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Tees CCPP Project

The Tees Combined Cycle Power Plant Project
Land at the Wilton International Site, Teesside

Volume 1 - Chapter 14

Regulations – 6(1)(b) and 8(1)

Applicant: Sembcorp Utilities UK
Date: November 2017

CONTENTS

14 HEALTH

14.1 INTRODUCTION

14.1.1 Terms of Reference for this Chapter

14.1 This chapter presents an assessment of the likely significant health effects from construction, operation and decommissioning of the Project. The baseline environment around the Project site is described, potential effects identified, proposed mitigation measures listed and an assessment of the significance of residual effects is made.

14.2 The amended Environmental Impact Assessment (EIA) Directive (2014/52/EU) includes requirements to consider direct and indirect significant effects of projects on 'population and human health'. This Directive has been transposed into UK regulations in this instance by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations). Under the EIA Regulations (Regulation 5(2) and paragraph 4 of Schedule 4) the EIA must identify, describe and assess, the direct and indirect significant effects of the proposed development (including any operational effects if appropriate) on a number of factors which now includes human health.

14.3 During pre-application consultation, the issue of health and impacts of the Project on the local population was raised as a matter of concern by residents and Public Health England (see *Table 14.1*).

14.4 The aim in undertaking an assessment of health impacts is to provide all interested parties with an evaluation of the Project's implications for health.

14.5 The aims and objectives of this assessment are therefore:

- to determine the potential health impacts of the Project on local people;
- to assess the nature and extent of health impacts;
- to identify ways to maximise positive and minimise negative health outcomes; and
- to inform the planning process and respond to health issues raised through this process.

14.1.2 Basis of Assessment including Realistic Worst Case Scenario

14.6 This chapter draws upon the key findings of the technical assessments (for instance related to traffic, noise and air quality) completed and presented elsewhere in the ES. It also presents information on potential electro-magnetic effects, which are not covered elsewhere in the ES.

14.7 Overall the Project proposes the construction and operation of up to 1,700 MWe of new CCGT electrical generation plant. Dependent on market conditions at the time of the final investment decision (after any approved DCO), the development of the Project could occur under two scenarios as follows.

- 'Scenario One' in which two CCGT 'trains' each of up to 850 MWe are constructed in a single phase to give a total aggregate capacity of up to 1,700 MWe.

- 'Scenario Two' in which one CCGT train of up to 850 MWe is built and commissioned and within five years of its commercial operation, beginning the construction of a further CCGT train of up to 850 MWe.

14.8 The findings of other aspects of the EIA have also been drawn upon (such as noise and air quality effects on people), which in turn assessed worst case scenarios with respect to the impact being assessed.

14.1.3 Consultation

14.9 Sembcorp has carried out various formal and informal consultation activities as part of the DCO process. *Table 14.1* contains summaries of the responses received.

Table 14.1 Consultation Responses

Source	Consultee Comment	Response
Please note the following is a summary of consultation responses directly noting potential impact related to effects on human health. Other consultation summaries in ES *Chapters 6* to *15* also include consultation responses which may directly or indirectly relate to human health. For instance the potential presence of contaminants in soils could have both environmental effects and effects on human health.		
20/07/2017 (PEIR Response) Public Health England	Thank you for your consultation regarding the above development. Public Health England (PHE) welcomes the opportunity to comment on your proposals and [preliminary environmental information report][Environmental Impact assessment at this stage of the project. PHE notes that we have replied to earlier consultations as listed below and this response should be read in conjunction with that earlier correspondence. Request for Scoping Opinion 15 March 2017 We have considered the submitted documentation and can confirm that we are broadly satisfied with the approach taken in preparing the Environmental Impact Assessment (EIA) and the conclusions drawn. The current submission does not consider any risks or impacts that might arise as a result of electric and magnetic fields associated with the connection of the proposed generation station to the national grid. We note that the connection will fall outside the application for a development consent order but would prefer to see the assessments included with this application so that the impacts of the scheme can be assessed. The current submission does not include a specific section summarising the potential public health impacts. We understand that the promoter will wish to avoid unnecessary duplication and that many issues including air quality, emissions to water, waste, contaminated land etc. will be covered elsewhere in the ES, but we believe that the summation of relevant issues into a specific section of the report provides a focus which ensures that public health is given adequate consideration. Such a 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	Noted and this chapter identifies health aspects considered by the Project.

Source	Consultee Comment	Response
	Statements and relevant guidance and standards should also be highlighted. Should you have any questions or concerns please do not hesitate to contact us.	
Approximately 5 public consultation responses received from the public exhibitions held on the 4th, 7th and 13th of July 2017	Concerns in regards noise, smell and air pollution impacts on residents in nearby areas.	Noted and this chapter identifies health aspects considered by the Project. Please note potential smell (or odour) has been considered and deemed to not require further assessment. Construction activities are not considered to be likely to create off-site odour issues. The operation of a CCGT will not result in odour effects on local amenity.

14.1.4 Policy and Legislation

General Considerations

14.10 A review has been undertaken of general and strategic planning policy and guidance such as national policy documents and the Local Development Frameworks (LDF). This is presented in *Chapter 2*. The policy context of greatest relevance to health is presented below. This chapter of the ES demonstrates that the Project is aligned with national, regional and local policy in relation to health.

Policy

14.11 *Table 14.2* identifies the key policies relevant to this health impact assessment.

Table 14.2 Policies Relevant to the Health Assessment

Topic	Health Aspects
Overarching National Policy Statement for Energy (EN-1)	Section 4.13 Health
The NPS for Electricity Networks Infrastructure (EN-5)	Section 2.10 Electric and Magnetic Fields (EMFs)
National Planning Policy Framework 2012 ("NPPF") and Planning Practice Guidance ("PPG")	Section 11. Conserving and enhancing the natural environment
RCBC Local Development Framework Core Strategy Development Plan Document, adopted July 2007 ("Core Strategy")	CS1 Policy CS1 Securing a Better Quality of Life
RCBC Draft Publication Local Plan (November 2016)	Policy SD 4 General Development Principles

National Planning Policy

14.12 The National Planning Policy Framework (NPPF) states that there are three dimensions to sustainable development: economic, social and environmental. Relevant text regarding health is discussed within paragraphs 120 to 125. Paragraph 120 of states 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, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner."*

Overarching National Policy Statement for Energy (EN-1)

14.13 The Overarching National Policy Statement for Energy (EN-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.*"

14.14 EN-1 also acknowledges that energy infrastructure may have negative health effects:

> "*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.*"

14.15 Section 4.13 of EN-1 makes clear that:

> "*Energy production has the potential to impact on the health and well-being ("health") of the population. Access to energy is clearly beneficial to society and to our health as a whole. However, the production, distribution and use of energy may have negative impacts on some people's health…Direct impacts on health may include increased traffic, air or water pollution, dust, odour, hazardous waste and substances, noise, exposure to radiation, and increases in pests.*"

The NPS for Electricity Networks Infrastructure (EN-5)

14.16 The National Policy Statement for Electricity Networks Infrastructure (EN-5) 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. 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.*"

14.17 However there are no new effects considered probable from EMF as a result of this Project and this is considered further below in *Section 14.6.9*.

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

Local Planning Policy

14.19 Local planning policy relevant to health is as described in chapters on emissions to water and land quality/ contamination (*Chapter 6*: Contaminated Land, Water Resources and Flood Risk), emissions to air (*Chapter 7*: Air Quality), noise and vibration (*Chapter 8*: Noise and Vibration), traffic (*Chapter 10*: Traffic and Transport), landscape and visual (*Chapter 11*: Landscape and Visual) and socio-economics aspects (*Chapter 13*: Socio-Economic Characteristics).

14.20 The Redcar & Cleveland Local Plan sets out the strategic policy framework for Redcar & Cleveland area and is used to make decisions on planning applications. The Core Strategy (1) (adopted 2007) highlights, within Policy DP6 Pollution Control, the importance of ensuring a development that may give rise to increased levels of noise or vibration is only permitted if it is acceptable in terms of human health and safety, environment; and general amenity. Policy DP6 highlights that where pollution is unavoidable, mitigation measures to reduce pollution levels will be required in order to meet acceptable limits.

14.21 There are no adopted local policies within the Core Strategy Development Plan Document (2007) and the Development Policies Development Plan Document (2007), which require a health impact assessment on a project specific level.

14.22 RCBC is currently preparing a 'New Local Plan' to replace the saved policies of the 1999 Local Plan and the above Development Plan Documents. Within the Draft Publication Local Plan (November 2016) Policy SD4 General Principles of Development states that a "*Health Impact Assessment will be required where the development is likely to have a significant impact on the health and wellbeing of the local population or particular groups within it*".

Relevant Guidance

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

(1) Redcar & Cleveland Borough Council.2007. Core Strategy DPD, Adopted - 2007

14.2 ASSESSMENT METHODOLOGY

14.2.1 Defining Health and Health Impact Assessment

What is 'Health'?

14.24 Health, or more importantly what constitutes good health, is difficult to define and measure in all of its aspects for a population, not least because perceptions regarding health and expectations of good health vary. Any definition of health applied in a HIA will influence the overall content and focus of the assessment. Following best practice, this HIA takes the World Health Organization's (WHO) definition, which states that health is;

> *"a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity"* [(1)].

A Socio-economic Model of Health

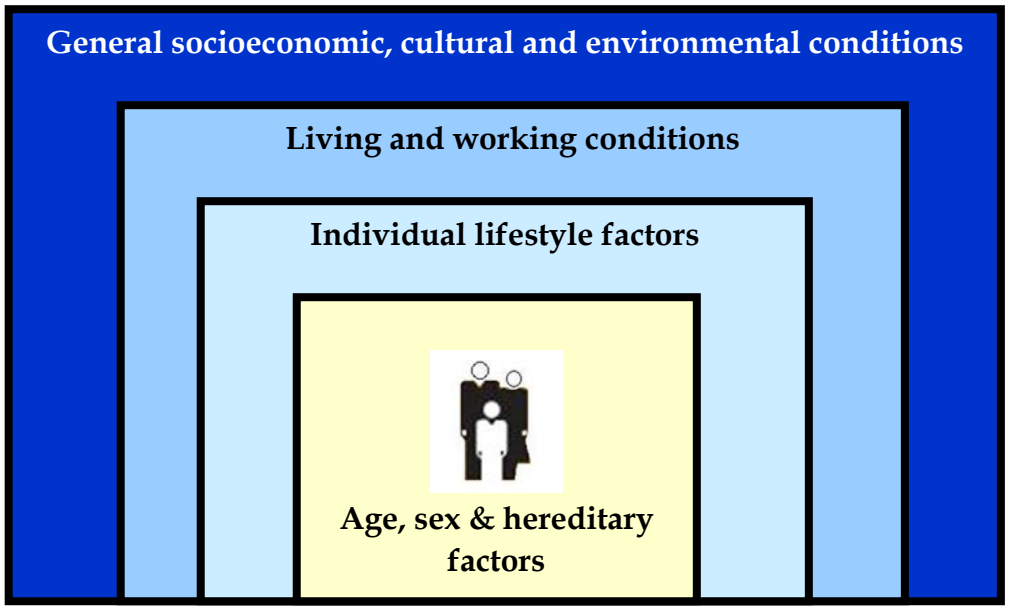
14.25 As a consequence of adopting the WHO definition, the basis of this assessment is a broad socio-economic model of health. For any individual, health is determined by a multitude of factors. There are individual factors that relate to age and genetics, which cannot be changed. Next, there are lifestyle factors, such as levels of physical activity, alcohol consumption, tobacco smoking, etc. Beyond these matters, a multitude of external factors play a significant part in determining health. These reflect the wider environment and encompass many aspects of the socio-economic context in which members of a community live and work.

14.26 A common way of summarising these factors is shown in *Figure 14.1*, which illustrates a model of the so-called 'determinants of health'. The core determinants are specific to an individual, whilst the outer determinants are a function of the socio-economic status of an individual. For example, social and community networks are also considered to be important for a person's health and wellbeing. If these networks are strong, evidence suggests that health is improved.

14.27 The physical environment (eg air quality) is one determinant that has some part to play in the health of populations, but is only one influence. Good housing, access to medical services, transport and being employed in a low stress job are also important.

(1) World Health Organization, (1948), Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946.

Figure 14.1 The Socio-economic Model of Health [1]



14.28 Determinants of health are generally well understood and can be defined with some confidence, although no list can be completely comprehensive, especially where the definition of health includes wellbeing, as is the case here.

14.29 In conducting an HIA, the effect of the Project under consideration on these determinants has to be considered. This is done by defining health 'pathways'. A health pathway can be described as any activity that influences a known determinant of health. These pathways are discussed further in *Section 14.2.3*.

14.2.2 Models for HIA

14.30 There is an extensive and growing body of knowledge and guidance on HIA. However, no statutory guidance exists and different HIAs employ slightly different methods to meet individual project requirements.

14.31 According to the Gothenburg consensus (a consensus paper developed by amongst others the WHO, the Nordic School of Public Health and the European Commission, which is designed to provide a common understanding and approach to undertaking HIA), HIA is:

> *"…a combination of procedures, methods and tools by which a policy, programme or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population"* [1].

(1) Modified from Dahlgren, G., and M. Whitehead. (1995). Tackling Inequalities: A Review of Policy Initiatives. In Tackling Inequalities in Health: An Agenda for Action, eds. M. Benzeval, K. Judge, and M. Whitehead. London: Kings Fund Institute

14.32 This assessment also takes into consideration the following guidance.

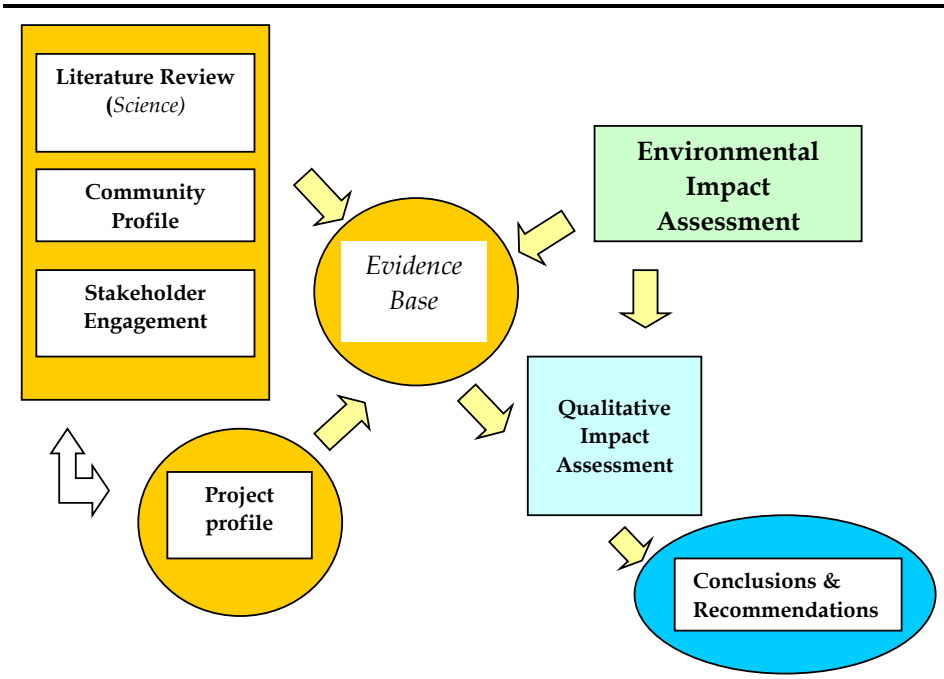
- A Short Guide to Health Impact Assessment: Informing Healthy Decisions, commissioned by NHS Executive London, August 2000.
- An Easy Guide To Health Impact Assessments For Local Authorities, Chimeme Egbutah And Keith Churchill, October 2002.
- Introducing health impact assessment (HIA): Informing the decision-making process, Health Development Agency, 2002.
- Luton Health Implementation Plan, 2009.
- Guidance on HIA: WHO, 2006.

14.33 The overarching method applied in this assessment to meet the objectives of the assessment includes:

- the compilation of an evidence base: (comprising a literature review, a community profile and a limited stakeholder engagement);
- the construction of a 'project profile';
- an analysis; and
- the conclusions on effects resulting from this process.

14.34 The method used is shown in *Figure 14.2*.

Figure 14.2 HIA Method



(1) World Health Organization (1999) Health impact assessment: Main concepts and suggested approach. Copenhagen: World Health Organization.

14.2.3 Project Profile

14.35 The project profile investigates the various stages and processes involved during the construction and operation of the Project. It defines the Project's footprint, the extent of activities that may result in potential health outcomes, and the influence they may have upon a range of determinants of health. In this way, the project profile identifies the potential health pathways.

14.36 Decommissioning of the Project may have an impact upon several attributes of health, but is beyond the scope of this assessment. The exact identity and nature of any such impacts can only be accurately identified nearer to the time of such a decommissioning, when appropriate plans and local context are apparent. This approach is based on professional experience gained on similar developments and pragmatic in that the exact means of decommissioning are not known at this time and will be subject to prevailing environmental controls at the time this activity is undertaken.

14.37 Once activities and their associated impacts have been outlined, they can be applied to the community profile. This will determine how such pathways might act on the relative susceptibilities and vulnerabilities of communities, using the HIA evidence base to identify a range of possible socio-economic, physical, mental and community health outcomes.

14.38 The purpose of the project profile is to identify relevant features associated with the Project that are potential influences on the determinants of health, introduced in Section 14.3.1 such as:

- environment (noise, air quality, visual);
- employment and income;
- education;
- housing;
- lifestyle;
- physical activity;
- access to services, amenities and social networks;
- community severance or cohesion;
- transport;
- social networks and connectivity;
- community identity; and
- access and accessibility.

14.39 The potential of these determinants to be influenced by the Project has been considered, using the available evidence base and expert judgement.

14.2.4 Community Profile

14.40 The community profile has been developed through the application of national statistics such as the National Census 2011 and the Indices of Multiple Deprivation 2015.

14.41 The combination of statistics and available survey information develops a picture of existing community susceptibilities and inequalities, including pockets of relative deprivation or affluence, which is used to inform the assessment and to identify vulnerable groups.

14.2.5 Developing an Approach to the Assessment

Introduction

14.42 A review of literature and previous project examples was undertaken to collect evidence on the potential health impacts associated with the Project. This was based on literature regarding health effects associated with the various elements of the Project and included a review of completed HIAs on electrical generation plant. The effects on health of the following topics were considered:

- air quality;
- transport;
- noise;
- visual environment;
- socio-economics; and
- social capital.

14.43 The review was not a systematic review of all the available literature on these topics, but is based on literature and approaches that are nationally or internationally recognised, peer reviewed and which reflects the consensus view. It is not intended to be a selective view of the evidence in the sense of taking a particular stance on a topic. The review provides a strong, defensible scientific evidence base on which to undertake the assessment of impacts.

14.44 This section summarises the information contained within the literature review, which forms the evidence base for research relating to changes in health determinants and consequent health effects.

14.45 Evidence of how health can be affected by different determinants and pathways is described below under the following headings:

- air quality;
- transport;
- noise;
- visual environment;
- employment, socioeconomics and housing; and
- social capital.

Air Quality

14.46 Exposure to outdoor air pollution is associated with both acute and chronic health effects. Particulate matter (PM) mainly generated from combustion and construction activities, can adversely affect human health in varying degrees

depending on its size, composition, origin and the length of exposure. The public health implications of the long-term effects of exposure to PM are an order of magnitude greater than those of the short-term effects, as measured by life years lost, although it is difficult to disentangle the two entirely.

14.47 Exposure to nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and PM10 at sufficiently high concentrations causes inflammation to airways and long-term exposure can increase the probability of respiratory symptoms and problems with lung function in some people.

14.48 Groups that are particularly vulnerable to exposure from air pollution include foetuses, young children, the elderly and those with cardio-respiratory disease, as well as the social-economically deprived.

14.49 Dust emissions and subsequent deposition arising from construction activities can cause annoyance. Dust can also irritate the eyes and aggravate pre-existing respiratory problems, such as asthma.

Transport

14.50 Transport plays a vital role in promoting health and wellbeing. It does this directly by providing communities with access to a range of services and amenities required to treat ill-health and to manage and promote healthy living. It does so indirectly through achieving and maintaining social and family networks and providing access to employment opportunities.

14.51 Transport can have a negative impact on health due to injuries and death through accidents. In addition, transport can lead to increased noise and air pollution resulting in respiratory and cardiovascular problems. Congestion constrains movement and leads to increased stress and frustration, and aggression, which in turn can lead to increased likelihood of a crash or accident. Traffic noise can also cause nervousness, depression, sleeplessness and irritability.

Noise

14.52 Noise has the potential to affect health in a variety of ways. Some effects can be auditory (damage to the ear) and occur as a direct impact of noise (at levels higher than considered here and in excess of statutory acoustic limiting values) whilst others are non-auditory; such as annoyance, night time effects and mental health impacts and may be associated with exposure to environmental noise. In the case of the Project the main potential impact from noise is for reduced amenity at nearby residential receptors during operation, with an effect on wellbeing of occupants. Dependent on the change above baseline levels, industrial noise (and reduced amenity) can have secondary health effects.

14.53 Annoyance is the most reported non auditory health effect associated with noise. Vibration can also cause annoyance to those experiencing it. Sleep

disturbance associated with noise is also a major issue with certain vulnerable groups more likely to be affected. It has been shown that noise levels that are sufficiently high can induce cardiovascular effects at the population level, including acute myocardial infarction.

Visual Environment

14.54 People attach considerable importance to the quality of their surroundings and the prosperity of an area can be influenced by its aesthetics. The visual presence of an industry is also linked to the level of risk that people perceive and such disturbances can become a focus for concern and anxiety.

14.55 The built environment affects public health and the way that people use their environment, influencing physical activity and the health impacts associated with this. The natural environment is known to have a restorative function in that it reduces stress and anxiety levels. There is a strong link between the visual environment and people's mental and physical health.

Employment and Socio-Economic Characteristics

14.56 Employment and income are regarded as the key determinants of health, influencing where an individual lives, the education received, access to healthcare and even lifestyle and behaviour.

14.57 Ethnic minorities, young people and the disabled generally face the highest levels of unemployment. These groups are likely to be found in more insecure employment and be poorly paid, therefore having low socio-economic status.

14.58 Unemployment is directly linked with poorer health (and vice versa). Unemployed individuals are more likely to report illness and injury as well as psychological symptoms such as demoralisation. Health outcomes associated with unemployment include physical health effects, mental health effects, suicide, wellbeing, role functioning, poor self-reported health and increased mortality.

14.59 Increased employment opportunities can have a positive influence on health through increasing social contact, involvement in a collective effort or activity and by forming social relationships. All of these contribute to wellbeing. In addition, those in insecure employment are likely to have poorer mental health than those in secure employment.

14.60 Employment and income together contribute to a person's socio-economic status. In broad terms, the greater the income, the better the health of a person. However, this relationship is not strictly linear. Above a certain amount, higher income is less proportionally related to improved health across a population.

Social Capital

14.61 The current body of research tentatively suggests that there is a link between social capital and health both physical and mental health. However, the existence of a causal relation between enhancement or erosion of social capital and health outcomes is contested, and there is no consensus that particular social capital indicators can be linked to particular health outcomes.

14.62 Consultation is crucial in gaining local knowledge and insight, alongside the particular concerns of actual or perceived health effects and benefits, assisting in more health conscious decision-making.

14.63 Stakeholder engagement was undertaken, in the form of a series of public exhibitions held in the local area. The consultation that was undertaken and key findings are summarised in the Consultation Report (Document 5.1).

14.2.6 Analysis

14.64 The analysis stage investigates and appraises potential outcomes and benefits, incorporating environmental and health data to identify populations at risk. It assesses the maximum theoretical impacts with a view to developing measures that reduce or avoid negative impacts/inequalities and enhance opportunities to improve health.

14.65 This has been achieved by identifying activities with identifiable health pathways and outcomes and applying them in the context of the community profile to assess exposure and sensitivity.

14.66 Potential impacts were identified and assessed based on the findings of the EIA and the evidence base, including the findings of the stakeholder engagement/consultation process. The analysis provides a qualitative professional judgment as to the likelihood and magnitude of the potential health outcomes.

14.2.7 Recommendations

14.67 This section aims to identify means of avoiding or minimising negative impacts on a community's health, healthcare services and social services etc and to promote and maximise any benefits associated with the Project. Thus, recommendations are developed to avoid, minimise, reduce, remedy or compensate for the negative impacts identified, and to create or enhance health benefits.

14.68 Recommendations, or mitigation measures, are also developed during the EIA process to reduce or negate any identified impacts on health. Some of these measures may even be beneficial to health.

14.2.8 Constraints and Limitations of the HIA

14.69 There were no major constraints in undertaking the HIA, although the community profile information is only available at a ward level and smaller area statistics are not available.

14.2.9 Impact Assessment Methodology and Significance Criteria

14.70 With the exception of effects relating to EMF, this chapter chiefly summarises health-related effects described elsewhere in *Chapter 6*: Contaminated Land, Water Resources and Flood Risk, *Chapter 7*: Air Quality, *Chapter 8*: Noise and Vibration), *Chapter 10*: Traffic and Transport, *Chapter 11*: Landscape and Visual and *Chapter 13*: Socio-Economic Characteristics.

14.71 The methodologies for these assessments, including identification of receptors (and their sensitivity), impacts (and their magnitude), and assessment of effects, are set out in the relevant technical chapters.

14.72 Risks associated with EMF have been considered following the advice provided by Public Health England (PHE) in their response to the Scoping Report. ICNIRP guidelines (ICNIRP, 1988) have been adopted as the reference for the recommended limits of exposure of the general public, following current Government policy.

14.73 The associated reference levels are summarised in *Table 14.3* below.

Table 14.3 ICNIRP 1988 Electric and Magnetic Fields Reference Levels

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

14.74 The assessment of potential EMF-related effects does not follow the 'standard' EIA methodology. The approach identifies all human receptors located within the electrical field and considers, when assessed with the adopted impact avoidance measures, whether effects identified are significant or not significant.

14.3 DEFINING THE PROJECT PROFILE

14.3.1 Function of a Project Profile

14.75 As described in *Chapter 5*: Project Description, the Project will comprise a natural gas fired CCGT generating station with an output capacity of up to 1,700 MWe and associated buildings, structures and plant within DCO order limits. No new overhead power lines are proposed.

14.76 The purpose of the project profile is to identify features associated with the Project which may potentially influence health [1]. The aim of the project profile is not to describe in detail the Project, but to identify key features for consideration and assessment within the HIA.

14.77 The profile outlines potential health effects by identifying aspects of the project which may have a health effect through a determinant of health and then outlining the 'health pathway' affected. This allows for identification of the 'health determinant' affected and therefore an indication of the 'health outcome', as well as the community or communities that are likely to be affected.

14.3.2 Health Pathways

14.78 The Project may exert an influence on health determinants via 'health pathways', which arise from consequences of its features. Any judgement on the capacity of the Project to influence health pathways has to consider both the levels of exposure in the absence of the Project (the baseline and future baseline) and the potential for a change in exposure as a result of the Project.

14.79 Examples of health pathways include:

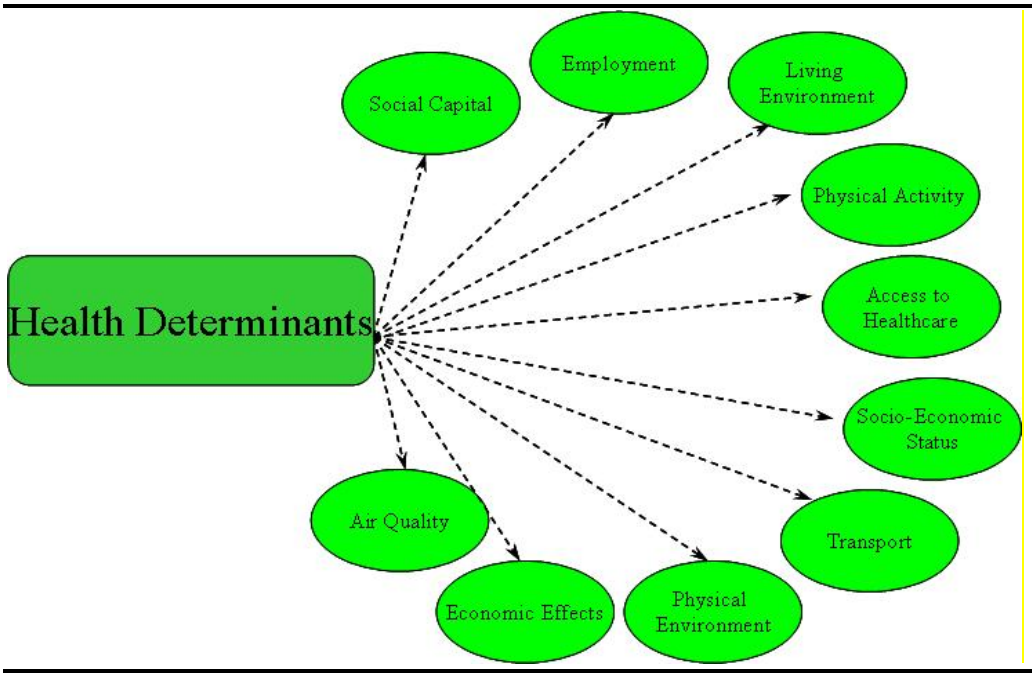
- changes to traffic flows which can affect community connectivity and risks of accidents;
- employment opportunities, with implications for improved socio-economic status, reductions in unemployment and the potential for compliance with local procurement policies and engagement with skills development programmes; and
- changes to the visual landscape with implications for the communities sense of place and wellbeing.

14.3.3 Health Determinants

14.80 A health determinant can be any factor which has the potential to influence the health of an individual. Health determinants are categorised in *Figure 14.3* [2].

(1) World Health Organization's (WHO) definition states that health is "a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity"
(2) Europa DG Health and Consumer Protection available at http://ec.europa.eu/health/ph_determinants/healthdeterminants_en.htm

Figure 14.3 Health Determinants



14.3.4 Health Outcomes

14.81 Once health pathways and their related health determinants have been identified, the potential impacts of the Project can be evaluated in relation to health outcomes.

14.82 The definition of health is a broad one and whilst the most serious outcomes may be recorded in the health system or be recognisable in hospital outpatient or primary health care activity, many others will be more subtle and therefore not result in contact with healthcare or other services. These outcomes could be described as 'sub-clinical' and may also relate to the wellbeing of some parts of the community.

14.3.5 Receptor

14.83 The receptor states which group(s) of people are most likely to be affected by the health outcome that has been identified. Receptors can be people that live or work close to the site or along proposed transport corridors, or who use facilities close to the site such as schools.

14.84 In addition to receptors, vulnerable groups will be identified. Vulnerable receptors are those individuals who will be unduly affected by the Project and include children, the elderly, the disabled and people of low socio-economic status.

14.4 THE PROJECT PROFILE

14.85 A summary of the features of the Project and their *possible* influence on health determinants is presented in *Table 14.4*. At this stage of the assessment, no conclusions are drawn on the *likely* impacts.

Table 14.4 Possible Project Influence on Health Determinants

Project Feature	Health Pathway	Health Determinant	Potential Health Outcome or Impact
Construction			
Noise and Vibration	Noise from on-site vehicles, equipment and activities	Physical environment	• Decreased wellbeing • Decreased quality of life • Mental health/stress
On site construction activities	Dust from construction activity	Physical Environment	• Nuisance and annoyance due to dust deposition • Decreased satisfaction with area
Delivery of construction material	HGV movements Decreased air quality from road traffic emissions and on site vehicles	Physical Environment Transport	• Accidents and injury • Death due to accidents • Increased respiratory diseases short and long term • Increased cardio-vascular diseases
Site Safety	Trespass onto site	Safety	• Accidents and injury • Death due to accidents
Visual impacts	Visual intrusion upon landscape, from structure	Physical Environment	• Decreased wellbeing
Workforce	Employment Opportunities	Income Employment	• Procurement of goods and services from local area • Increased income to employees • Employment
Visible presence of the Proposed Project	Quality of life Sense of living	Social capital	• Mental health/stress
	Value of housing	Housing	• Mental health/stress • Economic issues
Operation			
Delivery of construction materials	HGV movements	Physical environment	• Annoyance and sleep disturbance • Increased risk of accidents and injury • Death due to accidents

Project Feature	Health Pathway	Health Determinant	Potential Health Outcome or Impact
	Worker movements Visitor movements	Transport	• Increased journey times leading to annoyance
Workforce	Employment opportunities both direct and indirect Procurement of goods and services	Employment Income	• Improved incomes for those in employment • Improved quality of life • Long term health benefits associated with life expectancy and decreased morbidity associated with employment
Presence of the Project	Associated reduction in housing value	Housing	• Mental health/ stress • Anxiety
	Emergencies/ accidents and illegal access to site	Access to health care Physical environment	• Accidents and injury • Death
	Lighting regime	Physical environment	• Annoyance and sleep disturbance
Emissions to air	Decreased air quality due to stack emissions and traffic movements	Physical environment	• Increased incidence of respiratory/cardiovascular disease • Chronic effects through ingested or inhaled pollutants
Social Capital	Quality of life Control over own environment	Sense of self-determination	• Mental health/stress
Decommissioning			
Decommissioning of the Project may have an impact upon several attributes of health, but is beyond the scope of this assessment. The exact identity and nature of any such impacts can only be accurately identified nearer to the time of such a decommissioning, when appropriate plans and local context are apparent. However it is reasonable to assume that in the main they will be similar to construction.			

14.5 BASELINE CONDITIONS

14.5.1 Adopted Study Area

14.86 The definitions of the Study Area relevant to each of the health-related assessments are provided in the other relevant chapters of the ES.

14.87 Health profiles produced by the PHE provide baseline data on the health of people within the local area, to compare with average values for all areas of England. Data for Redcar and Cleveland Unitary Authority, the region and national data have been used. By virtue of the geographical scale of these datasets, they include a much broader population than is predicted to receive direct or indirect impacts associated with the Project. This allows data for Redcar and Cleveland (within which any impacts would be expected to occur) to be compared with the region and nationally so that any particular local trends or inequalities can be more readily identified.

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

14.89 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 sub stations where 400 kV lines are switched and electricity is transformed down to the next voltage, 132 kV, 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).

14.90 As the National Grid substations already exist for this Project, there will be no new EMF effects associated with their use for the Project. The Project will connect into these utilities and National Grid will ensure compliance with applicable codes.

14.5.2 Community Profile

14.91 Assessing the profile of the community is an important component of a HIA as it helps in developing an understanding of how those communities may be susceptible to potential health impacts and benefits arising from the Project. There is evidence to suggest that community characteristics such as ethnicity, deprivation and social and demographic structures can influence how susceptible a population is to external changes. Analysing the profile of a community can also help identify sensitive people and vulnerable communities that may be present and how the potential impacts from the Project may affect them disproportionately.

14.92 The community profile is also useful in highlighting 'hot spot' areas of high inequality which may be more susceptible to health impacts and benefits. Mapping the areas where there is existing poor health is therefore a crucial component of the community profile.

14.93 The profile is based primarily on information obtained for the ward in which the site is located, and the six closest wards, listed below:

- Dormanstown;
- Grangetown;
- Eston;
- Kirkleatham;
- Newcomen;
- Coatham; and
- South Bank.

14.94 The Unitary Authority of Redcar and Cleveland, within which the seven wards are contained, was also studied to provide mean data for the locality. Data for England and the North East region were also reviewed for comparative purposes.

14.95 The 2011 census remains the single best and most complete source of information regarding community characteristics. Information from the Redcar and Cleveland Ward Profiles and Joint Strategic Needs Assessment were also used to supplement the census data.

14.5.3 Population

Population Density

14.96 The population densities of the wards around the Project and in Redcar and Cleveland are significantly higher compared with the regional and national averages. Dormanstown Ward (where the Project is located) has the lowest population density (3.9) compared with other wards in the locality and it is also lower than the average for the unitary authority (5.1). Its resident population of 13,160 persons represents 11 % of the total population in which it lies.

Age

14.97 Dormanstown Ward has a low proportion of 45-59 year olds (20.3%), which is approximately 0.4% lower than the national average. It has a lower proportion of the 20-64 year old age group compared with the national average with a higher proportion of all other age groups.

Gender

14.98 Coatham Ward is the only ward in the locality with a higher proportion of males compared with females.

Ethnicity

14.99 The populations within the six wards around the site are dominated by white people. Dormanstown is predominantly white, with only 2% of the population identifying with a different ethnic category.

Religion

14.100 The significant majority of the population is Christian in all cases, with the second highest majority stating no religion.

14.5.4 Education, Skills and Training

14.101 There are higher proportions of people with no qualifications and those who attained level 1 and level 2 qualifications in all wards and Redcar and Cleveland Unitary Authority compared with the national average. Redcar and Cleveland Unitary Authority and the North East region have similar proportions of people with level 4 qualifications when compared with the national figures. However, Dormanstown Ward has a lower proportion of people with a degree (5%) compared with the unitary authority, regional and national averages. There are two primary schools in Dormanstown Ward; both of which have been rated 'Good', by Ofsted.

14.5.5 Employment

14.102 Dormanstown (where the Project is located), has the same proportions of full-time employees compared to the Redcar and Cleveland Unitary Authority but is slightly below the averages for the region. Dormanstown Ward also has a higher proportion of unemployed (7%) when compared with the region and nationally however the figures are in line with those of the Redcar and Cleveland Unitary Authority.

14.103 This is reflected in the Job Seekers Allowance (JSA) claimant figures, with Dormanstown Ward having over 3.5% of its population listed as claimants, with Redcar and Cleveland at 3.7% and the region (3.2%) and nationally (1.9%).

14.5.6 Transport

14.104 The level of car ownership in Dormanstown Ward is higher than in the other wards however the proportion of people with no car in Dormanstown Ward (32.5%) is slightly above Redcar and Cleveland Unitary Authority (28.4%), the region (31.5%) and nationally (25.8%).

14.105 The proportion of residents with two or more cars is 18.9% and is lower than the 22.9 % in the Redcar and Cleveland Unitary Authority and 24.7% nationally.

14.5.7 Housing

Housing Tenure

14.106 The proportion of residents that own their own home in Dormanstown Ward is the highest amongst the wards and slightly lower than the averages for the region and country. Approximately 26.8% of people in this ward are in socially rented properties, which is slightly higher than the average for the Unitary Authority, region and nationally. Overall, tenure types are skewed towards home ownership with all wards showing over 50% of the ward made up of this tenure. The exception to this is Grangetown Ward which has 28% of the housing tenure made up of home ownership and a higher level of social rented properties (57.8%).

Housing Type

14.107 The proportions of detached houses or bungalows are lower in Dormanstown Ward compared to the averages for the borough, region and country. The most common forms of accommodation in Dormanstown Ward are semi-detached houses or bungalows which make up over half of the tenure types, significantly higher than the national trend.

14.5.8 Health of the Community

Self-rated Health

14.108 There is a high proportion of people in all wards who rate their health as 'very good' and 'good' compared with the national average. Kirkleatham Ward has the highest proportion of people with 'bad' health compared with the Redcar and Cleveland area. Coatham Ward has the best health profile, with a high percentage of people rating their health as 'very good' and 'good' while only 8.3% of residents there rated their health as 'bad' and 'very bad'. However, this is still higher than the figures for the unitary authority, region and country, suggesting the health in this area is worse than average.

Deprivation

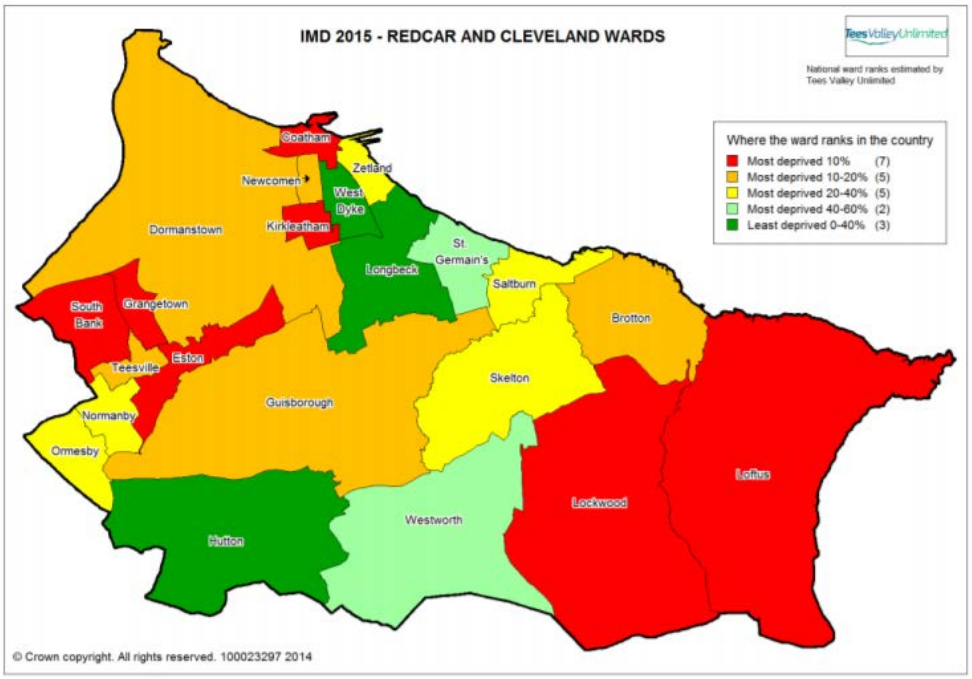
14.109 The index of multiple deprivation maps deprivation in terms of health and disability, based on the following indicators:

- employment deprivation;
- health deprivation and disability;
- education, skills and training;
- barriers to housing and services; and
- crime.

14.110 *Figure 14.4* indicates that the majority of the wards close to the Project site have relatively high levels of deprivation. Dormanstown Ward (where the Project is located) is within the 10%-20% most deprived nationally, while the

surrounding wards of Coatham, Kirkleatham, Eston, Grangetown, South Bank are within the 10% most deprived nationally.

Figure 14.4 IMD Map



14.5.9 Life Expectancy

14.111 The life expectancy at birth for males (78.6) and females (82) for Redcar and Cleveland Unitary Authority is lower compared with the national averages (79.4 and 83.1 respectively). This suggests that the general health of those born in this area is relatively poor compared with that of the rest of England.

14.5.10 Key Indicator Diseases and Behaviours

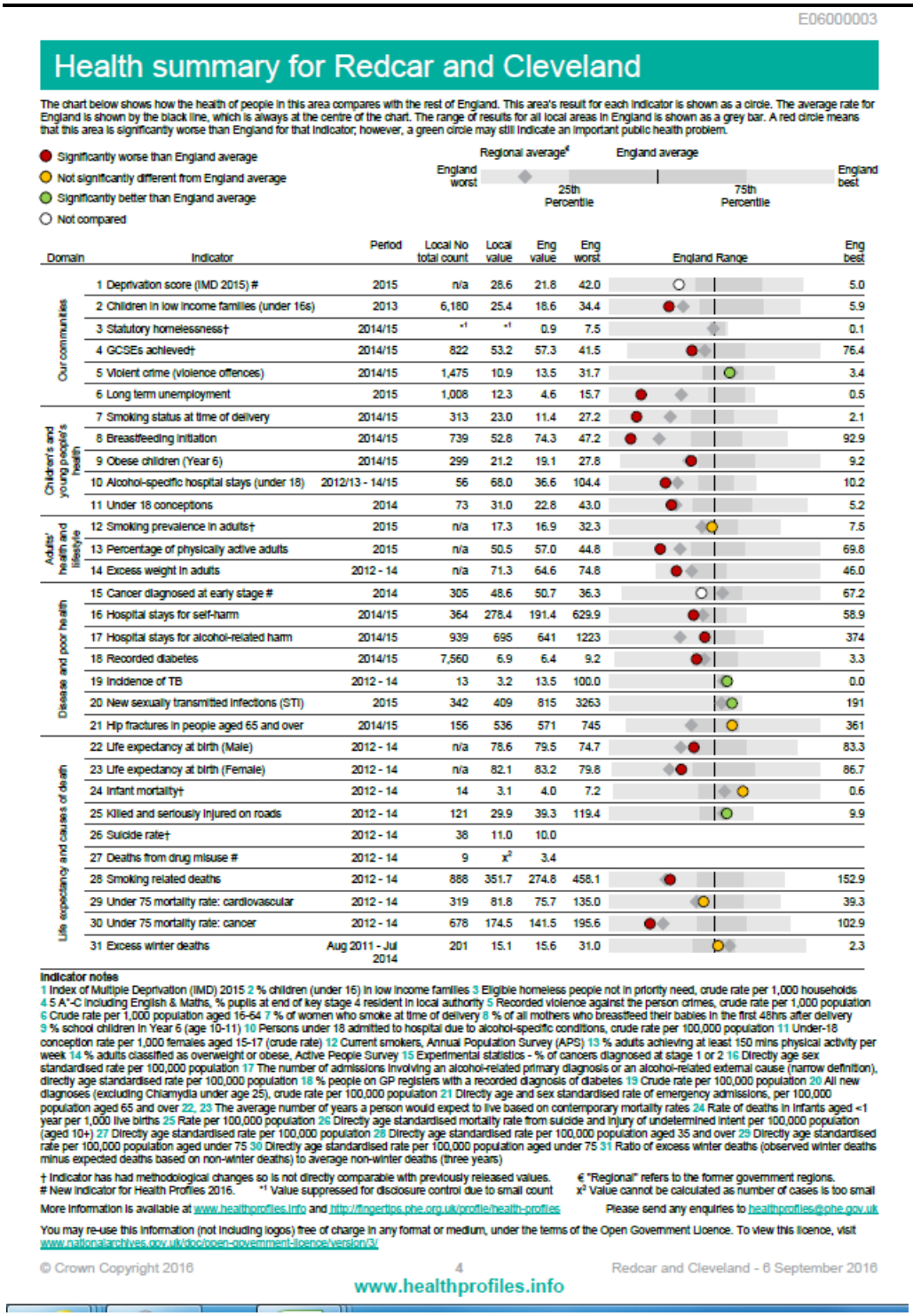
14.112 The Health Profile for Redcar and Cleveland, generated by the Department for Health, is presented in *Figure 14.5*. The red circles indicate the areas in which the unitary authority is performing significantly worse than England, yellow indicates no significant difference and green indicates the areas the unitary authority is performing significantly better. White circles are shown where no significant difference can be calculated.

14.113 *Figure 14.5* shows that the health of the people in Redcar and Cleveland is generally poorer compared to England as a whole. Obesity rates for adults, alcohol-related hospital visits and smoking related deaths are all significantly higher than the national figures.

14.114 Further analysis of health indicators shows that early deaths from cancer are higher in Redcar and Cleveland than the national average, while incidence

rates of tuberculosis and new sexual transmitted infections are lower than for England.

Figure 14.5 Health Profile for Redcar and Cleveland (2016)



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Health summary for Redcar and Cleveland

The chart below shows how the health of people in this area compares with the rest of England. This area's result for each indicator is shown as a circle. The average rate for England is shown by the black line, which is always at the centre of the chart. The range of results for all local areas in England is shown as a grey bar. A red circle means that this area is significantly worse than England for that indicator; however, a green circle may still indicate an important public health problem.

- Significantly worse than England average
- Not significantly different from England average
- Significantly better than England average
- Not compared

Regional average€ | England average | England worst | 25th Percentile | 75th Percentile | England best

Domain		Indicator	Period	Local No total count	Local value	Eng value	Eng worst	England Range	Eng best
Our communities	1	Deprivation score (IMD 2015) #	2015	n/a	28.6	21.8	42.0		5.0
	2	Children in low income families (under 16s)	2013	6,180	25.4	18.6	34.4		5.9
	3	Statutory homelessness†	2014/15	*1	*1	0.9	7.5		0.1
	4	GCSEs achieved†	2014/15	822	53.2	57.3	41.5		76.4
	5	Violent crime (violence offences)	2014/15	1,475	10.9	13.5	31.7		3.4
	6	Long term unemployment	2015	1,008	12.3	4.6	15.7		0.5
Children's and young people's health	7	Smoking status at time of delivery	2014/15	313	23.0	11.4	27.2		2.1
	8	Breastfeeding initiation	2014/15	739	52.8	74.3	47.2		92.9
	9	Obese children (Year 6)	2014/15	299	21.2	19.1	27.8		9.2
	10	Alcohol-specific hospital stays (under 18)	2012/13 - 14/15	56	68.0	36.6	104.4		10.2
	11	Under 18 conceptions	2014	73	31.0	22.8	43.0		5.2
Adults' health and lifestyle	12	Smoking prevalence in adults†	2015	n/a	17.3	16.9	32.3		7.5
	13	Percentage of physically active adults	2015	n/a	50.5	57.0	44.8		69.8
	14	Excess weight in adults	2012 - 14	n/a	71.3	64.6	74.8		46.0
Disease and poor health	15	Cancer diagnosed at early stage #	2014	305	48.6	50.7	36.3		67.2
	16	Hospital stays for self-harm	2014/15	364	278.4	191.4	629.9		58.9
	17	Hospital stays for alcohol-related harm	2014/15	939	695	641	1223		374
	18	Recorded diabetes	2014/15	7,560	6.9	6.4	9.2		3.3
	19	Incidence of TB	2012 - 14	13	3.2	13.5	100.0		0.0
	20	New sexually transmitted infections (STI)	2015	342	409	815	3263		191
	21	Hip fractures in people aged 65 and over	2014/15	156	536	571	745		361
Life expectancy and causes of death	22	Life expectancy at birth (Male)	2012 - 14	n/a	78.6	79.5	74.7		83.3
	23	Life expectancy at birth (Female)	2012 - 14	n/a	82.1	83.2	79.8		86.7
	24	Infant mortality†	2012 - 14	14	3.1	4.0	7.2		0.6
	25	Killed and seriously injured on roads	2012 - 14	121	29.9	39.3	119.4		9.9
	26	Suicide rate†	2012 - 14	38	11.0	10.0			
	27	Deaths from drug misuse #	2012 - 14	9	x^2	3.4			
	28	Smoking related deaths	2012 - 14	888	351.7	274.8	458.1		152.9
	29	Under 75 mortality rate: cardiovascular	2012 - 14	319	81.8	75.7	135.0		39.3
	30	Under 75 mortality rate: cancer	2012 - 14	678	174.5	141.5	195.6		102.9
	31	Excess winter deaths	Aug 2011 - Jul 2014	201	15.1	15.6	31.0		2.3

Indicator notes

1 Index of Multiple Deprivation (IMD) 2015 2 % children (under 16) in low income families 3 Eligible homeless people not in priority need, crude rate per 1,000 households 4 5 A*-C including English & Maths, % pupils at end of key stage 4 resident in local authority 5 Recorded violence against the person crimes, crude rate per 1,000 population 6 Crude rate per 1,000 population aged 16-64 7 % of women who smoke at time of delivery 8 % of all mothers who breastfeed their babies in the first 48hrs after delivery 9 % school children in Year 6 (age 10-11) 10 Persons under 18 admitted to hospital due to alcohol-specific conditions, crude rate per 100,000 population 11 Under-18 conception rate per 1,000 females aged 15-17 (crude rate) 12 Current smokers, Annual Population Survey (APS) 13 % adults achieving at least 150 mins physical activity per week 14 % adults classified as overweight or obese, Active People Survey 15 Experimental statistics - % of cancers diagnosed at stage 1 or 2 16 Directly age sex standardised rate per 100,000 population 17 The number of admissions involving an alcohol-related primary diagnosis or an alcohol-related external cause (narrow definition), directly age standardised rate per 100,000 population 18 % people on GP registers with a recorded diagnosis of diabetes 19 Crude rate per 100,000 population 20 All new diagnoses (excluding Chlamydia under age 25), crude rate per 100,000 population 21 Directly age and sex standardised rate of emergency admissions, per 100,000 population aged 65 and over 22, 23 The average number of years a person would expect to live based on contemporary mortality rates 24 Rate of deaths in infants aged <1 year per 1,000 live births 25 Rate per 100,000 population 26 Directly age standardised mortality rate from suicide and injury of undetermined intent per 100,000 population (aged 10+) 27 Directly age standardised rate per 100,000 population 28 Directly age standardised rate per 100,000 population aged 35 and over 29 Directly age standardised rate per 100,000 population aged under 75 30 Directly age standardised rate per 100,000 population aged under 75 31 Ratio of excess winter deaths (observed winter deaths minus expected deaths based on non-winter deaths) to average non-winter deaths (three years)

† Indicator has had methodological changes so is not directly comparable with previously released values. € "Regional" refers to the former government regions.
# New indicator for Health Profiles 2016. *1 Value suppressed for disclosure control due to small count x^2 Value cannot be calculated as number of cases is too small

More information is available at www.healthprofiles.info and http://fingertips.phe.org.uk/profile/health-profiles Please send any enquiries to healthprofiles@phe.gov.uk

Source: APHO. © Crown Copyright 2016

14.5.11 Infant Mortality

14.115 The infant mortality rate of a population is a helpful health indicator as it is associated with a range of social determinants of health including education, employment and access to health services. The infant mortality rate for

Redcar and Cleveland (3.1 per 1,000 live births) is lower than that of the country average (4 per 1,000 live births).

14.5.12 Road Traffic

14.116 It can be seen that considerable variation exists between the rate per 100,000 people killed or injured on roads in Redcar and Cleveland (29.9) and the rate for England (39.3). This could be due to the lower rate of car ownership in the Wards considered, or increased investment in road safety measures in the area.

14.5.13 Summary

14.117 Redcar and Cleveland experiences higher levels of deprivation compared with country-wide figures, but is broadly consistent with the averages for the North East region. Dormanstown Ward itself is less deprived compared with surrounding wards but is often ranked in the lowest decile nationally for indicators of deprivation, suggesting this area is more vulnerable than the surrounding areas for health impacts.

14.118 In terms of educational performance and qualifications, much of Redcar and Cleveland performs below the England average with regard to its skills base. This trend is also evident for employment and health deprivation, with Dormanstown Ward often falling into the most deprived area nationally.

14.119 The proportion of residents in Dormanstown Ward and surrounding wards who rate their health as 'very good and good' is lower than the unitary authority, regional and national averages. Therefore, the resident population of Dormanstown Ward generally performs worse for a number of health indicators compared to the rest of the unitary authority and the region generally and may be more susceptible to health impacts arising from the Project.

14.5.14 The Future Baseline

14.120 At the national level, future trends in public health are intrinsically linked to the economy (1), with significant financial pressures on services for the next 15 to 20 years. This trend will be concurrent with an increasingly aging population placing greater pressure on health services. For some health determinants there are likely to be positive impacts on public health from factors such as: rising educational attainment, improved working and living conditions, and greater access to green space. However, such improvements could be balanced or reversed by a stagnant economy or recession. In the longer term climate change may force up the price of foods and energy, with particular effects on those on low income or reliant on the state pension, and potential secondary effects on the health of these elements of the population.

(1) see eg the King's Fund Future Trends Overview, https://www.kingsfund.org.uk/publications/future-trends-overview

Other health factors stem from life-style and behaviours, eg current trends in obesity, inactivity and the incidence of Type 2 diabetes all suggest problems continuing into the future. Ambient environment also has an influence on public health. With regard to those aspects of the ambient environment that the Project will interact with and which are important to public health, the next 20 years or so are likely to see improved air quality as control of industrial emissions advances and electric vehicles begin to replace the petrol and diesel fleets and improved noise amenity in homes through better acoustic insulation building standards.

14.6 ASSESSMENT OF IMPACTS AND EFFECTS

14.6.1 Introduction

14.121 The effects on health that have been considered in this ES relate primarily to those arising from emissions to water and land quality/ contamination (*Chapter 6*) emissions to air (*Chapter 7*), noise and vibration (*Chapter 8*), traffic (*Chapter 10*), landscape and visual (*Chapter 11*) and socio-economic characteristics (*Chapter 13*).

14.122 Health effects are described under the following headings that reflect health determinants and health pathways:

- Air Quality and Dust
- Noise
- Transport
- Landscape and Visual Effects
- Accidents and Trespass
- Socio Economic Issues
- Social Capital

14.6.2 Air Quality and Dust

- Health Pathway: construction dust, construction traffic and road traffic.
- Health Determinant: living environment.
- Receptors: residents in the local area.
- Vulnerable Groups: those near to construction activities.

Potential Impacts during Construction

14.123 Construction activities will result in a temporary increase in dust emissions and exhaust emissions from haulage vehicles and machinery.

14.124 The air quality assessment concluded that as the Project is close to existing industrial areas, and these facilities are sensitive to dust ingress and susceptible to damage due to ingress of dust, mitigation measures for a high risk site will need to be implemented. The nearest residential receptors are approximately 600 m away, which is beyond the distance to which construction dust would be transported especially with mitigation in place.

Therefore there is no potential for negative health effects associated with dust deposition and worsened air quality during construction; no impact is predicted on human health during construction.

14.125 The predicted increase in airborne pollutant concentrations from construction traffic is considered negligible (see *Section 7.4.2)*.

Potential Impacts during Operation

14.126 During operation, the annual mean NOx concentration shows there are no significant effects on human health due to air quality impacts at any location. For the 1 hour mean, there is predicted to be a moderate impact at the maximum off-site location. However, due to the Predicted Environmental Concentration ('PEC') being well below 50% of the Air Quality Strategy ('AQS'), due to the low baseline, this is not considered to be sufficient to warrant further mitigation. This is illustrated in *Figure 7.5* and *Figure 7.6* for annual mean NO_2 and 1 hour mean NO_2 respectively and tabulated in *Table 7.15 NO_2 Annual Mean and 1 Hour Mean.*

14.127 No sensitive receptors were judged to be potentially affected by odour emissions during operation in the ES and it was screened out of the assessment (see also *Table 14.1*).

14.6.3 Noise

- Health Pathway: construction road traffic, construction site activities and operation.
- Health Determinant: living environment.
- Receptors: residents in the local area.
- Vulnerable Groups: elderly, young and shift workers.

Potential Impacts during Construction

14.128 Activities including the use of excavators, dump trucks and generators could cause a general increase in noise in the area during construction. The results indicate that the modelled noise levels are below the BS 5228 criterion of 65 dB LAeq and therefore no significant effects are expected as a result of on-site construction activities.

14.129 In regards construction traffic the modelling predicts an increase in noise levels of less than 1 dB(A) on any road link which is used by construction vehicles. Since this is below the criterion of 3 dB(A) no significant effect is predicted.

Potential Impacts during Operation

14.130 The noise assessment concludes that during Project operation, the noise level during the night will be at or below 40 dB(A) at four noise sensitive receptors (NSR). At NSR 1 (Derwentwater Road Grangetown) and 1a (Shakespeare

Avenue, Grangetown) the initial assessment indicates that noise levels are below a level which is likely to result in an adverse impact, when the changes over ambient (or baseline noise level) are considered in their context. At NSR 2 (High Street Lackenby) and NSR 3 (Lazenby: closest houses to the Project site) the initial assessment indicated a low potential impact dependent on context.

14.131 The modelling also indicates there will be a number of receptors situated further from the Project and which will experience very small increases in noise above existing levels. The predicted Project noise levels are below 39 dB(A) which is likely to be minimal, and not significant.

14.132 Consistent heightened noise levels can affect the health of local people with impacts including stress, annoyance and a decreased sense of wellbeing. The predicted noise level meets the lower end of the range of criteria employed to avoid sleep disturbance (ie 40 to 45 dB(A) from BS 8223). The noise resulting from the Project is unlikely to result in sleep disturbance although some noise may be audible outside of the domestic properties. Since it is reasonable to assume that most people are inside their building at night, the effects are not considered to be significant at any residential location.

14.133 During construction the external use of mobile plant will be restricted and the majority of deliveries will be received during the daytime period to limit possible noise.

14.6.4 Traffic and Transport

- Health Pathway: road and construction traffic.
- Health Determinant: transport
- Receptors: residents in close proximity, pedestrians, cyclists and redistributed traffic.
- Vulnerable Groups: elderly and children.

Potential Impacts during Construction

14.134 The transport assessment concludes that during construction there will be additional traffic on the surrounding road network. However, the increase in traffic due to construction traffic is not significant and unlikely to have a significant effect on other road users and pedestrians.

14.135 It is not anticipated that there will be an increased likelihood of accidents occurring along the main transport routes being used by the Project. This is due to the low percentage increases in traffic associated with construction, as well as the location and design of access to the site.

Potential Impacts during Operation

14.136 The transport assessment served to demonstrate that the capacity of the existing junctions, coupled with the negligible magnitude of change from the operation of the Project, means that the impact on driver delay will not be

significant chiefly due to the limited traffic associated with the operation of the facility.

14.6.5 Visual Effects

- Health Pathway: construction activities, facility building.
- Health Determinant: living environment.
- Receptors: residents of Redcar and Cleveland.
- Vulnerable Groups: those near to construction activities.

Potential Impacts during Construction

14.137 Visual disturbances during construction include:

- clearance of hard core and breakout of concrete;
- construction of temporary structures;
- site preparation and compaction;
- introduction of tall construction machinery, including cranes;
- introduction of construction laydown areas, which will be used for machinery and material storage and may include site compounds for safety;
- plant and vehicle movements; and
- introduction of construction site lighting, especially during the winter months.

14.138 The temporary visual disturbances listed above may have the potential to affect people's health, although the low level activity will not be visible to the majority of receptors due to intervening screening between them and the Project Site.

14.139 The landscape and visual assessment concludes that construction of the Project is likely to have no significant effect on the character of the area or at viewpoints within the study area and it is unlikely that the changes to the landscape would lead to negative health effects. This is a product of a number of factors, the primary one being that the Project Site location is within the Wilton International Site (which is zoned for industrial uses) and therefore development on it does not significantly change the character of the local area. Furthermore the Project site historically housed a similar sized gas-fired power plant.

Potential Impacts during Operation

14.140 Once operational, the Project would lead to permanent effects on a number of viewpoints through the presence of new structures in the landscape immediately west of the existing Ensus bioethanol plant, including a number of elements such as the main block, two high stacks of up to 75 m and 25 m tall cooling tower blocks as well as the introduction of additional site lighting for operational safety. However, none of these effects are expected to be

minor or not significant and it is unlikely that the changes to the landscape would lead to negative health effects.

14.6.6 Accident and Trespass

- Health Pathway: community disruption and access to services.
- Health Determinant: living environment/ physical environment
- Receptors: residents near to the site.
- Vulnerable Groups: children.

Potential Impacts during Construction

14.141 Access to the Project Site during construction will be restricted to people working on the Project, meaning the likelihood of an incident occurring involving a member of the public is low. This will be enforced using perimeter fencing and security at access points.

Potential Impacts during Operation

14.142 The likelihood of trespass incidents or accidents occurring during operation is unlikely with the facility being entirely fenced, with a secure access point and manned 24 hours a day by site staff. Any materials and waste products will be securely stored in accordance with applicable standards, requirements and bunded tanks within the Project, limiting the chance of harmful chemicals affecting the health of the local community from vandalism.

14.6.7 Socio-Economic Issues

- Health Pathway: employment opportunities.
- Health Determinant: employment.
- Receptors: business owners, residents of Redcar and Cleveland.
- Vulnerable Groups: business owners, those with low socio-economic status.

Potential Impacts during Construction

14.143 Construction will result in an increase in the number of direct and indirect employment opportunities in the area. The construction phase is expected to generate 98 Full Time Employment ('FTE') jobs spread over the construction period for Scenario One and employment for 131 FTE jobs spread over the construction period for Scenario Two with a proportion of these jobs being based in the local area (see also *Chapter 13*).

14.144 These opportunities would mean an increase in employment and associated income in the area, which will in-turn lead to health benefits associated with wellbeing. However, employment (both direct and indirect) associated benefits with the construction phase will be of a temporary nature and will therefore only bring transient health benefits to those who find employment. Health benefits will be greater if this employment is taken up by individuals who are currently unemployed. Re-employment and the associated benefits will be influenced by the level of construction that is occurring in the region.

Overall, these associated health benefits are unlikely to be considerable as they will be temporary.

14.145 Construction activity associated with the Project and increased levels of demand within the supply chain is likely to result in a temporary increase in economic output. This investment in the area could raise the income and living standards of local people, thus improving their health and wellbeing during the construction period.

Potential Impacts during Operation

14.146 The Project is expected to create 247 FTE jobs (60 as a direct result of the Project and approximately 187 jobs within the local economy).

14.147 The greatest community level health benefits will be felt if these positions are filled by previously unemployed people. Generally, health benefits such as increased lifespan, decreased illness and improved wellbeing will be experienced by those employed during the operation phase. Unlike the construction period, these benefits will be permanent.

14.148 In addition to supporting regeneration and enhancing employment opportunities with the local area through the application of a training and employment management plan, the Project will also support ongoing gross value added (GVA) generation. This revenue may be invested in the local area on services such as education, transport links or directly on health care. Therefore, there is the possibility that GVA generation resulting from the Project may improve health and wellbeing across Redcar and Cleveland.

14.6.8 Social Capital

- Health Pathway: community disruption and changes to living environment.
- Health Determinant: social capital.
- Receptors: residents of Redcar Cleveland.
- Vulnerable Groups: elderly, children and those with low socio-economic status.

Potential Impacts during Construction

14.149 Construction works are unlikely to significantly affect social networks, trust and support in the local community of Redcar and Cleveland. While noise and visual effects associated with construction activities can reduce people's pleasure of living in an area, the existing character of the area is predominantly industrial meaning the magnitude of change is lessened. However, stress and annoyance from changes to traffic flows and the fear of perceived health effects associated with any increased construction activity can make individuals more susceptible to mental health issues.

14.150 Construction workers are also unlikely to affect the social capital of local communities with workers mostly remaining within the site boundaries and a proportion of the work force being sourced locally. There will not be any

construction accommodation erected in the locality, meaning potential feelings of mistrust, fear of crime and decreased health are unlikely to manifest in local communities.

14.151 Once construction ends, the amount of on-site will staff reduce significantly, associated noise and visual effects will also lessen. Any potential effects on social capital and subsequent health impacts during construction will therefore be temporary.

Potential Impacts during Operation

14.152 Operation is also unlikely to affect social capital in communities close to the site. Increased numbers of people in the area can often disturb the social capital of existing communities, with people feeling less safe, which can reduce community interaction and worsen health. While the Project will employ approximately 60 people, some of which may be from outside the local area, this does not represent a large influx of people that would have a significant detrimental effect in an area that is already predominantly industrial.

14.153 While the transport assessment has concluded that the traffic movements during operation for the Project represent a small increase in local traffic, the perceived increase in journey times arising from the presence of HGVs could deter people from making journeys and reduce social participation levels.

14.6.9 EMF

Potential Impacts during Construction

14.154 There are no predicted impacts associated with EMF during construction.

Potential Impacts during Operation

14.155 As the National Grid substations already exist for this Project, there will be no new EMF effects associated with their use for the Project.

14.156 Measures will be implemented to protect operational staff from potential EMF effects associated with the existing substations. As National Grid will adopt the accepted design codes, no significant health effects in the medium to long-term for operational staff are predicted, based on the voluntary code of practice produced by Department of Energy and Climate Change and publicly available data.

14.6.10 Assessment of Effects during Decommissioning

14.157 This assessment assumes a scenario whereby decommissioning would require all components of the Project to be removed. The nature of potential health effects would therefore be similar to those anticipated during construction. However, the magnitude and therefore significance of health effects may be slightly less than those anticipated during construction due to the shorter

duration and intensity of decommissioning activities in comparison with construction. If a less intensive approach to decommissioning is used the employment and economic effects may be less than those reported here. Temporary disruption to the local community and reduced amenity for directly affected properties may occur during decommissioning, as a result of increased traffic, air quality, dust and noise, landscape and visual effects. These effects will be appropriately managed and no greater than negligible adverse effects are anticipated in respect of disruption to local communities.

14.7 HIA RECOMMENDATIONS

14.158 In addition to those mitigation measures set out in the ES for topics like noise and dust control, the following measures will be adopted to minimise the negative effects on health.

14.7.1 Construction Mitigation

14.159 The following measures specific to construction (see also *Chapter* 17 and the CEMP in *Annex L*) will be adopted.

- A community complaints procedure will be established and advertised widely, including the steps that will be taken once a complaint is received and the timescale in which a response and resolution can be expected.
- Information regarding construction activities will be communicated throughout the construction period to the most local communities via channels such as community meetings and the Project website.
- The Project will ensure the construction site area is secure and not vulnerable to trespass through adequate fencing and if appropriate the use of security guards.
- The Project will implement a Construction Traffic Management Plan (see *Annex I.2*), which is critical in minimising Road Traffic Accidents during construction.

14.7.2 Operational Mitigation

14.160 The following measures specific to operation will be adopted throughout the lifetime of the Project.

- Police and emergency services will be informed of any issues related to site safety and access.
- Local employment and procurement will be encouraged. If feasible, and available, local suppliers will be used for goods and services. Jobs created by the scheme will also be advertised and made available in the local area initially.

14.7.3 Conclusions

14.161 In conclusion, while there are potential public health effects during construction and operation of the Project with regard to factors such as noise, air quality and traffic these have been assessed to be not significant and are all amenable to mitigation measures (as summarised in *Chapter 17*).