



**AQUIND Limited**

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## **PEIR CHAPTER 25**

Human Health



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## 25 HUMAN HEALTH

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### 25.1 SCOPE OF THE ASSESSMENT

#### 25.1.1 INTRODUCTION

25.1.1.1 This chapter provides the preliminary human health assessment of the Proposed Development. The Proposed Development that forms the basis of this assessment is described in Chapter 3 - Description of the Proposed Development.

25.1.1.2 The human health assessment considers the potential impacts associated with the construction and operation of the Proposed Development on the following health determinants:

- Converter Station Area:
  - Air quality;
  - Noise;
  - Landscape and greenspace;
  - Employment and economy;
  - Soil/land contamination; and
  - Personal safety.
- Onshore Cable Corridor and Landfall:
  - Air quality;
  - Noise;
  - Transport and access;
  - Employment and economy;
  - Landscape and greenspace;
  - Soil/land contamination; and
  - Personal safety.

25.1.1.3 At the ES stage, issues identified within the PINS Scoping Opinion including water quality, exercise/physical activity and access to healthcare will be addressed.

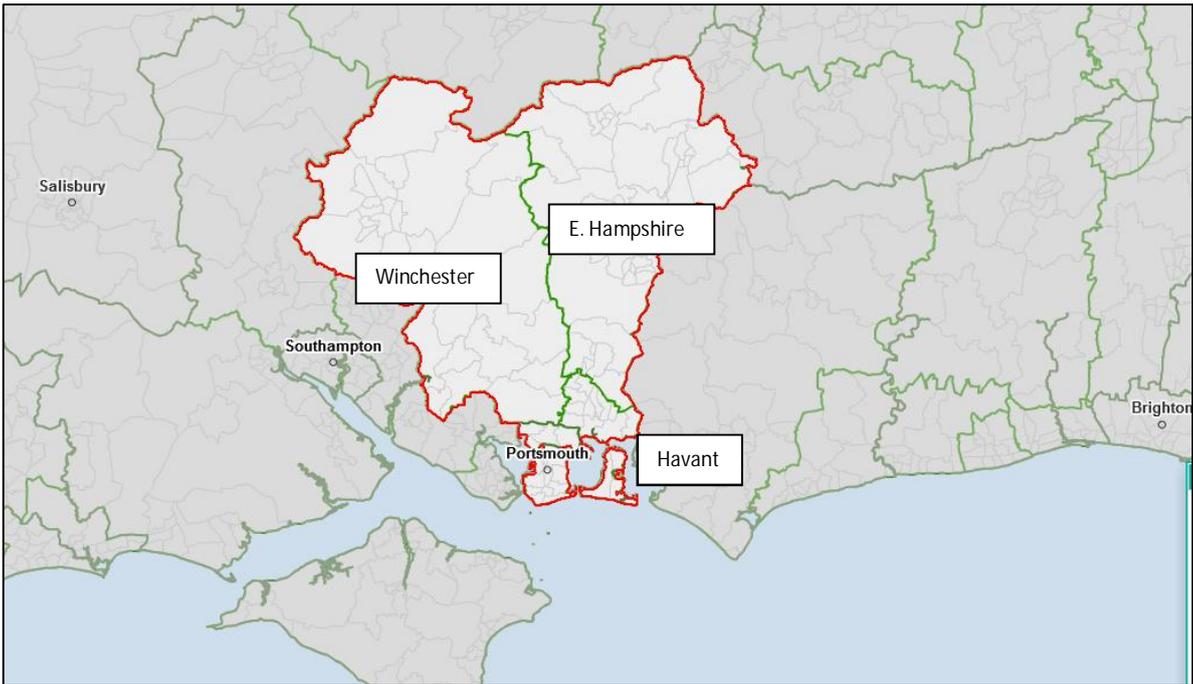
25.1.1.4 Prior to the 2017 EIA Regulations, the assessment of health in EIA focussed on impacts identified through other environmental topic assessments, such as air quality or land contamination. The 2017 EIA Regulations are interpreted as requiring a wider consideration of health impacts (IEMA, 2018). A formal methodology for the assessment of health in EIA is yet to be prepared or adopted, therefore this assessment utilises extensive professional experience in both EIA and the practice of Health Impact Assessment ('HIA').

## 25.1.2 STUDY AREA

- 25.1.2.1 The geographic scopes of the human health assessment have been selected on the basis of the scale of the development, as impacts could potentially be experienced at a district authority level. In addition, population and health data is consistently available at the district authority level. Therefore the study areas in this chapter are the areas of Winchester and East Hampshire local authority districts for the Converter Station Area assessment (Plate 25.1) and the areas of Winchester, East Hampshire, Havant local authority districts and Portsmouth unitary authority for the Onshore Cable Corridor and Landfall assessment (Plate 25.2). These areas are referred to as the districts.
- 25.1.2.2 Plate 25.2 The potential health impacts are likely to be greatest (and potentially significant) in the community surrounding the Proposed Development. While the Proposed Development has the potential to impact on the population outside of the area directly affected, these will be less than those impacts felt by the local community and unlikely to be significant.
- 25.1.2.3 The proposed population to be assessed within this chapter is:
- Proposed Converter Station Area: Residents within Winchester and East Hampshire; and
  - Onshore Cable Route and Landfall: Residents within Portsmouth, Havant, Winchester and East Hampshire.
- 25.1.2.4 Although the assessment assumed that human receptors are of high sensitivity, it is proposed that this human health assessment will prioritise the following vulnerable groups identified by looking at the current population baseline:
- Older people;
  - People with existing health conditions;
  - Unemployed and low-income groups; and
  - Socially excluded or isolated groups.



**Plate 25.1 - Proposed Converter Station Site Health Study Area**



**Plate 25.2 – Onshore Cable Route and Landfall Health Study Area**

## 25.2 LEGISLATION, POLICY AND GUIDANCE

25.2.1.1 This assessment has taken into account the current legislation, policy and guidance relevant to human health. These are listed below.

### 25.2.2 PLANNING POLICY

#### National Policy

##### Overarching National Policy Statement for Energy (EN-1)

- The Overarching National Policy Statement for Energy (NPS EN-1) (Department of Energy and Climate Change, 2011) was adopted in 2011. The NPS EN-1 sets out the Government’s national policy for the energy and infrastructure sector.
- Paragraph 5.13.1 of the NPS EN-1 recognises that energy production has the potential to impact on the health and well-being of a population. Paragraph 5.13.1 identified that that ES should assess these effects for each element of the project, identifying any adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate.

##### National Planning Policy Framework

- The NPPF supports ‘promoting healthy and safe communities’ and its core planning principles require consideration of local strategies for health improvement in both plan-making and decision-taking. In particular, the social dimension of sustainable development created a role for the planning system to promote healthy communities. It emphasises on the need to manage patterns of growth to make the fullest possible use of public transport, walking and cycling. According to the framework, the planning system can play an important role in facilitating social interaction and creating healthy, inclusive communities.

##### National Planning Practice Guidance

- The NPPG was published in 2014 and is regularly updated to reflect changes in wider government policy, priorities and secondary legislation such as the EIA Regulations. It adds further context to the NPPF, as well as replacing previous planning guidance documents. Together, the NPPF and NPPG set out what the Government expects of local authorities.
  - ¡ The NPPG identifies a healthy community as one that is;
    - § “...a good place to grow up and grow old in. It is one which supports healthy behaviours and supports reductions in health inequalities. It should enhance the physical and mental health of the community...”
  - ¡ The emerging Draft Planning Practice Guidance (Consultation March 2018) also states:

§ *“Plan-making authorities may work with public health leads and health organisations to understand and take account of the health status and needs of the local population, including the quality, quantity of and accessibility to healthcare and the effect any planned growth may have on this. Authorities should also assess quality, quantity of and accessibility to green infrastructure, sports, recreation and places of worship including expected future changes, and any information about relevant barriers to improving health and well-being”.*

## Local Policy

### Portsmouth City Council

- The Portsmouth Plan is the principal planning policy document in the city's Local Plan and replaces a large number of policies in the Portsmouth City Local Plan.
  - ¡ Portsmouth City Local Plan 2006, Retained Policies – DC21 Contaminated Land; DC31 Employment Sites Outside the Primary Areas (Portsmouth City Council, 2006). These policies identify that permission will only be granted for development on or near contaminated land where appropriate and sufficient measures can be taken to deal with the contamination; and that activities at sites and premises currently used for employment will be permitted provided that there is no unacceptable adverse effect on the amenity of adjoining or nearby residents.
  - ¡ The Portsmouth Plan 2012 – PCS12 Flood Risk; PCS13 A Green Portsmouth; PCS14 A Healthy City; PCS17 Transport; PCS18 Local Shops and Services; PCS23 Design and Conservation (Portsmouth City Council, 2012). These policies identify that the city council will reduce flood risk by following the flood risk management hierarchy; protect, enhance and develop the green infrastructure network; create a healthy city and improve the health and well-being of its residents; provide a sustainable and integrated transport network; and ensure local shops continue to provide essential services to their local communities. Furthermore, policy PCS23 identifies that new development must be well designed and, in particular, respect the character of the city.
- Partnership for Urban South Hampshire ('PUSH') Green Infrastructure Strategy
  - ¡ Portsmouth City Council is working with its partner authorities as part of PUSH to deliver the PUSH Green Infrastructure Strategy which aims to increase the amount of open space and access to open space within the PUSH area (Portsmouth City Council, 2012).

## Havant Borough Council

- The Havant Borough Local Plan (2011) sets out how the borough will develop in the future. This Local Plan will remain in place until the Havant Borough Local Plan 2036 is adopted.
  - Havant Borough Core Strategy 2011 - CS1 Health and Wellbeing; CS2 Employment; CS3 Skills and Employability; CS6 Regeneration of the Borough; CS7 Community Support and Inclusion; CS8 Community Safety; CS11 Protecting and Enhancing the Special Environment and Heritage of Havant Borough; CS13 Green Infrastructure; CS16 High Quality Design; CS20 Transport and Access Strategy (Havant Borough Council, 2011). CS1 Health and Wellbeing is a key policy to creating a place where people want to live, visit or work. Other listed policies identify the need to raise skill levels and increase employability; positively contribute through social, economic and/or physical regeneration; have community and local stakeholder involvement; consider of services for older people and other vulnerable groups; engrain community safety into the development process; protect and enhance the environment; maintain, manage, improve and create green infrastructure where possible; design to a high standard, helping to create places where people want to live, work and relax; and support and improve the transport networks.

## Winchester City Council

- The Winchester District Local Plan has been adopted by Winchester City Council. The South Downs Local Plan has replaced the existing planning policies operating across the South Downs National Park, superseding the parts of the Winchester District Local Plan covering the National Park. The Winchester District Local Plan is the long term strategic plan for development within Winchester District to 2031.
  - Joint Core Strategy 2013 – CP6 – Local Services and Facilities; CP7 – Open Space, Sport and Recreation, CP9 – Retention of Employment Land and Premises, CP10 – Transport; CP13 High Quality Design; CP15 – Green Infrastructure; CP17 – Flooding, Flood Risk and the Water Environment (Winchester City Council, 2013). These policies promote the retention of existing and the provision of new services and support facilities; sustainable transport alternatives; protection and enhancement of valuable environments and wildlife assets; high quality design; a positive contribution to the public realm; and the provision, protection and enhancement green infrastructure.

## East Hampshire District Council

- The East Hampshire Local Plan is a long-term document that will shape and guide development in East Hampshire to 2028. East Hampshire District Council is now reviewing its Local Plan. Consultation on draft plan will be undertaken in 2019.
  - i Joint Core Strategy: CP1 Presumption in favour of sustainable development; CP5 Employment and workforce skills; CP11 Housing tenure, type and mix; CP16 Protection and provision of social infrastructure; CP17 Protection of open space, sport and recreation and built facilities; CP20 Landscape; CP26 Water resources/water quality; CP27 Pollution; CP28 Green Infrastructure; CP31 Transport; CSWB2 Sustainable economic development; CSWB10 Green infrastructure (East Hampshire District Council, 2014). These policies promote a positive approach that reflects the presumption in favour of sustainable development when considering development; improves workforce skills and employability, promotes and supports skills and employment provisions, and addresses barriers to employment; addresses housing requirements; promotes and protects social infrastructure and open space; protect and enhance local distinctiveness sense of place and tranquillity; maintains, manages and enhances green infrastructure networks; protects and enhances water quality; does not affect health and safety of communities and their environments; and protects and enhances the quality, viability, availability, accessibility of public transport, and cycle and pedestrian links.
  - i East Hampshire District Local Plan: Second Review (Saved policies): HE18 Historic Parks and Gardens; HE19 Ancient Tracks and Lanes, Environmental Improvements; T4 Pedestrians and Cyclists, Cycling, Walking/Horse-riding; IB2 Industrial or Business Development within Settlement Policy Boundaries; IB3 Industrial and Business Development in the Countryside; HC2 Provision of facilities and services with new development; UI1 New Utility Infrastructure in the Countryside (East Hampshire District, 2006). These policies promote the protection of parks and gardens, and ancient tracks and lane; and the amenity of users of footpaths, bridleways, or cycleways. It identified that industrial or business developments (including new utility infrastructure) should not harm the enjoyment/amenity of occupiers of nearby properties, should not generate traffic of a type or amount inappropriate to local roads and should not harm the character of the site or of the countryside.

## GUIDANCE

### 25.2.2.1

As there is currently no established guidance on assessment of human health within EIA. Current best practise has been developed from the following documents:

- PHE, 2017. Health and Environmental Impact Assessment: A Briefing for Public Health Teams in England;
  - ┆ This document is aimed at public health professionals to inform them of the changes to the EIA Regulations and how they can contribute to the EIA process;
- Cave, B., Fothergill, J., Pyper, R., Gibson, G., and Saunders, P., 2017. Health in Environmental Impact Assessment: A Primer for a Proportionate Approach. Ben Cave Associates Ltd., IEMA and the Faculty of Public Health. Lincoln, England;
- Information from Health Impact Assessment practice;
  - ┆ Rather than creating a new methodology, an existing scale to define significance has been adopted from that used by the IOM for the North Staffordshire ‘Streetcar’ Bus Rapid Transport Scheme Health Impact Assessment, IOM, 2009;
- A Joint Strategic Needs Assessment prepared by Health and Wellbeing Boards is a key strategy for local planning authority to take into account to improve health and well-being and provides useful evidence for plan-making authorities (Ministry of Housing, Communities and Local Government, 2017);
  - ┆ Portsmouth City Council, Joint Strategic Needs Assessment (Portsmouth City Council, 2018);
  - ┆ Hampshire County Council, Joint Strategic Needs Assessment (Hampshire County Council, 2017); and
- The local authorities in the South of Hampshire are promoting a regional Partnership for Urban South Hampshire (‘PUSH’). This is a grouping of local authorities (Portsmouth, Southampton, Hampshire County Council, Fareham, Gosport, Havant, Eastleigh, Winchester, Test Valley and East Hampshire) who cooperate to help create a more prosperous, attractive and sustainable South Hampshire offering a better quality of life (Portsmouth City Council, 2012).

## **25.3 SCOPING OPINION AND CONSULTATION**

### **25.3.1 SCOPING OPINION**

- 25.3.1.1 As detailed within Chapter 1 Introduction, a Scoping Opinion was received by the Applicant from PINS (on behalf of the SoS) on 07 December 2018, including formal responses from statutory consultees and the Marine Management Organisation. There were no comments received from the LPA Scoping Opinions relating to human health. The responses from PINS in relation to Population and Human Health are set out below in Table 25.1.
- 25.3.1.2 Appendix 5.3 provides a complete set of responses in the PEIR to the contents of the Scoping Opinion.

**Table 25.1 – PINS Scoping Opinion Responses**

<b>Scoping Opinion Ref</b>	<b>Summary of Comment Received</b>	<b>How this has been addressed by the Applicant</b>
<p><b>4.23.1, Table 28.7</b></p>	<p>The Inspectorate notes that these health determinants are proposed to be scoped out of the health assessment. The Inspectorate agrees that these matters can be scoped out of the ES given the nature of the Proposed Development and the information provided within the Scoping Report. Those matters identified within Table 28.7 that the Inspectorate does not agree to scope out are described separately below.</p>	<p>Those matters that the Inspectorate does not agree to scope out are addressed below.</p>
<p><b>4.23.2, Table 28.7</b></p>	<p>Whilst the Inspectorate acknowledges that an assessment of impacts associated with construction (including dust and vehicle emissions) on sensitive receptors are to be included in the Air Quality aspect chapter, the ES should ensure that it relates the assessment of air quality to the assessment on human health. It is not necessary to duplicate assessments but appropriate cross-referencing between aspect chapters should be included.</p>	<p>A preliminary assessment of air quality effects on health is provided within the PEIR, Chapter 25 Human Health, and this will be further considered in the ES.</p>
<p><b>4.23.3, Table 28.7</b></p>	<p>Effects of water quality are to be included elsewhere in the ES; however, effects on human health associated with changes to water quality should be referenced in the Human Health aspect chapter, where significant effects could occur.</p>	<p>A preliminary assessment of water quality effects on health is provided within the PEIR, Chapter 25 Human Health, under the soil/ land contamination sub heading, and this will be further considered in the ES. Furthermore, the WFD Assessment – Marine (Appendix 7.1) assesses potential impacts on</p>

Scoping Opinion Ref	Summary of Comment Received	How this has been addressed by the Applicant
		recreational areas such as bathing waters. This will be cross referenced where relevant.
<b>4.23.4, Table 28.7</b>	<p>The Proposed Development may impact on Public Rights of Way (PRoW), cycle paths and open space and therefore, the Inspectorate cannot agree to scope this matter out, as there is the potential to reduce access to routes promoting active travel and physical activity. This matter should be included in the ES, where significant effects are likely to occur. Appropriate cross-references to other aspect chapters should also be included in the Human Health aspect chapter (e.g. Traffic and Transport, Socio-economics, and Landscape and Visual Amenity).</p>	<p>A preliminary assessment of these effects on health is provided within this chapter, under the 'Land take (landscape and greenspace)' heading. Reference has also been made to other chapters where relevant.</p>
<b>4.23.5, Table 28.7</b>	<p>Chapter 27: Socio-economics refers to a significant number of construction workers for the Proposed Development and the potential demand on local services including healthcare. The ES should include an assessment of effects on healthcare, where likely significant effects could occur. Cross-references between the Socio-economics chapter and this aspect chapter should be included.</p>	<p>The Socio-economics Chapter (Chapter 24) identifies that the level of detail regarding the construction stage required to undertake calculations relating to the specific numbers of construction workers was not available when scoping was undertaken and therefore information from the Applicant was used as a starting point. Employment generation and associated effects will be considered in further detail within the ES if likely significant effects are identified. The Socio-economics chapter has been cross-referenced within the PEIR, and will be cross-reference within the ES</p>

Scoping Opinion Ref	Summary of Comment Received	How this has been addressed by the Applicant
		regarding this aspect chapter.
<b>4.23.6, Table 28.7</b>	As per comments above regarding ‘access to healthcare’, given the statement that significant numbers of construction workers could arise as a result of the Proposed Development, the ES should assess the impact on local rented accommodation demand and affordability, where likely significant effects could arise.	Disruption to businesses and community facilities access (including schools and healthcare) is considered within the Transport and Assess section of the PEIR. Employment generation and associated effects will be considered in further detail within the ES if likely significant effects are identified.
<b>4.23.7, Paragraphs 28.4.4 and 28.4.5</b>	Although the Scoping Report defines the study area this should be provided with justification in the ES.	The study area for the assessment is described and justified in this chapter, Section 1. This will also be justified with the ES.
<b>4.23.8, Paragraph 28.4.6</b>	It is noted that health impacts will be assessed on the vulnerable groups listed at paragraph 28.4.6 only. The ES should provide justification in support of this approach.	The vulnerable groups considered within the assessment are described in this chapter, Section 1. These were identified through an analysis of the current population baseline.
<b>4.23.9, Paragraph 28.4.7</b>	The baseline population health data should have reference to the Public Health Outcomes Framework.	Public Health England's health data is referenced within the baseline for this chapter.

Scoping Opinion Ref	Summary of Comment Received	How this has been addressed by the Applicant
4.23.10, Table 28.9	The Inspectorate notes the definitions of significance to be applied to the impact assessment. The ES should make clear whether the intention is to conclude that a certain level of significance and above is deemed to be significant for the purposes of satisfying the EIA Regulations (e.g. major/moderate and major (and potentially moderate), as per the Scoping Report Chapter 4). Should this aspect chapter assessment methodology for significance differ from that to be included in Chapter 4, this should be clarified in the aspect chapter.	This chapter sets out the approach to determining significance within the EIA. This is aligned with the methodology presented in Chapter 4.
n/a	The Scoping Report does not cross-refer to any other relevant aspect chapters where impacts could result on human health (e.g. noise, air quality, water quality, land use, landscape). The ES should include appropriate cross-references to relevant assessments presented elsewhere in the ES.	This chapter identifies where other topics are cross referenced.

### Consultation

- 25.3.1.3 Consultation is a key part of the DCO application process. Further consultation will continue to be undertaken once the PEIR is made available, during further consultation opportunities and the project DCO application submission. Consultation with the EHO of the relevant Local Authorities will be undertaken to support the approach to the human health assessment in the ES.
- 25.3.1.4 Full details of project consultation for all disciplines are presented within Chapter 5 - Consultation.

## **25.4 METHODS OF ASSESSMENT**

- 25.4.1.1 Health impacts of the Proposed Development are assessed against each of the determinants of health (identified in Section 24.1), looking first at the baseline conditions within the study area, evidence of how each determinant affects health and then the effect that the Proposed Development has on the health of the population via the determinant category.
- 25.4.1.2 The evaluation of potential effects takes into account the strength of evidence for the health outcome, the number of people affected, the duration of the change, its frequency and reversibility. The vulnerability of the population experiencing the impact and their ability to absorb the impacts is considered. Where specific population groups are predicted to be particularly affected by a health impact, this is identified. The assessment assumes that a set of specifically human receptors are explicitly vulnerable (Section 24.1.7).
- 25.4.1.3 The assessment focuses on potential significant effects on human health from the Proposed Development. The assessment outlined in this chapter is based on the assessments of significant residual effects generated from other topics in the PEIR which have associated consideration of human health or aspects that effect human health. In particular this includes the consideration of Chapter 15 Landscape and Visual Amenity, Chapter 17 Soils and Agricultural Land Use, Chapter 18 Ground Conditions, Chapter 21 Traffic and Transport, Chapter 22 Air Quality, Chapter 23 Noise and Vibration, Chapter 25 Socio-economics and consideration of Electro-Magnetic Fields within Chapter 3 to identify health and wellbeing outcomes.

### **25.4.2 SIGNIFICANCE CRITERIA**

- 25.4.2.1 One of the challenges for the assessment of human health is defining significance of effects in the absence of guidance or universal applications of the terminology (Cave *et al.*, 2017). Rather than creating a new methodology, an existing scale to define significance has been adopted. The approach in this assessment has been adapted from that used by the IOM for the North Staffordshire 'Streetcar' Bus Rapid Transport Scheme Health Impact Assessment, IOM, 2009. Significance incorporates the intensity of the impact and its potential duration, as illustrated in Table 25.2.

#### 25.4.2.2

As identified within Chapter 4, effects deemed to be significant for the purpose of assessment are those which are described as 'major' and 'moderate/major'. In addition, 'moderate' effects can also be deemed as significant.

**Table 25.2 – Assessment Scale and Definition of Significance**

<b>Significance of Effect</b>	<b>Definition</b>	<b>Intensity [+/-]</b>	<b>Duration (SML) (TIP)</b>
<b>Major Adverse</b>	Health effects are categorised as a major negative if they could lead directly to deaths, acute or chronic diseases or mental ill health. They can affect either or both physical and mental health either directly or through the wider determinants of health and wellbeing. These effects can be important local, district, regional and national considerations. Mitigation measures and detailed design work can reduce the level of negative effect though residual effects are likely to remain.	The exposures tend to be of high intensity. Over a large geographical area or affect a large number of people or impact vulnerable groups. (- - - / + +)	Long term duration (L) Intermittent (I) Temporary (T) or Permanent (P) in nature
<b>Major beneficial</b>	Health effects are categorised as a major positive if they prevent deaths/prolong lives, reduce/prevent the occurrence of acute or chronic diseases or significantly enhance mental wellbeing would be a major positive.		
<b>Moderate Adverse</b>	Health effects are categorised as a moderate negative if the effects are long term nuisance impacts, e.g. odours and noise, or may lead to exacerbations of existing illness. The negative impacts may be nuisance/quality of life impacts which may affect physical and mental health either directly or through the wider determinants of health. The cumulative effect of a set of	The exposures tend to be of moderate intensity and/or over a relatively localised area and/or likely to affect a moderate-large number of people e.g. between 100-500 and/or sensitive groups (- - / + +)	Medium term duration (M) Intermittent (I) Temporary (T) or permanent (P) in nature.

Significance of Effect	Definition	Intensity [+/-]	Duration (SML) (TIP)
	<p>moderate effects can lead to a major effect. These effects can be important local, district and regional considerations. Mitigation measures and detailed design work can reduce and in some/many cases remove the negative and enhance the positive effects though residual effects are likely to remain</p>		
<b>Moderate Beneficial</b>	<p>Health effects are categorised as a moderate positive if they enhance mental wellbeing significantly and/or reduce exacerbations to existing illness and reduce the occurrence of acute or chronic diseases.</p>		
<p><b>Minor Adverse</b></p> <p><b>Minor Beneficial</b></p>	<p>Health effects are categorised as minor positive or negative, if they are generally lower level quality of life or wellbeing impacts. Increases or reductions in noise, odour, visual amenity, etc. are examples of such effects. These effects can be important local considerations. Mitigation measures and detailed design work can reduce the negative and enhance the positive effects such that there are only some residual effects remaining.</p>	<p>The exposures tend to be of low intensity and/or over a small area and/or affect a small number of people e.g. less than 100 (- / +)</p>	<p>Short term duration (S) Intermittent (I) Temporary (T) or permanent (P) in nature.</p>
<b>Neutral/No</b>	<p>No health effect or effects within the bounds of normal/accepted variation.</p>	N/A	N/A

### 25.4.3 ASSUMPTIONS AND LIMITATIONS

- 25.4.3.1 This chapter of the PEIR provides current preliminary information as it relates to the Proposed Development to date, as well as both baseline information and the assessment as far as it has progressed at this stage.
- 25.4.3.2 The information contained herein is intended to inform consultation responses at this stage. This assessment of potential significant effects as a result of the Proposed Development on identified sensitive receptors will be revisited at subsequent stages to inform the ES as the Proposed Development is refined. Specific mitigation measures will also be considered as part of the assessments.
- 25.4.3.3 The preliminary assessment is based on professional judgement and takes into account both the adverse and beneficial contribution that the Proposed Development could have on receptors. The chapter provides a broad, high level indication of potential effects on human health. The assessment of effects is based on a desk based study of the area. The consultant's professional judgement and experience in both EIA and the practice of HIA. Relevant information from other PEIR Chapter including Chapter 15 Landscape and Visual, Chapter 17 Soils and Agricultural Land Use, Chapter 18 Ground Conditions, Chapter 21 Traffic and Transport, Chapter 22 Air Quality, Chapter 23 Noise and Vibration, Chapter 25 Socio-economics and consideration of Electro-Magnetic Fields within Chapter 3 have been used in helping to assess the magnitude of effects of the Proposed Development on receptors.
- 25.4.3.4 The assessment will rely, in part, on data provided by third parties (for example local authorities, OS Mapping, Local Authorities, ONS and Public Health England ('PHE')) which are the most up-to-date available at the time of the assessment. The majority of the statistical information used in the assessment is based on the 2011 census and projected changes since 2011. The next census will not be undertaken until 2021 and therefore for this assessment the use of the 2011 data is necessary.
- 25.4.3.5 For decommissioning stage for the Converter Station Area it is assumed that similar effects to construction would arise. When decommissioned the Cable Route, it may be retained in situ, however, if it is reclaimed then similar impacts to the Onshore Cable Route construction are assumed. This will be further considered during the ES stage. During operation, there is the potential for scenarios requiring cable repair. Effects associated with this activity would be similar to the construction impacts.

## 25.5 BASELINE ENVIRONMENT

- 25.5.1.1 The study area was analysed to determine how it performs across a number of indicators which are related to potential health impacts of the proposed Converter Station Area, Onshore Cable Route and Landfall. These were:
- Population Characteristics;

- Employment;
- Landscape and land use;
- Access to greenspace;
- Transport and access;
- Noise;
- Air Quality; and
- Soil and land contamination.

25.5.1.2 Data from the above indicators themes were used to provide a profile of the study area population and health baseline.

## 25.5.2 POPULATION CHARACTERISTICS

### Population and age profiles

25.5.2.1 The population of the districts within the study area, according to the 2011 census are:

- East Hampshire – 115,608;
- Havant – 120,684;
- Portsmouth – 205,056; and
- Winchester – 116,595.

25.5.2.2 As identified within Chapter 24 Socio Economics, the 2017 ONS Population estimates for the four districts with the study area are:

- East Hampshire – 119,392;
- Havant – 125,065;
- Portsmouth – 214,718; and
- Winchester – 123,879.

25.5.2.3 The population levels within East Hampshire, Havant and Winchester are similar, however it is notable that within Portsmouth the population levels are almost twice as high, emphasising the urbanised nature of Portsmouth and the high population density compared with the more rural nature of the other authority areas.

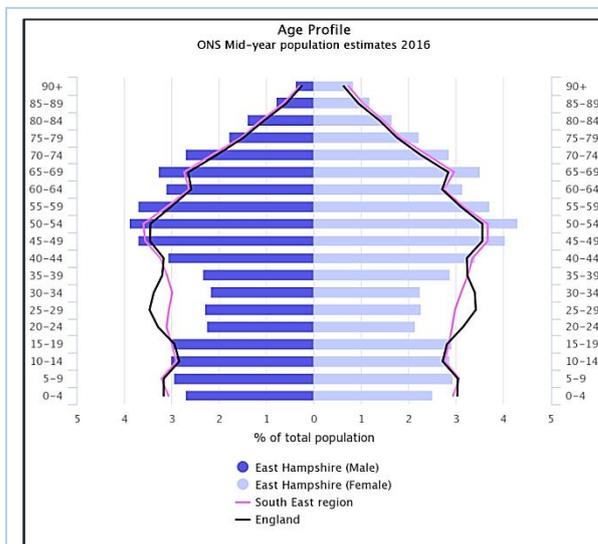
25.5.2.4 Population data for the districts within the study area is presented by age range within Table 25.3 below.

**Table 25.3 – Population groups (% of total population) (ONS, 2011a)**

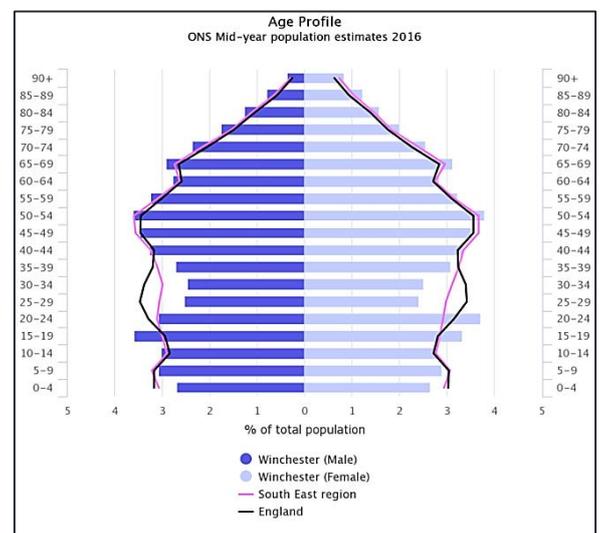
Location	Age range (% of total population 2011)					
	0 – 14	15 – 24	25-29	30 – 44	45 – 64	65 +
East Hampshire	17.3	11.0	4.4	18.4	29.6	19.3
Havant	16.8	11.9	5.3	17.4	27.4	21.1
Portsmouth	17.3	18.9	8.3	20.3	21.9	13.4

Location	Age range (% of total population 2011)					
	0 – 14	15 – 24	25-29	30 – 44	45 – 64	65 +
Winchester	17.2	13.4	4.8	18.9	27.0	18.7
South East Region	17.8	12.5	6.1	20.4	26.1	17.2
England	17.7	13.1	6.9	20.6	25.4	16.3

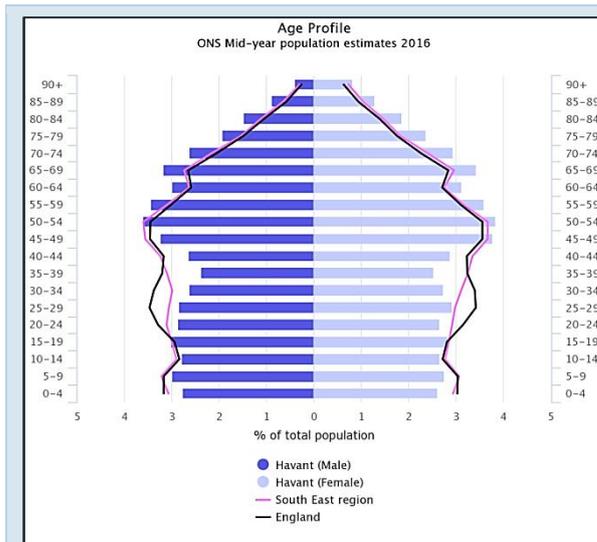
- 25.5.2.5 Age profile for East Hampshire, Winchester and Havant indicate that population of these study areas are generally older than both the regional and national profile, with lower representation of age groups between 20 to 39 years (see Plate 25.3, Plate 25.4 and Plate 25.5).
- 25.5.2.6 These districts have larger percentages of the population within the age range 45 to 65+ when compared to the South East (26.1%) and England (16.3%). This is consistent with Hampshire’s aging population (Hampshire County Council, 2017).
- 25.5.2.7 The age profile for Portsmouth indicates that the population of this study area is younger than both the regional and national profiles. Portsmouth has a higher representation of age groups between 15 to 34, and the largest demographic group aged between 15 to 44 when compared to other districts within the study area.



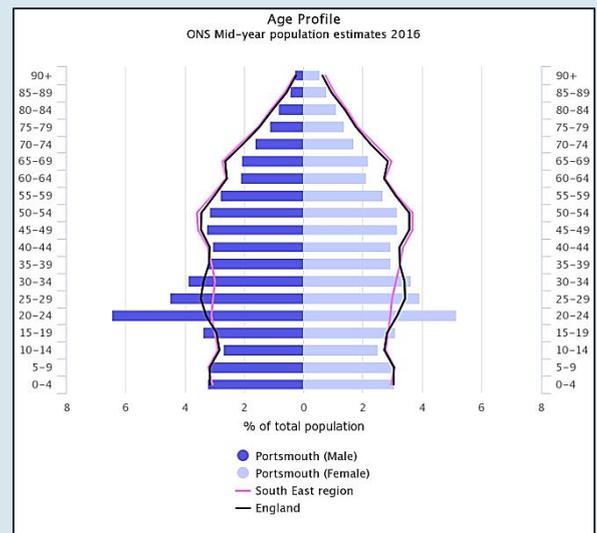
**Plate 25.3 - Age population profile for East Hampshire**



**Plate 25.4 - Age population profile for Winchester**



**Plate 25.5 - Age population profile for Havant**



**Plate 25.6 - Age population profile for Portsmouth**

**Index of Multiple Deprivation Score (IMD, 2015)**

- 25.5.2.8 The Indices of Deprivation present a comprehensive measure of relative deprivation, showing only that one area is more deprived than another. The English Indices of Deprivation 2015 use 37 separate indicators, organised across seven ‘domains’ of deprivation, which are combined to give the overall Indices of Multiple Deprivation (‘IMD’). This is an overall measure of multiple deprivation experienced by people living in an area.
- 25.5.2.9 The average score is calculated by averaging the Lower Layer Super Output Area (‘LSOA’) scores in each larger area after they have been population weighted. The more deprived the area, the higher the IMD score.
- 25.5.2.10 In terms of overall deprivation, three of the study area districts were less deprived than the national average, with Winchester and East Hampshire both being significantly less deprived than the national average and falling within the best percentile (75<sup>th</sup> percentile - best) (Table 25.4). Portsmouth, however, is considered to be more deprived than the national average.

The resultant scores for the areas can be ranked, where the rank of 1 (most deprived) is given to the area with the highest score. For overall deprivation, Portsmouth is ranked 63<sup>rd</sup> of 326 local authorities, whereas East Hampshire and Winchester are ranked 307 and 308 respectively (Table 25.4). Portsmouth is significantly more deprived with respect to its surrounding authorities. Table 25.4 – Study area Indices of Multiple Deprivation (Ministry of Housing, Communities and Local Government, 2015) Table 25.4 – Study area Indices of Multiple Deprivation (Ministry of Housing, Communities and Local Government, 2015)

Area	Indices of Multiple Deprivation – Average Score	Indices of Multiple Deprivation – Rank of the average score (of 326 Local Authority Districts)
East Hampshire	8.6	308
Havant	21.2	132
Portsmouth	27.1	63
Winchester	8.8	307
South East Region	-	-
England	21.8	-

25.5.2.11 Further consideration of deprivation is presented within Chapter 24 Socio-economics.

#### Life expectancy and mortality

25.5.2.12 Life expectancy within East Hampshire, Havant and Winchester districts indicate that on average populations live longer in these areas than the England average. However, the life expectancy in Portsmouth is observed to be significantly lower than the England average, with the male population having a lower life expectancy of 1.6 years less than the national average and female population of Portsmouth having an average life expectancy of 0.8 years less than the national average (Table 25.5).

Table 25.5 – Life expectancy at birth (PHE, 2018a)

Area	Life Expectancy at birth	
	Males	Females
East Hampshire	81.6	84.4
Havant	80.3	83.4
Portsmouth	77.9	82.3

Area	Life Expectancy at birth	
	Males	Females
Winchester	82.0	84.0
South East region	80.6	84.0
England	79.5	83.1

25.5.2.13

Table 25.6 identifies people's self-assessment of their general state of health in the study area and the percentage of residents with a long-term activity-limiting illness. The 2011 Census suggests that the health of the population within East Hampshire, Portsmouth and Winchester is good with a higher percentage of the residents considering themselves to be in 'very good health' compared to the national level. Havant is the only district that has a lower percentage of the residents considering themselves to be in 'very good health' compared to the national level. Havant is also the only district that has a higher percentage of the residents considering themselves to be in 'bad health' or 'very bad health' compared to both that in Portsmouth and the national level. However, Havant has a higher life expectancy than both Portsmouth and England as an average, which appears to conflict with its residents' perception of their health status.

**Table 25.6 – General Health of usual residents (2011)**

Area	Residence self-assessment of their general state of health (%)					Residents with a long-term activity-limiting illness (%)
	Very good	Good	Fair	Bad	Very bad	
East Hampshire	50.5	34.7	11.1	2.9	0.8	14.9
Havant	44.3	35.9	14.2	4.3	1.3	19.3
Portsmouth	47.7	34.8	12.4	3.9	1.2	16.0
Winchester	53.2	32.8	10.6	2.7	0.7	14.5
South East Region	49.0	34.6	12.0	3.4	1.0	17.6
England	47.2	34.2	13.1	4.2	1.2	15.7

25.5.2.14

Mortality from causes considered preventable<sup>1</sup> across all local authorities within the study areas implies that on average the residents of Portsmouth are less healthy than the population within other parts of the study areas, and less healthy than the average for the south-east region or the average England local authority (Table 25.6). Havant is similar to the national average but worse than the average for the south-east region. Both East Hampshire and Winchester have lower mortality rates from causes considered preventable.

**Table 25.7 – Mortality rate from causes considered preventable (Person) 2014-2016 (PHE, 2018b)**

<b>Area</b>	<b>Age Standardised rates of mortality from Causes Considered preventable (per 100,000 population)</b>
<b>East Hampshire</b>	140.1
<b>Havant</b>	178.1
<b>Portsmouth</b>	221.5
<b>Winchester</b>	134.0
<b>South East region</b>	159.6
<b>England</b>	182.8

25.5.2.15

Mortality from cancers considered preventable across all districts within the study areas implies that on average preventable cancer is responsible for a greater proportion of deaths amongst residents of Portsmouth than the population within other parts of the study areas. Residents in Winchester and East Hampshire experience very low mortality rates from cancers considered preventable. These rates are better than the national average. The Havant rate is similar to the national average Table 25.7.

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<sup>1</sup> a death is preventable if, in the light of understanding of the determinants of health at the time of death, all or most deaths from that cause (subject to age limits if appropriate) could be avoided by public health interventions in the broadest sense

**Table 25.8 – Under 75 mortality rate from cancer considered preventable 2014- 2016 (PHE, 2018c)**

<b>Area</b>	<b>Under 75 mortality rate from cancer considered preventable (per 1,000)</b>
<b>East Hampshire</b>	65.6
<b>Havant</b>	77.1
<b>Portsmouth</b>	97.8
<b>Winchester</b>	58.2
<b>South East region</b>	72.2
<b>England</b>	79.4

### 25.5.3 EMPLOYMENT RATE AND QUALIFICATIONS

#### 25.5.3.1

Levels of employment across the study areas can be seen to be above or equal to national average in all districts apart from Portsmouth. Only Winchester within the study area has an employment rate for those between 16 to 64 years of age above the regional average, which is increasing and significantly better (based on the 95% Confidence Intervals) than the national benchmark (PHE, 2018d). East Hampshire, Havant and Portsmouth have similar employment rates to the national average (based on the 95% Confidence Intervals) (Table 25.9). East Hampshire is the only district that has an employment rate which appears to be declining (PHE, 2018d).

**Table 25.9 – Employment rate for those between 16 to 64 years of age (%) between 2015 to 2018 (PE, 2018d)**

<b>Area</b>	<b>Employment rate for those between 16 to 64 years of age (%)</b>		
	2015/16	2016/17	2017/18
<b>East Hampshire</b>	75.2	79.3	75.6
<b>Havant</b>	74.2	75.6	75.2
<b>Portsmouth</b>	71.7	71.9	74.8
<b>Winchester</b>	85.0	75.8	83.2
<b>South East region</b>	77.2	77.7	78.5

Area	Employment rate for those between 16 to 64 years of age (%)		
England	73.9	74.4	75.2

25.5.3.2

In all districts within the study area, public administration, education and health is the largest employment industry. This industry accounts for more than a quarter of all residents aged 16 and over in employment. The agriculture, energy and water; manufacturing; and construction industry account for a larger percentage of the employed residents within Havant than for the districts within the study area, the regional average and national average. The financial, real estate, professional and administrative activities industry account for a larger percentage of the employed residents within Winchester and East Hampshire than for the other districts within the study area, the regional average and national average (Table 25.9).

Table 25.10 - Occupation by industry for residents aged 16 and over in employment (%) (2011) (ONS, 2011b)

	Agriculture, energy and water	Manufacturing	Construction	Distribution, hotels and restaurants	Transport and communication	Financial, Real Estate, Professional and Administrative activities	Public administration, education and health	Other
	Percentage (%) of total residents aged 16 and over in employment							
<b>East Hampshire</b>	2.6	8.6	8.2	19.0	9.4	18.8	28.0	5.4
<b>Havant</b>	2.8	11.6	10.5	21.5	8.1	13.6	27.3	4.5
<b>Portsmouth</b>	2.2	8.7	8.3	21.7	8.5	13.7	32.3	4.6
<b>Winchester</b>	2.7	6.1	6.7	18.3	9.9	19.1	32.3	4.9
<b>South East Region</b>	2.1	7.2	8.0	20.6	10.7	18.6	27.7	5.1
<b>England</b>	2.3	8.9	7.7	21.5	9.1	17.5	28.2	5.0

25.5.3.3 Unemployment amongst the Economically Active population (usual residents aged 16 to 74) within the study area is less than the national average, with an average unemployment of 3.3%, shown below:

- East Hampshire – 2.6%;
- Havant – 4.0%;
- Portsmouth – 4.3%; and
- Winchester – 2.3%.

25.5.3.4 The percentage of usual residents aged 16 to 74 that are retired is higher than the national average (13.7%) for East Hampshire (15.3%), Havant (17.3%) and Winchester (14.5%). The percentage of usual residents aged 16 to 74 that are retired within Portsmouth is 10.7%. This supports the population age profiles, which shows that that Portsmouth has a younger population with a higher representation of age groups between 15 to 34 (ONS, 2011c).

25.5.3.5 In 2011, the percentage of residents age 16 and over within East Hampshire and Winchester with a Level 4 qualification or above (broadly equivalent to a degree or higher qualification) is higher than the national (27.4%) and regional (29.9%) percentage at 33.9% and 40.7% respectively. For Havant and Portsmouth, the percentage of residents age 16 and over with a Level 4 qualification or above is lower than the national and regional percentage at 22.3% and 23.7% respectively (ONS, 2011d).

## 25.5.4 LANDSCAPE AND LAND USE

25.5.4.1 The existing Lovedean substation is located in a rural area on the northern fringes of Portsmouth, approximately 13.5 km to the north of the city centre, between Winchester and East Hampshire. It is surrounded by mixed agricultural fields with hedgerow boundaries and farm properties. The indicative Converter Station location is located within agricultural fields and surrounded by pockets of woodland, including Ancient Woodland. It is likely to be visible in views from surrounding public footpaths. These views are identified within Chapter 15 Landscape and Visual Amenity.

25.5.4.2 The existing substation is partly screened but is a feature of the current landscape, along with the associated pylons. The site is rural in nature, with the small settlements of Lovedean and Waterlooville lying approximately 1.5 km south east and south respectively. Horndean is to the east and Denmead approximately 1.5 km south west of the Converter Station Area.

25.5.4.3 The SDNP boundary is located to the west, north and east of the Converter Station Area. SDNP boundary is, at its closest point, located approximately 180-200 m to the north and west of the indicative Converter Station location. The SDNP has been given the status of an international Dark Skies Reserve. There are a number of promoted locations within the SNDP where people can visit to experience the South

Down's darkest skies. Two of which are, Old Winchester Hill and Butser Hill at approximately 7.4 km distance and 7.8 km distance from the indicative Converter Station location. Queen Elizabeth Country Park and Staunton Country Park are situated approximately 6 km north east and south east respectively.

25.5.4.4 The Onshore Cable Route will run from the proposed Landfall site in Eastney (near Portsmouth) to the Converter Station Area at Lovedean, a route of approximately 20 km in length. The southern section of this Onshore Cable Route to be located within the Onshore Cable Corridor will be along roads and/or residential roads/green space. The northern section of this Onshore Cable Route will run mainly along country roads/fields before terminating at the proposed Converter Station. There will also be AC cables from the Converter Station to the Substation, and it is anticipated that there will be FOC infrastructure located adjoining (but outside) the Converter Station perimeter fence. The Onshore Cable Route may cross some agricultural land. Landfall is not proposed within agricultural land.

25.5.4.5 The Landfall is located at Eastney beach, to the south east of Portsmouth on Portsea Island, Hampshire. The preferred location for the Landfall is within a car park to the south of Fort Cumberland Road, north of Eastney Beach. There is currently a caravan park to the west of the Landfall site and Fort Cumberland to the east. It is anticipated that FOC infrastructure will be located within approximately 1 km of the Landfall.

25.5.4.6 Further landscape and land use baseline information is presented within Chapter 15 Landscape and Visual Amenity and further land use baseline is presented within Chapter 24 - Socio-economics and Chapter 17 - Soils and Agricultural Land Use.

## 25.5.5 ACCESS TO GREENSPACE

25.5.5.1 There are no formal public open spaces within or directly adjacent to the indicative Converter Station site. There are two SINC, Crabden Copse and Crabden Row SINC adjacent the indicative Converter Station location. These sites are expected to have limited recreational value.

25.5.5.2 The Onshore Cable Corridor crosses through East Hampshire, Havant, Portsmouth and Winchester. The Onshore Cable Corridor runs through a mixture of rural and urban areas, including a number of settlements such as Denmead, Anmore, Waterlooville, Purbrook, Widley, Farlington and Portsmouth. The Onshore Cable Corridor mainly follows existing highways, following the A288, A2030, B2177 and A3 towards the Converter Station Area and substation at Lovedean.

25.5.5.3 Appendix 24.2 identifies all community resources within 500 m of the Proposed Development. Community Resources are identified in accordance with the section of the Proposed Development that it is located in proximity to. The community resources identified comprise a range of facilities including, education, health and community facilities such as halls, libraries and sport facilities.

#### 25.5.5.4

There are a number of formal and informal recreational/public open spaces within 500 m of the Onshore Cable Corridor and Landfall, listed below (see Chapter 24 Socio-economics):

- Section 3
  - ┆ A portion of Wayfarers Walk.
- Section 4
  - ┆ An open space (including a playground) on the corner of Hambledon Road and Sickle Way;
  - ┆ Jubilee Park;
  - ┆ Fielders Park;
  - ┆ Purbrook Bowling Club (including a playground and open space);
  - ┆ Portsmouth Golf Course; and
  - ┆ Wayfarers Walk.
- Section 5
  - ┆ An open space (playing fields and playground) east of Farlington Road.
- Section 6
  - ┆ Zetland Field; and
  - ┆ Springfield playing fields.
- Section 7
  - ┆ Farlington Marshes Nature Reserve; and
  - ┆ Two open spaces to the west and east of Eastern Road, including Farlington Playing Fields, Langstone Harbour Sports Ground and Baffins Milton Rovers FC ground.
- Section 8
  - ┆ The Admiral Lord Nelson Playing Fields;
  - ┆ South Sea Golf Course;
  - ┆ Great Salterns Recreation Area;
  - ┆ Grounds to the west of Portsmouth College;
  - ┆ Milton Common;
  - ┆ Tamworth Park; and
  - ┆ Milton Cemetery.
- Section 9
  - ┆ The University of Portsmouth Playing Fields;
  - ┆ Milton Locks Nature Reserve;
  - ┆ Bransbury Park;
  - ┆ Milton Park;
  - ┆ A dog park between Fair Oak Road and The Driveway; and
  - ┆ An open space between the dog park and Solent Drive.

- Section 10
  - A number of football fields and tennis courts; and
  - Eastney Beach.

25.5.5.5 There are no formal areas of recreational use within 500 m of Sections 1 or 2 of the Proposed Development.

25.5.5.6 There are several PRoW within 500 m of all sections of the Proposed Development except for Section 7. These PRoW link to the surrounding area and are described within Chapter 24 Socio-economics, Section 24.5.3. There are also a number of non-designated recreational routes to the south-west of the Proposed Development through Crabdens Copse, and portion of Wayfarers Walk, a Long-Distance Path, which is located to the west of the Proposed Development. Solent Way also starts at Farlington Marshes Nature Reserve, and runs south along the eastern coastline and then heads west along the Eastney foreshore.

## 25.5.6 TRANSPORT AND ACCESS

25.5.6.1 The road network in the vicinity of the Converter Station Area comprises mainly rural lanes handling low volumes of traffic. Site access is anticipated to be from Broadway Lane, which is the existing access route to Lovedean substation. Broadway Lane is subject to national speed limit with widths of less than 6m and no footways or cycle provision. No public transport facilities are provided along Broadway Lane.

25.5.6.2 The key strategic route serving the area is the A3 which connects London to Portsmouth. The closest access point from the A3 (Junction 2) to the Converter Station Area is via:

- B2149 > A3 Portsmouth Road > Lovedean Lane > Day Lane > Broadway Lane

25.5.6.3 The Onshore Cable Corridor passes through a range on different road types, from quite rural lanes around Denmead to A3 London Road and A2030 Eastern Road, which form major highway links within the Hampshire County Council and Portsmouth City Centre networks, and other residential roads/cul-de-sacs.

25.5.6.4 Where possible, the Onshore Cable Route will be located within public highway network, making use of the carriageway or footway/verges. The nearest railway station to the Converter Station Area, Rowlands Castle, is approximately 6.5 km to the east. There are a number of railway stations passed the Onshore Cable Corridor, including Fratton, Hilsea and Cosham within Portsmouth. The Onshore Cable Corridor remains at least 0.5 km from these stations, but the route will be constructed via micro tunnelling under the railway line at Farlington. There are numerous bus stops within the study area, principally within populated areas.

- 25.5.6.5 The proposed Landfall location is in Eastney, to the south east of Portsmouth on Portsea Island, Hampshire. The preferred location for the Landfall is within a car park to the south of Fort Cumberland Road, north of Eastney Beach.
- 25.5.6.6 A description of this route in relation to traffic, transport and non-motorised users is provided within Chapter 21 Traffic and Transport.
- 25.5.6.7 There are numerous facilities that will be accessed by residents within the communities in proximity to the Onshore Cable Corridor. Portsmouth is a substantial settlement and contains a large number of facilities that may attract visitors from smaller surrounding areas to access secondary schools, banks, Doctors' surgeries, etc. acting as a facilities hub for a large number of small communities. Journeys from Portsmouth to smaller communities may occur for recreational activities such as walking, cycling or equestrian activities.
- 25.5.6.8 Appendix 24.2 identifies all community resources/facilities within 500 m of the Proposed Development. These were identified in accordance with the section of the Proposed Development that it is located in proximity to. The community resources identified comprise a range of facilities including, education, health and community facilities such as halls, libraries and sport facilities.
- 25.5.6.9 It is noted that those businesses closer to construction activities are likely to experience comparatively greater disturbance. It is anticipated that as the design develops, the list of businesses potentially impacted by the Proposed Development during construction will be refined. Further detail is provided within Chapter 24 Socio-economics.

## **25.5.7 AIR QUALITY**

- 25.5.7.1 The Converter Station Area is located in a rural environment where air quality is mainly influenced by traffic emissions from small local roads. There are no significant industrial pollution sources in the surrounding area that influence air quality. According to both Winchester City Council and East Hampshire District Council's latest Air Quality Annual Status Reports, air quality in the vicinity of the indicative location of the proposed Converter Station meets all the relevant UK Air Quality Strategy ('AQS') objectives.
- 25.5.7.2 The closest village to the indicative Converter Station location is Lovedean, approximately 1.5 km to the south-east. The road closest to the indicative Converter Station location is Old Mill Lane to the west. On Old Mill Lane, Mill View Farm is approximately 230 m to the west of the indicative Converter Station location and there are residential properties 150 m to the north. There are no receptors within 100 m of the indicative Converter Station location.

- 25.5.7.3 The Onshore Cable Corridor runs through a number of Local Authorities. For the majority of the Onshore Cable Corridor, pollution concentrations meet all air quality objectives. However, part of the Onshore Cable Corridor goes through an AQMA declared by Portsmouth City Council due to exceedances of the annual mean nitrogen dioxide ('NO<sub>2</sub>') objective. This AQMA covers a section of road stretching from Milton Road to Eastern Road.
- 25.5.7.4 Installation of the cable will migrate along the route as the works progress. Any impacts will be short-lived. As the installation construction site migrates, it is possible that more than 100 residential receptors could lie within 20 m of the site particularly on the fringe of the outskirts of Portsmouth such as Eastney, Milton, Farlington, Widley, Purbrook and Waterlooville. Therefore, there are high sensitivity human receptors in the study area which are residential properties adjacent to the Onshore Cable Corridor.
- 25.5.7.5 There are existing residential properties directly to the north of the Landfall on Fort Cumberland Road. South of the Landfall is Southsea Leisure Park caravan park and Eastney Beach.
- 25.5.7.6 Based on the above, air pollutant concentrations in the vicinity of the proposed Converter Station Area and for the majority of the Onshore Cable Corridor meet all the relevant air quality objectives. Annual mean NO<sub>2</sub> concentrations are in exceedance of the UK AQS objective for the section of the route going through the Portsmouth City Council AQMA. All the annual mean background PM<sub>10</sub> (particulate matter 10µm or less) concentrations are below the relevant objectives. Further air quality baseline is presented in Chapter 22 Air Quality.

## 25.5.8 NOISE

- 25.5.8.1 Impacts of noise upon the populations across the study area can be seen to be low in all districts with the exception to Portsmouth, where 10.4 complaints are received per year per 1,000 population (Table 25.10). This implies that the noise threshold in Portsmouth may be high, though tolerance to cumulative noise may be low. Low incidence of noise complaints in parts of the study area may account for a low noise baseline, which could result in a low tolerance of incidence noise or noise nuisance.

**Table 25.11 – Rate of complaints about noise (NHS, 2012)**

<b>Area</b>	<b>Rate of noise complaints (Per 1000) cancer considered preventable</b>
<b>East Hampshire</b>	65.6
<b>Havant</b>	77.1
<b>Portsmouth</b>	97.8
<b>Winchester</b>	58.2
<b>South East region</b>	72.2
<b>England</b>	79.4

25.5.8.2 Within the Converter Station Area, Lovedean substation is considered one of the dominant noise sources in the area. Other sources of noise include road traffic on Old Mill Lane, Broadway Lane and unnamed local roads to the north and south of the sites.

25.5.8.3 Along the Onshore Cable Corridor, the dominant noise sources in the area is anticipated to be road traffic noise (e.g. Edney’s Lane, Anmore Road, B2150, B2177 and Ainsdale Road) and noise from industrial and commercial source.

25.5.8.4 Further baseline Noise detail is presented in Chapter 23 Noise and Vibration.

### **25.5.9 SOIL/LAND CONTAMINATION**

25.5.9.1 The area within the Site Boundary and within 500 m of the Site Boundary is within the lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level) for all sections of the Proposed Development.

25.5.9.2 A number of potentially contaminated sites for each section of the Proposed Development have been identified with Chapter 18 Ground Conditions, including historic mineral extraction, agricultural use, made ground and commercial suites. These previous uses may have resulted in potentially contaminated land.

### **25.5.10 FUTURE BASELINE**

25.5.10.1 The predicted percentage increase in population from mid-2016 to mid-2026 for the South-East of England is just over 6% which is slightly higher than the average for England which is 5.9%. The life expectancy at birth for both males and females within the study area has shown a general trend of increasing over the last decade (PHE, 2018a). The proportion of the population aged 65 and over is projected to increase by approximately 20% between mid-2016 and mid-2026 which is also slightly higher than the England average of 19.4% (ONS, 2017). Therefore, the population in the South-East of England is projected to increase, with a greater proportion of the population aged over 65. As such, the estimated working age

population (residents aged 16-64 years old) as a percentage of the total resident population for the four districts and the South-East of England is likely to decrease over the lifetime of the Proposed Development.

25.5.10.2 Recent trends between 2011 – 2018 show that in both England and the south east region, employment rates (aged 16-64) have increased. Employment rates remain higher in the south east region at 78.5%, compared to 75.2% for England. This trend is also observed for Winchester, Havant and Portsmouth; however, employment rates in East Hampshire has been observed to show a decrease during this period. It is envisaged that over time there are likely to be changes to the locations and types of businesses near to the Proposed Development.

25.5.10.3 Some areas of open space, recreation and pedestrian routes are likely to change dependent on the type and location of development in the area. However, there is a general trend towards protecting and enhancing areas of open and green space and enhancing connectivity between areas of recreational space, as demonstrated in the Portsmouth City Council Core Strategy (Portsmouth City Council, 2012). Assuming no future development of the Site is undertaken there are unlikely to be any significant changes in baseline ground conditions with regards to soil and land contamination.

## 25.5.11 HEALTH EVIDENCE

### Air Quality

25.5.11.1 The link between health effects and exposure to air pollutants is well established, with a number of health risks including respiratory conditions. The impact of long term human exposure to PM pollution is estimated to have an effect on mortality equivalent to nearly 29,000 deaths in the UK (COMEAP, 2010). Defra has estimated that the effect of NO<sub>2</sub> on mortality is equivalent to 23,500 deaths in the UK annually<sup>2</sup>. Any increases in mortality are likely to be either as a result of cardiovascular and/or respiratory mortality, particularly with regards to an elevated short-term exposure to NO<sub>2</sub> (Mills et al., 2015). There is no known threshold concentration below which NO<sub>2</sub> or PM<sub>10</sub> have no effect on a population's health.

### Noise

25.5.11.2 The health impacts of environmental noise are widely acknowledged. A number of reviews of impacts have been published (e.g. WHO, 2011) which highlight potential impacts on cardio-vascular disease, cognitive impairment and sleep disturbance and annoyance. Long term noise exposure is believed to have an influence on

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<sup>2</sup> Defra analysis using interim recommendations from COMEAP's working group on NO.

psychological health, although, with the exception of annoyance there is not as strong a link as for other health outcomes.

### **Transport and access**

25.5.11.3 Research has suggested that ‘access to local shops, post offices, places of entertainment and community activity all contribute to well-being’ (Harding, 1997). However, in 2011 5% of adults in Great Britain reported feeling isolated as a result of difficulty in accessing local shops and services (Randall, 2012). According to the Department for Transport, ‘over the course of a year over 1.4 million people miss, turn down or simply choose not to seek healthcare because of transport problems’ (Social Exclusion Unit, 2003).

25.5.11.4 People without private cars are typically likely to be particularly vulnerable to impacts on access to local shops and facilities, particularly in rural areas. This is more common among people on low incomes and older people. Mobility impaired or visually impaired people will be particularly vulnerable to impacts such as local footpath diversions. People who rely on regular contact with local healthcare services, such as those with disabilities or long-term illness, or those with young children, may be more vulnerable to impacts on access to these services.

25.5.11.5 A review of literature has shown that participating in activities leisure can contribute to a range of beneficial effects, including physical, social, emotional and cognitive health (Caldwell, 2005).

### **Land Take (Landscape and Greenspace)**

25.5.11.6 Greenspace is a valuable resource for physical activity and has the potential to contribute to reducing obesity and improving health (Lachowycz and Jones, 2011). Greenspace has been observed to have a stronger positive relationship with lower socioeconomic groups, older people and children and young people (Mass et al., 2006). Access to green and open space has been suggested to encompass the idea of walkability, which includes perceptions of social cohesion (Seaman et al., 2010). Changes in landscape including species diversity, open space and tranquillity can have psychological effects and affect mental health.

25.5.11.7 Landscape is increasingly seen to contribute to quality of life and human health (Waltert, 2011; Thwaites et al., 2005). Urbanisation is arguably the most dramatic form of land transformation and is a potential threat to mental health and wellbeing (White et al., 2013). An important aspect of landscape is green and open space. This has been suggested to improve physical and mental health and wellbeing by increasing opportunities for physical activity, reducing air pollution, noise, and ambient temperature, increasing social contacts and relieving psychophysiological stress (Dadvand et al., 2012).

25.5.11.8 Being physically active plays an essential role in ensuring health and wellbeing (NHS, 2015). It is known that physical activity benefits many parts of the body, heart, skeletal muscles, bones, blood (for example, cholesterol levels), immune system and nervous system. Exercise and physical activity can also reduce some of the risk factors for non-communicable diseases. The relationship between inactivity and obesity is well recognised (Department of Health, 2009). The WHO estimates that physical inactivity is responsible for 6% of deaths globally (WHO, 2010). Furthermore, engaging in social physical activities enhances mental and social wellbeing, helps reduce social isolation, and reduces adverse reactions to stress (PHE, 2016).

### **Soil/Land Contamination**

25.5.11.9 Construction work is likely to cause disturbance to the geology and soils and this includes potentially contaminated ground which could then impact upon human health receptors.

### **Employment and Economy**

25.5.11.10 Various studies have suggested a correlation between income inequality and a range of health problems (Rowlingson, 2011; Wilkinson and Pickett, 2009). Income is a key factor through which employment status affects health and wellbeing. A Department of Work and Pensions study found that ‘employment is generally the most important means of obtaining adequate economic resources, which are essential for material well-being and full participation in today’s society. Employment and socio-economic status are the main drivers of social gradients in physical and mental health and mortality’ (Waddell and Burton, 2006).

25.5.11.11 There is strong evidence that unemployment is generally harmful to health (Gerdtham and Johannesson, 2003) and there is a growing body of evidence which suggests that loss of employment or changes in employment status and/or reduction in income both influence health outcomes, including depression, limiting long term illnesses, and mortality. Employment also provides a vital link between an individual and society, and enables people to contribute to society and achieve personal fulfilment. The WHO identifies a number of ways in which employment benefits mental health. These include the provision of structured time, social contact and satisfaction arising from involvement in a collective effort (Marmot and Wilkinson, 2003).

25.5.11.12 The type of employment that a person enters will also have an effect on health. Research suggests that jobs with low personal control or low income are associated with poorer health status compared with high control/high income jobs (Kuper and Marmot, 2003).

### Personal Safety - Electro-Magnetic Fields (EMF)

- 25.5.11.13 Low-frequency magnetic fields induce circulating currents within the human body. If the strength of the outside magnetic field is intense, these currents could lead to the stimulation of nerves and muscles or affect other biological processes (WHO EMF Project). Radiofrequency electromagnetic radiation causes DNA damage apparently through oxidative stress (Smith-Roe, et al 2017; Ruediger, 2009) similar to near-UV radiation, which was also long thought to be harmless (Bandara and Weller, 2017).
- 25.5.11.14 The main symptom from exposure to radio waves is a heating effect. No known adverse health effects from low level (3kHz to 300Ghz), long-term exposure to radiofrequency or power frequency fields have been confirmed below the threshold level for body heating (Jauchem, 2008). However, a precautionary approach has been recommended when considering the health effects of EMF on children and young people (Kheifets et al 2005).
- 25.5.11.15 Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields biological and health effects discussed in this document (WHO EMF Project). No acute effects other than transient phenomena such as vertigo and nausea have been observed with exposure to static magnetic flux densities up to 8 T. There are no reports of long term or chronic adverse effects following prolonged static magnetic field exposure (van Rongen et al 2007).
- 25.5.11.16 Occasional reports of associations between health problems and presumed exposure to electromagnetic fields, have not been regarded by the scientific community as being necessarily caused by the field exposures. A number of epidemiological studies have suggested that there were increases in risk of childhood leukaemia with exposure to low frequency magnetic fields. However, results indicate a lack of a cause-effect relation between exposure to the fields and disease (Kheifets, 2001; Mezei and Kheifets 2001; WHO EMF Project).
- 25.5.11.17 Health effects associated with exposure to low level EMF have been recorded, and it is considered that these symptoms are as a consequence of exposure to other sources, exposures or anxiety related.
- 25.5.11.18 In the absence of any scientific evidence of a health effect, a population may still retain some element of fear of an installation, such as exposure to EMF radiation. This fear alone may have negative health impacts upon that population (Steimer, 2002). In addition, a perceived fear by the public has resulted in refusal of a planning application (Newport CBC v Secretary of State for Wales 1998).

- 25.5.11.19 In the UK, there are presently no statutory regulations to limit public exposure to power-frequency electric or magnetic fields. However, in 2004 the National Radiological Protection Board ('NRPB') provided advice to Government (NRPB, 2014), recommending the adoption in the UK of public exposure guidelines published in 1998 by the International Commission on Non-Ionizing Radiation Protection ('ICNIRP') (ICNIRP, 1998) in terms of the 1999 EU Recommendation (European Commission, 1999). The guidelines are designed to set conservative exposure levels for the general public to 50 Hz electric and magnetic fields, and they are endorsed by the UK's Health Protection Agency, the WHO and the UK Government.
- 25.5.11.20 The 1999 EU Recommendation does not contain any limits for static electric fields. Instead, there is a statement:
- "No E-field value is provided for frequencies <1Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided."*
- 25.5.11.21 No limits for static electric fields are given in the NRPB's 2004 advice either, but it states:
- "Where direct perception of static electric fields causes annoyance, or indirect effects of electrostatic discharge cause pain, it is important to reduce the possibility of occurrence of these effects. The threshold for perception of static electric fields is around 20 kV/m, and sensations become annoying above about 25 kV/m."*

## 25.6 PREDICTED IMPACTS

### 25.6.1 SECTION 1 – LOVEDEAN (CONVERTER STATION AREA)

#### Construction

#### Air Quality

- 25.6.1.1 Emissions are likely to be generated by the release of dust and PM during the site preparation and Construction Stage; changes in local pollutant concentrations (NO<sub>2</sub> and PM) due to exhaust emissions from construction vehicles and plant; and changes in local pollutant concentrations due to exhaust emissions from road vehicles delayed due to construction works and road closures. Exposure to air pollutants has been link to health risks including respiratory conditions.
- 25.6.1.2 The greatest impact on air quality due to emissions from vehicles and plant associated with the Construction Stage will be in the areas immediately adjacent to the site access. It is anticipated that construction traffic will access the site via Day Lane and Broadway Lane which has a small number of residential properties. The number of HDV required is not expected to lead to queuing on local roads adjacent to the site, and will be further mitigated by traffic management. Any increases in

concentrations of NO<sub>2</sub> caused by queuing on local roads adjacent to the site, will be temporary and is considered therefore to be **negligible**. It has been predicted that the additional emissions attributable to construction activities for the proposed Converter Station Area are unlikely to have an adverse impact upon sensitive human receptors.

- 25.6.1.3 Chapter 22 Air Quality identifies that negligible impact is likely from construction activities at the Converter Station Area. Overall, with the implementation of mitigation measures recommended within Chapter 22 Air Quality, the effect of Air Quality from the Converter Station Area construction on human health is anticipated to be **Neutral**.

### Noise

- 25.6.1.4 Construction activities are likely to result in some noise impacts from construction plant and construction vehicles accessing and servicing at the Converter Station Area. On Old Mill Lane, Mill View Farm is approximately 230 m to the west of the indicative Converter Station location and there are residential properties 150 m to the north. There are no receptors within 100 m of the indicative Converter Station location. There is the potential for some disturbance caused to those living nearby during the Construction Stage. Construction traffic associated with the Converter Station Area will also result in noise emissions.

- 25.6.1.5 Some effects will be mitigated through good construction practice and no night working identified within Chapter 23 Noise and Vibration. An assessment of the construction noise and vibration from the Converter Station will be provided in the Noise and Vibration ES Chapter, however, a preliminary appraisal of the potential impacts has been undertaken. The distance between the nearest receptors and the indicative Converter Station location are such that vibration impacts from construction are anticipated to be minor. It is anticipated that there may be construction noise impacts at the nearest receptors, though these will be short-term and temporary. Increased noise can give rise to sleep disturbance, annoyance and effects on psychological health for nearby residents. Due to the low number of receptors, limited proximity to the construction works and the temporary nature construction noise, the effect could represent a temporary **moderate** adverse health impact upon sensitive human health receptors.

### Land Take (Landscape and Greenspace)

- 25.6.1.6 The current land within the indicative Converter Station location is in agricultural use, with hedgerows and small pockets of woodland, and residential development to the south-east. There are no formal public open spaces within or directly adjacent to the indicative Converter Station location within 500 m and are no private assets within the Proposed Development aside from agricultural land which would be lost as a result of the proposed Converter Station, access road and associated

landscaping. Therefore, during construction of the Converter Station there is unlikely to be any direct effect on recreational and open space areas.

- 25.6.1.7 Indirect effects associated with disruption or reduced connectivity during construction to PRowS and non-designated recreational routes may occur temporally due to construction traffic and possible road diversions/closures, particularly to the seven PRowS within 500 m of the indicative Converter Station location and access road. This loss of access could reduce social contact, social cohesion and physical activity which play essential role in ensuring health and wellbeing. Any losses associated with disruption or connectivity as a result of the Converter Station are expected to be temporary and confined to the Construction Stage. However, the construction of the proposed Converter Station is expected to be undertaken in 2020 – 2023. Therefore, these potential diversions/closures would have a longer term effect on access to green and open space, and leisure opportunities. This may have a negative effect on human health as participating in activities leisure can contribute to a range of beneficial effects including physical, social, emotional and cognitive health.
- 25.6.1.8 There is also the potential for a change in amenity value due to the increase in construction traffic on nearby roads and associated noise, dust and vibration from the construction of the proposed Converter Station. As such, there is the potential for users of recreational/open areas and PRow to experience impacts associated with a loss of amenity.
- 25.6.1.9 There may also be adverse effects associated with a reduction in tranquillity and enjoyment of greenspaces as a result of annoyance and a reduction in the perceived overall recreational quality of the area due to construction activity and changes in traffic flows, particularly at PRowS and non-designated recreational routes/areas within 500 m of the indicative Converter Station and access road locations. These visual effects would also be experienced by people who live and work in the area, and recreational users, due to changes to the local landscape character as a result of the proposed Converter Station during construction.
- 25.6.1.10 The current population baseline for Winchester and East Hampshire indicates that health of the population across the Converter Station study area is generally being better than the national benchmark for various determinants. The effect on human health associated with any changes to landscape and greenspace associated with proposed Converter Station has been assessed as **Minor** adverse due to potential adverse effect on access to green and openspace and the limited predicted impacts the Converter Station is likely to have upon landscape character, with minimal change in visual landscape and intrusion.

## Employment and Economy

- 25.6.1.11 There is the potential for a beneficial impact during construction on the local economy as expenditure within the local supply chain is likely to increase during the construction works.
- 25.6.1.12 Construction employment represents a positive economic effect, with the construction stage potentially resulting in new construction employment, likely to benefit the local economy. Construction jobs may include onsite roles, as well as offsite pre-fabrication and supply chain employment. Such employment gains should result in beneficial health outcomes such as improved mental and physical health and provided opportunities for social contact. The impact is likely to be on a regional basis and not just localised to the Converter Station Area. Furthermore, the expenditure within the local supply chain is likely to be spread throughout the region, depending on the goods and services sought (indirect and induced impacts). Therefore, such beneficial health outcomes may be realised by populations outside of the study area.
- 25.6.1.13 Health outcomes as a result of increased employment opportunities and income levels during construction are anticipated to be of **minor benefit** and minor intensity to the population, particularly unemployed and low income groups, within the study area due to the indirect benefit to health gained from employment as well as improved household financial stability, though potentially only benefiting a small number of employees and their families. Such health benefits would be particularly significant for unemployed and low income vulnerable group.

## Soil/Land Contamination

- 25.6.1.14 Contamination is anticipated to be localised associated with historic and current site uses identified within the baseline section and within Chapter 18 Ground Conditions. During construction contaminants could be mobilised resulting in cross contamination of uncontaminated ground or controlled waters. Sites users and adjacent site users could be impacted during construction through direct contact, ingestion and inhalation of contaminated soils and possibly also contaminated ground water. Given the proposed mitigation measures identified with Chapter 18 Ground Conditions, any remaining impacts posed by any potentially contaminated soils/groundwaters to site users and neighbouring site users is anticipated to be negligible. As identified within Chapter 18 Ground Conditions, there will be a **Negligible** effect on human health receptors following the implementation of mitigation measures.

## Operation

### Air Quality

- 25.6.1.15 The operation of the proposed Converter Station and will not generate any emissions to air when in use. Operational activities will be limited to occasional vehicle trips (e.g. for routine maintenance). However, the number of trips generated is not expected to result in negative air quality effects on human health.
- 25.6.1.16 An assessment of potential impacts on local air quality from operational traffic emissions has been scoped out of the assessment within Chapter 22 Air Quality.

### Noise

- 25.6.1.17 It is anticipated that the dominant noise sources are likely to be the converter transformers, the cooling fan bank, the air conditioning filter bank and noise egress from the converter halls.
- 25.6.1.18 Given the rural location of the Converter Station Area, the noise climate at the closest residential receptors is generally low, with few dominant noise sources in the area. The substation noise levels are dominant when close to its boundary.
- 25.6.1.19 Noise from the proposed Converter Station during operation may result in negative effect on human health due to health impacts such as cognitive impairment, sleep disturbance, annoyance and effects on psychological health for nearby residents. Potential mitigation measures are set out in Chapter 23 Noise and Vibration. An assessment of the operational noise from the Converter Station will be provided in the ES within the Noise and Vibration chapter. It is anticipated that the nearest residential receptors may detect a perceptible noise as a result of the Converter Station.

### Land Take (Landscape and Greenspace)

- 25.6.1.20 The current land within the indicative Converter Station location is in agricultural use, with hedgerows and small pockets of woodland, and residential development to the south-east. There are no formal public open spaces within or directly adjacent to the indicative Converter Station location within 500 m and are no private assets within the Proposed Development aside from the agricultural land which would be lost as a result of the proposed Converter Station. Therefore, during operation of the proposed Converter Station there is unlikely to be any direct effect on access to recreational and open space areas.
- 25.6.1.21 The proposed Converter Station is likely to contribute to the urbanisation of the area during operation which may affect mental health and wellbeing. This may also result in effects associated with disruption or reduced amenity value of the surrounding area, including the seven PRow's with 500 m of the proposed Converter Station and access road. A reduction in the value of resources suitable for physical activity has the potential to negatively affect health.

25.6.1.22 New structures associated with the proposed Converter Station and new access road, loss of features including characteristic vegetation and change the composition of views from surrounding residential and open access land/PRoW may result in visual effects. These effects may be experienced by people who live and work in the area, and recreational users due to changes to the local landscape character as a result of the proposed Converter Station during operation. This can negatively affect mental health and wellbeing. Mitigation, including landscaping to screen the development, will help to mitigate adverse effects.

25.6.1.23 The current population baseline for Winchester and East Hampshire indicates a good level of health within the Converter Station study area, generally being better than the national benchmark for various determinants. The effect on human health associated with any changes to landscape and greenspace associated with proposed Converter Station is anticipated to be **minor** and permanent for the general population. This effect will depend on the final siting of the Converter Station and mitigation measure implemented.

### Employment and Economy

25.6.1.24 The indicative Converter Station location is within land currently used for agriculture. Agricultural Land Classification surveys have identified that there is the potential for the permanent loss of BMV land in Subgrade 3a (good quality agricultural land) to the south of the indicative Converter Station location. With the exception of loss of agriculture land, the Proposed Development would not result the loss or relocation of existing employment.

25.6.1.25 The proposed Converter Station will be designed for unmanned operation, but a small team of maintenance staff (typically 3-4) will be responsible for maintaining the plant. The development is therefore expected to have a positive effect on employment and income levels as a consequence the land use change during operation. In instances where such employment improves household income and financial stability, then indirect beneficial health outcomes is likely for both individuals from improved mental and physical health, as well as their dependants from improved opportunities and personal circumstances. Such health benefits would be particularly significant for unemployed and low income vulnerable group.

25.6.1.26 Employment opportunities created by the proposed Converter Station will be small may not be taken up by the population within the study area, although this will benefit the local area through increased local expenditure. This is expected to be negligible due to the small number of people effected.

25.6.1.27 Health outcomes as a result of increased employment opportunities and income levels during operation are anticipated to be of **Neutral** benefit to unemployed and low income groups.

### Personal Safety - Electro-Magnetic Fields ('EMF')

- 25.6.1.28 Electric and magnetic fields around the perimeter of the proposed Converter Station would originate from the circuits crossing the boundary and the Converter Station equipment within the boundary. The technical specifications will require that the Converter Station is designed to keep EMF below the safe levels specified in the appropriate guidelines (ICNIRP Guidelines).
- 25.6.1.29 Public fear of EMF exposure amongst the population of the EMF installation could have perceived negative health impacts upon that population through anxiety and fear particularly for local residents in proximity to the proposed Converter Station.

## 25.6.2 SECTIONS 2-10 - ONSHORE CABLE ROUTE AND EASTNEY (LANDFALL)

### Construction

#### Air Quality

- 25.6.2.1 Emissions are likely to be generated by the release of dust and PM during the site preparation and Construction Stage; changes in local pollutant concentrations (NO<sub>2</sub> and PM) due to exhaust emissions from construction vehicles and plant; and changes in local pollutant concentrations due to exhaust emissions from road vehicles delayed due to construction works and road closures. Particular activities and sources of dust associated with the Onshore Cable Route and Landfall are likely to include trenching, laydown and cable pulling. Exposure to air pollutants has been link to health risks including respiratory conditions.
- 25.6.2.2 The greatest impact on air quality due to emissions from vehicles and plant associated with the cable installation will be in the areas where existing traffic is disrupted by the works leading to slow moving traffic and queuing. This could lead to elevated levels of NO<sub>2</sub> emissions, particularly in locations where NO<sub>2</sub> emissions are already elevated. Through the implementation of traffic management, increases in concentrations of NO<sub>2</sub> caused by queuing on local roads adjacent to the site, will be temporary and is considered therefore to be a negligible effect. Based on existing local air quality in each construction area, the proximity of sensitive receptors to the roads likely to be used by construction vehicles, and the likely numbers of construction vehicles and plant that will be required, the impacts at the Onshore Cable Route and Landfall (and Optical Regeneration Station) are considered to be of negligible significance with the implementation of mitigation measures recommended within Chapter 22 Air Quality. Chapter 22 Air Quality identifies that negligible impact is likely from construction activities at the Onshore Cable Route and Landfall. Overall, the effect of Air Quality on human health is therefore anticipated to be **Neutral**.

## Noise

- 25.6.2.3 It is anticipated that there may be noise impacts at nearby receptors and vibration impacts at those receptors adjacent to the Onshore Cable Corridor, particularly during excavation of any hard-standing. Due to the proximity of human receptors to the proposed construction works, noise during construction may result in negative effect on human health. This can give rise to sleep disturbance, annoyance and effects on psychological health for nearby residents.
- 25.6.2.4 Within Chapter 23 Noise and Vibration, consideration has been given to the potential mitigation options which may be deployed to minimise noise and vibration impacts during the construction. It is anticipated that impacts will be short-term and temporary due to the linear nature of the Onshore Cable Route. Where receptors are in proximity to the Onshore Cable Route (i.e. receptors adjacent to roads), noise impacts from construction are predicted to be moderate to major. Vibration impacts are predicted to be minor to moderate.
- 25.6.2.5 Overall this is likely to result in a **moderate** adverse effect on health outcomes due to potential sleep disturbance, annoyance and effects on psychological health for nearby residents.

## Transport and Access

- 25.6.2.6 The Onshore Cable Corridor runs through a mixture of rural and urban areas, including number of settlements such as Denmead, Anmore, Waterlooville, Purbrook, Widley, Farlington and Portsmouth. The Onshore Cable Corridor mainly follows existing highways, following the A288, A2030, B2177 and A3 towards the proposed Converter Station Area and substation at Lovedean.
- 25.6.2.7 To minimise disruption, cable ducts will be used for installation. This allows short sections to be worked on at any one time and each length of cable pulled through, rather than needing to fully excavate each 600 m - 2,000 m length (approximately). The installation rate for cable ducts will be approximately 18 m - 30 m per day on average within urban areas and approximately 50 m per day for areas of open land. Where the Onshore Cable Route is in or immediately adjacent to roads, the installation will require traffic management measures. As identified within Chapter 3 Description of the Proposed Development, to minimise disruption a single lane closure would be used whenever practicable, rather than a full road closure.
- 25.6.2.8 Pedestrian, cyclist and road users of the local road network may experience amenity impact caused by construction traffic resulting in nuisance and disruption; fear and intimidation; increased traffic delay; severance; and road safety impacts as a result of Construction Stage traffic (consisting of HGVs, Abnormal Loads, cars and LGVs) travelling to and from the Onshore Cable Route construction location and due to road closures and diversions. Residents within the area of the Onshore Cable Route construction works or access routes will also be exposed to

construction traffic. Further detail is provided within Chapter 21 Traffic and Transport. Due to the construction methodology and need to provide suitable provisions for non-motorised users is anticipated that the Onshore Cable Route installation will generally have a minor adverse to negligible effect on these users across the Onshore Cable Route.

25.6.2.9 Based on current information on the Proposed Development, there may be temporary disruption to access to businesses and community facilities (including schools and healthcare) located in close proximity to the Onshore Cable Route as works are undertaken on the carriageway which provides access for vehicle users, and the pedestrian footway. This can result in the loss of beneficial effects associated with participating in leisure activities and access to local facilities including beneficial effects to well-being and physical, social, emotional and cognitive health.

25.6.2.10 There is the potential for a temporary impact on access to recreational and open space areas and PRowS. There is also the potential for a temporary change in amenity value due to the increase in construction traffic on nearby roads, as well as noise, dust and vibration from the construction of the Proposed Development. As such, there is the potential for users of recreational and open areas and PRowS experience impacts associated with a loss of amenity. This is likely to result in a **minor adverse** effect on health outcomes.

#### Economic and Employment

25.6.2.11 There is the potential for a beneficial impact during construction on the local economy as expenditure within the local supply chain is likely to increase during the construction works.

25.6.2.12 Construction employment represents a positive economic effect, with the Construction Stage resulting in job creation and increased local expenditure. Construction jobs will include onsite roles, as well as offsite pre-fabrication and supply chain employment. Such employment gains should result in beneficial health outcomes such as improved mental and physical health and provided opportunities for social contact and inclusion. The impact is likely to be on a regional basis and not localised to the Onshore Cable Corridor and Landfall. Furthermore, the potential expenditure within the local supply chain is likely to be spread throughout the region, depending on the goods and services sought (indirect and induced impacts). Therefore, these beneficial health outcomes may be realised by populations outside of the study area.

25.6.2.13 Health outcomes as a result of increased employment opportunities and income levels during construction are anticipated to be of **minor benefit** to unemployed and low income groups.

### Land Take (Landscape and Greenspace)

- 25.6.2.14 The Onshore Cable Corridor crosses East Hampshire District Councils, Havant Borough Council, Portsmouth City Council and Winchester City Council. It runs through a mixture of rural and urban areas including number of settlements including Denmead, Anmore, Waterlooville, Purbrook, Widley, Farlington and Portsmouth. The Onshore Cable Corridor mainly follows existing highways, following the A288, A2030, B2177 and A3 towards the proposed Converter Station Area and substation at Lovedean.
- 25.6.2.15 Along the Onshore Cable Corridor within 500 m there are several areas of recreational value/public open space which are likely to contribute to human health. These include Jubilee Park, Zetland Field, Farlington Marshes, Admiral Lord Nelson Playing Fields, Farlington Playing Fields, Great Salterns Recreation Area, Milton Common, Milton Cemetery, Milton Park, Bransbury Park and Eastney Esplanade. The Allotments to the south of Milton Common and the University of Portsmouth Playing Fields are potentially located within the possible route of the cable. This Onshore Cable Route may therefore result in the temporary loss of recreational and open space areas. This may remove opportunities for beneficial health outcome associated with access to green and open space (and physical activity), such as increasing social contact, relieving psychophysiological stress, benefiting physical health (e.g. heart, skeletal muscles, bones, blood) and increasing wellbeing thought physical activity. This will be determined at the ES stage once construction method details have been confirmed.
- 25.6.2.16 Indirect effects associated with disruption or reduced connectivity during construction to recreational and open space areas, and PRoWs may occur temporally due to construction traffic and possible road diversion/closures. This loss of access could reduce social contact, social cohesion and physical activity. Any loss associated with disruption or connectivity as a result of the Onshore Cable Route are expected to be temporary and confined to the Construction Stage.
- 25.6.2.17 There is also the potential for a temporary adverse change in amenity value due to the increase in construction traffic on nearby roads and associated noise, dust and vibration from the construction of the Onshore Cable Route and Landfall (and FOC infrastructure). As such, there is the potential for users of recreational and open areas and PRoW to experience impacts associated with a loss of amenity. Further adverse effects may be associated with a reduction in tranquillity and enjoyment of greenspaces as a result of annoyance and a reduction in the perceived overall recreational quality of the area due to construction activity and changes in traffic flows, particularly at identified PRoWs within 500 m of the Onshore Cable Corridor and Landfall. Visual impacts would also be experienced by people who live and work in the area, and recreational users, due to changes to the local landscape character during construction.

25.6.2.18 The current population baseline for Winchester and East Hampshire indicates a good level of health within the Converter Station study area, generally being better than the National benchmark for various determinants. The population baseline for Portsmouth and Havant, the more urban locations of the Onshore Cable Corridor and Landfall, indicates a lower level of health.

25.6.2.19 The effect on human health associated with the above temporary changes to landscape and greenspace associated with Onshore Cable Route and Landfall is anticipated to be **minor adverse** effect during construction for the general population.

#### Soil/Land Contamination

25.6.2.20 Contamination is anticipated to be localised associated with historic and current site uses. During construction contaminants could be mobilised resulting in cross contamination of uncontaminated ground or controlled waters. Sites users and adjacent site users could be impacted during construction through direct contact, ingestion and inhalation of contaminated soils and possibly also contaminated ground water. Given the proposed mitigation measures identified with Chapter 18 Ground Conditions, any remaining impacts posed by any potentially contaminated soils/groundwaters to site users and neighbouring site users is anticipated to be negligible. As identified within Chapter 18 Ground Conditions, there will be a **Negligible** effect on human health receptors following the implementation of mitigation measures.

#### Operation

#### Transport and Access

25.6.2.21 The Onshore Cable Corridor runs through a mixture of rural and urban areas, including number of settlements such as Denmead, Anmore, Waterlooville, Purbrook, Widley, Farlington and Portsmouth. The Onshore Cable Corridor mainly follows existing highways, following the A288, A2030, B2177 and A3 towards the proposed Converter Station Area and substation at Lovedean.

25.6.2.22 The land will be reinstated following the installation of the cables and thus returned to its previous use. Therefore, there are no permanent effects on transport and access during operation. It is not anticipated that the Proposed Development will impact upon the current function of highway network once operational.

25.6.2.23 There are no operational requirements associated with the Onshore Cable Route. Cable systems are reliable and require very little maintenance. Therefore, indirect effects associated with traffic disruption or reduced connectivity during operation is not anticipated to impact access to community facilities, including doctor's surgeries and hospitals, primary and secondary schools, dentists, churches, parish halls, recreational areas and leisure facilities, libraries and railway and bus stations. If

repairs or replacements are required during operation, effects associated with this activity would be similar to the construction impacts.

- 25.6.2.24 The health outcomes to the population associated with any changes in transport and access to resources associated with the Proposed Development during operation are anticipated to be **Neutral**.

#### Land Take (Landscape and Greenspace)

- 25.6.2.25 The land will be reinstated following the installation of the cables and thus returned to its previous use. There will be no permanent visible sign of the works, apart from manhole covers every approximate 6 km along the Onshore Cable Route at a link box location, or a small cabinet above ground providing a link pillar. This Onshore Cable Route would therefore not result in the permanent loss of recreational and open space areas.

- 25.6.2.26 There may be long term effects resulting from the loss of existing vegetation (hedgerows and hedgerow trees) where the new cable runs across for instance open fields, recreation fields and allotments. This could result in change in amenity value and a reduction in the perceived overall recreational quality of the area. This can reduce health benefits associated with green and open space, such as improvements to physical and mental health and wellbeing by increasing opportunities for physical activity. The extent of any vegetation loss will be subject to the confirmation of the final route option, the construction methods and reinstatement work, and mitigation measures implemented.

- 25.6.2.27 There are no operational requirements associated with the Onshore Cable Route and the associated cable equipment along the Onshore Cable Route. Cable systems are reliable and require very little maintenance. Therefore, indirect effects associated with traffic disruption or reduced connectivity during operation to recreational, open space areas, and PRoWs is not anticipated. If repairs or replacements are required during operation, effects associated with this activity would be similar to the construction impacts.

- 25.6.2.28 The effect on human health associated with any changes to landscape and greenspace associated with the Onshore Cable Route and Landfall is anticipated to be **Neutral** during operation for the general population due to the reinstatement and proposed mitigation.

#### Personal Safety – Electromagnetic Radiation

- 25.6.2.29 The public would not be exposed to electric fields from the Onshore Cable Route because the field is contained by the cable's protective metal sheath. The Onshore Cable Route would produce magnetic fields above ground level, although the strength of these fields would diminish quickly with increasing distance.

25.6.2.30 The calculated prospective maximum magnetic field strength due to the proposed AC Cables are well below the public exposure basic restriction level and the DC Cables is well below the limit for public exposure to static magnetic fields (approximately 1,000 times lower than the limit of 40,000 microtesla ( $\mu\text{T}$ )).

25.6.2.31 Though cabling will be buried, a residual public apprehension of EMF exposure amongst the population locally to the EMF installation could remain, thereby resulting in a **minor adverse** health effect upon the population from both fear and anxiety.

### 25.6.3 CUMULATIVE IMPACT ASSESSMENT

25.6.3.1 This PEIR Chapter has used the outputs of the Chapter 15 Landscape and Visual, Chapter 17 Soils and Agricultural Land Use, Chapter 18 Ground Conditions, Chapter 21 Traffic and Transport, Chapter 22 Air Quality, Chapter 23 Noise and Vibration, and Chapter 24 Socio-economics to identify health and wellbeing outcomes in the population. The interactions with these assessments are described below:

- Losses or changes in landscape including species diversity, open space and tranquillity could have adverse psychological effects and affect mental health.
- Ground conditions, soils and land use can affect human health through exposure to pollutants, reduced access to areas available for physical activity and reduced visual amenity.
- Traffic and transport can affect access (e.g. delays, diversion and fear) to healthcare and social networks. It also has a role to play in active travel, road safety and access to recreational/open space.
- Exposure to air pollutants can result in a number of health risks including respiratory conditions.
- The health impacts of environmental noise include cardio-vascular disease, cognitive impairment and sleep disturbance and annoyance.
- Effects to socio-economics, including employment opportunities, disruptions to businesses, and changing in amenity value of recreational and open space, will all effect human health.
- Public fear of EMF exposure amongst the population during the installation of cabling could have a negative health impact through anxiety and fear.

25.6.3.2 Cumulative effects as a result of development and topic interactions will be further assessed and reported in the ES once detailed chapter assessments have been undertaken, and information on surrounding developments is available.

## 25.7 PROPOSED MITIGATION

25.7.1.1 At this stage, no further mitigation measures are proposed above the primary measures identified within the Proposed Development description and mitigation measures identified within relevant discipline chapters.

## 25.8 SUMMARY AND CONCLUSIONS

25.8.1.1 This chapter provides an initial assessment of human health effects associated with the construction and operation of the Proposed Development.

### 25.8.2 BASELINE

25.8.2.1 Within the study area, Portsmouth has the largest population. Age profiles show that East Hampshire, Winchester and Havant have generally older populations, while the population in Portsmouth is generally younger than both regional and national age profiles. In terms of overall deprivation, Winchester and East Hampshire are both significantly less deprived than the national average, while Portsmouth is considered more deprived. This trend is also seen with life expectancy, with the life expectancy in Portsmouth being observed to be significantly lower than the national average. Havant is the only district that has a lower percentage of the residents considering themselves to be in 'very good health' compared to the national level.

25.8.2.2 Levels of employment across the study areas can be seen to be above or equal to national average in all districts apart from Portsmouth. Unemployment in Portsmouth and Havant is higher than the national average and lower than the national average in East Hampshire and Winchester.

25.8.2.3 Overall, Portsmouth and Havant are observed to have more health inequalities compared to East Hampshire and Winchester.

25.8.2.4 The indicative Converter Station location is in a rural area on the northern fringes of Portsmouth, located within arable field or fields currently used for equine activities, including horse grazing. There are no formal public open spaces within or directly adjacent to the indicative Converter Station location.

25.8.2.5 The Onshore Cable Corridor runs from the proposed Landfall site in Eastney to the Converter Station Area at Lovedean, a route of approximately 20 km in length. The southern section of this Onshore Cable Corridor will be along main roads and/or residential roads/green space. The northern section of this Onshore Cable Corridor will run along mainly along country roads/fields. There are formal and informal recreational/public open spaces within the vicinity of the Onshore Cable Corridor and Landfall.

25.8.2.6 Air pollutant concentrations in the vicinity of the Converter Station Area and for the majority of the Onshore Cable Corridor meet all the relevant air quality objectives. Within proximity to the Converter Station Area, Lovedean substation is considered one of the dominant noise sources in the area. The other dominant noise sources at the Converter Station Area and along Onshore Cable Corridor are road traffic and noise from industrial and commercial source.

### 25.8.3 ASSESSMENT

- 25.8.3.1 The assessment focuses on potential significant effects on human health from the Proposed Development. The assessment outlined in this chapter is based on the assessments of significant residual effects generated from other topics in the PEIR which have associated consideration of human health or aspects that effect human health.
- 25.8.3.2 The construction assessment for the Converter Station Area, Onshore Cable Corridor and Landfall has identified that there is the potential for **Moderate** temporary adverse effects arising from noise disturbance caused to those living nearby. There is also the potential for **minor** temporary adverse effects arising from change in amenity value due to indirect effect associated with disruption or reduced connectivity, visual amenity and tranquillity effects; and potential human health effects associated with soil/land contamination. **Neutral** to **Minor** beneficial health effects are likely as a result of increased employment opportunities and income levels during construction.
- 25.8.3.3 During operation of the Proposed Development, there is the potential for perceived health effects associated with EMF and effects on human health associated with any changes to landscape and greenspace. Though cabling will be buried, a residual public apprehension of EMF exposure amongst the population local to the EMF installation could remain, thereby resulting in a **minor adverse** health effect upon the population as a result of both fear and anxiety.
- 25.8.3.4 The public would not be exposed to electric fields from the DC Cables as the field is contained by the cable's protective metal sheath. The calculated prospective maximum electromagnetic field strength due to the DC Cables is well below the limit for public exposure to static magnetic fields, approximately 1,000 times lower than the limit of 40,000  $\mu$ T.
- 25.8.3.5 Effects from changes to landscape and greenspace associated with the Onshore Cable Route and Landfall following land reinstatement along the Onshore Cable Route are expected to be **Neutral**.

### 25.8.4 MITIGATION

- 25.8.4.1 At this stage, no further mitigation measures are proposed above the primary measures identified within the Proposed Development description and mitigation measures identified within relevant discipline chapters.

#### Conclusion

- 25.8.4.2 Further assessment will be undertaken for the Converter Station Area, Onshore Cable Route and Landfall during operation and construction within the ES Chapter once the design is refined further. During construction there are likely to be **Moderate** temporary adverse effects resulting from noise disturbance and **Minor** temporary adverse effects resulting local changes in amenity values, access to

green and open space and transport. Increased employment opportunities and income levels during construction are anticipated to have **Neutral** to **Minor** beneficial health effects. During operation of the Converter Station, there is the potential perceived health effects associated with EMF and effect on human health associated with any changes to landscape and greenspace. Health effects following land reinstatement along the Onshore Cable Route are expected to be **Neutral**.

## **25.9 ASSESSMENTS AND SURVEYS STILL TO BE UNDERTAKEN**

25.9.1.1 As the design is refined further, the assessment of potential effects on human health during construction and operation will be revisited and updated where relevant for the ES. Further data collection is not anticipated at this stage, unless this is required to address the PINS Scoping Opinion.

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