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23. Population and Human Health

23.1 Introduction

- 23.1.1 This chapter of the Environmental Statement (ES) identifies the communities that will be subject to impacts associated with the Proposed Development and identifies the potential effects on the health and wellbeing of those communities in Redcar and Cleveland and Stockton-on-Tees, Teesside as a consequence of the Proposed Development.
- 23.1.2 This chapter is a summary, highlighting key aspects relevant to population and human health of the technical assessments completed and presented within chapters: 8: Air Quality, 9: Surface Water, Flood Risk and Water Resources, 10: Geology, Hydrogeology and Contaminated Land, 11: Noise and Vibration, 16: Traffic and Transport, and 20: Socio-economics and Tourism (all ES Volume I, Document Ref. 6.2). An assessment of the Major Accidents and Natural Disasters that have the potential to arise during the construction and operation of the Proposed Development can be found in Chapter 22: Major Accidents and Natural Disasters (ES Volume I, Document Ref. 6.2).

23.2 Legislative Context

Legislative Background

- 23.2.1 Health is defined by the World Health Organisation (WHO) (2020) as:
“Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”
- 23.2.2 The EIA Directive 2014 (Directive 2014/52/EU of the European Parliament and of the Council) and the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 provide the legislative background regarding the assessment of the effects of certain public and private projects on the environment. These specifically include a requirement that the Environmental Impact Assessment (EIA) must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on population and human health (Regulation 5(2)(a)).
- 23.2.3 The effects on population and health that have been considered in this ES Chapter relate primarily to those arising from emissions to air (Chapter 8: Air Quality), emissions to water (Chapter 9: Surface Water, Flood Risk and Water Resources), land quality/ contamination (Chapter 10: Geology and Hydrogeology), noise and vibration (Chapter 11: Noise and Vibration), traffic (Chapter 16: Traffic and Transport), and socio-economics (Chapter 20: Socio-economics and Tourism) (see ES Volume I, Document Ref. 6.2). The relevant legislation relating to each of these topics is presented in the respective chapters for these disciplines.
- 23.2.4 Electro Magnetic Field (EMF) effects must be controlled in accordance with the Control of Electromagnetic Fields at Work Regulations 2016, which sets

out how employers must make and implement action plans to ensure compliance with the defined exposure limits (in Part 2 of the Schedule). Regulation 7(2) states:

“The action plan must include consideration of, where relevant—

(a) other working methods that entail lower exposure to electromagnetic fields;

(b) replacement equipment designed to reduce the level of exposure;

(c) technical measures to reduce the emission of electromagnetic fields, including, where necessary, the use of interlocks, screening or similar health protection mechanisms;

(d) demarcation and access control measures;

(e) maintenance programmes for work equipment, workplaces and workstation systems;

(f) the design and layout of workplaces and workstations;

(g) limitations on the duration and intensity of exposure; and

(h) the availability of suitable personal protective equipment.”

Planning Policy Framework

National Planning Policy

23.2.5 Given that this chapter is predominantly a summary document, the planning policy related to population and health impacts is presented in each of the technical chapters described above and in Chapter 7: Legislative Context and Planning Policy (ES Volume I, Document Ref. 6.2).

23.2.6 The Overarching National Policy Statement (NPS) for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011a) begins by describing the process of sustainability appraisal that the Policy Statement was subject to. In relation to positive effects of energy policy for health, EN-1 states:

“The energy NPSs are likely to ... have positive effects for health and well-being in the medium to longer term, through helping to secure affordable supplies of energy and minimising fuel poverty; positive medium and long term effects are also likely for equalities.”

23.2.7 EN-1 also recognises that energy infrastructure can have negative effects for health, stating:

“There may also be cumulative negative effects on water quality, water resources, flood risk, coastal change and health at the regional or sub-regional levels depending upon location and the extent of clustering of new energy and other infrastructure. Proposed energy developments will still be subject to project level assessments, including Environmental Impact Assessment, and this will address locationally specific effects.”

23.2.8 Section 4.13 of EN-1 makes clear that:

“Energy production has the potential to impact on the health and well-being (“health”) of the population. Access to energy is clearly beneficial to society

and to our health as a whole. However, the production, distribution and use of energy may have negative impacts on some people's health ... Direct impacts on health may include increased traffic, air or water pollution, dust, odour, hazardous waste and substances, noise, exposure to radiation, and increases in pests."

23.2.9 EN-1 also recognises that:

"Open spaces, sports and recreational facilities all help to underpin people's quality of life and have a vital role to play in promoting healthy living... Green infrastructure ... a network of multi-functional green spaces, both new and existing, both rural and urban, ... is integral to the health and quality of life of sustainable communities."

23.2.10 The NPS for Fossil Fuel Electricity Generating Infrastructure (EN-2) (DECC, 2011) also begins by describing the process of sustainability appraisal that the Policy Statement was subject to. In relation to health and wellbeing, EN-21 states:

"Through supporting the transition to a low-carbon economy, EN-2 is considered likely to have positive effects on the Economy and Skills, and Health and Well-being as secondary benefits and positive effects in the medium/long term on climate change. However these positive effects are uncertain because of the need to demonstrate viability of CCS"

23.2.11 The NPS adds:

"There are also likely to be some negative effects on Air Quality and Well-being, given the link between air quality and public health."

23.2.12 The NPS for gas supply infrastructure and gas and oil pipelines (EN-4) (Section 2.4) sets out the regime for managing hazardous substances and role of the Health and Safety Executive (HSE) in advising on risks taking into account the local population.

23.2.13 The National Policy Statement for Electricity Networks Infrastructure (EN-5) (DECC, 2011b) provides specific policy in relation to EMF resulting from electricity networks and their known and potential effects on health, stating:

"All overhead power lines produce EMFs, and these tend to be highest directly under a line, and decrease to the sides at increasing distance. Although putting cables underground eliminates the electric field, they still produce magnetic fields, which are highest directly above the cable (see para 2.10.12). EMFs can have both direct and indirect effects on human health. The direct effects occur in terms of impacts on the central nervous system resulting in its normal functioning being affected. Indirect effects occur through electric charges building up on the surface of the body producing a microshock on contact with a grounded object, or vice versa, which, depending on the field strength and other exposure factors, can range from barely perceptible to being an annoyance or even painful."

23.2.14 NPS EN-5 makes reference to health protection guidelines for public and occupational exposure which are further discussed below (see 'Other Guidance').

National Planning Policy Framework

- 23.2.15 The National Planning Policy Framework (NPPF) (MHCLG, 2019a), described within other ES technical chapters contains policies that are relevant at a national level and are supported and expanded upon by the ‘Planning Practice Guidance’, which is regularly updated.
- 23.2.16 Paragraph 5 of the NPPF makes it clear that the document does not contain specific policies for Nationally Significant Infrastructure Projects (NSIPs) such as the Proposed Development and that applications in relation to NSIPs are to be determined in accordance with the decision making framework set out in the Planning Act 2008 and relevant NPSs, as well as any other matters that are considered relevant. The NPPF and the Planning Practice Guidance are matters which the Secretary of State is likely to consider both important and relevant to his decision on any DCO application for the Proposed Development.
- 23.2.17 Policies of particular relevance to the scope of this chapter are those described in the relevant technical chapters (e.g. promoting sustainable transport) as described in Chapter 16: Traffic and Transport (ES Volume I, Document Ref. 6.2), but more specifically, Part 8 of the NPPF relates to promoting healthy communities. It states that:
- “Planning policies and decisions should aim to achieve healthy, inclusive and safe places ... 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.”*
- 23.2.18 Paragraph 180 goes on to state that:
- “to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health should be taken into account”.*

Local Planning Policy

- 23.2.19 Local planning policy relevant to population and health is as described within chapters that consider emissions to air (Chapter 8: Air Quality), emissions to water (Chapter 9: Surface Water, Flood Risk and Water Resources, land quality/ contamination (Chapter 10: Geology, Hydrogeology and Contaminated Land), noise and vibration (Chapter 11: Noise and Vibration), traffic (Chapter 16: Traffic and Transport), and socio-economics (Chapter 20: Socio-economics and Tourism) (all ES Volume I, Document Ref. 6.2) and summarised in Table 23-1 below.

Table 23-1: Local Planning Policy Relevant to Population and Human Health

Chapter	Policy	Reason for inclusion
Chapter 8: Air Quality	Redcar and Cleveland Borough Council (RCBC) Local Plan	Policy SD 4: General Development Principles states that all developments will be expected to 'minimise pollution including light and noise and vibration levels to meet or exceed acceptable limits'.
Chapter 9: Surface Water, Flood Risk and Water Resources and Chapter 11: Noise and Vibration	RCBC Local Plan Stockton-on-Tees Borough Council (STBC) Local Plan	Policies relating to flooding and foul and surface water flows. Policies relating to flooding, surface water run-off and ground, air, water, noise and light pollution.
Chapter 10: Geology, Hydrogeology and Contaminated Land	Tees Valley Joint Minerals and Waste Development Plan Documents, Policies and Sites DPD, Adopted September 2011	Provides guidance relating to contaminated land.
Chapter 16: Traffic and Transport	Redcar and Cleveland Local Transport Plan 2011 – 2021	Focuses on the five main goals of: reducing carbon emissions, supporting economic growth, promoting quality of opportunity, contributing to better safety, security and health and improving quality of life and a healthy natural environment.
Chapter 20: Socio-economics and Tourism	Tees Valley Combined Authority Strategic Economic Plan 2016 – 2026 (2016), Redcar and Cleveland Local Plan (2018), South Tees Area Supplementary Planning Document (2018), Stockton-on-Tees Local Plan (2019), Marine and Coastal Access Act (2009), North East Inshore and Offshore (Draft) Plans (2020)	Includes information regarding the economy and economic growth, employment and regeneration all of which impact the local population.

23.2.20 The RCBC Local Plan includes details relating to population and human health. The plan outlines that development proposals are expected to ‘create a healthy, active, safe and secure environment’ and ‘be designed, constructed and managed in ways that improve health and promote healthy lifestyles to help to reduce health inequalities’.

23.2.21 The STBC Local Plan similarly includes details relating to population and human health including strategic priorities focusing on achieving a healthy community. The plan also outlines that public safety is of key importance in the development process and that ‘this should be considered in terms of the impact on human health from new development’.

Other Guidance

23.2.22 To prevent the known adverse health effects of EMF, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) developed health protection guidelines in 1998 (ICNIRP, 1998) for both public and occupational exposure which have been taken into account in assessing the potential for health effects related to EMF.

23.3 Assessment Methodology and Significance Criteria

Impact Assessment and Significance Criteria

23.3.1 With the exception of effects relating to EMF, this chapter summarises key information, assessments, proposed mitigation measures and residual health-related effects described elsewhere in the ES.

23.3.2 The methodologies for these assessments, including the definition of Study Area, identification of receptors and their sensitivity, identification of impacts and their magnitude, and assessment of effects, are set out in the relevant technical chapters.

23.3.3 Standardised terminology is used to describe the relative significance of effects throughout this ES (unless stated otherwise in specific chapters). Effects are described as:

- adverse – detrimental or negative effect to a receptor group;
- beneficial – advantageous or positive effect to a receptor group;
- neutral – imperceptible effects to a receptor group;
- minor–, very short or highly localised effects of no significant consequence;
- moderate – more than a slight, very short or localised effect (by extent, duration or magnitude), which may be considered significant; or
- major – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

23.3.4 For the purposes of this assessment, moderate and major effects are deemed ‘significant’.

Electromagnetic Fields

23.3.5 Risks associated with EMF have been derived considering the advice provided by Public Health England (PHE) in their response issued with the EIA Scoping Opinion (The Planning Inspectorate (PINS), 2019) (see consultation section below). Additionally, the Electric and Magnetic Fields and Health website¹ has been used in order to gather information on the EMF risks associated with the types of infrastructure proposed. ICNIRP guidelines have been used as the reference for the recommended limits of exposure of the general public, following current government policy.

23.3.6 The associated reference levels are summarised in Table 23-2 below:

Table 23-2: EMF Reference Levels

Reference levels	Electrical field	Magnetic field
Public exposure	5 kV/ m	100 μ T
Occupational exposure	10 kV/ m	500 μ T

Source: ICNIRP, EMF guidelines, Health Physics 74, 494-522 (1998)

23.3.7 The assessment of potential EMF related effects does not follow the 'standard' EIA methodology of identifying the sensitivity of receptors and magnitude of effects to classify the effect using a matrix. Rather, all human receptors located within the electrical field are identified and, with reference to the identified impact avoidance measures, effects are qualitatively either considered to be significant or not significant, based on professional judgement.

23.3.8 The DECC Voluntary Code of Practice on compliance with EMF guidelines (DECC, 2012) advises that the Energy Networks Association (ENA) will maintain a publicly available list of types of equipment where the design is such that it is not capable of exceeding the ICNIRP exposure guidelines on its website. This obligation is set out on the industry website (www.emfs.info).

23.3.9 The nearest residential receptors are over 500 m from the to the Electrical Connection Corridor at Warrenby (Marsh House Farm) and Dormanstown (housing on Broadway West).

23.3.10 High-voltage underground cables can produce higher magnetic fields directly above them than an overhead line would produce at ground level, because the physical distance from the underground cable is smaller. However, the field falls more rapidly with distance to the sides, and they produce no external electric field. Such cables are not normally located beneath buildings (Energy Networks Association, 2012).

23.3.11 As a result of the type and location of the underground 275 kV Electrical Connection and its distance from residential areas, the effect during operation on public health will therefore be neutral and no formal assessment of risks assessed with the connection of the proposed generation station to the national grid is required.

¹ www.emfs.info

Extent of Study Area

- 23.3.12 The definition of the Study Area relevant to each of the population and health-related assessments in Chapters 8: Air Quality, Chapter 9: Surface Water, Flood Risk and Water Resources, Chapter 10: Geology, Hydrogeology and Contaminated Land, Chapter 11: Noise and Vibration, Chapter 16: Traffic and Transport and Chapter 20: Socio-economics and Tourism are set out in each chapter (all ES Volume I, Document Ref. 6.2). The Study Areas are determined by the receptors and impacts specific to each technical discipline and, as such, they vary in size depending on the discipline in question.
- 23.3.13 For the definition of the baseline for health of the local population, the Study Area is as defined for the socio-economics assessment in Chapter 20: Socio-economics and Tourism (ES Volume I, Document Ref. 6.2). This includes seven combined Lower Layer Super Output Areas (LSOAs) of Redcar and Cleveland and Stockton-on-Tees (for further information see Chapter 20: Socio-economics, ES Volume I, Document Ref. 6.2). Information for neighbouring areas including Middlesbrough and Hartlepool has also been included within this chapter.
- 23.3.14 Health profiles produced by PHE provide baseline data on the health of people within the local area, to compare with average values for all areas of England. Data for Redcar and Cleveland and surrounding local authorities including Middlesbrough, Stockton-on-Tees and Hartlepool have been used. By virtue of the geographical scale of these datasets, they include a much broader population than is predicted to receive direct or indirect impacts associated with the Proposed Development. This allows data for Redcar and Cleveland (within which any impacts would be expected to occur) to be compared with other neighbouring authorities within the region, so that any particular local trends, vulnerable groups or inequalities can be more readily identified.

Sources of Information

- 23.3.15 The data sources and methods used in surveys are set out in Chapter 4: Proposed Development and Chapter 5: Construction Programme and Management and each of the chapters on emissions to air (Chapter 8: Air Quality, Sections 8.3 and 8.4), emissions to water (Chapter 9: Surface Water, Flood Risk and Water Resources, Sections 9.3 and 9.4, land quality/contamination (Chapter 10: Geology, Hydrogeology and Land Contamination, Sections 10.3 and 10.4), noise and vibration (Chapter 11: Noise and Vibration, Sections 11.3 and 11.4), traffic and transport (Chapter 16: Traffic and Transport, Sections 16.3 and 16.4), and socio-economics (Chapter 20: Socio-economics and Tourism, Sections 20.3 and 20.4) (all ES Volume I, Document Ref. 6.2).
- 23.3.16 The health profiles produced annually by PHE have been utilised in the assessment. Data available for 2019 has been used, representing the most up to date information (PHE, 2019). Furthermore, data on five indicators of mental health has been sourced for the relevant Clinical Commissioning Group (CCG) areas in order to determine the baseline status of the population in this respect.

Rochdale Envelope

23.3.17 In line with Planning Inspectorate (PINS) Guidance Note Nine (PINS, 2018) and as outlined in Chapter 4: The Proposed Development, the Rochdale Envelope approach is being used within the EIA. The Rochdale Envelope is applicable where some of the details of a Proposed Development have not been confirmed when an application is submitted, and flexibility is needed to address uncertainty. The three key principles an assessment should adopt include:

- using a cautious worst-case approach;
- the level of information assessed should be sufficient to enable the likely significant effects of a Proposed Development to be assessed; and
- the need for flexibility should not be abused.

Consultation

23.3.18 The consultation undertaken with statutory consultees to inform this Chapter is summarised in Table 23-3.

23.3.19 For each of the other technical assessments, where effects on health are considered, consultation has been undertaken with the relevant local authorities and health authorities, and the findings of the EIA Scoping Opinion taken into account within the assessments. The consultation outcomes are set out in each of these chapters: 8: Air Quality, 9: Surface Water, Flood Risk and Water Resources, 10: Geology and Hydrogeology, 11: Noise and Vibration, 16: Traffic and Transport and 20: Socio-economics and Tourism (ES Volume I, Document Ref. 6.2).

Table 23-3: Summary of Consultation

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/how comments have been addressed
Planning Inspectorate	April 2019 (Scoping Opinion)	The Scoping Report states that no specific human health impact assessment is proposed, as the separate aspects relevant to human health will be assessed against criteria that have been established for the protection of human health (e.g. air quality). The Inspectorate is content with this approach and agrees with the approach to include a dedicated section within the ES to summarise the results of relevant environmental aspects.	A specific human health impact assessment has not been completed as agreed and instead this chapter summarises the findings of the relevant technical chapters in respect of human health and population.
Planning Inspectorate	April 2019 (Scoping Opinion)	The Applicant should assess the 'Health and wellbeing wider determinants' identified by Public Health England (see Appendix 2 of Scoping Opinion), where significant effects are likely. Consideration should be given to vulnerable populations.	The health and wellbeing wider determinants outlined within the Scoping Opinion (PINS, 2019) have been considered in the ES and summarised within this Population and Human Health chapter of the final ES.
Planning Inspectorate	April 2019 (Scoping Opinion)	The Scoping Report identifies the potential for health and safety impacts to arise but does not provide further detail regarding the proposed assessment of these impacts. The ES should set out the proposed methodological approach for assessing these matters.	The methodological approach for health and safety issues has been outlined in Section 23.3 of this chapter and in Section 22.5 of Chapter 22: Major Accidents and Natural Disasters (ES Volume I, Document Ref. 6.2).
Public Health England	21 st March 2019 (Letter)	<p>The Scoping Report does not identify a definition of health. The Scoping Report should accept the broad definition of health proposed by the World Health Organisation (WHO) and also include specific reference to mental health within the definition of health.</p> <p>Access, traffic and transport, socioeconomic and land use are outlined as a minimum for inclusion in the population and human health assessment. Should the applicant wish to scope out any of these determinants, the PEI Report must provide adequate justification.</p> <p>The EIA should clearly identify the range of vulnerable populations that have been considered within the assessment.</p>	<p>The WHO definition of health is outlined within the 'legislative background' section of this chapter and includes mental health. Mental health is covered within Paragraph 23.4.14.</p> <p>There is a specific chapter for Traffic and Transport (Chapter 16) and Socio-economics (Chapter 20) (see ES Volume I, Document Ref. 6.2). Access is included within the Traffic and Transport Chapter and land use is considered within Chapter 10: Geology, Hydrogeology and Contaminated Land (ES Volume I, Document Ref. 6.2).</p> <p>A Framework Construction Worker Travel Plan (CWTP) and a Framework Construction Traffic Management Plan are provided in Appendixes 16B and 16C (ES Volume III,</p>

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/how comments have been addressed
		<p>The assessments and findings of the ES and any EqIA should be cross referenced between the two documents, particularly to ensure the comprehensive assessment of potential impacts for health and inequalities and where resulting mitigation measures are mutually supportive.</p> <p>The overall risk to Non-Motorised Users (NMUs) and impact on active travel should be considered on a case-by-case basis, taking into account, the number and type of users and the effect that the construction / demolition vehicle movements will have on their journey and safety. Any traffic counts and assessment should also, as far as reasonably practicable, identify informal routes used by NMU or potential routes used due to displacement. The final ES should identify the temporary traffic management system with specific reference to NMU. This may be incorporated within the Code of Construction Practice or transport plan.</p> <p>The scheme should identify any additional opportunities to contribute to improved infrastructure provision for active travel and physical activity. This would include employee travel plans during the construction/demolition and operational phase.</p>	<p>Document Ref. 6.4). The Appointed contractor will be required to implement a final CWTP aimed at reducing the volume of construction staff and employee trips associated with the Proposed Development, especially during peak hours.</p>
Public England	Health 18 th September 2020 (Stage Consultation)	<p>We are pleased to note the baseline examination of local health profiles as part of chapter 23 of the PEIR (Population and Human Health). Please note that these profiles are updated annually, therefore, the most up to date profiles should be provided in the final ES. For example, the North East 2019 Health Profile data can be found here (published March 2020).</p> <p>Additional electrical infrastructure is required as part of the development; the applicant notes that new distribution lines of up to 400kV will be needed to link the PCC to an existing National Grid sub-station. We note that the current submission does not consider any risks or impacts that might arise as a result of electric and magnetic fields associated with the</p>	<p>The Baseline data presented in Section 23.4: Baseline Conditions uses the most up to date data at the time of writing of the ES i.e. the 2019 Local Authority Health Profile data (published March 2020).</p> <p>Formal assessment of risks assessed with the connection of the proposed generation station to the national grid screened out due to undergrounding of the Electrical Connection and distance from residential receptors.</p>

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/how comments have been addressed
Public England	Health 29 th April 2021 Consultation on the draft ES Chapter (letter)	connection of the proposed generation station to the national grid. PHE requested that further information be added in relation to the likely impacts and effects to human health associated with Air Quality.	Further information and signposting has been added to Section 23.6: Likely Impacts and Effects.

23.4 Baseline Conditions

Existing Baseline

23.4.1 This section considers the community profile in the Study Area (Redcar and Cleveland, Middlesbrough, Stockton-on-Tees and Hartlepool) including 2019 data for overall health and mental health status of the population.

Public Health

23.4.2 The distribution of the existing local population has been described earlier in this ES in Chapter 3: Description of the Existing Environment (ES Volume I, Document Ref. 6.2).

23.4.3 Health profiles produced by PHE provide a summary of the health of people within local authority areas and a comparison of local health with average values for all areas of England. Health and population profiles for 2017-2019 (PHE, 2020) have been obtained for the local authority area of Redcar and Cleveland, within which the Site is located, as well as those for surrounding local authorities including Middlesbrough, Stockton-on-Tees and Hartlepool. These predominantly report data for the 2016–2019 period. These are assumed to represent the ‘current baseline’.

Physical Health

23.4.4 These data show that Redcar and Cleveland has a population of 136,718. The average life expectancy for people living within Redcar and Cleveland and the surrounding local authorities varies when compared to the national average (see Table 23-4).

Table 23-4: Life Expectancy and Health Inequalities in the Surrounding Local Authority Areas

Location	Population	Female average (years)	Male average (years)	Difference in life expectancy between most and least deprived areas (female years)	Difference in life expectancy between most and least deprived areas (male years)	Average
England	55,977,178	83.2	79.8	7.5	9.5	8.5
Redcar and Cleveland	136,718	81.8	78.8	7.3	11.0	9.15
Stockton-on-Tees	197,213	81.4	78.1	13.8	15.2	14.5
Middlesbrough	140,545	80.0	75.3	12.0	12.6	12.3
Hartlepool	93,242	81.3	76.8	10.4	12.5	11.45

(PHE, 2020- data for years 2017-2019- published March 2020)

- 23.4.5 Within each local authority, health inequalities exist, marked by the variance in life expectancy for men and women in the most deprived areas, compared to the least deprived areas.
- 23.4.6 Both the male and female life expectancy values for Redcar and Cleveland, Stockton-on-Tees, Middlesbrough and Hartlepool are below the average life expectancy for males and females in England as a whole.
- 23.4.7 In comparison with the surrounding local authorities, Redcar and Cleveland has a low difference in life expectancy between the most and least deprived areas, with an average of 9.15 years. The difference in life expectancy for females between the most and least deprived areas of the borough is 7.3 years, which is considerably lower than the surrounding authorities. The difference in life expectancy for males between the most and least deprived areas of the borough is 11.0 years which is also lower than all surrounding areas, indicating that health inequalities are less apparent in Redcar and Cleveland when compared to the surrounding authorities.
- 23.4.8 Various factors contribute to mortality and indices are reported for six factors which can be used to determine health inequalities of a local area, when compared to national average and neighbouring authorities. These are presented in Table 23-5 below.
- 23.4.9 The health outcomes for people, when compared with the England average, show that three of the four local authority areas considered, including Redcar and Cleveland, have a lower than average infant mortality rate.
- 23.4.10 All of the local authority areas have a rate of road injuries and deaths lower than the England average.
- 23.4.11 Three of the four local authority areas considered, including Redcar and Cleveland, have a higher than average suicide rate with the rate in Middlesbrough significantly higher than the England average.
- 23.4.12 All of the local authority areas considered, including Redcar and Cleveland, have higher early death rates related to cardiovascular and cancer compared to the England average with the rate in Middlesbrough significantly higher than the England average.
- 23.4.13 The rate of excess winter deaths is higher within Redcar and Cleveland and Stockton-on-Tees than the England average, however it is lower within Middlesbrough and Hartlepool.

Table 23-5: Baseline Mortality Rates Within Local Authority Areas in the Vicinity of the Site

Community	Infant Deaths ^a	Road Injuries and Deaths ^b	Suicide Rate ^c	Early Deaths: Cardiovascular ^d	Early Deaths: Cancer ^b	Excess Winter Death ^e
England	3.9	42.6	9.6	71.7	132.3	30.1
Redcar and Cleveland	3.3	25.5	10.8	88.4	153.3	35.9
Stockton-on-Tees	3.5	25.1	9.3	74.4	157.3	39.4
Middlesbrough	4.2	25.4	15.6	118.6	184.8	25.1
Hartlepool	3.6	30.8	11.6	96.3	165.5	27.2

(PHE, data for years 2017-2019- published March 2020)

a. rate per 1,000 live births

b. values expressed as per 100,000 population

c. directly age-standardised rate per 100,000 population aged 10 and over

d. directly age-standardised rate per 100,000 population aged under 75

e. ratio of excess winter deaths to average of non-winter deaths

Mental Health

23.4.14 Mental health and well-being profiles produced by PHE provide a summary of the mental health of people within local authority areas and a comparison of local mental health with average values for all areas of England. Mental health profiles for 2017/2018 have been obtained and are provided in Table 23-6.

Table 23-6: Public Health England Joint Strategic Needs Assessment (JSNA) Report on Common Mental Health Disorders

Clinical commissioning group	Socio-economic deprivation overall indices of multiple deprivation Score ¹	People estimated to have any common mental health disorder (%) ²	Long term mental health problems among GP survey respondents (%) ²
England (national average)	21.8	16.9	9.1
Redcar and Cleveland	28.6	18.1	9.3
Stockton-on-Tees	24.6	17.0	11.8
Middlesbrough	40.2	19.6	11.6
Hartlepool	33.2	19.3	12.5

¹IMD, 2015. The indices of multiple deprivation score is the official measure of relative deprivation in England and defines deprivation to encompass a wide range of an individual's living conditions (Ministry of Housing, Communities and Local Government, 2019b).

²Aged 16 & over (PHE, 2018)

23.4.15 This table shows that the level of socio-economic deprivation and associated mental health problems in all of the local authority areas surrounding the Site is higher than the average for England.

23.4.16 Common mental health disorders and long-term mental health problems are experienced at a rate higher than the average for England within all of the local authority areas surrounding the PCC Site.

23.4.17 The National Health Service (NHS) South Tees CCG has prepared a draft strategy for mental health (2015–2020) (NHS South Tees CCG, 2013) which sets out priorities to improve the mental health of children and young people, adults and older people. This strategy sets out a number of priorities to ensure the mental health needs of people in the Middlesbrough and Redcar and Cleveland areas are identified and met. This includes 'helping people with mental illnesses recover in terms of employment, housing and social integration' and also provides an overview of marginalised groups in local communities that are at a higher risk of developing mental health problems, including people who are:

- young first-time mothers;
- living with long-term conditions;
- living with disabilities, including learning disabilities;

- people who have experienced abuse or bullying;
- victims of crime;
- living as migrants;
- from minority backgrounds;
- from the Lesbian, Gay, Bisexual, and Transgender communities;
- in the justice system;
- looked after young people and people leaving care as adults;
- living with sight or hearing impairment; and
- older and living alone or in isolation.

Future Baseline

23.4.18 Future baseline conditions are predicted for each topic where relevant in the technical chapters of this ES, whereby the conditions anticipated to prevail if the Proposed Development was not to be progressed are identified for comparison, where appropriate, with the predicted conditions with the Proposed Development. For example, potential future changes in air quality, which may affect human health, are described in Chapter 8: Air Quality (ES Volume I, Document Ref. 6.2).

23.4.19 Chapter 20: Socio-economics and Tourism (ES Volume I, Document Ref. 6.2) outlines that Redcar and Cleveland has a declining population.

Public Health

23.4.20 Changes to public health and inequalities are not straight forward to predict.

23.4.21 The King's Fund (The King's Fund, 2013) publishes analysis of future trends in health nationally which can be used to provide broad statements about potential health changes expected in the medium to longer term within the region.

23.4.22 The King's Fund reports that life expectancy has increased dramatically over the previous century and is predicted to continue to increase. Whereas in 2012, men could expect to live for just over 79 years and women to 83 years, by 2032 this is expected to increase to 83 years and 87 years respectively. Healthy life expectancy is growing at a similar rate, suggesting that the extra years of life will not necessarily be years of ill health. However, it is noted that medical advances, future patterns of disease and population behaviour could all have a significant impact on life expectancy and either drive it up or down.

23.4.23 The analysis predicts that the number of people with diseases will double over the next 20 years, for example, by 2030 there will be 3 million with cancer, but it states that many diseases will be easier to treat.

23.4.24 It forecasts that significant health inequalities are likely to persist, with people in more deprived populations having higher rates of disease and more than one disease. It suggests that population lifestyles will be a critical determinant of future patterns of disease and as such, a change in population lifestyles offers the greatest opportunity to reduce the burden of chronic disease.

23.4.25 On this basis, future baseline conditions in 2022-2026 for public health are not anticipated to be significantly different to the existing baseline conditions, although population growth is expected (as per the national trend), with the highest growth increases being in the older population.

Mental Health

23.4.26 The King's Fund analysis of mental health recognises that physical health problems significantly increase the risk of poor mental health, and vice versa, stating that approximately 30% of all people with a long-term physical health condition also have a mental health problem, most commonly depression/anxiety.

23.4.27 It states that adult mental health has remained relatively stable over the last 20 years (The King's Fund, 2013). However, looking to the future, it recognises that prolonged economic instability can be expected to increase demand for mental health services, as there is a close link between unemployment, debt and mental health problems—particularly depression and anxiety.

23.4.28 The UK Government is taking steps to transform mental health services across the UK including specific actions and targets to be achieved by 2023/2024 at a local level (NHS, 2019). Future baseline conditions in 2022-2026 for mental health and well-being therefore have the potential to improve, through provision of improved access to mental health services.

23.5 Development Design and Impact Avoidance

23.5.1 With the exception of effects relating to EMF, this chapter summarises key information, assessments, proposed mitigation measures and residual health-related effects described elsewhere in the ES. As such, relevant development design and impact avoidance measures relating to each of topic is presented in the respective chapters for these disciplines i.e. Chapter 8: Air Quality, Chapter 9: Surface Water, Flood Risk and Water Resources, Chapter 10: Geology and Hydrogeology, Chapter 11: Noise and Vibration, Chapter 16: Traffic and Transport and Chapter 20: Socio-economics and Tourism (ES Volume I, Document Ref. 6.2).

23.5.2 Selecting the location of the PCC Site on the former Redcar Steelworks site to the east of the Redcar Bulk Terminal, on the south bank of the River Tees in the South Bank Ward of RCBC, rather than an alternative site, avoids the PCC being located within close proximity to a significant number of residential receptors where the potential population and human health impacts might otherwise increase.

23.5.3 As described in Chapter 8: Air Quality (ES Volume I, Document Ref. 6.2), the Proposed Development will be designed such that process emissions to air will comply with the Emission Limit Values (ELV) requirements specified in the Industrial Emissions Directive (IED)(European Parliament, 2010), or, if tighter, the Large Combustion Plant (LCP) BRef. This will be regulated by the Environment Agency through the Environmental Permit required for the operation of the Proposed Development.

- 23.5.4 The choice and design of plant and equipment will comply with standard industry guidelines set to protect human health, including construction workers and operational staff.
- 23.5.5 During the detailed design of works for the Electrical Connection, potential electromagnetic interference effects would be identified and mitigated through the application of electromagnetic compatibility industry accepted practice. In accordance with good safety management principles, risks due to EMF from relevant sources including the substation and electrical connections (above or below ground) will be reduced using the 'as low as reasonably practicable' (ALARP) principle. EMF exposure to workers and operational staff will be addressed as part of this assessment.
- 23.5.6 Measures for the protection of workers from potential EMF effects will therefore include engineering and administrative controls, personal protection programmes, and medical surveillance in accordance with the relevant legislation and guidance. In particular, appropriate protective measures will be implemented if exposure in the workplace is predicted to result in the basic restrictions set out within ICNIRP Guidelines (1988) being exceeded.

23.6 Likely Impacts and Effects

- 23.6.1 Areas with a higher than average deprivation score within the Study Area (see Table 23-6) are likely to be more impacted by the human health effects outlined in this chapter than other areas due to the lower than average current health statistics for the population within these areas. Therefore, their susceptibility to new or increased adverse health effects is likely to be increased.
- 23.6.2 Potential impacts and effects from the Proposed Development, relating to population and human health that have been identified in the various chapters of the ES for the construction, operation and decommissioning phases of the Proposed Development. The decommissioning phase is not expected to commence until at least 2051 and is not anticipated to present any significant environmental impacts beyond those assessed for the construction phase of the Proposed Development. Where it is possible to predict decommissioning at this stage, these have been included below. Potential impacts and effects from the Proposed Development on population and human health include:
- emissions to air, which may affect air quality with consequential health effects (see Chapter 8: Air Quality, ES Volume I, Document Ref. 6.2) which could lead to a further deterioration in the local health figures outlined in Table 23-4 and Table 23-5. However, the embedded mitigation outlined within Chapter 8 means the construction effects of the Proposed Development are predicted to be not significant at all human health receptors.
 - emissions to air, which may affect air quality with consequential health effects (see Chapter 8: Air Quality, ES Volume I, Document Ref. 6.2) which could lead to a further deterioration in the local health figures outlined in Table 23-4 and Table 23-5. The impact of point source

emissions at human health receptors has been determined from isopleth figures of pollutant dispersion and maximum model output at discrete receptor locations. Chapter 8 concludes that the operational effects of the Proposed Development are predicted to be not significant at all human health receptors.

- operational effects caused by N-amine emissions with the potential for consequential health effects. The findings of the assessment are presented in Appendix 8C: Air Quality Amine Degradation Assessment, ES Volume III, Document Ref. 6.4. The results show that the predicted impacts are unlikely to result in an exceedance of the proposed Air Quality Assessment Level for N-nitroso-dimethylamine NDMA, even when considering the impacts of both the direct and in-direct emission processes. Therefore, are not predicted to produce a significant adverse effect on human health;
- increase in traffic, which could lead to: severance of communities, reduction in pedestrian amenity, increase in fear and intimidation of pedestrians, and reduction in highway safety; potentially increasing the local road injuries and deaths figure outlined in Table 23-5. Significant effects are not predicted based on the volume of traffic required for the construction of the Proposed Development (see Chapter 16: Traffic and Transport, ES Volume I, Document Ref. 6.2) and through the use of appropriate travel plans for construction workers and HGVs. As stated in Chapter 16, the traffic and transport effects from construction, operation and decommissioning are predicted to be negligible adverse and there will be no impacts of any significance to any of the road sections assessed;
- noise emissions, which may result in adverse effects on nearby sensitive receptors (see Chapter 11: Noise and Vibration, ES Volume I, Document Ref. 6.2) without adequate mitigation such as use of enclosures, design of plant and temporary or local screening of NSRs. As stated in Chapter 11, the residual noise effects of the Proposed Development are predicted to be of up to minor adverse and not significant for the construction, operation and decommissioning phases;
- land/groundwater contamination or mobilisation of existing land contaminants, which may result in human contact and associated adverse health impacts, (see Chapter 10: Geology, Hydrogeology and Contaminated Land, ES Volume I, Document Ref. 6.2), potentially leading to a deterioration in the local health figures outlined in Table 23-4 and Table 23-5 unless correctly identified and managed during construction of the Proposed Development. As stated in Chapter 10, the potential geological, hydrogeological and contamination related impacts associated with the Proposed Development are likely to be up to slight adverse during construction, and slight adverse for operation and decommissioning and not significant;
- emissions to water, which may result in adverse effects on local water quality with potential consequential adverse health effects, (see Chapter 9: Surface Water, Flood Risk and Water Resources, ES Volume I, Document Ref. 6.2) potentially leading to a deterioration in the local

health figures outlined in Table 23-4 and Table 23-5, unless embedded design measures prevent contamination of water resources. As stated in Chapter 9: Surface Water, Flood Risk and Water Resources, (ES Volume I, Document Ref. 6.2) during construction there are predicted slight adverse effects on water quality in Tees Bay which are not-significant; and

- the construction and operation of a development can result in effects on the economy and tourism (see Chapter 20: Socio-Economics and Tourism, ES Volume I, Document Ref. 6.2) potentially leading to changes in the socio-economic indices and mental health figures for the local area outlined in Table 23-6. During construction, there is predicted to be a major (significant) beneficial effect from employment and there are no adverse effects predicted that are classified as greater than minor adverse. During operation, the largest beneficial effect predicted is a moderate (significant) beneficial effect from employment and there are no adverse effects predicted that are classified as greater than negligible adverse.

23.7 Mitigation and Enhancement Measures

23.7.1 Mitigation measures are set out in the relevant technical chapters of the ES. No additional mitigation has been identified in this chapter.

23.8 Residual Effects and Conclusions

23.8.1 Health related effects are described in chapters 8: Air Quality, 9: Surface Water, Flood Risk and Water Resources, 10: Geology, Hydrogeology and Land Contamination, 11: Noise and Vibration, 16: Traffic and Transport and 20: Socio-economics and Tourism (all ES Volume I, Document Ref. 6.2).

23.8.2 Significant effects relating to population and human health at this stage include effects on construction and operation employment.

23.8.3 Residual significant effects relating to population and human health are outlined in Table 23-7 below:

Table 23-7: Summary of Significant Residual Effects

Chapter	Residual effect	Description of effect(s)
Chapter 20: Socio-economics and Tourism	Major (beneficial)	The estimated net employment generated during the four year construction phase is up to 1,760 workers per annum of which 880 are likely to be from the Middlesbrough and Stockton Travel to Work Area (TTWA)
	Moderate (beneficial)	The creation of jobs during the operation phase, resulting in a positive benefit for both the TTWA and outside the TTWA.

23.9 References

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