## CONTENTS



## TABLES

# 18.0 HUMAN HEALTH

## 18.1 Introduction

18.1.1 This chapter of the Environmental Statement (ES) addresses the potential effects of the Proposed Development on human health. This chapter provides an overview, highlighting key aspects of the technical assessments completed and presented elsewhere in the ES that are relevant to human health.

18.1.2 This chapter also includes baseline health related data to inform the overall conclusions of the chapter, and presents information on potential electromagnetic field (EMF) health effects from electricity cables and substations associated with the Proposed Development, which are not covered elsewhere in the ES.

## 18.2 Legislation and Planning Policy Context

Legislative Background

18.2.1 Section 5(2)(a) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 includes a requirement that the EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of a proposed development on population and human health.

18.2.2 The effects on health that have been considered in this ES relate primarily to those arising from emissions to air (Chapter 7: Air Quality), noise and vibration (Chapter 8: Noise and Vibration), traffic and transport (Chapter 9: Traffic and Transport), land quality/ contamination (Chapter 12: Geology, Hydrogeology and Land Contamination), emissions to water (Chapter 14: Water Resources, Flood Risk and Drainage), and socio-economics (Chapter 15: Socio-Economics). The relevant legislation relating to each of these topics is presented in the respective chapters for these disciplines.

18.2.3 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 Context

*National Planning Policy*

18.2.4 Planning policy related to air quality, noise and vibration, traffic and transport, land quality, water quality, and socio-economics is presented in the relevant technical chapters (Chapters 7, 8, 9, 12, 14 and 15). Key issues in the National Policy Statements (NPS) relating to health are summarised below.

18.2.5 The Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011a) describes the 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."* (paragraph 1.7.2)

18.2.6 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."* (paragraph 1.7.3)

18.2.7 Section 4.13 of EN-1 makes it 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."* (paragraph 4.13.1)

18.2.8 The NPS for Electricity Networks Infrastructure (EN-5) (Department for Energy and Climate Change (DECC), 2011b) although of limited relevance to the determination of the Application, provides specific policy in relation to 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."* (paragraph 2.10.2)

18.2.9 NPS EN-5 refers to health protection guidelines for public and occupational exposure. These are discussed below (see 'Other Guidance').

18.2.10 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2019) contains policies that are relevant at a national level and are supported and expanded upon by the 'Planning Practice Guidance', which is regularly updated. These are described within other health-related ES technical chapters, where relevant.

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

18.2.12 Paragraph 91 of the NPPF outlines that the planning system should aim to achieve healthy, inclusive and safe places that are designed to promote social interactions, are safe and accessible and enable and support healthy lifestyles. 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*

18.2.13 Local planning policy relevant to health is as described in Chapter 7: Air Quality, Chapter 8: Noise and Vibration, Chapter 9: Traffic and Transport, Chapter 12: Geology, Hydrogeology and Land Contamination, Chapter 14: Water Resources, Flood Risk and Drainage, and Chapter 15: Socio-Economics.

18.2.14 There are no local policies requiring health impact assessment on a project specific level.

Other Guidance

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

18.2.16 The Department of Energy and Climate Change (DECC) Voluntary Code of Practice on compliance with EMF guidelines (DECC, 2012) sets out the Government's policy requiring electricity cables and substations to be designed to comply with relevant exposure limits, as defined by the ICNIRP guidelines (1998).

## 18.3 Assessment Methodology and Significance Criteria

Impact Assessment and Significance Criteria

18.3.1 With the exception of effects relating to EMF, this chapter summarises health-related effects described elsewhere in Volume I and Volume III of the ES (Document Refs. 6.2 and 6.4 respectively).

18.3.2 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 or ES appendices (e.g. ES Volume III, Appendix 7B: Human Health Risk Assessment).

18.3.3 Standardised terminology is used to describe the relative significance of effects throughout the 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; or
- neutral – imperceptible effects to a receptor group; and
- 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.

18.3.4 As outlined in Chapter 2: Assessment Methodology for the purposes of this assessment, moderate and major effects are deemed 'significant'.

Electromagnetic Fields Assessment Methodology

18.3.5 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 (Appendix 1B, ES Volume III, Application Document Ref. 6.4) (see Consultation section below). The Electric and Magnetic Fields and Health website (www.emfs.info) 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.

18.3.6 The associated reference levels are summarised in Table 18.1 below.

**Table 18.1: ICNIRP (1998) 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 |

18.3.7 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 judgment.

Assessment Scenarios and Parameters

18.3.8 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: The Proposed Development.

Extent of Study Area

18.3.9 The definition of the Study Area relevant to each of the health-related assessments in Chapter 7: Air Quality, Chapter 8: Noise and Vibration, Chapter 9: Traffic and Transport, Chapter 12: Geology, Hydrology and Land Contamination, Chapter 14: Water Resources, Flood Risk and Drainage, and Chapter 15: Socio-Economics are set out in each chapter. The Study Areas are a function of the nature of the potential impacts and the locations of potentially affected receptors.

18.3.10 Baseline data regarding the health of the local population is provided (see Section 18.4) for the largest of these Study Areas (the air quality Study Area, which is 10 km around the Site, and the socio-economics Study Area, defined by the Grimsby Travel to Work Area, which includes Grismby, Cleethorpes and Immingham (see Plate 15.2 in Chapter 15: Socio-Economics)), with comparison to the whole of England.

18.3.11 PHE health profile data for North East Lincolnshire and surrounding local authorities including North Lincolnshire, East Lindsey, West Lindsey and East Riding of Yorkshire 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, but this allows data for North East Lincolnshire (within which the Site is located and therefore 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.

18.3.12 To determine the Study Area in respect of EMF, it is necessary to consider where exposure to EMF is possible, 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.

18.3.13 As described in Chapter 4: The Proposed Development, the Proposed Development includes an electrical switchyard with generator transformers (substation) located within the Main Development Area, and electrical cables will be required to connect to either the National Grid Electrical Transmission (NGET) system or the Northern Powergrid local distribution network.

18.3.14 If electricity is exported to the NGET system, the connection will be at the existing South Humber Bank Power Station (SHBPS) 400 kV substation, via an overground (not overhead) or underground connection located within the Site. If electricity is exported to the Northern Powergrid 132 kV local distribution network, this will be via an underground connection to an existing transmission tower located off Site. The cable routes for these two connection options are shown on Figure 17.2 (ES Volume II, Document Ref. 6.3). Electrical connection works outside of the Site, if required (i.e. for a local distribution network connection), do not form part of the Proposed Development, and the statutory undertaker (Northern Powergrid) will rely either on their statutory powers or obtain the relevant consents to undertake the works.

18.3.15 The usual way of expressing the field from an EMF source, and thereby determining the potential exposure area and corresponding study area, is to show how the field reduces with distance. The components of the Proposed Development (and potential associated connection off Site) are considered in turn below.

18.3.16 For substations where 400 kV lines are switched, it is reported that a receptor would need to be within a few metres of the perimeter boundary to receive an elevated field. The SHBPS NGET 400 kV substation already exists, its perimeter wall is located over 45 m from the SHBPS site boundary, and there will be no new EMF effects associated with its continued use for the Proposed Development because the substation will not be extended beyond its existing perimeter wall. The existing NGET 400 kV substation is therefore scoped out of the assessment.

18.3.17 For the smaller proposed new substation, it is reported (www.emfs.info) that the fields will only be elevated within a few metres of its perimeter, but to adopt a conservative approach the Study Area in respect of the proposed new substation has been set at a 100 m radius around the Main Development Area since its location within the Main Development Area is not yet fixed.

18.3.18 In relation to new sections of underground or overground (but not overhead) cables that may connect into the existing NGET substation or to the local distribution network off Site, research (see www.emfs.info) indicates that underground cables do not produce any external electric fields and that ground-level magnetic fields from underground cables fall much more rapidly with distance than those from a corresponding overhead line. However, magnetic

fields can be higher at small distances from the cable and overall, fields reduce to background concentrations at distances of around 20 m. To adopt a conservative approach, the study area in respect of underground cables has been set at a 50 m linear distance from the centreline of the cables.

18.3.19 There are no residential receptors within the EMF study area; the nearest receptor is Poplar Farm (located on South Marsh Road) located approximately 1 km west of the Site and approximately 120 m west of the potential off Site electrical connection point to the local distribution network.

Sources of Information and Data

18.3.20 The data sources and methods used in surveys are set out in Chapter 7: Air Quality, Chapter 8: Noise and Vibration, Chapter 9: Traffic and Transport, Chapter 12: Geology, Hydrogeology and Land Contamination, Chapter 14: Water Resources, Flood Risk and Drainage, and Chapter 15: Socio-Economics.

18.3.21 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 (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.

Consultation

18.3.22 The consultation undertaken with statutory consultees to inform this Chapter is summarised in Table 18.2 below.

**Table 18.2: Consultation Summary**

| CONSULTEE | METHOD OF CONSULT-ATION (DATE) | SUMMARY OF CONSULTEE COMMENTS | SUMMARY OF RESPONSE/ ACTION TAKEN |
|---|---|---|---|
| Planning Inspectorate | EIA Scoping Opinion for the Proposed Development (October 2019) | Section 7.2.25 relates to a Human Health Risk Assessment. PHE stated that the Applicant should ensure that the scope of updated assessments address all the relevant emissions from the Proposed Development which could result in significant effects on human health receptors. | All relevant emissions from the Proposed Development have been assessed within the relevant chapters including Chapter 7: Air Quality and Appendices 7A and 7B (ES Volume III, Document Ref. 6.4); Chapter 8: Noise and Vibration and Appendices 8A-8E (ES Volume III, Document Ref. 6.4); and Chapter 14: Water Resources, Flood Risk and Drainage and Appendices 14A and 14B (ES Volume III, Document Ref. 6.4).<br>In addition, this summary chapter presents a summation of effects on Human Health that have been included in the ES. |
| Public Health England | EIA Scoping Opinion for the Proposed Development (October 2019) | PHE understand that many issues including air quality, emissions to water, waste, contaminated land etc. will be covered elsewhere in the ES. It is recommended | A summation of potential impacts on human health has been prepared to meet these requirements and is contained within this Chapter. |

| | | | |
|---|---|---|---|
| | | that the Applicant provides a summation of relevant issues into a specific section of the report to provide 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 be highlighted. | |
| | | It is noted that the current proposals do not appear to consider possible health impact of | An assessment of the impacts of EMF has been undertaken and is included within this Chapter. |

| | | | |
|---|---|---|---|
| | | Electric and Magnetic Fields (EMF). | |
| Public Health England | S42 consultation response on Preliminary Environmental Information (PEI) Report. (December 2019) | PHE has reviewed the PEI Report and can confirm they are satisfied with the approach taken in preparing the report. | Noted and no additional response required. |
| | | The current submission does not consider any risks or impacts that might arise because of electric and magnetic fields associated with the connection of the proposed generation statement to the National Grid. PHE notes that the connection will fall outside the application for DCO but would prefer to see the assessment included within the application. | An assessment of the impacts of EMF has been undertaken and is included within this chapter. |
| | | The current submission does not include a specific | A summation of potential impacts on human health has been prepared to meet these requirements and is contained within this Chapter. |

| | | | |
|---|---|---|---|
| | | section summarising the potential public health impacts. A summation of relevant issues will ensure that public health is given adequate consideration and due weight in the planning process. Such a section should summarise key information, risk assessments, outline any proposed mitigation and identify any residual impacts or uncertainties. | |
| Health and Safety Executive | S42 consultation response on PEI Report (November 2019), | HSE would not advise against this nationally significant infrastructure project. The presence of hazardous substances on, over or under land at or above set threshold quantities (Controlled Quantities) will probably require | Comments noted and will be taken into account during the detailed design process. The schedule of Other Consents and Licences (Document Ref. 5.4) concludes that HSC is unlikely to be required, but that an application will be prepared if necessary. |

| | | | |
|---|---|---|---|
| | | Hazardous Substances Consent (HSC) | |

18.3.23 For each of the other technical assessments, where effects on health are considered, consultation has been undertaken with the relevant 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 7: Air Quality, Chapter 8: Noise and Vibration, Chapter 9: Traffic and Transport, Chapter 12: Geology, Hydrogeology and Land Contamination, Chapter 14: Water Resources, Flood Risk and Drainage, and Chapter 15: Socio-Economics).

Changes Since the Preliminary Environmental Information (PEI) Report

18.3.24 The PEI Report was published for statutory consultation in October 2019, allowing consultees the opportunity to provide informed comment on the Proposed Development, the assessment process and preliminary findings through a consultation process prior to the finalisation of this ES.

18.3.25 The key changes since the PEI Report was published are summarised in Table 18.3 below.

**Table 18.3: Summary of key changes to Chapter 18 since publication of the PEI Report.**

| SUMMARY OF CHANGE SINCE PEI REPORT | REASON FOR CHANGE | SUMMARY OF CHANGE TO CHAPTER TEXT IN ES |
|---|---|---|
| This chapter was not included within the PEI Report but has now been prepared to provide a summary of human health effects and an assessment of EMF effects. | In response to comments from PHE at EIA Scoping and Section 42 consultation stages of the EIA process. | Not applicable (new chapter since PEI Report). |

## 18.4 Baseline Conditions

Existing Baseline

18.4.1 This section considers the community profile in the Study Area (as defined for the socio-economics assessment in Chapter 15: Socio-Economics) including the current physical and mental health status of the population.

*Public Health*

18.4.2 The distribution of the existing local population within a 2 km Study Area has been described earlier in this ES (see Chapter 3: Description of the Proposed Development Site).

18.4.3 Health profiles produced annually by the Association of Public Health Observatories (APHO), now part of 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 East Lincolnshire, within which the Site is

located, as well as those for surrounding local authority areas including North Lincolnshire, West Lindsey District, East Riding of Yorkshire and Lincolnshire County Council (as the non-metropolitan county authority for the area including West Lindsey District). (North East Lincolnshire Health and Wellbeing Board, 2018). These predominantly report data for the 2016 – 2018 period. In the absence of more recent published data, these are assumed to represent the 'current baseline'.

18.4.4 These data show that the North East Lincolnshire area has a population of 159,821. The average life expectancy for people living within North East Lincolnshire and the surrounding local authorities is shown in Table 18.4, compared to the national average.

**Table 18.4: 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 THE MOST AND LEAST DEPRIVED AREAS (MALE YEARS) | AVERAGE |
|---|---|---|---|---|---|---|
| **England** | **55,977,178** | **83.2** | **79.6** | - | - | - |
| North East Lincolnshire | 159,821 | 82.2 | 77.6 | 9.1 | 13.1 | 11.1 |
| North Lincolnshire | 172,005 | 82.4 | 79.0 | 9.1 | 9.7 | 9.4 |
| West Lindsey | 94,869 | 83.5 | 79.6 | 6.0 | 7.7 | 6.85 |
| East Riding of Yorkshire | 339,614 | 83.8 | 80.1 | 3.8 | 6.3 | 5.05 |
| Lincolnshire | 755,833 | 82.9 | 79.2 | 5.7 | 8.2 | 6.95 |

[1]values at birth (2016-2018) sourced from the Health Profile for the individual local authority

18.4.5 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.

18.4.6 As outlined in Table 18.4, both the male and female life expectancy values for the North East Lincolnshire administrative area are lower than all of the surrounding local authorities and the average life expectancy for England as a whole.

18.4.7 In comparison with the surrounding local authority areas, North East Lincolnshire has a high difference in life expectancy between the most and least deprived areas, with an average of 11.1 years. The difference in life expectancy for females between the most and least deprived areas of North East Lincolnshire is 9.1 years, which is equal to or higher than the surrounding authorities. The difference in life expectancy for males between the most and least deprived areas of North East Lincolnshire is 13.1 years which is higher than all surrounding areas, indicating that health inequalities are more apparent in North East Lincolnshire when compared to the surrounding authority areas.

18.4.8 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 statistics are presented in Table 18.5.

**Table 18.5: 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 (national average)** | **3.9** | **42.6** | **9.6** | **71.7** | **132.3** | **30.1** |
| North East Lincolnshire | 4.85 | 53.6 | 9.63 | 88.2 | 162.6 | 25.2 |
| North Lincolnshire | 3.72 | 64.0 | 9.77 | 72.3 | 144.1 | 31.1 |
| West Lindsey | 3.43 | 94.7 | 11.5 | 70.4 | 128.8 | 38.1 |
| East Riding of Yorkshire | 2.0 | 63.0 | 11.4 | 64.9 | 122.4 | 36.9 |
| Lincolnshire | 3.0 | 67.4 | 10.4 | 78.2 | 132.5 | 33.3 |

*a rate per 1,000 live births 2016-2018 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 <75 yrs*

*e ratio of excess winter deaths to average non-winter deaths Aug 17 – Jul 18.*

18.4.9 The health outcomes for people, when compared with the England average, show that all of local authority areas considered (except East Riding of Yorkshire), have a higher than average infant mortality rate.

18.4.10 All of the local authority areas (except East Riding of Yorkshire), have a rate of road injuries and deaths higher than the England average. However, the rate of road injuries and deaths within North East Lincolnshire is lower when compared with surrounding local authority areas.

18.4.11 North East Lincolnshire also has comparatively low rates of suicide and lower rates of excess winter deaths than surrounding authorities and the England average.

18.4.12 All of the local authority areas have higher early death rates for cardiovascular and cancer reasons compared to the England average, with the exception of West Lindsey and the East Riding of Yorkshire, which has lower than average rates for both.

18.4.13 A topic specific review of the health indicators within the local population is undertaken for administrative areas by Joint Strategic Needs Assessment (JSNA). The North East Lincolnshire Public Health Annual Report was published in 2019 (North East Lincolnshire Council (NELC), 2019). 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 obesity and substance misuse. The prevalence of both is shown as higher for North East Lincolnshire than the national average.

*Mental Health*

18.4.14 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. The latest mental health profiles have been obtained and are provided in Table 18.6. Where a dash is included, no data is recorded.

**Table 18.6: Public Health England 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 (%)[3] |
|---|---|---|---|
| **England (national average)** | **21.8** | **16.9** | **9.9** |
| North East Lincolnshire | 30.9 | 18.1 | 13.8 |
| North Lincolnshire | 21.4 | 16.8 | 9.4 |
| West Lindsey | 19.2 | 15.3 | - |
| East Riding of Yorkshire | 15.8 | 14.4 | 8.3 |
| Lincolnshire | 20.6 | 15.8 | 9.6 |

[1] *IMD 2015*
[2] *Estimated % of population aged 16 and over in 2017*
[3] *Estimated % of population aged 16 and over in 2018/2019*

18.4.15 This table shows that the level of socio-economic deprivation in North East Lincolnshire is higher than the average for England. The number of people estimated to have common mental health problems and long term mental health problems in North East Lincolnshire are also higher than the average for England. North East Lincolnshire has a higher than average percentage of population with common mental health disorders when compared with the England national average and surrounding CCG areas. Similarly, North East Lincolnshire has a higher than average level of long term mental health problems among GP survey respondents when compared to the national average and surrounding CCG areas.

Future Baseline

18.4.16 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 7: Air Quality.

18.4.17 Chapter 15: Socio-Economics assesses that population growth in the Direct Impact Area is expected to reduce slightly up to 2041, with the working aged population reducing. The working aged population is also expected to reduce in

the Wider Impact Area, however, the population figures are expected to increase up to 2041.

*Public Health*

18.4.18 Changes to public health and in health inequalities are not straightforward to predict. The NELC Health and Wellbeing Board have identified the following key priorities in their Joint Strategic Assessment of Health and Wellbeing 2018 (North East Lincolnshire Health and Wellbeing Board, 2018) for all people in North East Lincolnshire to:

- fulfil their potential through skills and learning;
- benefit from sustainable communities;
- enjoy good health and wellbeing;
- enjoy and benefit from a strong economy; and
- feel safe and are safe.

18.4.19 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.

18.4.20 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.

18.4.21 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.

18.4.22 On this basis, future baseline conditions in 2020 - 2023 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.

18.4.23 Future baseline conditions in 2032 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*

18.4.24 North East Lincolnshire's Transformation Plan for Children and Young People's Mental Health and Emotional Wellbeing 2019/2020 (NELC and North East Lincolnshire CCG, 2019) is an additional supplement to the NELC and North East Lincolnshire CCG Future in Mind: Transformation Plan 2015 – 2020 (NELC and North East Lincolnshire CCG, 2015). This plan outlines matters pertaining to mental health and sets out the following themes for changes considered to be required to meet the mental health needs of children and young people:

- promoting resilience, prevention and early intervention for the mental wellbeing of children and young people;
- improving access to effective support;
- care for the most vulnerable;
- accountability and transparency; and
- developing the workforce.

18.4.25 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.

18.4.26 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.

18.4.27 Future baseline conditions in 2020 – 2023 for mental health are not anticipated to be significantly different to the existing baseline conditions.

## 18.5 Development Design and Impact Avoidance

Summary of Health-Related Design and Impact Avoidance Measures Described in Other ES Chapters

18.5.1 The location of the Proposed Development at the existing South Humber Bank Power Station site avoids close proximity to residential receptors and so reduces the potential for human health impacts.

18.5.2 The surrounding area is characterised by a mix of industrial and agricultural land use, with the land immediately surrounding the Site to the south, west and north-west currently in agricultural use with a polymer manufacturing site (Synthomer (UK) Limited) and the NEWLINCS waste management facility both located to the north of the Site beyond South Marsh Road. The closest residential receptors are located approximately 1 km west of the Site.

18.5.3 The Proposed Development incorporates embedded mitigation measures to avoid any significant human health effects. These include, but are not limited to:

- locating the administration block outside designated Health and Safety Executive (HSE) consultation zones;
- determination of the stack height based on air quality modelling;
- process emissions to air comply with the Emission Limit Value (ELV) requirements specified in the Industrial Emissions Directive (IED);
- design and operation of the buildings to control odour;
- measures to reduce traffic through the implementation of a Construction Worker Travel Plan and an Operational Travel Plan (see the Transport Assessment in Appendix 9A (ES Volume III, Document Ref. 6.4);
- adoption of a designated HGV route for construction and operational phases, which will keep HGVs to the strategic and principal road network, avoiding the use of minor roads in residential areas;
- implementation of an appropriate drainage system for foul and surface water;
- pollution prevention measures during construction and operation; and
- operation in compliance with an Environmental Permit regulated by the Environment Agency.

18.5.4 These measures will help to ensure that impacts on the health and well-being of the local population, as well as construction workers and operational staff, are not significant.

Electromagnetic Field Design and Impact Avoidance Measures

18.5.5 As set out in the ICNIRP Guidelines (International Commission on Non-Ionising Radiation Protection, 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.

18.5.6 During the detailed design of works to connect into the existing 400kV substation or 132 kV connection, potential electromagnetic interference effects will be identified and mitigated though 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 of workers and operational staff will be addressed as part of this assessment.

18.5.7 Measures for the protection of workers from potential EMF effects will therefore include risk assessment, engineering and administrative controls, personal protection programmes, and medical surveillance in accordance with the Control of Electromagnetic Fields at Work Regulations 2016 and relevant 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 (International Commission on Non-Ionising Radiation Protection, 1988) being exceeded.

## 18.6 Likely Impacts and Effects

Summary of Health Related Impacts and Effects Assessed in Other ES Chapters

18.6.1 A human health risk assessment is provided at Appendix 7B of ES Volume III (Document Ref. 6.4). The following impacts and effects are predicted:

- the change in annual mean concentrations of particulate matter, nitrogen dioxide and sulphur dioxide, experienced by the population located with 10 km of the Site has been used to estimate effects on the health of the population as a whole (population of 148,000) within the study area. The assessment concluded that predicted impacts associated with emissions of these pollutants do not represent a significant effect when compared to the local baseline health of the population in each local authority area;
- in relation to the quantification of carcinogenic and non-carcinogenic risks to human health from exposure of the local community to emissions of metals (elemental antimony (Sb), arsenic (As), cadmium (Cd), chromium (Cr), mercury (Hg), lead (Pb) and nickel (Ni)) and organic substances (polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/F) congeners and polycyclic aromatic hydrocarbons (PAHs) (benzo[*a*]pyrene (B[a]P), benzo[*a*]athracene (B[a]A), benzo[*b*]fluoranthene (B[b]F) and Chrysene) which are chemicals of potential concern, the assessment concluded that the maximally exposed individuals within North East Lincolnshire and surrounding areas, would not be subject to a significant additional carcinogenic risk or non-carcinogenic hazard as a consequence of being exposed to metals and organic substances emitted to air from the Proposed Development; and
- the magnitude of the impacts predicted from the operation of the Proposed Development on wider social and economic determinants of health (identified by health authorities as priority areas to target) is so minor that the Proposed Development is not considered to represent a significant risk to the health of the local population.

18.6.2 Other potential impacts and effects from the Proposed Development relating to human health that have been identified in the various chapters of the ES and are summarised below.

18.6.3 Emissions to air, which may affect air quality with consequential health effects (see Chapter 7: 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 (BAT) for the Proposed Development as required by the Environmental Permitting (England and Wales) Regulations 2017 (as amended)) as described in Section 18.5 above, so as to be not significant on human health.

18.6.4 Noise emissions, which have the potential to result in adverse health effects on nearby noise sensitive receptors (see Chapter 8: Noise and Vibration). As stated in Chapter 8: Noise and Vibration, a worst-case assessment has been undertaken and the resulting predicted levels fall well below background and ambient noise levels at human NSRs and no significant noise or vibration

effects are predicted to occur as a consequence of the operation of the Proposed Development.

18.6.5 Increases in traffic, which have the potential to cause severance of communities, reduction in pedestrian amenity, increase in fear and intimidation, and reduction in highway safety. Significant effects are not predicted based on the volume of traffic assessed for the construction of the Proposed Development (see Chapter 9: Traffic and Transportation) and through the use of relevant best practice measures, including appropriate travel plans for construction workers and HGVs.

18.6.6 Land contamination or mobilisation of existing soil/ groundwater contaminants, which may, via available pathways, result in human contact and associated adverse health impacts (see Chapter 12: Geology, Hydrogeology and Land Contamination). A range of best practice design and impact avoidance measures are proposed (see Section 12.5 of Chapter 12: Geology, Hydrogeology and Land Contamination) in order to ensure that such risks are appropriately identified and managed during construction, operation and decommissioning of the Proposed Development. With such measures applied, the potential land contamination related impacts on human health associated with the Proposed Development are likely to be negligible or minor adverse, and therefore not significant;

18.6.7 Emissions to water, which have the potential to result in adverse effects on local water quality with potential consequential adverse health effects (see Chapter 14: Water Resources, Flood Risk and Drainage). Taking into account the embedded design measures to prevent contamination of water resources outlined in Chapter 14: Water Resources, Flood Risk and Drainage, the residual effects on the key receptors have been assessed as minor to negligible adverse, and therefore not significant.

18.6.8 Creation of employment opportunities, with significant beneficial effects (see Chapter 15: Socio-Economics). By creating and sustaining employment opportunities for people in North East Lincolnshire, the potential for positive effects on mental health and well-being of individuals (due to aspects including security of employment) is evident.

Electromagnetic Field Related Effects

18.6.9 The Proposed Development has the potential for differential rather than whole population impacts associated with EMF.

18.6.10 In relation to the option to export electricity through underground or overground electrical cables from a new substation to the existing SHBPS NGET 400 kV substation, no residential receptors are present within the study area and none are known to be likely in the future baseline, so there is no potential for significant EMF effects for the general public. Furthermore, as the NGET substation already exists and it will not be extended beyond its existing perimeter wall, which is over 45 m from the SHBPS site boundary, there will be no new EMF effects to the general public associated with its use.

18.6.11 The alternative option, to export electricity through underground electrical cables from a new substation to a local distribution network tower approximately 2 km west of the Site also has no potential for significant EMF effects for the general public. The nearest residential receptor would be Poplar Farm located on South Marsh Road, approximately 120 m east of the existing tower where the connection would be made, 70 m beyond the conservative EMF Study Area. The proposed connection would not bring new electrical cables any closer to this residential property and there is no potential for significant EMF effects for the general public.

18.6.12 As such, the only potential exposure to EMF arises for construction workers and operational staff associated with the Proposed Development and potential off Site electrical connection. As described in Section 18.5, impact avoidance 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 Control of Electromagnetic Fields at Work Regulations 2016. With these measures in place, no significant health effects in the medium to long-term for construction workers or operational staff are predicted.

Comparison of Proposed Development and Consented Development

18.6.13 A comparison of effects of the Proposed Development on air quality, noise and vibration, traffic and transport, land contamination, water quality, and socio-economics, compared to the effects of the Consented Development are detailed in each of the health-related assessments in Chapter 7: Air Quality, Chapter 8: Noise and Vibration, Chapter 9: Traffic and Transport, Chapter 12: Geology, Hydrology and Land Contamination, Chapter 14: Water Resources, Flood Risk and Drainage, and Chapter 15: Socio-Economics. The effects of the Proposed Development are assessed to be the same as the effects of the Consented Development.

18.6.14 The Consented Development has the same options as the Proposed Development for connection to the electricity grid so the EMF effects are also assessed to be the same for both the Consented and Proposed Developments.

## 18.7 Mitigation and Enhancement Measures

18.7.1 Mitigation measures are set out in the relevant technical chapters of this ES.

18.7.2 Impact avoidance measures for the protection of construction workers and operational staff from potential EMF effects are described in Section 18.5.

18.7.3 No additional mitigation has been identified in this chapter.

## 18.8 Limitations or Difficulties

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

## 18.9 Residual Effects and Conclusions

18.9.1 Chapter 7: Air Quality, Chapter 8: Noise and Vibration, Chapter 9: Traffic and Transport, Chapter 12: Geology, Hydrogeology and Land Contamination, Chapter 14: Water Resources, Flood Risk and Drainage, and Chapter 15: Socio-Economics do not identify any significant adverse human health related effects.

18.9.2 Chapter 15: Socio-Economics identifies significant beneficial effects associated with employment generation during construction and operation of the Proposed Development.

18.9.3 No significant EMF-related health effects have been identified.

## 18.10 References

Department of Energy and Climate Change (2011a) *Overarching National Policy Statement for Energy (EN-1)*.

Department of Energy and Climate Change (2011b) *National Policy Statement for Electricity Networks (EN-5).*

Department of Energy and Climate Change (2012) Power Lines: Demonstrating compliance with EMF public exposure guidelines - A Voluntary Code of Practice.

International Commission on Non-Ionizing Radiation Protection (ICNIRP) (1998) *Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz). Published in Health Physics 74(4): 494-522*

Ministry of Housing, Communities and Local Government (2019) *National Planning Policy Framework* ('NPPF')

North East Lincolnshire Council (2019) *A Health Place, Director of Public Health Annual Report 2019*

North East Lincolnshire Council and North East Lincolnshire Clinical Commissioning Group (2015) *Future in Mind: Transformation Plan 2015 – 2020.*

North East Lincolnshire Council and North East Lincolnshire Clinical Commissioning Group (2019) *North East Lincolnshire's Transformation Plan for Children and Young People's Mental Health and Emotional Wellbeing 2019/2020*

North East Lincolnshire Health and Wellbeing Board (2018) *Joint Strategic Assessment of Health and Wellbeing in North East Lincolnshire*

Public Health England (2019) 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 February 2020]