AQUIND Limited

AQUIND INTERCONNECTOR

Environmental Statement – Chapter 26 Human Health

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

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Environmental Statement – Chapter 26
Human Health

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26. HUMAN HEALTH

26.1 SCOPE OF THE ASSESSMENT

26.1.1 INTRODUCTION

26.1.1.1 This chapter reports the outcome of the assessment of likely significant effects arising from the Proposed Development upon human health. The Proposed Development that forms the basis of this assessment is described in Chapter 3 (Description of the Proposed Development) of the Environmental Statement ('ES') Volume 1 (document reference 6.1.3).

26.1.1.2 The human health assessment considers the potential impacts associated with the Proposed Development on the following health determinants:

- Converter Station Area:
  - Air quality (construction);
  - Noise (construction and operation);
  - Employment and business activity (construction);
  - Landscape and green space (construction and operation);
  - Soil/land contamination and water quality (construction); and
  - Personal safety – Electro-Magnetic Field ('EMF') (operation).
- Onshore Cable Corridor and Landfall:
  - Air quality (construction and operation);
  - Noise (construction and operation);
  - Transport and access (construction and operation);
  - Employment and business activity (construction);
  - Landscape and green space (construction and operation);
  - Soil/land contamination and water quality (construction); and
  - Personal safety (operation).

26.1.1.3 Prior to the adoption of the revised EIA Regulations in 2017 the assessment of health in EIA tended to focus on biophysical issues related to environmental hazards, such as the impacts of air quality or land contamination on physical health. The EIA Regulations are now interpreted as requiring a wider consideration of population and health impacts (IEMA, 2017). A formal methodology for the assessment of health in EIA is yet to be prepared or adopted, therefore this assessment utilises professional experience in both EIA and the practice of Health Impact Assessments ('HIA').

26.1.1.4 This chapter assesses the impacts arising from the Proposed Development within the Onshore Components of the Order Limits and the Site only (above Mean Low Water Springs ('MLWS')). Refences to the Order Limits and the Site in this chapter, any appendices to it and plans enclosed to it, is only in relation to the Order Limits and the Site as applicable to the Onshore Components as illustrated in Figure 3.9 of the ES Volume 2 (document reference 6.2.3.9) Figure 3.9.

26.1.2 STUDY AREA

26.1.2.1 The geographic scope of the human health assessment has been selected based on the scale of the development. Impacts could potentially be experienced by the population within close proximity to the Proposed Development, and within the wider administrative areas within which the Proposed Development is to be located. Therefore, the study area population to be assessed within this chapter is:

- Converter Station Area: Population within the administrative areas of Winchester and East Hampshire (Plate 26.1); and
- Onshore Cable Corridor, including the Landfall: Population within the administrative areas of Portsmouth, Havant, Winchester and East Hampshire (Plate 26.2).

26.1.2.2 The potential health effects during both construction and operation stages are likely to be greatest for the communities included in and surrounding the Order Limits. While the Proposed Development has the potential to impact the population outside of this area, these impacts will likely be less than those felt by the local community. The assessment therefore focuses on effects to the community nearest the Order Limits. Impacts on community facilities, green space and walking / cycling routes resulting in health effects from the disruption of their use or enjoyment have been considered within 500 m of the Order Limits in light of the potential for users of these to experience impacts.

26.1.2.3 The human health assessment has been informed by the findings for the other relevant assessments undertaken as part of this EIA including Chapter 15 (Landscape and Visual Amenity), Chapter 18 (Ground Conditions), Chapter 19 (Groundwater), Chapter 20 (Surface Water Resources and Flood Risk), Chapter 22 (Traffic and Transport), Chapter 23 (Air Quality), Chapter 24 (Noise and Vibration), Chapter 25 (Socio-economics) of the ES Volume 1 (document references 6.1.15, 6.18, 6.1.19, 6.1.20, 6.1.22, 6.1.23, 6.1.24, 6.1.25) and consideration of EMF within Appendix 3.7 Onshore Electric and Magnetic Field Report. Where information and residual effects from these chapters are referred to within the human health assessment, these have been based on the study areas set out in those chapters.

Plate 26.1 - Converter Station Area Health Study Area

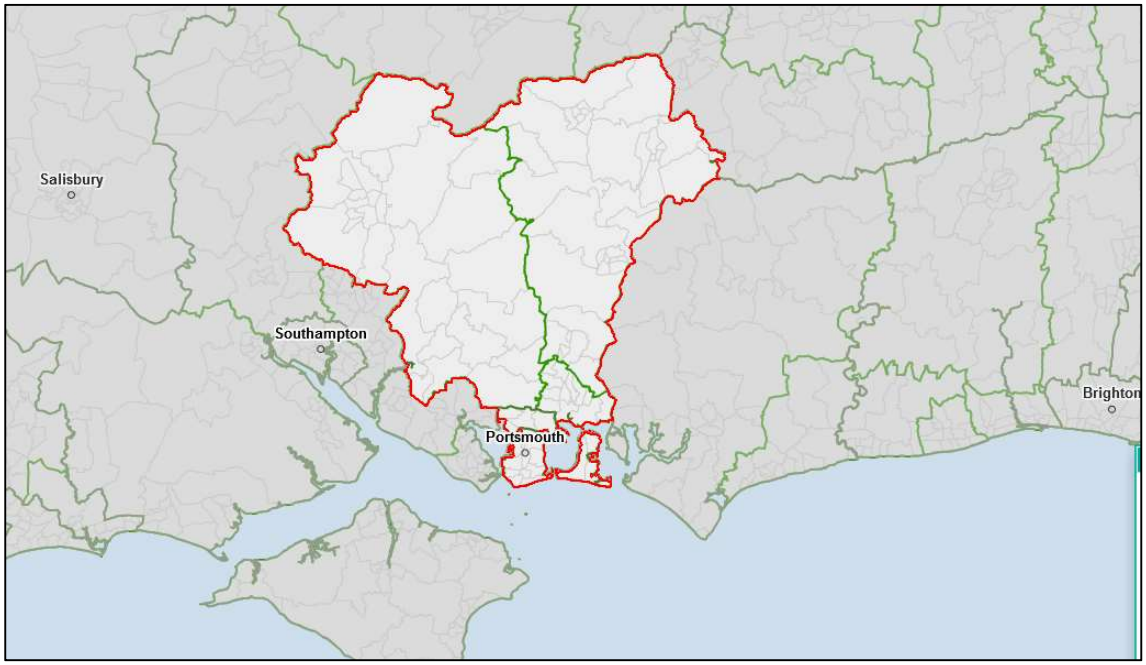

Plate 26.2 - Onshore Cable Corridor and Landfall Health Study Area

26.2 LEGISLATION, POLICY AND GUIDANCE

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

26.2.2 LEGISLATION

Countryside and Rights of Way Act 2000

26.2.2.1 The Countryside and Rights of Way Act 2000 ('CRoW') regulates access to land by the public and Public Rights of Way ('PRoW') and ensures access to them.

Health and Social Care Act 2012

26.2.2.2 The Health and Social Care Act 2012 introduced legal duties about health inequalities. It included specific duties for health bodies including the Department of Health, Public Health England ('PHE'), Clinical Commissioning Groups ('CCG's'), and NHS England which require the bodies to have due regard to reducing health inequalities between the people of England. The Act also brought in changes for local authorities on public health functions.

26.2.3 PLANNING POLICY

National Policy

National Policy Statement for Energy (EN-1)

26.2.3.1 In the s35 Direction letter, the Secretary of State (SoS) directed that the Proposed Development was, by itself nationally significant and that the Overarching National Policy for Energy (EN-1) (Department of Energy and Climate Change, 2011) should apply to the application as it would to a generating station of a similar generating capacity as the capacity of the interconnector. The NPS EN-1 sets out the Government's national policy for major energy infrastructure.

26.2.3.2 Paragraph 4.13.1 of the NPS EN-1 recognises that energy production has the potential to impact on the health and well-being of a population with access to energy being beneficial to society and our health as a whole, whilst noting the production, distribution and use of energy may have negative impacts on some people's health.

26.2.3.3 Paragraph 4.13.2 identifies that where the proposed development has an effect on human beings, an 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. Paragraph 4.13.2 also recognises it is necessary to consider the cumulative impact of more than one development on health.

National Planning Policy Framework

26.1.1.1. The National Planning Policy Framework ('NPPF') (Ministry of Housing, Communities & Local Government, 2019) provides national planning policies which seek to reduce the complexity and improve the accessibility of the planning system, whilst protecting the environment and encouraging growth in a sustainable manner.

26.1.1.2. The NPPF does not contain specific policies for Nationally Significant Infrastructure Projects (or major infrastructure projects) to be consented pursuant to the Planning Act 2008 (the 'Act'). These are to be determined in accordance with the Act, relevant national policy statements for major infrastructure (detailed above) and other matters that are relevant (which may include the NPPF).

26.2.3.4 Paragraph 8 of the NPPF identifies three overarching objectives which must be pursued to achieve sustainable development in mutually supportive ways. Of particular relevance to this chapter, the second objective a 'social objective' which identifies the need to support strong, vibrant and healthy communities, by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being.

26.2.3.5 Part 8 of the NPPF, 'promoting healthy and safe communities' provides that planning decisions should aim to achieve health, inclusive and safe places, which promote social interaction, are safe and accessible and enable and support health lifestyles.

26.2.3.6 With regard to open space and sports land, paragraph 96 provides that "*access to a network of high quality open spaces and opportunities for sport and physical activity is important for the health and well-being of communities"*. Further to this, paragraph 98 identifies that planning decisions "*should protect and enhance public rights of way and access*".

National Planning Practice Guidance

26.2.3.7 The National Planning Practice Guidance ('NPPG') was launched 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.

26.2.3.8 The NPPG policy for Health and Wellbeing (Ministry of Housing, Communities & Local Government, 2019) identifies a healthy place as one that:

> "…*supports and promotes healthy behaviours and environments and a reduction in health inequalities for people of all ages. It will provide the community with opportunities to improve their physical and mental health, and support community engagement and wellbeing*…"

26.2.3.9 The NPPG policy for open space, sport and recreation facilitates (Ministry of Housing, Communities & Local Government, 2014) states:

> "*Open space, which includes all open space of public value, can take many forms, from formal sports pitches to open areas within a development, linear corridors and country parks. It can provide health and recreation benefits to people living and working nearby; have an ecological value and contribute to green infrastructure". And "Public rights of way form an important component of sustainable transport links and should be protected or enhanced*".

Local Policy

Portsmouth City Council

26.2.3.10 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, relevant policy (Retained Policies): DC21 Contaminated Land (Portsmouth City Council, 2006).

- The Portsmouth Plan 2012, relevant policy: PCS13 A Green Portsmouth; PCS14 A Healthy City; PCS16 Infrastructure and Community Benefit; PCS17 Transport; PCS18 Local Shops and Services; PCS23 Design and Conservation (Portsmouth City Council, 2012).
    - Key policies above in relation to health identify that Portsmouth City Council ('PCC') will protect, enhance and develop the green infrastructure network (PCS13); create a healthy city and improve the health and well-being of its residents (PCS14); and ensure local shops continue to provide essential services to their local communities (PCS18).

26.2.3.11 Partnership for Urban South Hampshire ('PUSH') Green Infrastructure Strategy (Partnership for Urban South Hampshire, 2017)

- PCC 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).

26.2.3.12 The PCC Parks and Open Spaces Strategy (Portsmouth City Council, 2012) considers how Portsmouth's open spaces are planned, managed, protected, designed and maintained. It sets out a series of objectives to ensure that Portsmouth's parks and open spaces are of a consistent high standard, fit for purpose and meet the needs of Portsmouth's residents and visitors.

Havant Borough Council

26.2.3.13 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 Council, 2011).

- Havant Borough Core Strategy 2011, relevant policy: 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; and CS20 Transport and Access Strategy.
    - Key policies above in relation to health identify the need to creating a place where people want to live, visit or work (CS1); raise skill levels and increase employability (CS3); have community involvement and consider of services for older people and other vulnerable groups (CS7) and maintain, manage, improve and create green infrastructure (CS13).

26.2.3.14 In support of the upcoming Local Plan Havant Borough Council ('HBC') have produced an Open Space Strategy (Havant Borough Council, 2018). This strategy undertakes a qualitative and quantitative assessment of the existing and future open space needs of the community.

Winchester City Council

26.2.3.15 The Winchester District Local Plan 2013 (Winchester City Council, 2013) has been adopted by Winchester City Council ('WCC'). The South Downs Local Plan has replaced the existing planning policies operating across the South Downs National Park ('SDNP'), 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.

- Winchester District Local Plan Joint Core Strategy 2013, relevant policy: CP6 Local Services and Facilities; CP7 Open Space, Sport and Recreation; CP10 Transport; CP15 Green Infrastructure; and CP17 Flooding, Flood Risk and the Water Environment.
    - Key policies above in relation to health identify the need to retain exist and provide new services and support facilities (CP6); seek improvements in the open space network and in-built recreation facilities (CP7); encourage walking and cycling (CP10); have a positive contribution to the public realm; and the provision, protection and enhancement green infrastructure (CP15).

East Hampshire District Council

26.2.3.16 The East Hampshire Local Plan 2014 (East Hampshire District Council, 2014) aims to shape and guide development in East Hampshire to 2028. East Hampshire District Council ('EHDC') is now reviewing its Local Plan.

- Joint Core Strategy, relevant policy: CP1 Presumption in favour of sustainable development; CP5 Employment and workforce skills; 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; and CP31 Transport (East Hampshire District Council, 2014).
    - Key policies above in relation to health identify the need to promote and support skills and employment provisions (CP5); promote, protect and enhance social, open space and green infrastructure (CP16, CP17, CP28); restricts development which affects health and safety of communities (CP27); and protect and enhance public transport, and cycle and pedestrian links (CP31).
- East Hampshire District Local Plan: Second Review, relevant policy (saved policies): HE18 Historic Parks and Gardens; HE19 Ancient Tracks and Lanes; 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; and UI1 New Utility Infrastructure in the Countryside (East Hampshire District Council, 2006).

- Key policies above in relation to health promote the protection of parks and gardens (HE18), and the amenity of users of footpaths, bridleways, or cycleways (T4). They also identify 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 (IB2, IB3, UI1).

26.2.3.17 The Open Space Assessment for EHDC (East Hampshire District Council, 2018) replaces the previous strategy produced in 2008. This provides recommendations to support improved public health in the district by encouraging residents to make healthy lifestyle choices.

26.2.4 GUIDANCE

26.2.4.1 As there is currently no established guidance on the assessment of human health as part of an 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 (PHE, 2017);
  - 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; and
- 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 (Cave, 2017).
  - This document provides brief guidance and recommendations for those concerned with population and human health.

26.3 SCOPING OPINION AND CONSULTATION

26.3.1 SCOPING OPINION

26.3.1.1 As detailed within Chapter 4 (Methodology) of the ES (document reference 6.1.4), a Scoping Opinion was received by the Applicant from PINS (on behalf of the SoS) on 7 December 2018 (Appendix 5.3 (PINS Scoping Opinion) of the ES Volume 3 (document reference 6.3.5.3)). Comments were received from PHE on Health and Well-being, which were captured within the responses from PINS. The responses from PINS in relation to human health, and how those requirements should be addressed by the Applicant, are set out below:

- The Inspectorate agreed that a number of health determinants, listed below in Table 26.1, could be scoped out of the ES human health assessment given the nature of the Proposed Development.
- In accordance with the Inspectorate comments, the ES assessment on human health includes reference to the assessment of air quality and water quality. Effects on the marine environment are covered in Chapters 7 (Marine Water and Sediment Quality) (document reference 6.1.7). No potentially significant effects on human health with regards to the marine environment were identified at Scoping.
- The Inspectorate stated that the Proposed Development may impact on PRoW, cycle paths and open space. Although considered within the assessment scope of Chapter 25 (Socio-economics) and Chapter 22 (Traffic and Transport), this Chapter has considered these effects on human health. Cross-references to Chapter 22 (Traffic and Transport) and Chapter 25 (Socio-economics) have been made where relevant.
- The Inspectorate stated that the ES should include an assessment of effects on healthcare and local rented accommodation demand and affordability, where likely significant effects could occur. Employment generation has been considered in further detail in Chapter 25 (Socio-economics) (Section 25.7). Table 25.1 (topics scoped out of the assessment at Scoping) contained in Chapter 25 (Socio-economics) identifies that it is anticipated that construction workers from the South East will continue to reside within their current locations or be sourced in for specialist work (and therefore not bringing families with them). Therefore, it is unlikely that there will be a significant increase in demand for local services (accommodation and community facilities) during the Construction Stage. Accordingly, an assessment of effects on healthcare and local rented accommodation demand and affordability has not been undertaken on the basis that it is not considered likely significant effects could occur in this regard. Further justification is provided in the Chapter 25 (Socio-economic) assessment at Section 25.7.
- The Inspectorate noted that justification for the study area and vulnerable groups should be provided in the ES. This is provided within Section 26.1.2 and Section 26.4.2.2 and 26.4.2.3 of this ES Chapter respectively.
- In accordance with the Inspectorate comments, the baseline population health data has reference to the Public Health Outcomes Framework.
- In accordance with the Inspectorate comments, this Chapter sets out the approach to determining significance. Aligning with the methodology presented in Chapter 4 (EIA Methodology) of the ES Volume 1 (document reference 6.1.4), effects deemed to be significant for the purpose of assessment are those which are described as 'major' and 'moderate'.

- This ES Chapter includes appropriate cross-references to relevant assessments presented elsewhere in the ES where impacts could result on human health effects, as requested by the Inspectorate.

26.3.1.2 Appendix 26.1 (Consultation Responses) of the ES Volume 3 (document reference 6.3.26.1) includes the responses to the PINS EIA Scoping Opinion.

26.3.2 CONSULTATION PRIOR TO PEIR

26.3.2.1 No informal consultation specific to the assessment of the impact of the Proposed Development on human health was undertaken prior to statutory consultation and the publication of the PEIR. Topics the have supported the human health assessment, including noise and vibration, landscape, contamination, water quality, and transport, were covered within other topic specific consultation.

26.3.3 STATUTORY CONSULTATION

26.3.3.1 Consultation on the PEIR was undertaken between 27 February and 29 April 2019. There were no responses specific to human health, however, a summary of the key points raised in relation to other topics which affect human health are set out below.

- Denmead Parish Council and HBC raised concerns about noise from the Proposed Development. Noise impacts are considered within Chapter 24 (Noise and Vibration). This has been cross referenced where appropriate and effects on human health from noise and the associated perceived annoyance are considered within Sections 26.6.2 and 26.6.3.
- EHDC, SDNP and Campaign to Protect Rural England Hampshire identified that adverse impacts could occur to the landscape and visual settings and amenity value of the National Park, PRoW and long-distance walking routes. Landscape and visual amenity effects are considered within Chapter 15 (Landscape and Visual Amenity). Amenity effects, including impacts on access, that have the potential for significant effect on human health have been considered in this Chapter within Sections 26.6.2 and 26.6.3.
- EHDC raised concerns in relations to dust on human receptors during construction. The impacts of dust on human receptors has been assessed within Chapter 23 (Air Quality). This has been cross referred to where appropriate and considered within Sections 26.6.2 and 26.6.3 of this Chapter.
- Hampshire County Council requested confirmation of the likely impacts on access to residential properties and the road network during construction works, as well as proposed mitigation measures. These impacts on access to residential properties and the road network and measures to mitigate those impacts have been considered and are discussed within Chapter 22 (Traffic and Transport) and Chapter 25 (Socio-economics). Impacts that have the potential for significant effects on human health related to impacts on access to residential properties and the road network have been considered at Sections 26.6.2 and 26.6.3.

- HBC and PCC raised concerns in relation to potential temporary disruption to businesses. The impacts to businesses are assessed within Chapter 25 (Socio-economics), Section 25.7. Related impacts that have the potential for significant effects on human health have been considered within this Chapter within Sections 26.6.2 and 26.6.3.
- PCC raised concerns in relation to the potential impacts on open and recreational space and related parking. The potential impacts on open and recreational space (green space) on human health are identified during construction and operation stages within Sections 26.6.2 and 26.6.3 of this Chapter. Potential impacts are also assessed within Chapter 25 (Socio-economics), Section 25.7.
- PCC requested that the developer assess the impact of a loss of established or mature trees and their contribution to health and well-being. The health and wellbeing benefits associated with green space, landscape and greenery have been identified within this Chapter at Section 26.5.3. Section 26.6.2 and 26.6.3, and the assessment within Sections 26.6.2 and 26.6.3 includes consideration of changes to landscape and loss of features, including vegetation, during operation.

26.3.3.2 Appendix 26.1 (Consultation Responses) includes the responses to the PEIR consultation in relation to this topic and how these have been addressed. Further details of consultation undertaken to date is presented within the Consultation Report (document reference 5.1).

26.3.3.3 Consultation relevant to human health, including air quality, noise, employment, business disruption, landscape, contamination, water quality and transport, were further covered within other topic specific statutory consultation.

26.3.4 POST PEIR CONSULTATION

26.3.4.1 No human health specific consultation was undertaken following statutory consultation. Topics the have supported the human health assessment, including air quality, noise, landscape, contamination, water quality and transport, were covered within other topic specific post PEIR consultation.

26.3.5 ELEMENTS SCOPED OUT OF THE ASSESSMENT

26.3.5.1 The elements shown in Table 26.1 were not considered to give rise to likely significant effects at Scoping as a result of the Proposed Development and have therefore not been considered within the ES:

Table 26.1 – Topics and elements scoped out of the assessment at Scoping

Element Scoped Out	Justification
Health Determinants: Collisions; Social Isolation; Climate Change; Exercise and Physical Activity; Illicit Drug Use; Smoking Habit; Access to Nature; Hazards; Wealth Distribution; Community Participation; Crime/Antisocial behaviour; Housing; Income; Access to Healthcare; Childhood Development; and Level of Income	These health determinants were scoped out of the human health assessment taking into account the nature of the Proposed Development and the likelihood of the individual health determinants resulting in significant health effects.

26.3.5.2 As identified within Chapter 25 (Socio-economics), it is anticipated that construction workers from the South East will continue to reside within their current locations or be sourced in for specialist work (and therefore not bringing families with them). Therefore, it is unlikely that there will be a significant increase in demand for local services (accommodation and community facilities) during the Construction Stage. Therefore, effects on local services demand due to an increase in population from construction workers have been scoped out and are not considered further within this Chapter.

26.3.5.3 The generation of direct, indirect and induced employment opportunities during the Operational Stage have been scoped out of Chapter 25 (Socio-economics). Chapter 25 (Socio-economics) identifies that the additional direct, indirect and induced employment opportunities associated with the Proposed Development, which would be principally related to the maintenance of the HVDC cable and Converter Station, are considered to be minimal. As such, the health effects in relation to employment during operation would not be significant and will not be considered further within the ES.

26.3.5.4 The health determinants identified within the scoping report were consolidated during the development of the PEIR. This PEIR was subject to statutory consultation between 27 February and 29 April 2019. The consolidation of the health determinants was considered to be a necessary step to bring greater focus to the assessment, allowing the emerging complexities of the Proposed Development to be and to clearly be able to cross referenced. The consolidated health determinants were then adopted within this ES Chapter, as shown in Table 26.2.

Table 26.2: Scoping Report and ES health determinants

Scoping Report health determinants	ES health determinants
Noise	Noise
Access to services, facilities and amenities **Surface access** **Public transport**	Transport and access
Apprenticeships **Business activity** **Job creation and availability/quality of employment opportunities**	Economy and business activity
Landscape and Townscape **Land use** **Natural Habitats** **Access to green space/bluespace**	Landscape and green space
Soil land contamination	Soil/land contamination and water quality
Personal safety	Personal safety – EMF

26.3.5.5 Water Quality and Air Quality were added to the human health scope in response to the Scoping Opinion received from PINS.

26.3.6 IMPACTS SCOPED INTO THE ASSESSMENT

Construction Stage

26.3.6.1 The following impacts are considered to have the potential to give rise to likely significant effects during construction of the Proposed Development and have therefore been considered within the ES:

- Impacts associated with emissions of pollutants to air and generation of noise emissions resulting in health effects;
- Impacts associated with changes to landscape and green space resulting in health effects;
- Indirect impacts associated with changes in the local business activity and employment resulting in health effects;

- Impacts from contact with contaminated soil/land and water resulting in health effects; and
- Disruptions to local transport and access to community facilities resulting in health effects.

Operational Stage

26.3.6.2 The following impacts are considered to have the potential to give rise to likely significant effects during operation of the Proposed Development and have therefore been considered within the ES:

- Impacts associated with emissions of pollutants to air and generation of noise emissions resulting in health effects;
- Impacts associated with changes to landscape and green space resulting in health effects;
- Perceived fear of harm from EMF exposure; and
- Disruptions to local transport and access to community facilities resulting in health effects.

26.3.6.3 During operation, there is the potential for scenarios requiring cable repair. Effects associated with this activity would be similar to the construction impacts but targeted as specific locations and often shorter in duration.

Decommissioning Stage

26.3.6.4 For the decommissioning stage for the Converter Station Area it is assumed that similar effects to construction would arise. When decommissioning the Onshore Cable Route, it is assumed that the cables will either remain in situ or be removed from Joint Bays, resulting in much reduced impacts but similar to those listed above for construction.

26.4 ASSESSMENT METHODOLOGY

26.4.1.1 This assessment is based on established good practice guidance on HIA developed by PHE and the professional association the Institute of Environmental Management and Assessment ('IEMA'). With limited available guidance, use of professional experience in both EIA and the practice of HIA has also been used.

26.4.1.2 This health assessment consists of the following:

- A review of the existing baseline conditions within the study areas;
- A review of evidence of how each determinant (listed in Section 26.1.1.2) affects health;
- An assessment of the effect that the Proposed Development is likely to have on the health of the study area population via the health determinants identified within Section 26.1.1.2; and

- Identification of mitigation and enhancement measures where required.

26.4.1.3 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, frequency and reversibility. The vulnerability of the population experiencing the impact and their ability to absorb the impacts is considered. Where vulnerable population groups such as those listed in Section 26.4.2.2 and 26.4.2.3 are predicted to be particularly affected by a health impact, this is identified.

26.4.1.4 The assessment focuses on potential significant effects on human health from the Proposed Development. The assessment outlined in this Chapter is informed by the assessments of significant residual effects generated from other topics in this ES 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 18 (Ground Conditions), Chapter 19 (Groundwater), Chapter 20 (Surface Water Resource and Flood Risk); Chapter 22 (Traffic and Transport), Chapter 23 (Air Quality), Chapter 24 (Noise and Vibration), Chapter 25 (Socio-economics) and consideration of EMF within Appendix 3.7 Onshore Electric and Magnetic Field Report to identify health and wellbeing outcomes. Note that effects on agricultural businesses are covered separately in Chapter 17 (Soils and Agricultural Land Use) of the ES Volume 1 (document reference 6.1.17) and effects on the fishing industry are covered in Chapter 12 (Commercial Fisheries) of the ES Volume 1 (document reference 6.1.12).

26.4.1.5 The assessment takes into account key mitigation where this is specified by topic chapters so that residual effects are used in the human health assessment.

26.4.2 SIGNIFICANCE CRITERIA

26.4.2.1 In the absence of guidance or universal applications of terminology for defining significance of health effects in EIA, this assessment has adopted an existing scale to define significance. The approach in this assessment has been adapted from that used by the IOM for the North Staffordshire ‘Streetcar’ Bus Rapid Transport Scheme HIA, IOM, 2009, which is often applied in the practise of HIA. While the practice of HIA is not equivalent to the assessment of health in EIA, in the absence of formal guidance on assessing human health in EIA, there are aspects from HIA that can be drawn upon to inform the assessment, such as this approach to determining significance. Significance incorporates the intensity of the impact and its potential duration to determine the ‘magnitude’ of impact on human health receptors, as illustrated in Table 26.3.

26.4.2.2 The human health assessment assumed that all human receptors are sensitive. However, this assessment assumes that the population will include vulnerable groups that are more sensitive to change. These vulnerable groups were identified during the EIA Scoping stage through a review of the population baseline, and comprising:

- Older people;
- People with existing health conditions;
- Unemployed and low-income groups; and
- Socially excluded or isolated groups.

26.4.2.3 Since the EIA scoping stage, additional vulnerable groups have been judged to be present within the study area, comprising children and young people, and those with mobility impairment.

26.4.2.4 The assessment methodology and the assigning of sensitivity, magnitude (intensity and duration of impact) and significance has been developed using professional judgement. This professional judgement has been based on experience, a desk-based analysis of the public health baseline of the study area, and scientific literatures on health effects.

26.4.2.5 As identified within Chapter 4 (EIA Methodology), effects deemed to be significant for the purpose of assessment are those which are described as 'major' and 'moderate'. The effects predicted to be ‘minor’ or ‘negligible’ are considered to be ‘not significant’.

Table 26.3 - Assessment Scale and Definition of Significance

Significance of Effect	Definition	Intensity [+/-]	Duration (SML) (TIP)
Major Adverse	Health effects are categorised as major adverse 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 adverse 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	Long term duration, Intermittent, Temporary or Permanent in nature.
Major beneficial	Health effects are categorised as a major beneficial if they prevent deaths/prolong lives, reduce/prevent the occurrence of acute or chronic diseases or greatly enhance physical and mental wellbeing would be a major positive.		

Moderate Adverse	Health effects are categorised as a moderate adverse if the effects are long term nuisance impacts, e.g. odours and noise, or may lead to exacerbations of existing illness. The adverse 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 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 adverse and enhance the positive effects though residual effects are likely to remain.	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	Medium term duration Intermittent, Temporary, or permanent in nature.
Moderate Beneficial	Health effects are categorised as a moderate beneficial if they enhance physical and mental wellbeing greatly and/or reduce exacerbations to existing illness and reduce the occurrence of acute or chronic diseases.		
Minor Adverse	Health effects are categorised as minor beneficial or adverse, 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 adverse and enhance the positive effects such that there are only some residual effects remaining.	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.	Short term duration, Intermittent, Temporary or permanent in nature.
Minor Beneficial			
Negligible	No health effect or effects within the bounds of normal/accepted variation.	N/A	N/A

26.4.3 ASSUMPTIONS AND LIMITATIONS

26.4.3.1 A formal methodology for the assessment of health in EIA is yet to be prepared or adopted by government organisations or professional institutes, therefore this assessment utilises and is based on professional experience in both EIA and the practice of HIA. The assessment provides a broad, high level indication of both the adverse and beneficial impacts that the Proposed Development could have on receptors.

26.4.3.2 The human health assessment has been informed by the findings for the other relevant assessments undertaken as part of the EIA including Chapter 15 (Landscape and Visual Amenity), Chapter 18 (Ground Conditions), Chapter 19 (Groundwater), Chapter 20 (Surface Water Resource and Flood Risk); Chapter 22 (Traffic and Transport), Chapter 23 (Air Quality), Chapter 24 (Noise and Vibration), Chapter 25 (Socio-economics) and consideration of EMF within Appendix 3.7 Onshore Electric and Magnetic Field Report to identify health and wellbeing outcomes. The findings of the human health assessment are therefore based on the assumptions set out in those assessments.

26.4.3.3 The review of evidence is not exhaustive and aims only to provide a summary of the key issues relevant to the scope.

26.4.3.4 The assessment is at population level and individual level effects are not identified as this would require a detailed individual level of baseline information which is not proportionate to the scale of the Proposed Development. District level data is used as being representative of the existing residents, workers and visitors living, working and visiting the area around the Proposed Development.

26.4.3.5 Beneficial effects do not necessarily cancel out adverse effects as often the beneficial effects and adverse effects are experienced by different groups within a community. Though there can be overlap where individuals experience both the beneficial and adverse effects at the same or different points in time.

26.4.3.6 The assessment relies on data provided by third parties (including local authorities, OS Mapping, Office for National Statistics ('ONS') and 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 there would be further time lag until the initial data results were released) and therefore for this assessment the use of the 2011 data is necessary.

26.4.3.7 For the decommissioning stage for the Converter Station Area, it is assumed that similar effects to construction would arise. When decommissioning the Onshore Cable Route, it is assumed that the cables will either remain in situ or be removed from Joint Bays, resulting in much reduced impacts but similar to those identified for the Onshore Cable Corridor construction. It is assumed that the onshore cable ducts will remain in situ. During operation, there is the potential for scenarios requiring cable repair. Effects associated with this activity would be similar to the construction impacts but targeted as specific locations and often shorter in duration.

26.5 BASELINE ENVIRONMENT

26.5.1.1 A human health profile for the study areas identified in Section 26.1.2 has been built up, summarising baseline information which are related to the potential health impacts of the Converter Station Area, Onshore Cable Corridor and Landfall. Baseline areas include:

- Population characteristics: size, age, deprivation and life expectancy;
- Socioeconomic characteristic: education and employment;
- Green space and landscape;
- Transport and access;
- Noise;
- Air quality;
- Soil/land contamination and water quality; and
- EMF.

26.5.1.2 The key data sources used for the baseline include:

- PHE Public Health Outcomes Framework;
- PHE Local Authority Health Profiles;
- ONS database (accessed via Nomis);
- Ministry of Housing, Communities and Local Government English indices of deprivation 2019;
- Local authority policies and reports, including Local Plans;
- Joint Strategic Needs Assessment ('JSNA') prepared by Health and Wellbeing Boards, including PCC and Hampshire County Council JSNA;
- Public available GIS and mapping information; and
- Finding of other relevant chapters of this ES.

Population and age profiles

26.5.1.3 ONS Population estimates for 2018, released in June 2019, for the four districts with the study area and the South East are (ONS, 2019):

- East Hampshire – 120,700 (48.3% Males, 51.7% Females);
- Havant –125,800 (48.4% Males, 51.6% Females);
- Portsmouth – 215,100 (51.0% Males, 49.0% Females);
- Winchester – 124,300 (48.8% Males, 51.2% Females); and
- South East region – 9,133,600 (49.3% Males, 50.7% Females).

26.5.1.4 The population levels within East Hampshire, Havant and Winchester are similar to each other, while Portsmouth has a much larger population. This corresponds with Portsmouth being a more urbanised centre, compared to the more rural nature of the other districts in the study area.

26.5.1.5 Population density of the authorities in the study area are shown in Table 26.4, with Portsmouth having the highest population density, followed by Havant. These two districts have higher population density than the average for the South East. Winchester and East Hampshire both have lower population density than the average for the South East, indicative of their rural nature. The population density of all districts shows an increase from 2011 Census data to 2018 population estimates.

Table 26.4 - Population density (people per hectare - p/ha) for the study area and the South East in 2011 and 2018 (Local Government Association, 2019; ONS, 2011)

	East Hampshire	Havant	Portsmouth	Winchester	South East
Density (p/ha) 2011	2.2	21.8	50.7	1.8	4.5
Density (p/ha) 2018	2.4	22.7	53.3	1.9	4.8
District size (ha)	51,443.21	5,537.32	4,038.82	66,097.47	1,907,249.53

26.5.1.6 Population data for the districts within the study area is presented by age range within Table 26.5 below.

Table 26.5 - Population groups (% of total population) (ONS, 2011)

Location	Age range (% of total population 2011)							
	0–9	10–15	16–17	18–24	25-29	30–44	45–64	65 +
East Hampshire	11.1	7.7	2.8	6.9	4.4	18.4	29.6	19.3
Havant	10.9	7.3	2.6	8.0	5.3	17.4	27.4	21.2
Portsmouth	12.0	6.4	2.3	15.5	8.3	20.3	21.9	13.5
Winchester	11.2	7.2	2.8	9.3	4.8	18.9	27.0	18.7
South East Region	11.9	7.1	2.5	8.7	6.1	20.4	26.1	17.1
England	11.9	7.0	2.5	9.4	6.9	20.6	25.4	16.4
Numbers may not sum due to rounding								

26.5.1.7 East Hampshire, Winchester and Havant have larger percentages of the population within the age range of 65+ when compared to the South East (17.1%) and England (16.4%) (Table 26.5). This is consistent with Hampshire's aging population (Hampshire County Council, 2017). Older people are especially vulnerable to loneliness and social isolation (NHS, 2018). This can have detrimental effects on health having been identified as a risk factor for all-cause morbidity and mortality (Tomaka, 2006), and has been associated with cognitive decline and mental health conditions (Cacioppo, 2011).

26.5.1.8 The age profile for Portsmouth indicates that the population is younger than both the regional and national profiles. Portsmouth has a higher representation of children and young people, with 36.2% of the population within the age groups between 0 to 24, and the largest demographic group aged between 18 to 44 (44.1%) when compared to other districts within the study area, and both the regional and England profiles (Table 26.5).

26.5.1.9 The below age profiles for East Hampshire, Winchester and Havant also indicate that the populations of these districts are generally older than both the South East and England profile, with lower representation of age groups between 20 to 39 years (see Plate 26.3, Plate 26.4 and Plate 26.5).

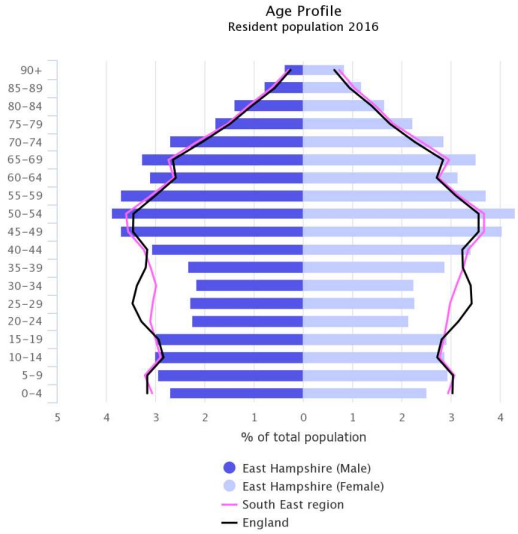

Plate 26.3 - Age population profile for East Hampshire

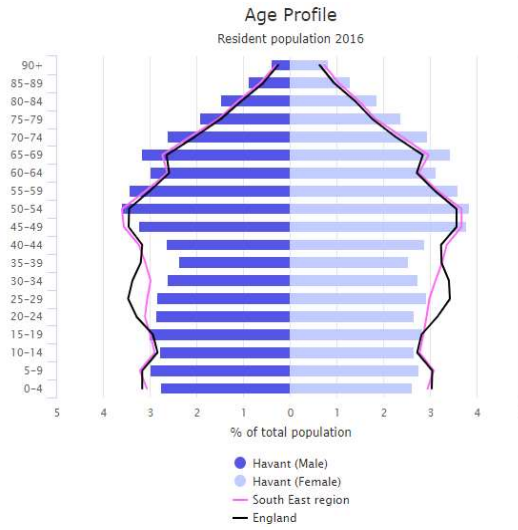

Plate 26.4 - Age population profile for Havant

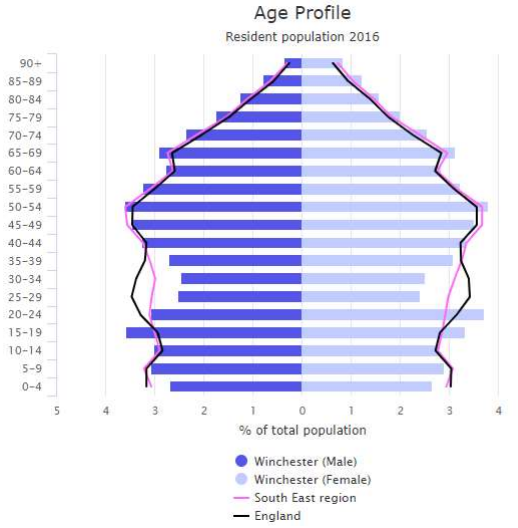

Plate 26.5 - Age population profile for Winchester

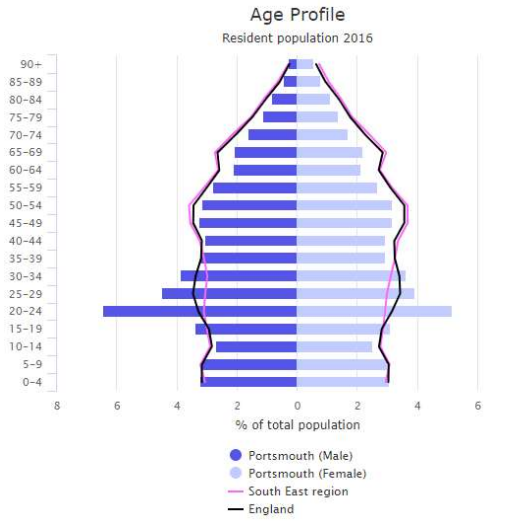

Plate 26.6 - Age population profile for Portsmouth

26.5.1.10 The 2011 Census data identifies that approximately 63,000 people in the UK identified themselves as Gypsy, Traveller and Irish Traveller. The South East region of England had both the largest number of Gypsies and Irish Travellers and the largest number per 10,000 people.

26.5.1.11 However, other sources suggest the 2011 Census figures may be underestimates (Cromarty, 2019). This population has a young age profile; in the 2011 Census the median age of Gypsies and Irish Travellers in England and Wales was 26 years compared to the national median of 39 years.

26.5.1.12 Gypsies and Irish Travellers below 20 years of age accounted for 39% of the ethnic group compared to 24% for the overall population of England and Wales (Cromarty, 2019). Significant health inequalities exist between the Gypsy and Traveller population in England and their non-Gypsy counterparts, and this group is considered socially deprived and excluded (Parry, 2007). Table 26.6 shows the number of Gypsies and Travellers sites, and Travelling Showpeople yards in the four districts within the study area.

Table 26.6 - Gypsies and Travellers sites, and Travelling Showpeople yards (Opinion Research Services, 2017; Opinion Research Services, 2018)

Area	Gypsies and Travellers		Travelling Showpeople	
	Sites	Pitches	Yards	Plots
East Hampshire (March 2017)	13	22	6	31
Havant (September 2016)	1	1	0	0
Portsmouth (July 2018)	0	0	0	0
Winchester (September 2016)	24	65	13	26

26.5.1.13 Homelessness is an extreme form of social exclusion and the health of people experiencing homelessness is significantly worse than the general population (Watson, 2016; Leng, 2017; Reynolds, 2018). Homelessness in the South East region is higher than any other region in England except for London, with approximately 29,600 homeless people in the South East. In the four districts within the study area, East Hampshire has the highest rate of homelessness with 1 in 380 people within the population being homeless. For the Portsmouth, Winchester and Havant this rate is 1 in 613, 1 in 1,274 and 1 in 2,067 respectively (Reynolds, 2018). These four districts are not within the worst 25% for homelessness nationally.

26.5.1.14 The location of residential properties within 500 m of the Order limits are listed within Chapter 25 (Socio-economics), Section 25.5.5. There are no residential buildings directly affected by the Proposed Development, although some residential land lies within the Order Limits. The Onshore Cable Corridor lies adjacent to both isolated residences and more densely populated residential areas, and runs underneath Southsea Leisure Park caravan park at the Landfall. Residents adjacent to the Order Limits are likely to experience direct disruption due to impacts on direct access for both pedestrians and vehicles, as well as effects from noise, air quality, traffic and visual intrusion.

Index of Multiple Deprivation Score

26.5.1.15 The Index of Multiple Deprivation ('IMD') is the official measure of relative deprivation for small areas, Lower Layer Super Output Area ('LSOA'), in England. The English Indices of Deprivation uses separate indicators, organised across seven 'domains' of deprivation, which are combined to give the overall IMD. This is an overall measure of multiple deprivation experienced by people living in an area.

26.5.1.16 The average score is calculated by averaging the LSOA scores in each larger area after they have been population weighted. The more deprived the area, the higher the IMD score.

26.5.1.17 In terms of overall deprivation, Winchester and East Hampshire are both significantly less deprived than the England average and falling within the best percentile (75th percentile - best) (Table 26.7). Portsmouth and Havant, however, are considered to be more deprived than the England average.

26.5.1.18 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 59th of 317 local authorities, whereas East Hampshire and Winchester are ranked 285th and 292nd respectively (Table 26.7). Portsmouth is significantly more deprived with respect to its surrounding authorities. Further consideration of deprivation is presented within Chapter 25 (Socio-economics).

Table 26.7 - Study Area Indices of Multiple Deprivation (Ministry of Housing, Communities & Local Government, 2019)

Area	IMD – Average Score	IMD – Rank of the average score (of 317 Local Authority Districts)
East Hampshire	10.3	285
Havant	21.8	119
Portsmouth	26.9	59
Winchester	9.6	292
England	19.6	-

Life expectancy and mortality

26.5.1.19 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[1] lower than the England average, with the male population having a lower life expectancy of 1.6 years less than the England average and female population of Portsmouth having an average life expectancy of 0.8 years less than the England average (Table 26.8).

Table 26.8 - Life expectancy at birth (PHE, 2019)

Area	Life Expectancy at birth (period 2015-2017)	
	Males	Females
East Hampshire	81.7	84.8
Havant	80.2	83.3
Portsmouth	78.1	82.3
Winchester	82.0	85.0
South East region	80.6	84.0
England	79.6	83.1

26.5.1.20 One way that PHE reports health inequalities within local authorities is by comparing the range in years of life expectancy from most to least deprived within the local authority. This health inequality in life expectancy is shown within Table 26.9 for the four districts within the study area, as well as the South East region and England averages (PHE, 2018).

[1] Where significance is noted, it is from a determination made in the source data, produced by PHE.

Table 26.9 - Life expectancy gap at birth (years) (slope index of inequality, period 2015-2017) (PHE, 2019)

Area	Life expectancy gap (years) (slope index of inequality, period 2015-2017)	
	Males	Females
East Hampshire	3.1	1.4
Havant	9.7	8.2
Portsmouth	8.1	6.7
Winchester	6.7	7.4
South East region (PHE, 2019)	8.0	5.9
England (PHE, 2019)	9.4	7.4

26.5.1.21 The Life Expectancy gap displays greater health inequalities in Havant and Portsmouth compared to East Hampshire and Winchester. The slope index of inequality in life expectancy at birth for Havant and Portsmouth districts also shows greater health inequalities than the South East region for both males and females. The slope index of inequality for East Hampshire is smaller than the South East region and England average.

26.5.1.22 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 England average. Havant is the only district that has a lower percentage of residents who consider themselves to be in 'very good health' compared to the England level. Havant is also the only district that has a higher percentage of the residents who consider themselves to be in 'bad health' or 'very bad health' compared to both Portsmouth and the England averages. However, Havant has a higher life expectancy than both Portsmouth and England, which appears to conflict with its residents' perception of their health status. Table 26.10 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.

Table 26.10 - 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

26.5.1.23 Mortality from causes considered preventable[2] across all districts within the study areas implies that on average the residents of Portsmouth are less healthy than the populations of other districts of the study area, and less healthy than both the South East and England (Table 26.11). Havant has a similar average to England, but worse than the average for the South East region. Both East Hampshire and Winchester have lower mortality rates from causes considered preventable compared to both the South East and England.

Table 26.11 - Mortality rate from causes considered preventable 2015-2017 (PHE, 2019)

Area	Age Standardised rates of mortality from causes considered preventable (per 100,000 population)
East Hampshire	140.1
Havant	178.1
Portsmouth	221.5
Winchester	134.0
South East region	159.6
England	182.8

[2] 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

20.1.1.1 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 districts in the study areas. Residents in Winchester and East Hampshire experience very low mortality rates from cancers considered preventable. These rates are better than the England average. The Havant rate is similar to the England average, but higher than the South East (Table 26.12).

Table 26.12 - Under 75 mortality rate from cancer considered preventable 2015-2017 (PHE, 2019)

Area	Under 75 mortality rate from cancer considered preventable (per 1,000)
East Hampshire	62.9
Havant	80.7
Portsmouth	93.5
Winchester	59.2
South East region	71.6
England	78.0

26.5.2 EMPLOYMENT AND QUALIFICATIONS

Evidence

26.5.2.1 Various studies have suggested a correlation between income inequality and a range of health problems (Rowlingson, 2011; Wilkinson, 2009; Truesdale, 2016). 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' (Waddell, 2006). Employment and socio-economic status are the main drivers of social gradients in physical and mental health and mortality (Waddell, 2006).

26.5.2.2 There is strong evidence that unemployment is generally harmful to health (Gerdtham, 2003) and evidence suggests that loss of employment or changes in employment status, and/or reduction in income 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, 2003).

26.5.2.3 The type of employment that a person enters will also influence health (Marmot., 2010). Research suggests that jobs with low personal control or low income are associated with poorer health status compared with high control or high income jobs (Kuper, 2003).

Baseline

26.5.2.4 Levels of employment across the study areas are above or equal to the England average in all districts apart from Portsmouth. Only Winchester has an employment rate for those between 16 to 64 years of age above the regional average. Winchesters employment rate is increasing based on recent PHE reported trends (the last six points in the time series) and significantly better[3] than the England benchmark (PHE, 2019). East Hampshire, Havant and Portsmouth have similar employment rates to the England average[4] (Table 26.13). East Hampshire is the only district that has an employment rate which appears to be declining according to PHE Public Health Profiles recent trends (based on the last six points in the time series) (PHE, 2019).

Table 26.13 - Employment rate for those between 16 to 64 years of age between 2015 – 2018 (PHE, 2019)

Area	Employment rate for those between 16 to 64 years of age (%)		
	2015/16	2016/17	2017/18
East Hampshire	75.2	79.3	75.6
Havant	74.2	75.6	75.2
Portsmouth	71.7	71.9	74.8
Winchester	85.0	75.8	83.2
South East region	77.2	77.7	78.5
England	73.9	74.4	75.2

26.5.2.5 Unemployment amongst the economically active population (usual residents aged 16 to 74) within the study area is lower than the England average, as shown below (ONS, 2011):

- East Hampshire – 2.6%;
- Havant – 4.0%;

[3] Based on the 95% Confidence Intervals
[4] Based on the 95% Confidence Intervals

- Portsmouth – 4.3%;
- Winchester – 2.3%;
- South East region – 3.4%;
- England – 4.4%.

26.5.2.6 The percentage of usual residents under 74 that are retired is higher than the England average (13.7%) for East Hampshire (15.3%), Havant (17.3%) and Winchester (14.5%). The percentage of usual residents under 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, 2011).

26.5.2.7 Gross weekly earnings for the study area districts are shown in Table 26.14. The weekly pay is highest in East Hampshire and Winchester, higher than the regional and England median weekly pay. The median weekly pay in Havant is higher than the England median weekly pay, but lower than the regional median weekly pay. The median weekly pay in Portsmouth is lower than both the regional and England median weekly pay.

Table 26.14 - Median gross 2018 weekly pay for employees living in the study area (pounds)

Area	Median gross 2018 weekly pay for employees living in the study area (pounds)
East Hampshire	£648.9
Havant	£575.6
Portsmouth	£509.7
Winchester	£723.6
South East region	£614.5
England	£574.9

26.5.2.8 In 2011, the percentage of residents aged 16 and over within East Hampshire and Winchester with a Level 4 qualification or above (broadly equivalent to a degree or higher qualification) was higher than England (27.4%) and the South East (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 was lower than the England and regional percentage at 22.3% and 23.7% respectively (ONS, 2011).

26.5.2.9 In 2018, the percentage of residents aged 16 to 64 with a Level 4 qualification or above within the study area, the South East region, and within England appears to have increased (see Table 26.15). East Hampshire and Winchester have a lower percentage of residence with no qualification compared to the England and regional percentage.

Table 26.15 - Percentage (%) of residents age 16 - 64 with Level 4 qualification or above, and with no qualifications (Jan 2018 - Dec 2018) (ONS, 2019)

Area	% residence with NVQ4+	% residence with no qualifications (NVQ)
East Hampshire	47.6	2.1
Havant	22.1	7.9
Portsmouth	35.6	6.9
Winchester	47.6	2.2
South East region	42.2	5.6
England	39.0	7.6

26.5.3 LANDSCAPE AND GREEN SPACE

Evidence

26.5.3.1 Green space is a valuable resource for increasing opportunities for physical activity and has the potential to contribute to reducing obesity and improving physical and mental health (Lachowycz, 2011; Sugiyma, 2018). Green space can also lead to health benefits from psychological relaxation and stress alleviation, and reduced exposure to noise and air pollutants, and increase social contacts (WHO, 2016a; Dadvand, 2012). Green space has been observed to have a stronger positive relationship with lower socioeconomic groups, older people, and children and young people (Mass, 2006). Access to green and open space has been suggested to encompass the idea of walkability, which includes perceptions of social cohesion (Seaman, 2010). Restricted access to natural areas may well be associated with poor psychological wellbeing (Wells, 2003).

26.5.3.2 Convenient, safe and connected walking and cycling infrastructure are important for promoting active travel. There is strong evidence that active travel can result in substantial health benefits (Winters, 2017).

26.5.3.3 Landscape is increasingly seen to contribute to quality of life and human health (Waltert, 2011; Thwaites, 2005) and the attractiveness or quality of green space is an important determination of green space use (O'Brien, 2010). Changes in landscape including species diversity, open space and tranquillity can have psychological effects and affect mental health. An important aspect of landscape is

green and open space. Studies have found that the presence of greenery in a neighbourhood has a positive relationship with resident's wellbeing, and social safety (Kaplan, 2001; De Vries, 2003).

26.5.3.4 Many studies carried out observing the relationship between green space and human wellbeing considered water as an element of green space (Volker., 2014). Exposure to so-called blue spaces can reduce stress and enhance mood (Karmanov, 2008) leading to both benefits to mental health and well-being, and levels of physical activity (Gascon, 2017).

26.5.3.5 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 including the 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). Access difficulties (environmental barriers or affordability) are one of the barriers to physical activity participation amongst older people (Franco, 2015).

Baseline

26.5.3.6 The Converter Station is situated next to the existing Lovedean substation, north-west of the village of Lovedean within the administrative boundary of WCC. The existing Lovedean substation is located in a rural fringe area in Winchester, approximately 13.5 km to the north of Portsmouth city centre, between Winchester and East Hampshire. It is surrounded by mixed agricultural fields with hedgerow boundaries and farm properties. Some smaller fields to the west are used by off-road vehicles and horse grazing. Crabdens Copse Site of Importance for Nature Conservation ('SINC'), Stoneacre Copse Ancient Woodland and Crabdens Row SINC are three areas of Ancient Woodland that surround the existing Lovedean substation to the north-east and south-west.

26.5.3.7 The existing Lovedean substation, associated pylons and overhead lines are dominant elements in the landscape of the Converter Station Area and the immediate surrounding area. The existing Lovedean substation is well screened by a belt of deciduous woodland which wraps around the substation to the north, south and east. Tranquillity levels associated with the Converter Station Area and its immediate surroundings are mixed, with relatively unmanaged woodland/hedgerows, sense of openness, and peace and quiet in specific locations, as well as the unsettled nature of some of the surrounding properties and land uses including the presence of overhead lines clustering around Lovedean Substation. Tranquillity is considered within Chapter 15 (Landscape and Visual Amenity).

26.5.3.8 The Converter Station Area would span across a number of small fields divided by hedgerows. The site is rural in nature, with a small number of dispersed properties clustered in small groups off Old Mill Lane, Broadway Lane (north and south) and Anmore Lane. Properties are often concentrated around farmsteads. The closest residential properties are approximately 0.2 km north of the Converter Station. Views from immediate residential properties surrounding the Converter Station range from direct and open to oblique and filtered.

26.5.3.9 The SDNP boundary is located to the west, north and east of the Converter Station. The SDNP boundary is, at its closest point, approximately 0.2 km to both the north and west of the Converter Station. The SDNP has been given the status of an international Dark Skies Reserve and has recreational use.

26.5.3.10 The Onshore Cable Corridor travels from the Converter Station at Lovedean to the Landfall site in Eastney, a route of approximately 19 km in length running through the administrative boundaries of WCC, HBC and PCC. It mainly follows existing highways, including Handerson Road, A2030, B2177, A3 and B2150 north towards the Converter Station Area. It runs through a mixture of rural and urban areas, including. the urban areas of Waterlooville, Purbrook, Drayton and Portsmouth. There are residential and commercial areas situated along the route, predominately where the route runs along highways and through built-up areas. The southern-most section of the Onshore Cable Corridor is less urban in nature. A description of the Onshore Cable Corridor (Section 2-9) is provided within Chapter 3 (Description of the Proposed Development), Section 3.4.4.

26.5.3.11 There are no formal green spaces within or directly adjacent to the Converter Station Area (Section 1). It is considered that the SDNP, within 500 m of the Converter Station, would be accessed using the PRoW discussed below. Views from publicly accessible locations around the Converter Station Area are partial and filtered through existing vegetation in the foreground including a mix of mature woodland, hedgerows and hedgerow trees. Pockets of woodland surround the Converter Station, including Crabdens Copse SINC, Stoneacre Copse Ancient Woodland and Crabdens Row SINC. These are outside of the Order Limits and are expected to have limited recreational value.

26.5.3.12 Within 500 m of the Onshore Cable Corridor and Landfall (Sections 2-10) there are a number of formal and informal recreational/public green spaces, including natural habitats that have recreational value. These are displayed with Table 26.16. Also see Chapter 25 (Socio-economics) and Figure 25.2. Although Kings Pond SINC natural habitat site falls within the Order Limits of the Proposed Development, this land is not publicly accessible and is therefore expected to have limited recreational value.

Table 26.16: Green space within 500 m of Sections 2-10 Order Limits

Section	Green space within 500 m of Section 2-10 Order Limits
Section 2	- No formal areas of recreational or public space within 500 m.
Section 3	- Goodman Fields and car park, an informal recreation area popular for dog walkers behind the auxiliary pumping station on Hambledon Road within the Order Limits.
Section 4	- An unnamed open space (including a playground) off Hambledon Road, along Darnel Road; - An unnamed open space (including a playground) on the corner of Hambledon Road and Sickle Way; - Waterlooville Recreation Ground (Jubilee Park), east of Hambledon Road accessed via Milton Road; - Forest End Allotment; - Berewood Park, including a playground area with multi use sport court and skate park off Hambledon Road, along Milk Lane; - Fielders Park, a formal open space area that services the surrounding residential neighbourhood; - The Bog, an open space off Hambledon Road on Ladybridge Road; - Purbrook Heath (including a playground and open space) and Purbrook Bowling Club, accessed via Purbrook Heath Road; - Purbrook West and East, east and west of London Road between Park Road and Downside Road; and - Portsdown Hill, a lookout point to the south of Portsdown Hill Road that provides an informal recreation space containing picnic benches with views out towards the sea. There is car parking space and a

Section	Green space within 500 m of Section 2-10 Order Limits
	variety of walking trails. This includes an SINC west of Farlington Avenue. This is within the Order Limits.
Section 5	- Waterworks Fields Play Area (playing fields and playground) east of Farlington Road, west of Grant Road and north of Solent Infant School; and - East Lodge Recreation Ground. Open space including play area, south of Havant Road.
Section 6	- Zetland Field, an open space with children's play area and ball court located to the east of the A2030 and north of Fitzherbert Road, within the Order Limits; - Unnamed area of open space located south of Springfield's Playing Fields; and - Springfield Playing Fields.
Section 7	- Farlington Marshes Local Nature Reserve and SINC, an area of reclaimed land in Langstone Harbour. There is a popular walk within the nature reserve which follows the route of the sea wall; - Farlington Playing Fields (large area of open space with football pitches and cricket squares), including the adjacent SINC, located within the Order Limits; - St John's College Farlington Pitches; - Anchorage Park, west of Eastern Road and east of Maidford Grove; - Baffins Milton Rovers Football ground (Kendall Stadium) and associated sports grounds, located within the Order Limits; and - Andrew Simpson Watersports Centre and the Tudor Sailing Club, both located on the shore of Langstone Harbour (bluespace).
Section 8	- Admiral Lord Nelson Playing Fields, consisting of an AstroTurf pitch and a multi-use game area; - Great Salterns Recreation Grounds; - Tangier Park, to the west of Portsmouth College including Baffins Park and Pond; - Milton Common, an expansive coastal open space popular for dog walkers with a network of informal paths which provide good access around the area, and connects to the Langstone Harbour Coastal Path. The eastern footpath running through the Common forms part of The Solent Way long distance path. Milton Common is an SINC and located within the Order Limits; and - Tamworth Park, a large area of open space including a children's play area. The Stacey Community Centre with floodlit ball court is adjacent to the park.

Section	Green space within 500 m of Section 2-10 Order Limits
Section 9	- The University of Portsmouth Langstone Campus Sports Site and Playing Fields; - Kingsley Road Open Space, located within the Order Limits; - Milton Locks Nature Reserve, which is an SINC, located within the Order Limits; - Locks Sailing Club, on the shore of Langstone Harbour (bluespace) - Milton and Eastney Allotments, located within the Order Limits; - Bransbury Park, mainly laid out as sports pitches. The area includes a flower garden, children's play area, skate park, miniature railway and floodlit sports area for netball, tennis and 5-a-side football. This is located within the Order Limits; - St James Public Park, a dog park between Fair Oak Road and The Driveway; - An unnamed area of open space directly to the east of Solent Drive; and - Open space east of Solent Drive, west of St James Park.
Section 10	- Cockleshell Playing Fields, including football fields and tennis courts. The football fields are home to Meon Milton Youth Football Club; - Fort Cumberland Road Play Area, a small playground on the corner of Fort Cumberland Road; - Fort Cumberland Open Space SINC, with the associated car park located within the Order Limits; and - Eastney Beach SINC, located within the Order Limits.

26.5.3.13 At the Converter Station Area (Section 1), PRoW 3, 5, 4, 6, 16, 20, 21, 22, 23 and 28 are within 500 m of the Order Limits and link to the surrounding road network (see Figure 25.2). PRoW 4 runs within the southern boundary of the Order Limits of the Converter Station (Section 1). Monarch's Way, a Long Distance Walking Route, also travels north, northwest and northeast of the Converter Station (Section 1) within 500 m of the Order Limits (and partly within the SDNP). There are seven PRoW within the Onshore Cable Corridor Order Limits; PRoW 41 (Section 2), 11 (Section 4), 17 (Section 4), 24 (Section 4), 30 (Section 5), 31 (Section 5) and 33 (Section 6). Denmead Millennium Trail, a local circular walking route, following PRoW 41 within Section 2 and is also within the Order Limits at Section 4 where it travels from Soake Road to Closewood Road.

26.5.3.14 There are also three Long Distance Walking Routes that are within the Order Limits of the Onshore Cable Corridor (Wayfarers Walk in Sections 4-5, The Solent Way in Sections 7-10 and Shipwrights Way in Section 10). There are several PRoW within 500 m of all sections of the Onshore Cable Corridor and Landfall except for Section

7. These PRoW and Long Distance Walking Routes link to the surrounding area and are displayed on Figure 25.2.

26.5.3.15 There are three Sustrans National Cycle Routes within 500 m of the Order Limits. These comprise Route 2 (Section 10), 22 (Sections 6 and 7) and 222 (Sections 4 - 10). In additions, there are a number of Sustrans Local Cycle Routes within 500 m of the Order Limits. These include routes on Eastern Road and routes off road through Milton Common. These routes are displayed within Figure 25.2.

26.5.3.16 Chapter 15 (Landscape and Visual Amenity) and Figure 15.46 also identify four cycling routes promoted either at a county or local level that are within 500 m of Section 1. These comprise Horndean Local Route, Horndean Technology College Route, River Alre Route and Broadpenny Down.

26.5.3.17 The proportion of adults reporting they are active has been increasing nationally with just over 6 in 10 adults achieved 150+ minutes of activity a week in November 2017/18 (Sport England , 2019), a 12-month increase of 0.8% in England. These improved results have been driven by women (aged 16+) and older adults (aged 55+). Those in routine/semi-routine jobs and those who are long term unemployed or have never worked are the most likely to be inactive (33%) and the least likely to be active (54%) (Sport England , 2019). Table 26.17 displays the percentage of physically active adults within the four districts of the population study area, and within the South East region and England. This demonstrates that physical activity in adults within the study area is higher than the England average.

Table 26.17 - Percentage of physically active adults (2017/2018)

Area	Percentage of physically active adults (2017/2018)
East Hampshire	69.7
Havant	68.9
Portsmouth	67.7
Winchester	72.6
South East Region	69.8
England	66.3

26.5.3.18 In England, 17.5% of children and young people aged 5-16 are meeting the current Chief Medical Officer guidelines of taking part in sport and physical activity for at least 60 minutes every day. A total of 43.2% of children and young people aged 5-16 undertaken at least, or an average of at least, 60 minutes every day (Sports England, 2019). Active play and informal activity remains the most common activity amongst children aged 5-11, and team sports is the most common activity amongst children and young people aged 11-16 (Sport England, 2019).

26.5.3.19 Further landscape and green space baseline information is presented within Chapter 15 (Landscape and Visual Amenity) and Chapter 25 (Socio-economics).

26.5.4 TRANSPORT AND ACCESS

Evidence

26.5.4.1 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 due to difficulty in accessing local shops and services (Randall, 2012). Transportation barriers lead to rescheduled or missed healthcare appointments, delayed care, and missed or delayed medication use, potentially lead to poorer management of chronic illness and thus poorer health outcomes (Syed, 2013). 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). Therefore, changes in journey times to healthcare facilities have the potential to result in adverse health effects.

26.5.4.2 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.

26.5.4.3 A review of literature has shown that participating in leisure activities can contribute to a range of beneficial effects, including physical, social, emotional and cognitive health (Caldwell, 2005). Engagement in leisure activities is also associated with increased subjective well-being (Kuykendall, 2015). Accessibility to leisure facilities can determine levels of physical activity (Randall, 2012).

26.5.4.4 Vehicle travellers, when faced with route changes or diversions, can experience stress from frustration; fear of potential accidents; and route uncertainty.

Baseline

26.5.4.5 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 the national speed limit with widths of less than 6 m and has no footways or cycle provision. No public transport facilities are provided along Broadway Lane.

26.5.4.6 The key strategic route serving the area is the A3 which connects London to Portsmouth. The Onshore Cable Corridor passes through a range on different road types, from quite rural roads 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. A description of the Onshore Cable Corridor (Section 2-9) is provided within Chapter 3 (Description of the Proposed Development), Section 3.6.4. Where possible, the Onshore Cable Corridor is located within public highway boundary, making use of the carriageway or footway/verges.

26.5.4.7 There are 13 bus services operating within the Onshore Cable Corridor and the proposed routing options for construction traffic for the Proposed Development, identified within Chapter 22 (Traffic and Transport), Table 22.7. There are numerous bus stops along the Onshore Cable Corridor associated with these bus services, principally within populated areas, including those located on B2150 Hambledon Road, A3 London Road, Fort Cumberland Road, A2030 Eastern Road, A2030 Havant Road, B2177 Portsdown Hill Road, Moorings Way and Furze Lane. Bus lanes are provided in both directions along the majority of the A3 London Road. The location for the Optical Regeneration Stations ('ORS') infrastructure (Section 10, Eastney Landfall) is within an existing car park to the south of Fort Cumberland Road, north of Eastney Beach.

26.5.4.8 A description of this route in relation to traffic, transport, and cycling and walking routes is provided within Chapter 22 (Traffic and Transport), Section 22.5.

26.5.4.9 Appendix 25.2 and Figure 25.1 identifies community facilities within 500 m of the Order Limits. The community facilities identified include schools, churches early childhood facilities, GP practices, pharmacies', opticians, dentists, care homes, and a library. These are further discussed within Chapter 25 (Socio-economics), Section 25.5.7. Portsmouth is a substantial settlement and acts 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. PRoW, Long Distance Walking Routes and Sustrans Cycle Route are identified within Section 26.5.3.13 - 26.5.3.15.

26.5.4.10 As well as the green space identifies within Table 26.16, there are also a number of leisure facilities directly adjacent to or within the Order Limits including;

- Section 4 - Waterlooville leisure centre; Portsmouth Golf Course;
- Section 7 - Andrew Simpson Watersports Centre; Tudor Sailing Club. There is a boat storage area, used by the Tudor Sailing Club which lies within the Order Limits;
- Section 8 - Great Salterns Golf Course; Langstone Harbour Viewing Car Park (within the Order Limits);
- Section 9 - Locks Sailing Club; Milton Cemetery and
- Section 10 - Premier Southsea Marina and Boatyard; Eastney Swimming Pool.

26.5.4.11 A list of leisure facilities within 500 m of the study area is presented within Appendix 25.2.

26.5.4.12 Businesses which are likely to experience potential direct disruption are identified in Chapter 25 (Socio-economics) and Appendix 25.2. Businesses adjacent to or with the Order Limits include:

- Section 3 - Easterlea Rest Home;
- Section 4 - businesses located at Hambledon Parade; local businesses opposite Hambledon Road; local businesses within BYNG's Business Park, Brambles Business Park and Hambledon Road Business Park; local businesses on the corner of Ladybridge Road and London Road; retail units between Lily Avenue and Lansdowne Avenue; The George Inn; the Hampshire Rose pub;
- Section 5 - commercial businesses within Farlington accessed from Farlington Avenue, Waterworks and Havant Road;
- Section 6 - Sainbury's Petrol Station and Sainbury's Supermarket; B&M Home Store, and Mountbatten Business Park;
- Section 7 - Morrisons on the corner of Anchorage Road and Eastern Road; Holiday Inn Express Portsmouth; Kendall Bros;
- Section 8 - Great Salterns Mansions Harvester; Premier Stores and BP Petrol Station; Harbourside;
- Section 9 - University of Portsmouth Langstone Campus; Ye Old Oyster House on Locksway Road; Thatched House Public House on Locksway Road; and
- Section 10 - Southsea Leisure Park; Spar and Marine Fish bar; Nelsons Bar and Restaurant.

26.5.4.13 There are no commercial properties adjacent to or with direct access to highway affected by the Order Limits for Section 1 and 2 which are likely to experience impacts due to the Proposed Development.

26.5.4.14 Waterlooville Fire Station (within 500 m of Section 4) is directly accessible from the A3 and Portsmouth Ambulance Station (within 500 m of Section 8) is located on Eastern Road west of Milton Common. RNLI Portsmouth Lifeboat Station is located along Ferry Road, east of the Landfall (Section 10, Eastney (Landfall)) location.

26.5.5 AIR QUALITY

Evidence

26.5.5.1 The link between health effects and exposure to air pollutants is well established, with a number of health risks including respiratory conditions resulting from Particulate Matter ('PM') pollution, which may be deposited within the lungs, affecting lung function and development. 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).

26.5.5.2 Defra has estimated that the effect of nitrogen dioxide ('NO_2') on mortality is equivalent to 23,500 deaths in the UK annually[5]. 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_2 (Mills, 2015).

26.5.5.3 The Lancet Commission on pollution and health examined the global burden of disease attributable to pollution risk factors and data from the 2012 WHO analysis of the global burden of disease caused by living and working in unhealthy environments (Prüss-Üstün .. A., 2016; WHO, 2016b; WHO, 2016c; Prüss-Ustün, 2014). Exposure of workers to elevated concentrations of benzene resulted in leukaemia and lymphoma (Rinsky, 1989).

26.5.5.4 Carbon monoxide at ambient air concentrations are several orders of magnitude below the concentration where carbon monoxide intoxications can be lethal. However, even at ambient concentrations, carbon monoxide pollution is associated with decreased lung function in asthmatic adults (Canova, 2010).

26.5.5.5 Whilst there are legal limit values and Air Quality Strategy ('AQS') objective values, it is widely recognised that pollutants related to construction and the products of combustion can be considered non-threshold pollutants, i.e. there is no known threshold concentration below which NO_2 or PM_{10} (PM with an aerodynamic diameter of 10µm or less) have no effect on a population's health.

26.5.5.6 Coarse PM (greater than 10µm diameter), such as construction dust, is not believed to penetrate the lungs to cause respiratory health problems. However, dust can cause eye and airway irritation and result in nuisance.

[5] Defra analysis using interim recommendations from COMEAP's working group on NO.

Baseline

26.5.5.7 The Converter Station Area is located in a rural environment where air quality is mainly influenced by traffic emissions from small local roads and agricultural activities. There are no significant industrial pollution sources in the surrounding area that influence air quality. According to both WCC and EHDC latest Air Quality Annual Status Reports, air quality in the vicinity of the indicative location of the Converter Station meets all the relevant UK AQS objectives.

26.5.5.8 The closest village to the Converter Station Area is Lovedean. Within 350 m of the Order Limits are scattered residential properties and the very western edge of Lovedean. There are receptors within 20 m of the Converter Station location, including within the Order Limits.

26.5.5.9 The Onshore Cable Corridor will lie within 20 m of many residential receptors particularly on the fringe of the outskirts of Portsmouth such as Eastney, Milton, Farlington, Widley, Purbrook and Waterlooville. The Onshore Cable Corridor also passes a number of schools.

26.5.5.10 For the majority of the Onshore Cable Corridor, existing pollution concentrations meet all air quality objectives. However, part of the Onshore Cable Corridor runs through Air Quality Management Area ('AQMA') No. 9 declared by PCC due to exceedances of the annual mean NO_2 objective. This AQMA covers a section of road from Milton Road to Eastern Road.

26.5.5.11 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.

26.5.5.12 All the annual mean background PM_{10} concentrations are below the relevant objectives. Although background $PM_{2.5}$ concentrations are below the relevant objectives Sections 5 and 6 are approaching 50% of the limit value for $PM_{2.5}$ and Sections 9 is above 50% of the limit value for $PM_{2.5}$. Further air quality baseline information is presented in Chapter 23 (Air Quality).

26.5.6 NOISE

Evidence

26.5.6.1 The health impacts of environmental noise are widely acknowledged and suggested to effect quality of life and well-being. A number of reviews of noise impacts on human health have been published (e.g. (WHO, 2011; Basner, 2014)) which highlight potential impacts on cardio-vascular disease, cognitive impairment and sleep disturbance and annoyance.

26.5.6.2 Annoyance is the most prevalent community response in a population exposed to environmental noise (Basner, 2014). Noise-induced annoyance may be considered an adverse effect on health. People annoyed by noise may experience a variety of negative responses, such as anger, disappointment, dissatisfaction, withdrawal, helplessness, depression, anxiety, distraction, agitation or exhaustion (WHO, 2011).

26.5.6.3 The overall community response depends on societal values and several personal (e.g. age and noise sensitivity) and situational characteristics (e.g. dwelling insulation) that might affect the individual degree of annoyance (Basner, 2014).

26.5.6.4 Long term noise exposure is believed to have an influence on psychological health, although, with the exception of annoyance there is not as strong a link as for other health outcomes.

Baseline

26.5.6.5 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 26.18). This implies that the noise threshold in Portsmouth may be higher than the less urban areas of the study area. Low incidence of noise complaints in parts of the study area may be due to the lower noise levels. However, this could result in a lower tolerance to changes in noise levels.

Table 26.18 - Rate of complaints about noise (NHS, 2012)

Area	Rate of noise complaints (Per 1,000) (2014/2015)
East Hampshire	4.8
Havant	3.1
Portsmouth	10.4
Winchester	3.5
South East region	5.3
England	7.1

26.5.6.6 Given the rural location of the Converter Station Area, the ambient noise climate at the closest residential receptors is generally quiet, with few dominant noise sources in the area. The Lovedean substation noise levels are dominant when close to its boundary.

26.5.6.7 Along the Onshore Cable Corridor, the dominant noise sources in the area is anticipated to be road traffic noise, the railway, and noise from industrial and commercial source.

26.5.6.8 Further baseline noise information is presented in Chapter 24 (Noise and Vibration).

26.5.7 SOIL/LAND CONTAMINATION AND WATER QUALITY

Evidence

26.5.7.1 Construction work can cause disturbance to the geology and soils, including potentially contaminated ground which could then impact upon human health receptors.

26.5.7.2 During construction contaminants can be mobilised resulting in cross contamination of uncontaminated ground or controlled waters. Site users and adjacent site users can be impacted during construction through direct contact, ingestion and inhalation of contaminated soils and possibly also contaminated ground water. Water is a key resource for quality of life. Access to clean water for drinking and sanitary purposes is a precondition for human health and well-being (European Environment Agency, 2018). Almost all human activities can adversely impact upon water quality, which is influenced by both direct point source and diffuse pollution.

Baseline

26.5.7.3 A number of potentially contaminated sites for each section of the Proposed Development have been identified in Chapter 18 (Ground Conditions), including historic mineral extraction, agricultural use, made ground and commercial sites. These previous uses may have resulted in potentially contaminated land. Result from samples collected during the 2018 ground investigation are discussed within Chapter 18 (Ground Conditions).

26.5.7.4 There are no watercourses within the Sections 1, 2, 5 and 6. Watercourses within 500 m of the Onshore Cable Corridor include;

- Section 3 - Kings Pond; Soake Farm;
- Section 4 - Unnamed Watercourses; Old Park Farm; North Purbrook Health;
- Section 7 - Farlington Marshes Gutter; Port Creek/Broom Channel;
- Section 8 - Great Salterns Drain; and
- Section 9 and 10 - Landstone Harbour.

26.5.7.5 The Water Framework Directive ('WFD') catchments that these watercourses fall within (Potwell Triand and Langstone Harbour WFD Catchments) have been assigned a Chemical Status (2016) of 'Good' and an Overall Status (2016) of 'Moderate'.

26.5.7.6 Chapter 20 (Surface Water Resources and Flood Risk) identifies that there are two licenced surface water abstractions in the near vicinity of the Onshore Cable Corridor.

26.5.7.7 Section 1 and 2 are located within an Environment Agency Source Protection Zone ('SPZ') 1 associated with Lovedean Pumping Station, potable water supply, and are also located within a SPZ 1 for public water supply. With the exception of the southernmost section of the Section 4, Sections 3 and 4 is located within an Environment Agency Source Protection Zone 1 and Inner Zone 1c relating to subsurface activity only. The underlying geology for some locations have been designated as Principal Aquifers, Secondary A Aquifers and/or Secondary Undifferentiated Aquifers. Further detail on the hydrogeology is provided in Chapter 19 (Groundwater) of the ES Volume 1.

26.5.7.8 Groundwater quality for waterbodies that lies within the Order Limits have been assigned classifications under WFD. For chemical classifications these groundwater waterbodies range between 'Poor' and 'Good' status (2016).

26.5.7.9 Further baseline information is provided within Chapter 18 (Ground Conditions), Chapter 19 (Groundwater), Chapter 20 (Surface Water Resources and Flood Risk), and Technical Appendix 20.2 Water Framework Directive Assessment.

26.5.8 PERSONAL SAFETY – EMF

26.5.8.1 Appendix 3.7 Onshore Electric and Magnetic Field Report provides an assessment of the EMF due to the Proposed Development. This report concluded that:

- Due to the earthed shielding of the HVAC Cables and HVDC Cables there will be no electric field present along the Onshore Cable Route;
- The HVAC and HVDC Onshore Cables are laid in agricultural land and along public highways, and the magnetic field strength is well below the guidelines and reduces rapidly with distance from the Onshore Cables;
- There will be no AC electric field outside of the Converter Station due to the earthed perimeter fence; and
- The Converter Station reactors must be designed and positioned to limit AC magnetic fields at the compound perimeter to levels below the guideline levels.

26.5.8.2 The below text provides a summary of health evidence on EMF.

26.5.8.3 Low-frequency electric and magnetic fields induce circulating currents within the human body. If the strength of the outside electric and magnetic field are excessive, these currents could lead to the stimulation of nerves and muscles or affect other biological processes (WHO EMF Project, 2019).

26.5.8.4 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 (WHO EMF Project, 2019). 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 tesla ('T') (van Rongen, 2007). This is several orders of magnitude higher than would be experienced from standard electricity network infrastructure (National Grid, 2019). In the view of the National Radiological Protection Board ('NRPB' (now PHE)), it is important to consider the possible need for further precautionary measures in respect to exposure of children to power frequency magnetic fields (NRPB, 2004).

26.5.8.5 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 long term exposure to low frequency magnetic fields. However, results indicate a lack of a cause-effect relation between exposure to the fields and disease (Mezei., 2001; Kheifets., 2001; Kheifets, 2010). The Health Protection Agency (now PHE) advises that the EMF association with childhood leukaemia is weak and unproven (HM Government, 2009).

26.5.8.6 There are some indications of non-specific medically unexplained symptoms suggested to be associated with EMF exposure, though it was considered that these symptoms were a consequence of exposure to other sources and may be due to stress reactions as a result of worrying about EMF health effects, rather than the EMF exposure itself (WHO, 2005).

26.5.8.7 In the absence of any scientific evidence of a health effect, a population may still retain some element of fear of an installation. This fear alone may have negative health impacts upon a population (Steimer, 2002).

26.5.8.8 It is theoretically possible for power lines to cause interference with pacemakers, defibrillators or other active implanted medical devices; however, this is very rare and there is no recorded instance of a patient coming to any harm this way in the UK (Energy Network Association, 2017).

26.5.8.9 In the UK, there are presently no statutory regulations to limit public exposure to power-frequency electric or magnetic fields. However, in 2004 the NRPB (now PHE) provided advice to Government (NRPB, 2004), recommending the adoption of the UK public exposure basic restrictions published in 1998 by the International Commission on Non-Ionizing Radiation Protection ('ICNIRP') (ICNIRP, 1998). The basic restrictions are designed to set conservative exposure levels for the general public to 50 Hz electric and magnetic fields, and these are endorsed by the PHE, the WHO and the UK Government.

26.5.8.10 Resulting from these recommendations government policy recommends that exposure of the public should comply with the ICNIRP 1998 guidelines in terms of the 1999 EU Council recommendations (European Union , 1999). The 1999 EU Council recommendation on the limitation of exposure of the public to electromagnetic fields recommends use of 1994 guidance for static magnetic fields. The limits of static magnetic fields are governed by this.

26.5.9 FUTURE BASELINE

26.5.9.1 The predicted percentage increase in population from mid-2016 to mid-2026 for the South-East of England is 6.4% which is slightly higher than the average for England which is 5.9% (ONS, 2018). The predicted population change for districts within the study area is lower than the England and South East regional averages for East Hampshire, Havant and Portsmouth at 4.7%, 4.8% and 4.6% respectively. For Winchester, the predicted percentage population increase is 6.8% (ONS, 2018).

26.5.9.2 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, 2018). The proportion of the population aged 65 and over within the South East region is projected to increase by 20.7% between mid-2016 and mid-2026 which is also slightly higher than the England average of 19.4% (ONS, 2018). Therefore, the population in the South East region 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.

26.5.9.3 It is anticipated that current employment trends (as detailed above in Section 26.5.2.4) will continue alongside changes to the locations and types of businesses near to the Proposed Development.

26.5.9.4 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 PCC Core Strategy (Portsmouth City Council, 2012). For example, Natural England have begun to investigate how to improve coastal access along a 30 km stretch of the Hampshire Coast between Old Portsmouth and South Hayling. The proposed route runs adjacent to Langstone Harbour, and would lie within the Order Limits in Sections 7, 8, 9 and 10 of the Proposed Development. Once the proposals are approved, Natural England will begin preparing the route for public use.

26.5.9.5 Future baselines relevant to Air Quality, Nosie, Ground Conditions, Water Quality, Socio-economics, traffic and landscape and covered within the respective chapters of this ES.

26.6 PREDICTED IMPACTS

Embedded Mitigation

26.6.1.1 Embedded mitigation includes those measures that have already been incorporated into the design of the Proposed Development to avoid or reduce any likely significant effects (these measures have been included in the assessment below).

Construction Stage

26.6.1.2 The human health assessment has included the following embedded mitigation measures, as set out in Chapter 3 (Description of the Proposed Development):

- Cable ducts allow short sections to be worked on at any one time. The installation rate for one circuit will be approximately 18 m - 30 m per day and typically in 100 m sections within urban areas, and approximately 50 m per day for areas of open land. This will minimise the duration of disruption at any one location;
- Joint Bays will be positioned in highway verges, fields or car parks, where possible, to limit the need for road closures;
- Temporary fencing will be used to secure the areas under construction during the construction works;
- Apart from the entry and exit points of the horizontal directional drilling ('HDD'), there will be no impact on the areas in between, including Eastney Beach, the Milton and Eastney Allotments and Milton Locks Nature Reserve;
- Where the Onshore Cable Corridor crosses green space, the route will be designed to avoid key recreational facilities wherever possible;
- Public activities and events that are planned in proximity to the Proposed Development will be taken into consideration during the phasing of the of construction works along the route;
- Working hours for the installation of the Onshore Cable are Monday to Friday, 07.00 -17.00 and Saturday typically 08:00 - 13:00; and for the construction of the Converter Station are 08.00 - 18.00 Monday to Friday and Saturday morning typically between 08.00 - 13.00. There may be occasional working outside these hours, for example to undertake HDD and other trenchless drilling techniques and reduce duration of works; accommodate delivery of abnormal loads and minimise traffic impacts or overnight to limit daytime disruption.

26.6.1.3 The human health assessment also includes the following management measures identified within Chapter 22 (Traffic and Transport) Appendix D - Framework Traffic Management Strategy (document reference 6.3.22.1):

- To minimise disruption, single lane closures and temporary traffic signals would be used, where practicable, rather than full road closures. Some road closures will be required, as identified within Chapter 22 (Traffic and Transport). Anticipated road closures are identified within Chapter 25 (Socio-economics), Section 25.4.6.3. Diversions would be in place for all road closures and pedestrian access will retained at all times.
- Where construction works do obstruct a footway an absolute minimum unobstructed width of 1.0 m will be provided alongside the construction corridor and where this is not possible a safe alternative route diversion will be provided. This will include provision of suitable crossing facilities where required.
- Where existing bus stops need to be closed, a temporary bus stop will be provided as close as possible to the original location, considering highway safety of all road users. Work within bus lanes will be complete in 100 m sections and bus priority will be maintained where the bus lane is suspended through provision of temporary bus priority traffic signals.
- Residents will be informed of construction works in advance, and encouraged to make alternative arrangements where possible. Where construction works fall on the opposite side of the carriageway to private driveways, access will be maintained at all times, and residents will be made aware of construction works/traffic signal control as appropriate.
- For residential driveway access, steel plating over the trench will be available during working hours in the case of emergencies. Where practicable, road plates may be installed outside of these times and construction fences removed to allow access over the construction zone.
- Access to business premises will be maintained using either three-way traffic signals, with excavation of the trench taking place in two phases to allow a 3 m access to be maintained at all times, or through use of road plates.

26.6.1.4 It is expected that there will be a programme of community liaison to ensure that the potentially effected receptors are provided with early warning of construction activities (including targeted leafleting at affected properties (residents and businesses) and community facilities). Signage and advanced warning will be provided in advance of the temporary closures. Any diversions will be suitable to accommodate all users, with particular attention to the needs of people with mobility and visual impairments to ensure that their safety and free movement is retained.

26.6.1.5 The construction assessment has had consideration for embedded mitigation identified within other relevant chapters including Chapter 15 (Landscape and Visual Amenity), Chapter 18 (Ground Conditions), Chapter 20 (Surface Water Resource and Flood Risk); Chapter 22 (Traffic and Transport), Chapter 23 (Air Quality), Chapter 24 (Noise and Vibration), Chapter 25 (Socio-economics) and consideration of EMF within Appendix 3.7 Onshore Electric and Magnetic Field Report, where the finding of that chapters has been used.

26.6.1.6 It should be noted that the assessment below also includes any additional mitigation specified by topic chapters so that residual effects are used in the human health assessment.

Operational Stage

26.6.1.7 Landscaping (including reprofiling if/where appropriate and associated planting) is proposed around the perimeter and to the north of the Converter Station Area to mitigate against the Landscape and Visual Amenity impacts and integrate the Converter Station into its surroundings. The relevant impacts, their effects and the consequence of embedded mitigation is discussed in Chapter 15 (Landscape and Visual Amenity) of this ES, to help integrate the Converter Station into the surrounding environment.

26.6.1.8 All existing footpaths and cycle paths will be reinstated and retained on completion of works.

26.6.1.9 Permanent fencing will be provided around the Converter Station, Telecommunications Buildings and ORS. Electric fields from the AC Cables are proposed to be contained by the cable's protective metal sheath. Appendix 3.7 Onshore Electric and Magnetic Field Report identifies that the converter station reactors must be designed and positioned to limit AC magnetic fields at the compound perimeter to levels below the guideline levels. It is assumed that acceptable levels will be achieved in accordance with this specification.

26.6.1.10 The operational assessment has consideration for embedded mitigation identified within other relevant chapters including Chapter 15 (Landscape and Visual Amenity), Chapter 18 (Ground Conditions), Chapter 20 (Surface Water Resource and Flood Risk); Chapter 22 (Traffic and Transport), Chapter 23 (Air Quality), Chapter 24 (Noise and Vibration), Chapter 25 (Socio-economics) and consideration of EMF within Appendix 3.7 Onshore Electric and Magnetic Field Report, where the finding of that chapters has been used.

26.6.1.11 It should be noted that the assessment below also includes any additional mitigation specified by topic chapters so that residual effects are used in the human health assessment.

26.6.2 SECTION 1 – LOVEDEAN (CONVERTER STATION AREA)

Construction

Air Quality

26.6.2.1 The Proposed Development is likely to increase emissions to air during construction. These emissions are likely to be generated by the release of dust, PM, NOx and NO_2 during sites preparation and construction. This will include changes in local pollutant concentrations due to exhaust emissions from construction vehicles and plant. However, where road closures and diversions are implemented there is the potential for temporarily improved air quality during construction due to reduced vehicle emissions.

26.6.2.2 Construction dust emissions are anticipated to be controlled and managed through best practice methods and site-specific mitigation, as identified within Chapter 23 (Air Quality) and the Onshore Outline CEMP (document reference 6.9). This will reduce any adverse impacts of air pollutants on receptors close to the construction works. It is therefore considered that typical health impacts from construction dust emissions, such as respiratory health effects are unlikely to occur as a result of construction activities and are of low risk.

26.6.2.3 However, there may be temporary residual minor adverse health impacts from associated anxiety due to perceived health effects, annoyance and nuisance from construction dust.

26.6.2.4 It is anticipated that construction traffic will access the site via Day Lane and Lovedean Lane, London Road, Portsmouth Road and the A3(M). There are a number of residential properties present along this access route. Any predicted increases in pollutant concentrations on local roads adjacent to the site resulting from construction activities and traffic associated with the Converter Station are likely to be short-lived, daytime only and temporary. Chapter 23 (Air Quality) identifies that there will be no exceedances of the national air quality strategy objectives for NO_2, PM_{10} and the $PM_{2.5}$ target value along this route. Therefore, any adverse impact on health as a consequence of increased pollutant emissions from construction activities and traffic will be negligible at the Converter Station (Section 1).

26.6.2.5 Overall, with the implementation of the mitigation measures described within Chapter 23 (Air Quality) and the Onshore Outline CEMP, the effect upon on human health as a result of air pollutants emitted during construction of the Converter Station Area is anticipated to impact a small number of people. Emissions will be temporary, medium term, with **negligible** (not significant) health effects due to changes in air quality and perceived health effects.

Noise

26.6.2.6 Chapter 22 (Noise and Vibration) identified that during enabling works and post-construction landscaping, negligible effects are predicted for all receptors with the exception of one. During the establishment and post construction landscaping of laydown areas, a short term (up to 5 days) minor adverse noise impact (not significant) is predicted on Broadway Farm (30 m from activities). Negligible noise effects have been predicted at all receptors during the superstructure and substructure works at the Converter Station and telecommunications building. This is primarily due to the relatively large distances between the works and any sensitive receptors. Chapter 22 (Noise and Vibration) also identified that negligible effects are predicted at all receptors during the trenching of the Onshore Cable Corridor over open ground within Section 1 between the Converter Station and Broadway Lane. There will be negligible vibration effects.

26.6.2.7 However, construction works could be intermittently audible at certain receptors, which could give rise to annoyance and lead to adverse effects on psychological health for nearby residents. This may cause anxiety for some residents. All health effects resulting from the impact of construction noise will be temporary in nature and only occur during the Construction Stage. No adverse impacts upon health from sleep disturbance associated with the Converter Station Area construction are anticipated, as construction activities are to take place on weekdays during 08:00 to 18:00 hours, and Saturday morning typically between 08.00 to 13.00.

26.6.2.8 Due to the low number of receptors, limited proximity to the construction works and the temporary nature of construction noise, the effect represents a temporary **minor adverse** (not significant) health effect.

Landscape and Green space

26.6.2.9 The land within the Converter Station Area is currently in agricultural use. There are no formal public open spaces within the Order Limits for the Converter Station Area, or within 500 m of the Order Limits. Therefore, during construction of the Converter Station there is unlikely to be a direct effect on recreational and open space areas. With consideration to Chapter 15 (Landscape and Visual Amenity), it is considered that due to distance, intervening topography, vegetation and the built form there will be negligible visual amenity impact on public open spaces with respect to human health. It is considered that the SDNP would be accessed by the PRoW and Monarch's Way within 500 m of the Converter Station, which are assessed below.

26.6.2.10 There is one PRoW (PRoW 4) which runs within the southern boundary of the Order Limits of the Converter Station Area. This PRoW is anticipated to be temporarily diverted during the construction period (Q3 2021 – Q1 2024). The proposed diversion is not considered to add substantial distance to the journey length. Therefore, this is only anticipated to result in a minor reduction in connectivity during construction.

26.6.2.11 At the Converter Station Area (Section 1), PRoW 3, 5, 6, 16, 20, 21, 22, 23, 28 and Monarch's Way, as well as Denmead Millennium Trail, and four cycling routes promoted at a county or local level, are within 500 m of the Order Limits and link to the surrounding road network (but not within the Order Limits). PRoW 5, 20, 22 and 23, and Monarch's Way are within or partly within SDNP.

26.6.2.12 These routes will be impacted by temporary disruption and degraded quality of landscape features due to construction activities and traffic during the Construction Stage. This would result in annoyance, and a reduced perceived amenity value and tranquillity of these routes, however, there is existing visual clutter associated with Lovedean substation, pylons and overhead lines. The identified impacts from temporary construction at the Converter Station Area (Section 1) could therefore result in nuisance impacts from diversions and reduced amenity value and recreational use. This could cause reduced social contact and physical activity which both play an essential role in ensuring health and wellbeing. However, these changes are unlikely to cause a significant reduction in the use of PRoW and walking routes for physical activity, and therefore would be unlikely to result in changes to health outcomes related to physical activity. A reduction in social contact and physical activity may have a greater impact on vulnerable groups including older people, children and young people and socially excluded or isolated groups.

26.6.2.13 The visual amenity assessment within Chapter 15 (Landscape and Visual Amenity), Table 15.11 identified that there would be residual significant visual amenity effects on 17 residential receptors surrounding the Converter Station during construction to various extents. Localised detrimental visual impacts and nuisance experienced by these residents would therefore result in adverse psychological health impacts.

26.6.2.14 These identified impacts would be temporary and confined to the Construction Stage. Some impacts would also be confined to working hours. Although the construction of the Converter Station Area is, for the purpose of the assessment, assumed to be undertaken in Q3 2021 – Q1 2024, all impacts are unlikely to occur across the whole construction period. Effects on users of green space and PRoW will be temporary, transient and intermittent to a small number of users at any one time. Therefore, these adverse health impacts would be temporary, short to medium term on a small to moderate number of people. The current population baseline for Winchester and East Hampshire indicates that health of the population across the Converter Station Area study area is generally better than the national benchmark for various determinants. Overall, the effect of any changes to landscape and green space associated with Converter Station Area during construction on human health has been assessed as temporary **minor adverse** (not significant).

Employment and business activity

26.6.2.15 It is recognised that the installation of specialist plant and equipment may not directly benefit the local economy as the majority of the employment will not be local. Some aspects of construction can be undertaken by local contractors such as earthworks, landscaping and onshore cable trenching. The workforce for these elements is likely to be local to the South East Region. Therefore, local construction employment represents a positive temporary economic effect with the Construction Stage potentially resulting in new construction employment likely to benefit the local economy. Such employment gains should result in beneficial health outcomes such as improved mental and physical health and provided opportunities for social contact.

26.6.2.16 There is also the potential for a temporary beneficial impact during construction on the local economy as expenditure within local businesses is likely to increase during the Construction Stage.

26.6.2.17 Chapter 25 (Socio-economics) identifies that for the Proposed Development there is an anticipated gross direct employment of approximately 525, with the majority of the workers coming from outside the South East Region.

26.6.2.18 It is unlikely that any businesses will be significantly disrupted within proximity to the Converter Station Area (Section 1).

26.6.2.19 Health outcomes as a result of increased employment opportunities and income levels during construction (such as a reduction in incidents of depression and improved mental health and social contact) are anticipated to be of temporary, short to medium-term, **negligible to minor beneficial** (not significant) to the population, particularly amongst 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.

Soil/Land Contamination and Water Quality

26.6.2.20 During construction contaminants could be mobilised resulting in cross contamination of uncontaminated ground and exposure of contaminated soils through construction activities including excavation may increase the leachability of contaminants to groundwater, if contaminants or groundwater are present. Construction activities also have the potential to introduce pollutants into the surface water drainage and wider surface water catchments through mobilised suspended solids and spillage of fuels and other chemicals. At the Converter Station Area the catchment is expected to primarily infiltrate into the ground and underlying aquifer, therefore, this may lead to a potential contamination risk to groundwater and associated groundwater abstractions.

26.6.2.21 There are no predicated impacts to surface water quality during construction at the Converter Station Area (Section 1) as no surface water features exist within 500 m. Following construction design mitigation, it is anticipated that there will be a negligible impact to aquifers at Section 1.

26.6.2.22 Sites users and adjacent site users could be impacted during construction through direct contact, ingestion and inhalation of contaminated soils and possibly also contaminated groundwater.

26.6.2.23 Given the proposed mitigation measures identified with Chapter 18 (Ground Conditions), Chapter 19 (Groundwater) and Chapter 20 (Surface Water Resource and Flood Risk), any remaining impacts posed by potentially contaminated soils/groundwaters to construction workers and adjacent site users is anticipated to be negligible. Therefore, there will be a **negligible** effect on all human health receptors.

Operation

Noise

26.6.2.24 It is anticipated that the dominant noise sources from the operation of the Converter Station Area are likely to be the converter transformers, the converter transformer fans and the valve converter cooling fan bank.

26.6.2.25 Given the rural location of the Converter Station Area, the ambient noise climate at the closest residential receptors is generally very quiet, with few dominant noise sources in the area. The Lovedean substation noise levels are dominant when close to its boundary.

26.6.2.26 Chapter 22 (Noise and Vibration) identifies that at all receptors except for one (including caravan sites to the north west), the predicted operational noise levels from the Converter Station are considered to represent a negligible magnitude of change, which is a negligible effect for the worst-case scenario. At one residential property, Hinton Daubnay, the overall predicted operational noise level marginally exceeds the noise criterion level by 0.4 dB. This impact could occur during the night-time. Therefore, there will be a permanent, long-term, minor adverse effect. Further mitigation measures could be employed to reduce the effect to negligible.

26.6.2.27 Considering the noise assessment, there are not anticipated to be any significant health effect caused by operational noise from Converter Station. However, it is anticipated that the noise from the Converter Station Area may be audible under certain operating and climatic conditions at the nearest residential receptors. Therefore, the Converter Station Area during operation may result in perceived annoyance and associated adverse effects on psychological health for nearby residents. This may cause anxiety for some residents and could lower levels of quality of life or wellbeing.

26.6.2.28 Exposures would be over a small area, and affect a small number of people. It is possible that older people may be particularly vulnerable to annoyance and stress from increases in low frequency noise. Overall, it is considered that the residual operational noise from the Converter Station Area will have a permanent, long-term, **negligible to minor adverse** effect (not significant) on human health receptors (residential receptors in close proximity).

Landscape and Green space

26.6.2.29 There are no formal public open spaces within or directly adjacent to the Converter Station Area within 500 m. Therefore, during operation of the Converter Station Area there is unlikely to be any direct effect on access to public open space areas. With consideration to Chapter 15 (Landscape and Visual Amenity), it is considered that due to distance, intervening topography, vegetation and the built form that there will be a negligible visual amenity impact on public open spaces associated with human health. It is considered that the SDNP would be accessed by the PRoW and walking routes within 500 m of the Converter Station, which are assessed below.

26.6.2.30 The visual amenity assessment within Chapter 15 (Landscape and Visual Amenity) identified that there would be significant visual effects on 17 residential receptors surrounding the Converter Station following the completion of construction (year 0) to various extents, with the number of effected residential receptors and the significance of the impacts on them reducing by years 10 and 20.

26.6.2.31 The current landscape character around the Converter Station Area would be permanently impacted due to the loss of existing features including characteristic vegetation (such as established trees) and changes to the composition of views from surrounding residential properties, PRoW and walking routes. This may result in effects associated with reduced amenity value and views of the surrounding area, including from surrounding PRoW (PRoW 3, 4, 5, 6, 16, 20, 21, 22, 23, 28 in Section 1) and Monarch's Way within 500 m of the Order Limits. This may adversely affect mental health and wellbeing of residential receptors due to the changes to their existing views, and users of these PRoW and walking routes. However, these changes are unlikely to cause a significant reduction in the use of PRoW and walking routes for physical activity, and therefore would be unlikely to result in changes to health outcomes related to physical activity. Mitigation measures, including landscaping to screen the development, will help to mitigate adverse effects on residents and PRoW users.

26.6.2.32 The current population baseline for Winchester and East Hampshire indicates that residents have a good level of health, generally above the national benchmark for various determinants. Physical activity in adults within the study area is also higher than the England average. Degradation of amenity value of PRoW and walking routes as well as changes to views from surrounding residential receptors has been assessed to result in a reduction in the quality of life and wellbeing impacts of a low intensity affecting a small number of people. This would have an adverse impact on mental health. Therefore, the effects will be **minor adverse** (not significant) and permanent for the general population.

Personal Safety – EMF

26.6.2.33 Electric and magnetic fields around the perimeter of the Converter Station Area 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 Area is designed to keep EMF below the public and occupational exposure limits in areas where the time of exposure to the general public is considered significant, specified in the appropriate guidelines (National Policy Statement for Electricity Networks Infrastructure (NPS EN-5); and associated voluntary code of practises which are referenced within).

26.6.2.34 There will be no AC electric field outside of the converter station due to the grounded perimeter fence. Appendix 3.7 Onshore Electric and Magnetic Field identifies that the converter station reactors must be designed and positioned to limit AC magnetic fields at the compound perimeter to levels below the guideline levels. On the assumption that acceptable levels will be achieved at the Converter Station Area perimeter in accordance with this specification, residual physical risk to nearby receptors has been assessed as not being significant to human health.

26.6.2.35 Adverse health impacts upon the local population could occur as a consequence of the fear of perceived harm to health as a consequence of EMF exposure brought about by the Converter Station Area. This could result in both anxiety and fear, particularly for local residents in close proximity to the Converter Station Area. This is likely to result in a temporary **minor adverse** effect (not significant).

26.6.3 SECTIONS 2 – 10: ONSHORE CABLE CORRIDOR AND LANDFALL (EASTNEY)

Construction

Air Quality

26.6.3.1 During the site preparation and construction, emissions are likely to be generated by the release of dust, PM, NOx, NO_2, carbon monoxide ('CO') and Total Hydrocarbons ('THC') (assumed to be benzene in the Air Quality assessment as a precautionary approach). This will include changes in local pollutant concentrations due to exhaust emissions from construction vehicles and plant (including drilling and cable pulling plant); and from road vehicle delays due to construction works and road closures. Particular activities and sources of dust associated with the Onshore Cable Corridor and Landfall are likely to include the combustion of diesel for power generation, HDD, trenching, laydown and cable pulling.

26.6.3.2 Construction dust emissions to the atmosphere are anticipated to be controlled and managed through best practice construction methods, as identified within Chapter 23 (Air Quality) and the Onshore Outline CEMP. This will reduce any impacts of air pollutants on receptors close to the construction works. It is therefore considered that typical health impacts from construction dust emissions, such as respiratory health effects are of low risk and are unlikely to occur as a result of construction activities. Chapter 23 (Air Quality) identifies Sections at high risk of adverse effects on amenity from construction dust emissions. Following recommended mitigation measures, these dust emissions would be mitigated and negligible. However, there may be adverse impacts associated with anxiety due to perceived health effects, annoyance and nuisance from construction dust.

26.6.3.3 HDD drilling could result in temporary short-term adverse effect on human health from emissions PM, NO_2, CO, and THC contained within exhaust gases. Chapter 23 (Air Quality) concludes that the emission of PM, CO and THC contained within exhaust gases from HDD drilling would have a negligible effect on health. Chapter 23 (Air Quality) identifies that there would be changes in the concentration of NO_2 equivalent to a maximum of 13% of the annual air quality objective, though the predicted increase does not exceed objective levels for NO_2.

26.6.3.4 Areas where the road network is disrupted by construction activities, resulting in slow moving traffic and queuing, could experience elevated concentrations of PM and NO_2 emissions. The implementation of traffic management measures will help to mitigate increases in pollutant concentrations on local roads. Chapter 23 (Air Quality) identifies that disruption to the road network during construction will generally have a negligible effect on air quality, with some minor- moderate beneficial and adverse effects identified at locations principally around the current AQMA and Waterlooville. These identified effects include predicted concentrations over the limit value for NO_2 under the Do-Minimum scenario (future baseline) at receptors adjacent to the M27 in the Portsdown area. However, NO_2 concentrations are predicted to improve under the Do-Something scenarios (traffic diversions), but remain over the limit value for NO_2. All other predicted changes in concentrations are within the relevant limit and objective values.

26.6.3.5 Installation of the Onshore Cable Route will migrate along the route as the works progress. Therefore, any impacts, including emissions from vehicles, plant associated with the cable installation and Landfall construction (including ORS infrastructure construction), is likely to be short-term and temporary.

26.6.3.6 Overall, with the embedded mitigation measures recommended in Chapter 23 (Air Quality), the effect of pollutant emissions on human health from the construction of the Onshore Cable Route and Landfall is anticipated to be **slight adverse** (not significant). Members of the population who have pre-existing health conditions, making them vulnerable to dust and poor air quality, will be particularly sensitive to these effects.

Noise

26.6.3.7 There will be noise impacts at nearby receptors and vibration impacts at those receptors adjacent to the Onshore Cable Corridor, particularly along the corridor where breaking of the road surface is required to dig the trenches. Over open ground, no breaking is required.

26.6.3.8 Chapter 22 (Noise and Vibration) identifies that for the majority of the Onshore Cable Corridor, negligible vibration effects are predicted on receptors. Chapter 22 (Noise and Vibration) identifies that vibration from trenching (road surface removal and re-surfacing) in close proximity to receptors along the Onshore Cable Route is predicted to cause some temporary, short-term, minor adverse effects (not significant). It is considered unlikely that these vibration effects would be experienced for more than one day by any given receptor. Furthermore, HDD-1 drilling under Southsea Leisure Park (potentially for a period of greater than five consecutive days) and sheet piling at HDD-1, could also result in a temporary, short-term, minor (not significant) effect.

26.6.3.9 Working hours for all Joint Bays, and the majority of the trenching activities, will be weekdays from 07:00 hours to 17:00 hours, and Saturdays 08:00 – 13:00. Works at each Joint Bay would last for approximately 4 weeks. The trenching works are linear and transient in nature and the noise assessment assumes that approximately 100 m per week along roads, and approximately 50 m per day over open ground, can be completed. Chapter 22 (Noise and Vibration) concludes that noise effects from Joint Bay works will be negligible in all sections. For trenching work during the above times, Chapter 22 (Noise and Vibration) concludes that noise effects at Sections 3, 6 and 7 on all receptors would be negligible. For Sections 2, 4, 5, 8, 9 and 10, trenching works are predicted to have a temporary short-term effect (for no more than five days by any given receptor) ranging from negligible to moderate (not significant) on all receptors.

26.6.3.10 There are some locations where trenching activities may need to occur outside of the above adopted working hours to minimise traffic disruption, and would include weekend and night-time working. Chapter 22 (Noise and Vibration) has assessed these locations, identifying the following effects:

- Section 4 - c.90 m section of the A3 London Road in Purbrook near Stakes Road;
  - At 44 properties and the Baptist Church and Church hall, a temporary short-term, moderate adverse effect (not significant) is expected during the two non-consecutive weekend daytime trenching. If these works occur over two consecutive weekend periods, this represents a major negative effect (significant).
- Section 5 - Havant Road near Drayton between Farlington Avenue and Eastern Road;
  - At 32 properties, a temporary short-term, major adverse effect (significant) is expected during the one weekend daytime and night-time trenching works, or during two consecutive weekend daytime only periods. If two non-consecutive weekends (daytime only) trenching is undertaken, there would be a moderate adverse effect (not significant).
- Section 6 - Fitzherbert Road and Sainsbury's Car Park
  - A temporary short-term, moderate adverse effect (not significant) is expected to occur when trenching activities are within 70 m of sensitive receptors (28 properties) provided works do not last for more than five consecutive nights (which is reasonable given the anticipated rate of trenching).
- Section 8 - Eastern Road between Airport Service Road and north of Milton Common (c. 350m south of Tangier Road);

- Work is expected take place at this location for approximately 33 days, during which time 24-hour working could be undertaken. The Harbourside Caravan Park would experience short-term major adverse effect (significant) from trenching work during weekday evening, weekend daytime, and night-time works. This is expected to last for no longer than four nights at any one receptor. Weekday daytime works at Harbourside Caravan Park represent a moderate adverse (not significant) effect. Weekday daytime works at the flat above the Harvester represent a negligible (not significant) effect. The weekday evening and weekend daytime represent a moderate adverse (not significant) effect. The night-time works represent a major adverse (significant) effect. At other identified receptors, including Langstone Harbour Sports Ground Pavilion, the Great Salterns Golf Course and driving range, Inn Lodge Hotel, sports pitches of the Goals Soccer Centre and 36 residential receptors, effects have been assessed as not significant.

26.6.3.11 HDD working hours will be 07:00 - 19:00 hours seven days per week, except for HDD-3 and HDD-4 which may involve 24 hour working seven days per week (tunnelling works only). The following noise effects have been predicted from HDD within Chapter 22 (Noise and Vibration):

- HDD-1 – site preparation (five weekdays) and restoration (four weekdays) is predicted to have a negligible impact. Negligible effects are predicted during weekday daytime HDD drilling works (43 weeks). Minor adverse (not significant) effects are anticipated at 12 residential receptors during weekend drilling works over 43 consecutive weekends.
- HDD-2 – site preparation (five weekdays) and restoration (four weekdays) is predicted to have a negligible impact. Negligible effects are also predicted during weekday drilling works (07:00 - 19:00 hours for up to 12 weeks). Weekend drilling works (07:00 - 19:00 hours for up to 12 weeks) is predicted to have a short-term, minor adverse (not significant) effect of the Thatched House public house.
- HDD-3 – negligible effects are predicted at all receptors for the durations of daytime weekday (07:00 - 1900) tunnelling works at all receptors. A minot adverse effect (not significant) is anticipated during weekday evening (19:00 - 22:00) and weekend daytime and evenings (07:00 – 22:00) tunnelling works at all receptors. Increased noise levels are predicted during nighttime working at Baffins Rovers FC and associated sports grounds, and Tudor Sailing Club however, it is assumed that these facilities will not be utilised during this time and therefore no effects are anticipated. The expected duration of works at HDD-3 is 31 weeks (or two periods of 17 weeks) based on 12 hour seven day per week working.
- HDD-5 – negligible effects are predicted at all receptors for the construction activities at HDD-5 (13 weeks).

- HDD-4 - negligible effects are predicted at all receptors for the duration of the weekday daytime tunnelling works and site preparation and restoration. A minor adverse effect (not significant) is anticipated at the sports pavilion during the weekday evening (19:00 - 22:00 hours) and weekend daytime and evening (07:00 - 22:00 hours) tunnelling works. No effect is anticipated at the sports pavilion and playing fields during the night-time (22:00 - 07:00 hours) tunnelling works, as it is assumed that these receptors are not utilised during these periods.
- HDD-6 – negligible effects are predicted at all residential receptors for the duration of the activities at HDD-6. However, public open space and footpaths in the vicinity of the HDD-6 compound are expected to experience noise impacts from drilling activities during hours of working (0700 - 1900 hours for two weeks). This is predicted to have a short-term, minor to moderate adverse (not significant) effect.

26.6.3.12 The key health outcomes relevant to noise are cardiovascular health, mental health (including annoyance, stress, anxiety or depression) and cognitive impairment.

26.6.3.13 Predicted effects identified within Chapter 22 (Noise and Vibration) during trenching works during normal working hours (weekdays 07:00 - 17:00) according to the noise assessment criteria identified no significant effects. However, noise and vibration during trenching works have been assessed as likely to result in adverse effects on the mental health of residential receptors including annoyance and stress due to the proximity of these works.

26.6.3.14 As identified above, significant effects identified within Chapter 22 (Noise and Vibration) are limited to the out-of-hours (weekend and night) working for the Onshore Cable Corridor, comprising trenching along A3 London Road (Section 4), Havant Road (Section 5), Eastern Road (Section 7). Night time working is expected to result in the greatest annoyance and effects on psychological health, and likely to result in sleep disturbance.

26.6.3.15 The majority of construction activities will be transient along each 100 m section and temporary. During these works, although a large number of total receptors may be affected during the total construction programme, at any given time noise impacts would be within a localised area, to a small number of receptors for a short term.

26.6.3.16 Overall construction noise is likely to result in a temporary short-term **moderate adverse** effect (significant) on human health due to potential anxiety regarding the potential impacts, sleep disturbance, annoyance and effects on psychological health for nearby residents. Some districts within the study area have a generally older population, and a higher percentage of residents who consider themselves to be in bad health. Older people, who might be retired or have existing health conditions, other people with existing health conditions, and unemployed and low-income groups might spend more time at home, and therefore be more exposed to noise impacts at residential receptors. These vulnerable groups are therefore likely to be more sensitive to the impacts from construction noise.

26.6.3.17 There will be no residual long-term adverse health outcomes as a result of construction of the Onshore Cable Corridor.

Transport and Access

26.6.3.18 There will be adverse impacts from construction works and construction traffic (including HGVs and employee vehicles) on pedestrian, cyclist and users of the local road network due to diversion and closures; associated delays and reduced access; and reduced amenity value while using these routes. Mitigation measures taken into consideration are detailed in Chapter 22 (Traffic and Transport), Appendix 22.1 Transport Assessment, and the Framework Traffic Management Strategy. Chapter 22 (Traffic and Transport) concludes that the construction effect on Traffic Delay and Severance would be temporary, short-term moderate adverse and minor to moderate adverse respectively for the Onshore Cable Corridor. Chapter 22 (Traffic and Transport) concludes that the effects on Pedestrian and Cycle Amenity would be moderate adverse.

26.6.3.19 PRoW provide opportunities for walking and cycling for both recreation and as a means of travel between community facilities and employment sites. Seven PRoW are within the Order Limits of the Onshore Cable Corridor; PRoW 41 (Section 2), 11 (Section 4), 17 (Section 4), 24 (Section 4), PRoW 30 (Section 5), 31 (Section 6) and 33 (Section 6). PRoW 30 (Section 5) is within the Order Limits, but is a subway under the Eastern Road and would therefore not be impacted. These PRoW will be temporarily diverted for a short period of time (one – two weeks at each location) for each of the two circuits, which could be installed at different times. The proposed diversions are not considered to add substantial distance to the journey length.

26.6.3.20 Additionally, there are three Long Distance Walking Routes that are within the Order Limits (Wayfarers Walk in Sections 4, The Solent Way in Sections 7-10 and Shipwrights Way in Section 10) that are likely to be directly intersected by the construction of the Onshore Cable Corridor. There are three Sustrans National Cycle Routes located within the Onshore Cable Corridor at Sections 6–10 for Routes 22 and 222, and Section 10 for Route 2. There are also sections of Sustrans Local Cycle Routes within the Order Limits of Sections 5 to 9. Pedestrians and cyclist using these routes would experience disruption to their journeys and an increase in journey length and time. However, the routes would remain open and only temporarily diverted (one – two weeks per 100 m section for each of the two circuits). The diversion routes will be designed to avoid adding substantial distance to the journey length of the route. Plans identifying new or altered means of access and temporary stopping up of streets or roads, and any diversions are presented within the Access and Rights of Way Plan (Document Reference 2.5).

26.6.3.21 As identified above, cyclists and pedestrians utilising these routes will experience disruption to their journey length and time; changes to the amenity value of their route; and possible increased stress from frustration and fear of potential accidents. This could deter people from choosing active travel (particularly where the route length has increased), and may cause disruption to lifestyles and daily routines; for example, travelling to school, work or community facilities may take longer or be perceived to be less safe. This could also result in reduced social interaction. The reduction in amenity value to routes would be temporary and locally to the transient cable construction works. The temporary diversions and disruption to access would not likely significantly affect population physical activity levels associated with active travel and would be unlikely to have an effect on developing new health conditions or exacerbating existing conditions.

26.6.3.22 This disruption to footpaths, cycle routes, and the road network (including disruption to buses) during construction would also impact on access to facilities used by the community such as schools, churches, pharmacies, opticians, GP practices and dentists. Populations within Portsmouth and Havant are anticipated to be more vulnerable to changes to access to health care and community facilities due to their current higher deprivation and general lower health (self-assessment and life expectancy gap); and therefore, would be more sensitive to access changes.

26.6.3.23 During construction of the Onshore Cable Corridor existing bus stops may need to be closed. Mitigation identified within the Framework Traffic Management Strategy will ensure temporary bus stops are provided as close as possible to the original location, and construction within existing bus lanes is mitigated with construction undertaken in 100 m sections (for each of the two circuits) and bus priority through provision of temporary bus priority traffic signals. The Onshore Cable Corridor crosses under the West Coastway Railway Line via trenchless methods. Therefore, the surrounding train network would not be affected.

26.6.3.24 The magnitude of any changes in journey times due to additional traffic and construction work are not anticipated to be sufficiently large enough to completely deter people from accessing community facilities, attending appointments or seeking advice at healthcare services. It is unlikely to result in significant adverse health effects associated with wellbeing, quality of life or receipt of healthcare and medication.

26.6.3.25 The Framework Traffic Management Strategy identifies that at Waterlooville Fire Station, Eastney Lifeboat Station and Portsmouth Ambulance Station, access will be maintained at all times. Along the Onshore Cable Corridor each construction location will be setup to ensure access by emergency vehicles is achievable, with temporary signals to facilitate access and minimise delay. Therefore, anticipated small temporary change in journey time is unlikely to significantly affect quality of life or receipt of time-critical.

26.6.3.26 Chapter 25 (Socio-economics) identifies that limited numbers of construction workers will be drawn from the regional labour market (South East England) who are likely to currently, and continue to, reside within this area. A considerable proportion of the workforce will be from specialist contractors and will reside elsewhere and use hotels and guest houses while undertaking shift work. Therefore, it is unlikely that there will be a significant increase in demand for community facilities during the Construction Stage. It is considered likely that the majority of these workers will continue to be registered with their existing GPs rather than registering with a GP in the local area, however, there may be a small transient demand on healthcare generated by construction workers who fall ill or are injured while temporarily in the area during construction. This temporary demand would not be significant, and construction employment associated with the Proposed Development is temporary for the duration of the works, so will not contribute to long-term demand on local healthcare.

26.6.3.27 There are a number of leisure facilities within or adjacent to the Onshore Cable Corridor, including Waterloo Leisure Centre (Section 4), Great Salterns Golf Course (Section 8), Langstone Harbour Viewing Car Park (Section 8), Andrew Simpson Watersports Centre (Section 7); Tudor Sailing Club and boat storage area (Section 7) and Locks Sailing Club (Section 9). Access to these facilities may be disrupted and delayed during temporary Onshore Cable Corridor construction works within the carriageway and pedestrian footway which could affect populations using these facilities. All facilities would be subject to the same traffic management strategy as the remainder of the route and access to individual premises will be retained through traffic management measures. There would be reduced access and disturbance (traffic, air quality, noise, visual effects) at these leisure facilities for a number of weeks during adjected construction works.

26.6.3.28 Therefore, impacts on access to community and leisure facilities along the Onshore Cable Corridor will be temporary, short-term and predominantly locally to the transient cable construction as works progress along the Onshore Cable Corridor. Direct effects would be limited to one - two weeks for each circuit, although the duration of disruption is likely to last up to several weeks as the cable installation progresses, depending on the location of the facility. Impacts from construction traffic associated with the ORS infrastructure (Section 10) would be temporary, but medium-term and intermittent. Although this disruption to access could result in a reduction in participation of leisure and a loss of health benefits associated with leisure activities and physical activity, temporary construction disruption is not anticipated to be sufficient to deter people from accessing these facilities completely.

26.6.3.29 Residents using the routes within the area of the Onshore Cable Corridor construction works will be exposed to construction activity and construction traffic, and this will result in some temporary changes in access for some residents during construction. This is likely to result in disruption and anxiety related to worry about access to homes. No residents will require relocation, and mitigation measures identified within the Framework Traffic Management Strategy will ensure residents will have access to their property at all times. Any road closures and access restrictions would be for motorised vehicles only. Any direct access restrictions would be temporary and short-term limited to 1-2 weeks for each circuit, although the duration of disruption is likely to last up to several weeks as the cable installation progresses, depending on the location of the property. Works at associated with ORS infrastructure (Section 10) would not restrict any direct access to properties. Reduced vehicle access to properties would result in annoyance and nuisance leading to a short-term adverse effect on health from a lowering of quality of life and wellbeing.

26.6.3.30 Further detail on disruptions to road network, cyclist and pedestrian routes, and accessibility to community and leisure facilities, and residential property, is provided within Chapter 25 (Socio-economics) and Chapter 22 (Traffic and Transport).

26.6.3.31 Overall, disruptions to local transport routes and changes in access to community and leisure facilities and residents is likely to result in a temporary, short-term, **minor adverse** effect (not significant) on health to the general population and vulnerable groups including those with existing health conditions, older people, those with mobility impairment and socially isolated groups. Adverse health effects would result in an impact on mental health (such as annoyance, worry and anxiety). Effects from temporary diversions and disruption would be unlikely to significantly affect population physical activity levels or social interaction, and would not result in new health conditions or exacerbating existing conditions. Although this would affect a moderate-large total number of people, the construction of the Onshore Cable Corridor will be transient resulting in more localised effects for short periods of time and to smaller population groups.

Landscape and Green space

26.6.3.32 Green space partly within the Onshore Cable Corridor and Landfall Order Limits that will have temporary partial loss include:

- Goodman Fields (Section 3) – The south-east corner of the field would be used during construction for up to 13 consecutive weeks;
- Portsdown Hill (Section 4) – A portion of the area running parallel to Portdown Hill Road would be used for construction for 12 weeks (not continuous). The car parking area would be fully and partially lost for up to 4 weeks;
- Zetland Field (Section 6) – A large portion of the open area would be used during construction for cable trenching for approximately ten weeks (not continuous). The play area will be avoided and remain accessible for use;
- Farlington Playing Fields (Section 7) – Various portions of the playing field would be required during construction for two HDD compounds and cable trenching for a total of 52 weeks (not continuous). A small portion of the associated car park is anticipated to be required for a portion of this construction stage. Access to St John's College Farlington Pitches to the east will be available at all times;
- Baffins Milton Rovers Football Ground and associated sports ground (Section 7) – A portion of the surrounding playing fields would be used during construction for up to eight weeks. The Onshore Cable Corridor has been designed to avoid the Football Club's main pitch, but training areas will be temporarily restricted;
- Milton Common (Section 8) – Portions of the Common on the western and eastern sides are within the Order Limits. An informal path across the common has been proposed to be used for construction works for a duration of approximately 23 weeks (not continuous), including a small area of works within the north east for HDD-6 work. The temporary loss of the area will not preclude use of the entire Common;

- University of Portsmouth sports pitches (Section 9) – A portion of the football pitches to the east of the university campus will temporarily preclude the use of the open space for sports purposes during construction for up to 12 weeks. Langstone Sports Site is located to the west of the University of Portsmouth Campus and not directly affected;
- Kingsley Road Open Space (Section 9) – This green space, including the car park to the north west, will be used for construction works (including HDD-2 works) for up to 24 weeks, although potentially not continuous;
- Bransbury Park (Section 9) – A portion running north to south of the park would be used for construction activities for 12 weeks (not continuous), but will not preclude the use of the park and key feature such as the skate park and existing football pitches. Bransbury Road Car Park will be also used, limiting access for those travelling by car; and
- Fort Cumberland Open Space SINC (Section 10) – A portion of the Fort Cumberland Road Car Park would be used for construction activities for approximately 66 weeks (not continuous). Fort Cumberland Open Space SINC would be indirectly impacted during this construction period over an increased duration due to the construction of the Landfall infrastructure and the presence of the HDD compound within Fort Cumberland Road Car Park. The partial temporary loss of this car park may also impact access to Eastney Beach, however, a proportion of the carpark will be available during the construction work.

26.6.3.33 Milton Locks Nature Reserve (Section 9), Milton and Eastney Allotments (Section 9) and Eastney Beach (Section 10) are within the Order Limits, however, land take from these locations is avoided through the use of HDD which travels underneath these sites. Apart from the entry and exit points of the HDD outside of these sites at the Thatched House and Kingsley Road Open Space, there will be no impact on access to the areas in between.

26.6.3.34 Although the identified green spaces listed above are likely to experience a partial temporary landtake during the Construction Stage, where this loss is associated with the cable trenching, the impact will be transient and short term as the cable progresses through the area. The installation rate for cable ducts will be approximately 50 m per day for areas of open land. Where green space is temporarily lost due to construction activities, access to green space will be impacted, though a portion of each green space will still be accessible for use by recreational users throughout the construction period.

26.6.3.35 There are also several sites of green space within 500 m of the Onshore Cable Corridor and Landfall Order Limits, but are not within the Order Limits and are therefore not effected by temporary landtake. Impact on these sites would be greatest for those adjacent to the Order Limits including:

- Section 4 - open space and playground along Darnel Road; open space and playground on Sickle Way; Forest End Allotment; Berewood Park; Purbrook West and East Allotments;
- Section 5 - Waterworks Fields Play Area;
- Section 7 - St Johns College Farlington Pitches;
- Section 8 - Tangier Park; and
- Section 10 - a playground on Fort Cumberland Road.

26.6.3.36 Although the Onshore Cable Corridor construction and installation will take in total approximately two years, 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. Therefore, impacts would be temporary, for short periods of time, and localised to the surrounding area for the duration that works are within close proximity. Due to the need to install two circuits, impacts could be experienced at these locations at two different times.

26.6.3.37 Green spaces within the Order Limits and within close proximity to the Onshore Cable Corridor and Landfall works will experience temporary disruption to access as a result of landtake; construction activity and traffic (including increased journey times); perceived reduced recreational quality; and reduced amenity value due to construction activities. This would reduce opportunities for access to green space, and with it the beneficial health outcomes, such as increasing social contact, relieving psychophysiological stress, benefiting physical health and increasing wellbeing through physical activity.

26.6.3.38 The effects of construction on walking and cycling routes are identified above in the *Transport and Access* section. This section identifies that six PRoW, three Long Distance Walking Routes, and three Sustrans National Cycle Routes will be directly affected by the Onshore Cable Corridor, resulting in reduced connectivity, disruption to journeys, increase in journey length and time for cyclists and pedestrians, as well as increased fear and intimidation. Impacts on these routes may deter people from choosing active travel options and accessing green spaces, resulting in adverse effects on physical and mental health.

26.6.3.39 Visual effects would also be experienced by residential receptors and PRoW users due to changes to the local landscape character and visual amenity during construction. Construction activities would be noticeable in immediate views of the Onshore Cable Corridor installation and Landfall construction (including ORS infrastructure construction). Any change in landscape can have psychological effects and affect mental health. Chapter 15 (Landscape and Visual Amenity) identifies that all visual amenity effects during the Onshore Cable Corridor construction between Section 2-9 are temporary and short term, and not significant. At the Landfall (Section 10), works would form a large proportion of the overall view for immediate visual receptors, and drilling equipment, construction of the ORSs, construction traffic as well as the installation of cable routes would also be noticeable. Works at Fort Cumberland Road Car Park would take place for approximately 66 weeks (not continuous). Chapter 15 (Landscape and Visual Amenity) identifies that for Section 10 (Landfall), residential and recreational receptors would experience direct temporary short-term moderate-major adverse localised significant effect on visual amenity based on a worst-case scenario.

26.6.3.40 It is considered that residential and recreational receptors would experience direct temporary medium-term **minor adverse** (not significant) psychological health impacts as a consequence of a short-term austere effects on visual amenity.

26.6.3.41 The overall effect on human health associated with the above temporary changes to landscape and green space associated with Onshore Cable Corridor and Landfall is anticipated to have a temporary, medium-term **minor adverse** effect (not significant) on human health during construction for the general population and vulnerable groups including older people, children and young people, low-income groups and people with existing health conditions, who are particularly vulnerable to the effects of reduced physical activity or may depend more on free of charge recreational facilities. This would affect a moderate-large total number of people, the construction of the Onshore Cable Corridor will be transient resulting in localised effects for short periods of time and to small population groups.

Employment and business activity

26.6.3.42 It is recognised that the installation of specialist plant and equipment may not directly benefit the local economy, due the lack of specific skills and resources. Some aspects of construction can be undertaken by local contractors such as earthworks, landscaping and onshore cable trenching. The workforce for these elements is likely to be local to the South East Region. Therefore, construction employment represents a positive economic effect, with the Construction Stage potentially resulting in job creation and increased local expenditure. Such employment gains should result in beneficial health outcomes such as improved mental and physical health, and provided opportunities for social contact and inclusion.

26.6.3.43 There is also the potential for a temporary beneficial impact during construction on the local economy as expenditure within the local supply chain is likely to increase during the construction works. This expenditure is likely to be spread throughout the region, depending on the goods and services sought (indirect, induced impacts).

26.6.3.44 Chapter 25 (Socio-economics) identifies that for the Proposed Development, there is an anticipated gross direct employment of approximately 525, with the majority of the workers coming from outside the South East Region.

26.6.3.45 A number of businesses within proximity to the Onshore Cable Corridor construction works will be disrupted. These businesses include local shops and businesses that run alongside the effected roads. Impacts are associated with reduction in accessibility and people's willingness to visit the business during disruption associated with construction. It is anticipated that these businesses depend on a varying level of footfall and vehicular access. Businesses adjacent to the Order Limits which rely on amenity value, provision of accommodation or outside space will be particularly affected, such as Great Salterns Mansions Harvester and Thatched House Public House.

26.6.3.46 Impacts on businesses are considered with Chapter 25 (Socio-economics), which identified that residual effects due to disruption to local businesses from changes to access, traffic, noise, dust and visual annoyance will be a temporary minor to minor - moderate adverse effect (not significant). Where businesses will be impacted by temporary loss of car parking and outside access areas, Chapter 25 (Socio-economics) identifies that there will be a minor - moderate adverse effect (not significant). As a result, adverse health effects on business owners and staff are expected to include stress associated with income uncertainty as a consequence of disruption to businesses. The businesses considered most affected by income uncertainty are small local shops.

26.6.3.47 Access to businesses will be maintained with different traffic management approaches applied depending upon the circumstances as described in the Traffic Management Strategy. Any direct access restrictions would be limited to 1-2 weeks for the installation of each of the two circuits, although the duration of disruption is likely to last up to several weeks as the cable installation progresses, depending on the location of the business. Works at Fort Cumberland Road Car Park would take place for a maximum of 66 weeks (not continuous). This would have an increased duration of effect as a result of construction traffic, noise, vibration and changes to the view on local businesses, including Southsea Leisure Park.

26.6.3.48 Health outcomes as a result of increased employment opportunities and income levels during construction are anticipated to have temporary **negligible to minor beneficial** effect (not significant) on the population, particularly unemployed and low-income groups. These beneficial health gains are likely to arise as a result of employment as well as improved household financial stability, though potentially only benefiting a small number of employees and their families. Health outcomes as a result of disruption to businesses are likely to have a temporary **minor adverse** effect (not significant).

Soil/Land Contamination and Water Quality

26.6.3.49 Contamination is anticipated to be localised and associated with the historic and current site uses identified within Chapter 18 (Ground Conditions). During construction, contaminants could be mobilised resulting in cross contamination of uncontaminated ground or controlled waters and exposure of contaminated soils. Trenching may increase the leachability of contaminants to groundwater if contaminants or groundwater are present. Inert ground materials are proposed for trench construction.

26.6.3.50 Construction activities have the potential to introduce and transfer pollutants into the surface water drainage and wider surface water catchments through mobilised suspended solids and spillage of fuels and other chemicals. This may lead to a potential contamination risk to groundwater and associated groundwater abstractions. If areas are flooded at a time where construction activities are being undertaken there is a significantly increased risk of pollutants entering waterbodies.

26.6.3.51 Site users and adjacent site users could be impacted during construction through direct contact, ingestion and inhalation of contaminated soils and possibly also contaminated groundwater.

26.6.3.52 Given the proposed mitigation measures identified with Chapter 18 (Ground Conditions), Chapter 19 (Groundwater) and Chapter 20 (Surface Water Resource and Flood Risk), any remaining impacts posed by any potentially contaminated soils, surface water and groundwaters to site users and neighbouring site users is anticipated to be negligible. There will be a **negligible** effect on all human health receptors following the implementation of mitigation measures.

Operation

Transport and Access

26.6.3.53 The land and road network will be reinstated following the installation of the Onshore Cables Route and thus returned to its previous use. There are no permanent effects on affected transport networks once operational, including; PRoW, Long Distance Walking Routes, Sustrans National Cycle Routes and Sustrans Local Cycle Routes. Therefore, there will be no effects preventing people from choosing active travel options and accessing green spaces or recreational and community facilities, which can have physical and mental health benefits.

26.6.3.54 There are no operational requirements associated with the Onshore Cable Corridor as there is no requirement for regular maintenance. Therefore, effects associated with traffic disruption or reduced connectivity during operation are not anticipated to impact transport or access to community facilities. Cable failures are possible, albeit rare in occurrence. If repairs are required during operation, effects associated with this activity would be similar in nature to the construction impacts but targeted at specific locations and often shorter in duration.

26.6.3.55 The ORS is located within the Fort Cumberland Road Car Park south of Fort Cumberland Road, which may provide parking for access to local communities and recreational facilities. During operation, this will slightly reduce the number of available public parking space where the ORS building will be located as the maximum size of the compound which houses the ORS will be 18 m x 34 m.

26.6.3.56 Waterlooville fire station (within 500 m of Section 4) is directly accessible from the A3 and Portsmouth Ambulance Station (within 500 m of Section 8) is located on Eastern Road west of Milton Common. RNLI Portsmouth Lifeboat Station is located along Ferry Road, east of the ORS. The emergency services ability to respond would not be affected during operation.

26.6.3.57 Changes/disruption to local transport and access to community facilities during operation would have a **negligible** effect on the health of the study area population.

Landscape and Green space

26.6.3.58 Land used during the Construction Stage will be reinstated following the installation of the cables and returned to its previous use. There will be no permanent visible sign of the works, apart from below ground Joint Bays and link boxes (either above or below ground) along the Onshore Cable Corridor and the potential for vegetation loss (including some established trees). This Onshore Cable Corridor will not result in the permanent loss of recreational and open space areas. There would be negligible changes to visual amenity and perceived overall recreational quality of green space, having no significant effect on human health from reduced mental health and wellbeing, or opportunities for physical activity.

26.6.3.59 There are no operational requirements associated with the Onshore Cable Corridor as there is no associated maintenance required. Cable failures are possible, albeit rare in occurrence. If repairs are required during operation, effects associated with this activity would be similar in nature to the construction impacts but targeted at specific locations and often shorter in duration. Therefore, effects associated with landscape and green space during operation of the Onshore Cable Corridor are not anticipated.

26.6.3.60 The ORS is located within Fort Cumberland Road Car Park. During operation, there may be localised visual amenity impacts on adjacent residents and recreational users. Recreational users within close proximity would include those using Fort Cumberland Open Space SINC; Sustrans National Cycle Routes 222 and 2; Long Distance Walking Routes Solent Way and Shipwrights Way; and Fort Cumberland Road playground. This may adversely affect the mental health and wellbeing of users of these resources as well as local residents. As planting matures it will provide screening around the ORS compound. The landfall infrastructure would not be visible for those recreational receptors on the beach.

26.6.3.61 The maximum size of the compound which houses the ORS will be 18 m x 34 m. Therefore, the ORS will slightly reduce the number of available public parking spaces that are likely to support access to Fort Cumberland Open Space SINC and Eastney Beach. This is not anticipated to cause a significant effect on human health associated with reduced access to green space and the associated benefits from physical activity and social interaction.

26.6.3.62 The effect on human health associated with the Landfall (Section 10), including adverse mental health and wellbeing, from reduced amenity value of green space and changes to views from surrounding residential receptors has been assessed. The outcome was that its impact would be adverse upon both quality of life and wellbeing, though of low intensity and only affecting a small number of people. Therefore, the effects will be of **minor adverse** (not significant) effect and permanent for the general population.

Noise

26.6.3.63 Chapter 22 (Noise and Vibration) concludes that as the cables are buried, noise effects during operation are expected to be negligible.

26.6.3.64 Cable systems are generally reliable and require no ongoing maintenance. However, cable failures are possible, albeit rare in occurrence. If repairs are required during operation, noise effects associated with this activity would be similar in nature to the construction impacts, but limited to specific locations and often shorter in duration.

26.6.3.65 Chapter 22 (Noise and Vibration) concludes that at the nearest sensitive receptors, the predicted operational noise levels from the ORS infrastructure are considered to represent a negligible magnitude of change, which is a negligible effect (not significant).

26.6.3.66 Based on the noise levels predicted within Chapter 22 (Noise and Vibration), noise from operation at the Landfall (Section 10) is likely to result in a temporary, short-term **negligible** effect on human health of surrounding residential receptors, including Southsea Leisure Park caravan site, and users of recreational facilities.

Air Quality

26.6.3.67 Chapter 23 (Air Quality) identified that the interconnector cable will not cause any emissions to air as part of their operation. There will therefore be no associated health effects.

26.6.3.68 The Proposed Development at the ORS includes two back-up diesel generators (assumed in the worst-case to have a capacity 200kVA each). It has been assumed that the generators will only be required to operate on six occasions a year in the event of power outage, and each occasion will be for a maximum of 24 hours. In addition, there will be a routine programmed single test run of one hour per generator a year. Chapter 23 (Air Quality) assessed that the emissions of PM, NO_2 THC and CO contained within exhaust gases from these generators would result in a negligible adverse permanent effect. THC concentrations (assumed to be benzene) have been assessed to increasing up to an equivalent of 24% of annual mean objective concentration. However due to key assumptions made in the assessment, such as assuming all THC emitted would be in the form of benzene, rather than a very small percentage, and that emissions would be continuous for 24 hrs rather than temporary, the assessment represents an overly conservative approach. The health effects of a temporary small increase in THC emissions, of which a small percent (1 to 5%) is benzene would be minor.

26.6.3.69 Based on the predicted effects on human receptors within Chapter 23 (Air Quality), air emissions from the back-up diesel generators at Landfall (Section 10) is likely to result in a permanent, short-term **negligible to minor adverse** effect on human health of surrounding receptors.

Personal Safety – EMF

26.6.3.70 Due to the grounded shielding of the HVAC and HVDC Onshore Cables there will be no electric field present along the HVAC Cable Route and HVDC Cable Route. The public would therefore not be exposed to electric fields from the Onshore Cable Corridor because the field is contained by the cable's protective metal sheath.

26.6.3.71 The HVAC Cables are laid in agricultural land. The peak magnetic field from the HVAC Cable is predicted to be 33 µT (50 Hz) at 1 m above ground, and reduces rapidly with distance from the cables. This magnetic field strength is well below the guidelines (limit 360µT).

26.6.3.72 The HVDC Onshore Cables are laid mainly along public highways. The peak magnetic flux density from the HVDC Cable is predicted 23 µT (DC) at 1 m above ground and reduces rapidly with distance from the cables. This magnetic field strength is well below the guidelines (limit 40,000µT).

26.6.3.73 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 temporary **minor adverse** health effect (not significant) upon the population from both fear and anxiety.

26.7 CUMULATIVE EFFECTS

26.7.1 INTER-PROJECT EFFECTS

Construction

26.7.1.1 There is potential for cumulative effects to occur when multiple developments are under construction at the same time. Construction impacts described above including disruption from reduced access (due to traffic congestion and construction works), noise, dust and reduced visual amenity have the potential to combine and increase the magnitude of impact on human health receptors.

26.7.1.2 Appendix 26.2 (Cumulative Effects Assessment Matrix (Stage 1 & 2)) of the ES Volume 3 (document reference 6.3.26.2) and Appendix 26.3 (Cumulative Effects Assessment Matrix (Stage 3 & 4)) of the ES Volume 3 (document reference 6.3.26.3) provide the assessment of cumulative effects. Those projects identified for assessment are listed below, mainly on the basis of potential for overlapping construction periods. It should be noted that exact construction periods for these developments are not currently known, therefore it is not known for certain whether construction periods will overlap. For the purpose of this assessment, it is assumed that they do, to provide a worst-case scenario.

26.7.1.3 For the following developments minor adverse effects were identified for human health receptors (**high sensitivity**) where the construction period has the potential to overlap and increase disturbance (including noise, traffic, changes to access, and construction dust). The effects are of a low intensity with a duration of several weeks and limited to adjacent receptors and users of adjacent leisure facilities or green space. The following were assessed as having **minor adverse** significance cumulative effects:

- Land at 38-44 London Road, Purbrook (8);

- Waterlooville Swimming Pool, Waterberry Drive, Waterlooville (10);
- Former BAE Systems, Waterloo Park, Elettra Avenue, Waterlooville (Hambledon Road) (11);
- Former Kingston Prison, Milton Road, Portsmouth (16);
- Land adj 1A Eveleigh Road, Portsmouth (20);
- Portsmouth Park Hotel, Eastern Road, Portsmouth (21);
- Former Dairy Site, Station Road, Portsmouth (23);
- Kendalls Wharf, eastern Road, Portsmouth (24);
- Land to north of Harbourside Holiday and Lodge Park (27);
- St James Hospital, Locksway Road, Southsea (28);
- Admiral Lord Nelson School, Dundas Lane, Portsmouth (29);
- Unit 5, Interchange Park, Robinson Way, Portsmouth (30);
- Self-Drive Depot, Airport Service Road, Portsmouth (31);
- Cliff House, Dayton Lane, Portsmouth (33);
- 81 Solent Road, Portsmouth (34);
- 142 Milton Road, Portsmouth (35);
- Land Bounded by Tanners Lane, Kidmore Lane and Anmore Road, Denmead (36);
- Land to rear of 32-36 Mill Road, Denmead (37);
- Grainger Development Site Land West of London Road, Waterlooville/Newlands (43);
- Berewood Phase 1, Hambledon Road, Denmead (46);
- Berewood Phase 2 Development Site, London Road, Purbrook (50);
- Berewood Phase 10a, South of Marrelsmoor Avenue, Waterlooville (54);
- Berewood Phase 9a, West of Marrelsmoor Avenue, Waterlooville (55);
- Berewood E2, Plot 1, Houghton Avenue, Waterlooville (56);
- North Portsea Island Coastal Flood Defence Scheme, eastern Road and Kendall's Wharf (62);
- North Hill, Portsmouth (65);
- Fraser Range (66);
- Land South of Lovedean Electricity Substation, Broadway Lane, Lovedean (67);
- Land to the south of Old Mill Lane and east/south-east of The Haven, Denmead (68);

- 36 Mill Road Denmead (69);
- Lovedean Electricity Station, Broadway Lane, Lovedean, Waterlooville (70);
- Land South of, Chalton Lane, Clanfield, Waterlooville (71);
- Yew Tree Cottage, Eastland Gate, Lovedean, Waterlooville (72);
- England Coast Path – Portsmouth to South Hayling (73); and
- Southsea Seafront from Long Curtain Moat in the West to Eastney Marine Barracks (74).

26.7.1.4 Those developments located further away, and therefore with more limited opportunity for cumulative effects, from human health receptors effected by the Proposed Development, with **negligible** cumulative effects are predicted for:

- Portsmouth City Centre Highway Network incorporating parts of Mile End Road, Church Street, Commercial Road Marketway, Charlotte Street, Cascades Approach, Hope Street, Flathouse Road (58);
- Welborne Land North of Fareham (59); and
- Site of Fawley Power Station, Fawley (60).

Operational Stage

26.7.1.5 No inter-project cumulative effects were identified during operation, however Appendix 24.9 Noise and Vibration (document reference 6.3.24.9) has identified the potential for cumulative operational effects, though further assessment is required in order to determine the significance of such effects, for:

- Land South of Lovedean Electricity Substation, Broadway Lane, Lovedean, Waterlooville (67); and
- Land to the south of Old Mill Lane and east/south-east of The Haven, Denmead (68).

26.7.2 INTRA-PROJECT EFFECTS

26.7.2.1 A number of effect interactions are considered in the assessment in relation to how disruption from construction and operation can include access, traffic, noise, air quality and visual amenity effects.

26.7.2.2 Depending on a more detailed construction programme which will be developed when a construction contractor is appointed, there is also potential for intra-project cumulative effects to occur if multiple areas used for recreation and open space are affected concurrently. As detailed in Chapter 4 (EIA Methodology), Chapter 29 (Cumulative Effects) presents a consideration of the potential intra-project effects for the Proposed Development.

26.8 PROPOSED MITIGATION AND ENHANCEMENT

20.1.1.2 Mitigation measures identified within the Proposed Development description and mitigation measures identified within relevant discipline chapters have been included within the assessment. Therefore, the assessment is an assessment of residual effects.

26.9 RESIDUAL EFFECTS

26.9.1.1 The following table provides a summary of the findings of the assessment.

Table 26.19 – Summary of Effects Table for human health

Description of Effects	Receptor	Significance and Nature of Effects Prior to mitigation	Summary of Mitigation/Enhancement	Significance and Nature of Residual Effects following Mitigation / Enhancement
Construction Stage – Section 1 (Converter Station Area)				
Emissions of pollutants to air resulting in respiratory health effects and anxiety due to perceived health effects, annoyance and nuisance from construction dust	Population of Winchester and East Hampshire	Negligible - / T / D / MT Negligible + / T / D / MT	Embedded mitigation (see Section 26.6), best practice construction methods and traffic management, and measures described in the Outline CEMP and Framework CTMP	Negligible - / T / D / MT Negligible + / T / D / MT
Generation of noise emissions resulting in annoyance and anxiety, leading to adverse effects on psychological health	Residents within the population of Winchester and East Hampshire, within the vicinity of the Converter Station.	Minor - / T / D / MT	Embedded mitigation (see Section 26.6), best practice construction methods and traffic management	Minor - / T / D / MT

Changes to landscape (visual impacts) and green space resulting in adverse psychological health impacts from annoyance and nuisance; and reduced perceived amenity value (and associated reduced social contact and physical activity)	Residents and users of green space within the population of Winchester and East Hampshire	Minor - / T / D / MT	Embedded mitigation (see Section 26.6), adherence to Design Principles, mitigation planting and retention and enhancement of existing planting and Outline CEMP, and traffic management	Minor - / T / D / MT
Indirect impacts associated with changes in the local business activity and employment resulting in beneficial health outcomes such as improved mental health and physical health and provided opportunities for social contact.	Population within Winchester, East Hampshire, Havant and Portsmouth	Negligible to minor + / T / D / MT	Measures identified within Chapter 25 (Socio-economics), including to employ and upskill local workforce where possible, Framework Traffic Management Strategy, Framework CTMP and consultation with affected users.	Negligible to minor + / T / D / MT

Impacts from contact with contaminated soil/land and water resulting in health effect	Site users and adjacent site users within Winchester and East Hampshire,	Negligible - / T / D / MT	Embedded mitigation (see Section 26.6) and the implementation of the Outline CEMP	Negligible - / T / D / MT
Operational Stage – Section 1 (Converter Station Area)				
Impacts from the generation of noise emissions resulting in perceived annoyance, anxiety, adverse effects on psychological health, causing lower levels of quality of life and wellbeing.	Residents within the population of Winchester and East Hampshire, within the vicinity of the Converter Station.	Negligible to minor - / P / D / LT	Embedded mitigation within the design	Negligible to minor - / P / D / LT
Impacts associated changes to landscape and green space from reduced amenity value and view resulting in adverse	Residents and user of green space within the population of Winchester and East Hampshire.	Minor - / P / D / LT	Embedded mitigation (see Section 26.6), adherence to Design Principles, mitigation planting and retention and enhancement of existing planting and	Minor - / P / D / LT

impacts on mental health and wellbeing.			Outline CEMP, restoration of recreational and open space and car parks, contractor review of construction programme and working areas.	
Perceived fear of harm from EMF exposure resulting in anxiety and fear	Local residents in close proximity to the Converter Station.	Minor - / T/ D / ST	N/A	Minor - / T / D / ST
Construction Stage – Sections 2-10				
Emissions of pollutants to air resulting in respiratory health effects and anxiety due to perceived health effects, annoyance and nuisance from construction dust	Population of Winchester, East Hampshire, Havant and Portsmouth.	Minor - / T / D / ST	Embedded mitigation, best practice construction methods and traffic management, and measures described in the Outline CEMP and Framework CTMP	Minor - / T / D / ST
Generation of noise emissions resulting in annoyance and	Residents within the population of Winchester, East	Moderate - / T / D / ST	Embedded mitigation – Best practice construction methods and traffic	Moderate - / T / D / ST

anxiety, leading to adverse effects on psychological health and sleep disturbance	Hampshire, Havant and Portsmouth		management (including working hours)	
Disruptions to local transport and access to community facilities and residence resulting in adverse mental health (annoyance, worry and anxiety) and reduced participation of leisure (associated health benefits) lowering of quality of life and wellbeing	Residents and users of community facilities within the population of Winchester, East Hampshire, Havant and Portsmouth	Minor - / T / D / ST	Embedded mitigation (see Section 26.6), Framework Traffic Management Strategy, Framework CTMP, consultation with affected users.	Minor - / T / D / ST
Changes to landscape causing psychological effects, and reduce amenity value and opportunities for access to green	Residents and users of green space within the population of Winchester, East Hampshire, Havant and Portsmouth	Minor - / T / D / MT	Embedded mitigation (see Section 26.6), best practice construction methods, traffic management, adherence to Design Principles, mitigation planting and	Minor - / T / D / MT

space; and with it the beneficial health outcomes, such as increasing social contact, relieving psychophysiological stress, benefiting physical health			retention and enhancement of existing planting, Outline CEMP, consultation with affected users, restoration of recreational and open space and car parks, contractor review of construction programme and working areas	
Indirect impacts associated with changes in employment resulting in beneficial health outcomes such as improved mental health and physical health and provided opportunities for social contact; and impacts associated with disruption to businesses causing stress associated	Population within Winchester, East Hampshire, Havant and Portsmouth.	Negligible to minor (employment opportunities) + / T / I / MT Minor (disruption to businesses) - / T / I / MT	Measures identified within Chapter 25 (Socio-economics), including to employ and upskill local workforce where possible, Framework Traffic Management Strategy, Framework CTMP and consultation with affected users.	Negligible to minor (employment opportunities) + / T / I / MT Minor (disruption to businesses) - / T / I / MT

with income uncertainty				
Impacts from contact with contaminated soil/land and water resulting in health effect	Site users and adjacent site users within Winchester, East Hampshire, Havant and Portsmouth.	Negligible - / T / D / MT	Embedded mitigation (see Section 26.6) and the implementation of the Onshore Outline CEMP	Negligible - / T / D / MT
Operational Stage – Sections 2-10				
Disruptions to local transport and access to community facilities and residence resulting in adverse mental health (annoyance, worry and anxiety) and reduced participation of leisure (associated health benefits) lowering of quality of life and wellbeing	Population within Winchester, East Hampshire, Havant and Portsmouth.	Negligible - / P / D / LT	N/A	Negligible - / P / D / LT

Impacts associated changes to landscape and green space from reduced access, amenity value and view resulting in adverse impacts on mental health and wellbeing, and reduce green space use for physical activity	Residents and users of green space within the population of Portsmouth in proximity to the landfall	Minor - / P / D / LT	Embedded mitigation (see Section 26.6), retention/enhancement of existing planting and maturation of new mitigation planting, resurfacing of Fort Cumberland Car Park, encouraging better parking and more capacity (as part of construction mitigation)	Minor - / P / D / LT
Impacts from the generation of noise emissions resulting in perceived annoyance, anxiety, adverse effects on psychological health, lower levels of quality of life and wellbeing.	Residents within the population near the landfall	Negligible - / P / D / LT	Embedded mitigation within the design	Negligible - / P / D / LT
Emissions of pollutants to air resulting in	Residents within the population near the landfall	Negligible to minor - / P / D / ST	Embedded mitigation within the design	Negligible to minor - / P / D / ST

respiratory health effects and anxiety due to perceived health effects, annoyance and nuisance.				
Perceived fear of harm from EMF exposure resulting in anxiety and fear	Local residents in close proximity to the Cable Corridor and landfall	Minor - / T / D / ST	N/A	Minor - / T / D / ST

Key to table:

26.9.1.2 + / - = Beneficial or Adverse P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term, N/A = Not Applicable

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