

West Burton C (Gas Fired Generating Station)

Appendix 13A: Human Health

EDF Energy (Thermal Generation) Limited

Project Number: 60527350

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1. Introduction

1.1 Overview

- 1.1.1 This appendix to the Environmental Statement (ES) (Volume I) addresses the potential effects of the Proposed Development on human health. This assessment is predominantly a summary document, highlighting key aspects of the technical assessments completed and presented elsewhere in the ES (Volume I) in so far as they relate to human health. It also presents information on potential electro-magnetic field (EMF) effects, which are not considered in other chapters of the ES (Volume I).
- 1.1.2 No figures are produced specifically for this appendix; rather figures produced for the purposes of other technical chapters of the ES have been referenced. These are provided in ES Volume III.

2. Legislation and Planning Policy Context

2.1 Legislative Background

2.1.1 The effects on health that have been considered in the ES (Volume I) 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: Flood Risk, Hydrology and Water Resources**), waste management (**Chapter 15: Sustainability, Waste and Climate Change**), land quality/contamination (**Chapter 11: Ground Conditions and Hydrogeology**) and socio-economics (**Chapter 13: Socio-Economics**), referred to as the ‘relevant technical chapters’. The relevant legislation relating to each of these technical topics is presented in the respective chapters for these disciplines.

2.2 Planning Policy Context

National Planning Policy

2.2.1 Given that this assessment is predominantly a summary document, the planning policy related to health impacts is presented in each of the technical chapters (Volume I) described above and in **Chapter 5: Legislative Context and Planning Policy Framework**.

2.2.2 The Overarching National Policy Statement for Energy (EN-1) (Ref 13A-1) begins by describing the process of sustainability appraisal that the Policy Statement was subject to. In relation to positive effects of energy policy for health, EN-1 states:

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

(paragraph 1.7.2)

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

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

(paragraph 1.7.3)

2.2.4 Section 4.13 of EN-1 states:

“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)

2.2.5 The NPS also recognises:

“Open spaces, sports and recreational facilities all help to underpin people's quality of life and have a vital role to play in promoting healthy living...Green infrastructure ... a network of multi-functional green spaces, both new and existing, both rural and urban, ... is integral to the health and quality of life of sustainable communities.”
(paragraph 5.10.2)

2.2.6 The National Policy Statement for Electricity Networks Infrastructure (EN-5) (Ref 13A-2), although not the primary NPS for the Proposed Development, 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.”
(paragraph 2.10.2)

2.2.7 The National Planning Policy Framework ('NPPF') (Ref 13A-3) as described in **Chapter 5: Legislative Context and Planning Policy Framework**, contains policies that are relevant at a national level and are expanded upon and supported by the Planning Practice Guidance (PPG) (Ref 13A-6) published in March 2014 and updated on 24 July 2018 (Ref 13A-4).

2.2.8 Paragraph 5 of the current and revised 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, paragraph 5 goes on to confirm that matters that can be considered to be 'relevant' to NSIPs may include the NPPF and the policies within it.

2.2.9 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

2.2.10 Local planning policy relevant to health is as described in the relevant technical chapters in ES Volume I. Although there are no local policies requiring health impact assessment on a project specific level, the Draft Bassetlaw Local Plan (Ref 13A-7) paragraph 3.16 recognises that good planning is crucial to healthy lifestyles and that *‘pursuing sustainable development through effective planning will inherently contribute to the promotion of healthy lifestyles’*.

2.2.11 The document signposts to the county wide strategy ‘Spatial Planning for the Health and Wellbeing of Nottinghamshire’ (Ref 13A-8) which five goals, operating at every level, from the strategic location of new development, down to the specific details of its design and layout; these goals are:

- Responding to global environmental issues.
- Avoiding adverse health impacts from development.
- Providing a healthy living environment.
- Promoting and facilitating healthy lifestyles.
- Providing access to health facilities and services.

2.2.12 The Draft Bassetlaw Local Plan states that *‘the Bassetlaw Plan will address health and wellbeing in a holistic manner, embedding it throughout the vision and strategy for what sustainable development will look like in Bassetlaw’*.

2.3 Other Guidance

2.3.1 To prevent the known effects of EMF, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) developed health protection guidelines in 1988 (Ref 13A-9) for both public and occupational exposure which have been taken into account in assessing the potential for health effects related to EMF.

3. Assessment Methodology and Significance Criteria

3.1 Impact Assessment and Significance Criteria

- 3.1.1 With the exception of effects relating to EMF, this chapter summarises health-related effects described elsewhere in ES Volume I (i.e. the relevant technical chapters).
- 3.1.2 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.
- 3.1.3 Risks associated with EMF have been derived considering the advice provided by Public Health England (PHE) in their response to the Scoping Opinion (**Appendix 1B**, ES Volume II). The Electric and Magnetic Fields and Health (EMFs) website has been used in order to gather information on the EMF risks associated with the types of infrastructure proposed. ICNIRP guidelines (Ref 13A-9) have been used as the reference for the recommended limits of exposure of the general public, following current Government policy.
- 3.1.4 The associated reference levels are summarised in **Table 1**.

Table 1: ICNIRP 1988 electric and magnetic fields reference levels

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

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

- 3.1.5 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.
- 3.1.6 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.

3.1.7 For the purposes of this assessment, moderate and major effects are deemed significant.

3.2 Extent of Study Area

- 3.2.1 The study area relevant to each of the health-related assessments in the relevant technical chapters (Chapters 6-16, ES Volume I) is a function of the nature of the impacts and the locations of potentially affected receptors. The study areas are therefore as reported in each of the technical chapters. The study area also includes receptors including workers/visitors within the West Burton Power Station site.
- 3.2.2 For the definition of the baseline for health of the local population in **Section 13.4**, the study area is as defined for the socio-economics assessment in **Chapter 13: Socio-Economics**.
- 3.2.3 To determine the study area in respect of EMF, it is necessary to consider where exposure to EMF is likely, in relation to 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 switchyards and the connecting cables and power lines.
- 3.2.4 The Proposed Development would comprise an OCGT power station and associated buildings, structures and plant, including new above or below ground electrical cables to connect to the existing 400kV switchyard within West Burton B Power Station (see **Chapter 4: The Proposed Development**).
- 3.2.5 The Department of Energy and Climate Change (DECC) voluntary Code of Practice on compliance with EMF guidelines (Ref 13A-10) advises that the Energy Networks Association will maintain a publicly-available list on its website of types of equipment where the design is such that it is not capable of exceeding the ICNIRP exposure guidelines. This obligation is implemented through the industry website (www.emfs.info), which lists compliant equipment.
- 3.2.6 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 large switchyards where 400kV lines are switched and electricity is transformed down to the next voltage, 132kV, 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).

3.2.7 In relation to the new sections of above or below ground cables that would connect into the existing 400kV switchyard, research suggests 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 20m. To adopt a conservative approach, the study area in respect of both ground level and/or underground cables has been set at a 50m linear distance from the centre line of the proposed electrical connection corridor to the 400kV switchyard, shown on **Figure 4.1a** and **Figure 4.1b** in ES Volume III.

3.3 Sources of Information/Data

3.3.1 The data sources and methods used in surveys are set out in each of the relevant technical chapters.

3.4 Consultation

3.4.1 A summary of consultation undertaken in the preparation of this assessment is set out in **Table 2** below.

Table 2: Consultation summary table

Consultee	Date	Summary of Consultee comments	Summary of Response/ how comments have been addressed
Public Health England (PHE)	(June 2017 EIA Scoping Opinion)	Stated that they: <i>“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.”</i>	This detailed appendix has been provided in response to the comment by PHE. This appendix summarises the health related impacts detailed across all ES technical chapters, with reference to National Policy Statements, guidance and standards.
		PHE also highlighted that assessments undertaken to inform the ES should be	The assessments presented in this ES have been scoped through a formal EIA

Consultee	Date	Summary of Consultee comments	Summary of Response/ how comments have been addressed
		<p>proportionate to the potential impacts of the proposal (with respect to health impacts) and that the rationale for the methodology of assessments (e.g. quantitative vs. qualitative or assessments scoped in vs. scoped out) should be fully explained in the ES.</p>	<p>Scoping process and are considered to be proportionate to the potential effects of the Proposed Development.</p>
		<p>Clarification was also sought on whether consideration would be given to possible health impacts of EMF stating: <i>“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.”</i></p>	<p>Potential EMF effects from the Proposed Development are assessed in this appendix.</p>
<p>Health and Safety Executive (HSE)</p>	<p>October 2017 (Preliminary Environmental Information (PEI) Report Consultation Response)</p>	<p>HSE advise that there are no major accident hazard installations with Hazardous Substances Consent (HSC) that would impact on this infrastructure project.</p> <p>The inner, middle and outer zones surrounding the existing and new gas pipelines need to be considered when “arranging the site layout and any occupied</p>	<p>Comments noted, and will be taken into account during the detailed design process.</p>

Consultee	Date	Summary of Consultee comments	Summary of Response/ how comments have been addressed
		<p>buildings in the vicinity of the pipeline”.</p> <p>A Pipeline Safety Regulations (PSR) Change Notification may be required to install the new gas connection pipeline to the existing WBB gas receiving facility.</p> <p>Hazard Substances Consent would be required to store or use any of the Named Hazardous Substances or Categories of Substances at or above the controlled quantities set out in Schedule 1 of these Regulations.</p>	

3.4.2 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 Scoping Opinion and PEI Report taken into account within the assessments. The consultation outcomes are set out in each of the technical chapters.

Summary of Key Changes to Appendix 13A since publication of the Preliminary Environmental Information (PEI) Report

3.4.3 The PEI Report was published for statutory consultation in September 2017, 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.

3.4.4 The key changes since the PEI Report was published are summarised in **Table 3** below.

Table 3: Summary of key changes to Appendix 13A since publication of the PEI Report

Summary of change since PEI Report	Reason for change	Summary of change to chapter text in the ES
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Summary of change since PEI Report	Reason for change	Summary of change to chapter text in the ES
<p>The 'signposting' document (provided in the PEI Report) has been expanded to include a summary of health-related impacts described in each of the relevant technical chapters in the ES.</p>	<p>To provide an accessible summary of all health-related effects in one appendix of the ES.</p>	<p>Additional information from technical chapters of ES summarised in this health appendix.</p>

4. Baseline Conditions

4.1 Overview

- 4.1.1 The baseline conditions are considered within each of the relevant technical chapters of ES Volume I.

5. Development Design and Impact Avoidance

5.1 Overview

- 5.1.1 **Chapter 4:** The Proposed Development (ES Volume I) describes the measures that have been incorporated in order to ‘design-out’ potential impacts that may affect health.
- 5.1.2 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 (Ref 13A-9), the occupationally EMF-exposed population would consist of adults who are generally exposed under known conditions and are trained to be aware of potential risk and to take appropriate precautions.
- 5.1.3 During the detailed design of works to connect into the existing 400kV switchyard, potential electromagnetic interference effects would be identified and mitigated through the application of electromagnetic compatibility industry accepted practice. In accordance with good safety management principles, risks due to EMI from relevant sources including the switchyard and electrical connections (above or below ground) will be reduced using the ‘as low as reasonably practicable’ (ALARP) principle. EMF exposure to workers and operational staff will be addressed as part of this assessment.
- 5.1.4 As described in **Chapter 6: Air Quality**, emissions of dust and particulates from the construction phase of the Proposed Development would be controlled in accordance with industry best practice, through incorporation of appropriate control measures, according to the risks posed by the activities undertaken, as determined through this assessment process. The management of dust and particulates and application of adequate mitigation measures would be controlled through the CEMP. A Framework CEMP is included as **Application Document Ref. 7.3**. The selected contractor would be encouraged to be a member of the ‘Considerate Constructors Scheme’, which is an initiative open to all contractors undertaking building work, to assist in reducing potential nuisance dust from the Proposed Development.
- 5.1.5 The Proposed Development will be designed such that process emissions to air comply with the Emission Limit Values specified in the Industrial Emissions Directive (Ref 13A-11). This will be enforced by the Environment Agency through an Environmental Permit required for the operation of the generating station.
- 5.1.6 The stack height(s) for the plant will be optimised with consideration given to ground-level air quality impacts. Dispersion modelling has been undertaken to determine the optimum stack height range considering impacts on human health receptors. Further information on the determination of the stack heights is provided in **Appendix 6A: Air Quality (Volume II)**.

- 5.1.7 Appropriate best practice mitigation measures will be applied during any decommissioning works and documented in a Decommissioning Environmental Management Plan (DEMP), secured via a Requirement of the draft DCO (**Application Document Ref 2.1**); no additional mitigation for decommissioning of the Proposed Development beyond such best practice is considered necessary at this stage. The predicted air quality effects of eventual decommissioning of the Proposed Development are considered to be comparable to, or less than those assessed for construction activities.
- 5.1.8 As set out in **Chapter 7: Traffic and Transport**, traffic movements would be controlled during the Proposed Development construction phase in order to minimise potential impacts on the surrounding road network and local villages, namely construction HGVs arriving or departing the West Burton Power Station site would travel to/from the north via the A620 and onwards to the A631. Signage is already in place at the West Burton Power Station site entrance directing HGVs north towards the A620. In addition, a HGV and Abnormal Indivisible Load (AIL) routing plan would be included within a Construction Traffic Management Plan (CTMP) which HGV drivers would be required to adhere to, controlled by a Requirement of the draft DCO.
- 5.1.9 In addition to the above, the Applicant would implement a range of good practice mitigation measures during the construction phase to minimise traffic impacts upon local highways, including:
- implementation of a Construction Workers' Travel Plan (CWTP) aimed at identifying measures and establishing procedures to encourage construction workers to adopt modes of transport (including walking and cycling) which reduce reliance on single occupancy private car use (a Framework CWTP is provided in **Application Document Ref. 7.7**);
 - liaison with the appointed contractor for the potential to implement construction worker minibuses and car sharing options (considered as part of the CWTP); and
 - the contractor would be required to prepare a CTMP to identify a number of measures to control the routing and impact that HGVs would have on the local road network during construction (a Framework CTMP is provided in **Application Document Ref. 7.6**). It is proposed that all construction HGVs would be required to arrive and depart the West Burton Power Station site from the north via the A620 and onwards to the A631 avoiding the village of Sturton-le-Steeple and the bridge height restrictions near Welham on the A620 towards Retford.
- 5.1.10 Once the Proposed Development is operational, up to 15 permanent operational roles would be created of which some are expected to be undertaken by existing West Burton/Cottam Power Station employees.
- 5.1.11 Decommissioning would be expected to require some traffic movements associated with the removal (and recycling, as appropriate) of material arising from

demolition and potentially the import of materials for land restoration and re-instatement. To minimise the impacts of decommissioning upon local highways, it is anticipated that a Decommissioning Traffic Management Plan (DTMP) would be prepared to control the routing and impact of HGVs.

5.1.12 As described in **Chapter 8: Noise and Vibration**, measures to mitigate noise will be implemented during the construction phase of the Proposed Development in order to control impacts at local residential noise sensitive receptors, particularly with respect to activities required outside of core working hours. The appointed contractor(s) will produce a CEMP that would provide details of proposed environmental control measures, including measures related to noise based upon the Framework CEMP included as **Application Document Ref. 7.3**. This would be secured via a Requirement of the draft DCO (**Application Document Ref. 2.1**) and would be submitted to and approved by the local planning authority prior to construction. The appointed contractor will then implement the approved CEMP.

5.1.13 The following best practicable means (BPM) will be applied, as far as reasonably practicable, during construction works to minimise noise (including vibration) at neighbouring residential properties and other sensitive receptors arising from construction activities:

- ensuring that all processes, procedures and measures are in place to minimise noise before works begin and throughout the construction programme;
- all contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2);
- ensuring that noise and vibration is controlled at source (e.g. the selection of quiet and low vibration equipment), review of the construction programme and methodology to consider quieter methods, consideration of the location of equipment on-site and control of working hours;
- use of modern plant, complying with applicable UK noise emission requirements and selection of inherently quiet plant;
- hydraulic techniques for breaking to be used in preference to percussive techniques, where reasonably practicable;
- if piling is required, use of lower noise piling (such as rotary bored or hydraulic jacking) rather than the driven piling techniques where reasonably practicable;
- off-site pre-fabrication where reasonably practical;
- use of screening locally around significant noise producing plant and activities;
- all construction plant and equipment to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use;
- loading and unloading of vehicles, dismantling of site equipment (such as scaffolding) or moving equipment or materials around the Site to be conducted

in such a manner as to minimise noise generation as far as reasonably practical;

- all vehicles used on-site shall incorporate broadband reversing warning devices as opposed to the typical tonal reversing alarms to minimise noise disturbance where reasonably practicable;
- appropriate routing of construction traffic on public roads and along access tracks;
- consultation with BDC and notification to local residents to advise of potential noisy works that are due to take place, especially if outside of core working hours; and
- monitoring of noise complaints and reporting to the contractor for immediate investigation.

5.1.14 Method Statements regarding construction management, traffic management, and overall site management will be prepared in accordance with best practice and relevant British Standards, to help to minimise impacts of construction works. One of the key aims of such Method Statements would be to minimise noise disruption to local residents during the construction phase as far as reasonably practicable.

5.1.15 Consultation and communication with the local community throughout the construction period would serve to publicise the works schedule, giving notification to residents regarding periods when higher levels of noise may occur during specific operations, and providing lines of communication where complaints can be addressed.

5.1.16 A detailed noise assessment would be carried out once the contractor is appointed and further details of construction methods are known, in order to identify specific mitigation measures for the Proposed Development (including construction traffic). It is proposed that the control of noise during construction would be secured via a Requirement of the draft DCO (**Application Document Ref 2.1**) to ensure that noise impacts relating to construction activities are controlled and appropriately monitored during construction.

5.1.17 The Proposed Development would be operated in accordance with an Environmental Permit issued and regulated by the Environment Agency. This will require operational noise from the generating station to be controlled through the use of Best Available Techniques (BAT), which will be determined through the Environmental Permit application. It is proposed that operational noise would also be controlled via a Requirement of the draft DCO (**Application Document Ref 2.1**).

5.1.18 **Chapter 10:** Landscape and Visual Amenity (ES Volume I) describes the proposals to substantially retain existing well established vegetation within the Site and sets out impact avoidance measures that would either be incorporated into the design or are standard construction or operational measures including:

- the selection of finishes for the buildings and other infrastructure would be informed by the finishes of adjacent developments and approved by BDC at the detailed design stage, in order to minimise the visual impact of the Proposed Development as far as reasonably practicable;
- lighting required during the operation stage of the Proposed Development would be designed to avoid excessive glare and minimise unnecessary light spill to nearby receptors, in accordance with the Lighting Strategy (**Application Document Ref. No. 7.4**); and
- the existing vegetation along the Site boundary would be retained and managed to ensure its continued presence to aid the screening of low level views into the Site. This has been incorporated into the Landscaping and Biodiversity Management and Enhancement Plan (**Application Document Ref. 7.5**) which is submitted as part of the Application for development consent.

5.1.19 During construction of the Proposed Development, the contractor(s) would be required to minimise potential adverse land contamination effects on sensitive receptors by implementing good operational practices (e.g. employing suitable surface water drainage control).

5.1.20 Construction workers would be protected from contact with hazardous materials by adopting appropriate health and safety measures including an assessment of appropriate measures under the Control of Substances Hazardous to Health (COSHH) Regulations 2002 (Ref 13A-12). Such measures would include suitable personal protective equipment, hygiene facilities and the implementation of dust control where considered necessary.

5.1.21 With regards to earthworks, the contractor(s) would ensure that all material is suitable for its proposed use and would not result in an increase in contamination-related risks on identified receptors including any landscaped areas and underlying groundwater. The CEMP would include measures to ensure that all materials are suitable for the proposed end use. This may include a Materials Management Plan as an appendix, to deal with any removal of materials off-site.

5.1.22 Given the historical land use within the West Burton Power Station site, there is a potential for contamination to be encountered locally within excavations. The contractor(s) would be required to implement pollution control measures to deal with any land contamination encountered during the construction works. These measures would include, as a minimum, the following:

- all workers would be required to wear PPE as applicable;
- should any potentially contaminated ground, including isolated 'hotspots' of contamination and/or potential deposits of asbestos containing materials (ACM), be encountered during construction, the contractor(s) would be required to investigate the area and then assess whether there is a need for containment or disposal of the material. The contractor(s) would also be

required to assess whether any additional health and safety measures are required. Any such investigations would be required to be undertaken in consultation with the Environment Agency and other appropriate consultees. To further minimise the risks of contaminants being transferred and contaminating other soils or water, construction workers would be briefed as to the possibility of the presence of such materials;

- in the event that contamination is identified during construction works, appropriate remediation measures would be taken to protect construction workers, future site users, water resources, structures and services; and
- the contractor(s) would implement, as required, a dust suppression/management system in order to control the potential risk from airborne contamination migrating off-site to adjacent sites, specifically the adjacent agricultural land, surrounding villages and the River Trent.

5.1.23 Foundations and services would be designed and constructed to prevent the creation of pathways for the migration of contaminants and be constructed of materials that are suitable for the ground conditions and designed use, for example water supply pipes would be designed in accordance with current good practice and applicable guidance to ensure pipes are protected from potential impacts associated with any contamination.

5.1.24 Piling design and construction works would be completed following preparation of a piling risk assessment, completed in accordance with the Environment Agency's '*Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention*' (Ref 13A-11). A piling and penetrative foundation design method statement would be submitted to BDC for approval prior to relevant works commencing; secured by a Requirement of the draft DCO (**Application Document Ref 2.1**).

5.1.25 With the above measures in place and with good housekeeping and management practices adopted and adhered to through compliance with the Environmental Permit, significant impacts to soil and groundwater can be avoided.

5.1.26 The Proposed Development would be subject to decommissioning under the conditions of the Environmental Permit, including conditions relating to chemical/polluting material handling, storage and use and emergency procedures in line with BAT. A detailed Decommissioning Environmental Management Plan (DEMP) would be prepared to identify required measures to prevent pollution during this phase of the Proposed Development, based on the detailed decommissioning plan.

5.1.27 The impact avoidance measures for decommissioning would be similar to those identified above for the construction phase. As above, measures would be in place to prevent pollution in accordance with the permit.

5.1.28 **Chapter 12: Flood Risk, Hydrology and Water Resources** sets out the following measures considered relevant to avoid impacts to human health.

- the Contractor would be required to produce a Flood Risk Management Action Plan/Method Statement which would provide details of the response to an impending flood during construction works and include:
 - a 24 hour availability and ability to mobilise staff in the event of a flood warning;
 - the removal of all plant, machinery and material as far as reasonably practicable from areas liable to flood including periods of any holiday close down;
 - details of the evacuation and site closedown procedures; and
 - arrangements for removing any potentially hazardous material and anything capable of becoming entrained in floodwaters, from the temporary works areas.

5.1.29 During the operational phase of the Proposed Development, the Applicant would subscribe to the Environment Agency's Flood Alert Service in the area.

5.1.30 As a precaution, flood resilience measures would be incorporated into the Proposed Development design to minimise as far as reasonably practicable the amount of damage and reduce the recovery time in the unlikely case of the Site becoming inundated. The following resilience measures have been identified as potential options for inclusion at the Site, subject to final design:

- it is recommended that ground levels across the Proposed Power Plant site are set at a minimum of the 0.1% AEP modelled fluvial flood level to allow for an increase in flood flows under climate change. As such, minimum ground level are to be above the River Trent 1 in 100 year flood level plus a 30% allowance for climate change (i.e. a minimum of 7.10m AOD); and
- inclusion into the existing Power Station's emergency response procedures including the recommendation of at least one Flood Warden for the Proposed Development.

5.1.31 Further details are included within the FRA presented as **Appendix 12A** (ES Volume II).

6. Likely Impacts and Effects

6.1 Overview

6.1.1 This appendix summarises health-related effects described elsewhere in the relevant technical chapters of the ES. The key health impacts for each of these assessment topics are summarised below, followed by the assessment of EMF effects.

6.2 EMF-Related Effects

6.2.1 The Proposed Development has the potential for differential rather than whole population impacts associated with EMF. Within the conservative up to 50m radius study area around the proposed electrical connection to the existing 400kV switchyard, 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.

6.2.2 As set out in **Section 5** (Development Design and Impact Avoidance) measures would be implemented to protect construction workers and operational staff from potential EMF effects associated with the existing switchyard and the associated above or below ground electrical cable if necessary. With the appropriate precautions in place, no significant health effects in the medium to long-term for construction workers or operational staff are predicted.

6.3 Chapter 6: Air Quality

6.3.1 No residential human health receptors have been identified within the study area outlined in **Chapter 6: Air Quality** in relation to effects of construction dust soiling and PM₁₀ impacts, and emissions from non-road mobile machinery (NRMM). On the basis of no relevant receptors within the study area, impacts have been screened out.

6.3.2 Residential receptors (R3, R4, R5, R11) shown on **Figure 6.1** (ES Volume III) along the proposed construction traffic route, which includes the surfaced, private access road, are more than 500m from the construction site exit and therefore beyond the screening distance for trackout effects.

6.3.3 The only identified sensitive receptors identified within the study area are potential transient receptors, such as users of the Public Right of Way (PRoW) along the River Trent (West Burton FP4), within 350m of the north-east Site boundary. However, in accordance with IAQM guidance (Ref 13A-14) and Defra guidance: Local Air Quality Management TG09 (Ref 13A-15), these receptors are identified as low sensitivity; as relevant sensitive locations to particulates are those in which individuals may be exposed for eight hours a day or more. Therefore, such transient receptors are not identified as sensitive for this assessment.

- 6.3.4 In summary, the effects of emissions to air from the construction site activities associated with the Proposed Development on the identified receptors are considered to be not significant, based on application of best practice mitigation measures outlined in the Framework CEMP (**Application Document Ref. 7.3**), and due to the distances to the identified sensitive receptors.
- 6.3.5 Although sulphur dioxide (SO₂), carbon monoxide (CO), benzene and 1,3-butadiene are present in motor vehicle exhaust emissions, and can lead to impacts upon human health, the concentrations of release and the number of vehicles likely to be generated as a consequence of the Proposed Development are not likely to give rise to significant effects. Additionally, no areas within the administrative boundaries of BDC or WLDC are considered to be at risk of exceeding the relevant objectives for these pollutants, and the risks to achievement of the relevant air quality objectives from the Proposed Development are considered negligible.
- 6.3.6 The air quality assessment of impacts at opening has assumed that the Emission Limit Values (ELVs) will be met for the operational plant as required under the Industrial Emissions Directive (IED) and in accordance with use of BAT under the environmental permitting regime. No additional mitigation has been identified as necessary for the opening phase of the Proposed Development. For this reason, the residual effects would be as reported within **Chapter 6: Air Quality** (i.e. not significant).

6.4 Chapter 7: Traffic and Transport

- 6.4.1 The predicted change in total traffic associated with Proposed Development construction activities is considerably less than 30% on each link road (very low impact). Therefore, the severance effect is negligible (not significant).
- 6.4.2 The change in total traffic (or HGV component) is considerably less than 50% on each link road (very low impact). Therefore, the effect for pedestrian amenity is negligible (not significant).
- 6.4.3 The change in total traffic is considerably less than 30% on each link road (very low impact). Therefore, the effect on fear and intimidation is negligible (not significant).
- 6.4.4 Accident data for the most recent five years has been acquired for the study area (see **Chapter 7: Traffic and Transport**). The statistics provide information on the location and severity of each Personal Injury Accident (PIA). Given that the level of increase in traffic flow resulting from the development is negligible, the effect on highway safety is negligible (not significant).
- 6.4.5 The performance of a junction is judged by the ratio of flow to capacity (RFC). As a general guide, a junction operating below a threshold of 0.85 is considered to operate within its design capacity. Junction modelling has been undertaken at two key junctions in the vicinity of the West Burton Power Station site (the results of

which are provided in the TA (**Appendix 7A** in ES Volume II) for the AM and PM peak hours (07:00 – 08:00 and 17:00 – 18:00). This demonstrates that each junction would operate within its design capacity at the assessed peak of construction (Q3 2029). Junction modelling, therefore, indicates that the driver delay effect of the Proposed Development would be negligible (not significant).

- 6.4.6 Up to 15 permanent operational roles would be created. Some of the roles are expected to be undertaken by existing West Burton/Cottam Power Station employees (refer to **Chapter 13: Socio-Economics**). As indicated in **Chapter 13: Socio-economics**, of these up to 15 roles, taking into account gross operation worker requirements and the additionality factors, up to approximately five net operational roles would be generated. However, for the purposes of this assessment, it is assumed that 15 operational roles would be created. Conservatively assuming car occupancy of one, this could equate to an additional 15 cars accessing the West Burton Power Station site per day (30 vehicle movements).
- 6.4.7 There would also be additional HGV traffic generated by deliveries associated with Proposed Development operational and maintenance plant/equipment. This is expected to equate to a maximum of four HGVs per day. Fuel for the Proposed Development would be natural gas which arrives at Site via pipeline, therefore, there would be no vehicular movements associated directly with the transport of gas to the Site.
- 6.4.8 Due to the very low traffic flows which would result once the Proposed Development is operational, the vehicle numbers generated would be considerably lower than those anticipated during the construction period. The overall traffic effects during Proposed Development operation are considered to be negligible (not significant).

6.5 Chapter 8: Noise and Vibration

- 6.5.1 Construction noise effects at all receptors during construction of the Proposed Development are predicted to be negligible (not significant) during the daytime period due largely to the distances between the works and the noise sensitive receptors (NSRs).
- 6.5.2 It may be necessary for some construction activities to take place continuously over day, evening and night periods during peak construction times of the Proposed Development, although the exact nature of the works is unknown. Comparison of the predicted daytime noise levels against the lower limit values for evening, weekend and particularly night-time working indicate potential minor adverse (not significant) effects at NSR during evening and weekend working but potential for moderate adverse (significant) effects at some NSRs during night-time working if the same intensity of working as for the daytime is assumed. Therefore, construction activities taking place during night-time hours would be planned, managed and mitigated appropriately so as not to exceed the Significant

Observable Adverse Effect Level (SOAEL) threshold values and reduce levels towards the Lowest Observable Adverse Effect Level (LOAEL) (or less) where practical. Provided the threshold values (defined in **Chapter 8: Noise and Vibration**) are not exceeded, construction activities outside of core working hours can be considered as having a minor adverse effect or less (not significant). Potential measures to ensure that appropriate mitigation is in place during the works are discussed in **Chapter 8: Noise and Vibration**.

- 6.5.3 There are no residential receptors in close proximity to the Proposed Development with the potential to be significantly affected by construction vibration. However, there is the potential for some vibration impacts upon buildings/structures within the West Burton Power Station site. Whilst it is considered unlikely that most typical construction working routines would generate levels of vibration above which building damage would be expected to be sustained (subject to final plant and working requirements), there is the potential that vibration impacts could cause annoyance to occupants.
- 6.5.4 If piling, heavy earthworks, vibratory rollers or other significant vibration producing operations are proposed in close proximity to any existing sensitive buildings, further consideration will be given to potential impacts, once the contractor is appointed and the construction methods requirements are developed. As the construction of the Proposed Development and the use of many of the existing buildings within the West Burton Power Station site are both within the control of the Applicant, any identified issues can be effectively managed by the Applicant and their contractor(s).
- 6.5.5 In the absence of additional mitigation, noise predictions for the worst-case plant configuration assessed (up to five smaller OCGTs) give rise to a range of impact magnitudes from low to high adverse at the seven receptor locations. This would result in effects between minor (not significant) to major adverse (significant). In the light of these results and a desire to reduce sound levels to the LOAEL (no greater than +5dB excess of rating level over background sound level), potential mitigation options to reduce sound levels have been considered.

6.6 Chapter 10: Landscape and Visual Amenity

- 6.6.1 Significant adverse visual impacts were identified at a single viewpoint only, (Viewpoint 4 PRoW Junction of Footpaths Bole FP3B and FP4, Bole) Footpath) during construction, operation and decommissioning.

6.7 Chapter 11: Ground Conditions

- 6.7.1 During construction, there is the potential for the following impacts, which could lead to human health effects:
- impact to construction workers from contaminated soils, sediments and groundwater/surface water encountered;

- impact to groundwater from runoff and/or leachates from stockpiled materials;
- impact to groundwater through creation of new or exacerbation of existing pathways;
- impact to workers, offsite residents and land from potentially contaminated dusts generated; and
- risks to underlying groundwater potential contamination in imported fill placed at the Site.

6.7.2 However, with the implementation of standard practice mitigation measures described in **Section 5** above, the effects are predicted to be negligible or minor adverse (not significant) and are therefore not anticipated to lead to human health effects.

6.7.3 Based on our current understanding of the Site, levels of contamination detected at the Site do not currently present a risk to human health and controlled waters. Assuming the implementation of the impact avoidance measures and best practice guidance defined within **Section 5**, there is a low likelihood of identified sensitive receptors being impacted upon by the Proposed Development throughout the construction, operation and decommissioning periods. The need for any additional mitigation measures (additional to the impact avoidance measures described in **Section 5**) would be developed in consultation with relevant stakeholders.

6.8 Chapter 12: Flood Risk, Hydrology and Water Resources

Construction

6.8.1 During construction, there is an elevated risk of leakage or accidental spillage of building materials and potential pollutants used on-site, which could migrate to nearby surface watercourses or infiltrate to groundwater. Washout facilities (washing of tools, plant and equipment), storage and use of various liquids and soluble solids, unstable exposed soils, excavated materials, stored aggregates, contaminated road surfaces, and fuel storage and handling all have the potential to result in pollution of water resources, which could indirectly lead to human health effects. However, due to the implementation of impact avoidance measures (set out in the Framework CEMP **Application Document Ref. 7.3**) no significant adverse effects are predicted. No adverse effects on human health due to exposure to contaminated water or impacts on recreational activity (such as walking, recreational fishing or river navigation) are predicted.

Operation

6.8.2 During operation there is the potential (albeit the risk is very low due to the implementation of appropriate drainage design) for localised and temporary changes in water quality of surface waters from any leakage in the drainage system and/or contaminated runoff from the Site. This could affect human health due to exposure to contaminated water or impacts on recreational activities.

However, the effect is predicted to be negligible adverse (not significant), resulting in negligible effects on human health.

- 6.8.3 Development of the Site for the Proposed Development will not increase the risk of flooding on or off-site.

6.9 Chapter 13: Socio-Economics

- 6.9.1 Construction of the Proposed Development could potentially start (subject to the necessary consents being granted and an investment decision being made) as early as Q3 2020. Construction activities are expected to be completed within four years and are more likely to be completed within three years. During this time, employment opportunities will be created as a result of the works. Although these jobs are temporary, they represent a positive economic impact that can be estimated as a function of the scale and type of construction. The direct expenditure involved in the construction phase will lead to increased output generated in the Worksop and Retford Travel to Work Area (TTWA) economy, resulting in a minor beneficial (not significant) effect on the local economy and consequentially a minor beneficial effect on human health.
- 6.9.2 The Proposed Development will also generate long-term jobs once operational, resulting in the creation of up to 15 roles, some of which are expected to be undertaken by existing West Burton/Cottam Power Station employees. Temporary and contractor employees associated with maintenance activities would also be employed as required. However, this is anticipated to result in negligible (not significant) effects, resulting in negligible human health effects from employment opportunities.

7. Mitigation and Enhancement Measures

7.1 Overview

7.1.1 Mitigation measures that would be relevant to human health are set out in the relevant technical chapters of this ES. However, where no significant effects have been identified, no additional mitigation measures are required in order to further reduce the potential impacts and effects. This is the case for **Chapter 6: Air Quality**, **Chapter 7: Traffic and Transport**, **Chapter 11: Ground Conditions and Hydrogeology**, **Chapter 12: Flood Risk, Hydrology and Water Resources** and **Chapter 13: Socio-Economic Effects**.

7.2 Noise and Vibration

7.2.1 In relation to **Chapter 8: Noise and Vibration**, it was appropriate to consider mitigation requirements further for operational effects, which in the absence of mitigation, would be significant for noise sensitive receptors.

7.2.2 In light of the required attenuation, further engineering appraisal has been undertaken. This has evaluated the main potential noise sources associated with the operational plant and identified potential design and embedded mitigation options that, in combination, could reduce predicted sound levels at nearby NSRs to below the LOAEL criteria. The potential mitigation measures considered to have the potential to reduce sound levels include:

- reducing the breakout noise from the GTs, generator and accessories through use of enhanced enclosures, or potentially containing them within a building;
- reducing the air inlet noise emissions by addition of further in-line attenuation;
- reducing the stack outlet noise emissions by addition of silencers or sound proofing panels;
- reducing fin fan cooler noise emissions by screening, re-sizing, fitting low noise fans or attenuation;
- screening or enclosing the transformers or other equipment;
- use of screening or bunding to shield receptors from noise sources; or
- orientation of plant within the Site to provide screening of low level noise sources by other buildings and structures, or orientating fans and the air inlet away from sensitive receptors.

7.2.3 The engineering appraisal undertaken has indicated that use of measures such as those listed above can achieve a reduction in sound levels so that the daytime and night-time LOAEL criterion of *rating level* no greater than +5 dB above the defined representative *background sound level* at each NSR can be achieved which would result in a very low magnitude of impact at each of the NSR and a negligible adverse (not significant) effect.

7.2.1 As the design progresses to the detailed design stage, the existing noise model will be refined and additional acoustic assessment will be undertaken in consultation with the designers, to determine the most appropriate mitigation options. The findings of the further assessment will inform the design to ensure that *rating levels* meet with a target of no greater than +5 dB above the representative *background sound level* at each NSR, resulting in a no more than a low magnitude of impact and no greater than a minor adverse effect, which would not be significant. It is proposed that operational noise would be controlled via a Requirement of the draft DCO (**Application Document Ref 2.1**), with the levels and the approach to monitoring of noise effects to be agreed with BDC in consultation with WLDC.

7.3 Landscape and Visual Amenity

7.3.1 Significant adverse visual impacts were identified at a single viewpoint only, (Viewpoint 4: Junction of Footpaths Bole FP3B and FP4, Bole) during construction, operation and decommissioning. The opportunity for mitigation of the visual effects of the Proposed Development is limited due to the size and scale of the Proposed Development. As shown in the assessment, the effects on visual amenity largely relate to the height of the tallest structures, as such it is considered that the addition of landscape features such as trees and woodland would not be effective in reducing the effects on visual amenity.

7.3.2 As stated in Section 2.65 of NPS EN-2 (DECC, 2011b) states that:

“It is not possible to eliminate the visual impacts associated with a fossil fuel generating station. Mitigation is therefore to reduce the visual intrusion of the buildings in the landscape and minimise impact on visual amenity as far as reasonably practicable.”
(paragraph 2.6.5).

7.3.3 The final finishes of the buildings and exact sizes of component parts would not be finalised until the final detailed design is complete. However, given the nature of the Proposed Development, it is anticipated that it would have a close visual relationship with existing structures on the West Burton Power Station site. Further details are presented in the Planning Statement (**Application Document Ref 7.1**).

8. Limitations or Difficulties

8.1 Overview

- 8.1.1 No significant limitations or difficulties have been identified in the preparation of this assessment in relation to EMF effects. Other limitations and difficulties are set out, where necessary, in ES chapters (Volume I).

9. Summary of Significant Residual Effects

9.1 Overview

- 9.1.1 No significant residual EMF-related effects have been identified.
- 9.1.2 All other health-related residual effects described in the relevant technical chapters are classified as not significant.
- 9.1.3 The significant residual effect on landscape and visual amenity at Junction of Footpaths Bole FP3B and FP4, Bole Footpath is not considered to have the potential to affect the health of large numbers of people, but effects would operate over the long-term. The effect would be reversible on eventual decommissioning of the Proposed Development.

10. References

- Ref 13A-1 Department of Energy and Climate Change (2011) *Overarching National Policy Statement for Energy (EN-1)*.
- Ref 13A-2 Department of Energy and Climate Change (2011b) *National Policy Statement for Electricity Networks (EN-5)*.
- Ref 13A-3 Department for Communities and Local Government (2012) *National Planning Policy Framework*.
- Ref 13A-4 Department for Communities and Local Government (2014) *Planning Practice Guidance* Available from: <http://planningguidance.communities.gov.uk/>
- Ref 13A-5 Department for Communities and Local Government (2019), National Planning Policy Framework (NPPF).
- Ref 13A-6 Department for Communities and Local Government (2018), Planning Practice Guidance.
- Ref 13A-7 Bassetlaw District Council, *Draft Bassetlaw Local Plan* (2019).
- Ref 13A-8 Spatial Planning for the Health and Wellbeing of Nottinghamshire (Jul 2016)
- Ref 13A-9 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 13A-10 Department of Energy and Climate Change (2012) *Power Lines: Demonstrating compliance with EMF public exposure guidelines - A voluntary Code of Practice*.
- Ref 13A-11 European Commission (2010) *Directive 2010/75/EU of the European Parliament and of the Council (Industrial Emissions Directive (IED))*
- Ref 13A-12 HMSO (2002) Control of Substances Hazardous to Health (COSHH) Regulations 2002
- Ref 13A-13 Environment Agency (2001) *Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention*.
- Ref 13A-14 Institute of Air Quality Management (2014) *Guidance on the Assessment of Dust from Demolition and Construction*.
- Ref 13A-15 DEFRA (2009) *Local Air Quality Management Technical Guidance LAQM.TG(09)*, February 2009.