

Connah's Quay Low Carbon Power

Environmental Statement Volume II Chapter 21: Human Health

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21. Human Health

21.1 Introduction

Overview

21.1.1 This chapter of the Environmental Statement (ES) presents an assessment of the likely significant environmental effects of the Connah's Quay Combined Cycle Gas Turbine (CCGT) fitted with Carbon Capture Plant (CCP) (hereafter referred to as the Proposed Development) with respect to Human Health during the construction, operation (including maintenance), and decommissioning phases of the Proposed Development. A description of the Proposed Development, including details of maximum parameters, is set out in **Chapter 4: The Proposed Development (EN010166/APP/6.2.4)**. This chapter relies on the findings of other technical assessments completed and presented within the following chapters (**EN010166/APP/6.2**) which are relevant to human health:

- **Chapter 8: Air Quality (EN010166/APP/6.2.8);**
- **Chapter 9: Noise and Vibration (EN010166/APP/6.2.9);**
- **Chapter 10: Traffic and Transport (EN010166/APP/6.2.10);**
- **Chapter 19: Socio-Economics Recreation and Tourism (EN010166/APP/6.2.19); and**
- **Chapter 20: Climate Change (EN010166/APP/6.2.20).**

21.1.2 This chapter is supported by the following figures (**EN010166/APP/6.3**):

- **Figure 3-3: Areas Described in the ES;** and
- **Figure 21-1: Welsh Index of Multiple Deprivation within the Baseline Study Area¹.**

21.1.3 This chapter is supported by the following appendices (**EN010166/APP/6.4**):

- **Appendix 1-A: Scoping Report;**
- **Appendix 1-B: Scoping Opinion;**
- **Appendix 2-B: Scoping Opinion Responses;** and
- **Appendix 7-A: Legislative, Policy and Guidance Framework for Technical Topics.**

¹ **Figure 21-1: Welsh Index of Multiple Deprivation within the Baseline Study Area (EN010166/APP/6.3)** shows the Order limits excluding the Accommodation Work Areas and ports.

Legislation, Policy and Guidance

21.1.4 Legislation, planning policy, and guidance relating to Human Health and pertinent to the Proposed Development are listed in **Table 21-1**. Further details regarding these can be found in **Appendix 7-A: Legislative, Policy and Guidance Framework for Technical Topics (EN010166/APP/6.4)**.

Table 21-1: Legislation, Planning Policy, and Guidance relating to Human Health

Type	Legislation, Policy and Guidance
Legislation	<ul style="list-style-type: none">• Public Health (Wales) Act 2017 (Ref 21-1);• Well-being of Future Generations (Wales) Act 2015 (Ref 21-2);• Planning (Wales) Act 2015 (Ref 21-3);• Control of Electromagnetic Fields at Work Regulations 2016 (Ref 21-4); and• Equality Act 2010 (Ref 21-5).
National Planning Policy	<ul style="list-style-type: none">• The Overarching National Policy Statement (NPS) for Energy (EN-1) (Ref 21-6);• The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (Ref 21-7);• The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Ref 21-8);• The NPS for Electricity Networks Infrastructure (EN-5) (Ref 21-9);• Future Wales: The National Plan 2040 (Ref 21-10);• Planning Policy Wales (PPW) (Ref 21-11); and• Public Health Wales Long-Term Strategy 2023 – 2035 (Ref 21-12).
Local Planning Policy	<ul style="list-style-type: none">• Flintshire County Council (FCC) Local Development Plan (LDP) (2015-2030) (Ref 21-13); and• Flintshire and Wrexham Public Services Board: Our Well-being Plan 2023-2028 (Ref 21-14).
National Guidance	<ul style="list-style-type: none">• IEMA² Guide to Effective Scoping of Human Health in Environmental Impact Assessment (EIA) (IEMA Health Scoping Guidance) (Ref 21-15);• IEMA Guide to Determining Significance for Human Health in EIA (IEMA Health Assessment Guidance) (Ref 21-16);• Wales Health Impact Assessment Support Unit Guidance (Ref 21-17); and

² The Institute of Environmental Management Assessment (IEMA) has changed its name to the Institute of Sustainability and Environmental Professionals (ISEP). Where general reference is made to the institute in this document, the following distinction has been made: ISEP (formerly IEMA). When referencing legacy IEMA documents, this distinction is not made.

Type	Legislation, Policy and Guidance
	<ul style="list-style-type: none">• Public Health England: Advice on the content of Environmental Statements accompanying an application under the Nationally Significant Infrastructure Planning Regime (hereafter referred to as 'Public Health England's Advice Note') (Ref 21-18).

21.2 Consultation and Scope of Assessment

Consultation

EIA Scoping Opinion

21.2.1 A request for an EIA Scoping Opinion was sought from the Secretary of State (SoS) through the Planning Inspectorate (PINS) in February 2024 as part of the EIA Scoping Process. The EIA Scoping Opinion was adopted on 20 March 2024 (**Appendix 1-B: Scoping Opinion (EN010166/APP/6.4)**).

21.2.2 Key issues raised in the EIA Scoping Opinion are summarised in **Table 21-2** along with a summary of how they have been addressed, where relevant.

Statutory Consultation

21.2.3 Statutory consultation was undertaken in October to November 2024. A Preliminary Environmental Information Report (PEIR) was issued in support of that consultation. **Table 21-3** outlines the statutory consultation responses relating to Human Health assessment and how regard has been had to these through the ES.

Targeted Consultation

21.2.4 Following Statutory Consultation changes were made to the heights of the proposed absorber and HRSG stacks and the Applicant undertook further targeted consultation. This consultation included a Supporting Information Report which detailed the environmental considerations associated with these changes. This Targeted Consultation was held between Thursday 8 May to Friday 6 June 2025. Responses to this targeted consultation are presented in the **Consultation Report (EN010152/APP/5.1)** and **Table 21-4** below outlines how and where these comments have been addressed within this chapter.

Additional Relevant Engagement

21.2.5 For Human Health, no additional consultation has been undertaken. As noted in **Table 21-3**, following Statutory Consultation the Applicant has contacted Betsi Cadwaladr University Health Board; however, it has not been possible to discuss the Human Health assessment³.

³ The Applicant contacted the Betsi Cadwaladr University Health Board by phone and email and it was not possible to determine an appropriate point of contact to discuss the Proposed Development.

Table 21-2: Scoping Opinion Responses

Comment ID	Consultee	Extract of comment	Response
3.13.1	PINS	<i>'No matters have been proposed to be scoped out of the assessment.'</i>	This is acknowledged.
3.13.2	PINS	<i>'The Scoping Report does not consider the impacts of the Proposed Development on housing supply. The ES should contain an assessment of the housing needs of the workforce and any LSE on local housing supply should be described.'</i>	An assessment of effects on local accommodation facilities has been undertaken in Section 19.6 of Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19) . This consists of assessing the effect of the construction workforce on local accommodation capacity.
3.13.3	PINS	<i>'The Inspectorate advises that, whilst an initial approach to the identification of sensitive receptors has been provided, the impacts on health and wellbeing and health inequalities of the Proposed Development may have particular impact on vulnerable or sensitive populations, including those that fall within the list of protected characteristics. These receptors, if present, should therefore be included in the scope of assessment.'</i>	IEMA guidance for human health assessment recommends that the assessment takes account of the sensitivity of relevant populations and vulnerable sub-populations and their ability to respond to change. This chapter considers potentially vulnerable sub-populations in the assessment in line with this guidance. Further information is provided within Section 21.4 where the existing and future baselines are discussed.
N/A	UK Health Security Agency (UKHSA)	<i>'Having considered the consultation documents, we do not have any specific comments at this stage. However, UKHSA requests that the proposer confirms either that the project does not contain any EMF sources that have a potential health impact; or that a health impact assessment is carried out in the Environmental Statement (ES).'</i>	The Proposed Development contains an Electrical Connection, which could produce electromagnetic fields (EMFs). The Human Health assessment presented in Section 21.6 assesses

Comment ID	Consultee	Extract of comment	Response
		<p><i>In terms of the level of detail to be included in an ES, we recognise that the differing nature of projects is such that their impacts will vary. UKHSA's predecessor organisation Public Health England (PHE) produced an advice document <i>Advice on the content of Environmental Statements accompanying an application under the NSIP Regime</i>, setting out aspects to be addressed within the Environmental Statement1. This advice document and its recommendations are still valid and should be considered when preparing an ES.</i></p> <p><i>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.</i></p> <p><i>It should be noted that Public Health Wales (PHW) is the national public health agency in Wales who will take the lead in health and wellbeing considerations.'</i></p>	<p>whether or not significant effects to human receptors would arise from EMFs produced in the operational phase under the 'radiation' determinant. It finds that no significant effects are likely.</p> <p>Public Health England's '<i>Advice on the content of Environmental Statements accompanying an application under the NSIP Regime</i>' has been considered and is detailed in Appendix 7-A: Legislative, Policy and Guidance Framework for Technical Topics (EN010166/APP/6.4).</p> <p>Where health impacts are scoped out, an explanation is provided in Section 21.2.</p>
N/A	Public Health Wales (PHW)	<p><i>'Our partners, the UK Health Security Agency (formerly Public Health England) have published guidance on information to be included in Nationally Significant Infrastructure Project (NSIP) "Advice on the content of Environmental Statements accompanying an application under the NSIP Regime". We would expect to see the advice and recommendations from this document reflected in any ES.</i></p> <p><i>We are encouraged that the relevant information has been included in the scoping document, such as the sections on Air Quality, Noise and Vibration and Health. We also welcome reference to the Wales Health Impact Assessment Support Unit Guidance and the Wellbeing of</i></p>	<p>The assessment presented in Section 21.6 has considered '<i>Advice on the content of Environmental Statements accompanying an application under the NSIP Regime</i>' and provides an overview of this in Appendix 7-A: Legislative, Policy and Guidance Framework for Technical Topics (EN010166/APP/6.4).</p>

Comment ID	Consultee	Extract of comment	Response
		<p><i>Future Generations Act in relation to formulating the human health impact assessment (HIA) for this project.</i></p> <p><i>Furthermore, we are encouraged by any projects that mitigate the impacts of climate change by reducing reliance on fossil fuels and transitioning to renewable energy source such as solar, wind, tidal etc., provided the emissions related to the construction and maintenance of the site are kept to a minimum and are offset by the longevity of the project.</i></p> <p><i>As stated, PHW works closely with health boards across Wales. Since this project is located within Betsi Cadwaladr University Health Board (BCUHB), we can work with the Director of Public Health (DPH) within BCUHB to make them aware of the project and around any health concerns that may arise from the project. There may be some aspects of the development relating to health of the population that can be fielded directly to the DPH, as the lead for local public health issues.'</i></p>	

Table 21-3: Statutory Consultee Responses

Consultee	Summary of Comment	Response
PHW	<p><i>'We support that the scoping document seeks to examine areas particularly relevant to human health, including air quality, surface- and groundwater, incident risk and management, noise and vibration and traffic changes.</i></p> <p><i>PHW are supportive of work to reduce and mitigate the impacts of climate change on health by reducing emissions from fossil fuels as we transition to renewable energy sources. PHW will be interested to see if there may be a side-effect benefit of NOx reduction from emissions as emitted gases may require processing before entering the carbon capture system.</i></p> <p><i>We welcome use of the Wales Health Impact Assessment Support Unit Guidance and the Wellbeing of Future Generations Act in formulating the human health impact assessment (HIA) for this project.</i></p> <p><i>As stated, PHW works closely with health boards across Wales. Since this project is located within Betsi Cadwaladr University Health Board (BCUHB), we can work with the Director of Public Health (DPH) within BCUHB to make them aware of the project, particularly regarding any health concerns that may arise from this project. There may be some aspects of the development relating to health of the population that can be fielded directly to the DPH, as the lead for local public health issues.'</i></p>	<p>This position is acknowledged.</p> <p>The Applicant has contacted BCUHB to discuss the human health assessment on numerous occasions. No response has been received from the Board, and therefore engagement has not been possible.</p>
UKHSA	<p><i>'We have considered the submitted documentation and note this is at the stage of Preliminary Environmental Information Report (PEIR), as such we are happy with the approach taken and the conclusions drawn, including scoped out (health) effects.'</i></p> <p><i>'In terms of the level of detail to be included in an Environmental Statement (ES), we recognise that the differing nature of projects is such that their impacts will vary. UKHSA's predecessor organisation Public Health England (PHE) produced an advice document</i></p>	<p>Public Health England's 'Advice on the content of Environmental Statements accompanying an application under the NSIP Regime' has been considered and is detailed in Appendix 7-A:</p>

Consultee	Summary of Comment	Response
	<p><i>Advice on the content of Environmental Statements accompanying an application under the NSIP Regime', setting out aspects to be addressed within the Environmental Statement. This advice document and its recommendations are still valid and should be considered when preparing an ES. 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.'</i></p> <p><i>'It should be noted that Public Health Wales (PHW) is the national public health agency in Wales who will take the lead in health and wellbeing considerations.'</i></p>	<p>Legislative, Policy and Guidance Framework for Technical Topics (EN010166/APP/6.4).</p> <p>Where health impacts are scoped out, an explanation is provided in Section 21.2.</p>
UKHSA	<p><i>'We note the assessment presented in section 21.6.83 to 21.6.87, Radiation and exposure to electromagnetic fields. In considering public health impacts associated with changes to the electricity infrastructure, the following guidelines explain where it is necessary to demonstrate compliance with the exposure guidelines that apply to public exposure to EMFs in the UK:</i></p> <p><i>https://assets.publishing.service.gov.uk/media/5a796799ed915d07d35b5397/1256-codepractice-emf-public-exp-guidelines.pdf</i></p>	<p>The Proposed Development contains an Electrical Connection, which could produce EMFs. As noted in Table 21-1, this chapter undertakes an assessment in line with Control of Electromagnetic Fields at Work Regulations 2016 (Ref 21-4). The Human Health assessment presented in Section 21.6 assesses whether or not significant effects to human receptors would arise from EMFs produced in the operational phase under the 'radiation' determinant. It finds that no significant effects are likely.</p>

Consultee	Summary of Comment	Response
UKHSA	<p><i>'Our position is that pollutants associated with road traffic or combustion, particularly particulate matter and oxides of nitrogen are non-threshold; i.e., an exposed population is likely to be subject to potential harm at any level and that reducing public exposure to non-threshold pollutants (such as particulate matter and nitrogen dioxide) below air quality standards will have potential public health benefits. We support approaches which minimise or mitigate public exposure to non-threshold air pollutants, address inequalities (in exposure) and maximise co-benefits (such as physical exercise). We encourage their consideration during development design, environmental and health impact assessment, and development consent.'</i></p>	<p>This position is acknowledged. This assessment considers the impacts of traffic and combustion pollutants associated with the Proposed Development. These are assessed under the 'air quality' and 'transport modes, access, and connections' determinants in Section 21.6. It finds that no significant effects are likely.</p>
FCC	<p><i>'The submitted environmental statement will need to have regard for Planning Policy Wales (PPW) (edition 12, 2024) and any relevant legislation and guidance such as relevant Technical Advice Notes that is in force/adopted in Wales. Also the application should have regard to the respective and relevant policies within the Flintshire Local Development Plan (LDP) adopted by the Council on 24 January 2023.'</i></p>	<p>As stated in Table 21-1, this chapter has considered guidance from Planning Policy Wales (PPW) (edition 12, 2024 (Ref 21-11)) when undertaking the human health assessment. It has also considered relevant policies from the Flintshire Local Development Plan, also stated in Table 21-1.</p>

Table 21-4: Targeted Consultation

Consultee	Summary of Comment	Response
Flint Town Council	<p>The Council expects:</p> <ul style="list-style-type: none"> - Transparent, accountable mitigation strategies for all identified environmental risks—including noise and vibration (e.g., from pile driving) in relation to nearby Listed Buildings; - Clear summaries of these assessments for public understanding; <p>Full details of compensation mechanisms available to adversely affected residents and businesses, including:</p> <ul style="list-style-type: none"> - How compensation will be calculated, - Who will administer the scheme, - How the public will be made aware of it. <p>Additionally, the Council requests:</p> <ul style="list-style-type: none"> - Clarification on how often the project's environmental performance will be reviewed, and How local residents will be kept informed of those findings. 	<p>Details of all mitigation and monitoring proposed is included within the Commitments Register (EN010166/APP/6.10).</p>
Flint Town Council	<p>Given the introduction of new emissions and changes to stack height, the Council considers a comprehensive Health Impact Assessment essential. This should be:</p> <ul style="list-style-type: none"> - Conducted independently, with Public Health Wales involvement; - Designed to assess long-term effects on residents, especially children and those with pre-existing health conditions. 	<p>The changes introduced at targeted consultation were proposed to provide adequate dispersion of air pollutants to ensure the avoidance of adverse significant air quality effects on human health.</p> <p>This chapter is based on IEMA health assessment guidance which states that '<i>health in EIA aligns to the wider principles and approach of Health Impact Assessment (HIA). Where the EIA follows IEMA guidance the health chapter will align to HIA principles, including</i></p>

Consultee	Summary of Comment	Response
	<p>The Council also requests that future consultation materials include easy-read formats, to ensure accessibility for all members of the community.</p>	<p><i>considering wider determinants of health and health inequalities.'</i> Therefore, this assessment meets HIA requirements. As set out in the methodology of this chapter, the human health assessment has been designed to assess both short and long-term effects on residents, including 'vulnerable sub-populations' such as children and those with pre-existing health conditions.</p> <p>The human health assessment in the ES has been conducted independently and is informed by various policy, legislation and guidance including Public Health Wales's Long-Term Strategy. Public Health Wales has been consulted with throughout the statutory consultation process and approved of the methodology set out in the Scoping Report, commenting that '<i>we support that the scoping document seeks to examine areas particularly relevant to human health, including air quality, surface- and groundwater, incident risk and management, noise and vibration and traffic changes</i>'. Further to this, consultation across the DCO application as a whole has been comprehensive and has been undertaken with a wide range of consultees.</p>

Scope of the Assessment

21.2.6 The health and wellbeing of individuals is determined by a broad range of individual constitutional and behavioural factors (or 'determinants'), as well as broader environmental, social, and economic factors. Some factors are direct and obvious, whilst others are indirect. IEMA Health Assessment Guidance (Ref 21-16) provides a list of determinants to be scoped in or out of the human health impact assessment. The basis of scoping health-related determinants was derived from a review of the project against those contained in the IEMA Health Assessment Guidance (Ref 21-16).

21.2.7 Following the scoping process, the scope of the human health assessment as agreed with PINS (**Appendix 1-B: Scoping Opinion (EN010166/APP/6.4)**) is as follows:

Table 21-5: Scope of the Human Health Assessment⁴

Determinants Scoped In	Project Phase
Health and social care services	Construction; operation; and decommissioning.
Employment and income	Construction; operation; and decommissioning.
Education and training	Construction; operation; and decommissioning.
Transport modes, access, and connections	Construction; operation; and decommissioning.
Air quality	Construction; operation; and decommissioning.
Noise and vibration	Construction; operation; and decommissioning.
Open space, leisure, and play	Construction; operation; and decommissioning.
Climate change mitigation and adaptation	Construction; operation; and decommissioning.
Water quality or availability	Construction; operation; and decommissioning.
Radiation and exposure to electromagnetic fields	Operation.

21.2.8 Impacts on human health may have a particular impact on vulnerable or sensitive populations. Where necessary, impacts on these groups have been identified and assessed. See paragraph 21.3.6 for more detail.

⁴ Radiation and exposure to electromagnetic fields (EMFs) has been scoped out for the construction and decommissioning phases on the basis that the Electrical Connection Corridor would not be in use during these phases, and therefore no EMFs would be produced.

21.2.9 Following further assessment, a number of IEMA determinants are scoped out of the human health assessment on the basis there is no potential for significant effects to arise during the construction, operation and decommissioning of the Proposed Development. **Table 21-6** lists the IEMA determinants that have been scoped out and provides justification for each.

Table 21-6: Determinants Scoped Out of the Assessment

IEMA determinant scoped out	Justification for scoping out
Physical activity	Physical activity effects relate most directly to open space and transport and so are captured within the assessments of those determinants (see paragraphs 21.6.16, 21.6.31, 21.6.56, and 21.6.72), as suggested by IEMA guidance.
Housing	An assessment of the impact of the Proposed Development on local housing availability as a result of the needs and demand for temporary accommodation from the construction workforce is undertaken in Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19) . No significant effects to human health are anticipated.
Risk-taking behaviour	There are no significant effects expected in relation to risk taking behaviour of the workforce of the Proposed Development. Potential harm or injury to workers is assessed in Chapter 22: Major Accidents and Disasters (EN010166/APP/6.2.22) . Safety of construction staff is detailed in the Framework Construction Environment Management Plan (CEMP) (EN010166/APP/6.5) .
Community safety	There are no significant effects expected in relation to community safety. Chapter 22: Major Accidents and Disasters (EN010166/APP/6.2.22) explains how the Proposed Development would minimise injury risk to workers, and there is no prospect of injury risk to the public.
Community identity, culture, resilience, and influence	The Proposed Development is broadly aligned in character to the existing Connah's Quay Power Station. Therefore, it is unlikely that it would affect the way people feel about their community, sense of belonging, or local pride and wellbeing.
Social participation, interaction, and support	Effects relating to accessing community centres and other places of social interaction are assessed under the 'transport, access and modes' determinant in Section 21.6.
Diet and nutrition	The Proposed Development would not affect access to food or good nutrition.

IEMA determinant scoped out	Justification for scoping out
Relocation	The Proposed Development would not require relocation of residents or loss of housing.
Land quality	Chapter 14: Geology and Ground Conditions (EN010166/APP/6.2.14) states that impacts to human health and controlled waters caused by land contamination are considered unlikely as construction, maintenance and operation and decommissioning of the Proposed Development would be in accordance with environmental legislation, good practice and in accordance with an environmental permit required for the Proposed Development. Therefore, it is anticipated that there would be no significant effects to human health receptors.
Wider societal infrastructure and resources	Considerations such as wider contributions to economic development are assessed under the 'employment and income' (sections 21.6.8 and 21.6.49), and 'education and training' (sections 21.6.13 and 21.6.53) determinants.
Built environment	Considerations such as access to health and social care services, and educational facilities are assessed under the 'transport modes, access, and connections', and 'health and social care' determinants in Section 21.6.

21.3 Assessment Methodology

Impact Assessment

- 21.3.1 The World Health Organization (WHO) Europe defines health as a '*state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*' (Ref 21-19). Public health therefore encompasses general wellbeing, not just the absence of illness.
- 21.3.2 The health and wellbeing of individuals is determined by a broad range of individual constitutional and behavioural factors (or 'determinants'), as well as broader environmental, social, and economic factors. Some factors are direct and obvious, whilst others are indirect.
- 21.3.3 Within a population there can also be health inequalities, defined by the WHO as '*differences in health status or in the distribution of health determinants between different population groups. For example, differences in mobility between elderly people and younger populations or differences in mortality rates between people from different social classes*' (Ref 21-19).
- 21.3.4 The assessment of potential human health effects uses the effect significance terms and definitions as described within IEMA Health Assessment Guidance (Ref 21-16).

21.3.5 The human health assessment follows the general impact assessment methodology as set out in IEMA Health Assessment Guidance (Ref 21-16). It also follows the general principles of the Wales Health Impact Assessment Support Unit Guidance (Ref 21-17) and Public Health England's Advice Note (Ref 21-18). The specific impact magnitude and impact sensitivity criteria for this assessment have been set out below.

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

- sensitivity of human health receptors including general populations and potentially vulnerable sub-populations: the assessment takes account of the qualitative (rather than quantitative) sensitivity of relevant populations and sub-populations and their ability to respond to change (**Table 21-7**). Potentially vulnerable sub-populations are highlighted within each determinant where they may be disproportionately affected by certain impacts; and
- magnitude of impact: this entails consideration of:
 - the scale of the exposure of the population to an impact;
 - whether the impact is one-off or continuous;
 - the likely nature of the human health impact;
 - the duration and revisability of the change; and
 - the proportion of the relevant study area population that would be affected (**Table 21-8**).

Table 21-7: Sensitivity / Value Criteria for Human Health

Sensitivity / Value	Sensitivity / Value Criteria
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

Sensitivity / Value	Sensitivity / Value Criteria
	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.

Source: Adapted from: IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment, 2022 (Ref 21-16).

Table 21-8: Magnitude Criteria for Human Health

Magnitude	Magnitude Criteria
High	High exposure or scale; long-term duration or permanent change; 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; gradual reversible; 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; rapid reversible; 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; immediate reversible; 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.

Source: Adapted from: IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment, 2022 (Ref 21-16).

21.3.7 Human health effects reflect the relationship between the sensitivity of affected receptors (**Table 21-7**) and the magnitude of the impact (**Table 21-8**) in accordance with **Table 21-9**.

Table 21-9: Classification of Effect Matrix

		Sensitivity			
		High	Medium	Low	Very Low
Magnitude	High	Major	Major/ Moderate	Moderate/ Minor	Minor/ Negligible
	Medium	Major/ Moderate	Moderate	Minor	Minor/ Negligible
	Low	Moderate/ Minor	Minor	Minor	Negligible
	Negligible	Minor/ Negligible	Minor/ Negligible	Negligible	Negligible

Source: *IEMA Guidance for Determining Significance for Human Health in Environmental Impact Assessment, 2022* (Ref 21-16).

21.3.8 Effects are defined as follows:

- beneficial classifications of significance indicate an advantageous or positive effect on an area, which may be minor, moderate or major;
- negligible classifications of significance indicate imperceptible effects on an area;
- adverse classifications of significance indicate a disadvantageous effect on an area, which may be minor, moderate or major; and
- no effect classifications of significance indicate that there are no effects on an area.

21.3.9 Duration of effect is also considered, with more weight given to permanent changes than to temporary, reversible changes. For the purposes of this assessment, short-term effect durations are one year or less, medium-term effect durations are one to five years, and long-term effect durations are those over five years.

21.3.10 In accordance with the methodology set out in IEMA guidance (Ref 21-16), major and moderate effects are classed as significant, whilst minor and negligible effects are classed as not significant, as indicated by the light grey shading in **Table 21-9**.

21.3.11 As stated by IEMA (Ref 21-16), the classification of effects matrix is only a tool to assist with judgement and there are not clear cut-off points between categories and terminologies. The point at which an impact changes magnitude category is a professional judgement and is supported by evidence and justification in this chapter.

Rochdale Envelope

21.3.12 The setting of design parameters using the 'Rochdale Envelope' approach is described in **Chapter 2: Assessment Methodology (EN010166/APP/6.2.2)**. The maximum parameters for the principal components of the Proposed Development are set out in the **Design Principles Document (EN010166/APP/7.8)** and are illustrated on the **Works Plan**

(EN010166/APP/2.4) and the **Parameter Plans (EN010166/APP/2.5)**.

These parameters, together with assumptions regarding the future plans for the existing Connah's Quay Power Station set out in **Chapter 2: Assessment Methodology (EN010166/APP/6.2.2)** have been used to

inform the representative worst-case scenario that has been assessed in this chapter, in order to provide a robust assessment of the impacts and likely significance of environmental effects of the Proposed Development at its current stage of design.

21.3.13 In particular, focused use of the Rochdale Envelope has been adopted for the following aspects:

- the maximum scenario (i.e. worst-case) has been assessed for impacts on access to healthcare services, transport, air quality, noise, open space, water, and radiation, as these are envisioned to be adverse impacts; and
- minimum parameters (i.e. worst-case) for impacts on other receptors such as employment and income, and education and training have been assessed, whereby the worst-case scenario is considered as the effects of the Proposed Development are expected to be a beneficial impact.

Assessment Assumptions and Limitations

Assumptions

21.3.14 It is assumed that the existing National Grid Electricity Transmission (NGET) 400 kV Substation and associated transmission/distribution lines would remain operational during construction, operation and decommissioning of the Proposed Development. As detailed in the **Electricity Grid Connection Statement (EN010166/APP/7.2)** within the Electrical Connection Corridor a 400 kV single circuit cable route and control system cables would be installed primarily below ground at a depth of at least 1.1 m. Replacement of the existing 400 kV cables or other supporting above-ground assets within the Electrical Connection Corridor would be undertaken using existing access points (and below-ground cable conduits, if required). Further information on these works is provided in the **Electricity Grid Connection Statement (EN010166/APP/7.2)**.

Limitations

21.3.15 The assessment presented in this chapter is based on the available baseline and design information. Following consultation and subsequent evolution of the design and baseline data, a full and comprehensive assessment is presented in this chapter.

21.3.16 The assessment of likely health effects arising from the Proposed Development is based on professional judgement, drawing on relevant guidance as set out in paragraph 21.1.4.

21.3.17 Effects on human health draw upon other ES chapters, namely the chapters listed in paragraph 21.1.1. Relevant assumptions and limitations are set out in the respective chapters and as such are not repeated here.

21.3.18 It should be noted that it is not always practicable to determine the catchment area for community facilities. Residents of an area may use

facilities located within different districts or regions without regard for statutory boundaries.

21.4 Baseline Conditions and Study Area

21.4.1 This section describes the baseline environmental characteristics for the Proposed Development and a defined study area, with specific reference to human health.

21.4.2 Firstly, a demographic and health profile of the local population is set out. Secondly, existing local infrastructure relevant to the health assessment is summarised; this draws largely on **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)** and includes health provision, community facilities and recreational routes such as Public Rights of Way (PRoW).

21.4.3 The study area focuses on the Construction and Operation Area and not the routes and ports used to transport Abnormal Indivisible Loads (AIL) to the Main Development Area (referred to as the 'Accommodation Work Areas'). This is because no permanent works would be undertaken within any Accommodation Work Areas and therefore, impacts of greater than a negligible impact magnitude are unlikely to be experienced in those locations.

Study Area

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

- Connah's Quay: Golftyn;
- Flint: Castle;
- Flint: Coleshill and Trelawny; and
- Flint: Oakenholt.

21.4.5 Depending on the human health indicator being analysed, some 2022 ward level data is available from the 2021 Census⁵ (Ref 21-20) which has been used as the preferred dataset where possible. It is important to note that the electoral ward boundaries have changed in recent years and although the geographic extents of these may differ, both the historic ward boundaries and the revised ward boundaries provide an indication of local health in

⁵ The ONS cautioned that the national lockdown as a result of the covid-19 pandemic would have impacted the data recorded in the 2021 Census. While the pandemic did influence certain aspects of the data, such as employment, mobility, and living arrangements, the Census offers invaluable insights into demographic trends, social conditions, and economic factors.

proximity to the Proposed Development and are therefore considered suitable for assessing the existing baseline conditions for human health.

21.4.6 Where ward level data is not available, the 12 2011 Lower Layer Super Output Areas (LSOAs) that align with the 2022 wards have been used as the study area. **Table 21-10** below shows which LSOAs match-up to each ward. The 2011 LSOAs are shown on **Figure 21-1: Welsh Index of Multiple Deprivation within the Baseline Study Area (EN010166/APP/6.3)**.

Table 21-10: 2022 wards and their corresponding 2011 LSOAs

2022 Wards	2011 LSOAs
Connah's Quay: Golftyn	Connah's Quay: Golftyn 1
	Connah's Quay: Golftyn 2
	Connah's Quay: Golftyn 3
	Connah's Quay: Golftyn 4
Flint: Castle	Flint: Castle
Flint: Coleshill and Trelawny	Flint: Coleshill 1
	Flint: Coleshill 2
	Flint: Coleshill 3
	Flint: Trelawny 1
	Flint: Trelawny 2
Flint: Oakenholt	Flint: Oakenholt 1
	Flint: Oakenholt 2

Existing Baseline

Age

21.4.7 According to the most recent Census (Ref 21-20), the total population of the study area in 2021 was 18,993. Within this population, the share of residents aged 65 and over (17.7%) was lower than the regional (21.4%) and national (21.4%) figures. The proportion of working age residents (aged 16 to 64) was 63.5%, slightly higher than in Flintshire (60.8%) and Wales (61.0%). The study area had a slightly higher proportion of children (18.8%) compared to regional (17.7%) and national (17.7%) levels. Children are therefore considered to be overrepresented in the study area and this sub-population could be more sensitive to changes to their environment and may have a higher reliance on health services and social infrastructure. This sub-population has been assessed in the assessment of likely impacts for each health determinant, as relevant.

21.4.8 This age breakdown for the study area, Flintshire, and Wales is illustrated in **Plate 21-1**.

Plate 21-1: Age Breakdown (%) for the study area, Flintshire, and Wales



Source: Census 2021; 'TS007: Age by single year'. Please note values may not add to 100% due to rounding

Ethnicity

21.4.9 In regard to ethnic group, **Table 21-11** shows that 97.6% of residents in the study area in 2021 were White, a higher proportion than Wales (93.8%), however in line with Flintshire (97.6%) (Ref 21-20). There was also a lower proportion of all ethnic minority groups in the study area and Flintshire compared to national figures. For example, 0.9% of residents in the study area and Flintshire are within the Asian, Asian British, or Asian Welsh group, compared to 2.9% in Wales.

Table 21-11: Ethnic Group (%) for the study area, Flintshire, and Wales

Ethnic Group (%)	Study area	Flintshire	Wales
White	97.6%	97.6%	93.8%
Asian, Asian British or Asian Welsh	0.9%	0.9%	2.9%
Black, Black British, Black Welsh, Caribbean or African	0.2%	0.2%	0.9%
Mixed or Multiple ethnic groups	0.9%	0.9%	1.6%
Other ethnic group	0.4%	0.3%	0.9%

Source: Census 2021; 'TS021: Ethnic Group'. Please note values may not add to 100% due to rounding.

Education

21.4.10 In 2021, the proportion of residents aged 16 or over in the study area who gained a level 4 qualification (degree-level or equivalent) or above was 22.9% (Ref 21-20). This was lower than the proportion seen in Flintshire (29.2%), and particularly lower than the average for Wales (31.5%).

21.4.11 In the study area, 18.2% of residents aged 16 or over had a level 3 (A-Level or equivalent) qualification as their highest level of qualification, a larger proportion than Flintshire (17.8%) and Wales (17.2%). This is a similar pattern to level 2 (General Certificate of Secondary Education (GCSE) or equivalent) qualifications, as 16.1% of residents aged 16 and over in the study area had this qualification as their highest attained, compared to 15.3% of residents in Flintshire and only 14.4% of residents in Wales. Overall, residents in the study area have lower levels of qualifications compared to Flintshire and Wales.

Economic Activity

21.4.12 According to the Census, in 2021 the economic activity rate (amongst 16-to-64-year-olds) was 64.0% in the study area which was higher than the rate for Flintshire (60.6%), and significantly higher than the rate for Wales (56.5%) (Ref 21-20).

21.4.13 Claimant count data (Ref 21-21) measures the number of people claiming benefits principally for the reason of being unemployed. In November 2024, the claimant count for residents (as a proportion of residents aged 16 to 64) in the study area was 3.6%, this was slightly higher than the figures for Flintshire (2.9%) and Wales (3.5%).

Income

21.4.14 Gross Disposable Household Income (GDHI) per head (Ref 21-22) is the amount of money an individual person has left for saving or spending after expenditure associated with income (such as taxes and social contributions, property ownership and future pension provision). Data at ward level is

unavailable for GDHI per head and so data for the local authority Flintshire has been used to inform the baseline for this indicator. GDHI per head in Flintshire in 2022 was £19,723; this was higher than the average for Wales (£18,652). This suggests that residents in the study area have a greater level of GDHI than the national average.

Deprivation

21.4.15 The 2019 Welsh Index of Multiple Deprivation (WIMD) (Ref 21-23) provides a set of relative measure of deprivation for small geographical areas in Wales. Ward level data is not available within this dataset and therefore, the 12 corresponding LSOAs have been studied instead.

21.4.16 **Figure 21-1: Welsh Index of Multiple Deprivation within the Baseline Study Area (EN010166/APP/6.3)** displays the overall deprivation classification of LSOAs within the study area of the Construction and Operation Area. It shows that there are pockets of high deprivation in the towns of Connah's Quay and Flint, but more rural areas experience lower deprivation.

21.4.17 The WIMD also assesses health deprivation as a domain. The domain measures the risk of premature death and the impairment of quality of life through poor physical or mental health. Two of the LSOAs in the study area were among the top 10% most deprived LSOAs in Wales for health, with Flint: Coleshill 2 ranking as the most deprived of all LSOAs in Flintshire. Two LSOAs in the study area also ranked in the top 20% in Wales, and one LSOA in the study area ranked in the top 40% most deprived in Wales. For the remaining six LSOAs in the study area, two were in the top 50% of least deprived LSOAs in Wales, one in the top 40%, and four in the top 30%.

21.4.18 Further, the WIMD contains data relating to housing as a domain. This measures the quality of housing and overcrowding. One LSOA in the study area ranked within the top 20% most deprived LSOAs in Wales. Two LSOAs in the study area ranked in the top 30%, two ranked in the top 40%, and two ranked in the 50% most deprived LSOAs in Wales. For the remaining LSOAs in the study area, one ranked in the top 10% least deprived LSOAs in Wales, two ranked in the top 20%, and two ranked in the top 30%.

21.4.19 WIMD also assess access to services as a domain. This measures access to broadband accessibility and travel times to public services. One LSOA in the study area ranked in the top 20% most deprived LSOAs in Wales, two ranked within the top 40% most deprived, and two ranked within the top 50% most deprived. For the remaining seven LSOAs in the study area, one ranked in the top 10% least deprived, three ranked in the top 20%, and three ranked in the top 50%.

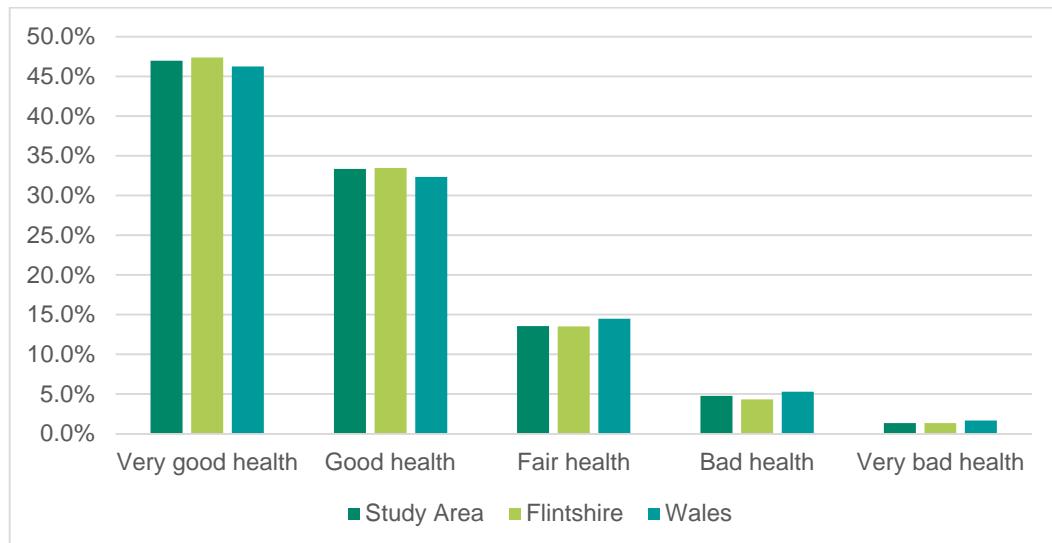
21.4.20 In summary, overall deprivation varies across the study area but is high in the towns of Connah's Quay and Flint. Similarly, health deprivation is also varied across the study area but again is worse within urban areas.

General Health

21.4.21 As part of the Census (Ref 21-20), respondents are asked to self-assess the state of their health, both physical and mental. Data for this shows that 80.3% of residents in the study area believed that they were living in 'good'

or 'very good' health, a similar proportion to that in Flintshire (80.8%), and higher than in Wales (78.6%). Furthermore, 6.1% of the population in study area rated their health as 'bad' or 'very bad', similar to Flintshire (5.7%), but slightly lower than in Wales (6.9%). This is illustrated in **Plate 21-2**.

Plate 21-2: Self-Assessed Health for the study area, Flintshire, and Wales



Source: Census 2021; 'TS037 – General Health'

Mental Health

21.4.22 The Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) (Ref 21-24) measures mental well-being on a scale from 14 to 70, where a higher score represents a more positive mental well-being. In 2022/23, the WEMWBS score for adults (persons aged 16+) in Flintshire was 48.7, this was only slightly higher than the national average (48.1). This indicates that mental well-being among adults in Flintshire is broadly in line with the rest of Wales and therefore within the study area mental well-being is considered to be 'good'.

Disability

21.4.23 The Census (Ref 21-20) data in **Table 21-12** contains information relating to disability. In 2021, 19.0% of residents in the study area were classed as disabled under the Equality Act 2010 (Ref 21-5), a similar proportion to that in Flintshire (19.1%), and lower than in Wales (21.6%). Also in the study area, 9.2% of residents believed their day-to-day activities were 'limited a lot' by disabilities, slightly higher than in Flintshire (8.6%), but a lower rate than in Wales as a whole (10.3%).

Table 21-12: Disability Information for the study area, Flintshire, and Wales

	Study area	Flintshire	Wales
Disabled under the Equality Act (%)	19.0%	19.1%	21.6%
Day-to-day activities limited a lot	9.2%	8.6%	10.3%
Day-to-day activities limited a little	9.8%	10.5%	11.3%
Not disabled under the Equality Act (%)	81.0%	80.9%	78.4%
Has long term physical or mental health condition but day-to-day activities are not limited	5.7%	7.0%	6.6%
No long term physical or mental health conditions	75.3%	74.0%	71.8%

Source: Census 2021; 'TS038 Disability'. Please note values may not add to 100% due to rounding.

Wider Determinants of Health

21.4.24 Wider determinants of health can also be insightful in building the health profile of an area. PHW provides data on a range of health determinants (Ref 21-25). Data was not available at ward or LSOA level; therefore, the following indicators are compared at regional and national level:

- life expectancy: between 2020 and 2022, the average life expectancy at birth in Flintshire for females was 81.9 years and 78.5 years for males. The figure for females was in line with Wales (81.8 years), and the figure for men was slightly higher than Wales (78.0 years);
- inequality: between 2020 and 2022, the gap in life expectancy at birth between the most and least deprived areas in Flintshire for females was 5.5 years, which was lower than the national figure (6.4 years), and 8.0 years for men, which was higher than the national average (7.6 years);
- childhood obesity: in 2021, 65.5% of adolescents (persons aged 11-16) reported a 'healthy range' BMI category which was in line with the national average (65.0%). In addition, 16.2% of adolescents in Flintshire were physically active every day for at least 60 minutes, the same percentage as the national average;
- smoking prevalence: in 2022/23, 9.2% of adults (persons aged 16+) smoked in Flintshire. This was lower than the national average (12.8%);
- alcohol consumption: in 2022/23, 20.4% of adults reported drinking above 14 units a week which was higher than the national average (17.2%); and

- physically inactive adults: 47.6% of adults reported meeting physical activity guidelines in 2022/23. This was lower than the national figure (55.4%).

Healthcare Facilities

21.4.25 There are several community hospitals near the Proposed Development, the closest of which is Deeside Community Hospital, which is approximately 3.6 km south of the Main Development Area.

21.4.26 The nearest hospital (with an accident and emergency department) to the Main Development Area is the Countess of Chester Hospital, which is located approximately 12 km away in the neighbouring unitary authority Cheshire West and Chester.

21.4.27 There are multiple GP surgeries within proximity of the Construction and Operation Area. Those within 2.5 km of the Order limits (excluding the Accommodation Work Areas) are detailed in **Table 21-13**.

Table 21-13: General Practice (GP) Surgeries within 2.5km of Order limits (Excluding the Accommodation Work Areas)

GP Surgery	Distance From the Order limits (Excluding the Accommodation Work Areas) (Approx. km)
The Quay Health Centre	1.5
St Mark's Dee View Surgery	1.5
Allt Goch Medical Centre	1.9
Eyton Place Surgery	2.2
The Laurels Surgery	2.2
Deeside Medical Centre	2.4

Source: NHS Wales, 2024; GP Practice Analysis 2024.

21.4.28 The latest GP data published by NHS Wales (Ref 21-26) indicates that the total patients registered at the GP surgeries in **Table 21-13** was 36,588 in 2024. Across these GP surgeries there were 19 full time equivalent (FTE) working GPs, averaging at 1,926 patients per GP, which is above the Royal College of General Practitioners target of 1,800 patients per GP.

21.4.29 Overall, there is a range of GP surgeries near to the Proposed Development, however they contain a high patient to GP ratio which could limit access to health services for local people.

Social Infrastructure

21.4.30 **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19) and Appendix 19-A: List of Community Facilities Baseline Assessment (EN010166/APP/6.4)** detail the educational facilities located in proximity of the Proposed Development (refer to Section 19.4 therein).

21.4.31 Police stations in the vicinity of the Proposed Development include:

- Deeside Police Station, located approximately 2.4 km Construction and Operation Area; and
- Mold Police Station, located approximately 8.1 km south-west of the Construction and Operation Area.

21.4.32 The Proposed Development is covered by the North Wales Fire and Rescue Service. The closest station is Deeside Fire Station, located approximately 3.2 km south-east of the Construction and Operation Area. There is also Flint Fire Station, located approximately 5 km north-west and Buckley Fire Station, located 6.2 km south of the Construction and Operation Area.

Community and Recreational Facilities

21.4.33 There is a range of community and recreational facilities located in proximity to the Proposed Development, including churches, greenspaces, public houses and hotels. These are detailed in **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)** and **Appendix 19-A: List of Community Facilities Baseline Assessment (EN010166/APP/6.4)**. Overall, it is considered that there is a good provision of facilities, with community facilities concentrated in Connah's Quay and Oakenholt and open spaces in more rural parts of the study area.

Public Rights of Way (PRoW)

21.4.34 Information relating to PRoWs located within the vicinity of the Proposed Development can be found in **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)**. The provision of PRoWs is considered to be good.

Electromagnetic fields

21.4.35 As described in **Chapter 3: Location of the Proposed Development (EN010166/APP/6.2.3)**, the land between the Main Development Area and the Construction and Indicative Enhancement Area (C&IEA) is occupied by the existing National Grid Electricity Transmission 400 kV substation, connected to the Main Development Area, and existing Scottish Power Energy Networks 132 kV substation. Existing 400 kV high-voltage overhead electrical transmission lines run across the site, crossing a corridor of open space, scrub and woodland parallel to the south-west border within the Main Development Area as shown on **Figure 3-5: Key Environmental Constraints (Centred on the Main Development Area) (EN010166/APP/6.3)** and are also present within the northern and southern extents of the C&IEA.

Future Baseline

21.4.36 The future baseline scenarios are set out in **Chapter 2: Assessment Methodology (EN010166/APP/6.2.2)**. The assessment has considered 2040 as the future baseline year, in that it represents the latest potential opening year of the Proposed Development and maintains a reasonable degree of accuracy and reliability. The future baseline is anticipated to be largely the same as the existing baseline for human health based on professional judgement and experience on previous DCO schemes. However, it would be reasonable to expect that the age structure of the population will change. The future baseline scenario for this indicator is detailed below.

Age

21.4.37 According to ONS population projections⁶ (Ref 21-27), Flintshire is projected to experience a net population increase of 3% between 2021 and 2041 (as shown in **Table 21-14**). Proportional reductions are expected within the 0 to 15 age group, whilst the elderly population is expected to grow considerably. These trends reflect national projections for which the total population is likely to experience a slight net age increase, with decreases in younger populations and increases in the 65 and over category.

⁶ Data at smaller geographical areas are not available for population projections, therefore Local Authority level data has been used.

Table 21-14: Population Projections in Flintshire and Wales

Geography	Age Group	2021	2026	2031	2036	2041	Change between 2021 and 2041 (%)
Flintshire	All ages	156,862	158,459	159,366	160,336	161,505	3.0%
	Aged 0 to 15	29,088	28,316	27,613	27,390	27,709	-4.7%
	Aged 16-64	94,048	94,104	92,562	91,200	91,421	-2.8%
	Aged 65+	33,727	36,040	39,191	41,746	42,374	25.6%
Wales	All ages	3,162,117	3,201,265	3,235,913	3,266,671	3,296,465	4.2%
	Aged 0 to 15	568,996	557,161	539,697	535,390	542,488	-4.7%
	Aged 16-64	1,920,104	1,922,665	1,911,584	1,896,494	1,902,879	-0.9%
	Aged 65+	673,017	721,439	784,632	834,787	851,098	26.5%

21.5 Development Design and Embedded Mitigation

21.5.1 The Proposed Development has been designed, as far as possible, to avoid or minimise adverse impacts and effects on Human Health through the process of design development, and by embedding measures into its design.

21.5.2 Mitigation measures embedded within the Proposed Development, as set out in the respective chapters identified in paragraph 21.1.1, would also provide mitigation for effects on receptors from a human health perspective.

21.5.3 The following standard construction practices are relevant to this assessment:

- a **Framework CEMP (EN010166/APP/6.5)** has been prepared to describe the specific mitigation measures to be followed to control and reduce impacts on the environment during the construction phase. The **Framework CEMP (EN010166/APP/6.5)** has been developed to consider the environmental assessments, including mitigation measures presented in this ES;
- a **Decommissioning Environmental Management Plan (DEMP)** would be produced pursuant to a Requirement of the **Draft DCO (EN010166/APP/3.1)**. The **DEMP** would consider in detail all potential environmental and social risks on the Proposed Development and contain guidance on how risks can be removed or mitigated. This would include details of how surface water drainage should be managed during the decommissioning phase; and
- the **Framework Construction Traffic Management Plan (CTMP) (EN010166/APP/6.6)** and **Framework Construction Worker Management Plan (CWMP) (EN010166/APP/6.7)** set out measures to control construction Heavy Goods Vehicle (HGV) traffic. They include details of the construction routes for HGVs and restrictions on the timing of HGV movements to and from the Order limits and measures to reduce the impact of workers travelling to and from Construction and Operation Area.

21.6 Assessment of Likely Impacts and Effects

21.6.1 Taking into account the embedded mitigation measures as detailed in Section 21.5 above, the potential impacts and effects of the Proposed Development have been assessed using the methodology as detailed in Section 21.3 of this chapter and **Chapter 2: Assessment Methodology and Consultation (EN010166/APP/6.2.2)**.

Construction Phase

Health and social care services

21.6.2 The simultaneous construction phase has been adopted for the socio-economic assessment to present a worst-case scenario. In this scenario, it is anticipated that peak construction workforce numbers would be approximately 1,600 workers. Further details of the estimated simultaneous phase construction period are provided in **Chapter 5: Construction**

Management and Programme (EN010166/APP/6.2.5). A high level of leakage is expected (55%) (see **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)**) meaning in a very worst-case during peak construction, 880 workers could be sourced from outside of the 60-minute drive time area. These additional construction workers may place extra demand on health and social care services if they move to the area, or if emergency treatment is required.

21.6.3 The sensitivity of the local population is considered to be medium. This reflects that GP practices local to the Proposed Development are, on average, operating above benchmark patient to GP ratios, however routine self-reported census statistics indicate that 80.3% rate their health status as 'good' or 'very good'. Based on professional judgement, the population is considered to have a limited capacity to adapt to change in relation to access to health and social care services.

21.6.4 The average proportion of the population aged under 16 within the study area is higher than in Flintshire and Wales. In addition to this, while the general population is considered to have medium sensitivity, there are likely to be some more vulnerable sub-populations within this; for example, those experiencing high deprivation or with pre-existing health conditions, within the small pockets of deprivation identified in the baseline. Therefore, children and more vulnerable sub-populations are likely to have higher reliance on health services and have been assessed as having a high sensitivity to changes to accessing healthcare services.

21.6.5 If workers reside locally already, they would likely be registered at a local practice currently and would not therefore place additional demand for services on local GPs. However, under a worst-case, it is assumed that all of the approximately 880 non-local construction workers would require places at local GPs. There are 19 FTE GPs at the six surgeries near to the Proposed Development and the patient to GP ratio is 1,926, which is above the recommended ratio of 1,800 (see paragraph 21.4.28). If the additional 880 patients register at the six surgeries, this would slightly increase the ratio for each GP to 1,972 patients per GP.

21.6.6 Due to the limited scale of impacts upon healthcare services and the reversibility of effect, the magnitude of these adverse impacts is assessed to be low.

21.6.7 Overall, the likely effect on human health arising from impacts on access to health and social care services during the construction phase is assessed to be **minor adverse (not significant)** for the general population and despite its higher sensitivity, **minor adverse (not significant)** for the more vulnerable sub-population due to the limited scale of impacts.

Employment and income

21.6.8 There is evidence that employment matters to health, not only from an economic standpoint, but also in terms of quality of life (Ref 21-28). Good quality work protects against social exclusion through the provision of income, social interaction, a core role and identity and purpose. Therefore, the generation of jobs is assessed to be a beneficial outcome.

21.6.9 Baseline data with respect to employment and income indicates that there is a slightly higher benefits claimant count in the study area compared to national rates. However, there is a relatively high economic activity rate and average GDHI. Therefore, the local labour force in the study area is assessed to be of low sensitivity due to its limited capacity to benefit from additional employment and income opportunities.

21.6.10 As set out in **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)**, the Proposed Development would generate an average of 608 gross direct FTE jobs on-site over the construction period. The jobs arising over the construction period would be temporary. **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)** estimates that, after accounting for displacement, leakage and multiplier effects, the Proposed Development would support, on average, 683 additional jobs during the construction period. Of these, 308 jobs per annum are expected to be taken-up by residents within the 60-minute drive time area (see **Figure 19-2: Mapped 60-minute drive time radii from the Order Limits (EN010166/APP/6.3)**).

21.6.11 The additional jobs within the study area would represent local job growth, and additional income could lead to beneficial health impacts in terms of protecting against social exclusion. However, the overall change would be small in the context of the overall number of jobs locally. Therefore, the magnitude of impact is assessed to be low.

21.6.12 Overall, likely effect on human health arising from impacts on employment and income during the construction phase is assessed to be **minor beneficial (not significant)**.

Education and training

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

21.6.14 The Applicant would pursue an arrangement with training provider TTE Technical UK (TTE), or any other suitable training provider, for apprentices to work on the Proposed Development. The current expectation for this is one apprenticeship per year during construction, equating to a maximum of 9. The Applicant is in the early stages of working with Coleg Cambria, Bangor University, and Wrexham University to align courses at nearby education facilities with skills required for the Proposed Development and other regional projects. Though no formal commitments have been reached as of this stage, suitable arrangements would be in place for construction and operation of the Proposed Development to benefit both local socio-economic needs and those of the Proposed Development. It is considered that the assessment of significance is not dependent on these potential initiatives and so the assessment has not taken such measures into account in determining the impact and classification of effect. On this basis, the magnitude of impact on education and training in the construction phase is assessed to be low.

21.6.15 Overall, it is expected that the Proposed Development would create opportunities to provide good quality education and training which are beneficial to quality of life and therefore health. The likely effect on human health arising from impacts on education and training during the Proposed Development construction phase is assessed as **minor beneficial (not significant)**.

Transport modes, access, and connections

21.6.16 Residents of properties in the towns and villages surrounding the Proposed Development attempting to access healthcare, educational, and community facilities are likely to use the same strategic roads as construction traffic associated with the Proposed Development. Increased traffic flows and severance effects may inhibit the ability of local residents to access these facilities.

21.6.17 Baseline data shows that the study area experiences higher rates of good health, but lower levels of educational attainment compared to Flintshire and Wales as a whole. The sensitivity of the general population in relation to accessing these services is therefore assessed to be low.

21.6.18 Sensitivity of the vulnerable sub-population is assessed to be medium. This reflects that the sub-population includes a high representation of children who may be more reliant on transport to access health and social care services and educational facilities. Based on professional judgement, this sub-population may have limited capacity to adapt to change in relation to access to health and social care services and educational facilities.

21.6.19 **Chapter 10: Traffic and Transport (EN010166/APP/6.2.10)** sets out a reasonable worst-case assessment of the traffic and transport effects of the Proposed Development during the construction phase. The peak month for construction activity of HGVs and light vehicles during the simultaneous phase construction is forecast to be month 36 during 2034. There could be up to 240 HGVs travelling to and from the Main Development Area per day. The volume of worker traffic (Large Goods Vehicles (LGVs)) on the network is predicted to be at its maximum of around 1,374 two-way daily vehicle movements in the simultaneous phase construction. These would be spread over a full working day (08:00 to 18:00 Monday to Friday (except bank holidays) and 08:00 to 13:00 on Saturdays).

21.6.20 There is only one link road that could experience significant traffic and transport effects: Kelsterton Road. However, assuming a 12-hour working day⁷, this could equate to an hourly increase of approximately 130 vehicles, including 15 HGVs. This is the equivalent of an additional two vehicles every minute and one HGV every four minutes. These quantities are not considered to have perceivable difference when compared to the baseline traffic on Kelsterton Road, and as such, it is considered this would be sufficiently mitigated by the **Framework CTMP (EN010166/APP/6.6)**. Given this, and that the duration of impact is short-term and that there is potential

⁷ Assuming core working hours and one hour at the start and the end of the working day for travel.

for only minor changes to quality-of-life, the overall magnitude of impact is assessed to be low.

21.6.21 Therefore, the overall likely effect on human health arising from impacts on transport modes, access and connections during the Proposed Development construction phase is assessed to be **minor adverse (not significant)** for the general population, and **minor adverse (not significant)** for the more vulnerable sub-population.

Air quality

21.6.22 The activities of the Proposed Development have the potential to reduce air quality, due to construction dust or increased nitrogen dioxide (NO₂) and particulate matter concentrations, which could lead to adverse health effects on residents.

21.6.23 Baseline data indicates that residents in the study area experience similar levels of good and bad health compared to Flintshire and Wales. The sensitivity of the general population with respect to air quality is therefore assessed to be low. Sensitivity of the vulnerable sub-population is assessed to be medium. This reflects that the sub-population includes a high representation of dependants (children). Children are more susceptible to the impacts arising from air quality, as their respiratory systems are still developing.

21.6.24 An assessment of potential air quality effects during the construction of the Proposed Development is set out in **Chapter 8: Air Quality (EN010166/APP/6.2.8)**. The chapter presents the assessments of construction dust and construction traffic emissions. The construction dust risk assessment undertaken determines that the worst-case risk of dust effects would be low, and with the implementation of the measures detailed in the **Framework CEMP (EN010166/APP/6.5)**, effects to health and the local community are considered to be not significant. The assessment of the construction traffic emissions finds that the worst-case risk of dust effects would be negligible and effects to health receptors are considered to be not significant.

21.6.25 Given the available data, taking into account that residents across the study area would experience no significant effects on air quality after implementation of appropriate mitigation, the magnitude of impact is expected to be low during the construction phase.

21.6.26 Therefore, the overall likely effect on human health arising from impacts on air quality during the construction phase is assessed to be **minor adverse (not significant)** for the general population and **minor adverse (not significant)** for the vulnerable sub-population.

Noise and vibration

21.6.27 The construction activities of the Proposed Development have the potential to lead to increases in noise and vibration, which could lead to adverse health and wellbeing effects in terms of annoyance and/or disrupt local amenities.

21.6.28 An assessment of the risk of noise and vibration impacts during construction is provided in **Chapter 9: Noise and Vibration (EN010166/APP/6.2.9)**.

Baseline data indicates that the main sources of noise near to Construction and Operation Area include the noise generated by plant or equipment used at the existing Connah's Quay Power Station, generally expressed as sound power levels or the vibration generated by the plant. Existing baseline noise conditions of the Proposed Development and local transport network suggest that some of the local population may already have a degree of exposure to transport noise that may affect annoyance outcomes. **Chapter 9: Noise and Vibration (EN010166/APP/6.2.9)** assigns varying levels of sensitivity to different receptors. In line with the IEMA Health Scoping Guidance (Ref 21-15), the human health assessment uses **Chapter 9: Noise and Vibration (EN010166/APP/6.2.9)** to conduct a community-level assessment. Therefore, taking into consideration the baseline noise conditions for the community, the sensitivity of the general population is considered to be low. Sensitivity of the vulnerable sub-population is assessed to be medium. This reflects that the sub-population includes a high representation of dependants (children). Children are more susceptible to the impacts arising from noise and vibration.

21.6.29 For construction noise and vibration, effects at all noise sensitive receptors (NSRs) are considered to be not significant following the implementation of measures detailed in the **Framework CEMP (EN010166/APP/6.5)**. For construction traffic, residual noise effects are considered significant at two NSRs (R21 and R22 see **Figure 9-1: Noise Sensitive Receptor and Sound Monitoring Locations (EN010166/APP/6.3)**) which are residential properties on Kelsterton Road (see paragraph 21.6.20). Whilst it is recognised that these properties could individually experience significant effects, at a community level the overall human health effect on the general population is not expected to be significant. Taking this into consideration, the magnitude of impact anticipated with respect to noise and vibration impacts on health during construction is assessed to be low. This reflects that the majority of the population would not experience a change in noise and vibration and any change would likely not impact an individual's wellbeing.

21.6.30 Therefore, the overall likely effect on human health arising from impacts on noise and vibration during the construction phase is assessed to be **minor adverse (not significant)** for the general population and **minor adverse (not significant)** for the vulnerable sub-population.

Open space, leisure, and play

21.6.31 Construction activities of the Proposed Development may intersect, or otherwise impact upon, the accessibility of open space and PRoW in the study area, which could impact the health and wellbeing of local residents.

21.6.32 As set out in the baseline of **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)**, there are a number of PRoWs in the Order limits. Given that there is a large network of PRoWs within 500 m of the Order limits that could be used as substitutes for PRoW closure, the sensitivity of the population to PRoW closures is assessed to be low.

21.6.33 Changes to journey times, local travel patterns, and certainty of routes for users would arise from the temporary closures and diversions of PRoWs. Two PRoW (404/67/10 and 404/66/10 (including 404/66/20)) form part of the network around Little Leadbrook Farm linking Leadbrook Drive to Allt Goch Lane. Temporary disruption to users of these footpaths would occur during construction, as they run directly through the Proposed CO₂ Connection Corridor. It is anticipated that one temporary closure (comprising both footpaths) would be required. It is anticipated that a temporary diversion would be required that would follow an alternative route within the same field, limited to the construction period for the Proposed CO₂ Connection, and no permanent changes to the PRoW would be required. No other impacts to open space or leisure facilities are expected. Therefore, the magnitude of the impact is assessed as low.

21.6.34 Therefore, the overall likely effect on human health arising from impacts on open space, leisure and play during the Proposed Development construction phase is assessed to be **minor adverse (not significant)**.

Climate change mitigation and adaptation

21.6.35 As discussed in **Chapter 20: Climate Change (EN010166/APP/6.2.20)**, the total greenhouse gas (GHG) emissions from the Proposed Development during the construction phase are calculated to be 467,733 tonnes of carbon dioxide equivalent (tCO₂e). GHG emissions related to construction are anticipated to occur between 2031 to 2035, with the majority of emissions attributable to the embodied carbon and transport of construction materials and products (approximately 96%). This corresponds to an average of 93,547 tCO₂e/year over the five year construction period.

21.6.36 Sensitivity of the local population is low. The self-reported health of the population indicates that 80.3% of the population rate their health status as 'good' or 'very good', in line with the averages for Flintshire and Wales. This indicates that the majority of the local population are healthy, however, there is still a percentage that would suffer from respiratory illness. Individuals with respiratory illnesses are more susceptible to the impacts arising from GHG emissions.

21.6.37 Sensitivity of the under-16 vulnerable sub-population is medium. This reflects that in terms of life stage, the sub-population includes a high representation of dependants (children). Children are more susceptible to the impacts arising from GHG, as their respiratory systems are still developing. As outlined in **Chapter 20: Climate Change (EN010166/APP/6.2.20)**, GHG impacts could include emissions from any fuel consumption for transportation of materials, energy (electricity, fuel etc.) consumption from plant and vehicles, generators on site and construction workers commuting, and emissions from the disposal and treatment of wastewater. These emissions could contribute to worsened breathing of this vulnerable sub-population. Furthermore, health impacts from climate change disproportionately affect those who are less able to adapt and respond to such impacts, with children being particularly susceptible.

21.6.38 The emissions during the construction phase would be limited, and as outlined in **Chapter 20: Climate Change (EN010166/APP/6.2.20)**, would not contribute significantly to Welsh Carbon Budgets or UK Carbon Budgets.

Therefore, it can be assessed that the magnitude of impact is assessed as negligible for both the local population and the vulnerable sub-population.

21.6.39 Overall, the likely effect on human health arising from impacts on climate change, mitigation and adaptation through changes to GHG emissions during the Proposed Development construction phase is assessed to be **negligible (not significant)** for the general population, and **minor adverse (not significant)** for the more vulnerable sub-population.

Water quality or availability

21.6.40 Where construction works are undertaken within or in proximity to surface watercourses and groundwater there is potential for adverse impacts on water quality due to deposition or spillage of soils, sediment, oils, fuels, or other construction chemicals. There may also be indirect water quality impacts to downstream receptors, as contaminated water can propagate down to receiving water courses. This section assesses impacts to drinking water quality and quantity from a human health perspective. Sensitivity of the population to change is assessed as high due to the high reliance on safe drinking water for human health.

21.6.41 **Chapter 13: Water Environment and Flood Risk (EN010166/APP/6.2.13)** contains an assessment of impacts on surface and ground water. It finds that there is potential for impacts on water quality due to discharge of sediment laden water associated with construction and potential for spillage of soils, fuels, or other construction chemicals. However, additional sediment and pollution control measures would be applied, as well as good site management, and implementation of the **Framework CEMP (EN010166/APP/6.5)** employing general pollution prevention measures. Furthermore, the Proposed Development is not likely to impact local water supply. Therefore, magnitude of impact is assessed as negligible.

21.6.42 Overall, the likely effect on human health arising from impacts on water quality and availability during the Proposed Development construction phase is assessed to be **minor adverse (not significant)**.

Operation Phase

Health and Social Care Services

21.6.43 As discussed in **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)**, the Proposed Development would create, on average, 82 net direct FTE jobs during operation, 45 of which could go to residents outside of the 60-minute drive time area (see Table 19-8 of **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)**). These 45 operational staff may place extra demand on health and social care services if they move to the area, or if emergency treatment is required.

21.6.44 Sensitivity of the local population is medium. This reflects that GP practices local to the Proposed Development are, on average, operating above benchmark patient to GP ratios however routine self-reported census statistics indicate that 80.3% rate their health status as 'good' or 'very good'. Based on professional judgement, the population is considered to have a

medium capacity to adapt to change in relation to access to health and social care services.

21.6.45 The average proportion of the population aged under 16 within the study area is higher than in Flintshire and Wales. In addition to this, while the general population is considered to have medium sensitivity, there are likely to be some more vulnerable sub-populations within this; for example, those experiencing high deprivation or with pre-existing health conditions, within the small pockets of deprivation identified in the baseline. Therefore, children and more vulnerable sub-populations are likely to have higher reliance on health services and have been assessed as having a high sensitivity to changes to accessing healthcare services.

21.6.46 If workers reside locally already, they would likely be registered at a local practice currently and would not therefore place additional demand for services on local GPs. It is unlikely that many workers would move to live in the immediate area and access the GP surgeries local to the Proposed Development. However, under a worst-case, it is assumed that all of the approximately 45 operational workers who are not likely to live locally require places at local GPs. There are 19 FTE GPs at the six surgeries near to the Proposed Development and the patient to GP ratio is 1,926 patients per GP. If the additional 45 patients register at the six surgeries, this would very slightly increase the ratio for each GP to 1,928 patients per GP. As noted in the future baseline, the population of Flintshire is expected to grow by 3.0% by 2041. In a worst-case scenario where the number of GPs would remain the same, a 3.0% increase in population would increase the patient to GP ratio to 1,984 patients per GP. If the additional 45 operational workers register at the six surgeries, this would again very slightly increase the ratio for each GP to 1,986 patients per GP.

21.6.47 Due to the very limited scale of impacts upon healthcare services and the reversibility of the effect, the magnitude of these adverse impacts is assessed to be negligible.

21.6.48 Overall, likely effect on human health arising from impacts on access to health and social care services during the operational phase is assessed to be **negligible (not significant)** for the general population and **minor adverse (not significant)** for the more vulnerable sub-population.

Employment and income

21.6.49 Baseline data with respect to employment and income indicates that there is a relatively low claimant count in the study area and a relatively high average GDHI in Flintshire compared to Wales. Therefore, the local labour force in the study area is assessed to be of low sensitivity due to its limited capacity to benefit from additional employment and income opportunities.

21.6.50 As set out in **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)**, the Applicant estimates that the Proposed Development would require an average of 66 gross direct FTE jobs on-site over the operational period. **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)** estimates that, after accounting for displacement, leakage and multiplier effects, the Proposed Development would support, on average, 82 net additional jobs during the operational

period. Of these, 37 jobs per annum would be expected to be taken-up by residents within the 60-minute drive time area.

21.6.51 Direct jobs created would represent local job growth (a beneficial impact), although the overall change would be very small in the context of the total number of jobs available locally. Therefore, the magnitude of impact is assessed as negligible.

21.6.52 Overall, the likely effect on human health arising from impacts on employment and income during the Proposed Development operational phase is assessed to be **negligible (not significant)**.

Education and training

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

21.6.54 The Proposed Development would create a number of jobs, and as noted earlier, the Applicant would pursue an arrangement with TTE, or any other suitable training provider, for apprentices to work on the Proposed Development. The current proposal for this is one apprenticeship per year during operation, up to a maximum of 30. The Applicant is in the early stages of working with Coleg Cambria, Bangor University, and Wrexham University to align courses at nearby education facilities with skills required for the Proposed Development and other regional projects. Further, discussions between the Applicant and the regional skills partnership are ongoing. Though no formal commitments have been reached as of this stage, it is assumed that suitable arrangements would be in place for construction and operation of the Proposed Development to benefit both local socio-economic needs and those of the Proposed Development. It is considered that the assessment of significance is not dependent on these potential initiatives and so the assessment has not taken such measures into account in determining the impact and classification of effect. On this basis, the magnitude of impact on education and training in the operation phase is assessed to be low.

21.6.55 Overall, the Proposed Development could provide opportunities to provide good quality education and training opportunities which are beneficial to health. Therefore, the likely effect on human health arising from impacts on education and training during the Proposed Development operational phase is assessed to be **minor beneficial (not significant)**.

Transport modes, access, and connections

21.6.56 Residents of properties in the towns and villages surrounding the Proposed Development attempting to access healthcare, educational, and community facilities are likely to use the same strategic roads as operational traffic associated with the Proposed Development. Increased traffic flows and severance effects may inhibit the ability of local residents to access these facilities.

21.6.57 Baseline data shows that the study area experiences higher rates of good health but lower levels of educational attainment compared to Flintshire and

Wales as a whole. The sensitivity of the general population is therefore assessed to be low.

21.6.58 Sensitivity of the vulnerable sub-population is assessed to be medium. This reflects that sub-population includes a high representation of children who may be more reliant on transport to access health and social care services and educational facilities. Based on professional judgement, this sub-population may have limited capacity to adapt to change in relation to access to health and social care services and educational facilities.

21.6.59 **Chapter 10: Traffic and Transport (EN010166/APP/6.2.10)** sets out a reasonable worst-case assessment of the traffic and transport effects of the Proposed Development during the operational phase. It is forecast that there would be up to 12 HGVs, and 110 LGVs/cars travelling to and from the Main Development Area per day. Although this represents a long-term increase in the number of vehicles on the roads near to the Proposed Development, this is not considered to represent a perceptible change due to the existing access function between the Main Development Area and the Strategic Road Network.

21.6.60 There are no roads that could experience significant traffic and transport effects during operation in relation to severance. Given this, there is potential for only minor changes to quality-of-life and so the overall magnitude of impact is assessed to be negligible.

21.6.61 Overall, the effect on human health arising from impacts on transport modes, access, and connections during the Proposed Development operational phase is assessed to be **negligible (not significant)** for the general population, and **minor adverse (not significant)** for the more vulnerable sub-population.

Air quality

21.6.62 The operational activities of the Proposed Development have the potential to reduce air quality, due to operation emissions or traffic emissions which could lead to adverse health effects on residents.

21.6.63 Baseline data indicates that residents in the study area experience similar levels of good and bad health compared to Flintshire and Wales. The sensitivity of the general population with respect to air quality is therefore assessed to be low. Sensitivity of the vulnerable sub-population is assessed to be medium. This reflects that the sub-population includes a high representation of dependents (children). Children are more susceptible to the impacts arising from air quality, as their respiratory systems are still developing.

21.6.64 An assessment of potential air quality effects during the operation of the Proposed Development is set out in **Chapter 8: Air Quality (EN010166/APP/6.2.8)**. The chapter presents assessments of CCP emissions and operation traffic emissions. The operation emissions assessment undertaken determines that impacts to human health would not be significant with process contributions ranging from imperceptible to low adverse. For N-amines where the Predicted Environmental Concentration is assessed to be below the air quality assessment level at all sensitive

receptors, the overall effect is deemed to be minor and not significant with regard to air quality. The operation traffic assessment determines that effects would be imperceptible due to limited vehicles required for operation.

21.6.65 Given the available data and taking into account that residents across the study area would experience no significant effects on air quality, the magnitude of impact is expected to be negligible during the operational phase.

21.6.66 Therefore, the overall likely effect on human health arising from impacts on air quality during the operational phase is assessed to be **negligible (not significant)** for the general population and **minor adverse (not significant)** for the more vulnerable sub-population.

Noise and vibration

21.6.67 The operational activities of the Proposed Development have the potential to lead to increases in noise and vibration, which could lead to adverse health and wellbeing effects in terms of annoyance and/or disrupt local amenities.

21.6.68 An assessment of the risk of noise and vibration impacts during operation is provided in **Chapter 9: Noise and Vibration (EN010166/APP/6.2.9)**. Baseline data indicates that the main sources of noise include the noise generated by plant or equipment used on-site, generally expressed as sound power levels or the vibration generated by the plant. Existing baseline noise conditions of the Proposed Development suggests the local population is likely to already be accustomed to an industrial source of noise with the operation of Connah's Quay Power Station. In line with IEMA Health Scoping Guidance (Ref 21-15), the human health assessment uses **Chapter 9: Noise and Vibration (EN010166/APP/6.2.9)** to conduct a community level assessment. Therefore, taking into consideration the baseline noise conditions and existing exposure to noise, the sensitivity of the general population is considered to be low. Sensitivity of the vulnerable sub-population is assessed to be medium. This reflects that the sub-population includes a high representation of dependants (children). Children are more susceptible to the impacts arising from noise and vibration.

21.6.69 Operational vibration is scoped out of the assessment presented in **Chapter 9: Noise and Vibration (EN010166/APP/6.2.9)**.

21.6.70 For operational noise, there are no significant residual effects anticipated, and therefore the overall human health effect on the general population is not expected to be significant. Taking this into consideration, the magnitude of impact anticipated with respect to noise impacts on health during operation is assessed to be negligible. This reflects that the population would not experience a significant change in noise and therefore noise would likely not impact an individual's wellbeing.

21.6.71 The overall likely effect on human health arising from impacts on noise and vibration during the operational phase is assessed to be **negligible (not significant)** for the general population and **minor adverse (not significant)** for the vulnerable sub-population.

Open space, leisure, and play

21.6.72 As set out in the baseline of **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)**, there are a number of PRoWs within the Order limits and open spaces within 500 m of the Order limits. Given that there is a large network of PRoWs within the study area that could be used as substitutes in the case of PRoW closure, the sensitivity of the population to effects on PRoW is assessed to be low.

21.6.73 All of the PRoWs that are diverted during the construction phase would be re-opened during the operation phase and there would be no impacts to users.

21.6.74 Overall, there is likely to be **no effect** on human health arising from impacts on open space, leisure and play during the Proposed Development operational phase.

Climate change mitigation and adaptation

21.6.75 The study area contains a population who are in good health generally. Therefore, the local population may be less susceptible to impacts arising from GHG emissions, climate change mitigation and adaptation, and so has been assessed as having low sensitivity to change.

21.6.76 Sensitivity of the under-16 vulnerable sub-population is assessed as medium. This reflects the sub-population includes a high representation of children. Children are more susceptible to the impacts arising from GHG, as their respiratory systems are still developing. Children are also less able to adapt and respond to climate change impacts, therefore impacts on their health impacts could be disproportionate.

21.6.77 As outlined in **Chapter 20: Climate Change (EN010166/APP/6.2.20)**, the Proposed Development is projected to result in carbon emissions during its operation. Although emissions released have implications for UK and Welsh carbon budgets, the associated impacts of climate change from the emissions are not likely to be detrimental to human health and the Proposed Development is likely to deliver an emission reduction relative to the baseline. Therefore, the Proposed Development can be assessed as having a GHG impact that is of low magnitude from a human health perspective.

21.6.78 Overall, the likely effect on human health arising from impacts on climate change mitigation and adaptation through reduced GHG emissions during the Proposed Development operational phase is assessed to be **minor adverse (not significant)** for the general population, and **minor adverse (not significant)** for the more vulnerable sub-population.

Water quality or availability

21.6.79 The Proposed Development has the potential to impact water quality and availability during operation. Due to the high reliance of the local population on safe drinking water as a resource, sensitivity is assessed as high.

21.6.80 **Chapter 13: Water Environment and Flood Risk (EN010166/APP/6.2.13)** outlines that impacts to surface water could include process water and foul water containing pollutants and harmful chemicals being accidentally discharged into surface water receptors. Impacts to groundwater could

include contamination as a result of chemical spills and impacts to quality through introduction of new pathways along boundaries of subsurface infrastructure. However, with good site management and employment of general pollution prevention measures set out in **Chapter 13: Water Environment and Flood Risk (EN010166/APP/6.2.13)** and the **Framework CEMP (EN010166/APP/6.5)**, magnitude is assessed as negligible. Furthermore, the Proposed Development is not likely to impact local water supply as mains water is only required for domestic and sanitary use.

21.6.81 Overall, the likely effect on human health arising from impacts on water quality and availability during the Proposed Development operational phase is assessed to be **minor adverse (not significant)**.

Radiation and exposure to electromagnetic fields

21.6.82 Due to the Electrical Connection Corridor, the Proposed Development has the potential to expose local residents to EMF. The existing NGET 400 kV Substation and associated transmission/ distribution lines are currently operational. As detailed in the **Electricity Grid Connection Statement (EN010166/APP/7.2)** within the Electrical Connection Corridor a 400 kV single circuit cable route and control system cables would be installed primarily below ground at a depth of at least 1.1 m. Replacement of the existing 400 kV cables or other supporting above-ground assets within the Electrical Connection Corridor would be undertaken using existing access points (and below-ground cable conduits, if required).

21.6.83 Baseline information illustrates that residents in the study area have similar levels of good and poor health to Flintshire and Wales. There is also an existing substation (NGET 400 kV Substation) and associated transmission and distribution lines located in the study area, suggesting a pre-existing level of exposure to EMF. Therefore, the sensitivity of the population to EMF effects is considered to be medium.

21.6.84 It is assumed that the existing NGET 400 kV Substation and associated transmission/ distribution lines would remain operational during construction and operation of the Proposed Development. High-voltage underground cables can produce higher magnetic fields directly above them than an overhead line would produce at ground level, because the physical distance from the underground cable is smaller. However, the field falls more rapidly with distance to the sides, and they produce no external electric field. Such cables are not normally located beneath buildings (Ref 21-29).

21.6.85 As a result of the location of the Electrical Connection Corridor and its distance from residential areas (>175 m), the magnitude of any potential impact on human health is considered to be low.

21.6.86 Overall, the likely effect on human health arising from impacts on radiation during the Proposed Development operational phase is assessed to be **minor adverse (not significant)**.

Decommissioning Phase

21.6.87 As outlined in **Chapter 8: Air Quality (EN010166/APP/6.2.8)**, **Chapter 9: Noise and Vibration (EN010166/APP/6.2.9)**, **Chapter 10: Traffic and Transport (EN010166/APP/6.2.10)**, **Chapter 13: Water Environment and Flood Risk (EN010166/APP/6.2.13)**, **Chapter 19: Socio-Economics, Recreation and Tourism (EN010166/APP/6.2.19)**, and **Chapter 20: Climate Change (EN010166/APP/6.2.20)**, effects during the decommissioning phase of the Proposed Development are anticipated to be no worse than those experienced during the construction phase.

21.7 Additional Mitigation and Enhancement Measures

21.7.1 No additional mitigation or enhancement measures related to human health are proposed because there are no likely significant adverse effects anticipated.

21.8 Summary of Residual Effects

21.8.1 **Table 21-15**, **Table 21-16**, and **Table 21-17** summarise the residual effects of the Proposed Development on Human Health receptors.

Table 21-15: Summary of Residual Effects (Construction)

Determinant	Sensitivity (value)	Description of Impact	Magnitude of Impact Prior to Additional Mitigation	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
Health and social care services – general population	Medium	Impact of workforce on access to healthcare services	Low	N/A	Low	Minor adverse (not significant)
Health and social care services – vulnerable sub-population	High	Impact of workforce on access to healthcare services	Low	N/A	Low	Minor adverse (not significant)
Employment and income – general population	Low	Impact of employment	Low	N/A	Low	Minor beneficial (not significant)
Education and training – general population	Medium	Impact of educational activities or skills-based training provided by the Applicant	Low	N/A	Low	Minor beneficial (not significant)
Transport modes, access and connections – general population	Low	Impacts on access to health services and other social infrastructure	Low	N/A	Low	Minor adverse (not significant)
Transport modes, access and connections – vulnerable sub-population	Medium	Impacts on access to health services and other social infrastructure	Low	N/A	Low	Minor adverse (not significant)

Determinant	Sensitivity (value)	Description of Impact	Magnitude of Impact Prior to Additional Mitigation	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
Air quality – general population	Low	Impacts of air quality changes as a result of the Proposed Development	Low	N/A	Low	Minor adverse (not significant)
Air quality – vulnerable sub-population	Medium	Impacts of air quality changes as a result of the Proposed Development	Low	N/A	Low	Minor adverse (not significant)
Noise and vibration – general population	Low	Impacts arising from increased exposure to noise	Low	N/A	Low	Minor adverse (not significant)
Noise and vibration – vulnerable sub-population	Medium	Impacts arising from increased exposure to noise	Low	N/A	Low	Minor adverse (not significant)
Open space, leisure and play – general population	Low	Impacts on open spaces, PRoW, recreational facilities and opportunities for physical activity and active travel	Low	N/A	Low	Minor adverse (not significant)
Climate change mitigation and adaptation – general population	Low	Impacts arising from increased or reduced exposure to GHG emissions	Negligible	N/A	Negligible	Negligible (not significant)
Climate change mitigation and	Medium	Impacts arising from increased or reduced	Negligible	N/A	Negligible	Minor adverse (not significant)

Determinant	Sensitivity (value)	Description of Impact	Magnitude of Impact Prior to Additional Mitigation	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
adaptation – vulnerable sub-population		exposure to GHG emissions				
Water quality or availability – general population	High	Impacts to ground or surface water that could affect drinking water	Negligible	N/A	Negligible	Minor adverse (not significant)

Table 21-16: Summary of Residual Effects (Operation)

Receptor	Sensitivity (value)	Description of Impact	Magnitude of Impact Prior to Additional Mitigation	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
Health and social care services – general population	Medium	Impact of workforce on access to healthcare services	Negligible	N/A	Negligible	Negligible (not significant)
Health and social care services – vulnerable sub-population	High	Impact of workforce on access to healthcare services	Negligible	N/A	Negligible	Minor adverse (not significant)
Employment and income – general population	Low	Impact of employment	Negligible	N/A	Negligible	Negligible (not significant)
Education and training – general population	Medium	Impact of educational activities or skills-based training provided by the Applicant	Low	N/A	Low	Minor beneficial (not significant)
Transport modes, access and connections – general population	Low	Impacts on access to health services and other social infrastructure	Negligible	N/A	Negligible	Negligible (not significant)

Receptor	Sensitivity (value)	Description of Impact	Magnitude of Impact Prior to Additional Mitigation	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
Transport modes, access and connections – vulnerable sub-population	Medium	Impacts on access to health services and other social infrastructure	Negligible	N/A	Negligible	Minor adverse (not significant)
Air quality – general population	Low	Impacts of air quality changes as a result of the Proposed Development	Negligible	N/A	Negligible	Negligible (not significant)
Air quality – vulnerable sub-population	Medium	Impacts of air quality changes as a result of the Proposed Development	Negligible	N/A	Negligible	Minor adverse (not significant)
Noise and vibration – general population	Low	Impacts arising from increased exposure to noise	Negligible	N/A	Negligible	Negligible (not significant)
Noise and vibration – vulnerable sub-population	Medium	Impacts arising from increased exposure to noise	Negligible	N/A	Negligible	Minor adverse (not significant)

Receptor	Sensitivity (value)	Description of Impact	Magnitude of Impact Prior to Additional Mitigation	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
Open space, leisure and play – general population	Low	Impacts on open spaces, PRoW, recreational facilities and opportunities for physical activity and active travel	No impact	N/A	No impact	No effect (not significant)
Climate change mitigation and adaptation – general population	Low	Impacts arising from increased or reduced exposure to GHG emissions	Low	N/A	Low	Minor adverse (not significant)
Climate change mitigation and adaptation – vulnerable sub-population	Medium	Impacts arising from increased or reduced exposure to GHG emissions	Low	N/A	Low	Minor adverse (not significant)
Water quality or availability – general population	High	Impacts to ground or surface water that could affect drinking water	Negligible	N/A	Negligible	Minor adverse (not significant)
Radiation and exposure to EMFs	Medium	Impacts arising from increased exposure to EMFs	Low	N/A	Low	Minor adverse (not significant)

Table 21-17: Summary of Residual Effects (Decommissioning)

Determinant	Sensitivity (value)	Description of Impact	Magnitude of Impact Prior to Additional Mitigation	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
Health and social care services – general population	Medium	Impact of workforce on access to healthcare services	Low	N/A	Low	Minor adverse (not significant)
Health and social care services – vulnerable sub-population	High	Impact of workforce on access to healthcare services	Low	N/A	Low	Minor adverse (not significant)
Employment and income – general population	Low	Impact of employment	Low	N/A	Low	Minor beneficial (not significant)
Education and training – general population	Medium	Impact of educational activities or skills-based training provided by the Applicant	Low	N/A	Low	Minor beneficial (not significant)
Transport modes, access and connections – general population	Low	Impacts on access to health services and other social infrastructure	Low	N/A	Low	Minor adverse (not significant)

Determinant	Sensitivity (value)	Description of Impact	Magnitude of Impact Prior to Additional Mitigation	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
Transport modes, access and connections – vulnerable sub-population	Medium	Impacts on access to health services and other social infrastructure	Low	N/A	Low	Minor adverse (not significant)
Air quality – general population	Low	Impacts of air quality changes as a result of the Proposed Development	Low	N/A	Low	Minor adverse (not significant)
Air quality – vulnerable sub-population	Medium	Impacts of air quality changes as a result of the Proposed Development	Low	N/A	Low	Minor adverse (not significant)
Noise and vibration – general population	Low	Impacts arising from increased exposure to noise	Low	N/A	Low	Minor adverse (not significant)
Noise and vibration – vulnerable sub-population	Medium	Impacts arising from increased exposure to noise	Low	N/A	Low	Minor adverse (not significant)

Determinant	Sensitivity (value)	Description of Impact	Magnitude of Impact Prior to Additional Mitigation	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
Open space, leisure and play – general population	Low	Impacts on open spaces, PRoW, recreational facilities and opportunities for physical activity and active travel	Low	N/A	Low	Minor adverse (not significant)
Climate change mitigation and adaptation – general population	Low	Impacts arising from increased or reduced exposure to GHG emissions	Negligible	N/A	Negligible	Negligible (not significant)
Climate change mitigation and adaptation – vulnerable sub-population	Medium	Impacts arising from increased or reduced exposure to GHG emissions	Negligible	N/A	Negligible	Minor adverse (not significant)
Water quality or availability – general population	High	Impacts to ground or surface water that could affect drinking water	Negligible	N/A	Negligible	Minor adverse (not significant)

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