15 OTHER ISSUES

15.1 INTRODUCTION

This chapter of the Environmental Statement (ES) describes and assesses the potential effects of the proposed Spicer Hill Wind Farm ('the Development') on the following issues:

- Air Quality and Climate; and
- Health and Safety Considerations.

15.2 METHODOLOGY

Baseline conditions have been established through desk-based assessment and consultation in relation to the above issues where appropriate. The methods of assessment for the various subjects considered within this chapter are described in greater detail in the relevant sections below.

15.2.1 Consultation

As a part of the Scoping process (that was carried out in August 2007 for the original 5-turbine application), the relevant organisations were contacted with regard to the proposal.

A consultation response from the Highways Agency refers to the Spatial Planning Advice Note: SP 02/06[1], which advises as a good practice that wind farms should be sited such that oncoming vehicles have a clear and continuous view along the length of the carriageway. Good approach visibility will help in avoiding any visual and noise distractions for the drivers.

The Spatial Planning Advice Note has been updated since the last consultation and the chapter refers to the new guidance published in 2007[2] in the sections below.

15.3 AIR QUALITY AND CLIMATE

This section considers the positive and negative contributions that the Development may make towards air quality, dust and greenhouse gas emissions as a result of the construction, operation and de-commissioning phases of the Development.

15.3.1 Construction

The movement of vehicles and plant on site would create exhaust emissions. In addition, construction activities have the potential to create a dust nuisance in dry, windy conditions.

On-site plant has the potential to release emissions during the construction phase of the Development. As a consequence of the relatively small scale nature of the Development in combination with the high degree of dispersion of airborne pollutants that would occur prior to reaching sensitive receptors (nearby dwellings) , the nearest of which is approximately 450 m from the nearest proposed turbine, emissions originating from on-site plant are considered to be negligible.

The movement of soils and rubble during construction and site preparation activities may result in the generation of airborne soil dust. The occurrence and significance of dust generated by earth moving operations is extremely difficult to estimate, and depends upon meteorological and ground conditions at the time and locations of the earth works.

[1] Highways Agency (2006) 'Spatial Planning Advice Note: Planning Applications for Wind Turbines sited near to Trunk Roads'
[2] Highways Agency (2007) 'Spatial Planning Advice Note: Wind farms Good Practice Guide'

Airborne soil dust generated in such a manner is typically coarse and therefore remains airborne for short periods only. US Environmental Protection Agency (US EPA) research[3] shows that in excess of 90% of total airborne dust returns to rest within 100 m of the emission source and over 98% within 250 m. Construction dust is therefore only expected to represent a potential nuisance to exposed human receptors (residential properties) at distances of less than 250 m of the construction activities. The nearest residential property is located approximately 450 m from proposed construction activities, and therefore effects associated with dust creation during site preparation and construction are considered to be negligible.

Given the short-term nature of the construction period, and the distances to the nearest residential properties, impacts on local air quality are likely to be negligible.

15.3.2 Operation

The purpose of the Development is to generate electricity from a renewable source of energy, therefore offsetting the need for power generation through the combustion of fossil fuels. Consequently, any electricity generated by the Development would result in a reduction of emissions of carbon dioxide (CO_2) with associated environmental benefit.

During its operational lifespan the Development has the potential to displace electricity generated from fossil fuels and consequently prevents CO_2 from being released. The actual amount of CO_2 released through electricity generation in the UK relates directly to the generating plant in use at any given time. This mix changes on a daily basis and will change in the future as UK generating plant is replaced and fuel costs change, as a consequence it is not possible to predict exactly how much CO_2 release the wind farm will prevent over its lifetime.

The Business Enterprise and Regulatory Reform (BERR) Digest of UK Energy Statistics 2008[4] states that, in 2007, 405 tonnes of CO_2 were released each gigawatt hour (GWh) when generating electricity from gas; this increased to 939 tonnes per GWh when generation was from coal. The average CO_2 release from the fossil fuel mix, which also includes oil, was 643 tonnes per GWh.

On this basis the Development, with an estimated energy yield of approximately 16.5 GWh (6.9 MW installed capacity) per year[5], would displace a minimum of 6,682 tonnes of CO_2 emissions each year from entering the atmosphere[6]. The actual savings will depend on which source of electricity generation the wind farm generating capacity is displacing at any given time.

The operation of the Development has the potential, based on the same assumptions, to also displace other gases related to coal-fired electricity generation including those associated with acid rain such as sulphur dioxide (SO_2) and oxides of nitrogen (NO_X).

15.3.3 CO_2 Emissions Lifecycle of a Wind Farm

CO_2 emissions will also result throughout the entire life of a wind farm including construction, maintenance and decommissioning such as from steel and cement production and transport. However such emissions are involved in building any conventional electricity plant. Conventional fossil fuelled electricity plants have the additional CO_2 emissions from

[3] USEPA AP42, Fifth Edition, *Compilation of Air Pollutant Emission Factors: Volume 1, Stationary Point and Area Sources*

[4] BERR (2008) '*Digest of UK Energy Statistics 2008'* (DUKES 2008) Pg 124 [Chapter 5 Electricity, Table 5C. Figures for 2007] (www.berr.gov.uk/energy/statistics/publications/dukes/page45537.html)

[5] Assuming a capacity factor of 27.3% (taken from Table 7.4 in BERR DUKES 2008)

[6] Based on displacement of electricity generated by gas for 2007 (405 tonnes of CO_2 per GWh) that is considered to be an underestimate of the emissions of CO_2 displaced by the operation of the Development.

procurement and burning of fossil fuel energy sources during operation which increases their impact.

The Parliamentary Office of Science and Technology (October 2006) compared the life cycle CO_2 emissions of different electricity generation systems used in the UK[7]. This found that coal burning power systems have the largest carbon footprint of all the electricity generation systems analysed, having up to 1000 g of CO_2-equivalent per kilowatt hour (kWh) of generation (1000 gCO_2eq/kWh). The carbon footprint of fossil fuelled power plants is dominated by emissions during their operation.

In contrast, it finds that electricity from wind energy has one of the lowest carbon footprints with nearly all of the emissions arising during the manufacturing and construction phases (such as from the production of steel and concrete which account for 98% of the total life cycle CO_2 emissions). The carbon footprint for onshore wind energy is given as only 4.64 gCO_2eq/kWh.

When taking account of the full life cycle emissions of CO_2, a wind farm therefore emits far less CO_2 per unit of energy from construction, maintenance and operation than conventional fossil fuelled electricity plants such as coal, oil and gas.

15.3.4 Decommissioning

Effects from this phase of the Development will be similar to those generated during the construction phase.

15.4 HEALTH AND SAFETY CONSIDERATIONS

15.4.1 Introduction

This section contains a range of health and safety considerations that are considered relevant to the construction, operation and de-commissioning of wind farms:

- Driver distraction;
- Safety of structures in extreme weather conditions; and
- Health and safety procedures during construction, operation and de-commissioning including the Construction (Design and Management) (CDM) Regulations 2007.

15.4.2 Driver Distraction

A Companion Guide to PPS22[8] states that *"Drivers are faced with a number of varied and competing distractions during any normal journey, including advertising hoardings, which are deliberately designed to attract attention…Wind turbines should therefore not be treated any differently from other distractions a driver must face and should not be considered particularly hazardous. There are now a large number of wind farms adjoining or close to road networks and there has been no history of accidents at any of them."*

In 2004, Faber Maunsell undertook a research project[9] reviewing accident records surrounding wind farms. The results showed no significant increase in the number of accidents before and after construction of the wind farm.

Each of the turbines within the Development layout is located beyond the minimum separation distances between roads and wind turbines, which is advised as tip height plus 50

[7] Parliamentary Office of Science and Technology(2006) "*Carbon Footprint of Electricity Generation*" Postnote Number 268
[8] Office of the Deputy Prime Minister (ODPM) (2004) '*Planning for Renewable Energy A Companion Guide to PPS22*.'
[9] Faber Maunsell, (2004) '*Review of Accident Data Surrounding Wind Farms across the UK*.'

m by Highways Agency Guidance[10] *i.e.* 151 m for this Development. The nearest turbine (*i.e.* turbine number 2, as shown in Figure 1.2) is located approximately 154 m from the Spicer House Lane. Consequently, it is considered unlikely that driver distraction will occur as a result of the Development.

15.4.3 Effects of Weather

Due to the exposed nature of wind farm sites, wind turbines are designed to withstand extreme weather conditions.

14.1.1.1 Extreme Winds

Modern turbines are fitted with sensors which will automatically shut down and brake the turbines should very high wind speeds occur which exceed safe operating limits. This prevents excessive wear on the gear box.

14.1.1.2 Lightning Strike

Modern turbines are equipped with lightning protection equipment. If lightning occurs, the equipment will effectively and safely conduct the lighting strike into the earth.

14.1.1.3 Icing

In certain meteorological conditions, such as still, cold weather, it is possible for ice to form on the rotor blades. If this occurs, two types of hazard may result:

- Ice fragments thrown from the rotor; and
- Ice fall from the turbines while shut down.

Ice throw has been observed to be a higher risk in very cold climatic conditions, for example in the high latitudes of Scandinavia or very high altitudes in mainland Europe. Ice fall occurs if ice collects on the turbine and falls to the ground when the ice begins to melt. This would occur when the temperature warms following a period of extreme cold weather conditions.

Due to the more temperate climate of the United Kingdom when compared to Scandinavia or high altitudes in mainland Europe, the potential for ice throw to occur is considered to be minor[11]. Further, the Companion Guide to PPS22 states that *"The build-up of ice on turbine blades is unlikely to present problems on the majority of the sites in England. For ice to build up on wind turbines particular weather conditions are required, that in England occur for less than one day per year."*

The Development layout has been designed to ensure that the rotor blades do not over sail any public road or recreational routes, hence minimising risk from ice fall. The low risk of ice throw would be further minimised by fitting the turbines with vibration sensors (or other ice detection measures) which detect any imbalance which might be caused by icing, in which case the affected turbine/s would be shut down temporarily until normal balance is restored.

Operational procedures would also be put in place to ensure the safety of both workers and the public in relation to ice throw and ice fall. In addition to temporary turbine shut down, other procedures could include warning signage.

[10] Highways Agency (2007) Network Strategy Spatial Planning Advice Note: SP04/07 Planning Applications for Wind Turbines sited near to Trunk Roads.

[11] *Wind Energy Production in Cold Climates* (WECO) ETSU W/11/00452/REP (2008) ' Icing Map – Figure 4' (http://www.fmi.fi/research_meteorology/meteorology_9.html)

15.4.4 Other Health and Safety Issues

A comprehensive health and safety assessment would be carried out prior to construction by the selected constructor in accordance with legislation. This will be initially addressed as part of the pre-tender process. A Construction, Design and Management (CDM) co-ordinator will be appointed and be responsible for the provision of pre-construction information pack, as required under the Construction (Design and Management) Regulations 2007. The appointed contractor will be required to provide a construction phase plan. The information presented within this ES provides an outline of the issues to be addressed.

14.1.1.4 Design and Construction

The layout and design of the wind farm takes into account the following considerations:

- Site boundary;
- Location and prevention of contact with underground and overhead services;
- Public access and safety;
- Other structures on site;
- Access and egress;
- Traffic control;
- Stability of slopes; and
- Effects of the design life of the structures.

The construction of the site would be managed in accordance with the Health and Safety at Work etc. Act 1974[12] and would comply with all other relevant Health and Safety Regulations, including:

- The Construction (Health, Safety and Welfare) Regulations 1996;
- The Construction (Design and Management) Regulations 2007; and
- The Electricity Safety, Quality and Continuity Regulations 2002.

The site would operate to the BWEA '*Guidelines for Health and Safety in the Wind Energy Industry*'[13]. Potentially hazardous areas such as foundation excavations would be fenced and signed as appropriate.

14.1.1.5 Risk Assessment

In order to effectively guard against the risk of accidents, a clear system of identifying hazards and implementing effective control measures would be put into place. The most effective manner of achieving this is through clear, concise risk analysis.

This will take place at three different levels during the lifetime of the Development:

- Designers will undertake a design review to design out in so far as is practicable any risks associated with the project. Those risks that cannot be designed out will be highlighted to the principal contractor within a pre-tender health and safety plan in the form of clear concise risk assessments;
- The principal contractor will be responsible for carrying out regular risk assessments for all operations that have an inherent risk of severe injury; and
- The designers and the principal contractor will liaise in order to produce risk assessments for all remaining residual risks involving the day-to-day running and maintenance operations and eventual decommissioning of the Development.

[12] Health and Safety Executive (1974) Health and Safety at Work *etc.* Act 1974. (http://www.hse.gov.uk/legislation/hswa.pdf)
13 BWEA (2008) 'Guidelines for Health & Safety at Work etc'. http://www.bwea.com/pdf/HSGuidelines.pdf

14.1.1.6 Health and Safety File

A competent, adequately resourced site supervisor would be appointed for the works. All relevant information relating to health and safety would be passed on to the site supervisor. The site supervisor will notify the relevant safety authorities and prepare the pre-tender health and safety plan and ensure that a construction phase health and safety plan is adequately developed. The site supervisor will collate information from the designers and principal contractor to produce a health and safety file for the project.

The site health and safety file will be completed as soon as is possible after the construction of the Development. It will contain all relevant health and safety information relating to the Development in relation to the day to day running and maintenance operations and eventual decommissioning of the Development. It is the owner's duty to hold and make available any information contained in the file to anyone who would need such information.

14.1.1.7 Operation

A Supervisory Control and Data Acquisition (SCADA) system monitors the Development's performance and should a fault occur a message is automatically sent to the engineer preventing emergency situations from occurring.

Warning signs and security infrastructure would be in place around the substation and control building to ensure public safety, as described in Chapter 3: *Project Description* of this ES.

15.5 SUMMARY OF EFFECTS

A summary of the potential and residual effects and mitigation discussed in this chapter is included in Table 14.2.

Table 14.2 Summary of Effects Table

Potential Effect	Mitigation	Residual Effect
Construction Effects		
Dust Nuisance	Use of water sprays and good construction practices	Not significant
Site Health and Safety	Relevant health & safety regulations and guidelines will be followed to ensure safe design and construction of the wind farm site.	Not significant
Operational Effects		
Emissions savings	None necessary	Positive effect from CO_2 emission savings during wind farm's 25 year operational lifetime.
Site Health and Safety	Relevant health and safety regulations and guidelines will be followed to ensure safe operation of the wind farm site.	Not significant
Driver Distraction	None necessary	Not significant
Effects of Weather	Sensors and protection equipment fitted to turbines and operational procedures to mitigate any risks.	Not significant
Decommissioning Effects		
Site Health and Safety	Relevant health and safety regulations and guidelines will be followed to ensure safe decommissioning of the wind farm site.	Not significant

15.6 STATEMENT OF SIGNIFICANCE

The Development will have a benefit of emission savings. Each year of the 25 year operational life, it would displace a minimum of 6,682 tonnes of CO_2 emissions. Even when taking account of the full life cycle emissions of CO_2, a wind farm emits far less CO_2 per unit of energy from construction, maintenance and operation than conventional fossil fuelled electricity plants such as coal, oil and gas.

Any health and safety risks will be addressed through mitigation measures and normal construction and operational procedures. All relevant legislation will be adhered to during all phases of the Development. The implementation of current best practice and technology will be used so as to minimise any health and safety risks that might be associated with the Development. The implementation of the construction design and management principles will result in a wind farm built, operated and maintained to the highest standards of safety.

The Development would not cause any decrease in highway safety due to driver distraction. Sensors and protection equipment will be fitted to turbines and operational procedures followed to mitigate any safety risks associated with extreme weather.