43	63.87
B01b - Children in absolute low income families (under 16s)	Persons	2020/21	16.60	15.10
B05 - 16 to 17 year olds not in education, employment or training (NEET) or whose activity is not known	Persons	2020	5.28	5.48
B10 - Killed and seriously injured (KSI) casualties on England's roads	Persons	2020	79.53	86.08
B12b - Violent crime - violence offences per 1,000 population	Persons	2021/22	43.91	34.95
B14a - The rate of complaints about noise	Persons	2019/20	3.75	6.37
B14b - The percentage of the population exposed to road, rail and air transport noise of 65dB(A) or more, during the daytime	Persons	2016	5.51	5.50
B14c - The percentage of the population exposed to road, rail and air transport noise of 55 dB(A) or more during the night-time	Persons	2016	9.37	8.48
B15a - Homelessness: households owed a duty under the Homelessness Reduction Act	N/A	2020/21	11.93	11.34
B15c - Homelessness: households in temporary accommodation	N/A	2020/21	1.64	4.03
B16 - Utilisation of outdoor space for exercise/health reasons (over 16s)	Persons	Mar 2015 - Feb 2016	17.55	17.92
B17 - Fuel poverty (low income, low energy efficiency methodology)	N/A	2020	14.43	13.23
1.01i - Children in low income families (all dependent children under 20)	Persons	2016	18.10	17.00
C09a - Reception: Prevalence of overweight (including obesity)	Persons	2021/22	23.28	22.25
C09b - Year 6: Prevalence of overweight (including obesity)	Persons	2021/22	39.05	37.76
C10 - Percentage of physically active children and young people	Persons	2020/21	44.02	44.63
C15 - Proportion of the population meeting the recommended '5-a-day' on a 'usual day' (adults)	Persons	2019/20	51.17	55.43
C16 - Percentage of adults (aged 18+) classified as overweight or obese	Persons	2020/21	65.92	63.45
C17a - Percentage of physically active adults	Persons	2020/21	64.47	65.94
C17b - Percentage of physically inactive adults	Persons	2020/21	24.95	23.38
C22 - Estimated diabetes diagnosis rate	Persons	2018	81.15	77.95
C27 - Percentage reporting a long-term Musculoskeletal (MSK) problem	Persons	2021	19.35	17.01
C28d - Self reported wellbeing: people with a high anxiety score	Persons	2020/21	25.73	24.15
D01 - Fraction of mortality attributable to particulate air pollution (new method)	Persons	2020	5.00	5.64

Indicator	Sex	Period	North West	England
D02b - New STI diagnoses (excluding chlamydia aged under 25) per 100,000	Persons	2021	322.04	394.47
E01 - Infant mortality rate	Persons	2018 - 20	4.33	3.90
E03 - Under 75 mortality rate from causes considered preventable (2019 definition)	Persons	2017 - 19	176.86	142.25
E04b - Under 75 mortality rate from cardiovascular diseases considered preventable (2019 definition)	Persons	2017 - 19	34.91	28.06
E05b - Under 75 mortality rate from cancer considered preventable (2019 definition)	Persons	2017 - 19	65.34	54.06
E06b - Under 75 mortality rate from liver disease considered preventable (2019 definition)	Persons	2017 - 19	22.65	16.65
E07b - Under 75 mortality rate from respiratory disease considered preventable (2019 definition)	Persons	2017 - 19	27.10	20.22
E14 - Excess winter deaths index	Persons	Aug 2019 - Jul 2020	19.50	17.40

### 19.4.3 Future baseline scenario

- 19.4.3.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires that "an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge" is included within the Environmental Statement. In the event that Morgan Generation Assets does not come forward, an assessment of the future baseline conditions has been carried out and is described within this section.
- 19.4.3.2 Population health data presents a snapshot at a particular time. It is well recognised that population health is subject to continuing influences, both at the individual and community level. Influences may be environmental, such as seasonal variation in wellbeing and communicable diseases, they may also respond to socio-economic factors, such as migration and the availability of jobs.
- 19.4.3.3 Longer term trends and interventions in population health may influence the future baseline. Health and social care, public health initiatives and government policies aim to reduce inequalities and improve quality of life. The historic success of such interventions is increasingly challenged by national trends such as an aging population, rising levels of obesity and the COVID-19 pandemic. The implications of COVID-19 for public health will take years to be reflected within statistical data releases, but it is expected that the pandemic will have exacerbated public health challenges. The pandemic disproportionately affected vulnerable groups, including due to age and ill-health.
- 19.4.3.4 For assessment purposes, the current health baseline is considered a suitable proxy of the future baseline. The current baseline used in this assessment includes appropriate health indicators to reflect the types of health outcomes that that would

also be relevant for the future population (e.g. in relation to age and long-term conditions). The assessment methodology includes a categorisation of vulnerable population groups, which, for example, allows for the effects of ‘older people’ and ‘people with existing poor health’ to be distinguished from the general population. The assessment sensitivity score for each vulnerable group is independent of the population size within that group, which would be the main change between the current and future baseline. The sensitivity scores within the assessment therefore account for both current and future population characteristics.

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

#### 19.4.4 Data limitations

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

19.4.4.2 The health assessment partially draws from and builds upon, the technical outputs from inter-related technical disciplines set out in paragraph 19.1.1.3.

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

19.4.4.4 Reducing uncertainty is a key element of impact assessment. Whilst not all uncertainty can be removed, the following steps have been taken to allow confidence in the health assessment conclusions:

- Methods are used that triangulate evidence sources and professional perspectives
- The scientific literature reviews undertaken give priority to high quality study design, such as systematic reviews and meta-analysis, and strength of evidence
- Quantitative inputs for other assessments have been used, which included model validation, as described in inter-related technical disciplines set out in paragraph 19.1.1.3
- The health assessment has been cautious, with conservative assessments, for example in taking account of non-threshold effects and vulnerable group findings
- The need for monitoring and adaptive management has been considered
- The health assessment has been transparent in its analysis and follows good practice as set out in guidance referenced in section 19.5.1.

19.4.4.5 It is also noted that a number of assumptions have been made on the required workforce of the Morgan Generation Assets which are detailed in volume 2, chapter 18: socio-economics and community of the PEIR.

19.4.4.6 It is considered that these limitations and assumptions do not affect the robustness of the assessment and that the evidence available is sufficient to reach conclusions as to the likely significant effects of the project on population health.

## 19.5 Impact assessment methodology

### 19.5.1 Overview

19.5.1.1 The human health impact assessment has followed the methodology set out in volume 1, chapter 5: EIA methodology of the PEIR. Specific to the human health impact assessment, the following guidance documents have also been considered:

- Institute of Environmental Management and Assessment (IEMA) 2022 guidance on health in EIA series: effective scoping (Pyper, et al., 2022a) and determining significance (Pyper, et al., 2022b). Hereafter referred to collectively as the “IEMA 2022” guidance.
- Institute of Public Health (IPH), Guidance, Standalone Health Impact Assessment and health in environmental assessment, 2021 (Institute of Public Health, 2021).
- International Association for Impact Assessment (IAIA) and European Public Health Association. A reference paper on addressing Human Health in EIA (IAIA, 2020) and academic discussion of the same (Cave, Pyper, Fischer-Bonde, Humboldt-Dachroeden, & Martin-Olmedo, 2021).
- Public Health England, Advice on the content of Environmental Statements accompanying an application under the Nationally Significant Infrastructure Planning (NSIP) Regime (PHE, 2021).
- Public Health England, Health Impact Assessment in spatial planning 2020 (Public Health England, 2020).
- World Health Organisation (WHO) guidelines on air quality and noise (Berglund, Lindval, Schwela, & Organization, 1999; WHO, 2009; WHO, 2018; WHO, 2021).

19.5.1.2 In addition, the human health impact assessment has considered the legislative framework as defined by:

- The Environment Act 2021 (HM Government, 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 legalisation) and its implementation to be well designed and delivered, so that positive outcomes for the environment and people’s health and wellbeing are achieved.
- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 set out the topics to be assessed within the EIA process, including: ‘The EIA must identify, describe and assess in an appropriate manner, in light of

each individual case, the direct and indirect significant effects of the proposed development on the following factors –population and human health...’.

- The Air Quality Standards Regulations 2010 (HM Government, 2010) set out statutory health protection standards on ambient air quality.
- The Environment Act 1995 sets provisions for protecting certain environmental conditions of relevance to health in the UK (HM Government, 1995). Part II covers contaminated land and Part IV covers air quality.
- The Environmental Protection Act 1990 (as amended), Part IIA covers contaminated land and Part III manages the control of emissions (including dust, noise and light) that may be prejudicial to health or a nuisance (HM Government, 1990).
- The Public Health (Control of Disease) Act 1984 (as amended) (HM Government, 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.
- The Health and Safety at Work etc Act 1974 (HM Government, 1974a) places duties on employers to ensure, ‘so far as is reasonably practicable’: the health, safety and welfare at work of all their employees; and that persons not in their employment are not exposed to risks to their health or safety as a result of the activities undertaken.
- Control of Pollution Act 1974 (HM Government, 1974b) makes provisions in relation to waste disposal, water pollution, noise, atmospheric pollution and public health. It describes licencing of certain activities to avoid danger to public health or serious detriment to the amenity of the locality affected. It also covers control of, and consent for, noise on construction sites (sections 60 and 61), including defining ‘best practicable means’ (section 72).
- International Convention for the Prevention of Pollution from Ships (MARPOL) 1973 Regulations are aimed at preventing and minimising, both accidental and operational, pollution from ships are included in the MARPOL (International Maritime Organisation, 1973).

**19.5.2 Impact assessment criteria**

- 19.5.2.1 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 chapter 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 those which are described in further detail in volume 1, chapter 5: EIA methodology of the PEIR.
- 19.5.2.2 Judgments are based on most relevant criteria in Table 19.9, Table 19.10 and Table 19.12. It is likely in any given analysis that some criteria will span score categories. These are as set out by guidance (IEMA, 2022).
- 19.5.2.3 The criteria for defining magnitude in this chapter are outlined in Table 19.9 below.

**Table 19.9: Definition of terms relating to the magnitude of an impact.**

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.

19.5.2.4 The criteria for defining sensitivity in this chapter are outlined in Table 19.10 below.

**Table 19.10: Definition of terms relating to the sensitivity of the receptor.**

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.

19.5.2.5 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 19.11. Where a range of significance of effect is presented in Table 19.11, the final assessment for each effect is based upon expert judgement. Table 19.12 provides indicative criteria to support this judgement.

19.5.2.6 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 Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

**Table 19.11: Matrix used for the assessment of the significance of the effect.**

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

19.5.2.7 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 19.12.

**Table 19.12: 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"> <li>Changes, due to the project, have a <b>substantial</b> 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 <b>consensus</b> on the importance of the effect</li> <li>Change, due to the project, could result in a regulatory threshold or statutory standard being <b>crossed</b> (if applicable)</li> <li>There is likely to be a <b>substantial</b> change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a <b>causal</b> relationship between changes that would result from the project and changes to health outcomes</li> <li>In addition, health priorities for the relevant study area are of <b>specific</b> relevance to the determinant of health or population group affected by the project.</li> </ul>
Moderate (significant)	<p>The narrative explains that this is significant for public health because:</p> <ul style="list-style-type: none"> <li>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</li> <li>Change, due to the project, could result in a regulatory threshold or statutory standard being approached (if applicable)</li> <li>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</li> <li>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.</li> </ul>

Category/Score	Indicative criteria
Minor (not significant)	<p>The narrative explains that this is not significant for public health because:</p> <ul style="list-style-type: none"> <li>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</li> <li>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)</li> <li>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</li> <li>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.</li> </ul>
Negligible (not significant)	<p>The narrative explains that this is not significant for public health because:</p> <ul style="list-style-type: none"> <li>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</li> <li>Change, due to the project, would not affect a regulatory threshold, statutory standard or guideline (if applicable)</li> <li>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</li> <li>In addition, health priorities for the relevant study area are not relevant to the determinant of health or population group affected by the project.</li> </ul>

- 19.5.2.8 The temporal scope of this chapter used the following summary terms:
- ‘Very short term’ relates to effects measured in hours, days or weeks
  - ‘Short term’ relates to effects measured in months, (up to 24 months duration)
  - ‘Medium term’ relates to effects measured in years
  - ‘Long term’ relates to effects measured in decades.
- 19.5.2.9 The chapter uses the World Health Organization (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*” (World Health Organization, 1948).
- 19.5.2.10 The chapter 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*” (World Health Organization, 2022).
- 19.5.2.11 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.
- 19.5.2.12 Impacts of the Morgan Generation 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.
- 19.5.2.13 A change in a determinant of health effects 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 Morgan Generation 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.
- 19.5.2.14 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.
- 19.5.2.15 The human health assessment is a qualitative analysis, following the IEMA 2022 guidance approach, which draws on qualitative and quantitative inputs from other EIA topic chapters. This is considered the most appropriate methodology for assessing wider determinants of health proportionately, consistently and transparently.
- 19.5.2.16 As set out in guidance the assessment methods allow a consideration of the effect on population health outcomes and what this means for public health, drawing on, as relevant, the: scientific literature; health baseline change; local health priorities; health policy context; compliance with regulatory or statutory standards; and consultation.
- 19.5.2.17 The approach taken ensures that HIA is embedded within the EIA in line with good practice (Public Health England, 2020).

### 19.5.3 Vulnerable groups

- 19.5.3.1 The methods draw on the list of vulnerable population groups set out in guidance. The following six broad population groups are used to inform a consistent narrative on potential health inequalities across the assessment. These groups are broadly defined to facilitate a consistent discussion across health issues. 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.

- 19.5.3.2 The following general characterisations of how the ‘general population’ may differ from ‘vulnerable group populations’ were considered when scoring sensitivity. These statements are not duplicated in each assessment and apply (as relevant) to the issues discussed for construction, operations and maintenance and decommissioning.

- 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); less likely to rely on resources shared with the Mona Offshore Wind Project.
- 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); more likely to rely on resources shared with the Mona Offshore Wind Project

- 19.5.3.3 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. socioeconomic status and income).

- 19.5.3.4 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.

- 19.5.3.5 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.

## 19.6 Key parameters for assessment

### 19.6.1 Maximum design scenario

- 19.6.1.1 The health assessment does not duplicate the maximum design scenarios (MDS) described in the inter-related technical disciplines set out in paragraph 19.1.1.3.

- 19.6.1.2 The MDS identified in Table 19.13 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the Project Design Envelope provided in volume 1, chapter 3: project description of the PEIR. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different infrastructure layout), to that assessed here be taken forward in the final design scheme.

**Table 19.13: Maximum design scenario considered for the assessment of potential impacts on human health.**

<sup>a</sup> C=construction, O=operational and maintenance, D=decommissioning

Potential impact	Phase <sup>a</sup>			Maximum Design Scenario	Justification
	C	O	D		
Transport modes, access and connections	✓	✓	✓	MDS is in relation to commercial operators including strategic routes and lifeline ferries. The relevant MDS is stated in volume 2, chapter 12: Shipping and navigation of the PEIR.	The greatest level of disruption in access.
Community identity, culture, resilience and influence	x	✓	x	MDS is in relation to visual impact of the wind turbines. The relevant MDS is as stated in volume 2, chapter 15: Seascape, landscape and visual resources of the PEIR.	The greatest visual impact of the Morgan Generation Assets.
Employment and income, adverse	✓	✓	✓	MDS is in relation to loss or restricted access to commercial fishing grounds. The relevant MDS is as stated in volume 2, chapter 11: Commercial fisheries of the PEIR.	The greatest unemployment or adverse economic implications.
Climate change and adaptation	x	✓	x	MDS is in relation to renewable energy generation and subsequent reduced greenhouse gas emissions. The relevant MDS is as stated in volume 2, chapter 17: Climate change of the PEIR.	The smallest output contribution to renewable energy generation.
Wider societal infrastructure and resources	x	✓	x	MDS is in relation to renewable energy generation. The relevant MDS is as stated in volume 2, chapter 17: Climate change of the PEIR.	The smallest output contribution to renewable energy generation.

**19.6.2 Impacts scoped out of the assessment**

19.6.2.1 On the basis of the baseline environment and the description of development outlined in volume 1, chapter 3: project description of the PEIR, a number of impacts are proposed to be scoped out of the assessment for human health. These impacts are outlined, together with a justification for scoping them out, in Table 19.14.

19.6.2.2 Table 19.14 follows the list of issues set out in guidance (IEMA, 2022).

**Table 19.14: Impacts scoped out of the assessment for human health.**

Potential impact	Justification
<b>Health related behaviours</b>	
Physical activity	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Health promotion within the Morgan Generation Assets workforces will be considered as a good practice enhancement measure but is otherwise scoped out. Community physical activity is not affected by offshore works or port operations.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>Health promotion within the Morgan Generation Assets workforces will be considered as a good practice enhancement measure but is otherwise scoped out. Community physical activity is not affected by offshore works or port operations.</li> </ul>
Risk taking behaviour	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Issues of community health behaviours being detrimentally affected by the presence of the workforce are scoped out. The workforces comprise those based aboard vessels and those based at ports. Those aboard vessels may be multinational professionals, travelling back to their usual place of residence on a rotational basis. This may involve temporary accommodation, e.g. in a hotel close to the port or other travel hub, the night following disembarking and the night prior to reembaring. This is usual practice. Extended periods of leave spent within port, or other UK, communities is not expected. The port workforces are assumed to be predominantly existing residents within the regional area, commuting to work and returning home between shifts. There is not considered to be the potential for a likely significant population health effect associated with risk taking behaviour by the workforces afloat or ashore, this issue is scoped out. The issue of communicable illness, including in relation to COVID-19 is noted but scoped out. The Morgan Generation Assets will operate appropriate measures to safeguard the Morgan Generation Assets workforce and the public in line with Government guidance of the day, including in relation to vessel crews. Risks are similar to other routine construction and shipping activities.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>The same conclusions are reached for the operational workforce. The workforce is expected to be smaller in number and more locally resident. There is not considered to be the potential for a likely significant population health effect associated with risk taking behaviour by the workforces afloat or ashore, this issue is scoped out.</li> </ul>

Potential impact	Justification
Diet and nutrition	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Offshore there are no effects on agricultural lands. Port activities are neither expected to require agricultural land take, nor disrupt food related production or transport. Potential effects on diet due to impacts to commercial fisheries (notably shellfish harvesting) have been considered, see section 19.8.4. The changes are not considered likely to affect availability or price of food to a degree that could affect population health. Wider economic effects to health associated with commercial fisheries are discussed in section 19.8.4. The potential for shipping and navigation changes to affect access to affordable healthy food for the population of the Isle of Man is discussed in section 19.8.2.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>
<b>Social environment</b>	
Housing	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Housing related issues are scoped out. No new housing is proposed. The workforce will have housing requirements, but it is expected that a high proportion will be resident in the regional area or would be based aboard their vessels unless traveling to their usual place of residence. Any temporary accommodation requirements would be met through usual capacity for such activities around ports. As stated in volume 2, chapter 18: socio-economics and community, there is not considered to be a significant effect associated with changes in the availability of housing.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>The same conclusions are reached for the operational workforce. The workforce is expected to be smaller in number than for construction and decommissioning, and more locally resident.</li> </ul>
Relocation	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Neither offshore works nor port activities would involve compulsory land purchases of homes or community facilities. This issue is scoped out.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>
Open space, leisure and play	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Offshore and port activities are not expected to affect access to areas of open space that could significantly affect population health. This reflects use of existing port areas and designated shipping routes near ports. Furthermore, offshore activities would be a considerable distance from land, so have limited potential to effect marine leisure on a scale that could be influential to public health. This issue is scoped out.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>
Transport modes, access and connections	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Vehicle transport is expected to predominantly relate to the movement of goods, materials, people and plant to and from a port location associated with the offshore works. Although a project port has not been determined, the road infrastructure to ports in general is good. It is considered reasonable to assume that an existing major port would be selected with appropriate existing consents that have taken transport impacts into account. Port expansion is not part of the scheme being proposed. Any potential environmental effects are expected to be considered in accordance with any consents and permits that may be required, by the ports themselves..</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>

Potential impact	Justification
Community safety	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>The Morgan Generation Assets workforce requires skilled technical roles. There are not anticipated to be community safety or security issues associated with worker behaviour in ports or communities. The Morgan Generation Assets would operate appropriate safeguarding and modern slavery policies. The potential for widespread actual or perceived crime that could affect population health is unlikely. This issue is therefore scoped out.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>
Community identity, culture, resilience and influence	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Demographic changes that could affect community identity are not anticipated, as there would not be a large in-migration or out-migration of workers to local communities. Visual impacts of offshore activities are expected to be limited due to their distance offshore. Temporary employment opportunities are not expected to have a strong influence on community identity. These issues are therefore scoped out.</li> </ul>
Social participation, interaction and support	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>The Morgan Generation 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). This issue is therefore scoped out. Whilst project wide consultation for the Morgan Generation Assets are likely to support community empowerment and voice, this is not considered to be of a scale that would result in significant population health effects. This issue is therefore scoped out.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>
Economic environment	
Education and training	<p>Construction, Operations and maintenance and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Whilst the project could support upskilling and career development in relation to its workforces, this is not on a scale with the potential for significant population level effects. Consideration has been given to how benefits, including for local and vulnerable groups, could be enhanced. At this stage there is not sufficient information or certainty of such measures being offered to warrant an assessment. This issue is therefore scoped out.</li> </ul> <p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>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.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>

Potential impact	Justification
Employment and income	<p>Construction, Operations and maintenance and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Whilst the project provides opportunities for good quality employment, which are noted as beneficial for health, these are not on a scale with the potential for significant population level effects. Consideration has been given to how benefits, including for local and vulnerable groups, could be enhanced. At this stage there is not sufficient information or certainty of such measures being offered to warrant an assessment. This issue is therefore scoped out.</li> </ul> <p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>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 therefore scoped out. The project would operate appropriate employment equality policies but is not expected to influence how employment affects family structures and relationships in local populations. Occupational working conditions include particular risks, which are appropriately managed through health and safety policies and practices. Project activities are not expected to differ from industry norms. These issues are therefore scoped out.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>
Bio-physical environment	
Climate change and adaptation	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>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 issue is therefore scoped out.</li> </ul>
Air quality	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>The project is not expected to generate offshore air quality effects during all phases. This issue is therefore scoped out.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>
Water quality or availability	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Offshore pollutant spills have potential to affect coastal bathing water quality, which can result in toxin exposures through dermal contact and ingestion. However, as stated in volume 2, chapter 7: benthic subtidal ecology of the PEIR, the risk of such events is managed by the implementation of measures set out in standard post-consent plans (e.g. Environmental Management Plan, including Marine Pollution Contingency Plan (MPCP)). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR (Oslo-Paris), International Maritime Organisation (IMO) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. This issue is scope out on the basis of the anticipated effectiveness of such measures.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> <li>Nearshore/onshore: Checks and maintenance activities are unlikely to result in any water related risks to public health. Any risks would be managed through standard best practice spill avoidance and response measures that would be secured through the MPCP. This issue is therefore scoped out.</li> </ul>

Potential impact	Justification
Land quality	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Offshore works would not affect land quality. Port activities are unlikely to result in public exposures to contaminated soils. Any new or historic contamination that may be mobilised by activities will be managed by existing port consents standard best practice contamination avoidance and response measures. This issue is scoped out.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>
Noise and vibration	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Consistent with the section 3.15 of the Scoping Opinion, the offshore airborne noise effects to human health are scoped out. Port activities would generate noise but this is not expected to be of a scale, timing or character that differs from existing operational port levels. This issue is scoped out.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>
Radiation	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Non-ionising electro-magnetic field (EMF) effects are scoped out. Offshore electrical infrastructure, including offshore substations, are not located in proximity to communities. Relevant occupational safeguards would be followed. No EMF risk is therefore likely for offshore aspects of the Morgan Generation Assets. No ionising radiation sources are proposed. These issues are scope out.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>As for construction and decommissioning.</li> </ul>

**Institutional and built environment**

Health and social care services	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Effects on health and social care are scoped out. The Morgan Generation Assets workforce is assumed to include a high proportion of people who are resident in the regional area. The UK workforce would have NHS entitlement irrespective of place of residence. UK workers away from their usual place of residence for a prolonged period would be able to register with local primary healthcare on a temporary basis. This would facilitate NHS funding for their care. The expectation is that the great majority of healthcare needs of the offshore workforce will be met either by occupational provision aboard their vessel or by their usual healthcare provider when they return to their usual place of residence during rotation. The multinational workforce are assumed to be covered by health insurance provisions that would allow the NHS to recoup costs to an extent that avoided any significant adverse effect on healthcare services. This is routine practice across industries and sectors. The Morgan Generation Assets workforce assumptions set out in volume 2, chapter 18: socio-economics and community of the PEIR support routine NHS service planning. The project will operate appropriate occupation health services. 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 and the workforce of skilled technical roles would return to their usual places of residence when ashore. This issue is therefore scoped out.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>The same conclusions are reached for the operational workforce. The workforce is expected to be smaller in number and more locally resident. This issue is therefore scoped out.</li> </ul>
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Potential impact	Justification
Built environment	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>Offshore utilities disruption is unlikely and any crossing of existing power or communications cables would be managed to avoid interruption. Appropriate waste management practices would be used, including regard to the MARPOL regulations on waste at sea. Significant population health implications are not anticipated and are scoped out.</li> </ul> <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> <li>The Morgan Generation Assets would introduce new elements in the built environment. This is assessed in section 19.8.3. The distance offshore means there is very limited direct impacts on human receptors. Port or offshore operational activities are not considered to have waste management, land use or infrastructure use implications on a scale that could affect population health. These issues are scoped out.</li> </ul>
Wider societal infrastructure and resources	<p>Construction and Decommissioning phases</p> <ul style="list-style-type: none"> <li>The Morgan Generation Assets' energy infrastructure would not generate public health benefits at this stage. This issue is scoped out.</li> </ul>

**19.7 Measures adopted as part of the Morgan Generation Assets**

- 19.7.1.1 For the purposes of the EIA process, the term 'measures adopted as part of the project' is used to include the following measures (adapted from (IEMA, 2016)):
- Measures included as part of the project design. These include modifications to the location or design of the Morgan Generation Assets which are integrated into the application for consent. These measures are secured through the consent itself through the description of the development and the parameters secured in the DCO and/or marine licences (referred to as primary mitigation in (IEMA, 2016))
  - Measures required to meet legislative requirements, or actions that are generally standard practice used to manage commonly occurring environmental effects and are secured through the DCO requirements and/or the conditions of the marine licences (referred to as tertiary mitigation in (IEMA, 2016)).
- 19.7.1.2 This human health chapter takes as its input the residual effect conclusions of the inter-related technical disciplines set out at paragraph 19.1.1.3. In this regard the health assessment relies on the measures adopted as part of the Morgan Generation Assets set out in those chapters and does not repeat them. This avoids duplication and keeps the assessment proportionate.
- 19.7.1.3 No additional tertiary mitigation has been identified.
- 19.7.1.4 Where significant effects have been identified, further mitigation measures (referred to as secondary mitigation in IEMA 2016) have been identified to reduce the significance of effect to acceptable levels following the initial assessment. These are measures that could further prevent, reduce and, where possible, offset any adverse effects on the environment. These measures are set out, where relevant, in section 19.8 below.

## 19.8 Assessment of significant effects

19.8.1.1 The potential impacts arising from the construction, operations and maintenance and decommissioning phases of the Morgan Generation Assets have been assessed for human health. These are listed in Table 19.13 along with the MDS against which each impact has been assessed.

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

### 19.8.2 Transport modes, access and connections

19.8.2.1 During the construction, operations and maintenance and decommissioning phases shipping and offshore restricted areas may lead to disruption of routine and or emergency shipping access to the Isle of Man. This has the potential to affect the availability of goods and services that support health promotion, health protection and healthcare services. The MDS is represented by the greatest level of disruption in access and is summarised in Table 19.13.

19.8.2.2 This section has been informed by volume 2, chapter 12: shipping and navigation of the PEIR, which sets out relevant assessment findings and mitigation measures that have been taken into account. This includes the issues of vessel collision and allision, which are discussed in section 19.10, being most relevant to cumulative effects. Volume 2, chapter 12: shipping and navigation of the PEIR concludes for the issues most relevant this assessment:

- A potential impact on recognised sea lanes essential to international navigation is negligible for construction, operations and decommissioning.
- The potential impact to commercial operators including strategic routes and lifeline ferries is considered to be minor adverse for construction, operations and decommissioning.
- The potential impact on adverse weather routing is moderate adverse for construction, operations and decommissioning. The Applicant has made firm commitments to reducing the potential impacts on shipping and navigation receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application.
- Potential impacts on access to ports and harbours is negligible for construction, operations and decommissioning.

19.8.2.3 For these transport access issues, a potential population health effect is considered likely because there is a plausible source-pathway-receptor relationship:

- The source is disruption by vessels and restricted areas
- The pathway is a change in access to goods and services that support health directly and indirectly
- Receptors are residents and visitors to the Isle of Man.

19.8.2.4 Furthermore, the potential effect is likely as no highly unusual conditions are required for the source-pathway-receptor linkage.

19.8.2.5 The population groups relevant to this assessment are:

- The 'local' population of the Isle of Man.
- The sub-population vulnerable due to young age, old age, low income, poor health, social disadvantage or access and geographical factors.

### Construction, Operation and Maintenance, and Decommissioning

#### Magnitude of impact

19.8.2.6 The scale of change is considered small, with potential for occasional disruption. For commercial operators including strategic routes and lifeline ferries changes in access would result in possible minor delays. During adverse weather conditions, more substantial delays could occur potentially resulting in cancellations in some services. The duration would be short-term. Outcome reversal may be rapid once services are reinstated, with slight service quality implications. There is the potential for minor adverse changes in morbidity for a large minority of the population.

19.8.2.7 It is predicted that the impact will affect the receptor directly and indirectly. The magnitude is therefore considered to be **low**.

#### Sensitivity of receptor

19.8.2.8 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 19.5.3.

19.8.2.9 The general population of residents and visitors to the Isle of Man are likely to be in good general health and make limited use of healthcare services affected by any disruption to shipping. Most people are also likely to have access to alternative goods, amenities and services that have a health promotion or health protection function, (e.g. that facilitate active lifestyles or reduce risks of social isolation). 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 them having greater resources and good physical and mental health.

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

19.8.2.11 The vulnerable group 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 population may therefore be more reliant on the affected goods and services with greater likelihood that any disruption could affect health outcomes. Deprived populations may already face more access barriers compared to the general population and therefore be more sensitive to access changes. Issues of access are particularly relevant in island contexts, such as the Isle of Man, where alternative access to goods and services is limited. Low incomes may compound access barriers by limiting adaptive response. Vulnerability also includes those accessing health services (emergency or non-emergency) at locations in the UK. Ambulance services (and the recipients of their care) are particularly sensitive to delays in response times (time taken to arrive and stabilise the patient). The Isle of Man Air Ambulance Service is not expected to be affected. There may be some disruption during adverse weather to the Isle of Man Steam Packet Company vessels, and other vessels, that provide lifeline and essential

	deliveries, including of people to NHS care in the UK. Such impacts on commercial operators has been deemed minor adverse (volume 2, chapter 12: shipping and navigation of the PEIR). People in poor or very poor health may be more frequent users of healthcare service and therefore be more sensitive to access changes.	19.8.3.2	Impact will result from visibility of both moving and static project components occupying Morgan Array Area (e.g. rotating wind turbines and service vessels/aircraft) which have the potential to affect peoples' appreciation of the surrounding seascape/landscape.
19.8.2.12	The sensitivity of the vulnerable group population is therefore, considered to be <b>high</b> .	19.8.3.3	Community identity as a determinant of health has a strong subjective dimension that varies between individuals. The visibility of the windfarm can be interpreted differently and includes beneficial effects such as reminding people that the local economy supports employment opportunities and renewable electricity generation, as well as potential adverse effects where people feel the coastal setting is adversely affected. Health effects may be associated with mental health conditions (e.g. stress, anxiety or depression) due to underlying social determinants influencing community identity and wellbeing.
	<b>Significance of effect</b>		
19.8.2.13	Overall, the magnitude of the impact is deemed to be <b>low</b> and the sensitivity of the vulnerable group population is considered to be <b>high</b> .	19.8.3.4	This section has been informed by volume 2, chapter 15: seascape, landscape and visual resource of the PEIR which sets out relevant assessment findings and mitigation measures that have been taken into account. Chapter 15 concludes: <ul style="list-style-type: none"> <li>• The impact to direct seascape during construction, maintenance, operations and decommissioning is deemed to be major adverse.</li> <li>• The impact to seascape character in adjacent areas during construction and decommissioning is deemed to be minor adverse. During operations and maintenance, impacts on seascape character will be minor to moderate adverse within the MCA 38 Irish Sea and the adjacent Isle of Man MCA A as a whole.</li> <li>• The impact to national landscape character on the Isle of Man (LCT E Rugged Coast and LCT D Incised Slopes) will be minor to moderate adverse for construction, operations, maintenance and decommissioning.</li> <li>• Impact to landscape character in relation to the English Lake District WHS and Lake District National Park during operations and maintenance is deemed to be negligible adverse for construction and decommissioning and minor adverse at most for operations and maintenance phases.</li> <li>• Impacts on the views from and visual amenity of national trails and long distance paths in the SLVIA study area falling within the ZTV of Morgan Array Area will be affected. During construction and decommissioning phases, the effect will be moderate adverse at most for Raad ny Foillan Coastal Path (Isle of Man). During operation and maintenance the effect for Raad ny Foillan Coastal Path will be moderate adverse in general. The exception to this will be the sections in the vicinity of Douglas and Laxey (due to framed nature of views and the proximity of the receptor to Morgan Array Area) where the effects will be moderate to major adverse.</li> <li>• The visual impacts on people using land with public access will affect the summits of Snaefell, Slieau Ruy and South Barrule (Isle of Man). During construction and decommissioning the effect is deemed to be minor to moderate adverse. During operations and maintenance the effect is deemed to be moderate adverse.</li> <li>• The impacts to people using the National Cycleway Network (Isle of Man) is judged to be negligible to minor adverse during construction and</li> </ul>
19.8.2.14	Access to health supporting goods and services is a <i>specific</i> public health priority for the Isle of Man community and the scientific literature is well established on the <i>causal</i> association between physical and mental health outcomes and access to resources that support health and healthcare services. However, the overall potential access disruption is on a scale that could have only <i>slight</i> implication for the population health baseline of the Isle of Man. This conclusion takes into account that a scarcity of resources or access opportunities may result in differential or disproportionate effects experienced by those who are most vulnerable, including due to low incomes and existing poor health. Even accounting for this, there is considered only a <i>marginal</i> impact on the ability to deliver health policies, including related to the supply of essential goods and services, as well as in relation to narrowing health inequalities.		
19.8.2.15	The effect would, therefore, be of <b>minor</b> adverse significance, which is not significant in EIA terms.		
	<b>Further mitigation and residual effects</b>		
19.8.2.16	The Applicant has made firm commitments to reducing the potential impacts on shipping and navigation receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application. It is expected the further mitigation will enable a conclusion of a <b>negligible (not significant)</b> residual effect for population health, which will be confirmed in the Environmental Statement.		
19.8.2.17	The anticipation of such measure being secured as part of the final design should mean that mental health and wellbeing effects from concern over the potential impact to access on the Isle of Man, including cumulatively with other projects, should be avoided. It should also mean that the actual effect should be appropriately mitigated, including any adverse effect on health inequalities.		
19.8.2.18	To reduce the potential for community concern, a clear statement that the final project design will allow appropriate access to the Isle of Man is included in the PEIR non-technical summary. This is in itself a form of mitigation and aligns with good practice.		
	<b>19.8.3 Community identity, culture, resilience and influence</b>		
19.8.3.1	The operations and maintenance of the Morgan Generation Assets' offshore activities (22.3 km offshore from the Isle of Man and 36.3 km from the northwest coast of England) may lead to effects on visual impact and community identity. The MDS is represented by the greatest visual impact of the wind farm and is summarised in Table 19.13.		

	decommissioning, and minor adverse at most during operations and maintenance.		
	<ul style="list-style-type: none"> <li>Impacts to key coastal settlement seafronts/shorelines are considered in relation to the Douglas and Laxey (Isle of Man). The effect is judged to be minor to moderate adverse during construction and decommissioning. For operations and maintenance the effects will be moderate to major adverse in the case of the views across the adjacent seascape from Douglas and Laxey seafronts.</li> <li>The visual impact of people travelling along coastal roads near the coast on the Isle of Man is deemed to be negligible adverse during construction and decommissioning, and negligible to minor adverse during operations and maintenance.</li> <li>The visual impact on people travelling along coastal railways near the coast on the Isle of Man is judged to be minor adverse during construction and operations, and minor to moderate adverse during operational and maintenance.</li> <li>The visual impact on people using main ferry routes is judged to be moderate to major adverse during all project phases.</li> </ul>		
19.8.3.5	A potential population health effect is considered likely because there is a plausible source-pathway-receptor relationship: <ul style="list-style-type: none"> <li>The source is visual change associated with the operational windfarm and perceived benefits of the Morgan Generation Assets which influence community identity</li> <li>The pathway is factors that contribute to behaviour and a sense of identity, including: changes in visual environmental cues; and economic and prosperity cues that influence social status</li> <li>Receptors are residents in the local coastal communities.</li> </ul>	19.8.3.9	It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be <b>low</b> .
19.8.3.6	Furthermore, the potential effect is probable as no highly unusual conditions are required for the source-pathway-receptor linkage.	19.8.3.10	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 19.5.3. This reflects that for most people in the local area the Morgan Generation Assets would not be a strong driver of community identity given many other influences on the local social, economic and environmental landscape. For most people there would be no regular views of the wind farm.
19.8.3.7	The population groups relevant to this assessment are: <ul style="list-style-type: none"> <li>The 'local' population of the Isle of Man</li> <li>The 'regional' population of coastal communities in North West England</li> <li>The vulnerable sub-populations including young and old people, people with low incomes, people with poor health, and people experiencing social disadvantage.</li> </ul>	19.8.3.11	The sensitivity of the general population is therefore, considered to be <b>low</b> .
	<b>Operations and maintenance</b>	19.8.3.12	Vulnerability in this case is linked to the proportion of people who have expectations that their community or way of life would be changed to a large degree, positively or negatively, by visual change caused by the Morgan Generation Assets. This includes those with frequent views of the Morgan Array Area, for whom uninterrupted natural seascape views are highly valued as a component of community identity, for example coastal communities of Douglas and Laxey.
	<b>Magnitude of impact</b>	19.8.3.13	The sensitivity of the vulnerable group population is therefore, considered to be <b>high</b> .
19.8.3.8	The impact is predicted to be of local and regional spatial extent, long-term duration, continuous and low reversibility. However, the scale of visual change from the windfarm 22.3 km offshore would be small with frequent views during clear weather conditions. The change is likely to have a very minor influence on quality of life and		<b>Significance of effect</b>
		19.8.3.14	Overall, the magnitude of the impact is deemed to be <b>low</b> and the sensitivity of the vulnerable population group is considered to be <b>high</b> .
		19.8.3.15	The effect is characterised as being both <i>beneficial</i> and <i>adverse</i> in direction, reflecting the subjective nature of community identity. The level of change in sense of place and community cohesion is <i>unlikely to influence health policy</i> delivery or inequalities. Any change to the local population health baseline would be <i>slight</i> and comprised of both beneficial and adverse influences.
		19.8.3.16	Across both the general population and vulnerable group population there are expected to be both <b>minor adverse</b> and <b>minor beneficial</b> effects, which is <b>not significant</b> in EIA terms. The inclusion of both positive and negative outcomes from the same impact reflects the likelihood of a range of subjective responses to the visual change.
			<b>Further mitigation and residual effects</b>
		19.8.3.17	No further mitigation is considered necessary in relation to population health outcomes. No additional enhancements of the expected positive outcomes of the proposed development are considered necessary.
		<b>19.8.4</b>	<b>Employment and income</b>
		19.8.4.1	The spacing of wind turbines within the Morgan Array Area may lead to changes in access to commercial shellfish harvesting grounds. The MDS is represented by the greatest unemployment or adverse economic implications and is summarised in Table 19.13.



19.8.4.2	As stated in section 19.3, changes in direct and indirect employment opportunities have socio-economic effects that impact upon health and mental well-being.		associated with job insecurity. At most there may be <i>slight</i> healthcare service implications. The magnitude is therefore, considered to be <b>low</b> .
19.8.4.3	This section has been informed by volume 2, chapter 11: commercial fisheries of the PEIR, which sets out relevant assessment findings and mitigation measures that have been taken into account. Volume 2, chapter 11: commercial fisheries concludes: <ul style="list-style-type: none"> <li>• Restricted access to fishing grounds during construction of the Morgan Generation Assets is considered negligible or minor adverse.</li> <li>• During operations, the loss or restricted access to fishing grounds is considered negligible for most receptors. A moderate adverse effect is predicted for Scottish west coast scallop vessels. With further mitigation, such as increasing the minimum distance between wind turbines, this could reduce to minor adverse.</li> <li>• The construction, operations maintenance, and decommissioning phases may lead to displacement of fishing activity into other areas, as a result of loss or restricted access to fishing grounds. The impact is judged to be negligible for all receptor groups.</li> <li>• The construction, operations and maintenance and decommissioning phases may lead to interference with fishing activity, as a result of increased vessel traffic caused by vessels associated with the Morgan Generation Assets or changes to shipping routes. The impact is judged to be negligible or minor adverse.</li> </ul>		<b>Sensitivity of receptor</b>
		19.8.4.8	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 19.5.3. This reflects that most people would already be within stable employment that would be unaffected by the Morgan Generation Assets (or being a dependant of such a person).
		19.8.4.9	The sensitivity of the general population is therefore, considered to be <b>low</b> .
		19.8.4.10	Vulnerability in this case relates to people and their dependants who are in affected commercial fisheries related employment, on low incomes, have poor job security, poor working conditions or who are unemployed. Future young or older people may also come to rely on those employed.
		19.8.4.11	The sensitivity of the vulnerable group population is therefore, considered to be <b>high</b> .
			<b>Significance of effect</b>
		19.8.4.12	Overall, the magnitude of the impact is deemed to be <b>low</b> and the sensitivity of the vulnerable population group is considered to be <b>high</b> .
19.8.4.4	A potential population health effect is considered likely because there is a plausible source-pathway-receptor relationship: <ul style="list-style-type: none"> <li>• The source is changes in direct and indirect jobs and economic activity</li> <li>• The pathway is good quality employment and income providing more health supporting resources</li> <li>• Receptors are people of working age (and their dependants).</li> </ul>	19.8.4.13	The changes to employment and income associated with some commercial fishing activities being unable to operate within the Morgan Array Area would have adverse physical and mental health effects (including to dependants). This conclusion is supported by a <i>clear</i> association between employment and health in the scientific literature. Consequently, there may be a <i>small</i> adverse change in localised health baselines where coastal community employment is strongly linked to commercial fishing in the Morgan Array Area. This could be associate with a <i>marginal</i> increase in health inequalities. More generally the regional and national health baseline effects would, at most, be slight; with limited potential to affect the delivery of health policy.
19.8.4.5	Furthermore, the potential effect is probable as no highly unusual conditions are required for the source-pathway-receptor linkage.	19.8.4.14	The effect will, therefore, be of <b>minor adverse</b> significance, which is <b>not significant</b> in EIA terms.
19.8.4.6	The population groups relevant to this assessment are: <ul style="list-style-type: none"> <li>• The 'regional' populations of North West England and Scotland (for communities strongly associated with Scottish west coast scallop vessels). Consideration has also been given to potential effects on the Isle of Man.</li> <li>• 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.</li> </ul>	19.8.4.15	The Applicant has made firm commitments to reducing the potential impacts on commercial fisheries receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application. Such mitigation strategies could ensure that any adverse health effects associated with the determinant are avoided and could reduce this effect to <b>negligible (not significant)</b> .
	<b>Construction, Operation, Maintenance and Decommissioning</b>	19.8.4.16	The anticipation of such measure being secured as part of the final design should mean that mental health and wellbeing effects from concern over the potential impact to commercial fishing related livelihoods, including cumulatively with other projects, should be avoided. It should also mean that the actual effect should be fully mitigated, including any adverse effect on health inequalities.
	<b>Magnitude of impact</b>		
19.8.4.7	Changes in fishing access would be <i>continuous</i> and of <i>long-term</i> duration, though reversible following decommissioning. The effects are judged to relate to a <i>small</i> scale of change given access to alternative fishing grounds for most employers. This is likely to relate to <i>minor</i> changes in physical and mental health morbidity		

## 19.8.5 Climate change and adaptation

- 19.8.5.1 The Morgan Generation Assets contribute towards wider energy sector transition to renewable energy which reduces the severity of climate change. The MDS is represented by the smallest output contribution to renewable energy generation (1.5 GW) and is summarised in Table 19.13.
- 19.8.5.2 Renewable energy generation and subsequent reduced greenhouse gas emissions supports avoiding adverse health effects associated with climate change. These include extreme temperature and climatic effects related to infectious diseases occurrence, food insecurity, injury and death (Costello, et al., 2009). These effects are relevant to the UK population, but also the global population, particularly deprived populations in low- and middle-income countries.
- 19.8.5.3 There are important global inequalities in the effects of climate change, with the greatest adverse effects on health expected in the some of the poorest and least economically developed populations. In contrast, populations that benefit from rapid social and economic development are expected to experience reduced (but not eliminated) adverse effects to health from climate change. Changes in health outcomes related to climate change are therefore expected to be relatively small in the UK. When considering health and well-being, there is a global responsibility to reduce the effect of climate-altering pollutants that are expected to reduce health outcomes in low- and middle-income countries. The Intergovernmental Panel on Climate Change states that there are opportunities to achieve co-benefits from actions that reduce emissions of climate altering pollutants and at the same time improve health (IPCC, 2014).
- 19.8.5.4 Key health outcomes (globally) relate to heat-related disorders (e.g. heat stress and lower work capacity), respiratory disorders (e.g. worsened asthma), infectious diseases, population displacement, water and food insecurity (e.g. lower crop yields) and injury, death and mental stress associated with natural disasters.
- 19.8.5.5 This section has been informed by volume 2, chapter 17: climate change of the PEIR which sets out relevant assessment findings and mitigation measures that have been taken into account. Chapter 17 concludes:
- Despite high greenhouse gas emissions resulting from the construction stage of development, the avoided emissions resulting from the operations and maintenance phases would result in excess electricity (avoiding generation curtailment) and the displacement of fossil fuels. This would result in a significant beneficial effect.
- 19.8.5.6 A potential population health effect is considered likely because there is a plausible source-pathway-receptor relationship:
- Source: renewable energy created during the operation of the wind farm
  - Pathway: reduction in climate-altering pollutants that contribute to climate change, which is associated with global changes in temperature, crop yields, productivity and disease prevalence
  - Receptor: international global population, particularly vulnerable populations in low- and middle-income countries.
- 19.8.5.7 Furthermore, the potential effect is probable as no highly unusual conditions are required for the source-pathway-receptor linkage.

19.8.5.8 The population groups relevant to this assessment are:

- The 'national' population of England, and the wider UK
- The 'international' population globally
- The sub-population vulnerable due to less capacity to adapt to climate change including young and old people, people with low incomes, people with poor health (physical and mental), people experiencing social disadvantage including gender disparities and people with access and geographical vulnerability (such that they may be unable to adopt climate change mitigation strategies).

### Operation and maintenance

#### Magnitude of impact

- 19.8.5.9 Whilst the scale of change would be *very small* within the national energy sector emissions context, it would be *continuous* and *long-term*. The health effect likely represents a *minor* change in the risk of mortality and morbidity linked to a range of health determinants influenced by a changing climate for a *large minority* of the global population and a *small minority* of the national population. Relevant potential effects include population displacement, food insecurity, infectious disease occurrence and exposure to extreme climatic events.
- 19.8.5.10 The impact is predicted to be of national and international spatial extent with the impact affecting the receptor directly and indirectly. The magnitude is therefore, considered to be **low**.

#### Sensitivity of receptor

- 19.8.5.11 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 19.5.3. This reflects that UK is a developed economy and has comparatively high resilience and capacity to adapt, so in general the national population can be considered to be of low sensitivity.
- 19.8.5.12 The sensitivity of the general population is therefore, considered to be **low**.
- 19.8.5.13 Adverse effects would be disproportionately experienced by the most vulnerable members and regions of society (globally). Such effects are likely to widen health inequalities. Although the general population in UK are likely able to get support to cope with the effects of climate change, some vulnerable population groups are at greater risk (e.g. people with socio economic disadvantage or old age making it harder to cope with heatwaves or flooding).
- 19.8.5.14 The sensitivity of the vulnerable group population is therefore, considered to be **high**.

#### Significance of effect

- 19.8.5.15 Overall, the magnitude of the impact is deemed to be **low** and the sensitivity of the vulnerable population group is considered to be **high**.
- 19.8.5.16 The scientific literature (Al-Delaimy, Ramanathan, & Sánchez Sorondo, 2020) supports a *causal* relationship between climate altering pollutants, climate change and population health outcomes. Although the change due to the Morgan Generation

19.8.5.17	<p>Assets would have a <i>very limited</i> effect on the global or national health baseline even accounting for long-term inter-generational effects; the Morgan Generation Assets makes an <i>influential</i> contribution to delivering national climate change policy, including public health related climate policies.</p> <p>The effect will, therefore, be of <b>minor beneficial</b> significance, which is not <b>significant</b> in EIA terms.</p> <p><b>Further mitigation and residual effects</b></p>	19.8.6.7	Furthermore, the potential effect is probable as no highly unusual conditions are required for the source-pathway-receptor linkage.
19.8.5.18	<p>No further mitigation is considered necessary in relation to population health outcomes. No additional enhancements of the expected positive outcomes of the proposed development are considered necessary.</p>	19.8.6.8	<p>The population groups relevant to this assessment are:</p> <ul style="list-style-type: none"> <li>• The ‘national’ population of England, and the wider UK</li> <li>• The vulnerable sub-populations including young and old people, people with low income and their dependants, people with poor health or disabilities, people experiencing social disadvantage and people with access and geographical vulnerability.</li> </ul>
<p><b>19.8.6 Wider societal infrastructure and resources</b></p>		<p><b>Operation and maintenance</b></p> <p><b>Magnitude of impact</b></p>	
19.8.6.1	<p>The electricity produced by the Morgan Generation Assets would enable many aspects of everyday life that either protect or promote good health. The MDS is represented by the smallest output contribution to renewable energy generation (1.5 GW) and is summarised in Table 19.13.</p>	19.8.6.9	<p>Project generation of renewable electricity would have <i>continuous</i> public health benefits to energy security (subject to weather conditions and maintenance), despite the scale of contribution being relatively <i>small</i> within the national energy generation context. The effects are likely to provide a <i>minor</i> reduction in risks for population <i>mortality</i> (e.g. reducing excess winter deaths) and <i>morbidity</i> of physical and mental health outcomes related to standard of living and access to health supporting infrastructure. Such an effect may extend via the national grid to a <i>large minority</i> of the national population. Such effects may bring <i>small</i> benefits to healthcare service quality by reducing capacity burdens.</p>
19.8.6.2	<p>UK energy security is important for maintaining continuous and affordable electricity which supports many aspects of public health. This includes power to safely cook and refrigerate food, regulate the temperature and lighting of homes and schools, operate health and social care services, maintain economic productivity and employment, and operate technologies that improve quality of life and social support. Sustained interruption of supply or rapid increases in costs would both be expected to result in reductions in health and well-being outcomes. Increases in the cost of electricity, particularly in the context of rising costs of living, can cause some people to prioritise essential costs (e.g. food, shelter) over electricity demands (e.g. heating a home).</p>	19.8.6.10	<p>The impact is predicted to be of national spatial extent, with direct and indirect effects to population health. The magnitude is therefore, considered to be <b>medium</b>.</p> <p><b>Sensitivity of receptor</b></p>
19.8.6.3	<p>Energy insecurity is a public health concern particularly for vulnerable populations (low-income, children, elderly). It is associated with hazardous exposures, heat stress, cold stress, asthma, chronic disease, poor mental health, parental fear and stigma, family disruption and residential instability (Hernández, 2016). In children, energy insecurity has been shown to affect development, hospitalisation and overall child health (Cook, et al., 2008).</p>	19.8.6.11	<p>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 19.5.3. The general population comprise those members of the community in good physical and mental health and with greater resources to respond to the costs of energy or to interruptions in supply.</p>
19.8.6.4	<p>This section has been informed by volume 2, chapter 17: climate change which sets out relevant assessment findings and mitigation measures that have been taken into account.</p>	19.8.6.12	<p>The sensitivity of the general population is therefore, considered to be <b>low</b>.</p>
19.8.6.5	<p>Chapter 17 concludes that the Morgan Generation Assets are in line with the NPPF’s principle of supporting new renewable and low carbon energy developments, in addition to their associated infrastructure, in order to contribute to reductions in greenhouse gas emissions.</p>	19.8.6.13	<p>The sub-population on low incomes, for whom energy security and interruption of energy supplies are more sensitive, pose a greater risk. This is particularly the case for dependants at risk during temperature extremes, including heatwaves and cold weather, as well as people in poor health, including when accessing healthcare.</p>
19.8.6.6	<p>The potential health effect is considered likely because there is a plausible source-pathway-receptor relationship:</p> <ul style="list-style-type: none"> <li>• Source: renewable electricity generation;</li> <li>• Pathway: energy security whilst avoiding climate altering emissions;</li> <li>• Receptor: population connected to the national power grid.</li> </ul>	19.8.6.14	<p>The sensitivity of the vulnerable group population is therefore, considered to be <b>high</b>.</p> <p><b>Significance of effect</b></p>
		19.8.6.15	<p>Overall, the magnitude of the impact is deemed to be <b>medium</b> and the sensitivity of the vulnerable population group is considered to be <b>high</b>.</p>
		19.8.6.16	<p>The Morgan Generation Assets provide a protective effect on the health baseline and that this would be important for public health. This conclusion reflects the scientific literature which establishes a <i>clear</i> association between energy security and health outcomes. The Morgan Generation Assets are likely to be <i>influential</i> to delivering</p>

health policy, including in narrowing inequalities that are at risk of widening due to reduced national energy security and rising costs of living.

19.8.6.17 The effect will, therefore, be of **moderate beneficial** significance, which is **significant** in EIA terms.

**Further mitigation and residual effects**

19.8.6.18 No further mitigation is considered necessary in relation to population health outcomes. No additional enhancements of the expected positive outcomes of the proposed development are considered necessary.

**19.8.7 Future monitoring**

19.8.7.1 Table 19.15 below outlines the proposed monitoring commitments for human health.

**Table 19.15: Monitoring commitments.**

Environmental effect	Monitoring commitment	Means of implementation
Health – Education and training	During construction, operation and decommissioning monitor the proportion of local people with long-term unemployment, high job instability or low income who enter good quality stable employment with Morgan Generation Assets in order to confirm the expected benefit and further tailor the targeting of local vulnerable groups.	Morgan Generation Assets employment and skills plan
Health – Employment and income	During construction, operation and decommissioning monitor the proportion of NEETs taking up, and completing, training opportunities with Morgan Generation Assets in order to confirm the expected benefit and further tailor the targeting of local vulnerable groups.	Morgan Generation Assets employment and skills plan

**19.9 Cumulative effect assessment methodology**

**19.9.1 Methodology**

19.9.1.1 The Cumulative Effects Assessment (CEA) takes into account the impact associated with the Morgan Generation Assets together with other projects and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see volume 3, annex 5.3: CEA screening matrix). Each project has been considered on a case by case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

19.9.1.2 The human health CEA methodology has followed the methodology set out in volume 1, chapter 5: EIA methodology of the PEIR. As part of the assessment, all projects and plans considered alongside the Morgan Generation Assets have been allocated into 'tiers' reflecting their current stage within the planning and development process, these are listed below.

19.9.1.3 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.

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

19.9.1.5 The projects, plans and activities scoped into the CEA are informed by those considered within the CEA of:

- Volume 2, chapter 11: Commercial fisheries of the PEIR
- Volume 2, chapter 12: Shipping and navigation of the PEIR
- Volume 2, chapter 14: Other sea users of the PEIR
- Volume 2, chapter 15: Seascape, landscape and visual resources of the PEIR
- Volume 2, chapter 17: Climate change of the PEIR
- Volume 2, chapter 18: Socio-economics and community of the PEIR.

**19.9.2 Maximum design scenario**

19.9.2.1 The MDS is informed by the cumulative MDS provided in:

- Volume 2, chapter 11: Commercial fisheries of the PEIR
- Volume 2, chapter 12: Shipping and navigation of the PEIR
- Volume 2, chapter 14: Other sea users of the PEIR
- Volume 2, chapter 15: Seascape, landscape and visual resources of the PEIR
- Volume 2, chapter 17: Climate change of the PEIR
- Volume 2, chapter 18: Socio-economics and community of the PEIR.

19.9.2.2 The MDS have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the Project Design Envelope provided in volume 1, chapter 3: project description of the PEIR as well as the information available on other projects and plans, in order to inform a 'MDS'. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different wind turbine layout), to that assessed here, be taken forward in the final design scheme.

## 19.10 Cumulative effects assessment

- 19.10.1.1 A description of the significance of cumulative effects upon population health arising from each identified impact is given below.
- 19.10.1.2 Cumulative health assessment extends the analysis of each determinant of health. This means for each determinant of health the relevant reasonably foreseeable cumulative projects are listed and a professional judgement is made as to the combined level of effect and its implications for public health. Following IEMA 2022 guidance, sensitivity of the relevant populations is unchanged from the main assessment in section 19.8. Magnitude is however appraised in light of the combined effect of multiple projects.
- 19.10.1.3 As set out in IEMA 2022 guidance for human health, a combined public health effect is most likely where a population is affected by multiple determinants of health and a large proportion of the same individuals within that population experience the combination of effects.
- 19.10.1.4 A high degree of spatial proximity is required for there to be the potential for cumulative effects for localised changes in determinants of health, e.g., dust from a construction site. In contrast, where there are more far-reaching effects in a determinant of health, e.g., job creation or noise along shared transport corridors, there is greater opportunity for cumulative interactions between projects.
- 19.10.1.5 For each of the determinants in the main assessment the cumulative assessment considers the potential for pathways to the same population from other large-scale developments that are similar in location and timing. The assessment is qualitative, following the approach set out in section 19.5, and considers the potential for combined magnitudes of effect to the same populations.
- 19.10.1.6 This chapter is informed by cumulative assessment conclusions set out in other chapters (as listed in section 19.1). The health assessment does not duplicate detail set out in those chapters. Distinctions between Tier 1 and Tier 2 projects follow other assessment chapters. Tier 1 being those projects where levels of uncertainty are lower, due to being more advanced in the planning process.
- 19.10.1.7 Offshore effects focus on the interaction of the Morgan Generation Assets with Mona Offshore Wind Project, Awel-y-Mor Offshore Wind Farm and Morecambe Offshore Wind Farm generation assets. These projects collectively have the potential for a greater magnitude of impact across the offshore health assessments.
- 19.10.1.8 The following sections provide a CEA on issues with sufficient information and the potential for likely significant population health cumulative effects.

### 19.10.2 Transport modes, access and connections – Offshore

#### Tier 1 and Tier 2

#### **Construction, Operations and Maintenance, and Decommissioning**

- 19.10.2.1 This section has been informed by volume 2, chapter 12: shipping and navigation of the PEIR, which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account. Volume 2, chapter 12: shipping and navigation of the PEIR concludes:

- The potential for moderate adverse cumulative impacts to commercial operators including strategic routes and lifeline ferries.
- The potential for major adverse cumulative impacts on adverse weather routeing.
- The potential for major adverse cumulative impacts to vessel collision risk.
- The potential for moderate adverse cumulative impacts on collision (contact) risk to vessels.

19.10.2.2 The Applicant has made firm commitments to reducing the potential impacts on shipping and navigation and commercial fisheries receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application. Volume 2, chapter 12: shipping and navigation of the PEIR does not provide a residual effect conclusion at the PEIR stage for cumulative effects, but it is the expectation of the health assessment that ultimately these issues will be satisfactorily resolved. Until that situation is confirmed the health assessment takes the reasonable worst case and assesses the unmitigated effects as reported in volume 2, chapter 12: shipping and navigation of the PEIR.

19.10.2.3 The population groups relevant to the cumulative health assessment are:

- The 'local' population of the Isle of Man.
- The 'regional' populations of North West England.
- The sub-population vulnerable due to young age, old age, low income, poor health, social disadvantage or access and geographical factors.

#### **Magnitude of impact**

19.10.2.4 The cumulative effect is predicted to be similar in the majority of its characteristics to the individual level magnitude described in section 19.8.2. The combined effect of the projects means the scale of change is considered to be medium rather than small, with more frequent disruptions and greater combined risks. Disruption is still likely to be occasional, but more frequent than the individual level effect.

19.10.2.5 It is noted that the combined effect is driven by the collective array area distribution of the Morgan and Mona projects, with Morecambe Offshore Wind Farm and Awel-y-Mor Offshore Wind Farm contribute to a reduction in alternative navigation options in this context.

19.10.2.6 It is predicted that the impact will affect the receptor directly and indirectly. The magnitude is therefore considered to be **medium**.

#### **Sensitivity of the receptor**

19.10.2.7 The sensitivity of the general and of the vulnerable group populations are unchanged in the cumulative assessment. As set out in section 19.8.2, the sensitivity of the general population is **low** and the sensitivity of the vulnerable group population is **high**.

### Significance of effect

- 19.10.2.8 Overall, the magnitude of the impact is deemed to be **medium** and the sensitivity of the vulnerable group population is considered to be **high**. The effect will, therefore, be of **moderate** adverse significance, which is significant in EIA terms.
- 19.10.2.9 The reasons this is significant for public health are as set out in section 19.8.2, with the difference being that the cumulative effect has the potential to result in a *small* rather than slight change to the population health baseline of the Isle of Man. Such a change would be driven by ongoing and more frequent disruption in access to essential goods and services and increased shipping risk. This is likely to be *influential* in widening health inequalities, with those least able to adapt being most affected.

### Further mitigation and residual effect

- 19.10.2.10 As noted in volume 2, chapter 12: shipping and navigation of the PEIR following mitigation, that would be reported in the Environmental Statement, which would include additional controls, the residual effect is expected to be negligible (not significant). This includes collaborative efforts with other projects that are also seeing solutions on this issue.
- 19.10.2.11 It is expected that the further mitigation will enable a conclusion of a **negligible to minor adverse (not significant)** residual cumulative effect for population health. This will be confirmed in the Environmental Statement.
- 19.10.2.12 As set out in section 19.8.2, the health assessment notes the importance of clear communication with the public to avoid levels of concern that could in themselves result in mental health and wellbeing effects. The PEIR non-technical summary provides appropriate mitigation by explaining how the final design will allow appropriate and safe access to the Isle of Man.

## 19.10.3 Community identity, culture, resilience and influence

### Tier 1 and Tier 2

#### Construction, Operations and Maintenance, and Decommissioning

- 19.10.3.1 This section has been informed by volume 2, chapter 15: seascape, landscape and visual resource of the PEIR which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account. Chapter 15 concludes that there is judged to be there is judged to be a moderate adverse cumulative effect on the MCA 38 Irish Sea South and for visual receptors on ferry routes (Liverpool to Douglas) operations and maintenance. All other cumulative effects are deemed negligible to minor adverse.
- 19.10.3.2 The population groups relevant to the cumulative health assessment are:
- The 'local' population of the Isle of Man
  - The 'regional' population 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.

### Magnitude of impact

- 19.10.3.3 The cumulative effect is predicted to be similar in the majority of its characteristics to the individual level magnitude described in section 19.8.3. The combined effect of the projects relates mostly to visual effects in the MCS 38 Irish Sea South or on ferry routes (Liverpool to Douglas). The scale of change is therefore likely to be small scale and short-term duration with only occasional events.

- 19.10.3.4 The impact will affect the receptor directly. The magnitude is therefore considered **low**.

### Sensitivity of the receptor

- 19.10.3.5 The sensitivity of the general and of the vulnerable group populations are unchanged in the cumulative assessment. As set out in section 19.8.3 the sensitivity of the general population is **low** and the sensitivity of the vulnerable group population is **high**.

### Significance of effect

- 19.10.3.6 Overall, the magnitude of the impact is deemed to be **low** and the sensitivity of the vulnerable group population is considered to be **high**. The effect will, therefore, be up to a **minor** adverse and minor beneficial significance, which is not significant in EIA terms.

### Further mitigation and residual effects

- 19.10.3.7 No further mitigation is considered necessary in relation to population health outcomes. No additional enhancements of the expected positive outcomes of the proposed development are considered necessary.

## 19.10.4 Employment and income

### Tier 1 and Tier 2

#### Construction, Operation and maintenance and Decommissioning

- 19.10.4.1 This section has been informed by volume 2, chapter 11: commercial fisheries of the PEIR, which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account. Volume 2, chapter 11: commercial fisheries concludes: there is the potential for a moderate adverse effect during operation and maintenance, but only a minor adverse effect during construction. The effects both relate to Scottish west coast scallop vessels.

- 19.10.4.2 The population groups relevant to the cumulative health assessment are:

- The 'regional' populations of North West England and Scotland (for communities strongly associated with Scottish west coast scallop vessels). Consideration has also been given to potential effects on the Isle of Man.
- 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. Magnitude of impact

### Magnitude of impact

- 19.10.4.3 The cumulative effect is predicted to be similar in the majority of its characteristics to the individual level magnitude described in section 19.8.4. The combined effect of the

projects means a larger area of fishing grounds would have reduced access, with a medium scale of change for affected fishing communities (notably Scottish west coast scallop vessels).

19.10.4.4 It is noted that Morecambe offshore wind farm may not affect the same parts of the commercial fishing fleet, so may not contribute to cumulative effects relating to Scottish west coast scallop vessels. This will be confirmed in the Environmental Statement. At this stage it is assumed the combined effect is driven by the interaction of the Morgan and Mona projects, with Awel y Môr Offshore Wind Farm also contributing to a lesser degree due to spatial overlap in the southern limits of the scallop fishery for Scottish west coast scallop vessels.

19.10.4.5 Whilst there is the potential for a combined effect from the projects, it is also likely that the effect would be distributed across a large regional area, rather than the projects having overlapping localised effects to the same communities. On this basis the impact is not considered to be of greater than the individual level effect. The magnitude is therefore considered to be **low**.

#### Sensitivity of the receptor

19.10.4.6 The sensitivity of the general and of the vulnerable group populations are unchanged in the cumulative assessment. As set out in section 19.8.4 the sensitivity of the general population is **low** and the sensitivity of the vulnerable group population is **high**.

#### Significance of effect

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

#### Further mitigation and residual effect

19.10.4.8 The Applicant has made firm commitments to reducing the potential impacts on shipping and navigation receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application.

19.10.4.9 As noted in volume 2, chapter 12: shipping and navigation of the PEIR following mitigation, that would be reported in the Environmental Statement, which would include additional controls, the residual effect is expected to be negligible (not significant). This includes collaborative efforts with other projects that are also seeing solutions on this issue.

19.10.4.10 It is expected that the further mitigation will enable a conclusion of a **negligible (not significant)** residual cumulative effect for population health. This will be confirmed in the Environmental Statement.

### 19.10.5 Climate change and adaptation

19.10.5.1 The Morgan Generation Assets in combination with Mona Offshore Wind Project, Awel-y-Mor Offshore Wind Farm and Morecambe Offshore Wind Farm generation assets will all contribute towards wider energy sector transition to renewable energy

which reduces the severity of climate change. Cumulatively these projects have a greater magnitude of effect. In the context of effects on global atmospheric conditions, rather than localised effects, the cumulative effect is arguably inclusive of all energy projects currently being consented, and likely much broader than just this one sector. Such a broad cumulative assessment is not within the scope of project level EIA. On this basis the cumulative effect is noted as greater, but for this subset of Tier 1 and Tier 2 projects the effect is conservatively considered to remain minor beneficial. The potential for cumulative effects will be kept under review and further reported in the Environmental Statement health chapter.

### 19.10.6 Wider societal infrastructure and resources

19.10.6.1 In combination with Mona Offshore Wind Project, Awel-y-Mor Offshore Wind Farm and Morecambe Offshore Wind Farm generation assets, the Mona Offshore Wind Project will provide enhanced energy security. The national context of such energy security has been considered and the individual effects are not expected to be collectively greater. Sensitivity of the population remains unchanged as does the overall magnitude. On this basis the cumulative effect would remain **moderate beneficial**, which is significant in EIA terms.

### 19.10.7 Future monitoring

19.10.7.1 No further monitoring is proposed.

### 19.11 Transboundary effects

19.11.1.1 A screening of transboundary impacts has been carried out and has identified that there was no potential for significant transboundary effects with regard to human health from the Morgan Generation Assets upon the health of populations in other states. Effects to the Isle of Man are discussed within the main assessment in section 19.8.

### 19.12 Inter-related effects

19.12.1.1 Inter-relationships are considered to be the impacts and associated effects of different aspects of the Morgan Generation Assets on the same receptor. These are considered to be:

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Morgan Generation Assets (construction, operations 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, changes in community identity, changes in employment and benefits from renewable energy security, 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.

19.12.1.2 A description of the likely interactive effects arising from the Morgan Generation Assets on human health is provided in volume 2, chapter 15: inter-related effects of the PEIR.

19.12.1.3 The population health effects identified and assessed in this chapter have the potential to interact with each other. The areas of potential interaction between effects for a given geographic population are presented in Table 19.16. Vulnerable group effects are expected across all geographic populations, so are not listed separately.

19.12.1.4 Table 19.17 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operational and maintenance and decommissioning phases of the Morgan Generation Assets, and also the inter-related effects (receptor-led effects that are predicted to arise for human health receptors).

**Table 19.16: Interaction between health determinants by geographic populations.**

	Local		Regional	National	International
	Isle of Man	North West England	UK		Global
Transport (access – offshore)	✓				
Community identity	✓		✓		
Employment (adverse)			✓		
Climate change	(✓)	(✓)	(✓)	✓	✓
Wider societal resources	(✓)	(✓)	(✓)	✓	

Key:	Positive (green)	Positive as a component within wider area assessment (light green)	Negative (blue)	Positive and negative (orange)
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Description of impact	Phase <sup>a</sup>			Likely significant inter-related effects	Significance
	C	O	D		
				assessment, including where effects are characterised as 'long-term'.	
<b>Receptor-led effects</b>					
Combination of reduced transport access and effects on community identity locally on the population of the Isle of Man.		✓		A small minority of the population of the Isle of Man may experience views of the wind farm (adversely affecting community identity health outcomes) and adverse impacts affecting health due to shipping route disruption. Combined effects are considered likely during the operational phase, once the windfarm is a feature of the seascape. The combined effects may particularly affect vulnerable groups with existing poor mental health. At a population level it is not expected that the combination of effects would interact in a way that would significantly reinforce health outcomes. No greater effect is therefore likely.	No change.
Combined national population benefits relating to climate change and wider societal resources			✓	Nationally the population would benefit both from a reduction in the severity of health effects associated with climate change and from the benefits to public health of energy security. Effects would be greatest for vulnerable groups, particularly those on low incomes less able to adapt or afford alternatives. As the effects associated with climate change are expected to be driven by the benefit to deprived populations globally, the combined effect in the UK of these health determinants is not expected to be greater than the individual effects.	No change.

**Table 19.17: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operational and maintenance and decommissioning phases of the Morgan Generation Assets and from multiple effects interacting across all phases (receptor-led effects).**

Description of impact	Phase <sup>a</sup>			Likely significant inter-related effects	Significance
	C	O	D		
Combined Transport access effects across project phases.	✓	✓	✓	Effects relating to ongoing disruption to access across construction, operations and maintenance and decommissioning are already taken into account by the health	No change.

### 19.13 Summary of impacts, mitigation measures and monitoring

19.13.1.1 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 19.1.1.3.

19.13.1.2 This chapter finds that the Morgan Generation Assets will potentially have beneficial and adverse health effects. These are summarised in Table 19.18. The chapter concludes that:



- As set out in section 19.8.2, impacts on transport modes, access and connections in relation to commercial operators including strategic routes and lifeline ferries to the Isle of Man will have a minor adverse effect for population health, which is not significant in EIA terms. The Applicant has made firm commitments to reducing the potential impacts on shipping and navigation receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application.
- As set out in section 19.8.3, community identity, culture, resilience and influence in relation to visual impacts of the wind turbines will have a minor adverse and minor beneficial effect which is not significant in EIA terms.
- As set out in section 19.8.4, employment and income in relation to loss or restricted access to commercial fishing grounds will have a minor adverse effect for population health, which is not significant in EIA terms. The Applicant has made firm commitments to reducing the potential impacts on commercial fisheries receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application.
- As set out in section 19.8.5, climate change and adaptation in relation to renewable energy generation and subsequent reduced greenhouse gas emissions will have a minor beneficial effect for population health, which is not significant in EIA terms.
- As set out in section 19.8.6, wider societal infrastructure and resources in relation to renewable energy generation will have a moderate beneficial effect for population health, which is significant in EIA terms.
- Table 19.18 presents a summary of potential effects, monitoring and mitigation. Overall, it is concluded that there will be no significant adverse effects arising from the Morgan Generation Assets during the construction, operations and maintenance or decommissioning phases. Public health benefits in relation to climate change (not significant) and energy security (significant) are expected for population health.
- Table 19.19 presents a summary of the potential cumulative impacts, mitigation measures and residual effects. Overall, it is concluded that there will be the following cumulative effects from the Morgan Generation Assets alongside other projects/plans:
  - A moderate adverse cumulative effect for transport modes, access and connections. The Applicant has made firm commitments to reducing the potential impacts on shipping and navigation receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application.
  - A minor adverse cumulative effect for employment and income.
  - A moderate beneficial cumulative effect for wider societal infrastructure and resources.
- No potential transboundary impacts have been identified in regard to effects of the Morgan Generation Assets.

**Table 19.18: Summary of potential environmental effects, mitigation and monitoring.**

<sup>a</sup> C=construction, O=operational and maintenance, D=decommissioning

Description of impact	Phase <sup>a</sup>			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Transport modes, access and connectivity	✓	✓	✓	Tertiary measures	C: low O: low D: low	C: high O: high D: high	Minor adverse (not significant)	The Applicant has made firm commitments to reducing the potential impacts on shipping and navigation receptors..	Not assessed for PEIR as additional risk controls are to be further considered and included for DCO application.	None.
Community identity, culture, resilience and influence		✓		Tertiary measures	O: low	O: high	Minor adverse and minor beneficial (not significant)	No further mitigation required.	Unchanged	None.
Employment and income	✓	✓	✓	Tertiary measures	C: low O: low D: low	C: high O: high D: high	Minor adverse (not significant)	The Applicant has made firm commitments to reducing the potential impacts on commercial fisheries receptors..	Not assessed for PEIR as additional risk controls are to be further considered and included for DCO application.	None.
Climate change and adaptation		✓		Tertiary measures	O: low	O: high	Minor beneficial (not significant)	No further mitigation required.	Unchanged	None.
Wider societal infrastructure and resources		✓		Tertiary measures	O: medium	O: high	Moderate beneficial (significant)	No further mitigation required.	Unchanged	None.

**Table 19.19: Summary of potential cumulative environmental effects, mitigation and monitoring.**

<sup>a</sup> C=construction, O=operational and maintenance, D=decommissioning

Description of effect	Phase <sup>a</sup>			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
<b>Tier 1 &amp; 2</b>										
Transport modes, access and connectivity	✓	✓	✓	Tertiary measures	C: medium O: medium D: medium	C: high O: high D: high	Moderate adverse (significant)	The Applicant has made firm commitments to reducing the potential impacts on shipping and navigation receptors.	Not assessed for PEIR as additional risk controls are to be further considered and included for DCO application.	None.
Community identity, culture, resilience and influence	✓	✓	✓	Tertiary measures	C: low O: low D: low	C: high O: high D: high	Minor adverse (not significant)	No further mitigation required.	Unchanged	None.
Employment and income	✓	✓	✓	Tertiary measures	C: low O: low D: low	C: high O: high D: high	Minor adverse (not significant)	The Applicant has made firm commitments to reducing the potential impacts on commercial fisheries receptors.	Not assessed for PEIR as additional risk controls are to be further considered and included for DCO application.	None.
Climate change and adaptation		✓		Tertiary measures	O: low	O: high	Minor beneficial (not significant)	No further mitigation required.	Unchanged	None.
Wider societal infrastructure and resources		✓		Tertiary measures	O: medium	O: high	Moderate beneficial (significant)	No further mitigation required.	Unchanged	None.

## 19.14 Next steps

19.14.1.1 The Applicant has made firm commitments to reducing the potential impacts on shipping and navigation receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application. The conclusions provided in this chapter will be reviewed with regards to such measures. Further discussion with public health stakeholders will also be undertaken. Opportunities to target socio-economic benefits to vulnerable groups will continue to be explored.

## 19.15 References

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