

Environmental Statement: Volume I

Chapter 16: Human Health

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16.0 HUMAN HEALTH

16.1 Introduction

16.1.1 This chapter of the Environmental Statement (ES) addresses the potential effects of the Proposed Development on human health. This assessment is predominantly a 'signposting' document, highlighting key aspects of the technical assessments completed and presented elsewhere in the ES and which are relevant to human health.

16.1.2 No figures are produced specifically for this chapter, rather figures produced for the purposes of other technical chapters of the ES have been referenced. These are provided in ES Volume II (Application Document Ref: 6.3).

16.2 Legislation and Planning Policy Context

Legislative Background

16.2.1 The effects on health that have been considered in this ES relate primarily to those arising from: emissions to air (Chapter 6: Air Quality), traffic (Chapter 7: Traffic and Transport), noise and vibration (Chapter 8: Noise and Vibration), emissions to water (Chapter 12: Surface Water, Flood Risk and Drainage), land quality/ contamination (Chapter 11: Ground Conditions and Hydrogeology) and socio-economics (Chapter 14: Socio-Economics). The relevant legislation relating to each of these topics is presented in the respective chapters for these disciplines.

Planning Policy Context

National Planning Policy

16.2.2 Given that this chapter is a 'signposting' document, the planning policy related to health impacts is presented in each of the technical chapters described above and in ES Chapter 5: Planning Policy. Notwithstanding this, key issues in the National Policy Statements (NPS) relating to health are set out below.

16.2.3 The Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC), Ref 16-1) describes the process of sustainability appraisal that the document 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."

16.2.4 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 location specific effects."

16.2.5 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.”

16.2.6 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,” and that, “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.”

16.2.7 The NPS for Electricity Networks Infrastructure (EN-5) (Ref 16-2) provides specific policy in relation to electromagnetic fields (EMF) 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.”

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

16.2.9 The National Planning Policy Framework (NPPF) (Ref 16-3), described in ES Chapter 5: Planning Policy, contains policies that are relevant at a national level and are supported by the policies contained within the NPPF are supported and expanded upon by the ‘Planning Practice Guidance’, which was most recently revised in October 2018.

16.2.10 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 both important and relevant. However, the NPPF confirms that matters that can be considered to be both important and relevant to NSIPs may include the NPPF and the policies within it.

16.2.11 Policies of particular relevance to the scope of this chapter are those described in the relevant technical chapters (e.g. promoting sustainable transport described in Chapter 7: Traffic and Transportation), but more specifically, Part 8 of the NPPF relates to promoting healthy and safe communities. It states that:

“Planning policies and decisions should aim to achieve healthy, inclusive and safe places which promote social interaction [...], are safe and accessible [...] and enable and support healthy lifestyles.”

Local Planning Policy

- 16.2.12 Local planning policy relevant to health is as described in chapters on emissions to air (Chapter 6: Air Quality), traffic (Chapter 7: Traffic and Transport), noise and vibration (Chapter 8: Noise and Vibration), emissions to water (Chapter 12: Surface Water, Flood Risk and Drainage), land quality/ contamination (Chapter 11: Ground Conditions and Hydrogeology) and socio-economics (Chapter 14: Socio-Economics).
- 16.2.13 There are no local policies requiring health impact assessment on a project specific level.

Other Guidance

- 16.2.14 To prevent the known effects of EMF, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) developed health protection guidelines in 1998 (Ref 16-4) for both public and occupational exposure which have been taken into account in assessing the potential for health effects related to EMF.

16.3 Assessment Methodology and Significance Criteria

- 16.3.1 As outlined above, with the exception of effects relating to EMF, this chapter only ‘signposts’ health-related effects described elsewhere in the ES.
- 16.3.2 The methodologies for these assessments, including identification of receptors and their sensitivity, identification of impacts and their magnitude, and assessment of effects, are set out in the relevant technical chapters.
- 16.3.3 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 – slight, 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.
- 16.3.4 For the purposes of this assessment, moderate and major effects are deemed ‘significant’.

Electromagnetic Fields

- 16.3.5 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 (ES Volume III, Appendix 1B – Application Document Ref 6.4) (see Consultation section below). The Electric and Magnetic Fields and Health website 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.

16.3.6 The associated reference levels are summarised in Table 16.1 below.

Table 16.1: ICNIRP 1988 electric and magnetic fields reference levels

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

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

16.3.7 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 either considered to be significant or not significant.

Extent of Study Area

16.3.8 The definition of the Study Area relevant to each of the health-related assessments in Chapters 6: Air Quality, 7: Traffic and Transport, 8: Noise and Vibration, 11: Ground Conditions and Hydrogeology, 12: Surface Water, Flood Risk and Drainage, and 14: Socio-Economics are set out in each chapter. The study areas are a function of the nature of the impacts and the locations of potentially affected receptors.

16.3.9 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 14: Socio-Economics.

16.3.10 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 North Lincolnshire and surrounding local authorities including, North East Lincolnshire West Lindsey and East Lindsey has 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 North Lincolnshire (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 or inequalities can be more readily identified.

16.3.11 To determine the study area in respect of EMF, it is necessary to consider where exposure to EMF is likely, considering the Proposed Development. EMF comprises electric and magnetic fields, the magnitude of which is defined by the design characteristics of the sources. It is recognised that there are potential health impacts associated with electrical and magnetic fields around substations and the connecting cables and power lines.

16.3.12 As described in Chapter 4: The Proposed Development, the Proposed Development will comprise an electrical connection (the ‘Electrical Connection’) of up to 400 kilovolts and associated controls systems. The Electrical Connection would comprise either overhead or below ground cables, or a combination of both with a total length of approximately 300m, running between the OCGT Power Station Site and the substation on the Existing VPI CHP Plant Site. No new off-site overhead or underground transmission lines are

required as a result of the Proposed Development; the existing infrastructure will be utilised.

- 16.3.13 The DECC voluntary Code of Practice on compliance with EMF guidelines (Ref 16-5) advises that the Energy Networks Association 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 implemented through the industry website (www.emfs.info).
- 16.3.14 The usual way of expressing the field from an EMF source, and thereby determining the potential exposure area, is to show how the field reduces with distance. For sub stations where 275kV lines (or larger) are switched and electricity is transformed down to a lower voltage, it is reported that a receptor would need to be within metres or perhaps tens of metres of the perimeter to receive an elevated field (www.emfs.info). As the National Grid substation already exists, there will be no new EMF effects associated with its use for the Proposed Development, nor are there any potentially sensitive receptors within tens of metres of the existing sub-station to which the Proposed Development is to connect; the nearest receptor would be a single residential property on Marsh Lane approximately 325m east of the Site.
- 16.3.15 To adopt a conservative approach, the study area in respect of the cables has been set at a 50m linear distance from the centre line of the cables (the EMF Study Area). As above, there are no potentially sensitive receptors within the EMF Study Area; the nearest receptor would be a single residential property on Marsh Lane approximately 325m east of the Site.

Sources of Information and Data

- 16.3.16 The data sources and methods used in surveys are set out in each of the chapters on emissions to air (Chapter 6: Air Quality), traffic (Chapter 7: Traffic and Transport), noise and vibration (Chapter 8: Noise and Vibration), emissions to water (Chapter 12: Surface Water, Flood Risk and Drainage), land quality/ contamination (Chapter 11: Ground Conditions and Hydrogeology) and socio-economics (Chapter 14: Socio-Economics).
- 16.3.17 The health profiles produced annually by PHE have been utilised in the assessment. Data for 2018 has been used, representing the most up to date information (Ref 16-6). Furthermore, data on five indicators of mental health has been sourced for the relevant Clinical Commissioning Areas in order to determine the baseline status of the population in this respect.

16.4 Consultation

- 16.4.1 The consultation undertaken with statutory consultees to inform this Chapter is summarised in Table 16.2 below.

Table 16.2: Consultation Summary Table

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
Secretary of State (SoS)	July 2018 (Scoping Opinion)	The residential receptors that will be assessed are listed in paragraph 2.3 of the Scoping Report. The aspect chapter has not provided justification for why these receptors have been chosen or the precise location for each of the receptors. The methodology used to determine the receptors as well as a concise description of their locations should be included within the ES. For greater clarity the Applicant may consider presenting the receptors on a figure within the ES.	The receptors identified for the assessment are detailed in Table 6.12 of Chapter 6: Air Quality and are shown in Figure 6.1 (ES Volume II, Application Document Ref. 6.3).
		The baseline conditions are described with reference to one air quality monitoring station measuring NO ₂ , SO ₂ and PM ₁₀ which is located in South Killingholme. The Applicant should ensure that the baseline data is representative of the entire study area and is applicable for the extent of the impacts likely to result in significant effects.	Justification of the background air quality used in the assessment, to represent the study area, is detailed in Section 6.8 (Chapter 6: Air Quality). A review of available data has been carried out, with the chosen baseline concentrations justified in the context of this assessment.
SoS	July 2018 (Scoping Opinion)	Section 6.2.14 states that an assessment of Human Health Risk Assessment (HHRA) is not required due to the Proposed Development meeting the Air Quality Strategy objectives. The Inspectorate does not consider it necessary for the ES to include a stand-alone Health aspect chapter but does consider that an HHRA should be assessed under relevant aspect chapters where significant effects are likely. To support the reader and provide clarity the ES should contain a table which cross-references to where the relevant information and assessment of human health is located	This Chapter - separate to other chapters - has been prepared in response to Public Health England

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
PHE	July 2018 (Scoping Opinion)	We understand that the promoter will wish to avoid unnecessary duplication and that many issues including air quality, emissions to water, waste, contaminated land etc. will be covered elsewhere in the ES. We believe the summation of relevant issues into a specific section of the report provides a focus which ensures that public health is given adequate consideration. The section should summarise key information, risk assessments, proposed mitigation measures, conclusions and residual impacts, relating to human health. Compliance with the requirements of National Policy Statements and relevant guidance and standards should also be highlighted.	The equivalent Chapter within the Preliminary Environmental Information (PEI) Report was prepared to meet these requirements and is retained within this Chapter.
		The proposer should confirm either that the proposed development does include or impact upon any potential sources of EMF; or ensure that an adequate assessment of the possible impacts is undertaken and included in the ES.	An assessment of the impacts of EMF was prepared as part of the equivalent Chapter within the PEI Report and is retained within this Chapter.
	December 2018 (Stage 2/ PEI consultation)	We have reviewed the PEIR and can confirm that we are broadly satisfied with the approach taken in preparing this report. With respect to potential emissions to air from the proposed development, air quality modelling indicates that worst case short and long-term impacts will be insignificant at all identified residential receptors.	Not Applicable
		We note that environmental impacts and controls during both the construction and decommissioning phases have only been outlined in the supporting documentation. However, it is noted that the developer will prepare Environmental Management Plans in due course. These documents will detail control measures that are intended to reduce environmental impacts during these (i.e. construction and decommissioning) phases of the development.	Environmental impacts will be controlled through the use of Environmental Management Plans. An Outline Construction Environmental Management Plan (CEMP) is included with this ES (See Appendix 4A ES Volume III (Document Reference 6.4)).

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
		With respect to the submitted information, we are satisfied that the development's potential impacts on environmental public health have been adequately addressed at this stage and, where necessary, suitable mitigation has been proposed.	Not applicable.
North Lincolnshire Council	December 2018 (Stage 2/ PEI consultation)	Air Quality Confirmed agreement to the approach to the assessment of air quality impacts.	Not Applicable
		Noise and Vibration It is considered that noise from construction operations can be adequately mitigated via an acceptable CEMP. A requirement is suggested to limit the operational noise of the plant as measured from the nearest residential property, Hazeldene, Marsh Road.	As per Chapter 8: Noise and Vibration of this ES, and summarised within this Chapter. A framework CEMP has been drafted and suitable requirements are contained within the DCO Appendix 4A (ES Volume III, Application Document Ref.6.4).
		Contamination In respect to human health chemical analysis of soil samples did not identify elevated concentrations of contamination. Trace values (<0.001%) of asbestos (chrysotile) were identified in a number of soil samples. The report has concluded that no significant risk to human health is present and an appropriate CEMP and use of standard PPE will provide sufficient protection to ground workers coming into contact with soil. No further remediation is proposed.	Not Applicable

16.4.2 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 (Chapters 6: Air Quality, 7: Traffic and Transport, 8: Noise and Vibration, 11: Ground Conditions and Hydrogeology, 12: Surface Water, Flood Risk and Drainage, and 14: Socio-Economics).

16.5 Changes Since the Preliminary Environmental Information (PEI) Report

16.5.1 The changes in the Proposed Development since the publication of the PEI Report are presented in Chapter 4: Proposed Development. It is not considered that the changes described in that Chapter have any effect on this assessment.

16.6 Use of the Rochdale Envelope

16.6.1 A focussed use of the Rochdale Envelope approach has been adopted to present a worst case assessment of potential environmental effects of the different parameters of the Proposed Development that cannot yet be fixed. The parameters included within the Rochdale Envelope are described in Chapter 4: Proposed Development.

16.6.2 Changes within the parameters described are not considered to have any effect on this assessment.

16.7 Baseline Conditions

Existing Baseline

16.7.1 This section considers the community profile in the study area (as defined for the socio-economics assessment in Chapter 14: Socio-Economics) including the current physical and mental health status of the population.

Public Health

16.7.2 The distribution of the existing local population within a 2km study area has been described earlier in this ES (see Chapter 3: Description of the Site).

16.7.3 Health profiles produced annually 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 profiles for 2018 have been obtained for the local authority area of North Lincolnshire, within which the Site is located, as well as those for surrounding local authorities including North East Lincolnshire, West Lindsey and East Lindsey (Ref 16-6). These predominantly report data for the 2012 – 2014 period. In the absence of more recent published data, these are assumed to represent the 'current baseline'.

16.7.4 These show that the North Lincolnshire area has a population of 171,000. The average life expectancy for people living within North Lincolnshire and the surrounding local authorities varies when compared to the national average (see Table 16.3).

Table 16.3: Life Expectancy and Health Inequalities in the Surrounding Local Authority Areas

Location	Population	Female average (years) ¹	Male average (years) ¹	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	55,268,067	83.1	79.5			
North Lincolnshire	171,000	82.6	78.9	8.3	9.8	9.1
North East Lincolnshire	160,000	84.2	80.0	7.7	12.3	10
East Lindsey	139,000	82.2	78.7	5.4	7.3	6.4
West Lindsey	94,000	84.2	80.0	6.9	7.0	7

¹values at birth (2014-2016) sourced from the Health Profile for the individual local authority

16.7.5 Both the male and female life expectancy values for West Lindsey and North East Lincolnshire are equal to or better than the average life expectancy for males and females in England as a whole. However, by contrast, the average life expectancy for males and females in North Lincolnshire and East Lindsey are lower than the national average.

Table 16.4: Baseline mortality rates within local authority areas in the vicinity of the Proposed Development

Community	Infant Deaths ^a	Road Injuries and Deaths ^b	Suicide Rate ^c	Early Deaths: Cardiovascular ^d	Early Death: Cancer ^b	Excess Winter Death ^e
England	3.9	39.7	9.9	73.5	136.8	17.9
North East Lincolnshire	3.0	45.3	9.9	91.4	165.6	18.4
North Lincolnshire	3.7	54.4	7.5	78.4	149.3	19.7
East Lindsey	2.0	72.8	13.0	90.7	147.2	12.3
West Lindsey	4.1	67.9	9.1	74.9	123.2	13.6

^a rate per 1,000 live births 2014-2016 sourced from the Health Profile for the individual local authority.

^b values expressed as per 100,000 population

^c values expressed as per 100,000 population (aged 10+)

^d values expressed as per 100,000 population age 35+

^e ratio of excess winter deaths to average non-winter deaths Aug 11 – Jul 14.

- 16.7.6 Within each local authority, health inequalities exist, marked by the variance in life expectancy for men and women in the most deprived, compared to the least deprived areas. Data available on health inequalities is reported in
- 16.7.7 Table **16.4** above.
- 16.7.8 The most deprived areas within the North East Lincolnshire administrative area have an average life expectancy that is 12.3 years shorter for men in the least deprived areas compared to the most deprived areas. The equivalent difference for women is 7.7 years. By contrast, the differences in life expectancy between the least and most deprived areas of East Lindsey are 5.4 years for females and 7.3 years for males, which indicate that health inequalities are slightly less apparent in East Lindsey, compared to the authority of North East Lincolnshire. Health inequalities for females within North Lincolnshire, within which the Proposed Development would be located, are illustrated by the highest difference in life expectancy (8.3 years) between the least deprived and most deprived areas.
- 16.7.9 Various factors contribute to mortality and indices are reported for eight 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 above.
- 16.7.10 The health outcomes for people, when compared with the England average, show that the local authority areas considered above, with the exception of West Lindsey, have a lower infant mortality rate. All of the local authority areas have a rate of road injuries and deaths higher than the England average. The rate within North Lincolnshire is lower when compared to most surrounding local authority areas (other than North East Lincolnshire). However, North East Lincolnshire has a comparatively high early death rate for cardiovascular and cancer reasons and also (with North Lincolnshire) a high rate of excess winter deaths, often cause by fuel poverty.
- 16.7.11 A topic specific review of the health indicators within the local population is undertaken for administrative areas by Joint Strategic Needs Authorities. The North East Lincolnshire Public Health Annual Report was published in 2016 (Ref 16-7). This report largely confirms the data reported above. Additional data relating to non-mortality indices of health is presented in the report, including the prevalence of diabetes and chronic kidney disease. This showed the prevalence of both diseases as higher for North East Lincolnshire than the national average.
- 16.7.12 The North Lincolnshire Public Health Annual Report was published in 2017 (Ref 16-8). This report notes that life expectancy within North Lincolnshire is rising (contrary to “*recent regional and national trends*”) and that the differences in health outcomes between men and women is narrowing. The report acknowledges the health inequalities highlighted in Table 16.3 above and that “*residents continue to experience the impact of higher rates of smoking and high rates of employment in heavy industry.*”

Mental Health

- 16.7.13 The Proposed Development is located within the North Lincolnshire Clinical Commissioning Group. Data published on mental health within this, and surrounding Clinical Commissioning Group areas, is provided in Table 16.5 below (PHE, 2018). Where a dash is included, no data is recorded.

Table 16.5: Clinical Commissioning Group Report on Common Mental Health Disorders

Clinical Commissioning Group	Socio-economic deprivation overall indices of multiple deprivation Score	People estimated to have any common mental health disorder (%)	Long term mental health problems among GP survey respondents (%) ¹
England	21.8	16.1	5.7
North East Lincolnshire	-	34.3	4.7
North Lincolnshire	-	14.6	5.0
Lincolnshire East	26.3	5.3	7.0
Lincolnshire West	20.7	8.4	6.6

¹ Estimated % of population aged 16-74

16.7.14 This table shows that common mental health disorders and long term mental health problems are experienced at a rate lower than the average for England. The rate for North East Lincolnshire is significantly higher than national average in regards to the number of people estimated to have mental health disorders, but is lower for longer-term mental health problems. Whilst percentages of long term metal health problems in North East Lincolnshire are broadly in line with neighbouring Clinical Commissioning Groups, those estimated to have common mental health disorders are significant higher.

Future Baseline

16.7.15 Future baseline conditions are predicted for each topic in the relevant technical chapters of this ES, whereby the conditions anticipated to prevail if the Proposed Development was not to be progressed are identified for comparison 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 6: Air Quality.

16.7.16 Chapter 14: Socio-Economics assesses that population growth in the Direct Impact Area is expected to be positive up to 2041, albeit at a slower percentage than the wider area or national averages (0.19% compared to 0.32% and 0.27%, respectively). This growth in the Direct Impact Area will be driven by the 65+ age bracket, with projections of young (0 to 15 years) and the working age (16 to 64 years) projected to decline to 2041.

Public Health

16.7.17 Changes to public health and inequalities are not straight forward to predict. The North Lincolnshire Council Health and Wellbeing Board have identified the following key priorities in their Joint Strategic Assessment of Health and Wellbeing (2018, Ref 16-9):

- People live work and socialise in healthy places;
- Healthy lifestyles are the norm;
- Children have the best start in life and thrive;
- People live well for longer and enjoy good mental wellbeing;
- People age well and are enabled to live independently in the community; and
- People get the right care and support at the right time.

- 16.7.18 No specific predictions for future baseline public health are available for the local area. However, the King's Fund (www.kingsfund.org.uk/time-to-think-differently/trends) 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.
- 16.7.19 The King's Fund reports that 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.
- 16.7.20 The King's Fund 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 states that many diseases will be easier to treat.
- 16.7.21 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.
- 16.7.22 On this basis, future baseline conditions in 2019 - 2022 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.
- 16.7.23 Future baseline conditions in 2037 for public health are expected to include improved healthy life expectancy (based on the Kings Fund predictions), but with a large number of potential factors influencing public health, this cannot be quantified for the study areas relevant to this chapter, as set out above.

Mental Health

- 16.7.24 The North Lincolnshire Clinical Commissioning Group has prepared a plan to better engage and help young people with matters to mental health. The North Lincolnshire Children and Young People's Emotional Health and Wellbeing Transformation Plan (2015 – 2020, Ref 16-10) sets out the following themes for the changes considered to be required to meet the mental health needs of children and young people:
- Promoting resilience, prevention and early intervention;
 - Improving access to effective support – a system without tiers;
 - Caring for the most vulnerable;
 - Improving accountability and transparency; and
 - Developing the workforce.
- 16.7.25 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.

- 16.7.26 It states that adult mental health has remained relatively stable over the last 20 years. 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.
- 16.7.27 Future baseline conditions in 2019 - 2022 for mental health are not anticipated to be significantly different to the existing baseline conditions.
- 16.7.28 If economic uncertainty prevails, there is the potential for prevalence of mental health conditions to increase by 2041, whereas if there is a greater increase in economic security, the prevalence of mental health conditions may decrease by 2041.

16.8 Operational Plant

- 16.8.1 As described in Chapter 6: Air Quality, the Proposed Development will be designed such that process emissions to air comply with the Emission Limit Values specified in the Industrial Emissions Directive and this will be enforced by the Environment Agency through an Environmental Permit required for the operation of the generating station.
- 16.8.2 Selecting the Site adjacent to existing infrastructure (including the Existing VPI CHP Plant and the Total Lindsey Oil Refinery (TLOR)) rather than an alternative site, avoids the Proposed Development being located within closer proximity to residential receptors where the significance of the potential human health impacts might otherwise increase. The selection of the location of the Proposed Development together with the various measures to be implemented as described in the other relevant chapters of this ES would ensure that the impacts on the health of the local population have been minimised as far as practicable.
- 16.8.3 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. As set out in the ICNIRP Guidelines (ICNIRP, 1988), the occupationally EMF-exposed population will consist of adults who are generally exposed under known conditions and are trained to be aware of potential risk and to take appropriate precautions.
- 16.8.4 Measures for the protection of workers from potential EMF effects include engineering and administrative controls, personal protection programmes, and medical surveillance in accordance with the relevant legislation and guidance.
- 16.8.5 Appropriate protective measures will be implemented if exposure in the workplace is predicted to result in the basic restrictions set out within ICNIRP Guidelines (ICNIRP, 1988) being exceeded.

16.9 Likely Impacts and Effects

- 16.9.1 Potential impacts and effects from the Proposed Development relating to human health that have been identified in the various chapters of the ES include:
- Emissions to air, which may affect air quality with consequential health effects (see Chapter 6: Air Quality), but such effects will be mitigated through technology

selection, appropriate stack design and emissions control (as part of the implementation of Best Available Techniques for the Proposed Development as required by the Environmental Permitting (England and Wales) Regulations 2017 (as amended)) so as to be not significant on human health;

- Increases in traffic, which may cause severance of communities, reduction in pedestrian amenity, increase in fear and intimidation, and reduction in highway safety although significant effects are not predicted based on the volume of traffic required for the construction of the Proposed Development (see Chapter 7: Traffic and Transportation) and through the use of appropriate travel plans for construction workers and HGVs;
- Noise emissions, which may result in adverse effects on nearby sensitive receptors (see Chapter 8: Noise and Vibration) without adequate mitigation such as use of enclosures, design of plant and controlling night time construction working. As stated in Chapter 8: Noise and Vibration, the residual noise effects of the Proposed Development will be of negligible significance;
- Land contamination or mobilisation of existing land contaminants, which may result in human contact and associated adverse health impacts (see Chapter 11: Ground Conditions and Hydrogeology) unless correctly identified and managed during construction of the Proposed Development. As stated in Chapter 11: Ground Conditions and Hydrogeology, the potential geological, hydrogeological and contamination related impacts associated with the Proposed Development are likely to be negligible or minor adverse, and therefore not significant;
- Emissions to water, which may result in adverse effects on local water quality with potential consequential adverse health effects (see Chapter 12: Surface Water, Flood Risk and Drainage) unless embedded design measures prevent contamination of water resources. As stated in Chapter 12: Surface Water, Flood Risk and Drainage, the residual effects on the key receptors have been assessed as minor to negligible adverse, and therefore not significant; and
- Creation of employment opportunities, with beneficial health impacts (see Chapter 14: Socio-Economics).

EMF-related Effects

16.9.2 The Proposed Development has the potential for differential rather than whole population impacts associated with EMF. Within the conservative EMF Study Area around the Electrical Connection, no residential receptors are present and none are anticipated to be present in the future baseline. As such, the only potential exposure to EMF arises for construction workers and operational staff and no significant health effect is predicted for the general public.

16.9.3 Measures will be implemented to protect construction workers and operational staff from potential EMF effects associated with the existing substation and the electrical cable in accordance with the appropriate legislation and guidance. With the appropriate precautions in place, no significant health effects in the medium to long-term for construction workers or operational staff are predicted.

16.10 Mitigation and Enhancement Measures

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

16.11 Limitations or Difficulties

16.11.1 No significant limitations or difficulties have been identified in the preparation of this chapter.

16.12 Residual Effects and Conclusions

16.12.1 No significant EMF-related health effects have been identified. All other health-related effects are described in Chapters 6: Air Quality, 7: Traffic and Transport, 8: Noise and Vibration, 11: Ground Conditions and Hydrogeology, 12: Surface Water, Flood Risk and Drainage, and 14: Socio-Economics.

16.13 References

- Ref 16-1 Department of Energy and Climate Change (2011) Overarching National Policy Statement for Energy (EN-1).
- Ref 16-2 Department of Energy and Climate Change (2011) National Policy Statement for Electricity Networks (EN-5).
- Ref 16-3 Ministry of Housing, Communities and Local Government (2018) National Planning Policy Framework ('NPPF')
- Ref 16-4 International Commission on Non-Ionising Radiation Protection (1988) Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz).
- Ref 16-5 Department of Energy and Climate Change (2012) Power Lines: Demonstrating compliance with EMF public exposure guidelines - A Voluntary Code of Practice.
- Ref 16-6 Public Health England (2018) Public Health Profiles and Mental Health Profiles. Available from: <http://fingertips.phe.org.uk/profile/health-profiles>
<http://fingertips.phe.org.uk/profile-group/mental-health/profile/cmhp> [accessed October 2018]
- Ref 16-7 North East Lincolnshire Clinical Commissioning Group, Public Health Annual Report (2016). Ageing Well in North East Lincolnshire.
- Ref 16-8 North Lincolnshire A snapshot of our people and place, Director of Public Health Annual Report (2017).
- Ref 16-9 Joint Strategic Assessment of Health and Wellbeing in North Lincolnshire, North Lincolnshire Health and Wellbeing Board (2018).
- Ref 16-10 North Lincolnshire Children and Young People's Emotional Health and Wellbeing Transformation Plan 2015 –2020.