

Crook Hill Wind Farm

Environmental Statement

January 2007

**Volume 1
Non Technical Summary**

PREFACE

This Non Technical Summary (NTS) has been prepared in support of a planning application for the proposed Crook Hill Wind Farm located north of Rochdale above Watergrove Reservoir in the Metropolitan Borough of Rochdale. The NTS is a summary of the full Written Statement presented in Volume 2 of this Environmental Statement (ES).

The Ordnance Survey grid reference for the centre of the site is 3925 4195 and its location is shown in Figure 1. The planning application is for twelve (12) wind turbines, each typically up to 3 Megawatts (MW) in capacity, ancillary equipment and on site infrastructure for a period of twenty-five years (25) for the purposes of generating renewable energy through wind power.

The wind turbine design detailed in this ES comprises a three bladed rotor that is up to ninety (90) metres in diameter supported on an (up to) eighty (80) metre high cylindrical/lattice tower to give a maximum tip height of up to 125m. The planning application also comprises an (up to) eighty (80) metre fixed lattice anemometry mast to monitor and optimise the performance of Crook Hill Wind Farm wind turbines. All components of the project are displayed in Figure 2.

Planning permission to erect a 60m temporary anemometry mast to measure wind speed and direction was granted in August 2006. This has been erected on site and will operate for 18 months before decommissioning.

This NTS has been prepared and compiled by renewable energy consultancy, Dulas Ltd, following the undertaking of an Environmental Impact Assessment (EIA) of the proposed wind farm scheme. Dulas has over 20 years' experience in renewable energy development and planning, and its combined technical and environmental understanding of wind farm development coupled with a detailed knowledge of impact avoidance and mitigation has led to Dulas' involvement in over 50 renewable energy projects throughout the United Kingdom.

The Environmental Impact Assessment team has been assembled with the intention of conducting a thorough, objective assessment of all the environmental effects likely to arise as a result of the proposed development. The specialist advice and support was delivered by the following external, independent consultancies, each of which also has extensive experience in renewable energy planning and environmental assessments:

Landscape and Visual Assessment (LVA)

Axis PED
Chester Enterprise Centre
Hoole Bridge
Chester
CH2 3NE

Noise Assessment

Hayes Mackenzie Partnership
Lodge Park
Tre'r ddol
Machynlleth
Powys
SY20 8PL

Ecological Assessment

Ecology Matters
Bronhaul
Pentrebach
Talybont
Ceredigion
SY24 5EH

Archaeological Assessment

AOC Archaeology Group
Edgefield Industrial Estate
Loanhead
EH20 9SY

Photomontages and Wireframes

Phil Marsh
5b Hope Bowdler
Church Stretton
Shropshire SY6 7DD

Construction, Operation and Decommissioning

Project Management Support Services
Ton y Bwlch
Blaenwynlais
Caerphilly
CF83 1NG

Hydrogeology

Sinclair Knight Mertz
Alberton House
St Mary's Parsonage
Manchester
M3 2WJ

Transport Access Analysis

Faber Maunsell
3rd Floor
8 Princes Parade
Princess Docks
Liverpool
L3 1QH

Mining Studies

N.A. Brown
Tugela
Strawberry Gardens
Penally
Tenby
SA70 7QF

Planning Appraisal

David Stewart Associates
Selgars House
Uffculme
Cullompton
Devon
EX15 3DA

Twenty (20) copies of the four volume Environmental Statement have been produced for submission with the planning applications to both Councils. In addition multiple copies of the ES on CD have been produced for distribution to other stakeholders and the local communities, which are available from Rochdale and Calderdale MBCs.

For further copies of the Environmental Statement (at a cost of £180) or CD copies (at a cost of £15) please contact:

Michael Phillips
Dulas Ltd
Unit 1, Dyfi Eco Parc
Machynlleth
Powys
SY20 8AX

Tel: 01654 705015
Fax: 01654 703000
E-mail: michael.phillips@dulas.org.uk

The contact for Coronation Power Ltd, the Developer, is:

Vickram Mirchandani
Crown House
108 Aldersgate
London
EC1A 4JQ

A copy of this NTS and the full ES is on display at Rochdale MBC Council offices and Calderdale MBC planning offices in Halifax. In addition, download copies of the Non Technical Summary and some Figures are available at www.coronationpower.com

1 INTRODUCTION

1.1 The Proposal

1.1.1 Introduction

1.1.1.1 The Crook Hill Wind Farm proposal is for the installation of twelve (12) wind turbines, ancillary equipment and on site infrastructure for a period of twenty-five (25) years on land located above Watergrove Reservoir, north of Rochdale in the Metropolitan Boroughs of Rochdale and Calderdale. The main part of the wind farm site on Crook Hill is common land and is under the ownership of the Lord of the Manor of Rochdale. The access track from Calderbrook to the proposed wind farm site is on private land also owned by the Lord of the Manor.

1.1.1.2 Part of the wind farm infrastructure is located within Rochdale MBC administrative area (seven (7) wind turbines and associated infrastructure) whilst the remaining five (5) wind turbines and associated infrastructure is located in Calderdale MBC administrative area. Consequently, planning applications have been prepared for both these local planning authorities (LPAs) for the respective wind farm components located in each LPA. This Environmental Statement presents assessments of impact for the entire wind farm scheme and will be submitted alongside the planning applications to both LPAs.

1.1.1.3 The proposal is known as the Crook Hill Wind Farm and its location is shown in Figure 1. The proposed wind turbine locations are shown in Figure 2. Each wind turbine would typically have a generating capacity of up to 3 Megawatts (MW), and would be a three-bladed design with a maximum tip height of up to 125m. The Developer, Coronation Power Limited, is bound to adhere to European Union procurement law for the procurement of goods and services, which exceed a total contract value of €473,890. The final choice of wind turbine would therefore follow a competitive tendering process where qualifying wind turbines would be required to meet the standards and specifications set out within this Environmental Statement. Qualifying wind turbines of this capacity may have slightly differing dimensions, such as a 60m tower with a 40m blade or a 70m

tower with a 40m blade. The Developer is applying for planning consent for wind turbines with a maximum tip height of 125m, to encompass these minor variances across the wind turbine market.

1.1.1.4 This NTS and the full assessments presented in the ES are based upon one of these qualifying wind turbines, the Vestas V90 3MW machine, an illustration of which is shown in Figure 3, but the assessments herein contained take account of the potential for minor variations in the dimensions of qualifying turbines. The V90 wind turbine has a height to the centre of the nacelle of up to 80m and a rotor diameter of up to 90m, giving an overall height from ground to tip of up to 125m.

1.1.1.5 On this basis the total installed capacity of Crook Hill Wind Farm would amount to 36MW. Based upon calculated wind regime for the site, this translates to approximately 94,608¹ Megawatt-hours (MWhrs) per annum, which is equivalent to the annual average energy needs of approximately 20,129 homes (based on an average energy consumption per household of 4700 Kilowatt Hours (kWhrs) per year²). The Crook Hill Wind Farm would therefore provide energy equivalent to the domestic consumption of approximately 12.24% of homes in the Rochdale and Calderdale MBC areas which is clean, economic and renewable (based on 2001 census figures of 83,452 and 80,937 houses respectively). Importantly, the proposal will contribute to the reduction of greenhouse gas emissions to the atmosphere, which are scientifically shown to be a major contributor to and determinant of climate change, and will constitute a commitment by Rochdale and Calderdale MBCs to the attainment of national and regional renewable energy targets for the United Kingdom. Such benefits are now, as established by Planning Policy Statement 22: Renewable Energy (2004) and the recent Energy Review

¹ This figure is calculated by multiplying the capacity of the site (36MW) by the number of hours in the year (8760) by the typical capacity factor (0.3).

² Figure derived UK Digest of Energy Statistics, DTI, 2005.

(2006), material considerations in any planning application for renewable energy projects and should be considered by the local planning authority when determining such an application.

1.1.1.6 The recent energy review, The Energy Challenge (July 2006), sets out the Statement of National Need for Renewable Energy in Annex D.

1.1.1.7 Within the Statement of Need, the Government emphasises the following:

New renewable projects may not always appear to convey any particular local benefit, but they provide crucial national benefits. Individual renewable projects are part of a growing proportion of low-carbon generation that provides benefits shared by all communities both through reduced emissions and more diverse supplies of energy, which helps the reliability of our supplies. This factor is a material consideration to which all participants in the planning system should give significant weight when considering renewable proposals ... The benefits to society and the wider economy as a whole are significant and this must be reflected in the weight given to these considerations by decision makers in reaching their decisions.

1.1.1.8 Clearly, the above Statement of National Need has to be balanced in the development control process against the need to ensure proposals accord with local development plan guidance and with national legislation for the protection of natural resources and assets. The ES provides the detailed assessments and information necessary to enable the local planning authority to achieve such a balance of opinion.

1.1.2 Wind Turbine Selection

1.1.2.1 Qualifying wind turbines would be required to meet the standards and specifications set out within the ES: they would have to conform to the design, structural, noise and other standards and specifications cited in the ES, including the application maximum tip height of up to 125 metres.

1.1.2.2 In the event that Crook Hill Wind Farm is consented, tenders would be issued to wind turbine manufacturers which would present the standards and specifications to which

the turbine would have to accord.

1.1.2.3 Qualifying wind turbines may have slightly differing dimensions and may be smaller than 125m to tip, such as a 70 metre tower with a 40 metre blade or a 65 metre tower with a 45 metre blade, for example. The Developer is applying for planning consent for wind turbines with a maximum tip height of 125 metres, to encompass the variances across the wind turbine market.

1.1.2.4 However, broadly, and without prejudice to the likely candidates, turbines that may qualify include those presented below:

Manufacturer	Model	Capacity
<i>Nordex</i>	N80	2.5 MW
<i>Vestas</i>	V80 V90	2 MW 2 or 3 MW
<i>Clipper</i>	Liberty 2.5MW	2.5 MW
<i>Gamesa</i>	G80	2 MW
<i>Repower</i>	MM82	2 MW
<i>Siemens</i>	SWT 2.3	2.3 MW
<i>GE Wind</i>	GEWE	2.7 MW
<i>Enercon</i>	E70	2 MW

1.1.3 The Siting of Wind Turbines

1.1.3.1 The proposed wind turbine layout is based on a balance between numerous on-site micro constraints (such as ecology, hydrology, archaeology, distance from footpaths, distance from households and microwave links), minimum separation distances between turbines (to avoid turbulence impacts to nearby turbines which may reduce performance and increase operation and maintenance costs), and aesthetic appearance.

1.1.3.2 Within the available site area, the Developer then endeavoured to optimise the capacity of the site to ensure the maximum generating output, and hence the contribution the site would have to national and local policy goals in respect of climate change, environmental pollution and security of energy supply.

1.2 Proposed Grid Connection Route

1.2.1 At the substation and switchgear facility on the proposed wind farm site (see location on Figure 2) the electricity generated by the wind farm would be metered and exported to the local electricity distribution network. The connection would be the subject of a separate application under Section 37 of the Electricity Act 1989 and would be the responsibility of United Utilities. Consequently, the grid connection for the wind farm does not form part of the planning application for the Crook Hill Wind Farm.

1.2.2 Preliminary feasibility studies have established that the likely grid connection options would be:

- 33kV busbar connection at Littleborough 33/6.6kV substation
- 33kV busbar connection at Whitworth 33/6.6kV substation

1.3 Access to the Crook Hill Wind Farm

1.3.1 All equipment and plant will access the wind farm site via the M62, M627 and A58. Sections of the road will require use of the full width of the carriageway for long loads and hence such loads would require a police escort. The Developer will schedule deliveries of abnormal loads outside of peak traffic times and in agreement with the police and Highways authority. The access will utilise the Calderbrook Road off the A58. At the point where the Higher Calderbrook Road splits close to the chapel a new site entrance bellmouth would be constructed to accommodate site construction and turbine transportation vehicles (see Figure 2). Part of this bellmouth will have a sealed surface in order to help avoid construction materials entering the road carriageway.

1.3.2 An entirely new access track across open land would have to be constructed as presented in Figure 2. This route presents a challenge in terms of engineering construction due to the gradient and peat deposits but a feasibility study by Faber Maunsell has established that a viable access can be situated

on the land.

1.3.3 The transport vehicles would pass along this track up the gradient to the wind farm area. A temporary site compound would be constructed at the top of the main site access track on an area of flat ground. Where appropriate, suitable engineering methods would have to be employed to ensure that the site tracks do not cause unacceptable impacts to hydrological flows and features across the site and consequently do not lead to unacceptable ecological impacts. Effective drainage ditches, for example, will have to be constructed alongside the new tracks, which would have to be fed into existing channels and drains across the site. Appropriate silt traps would have to be installed to prevent the run off of loose material. The details of engineering designs, construction methods and appropriate mitigation would be agreed with the relevant local planning authorities as part of a Construction Method Statement if agreement in principle on the route is reached.

1.4 Construction Activities, Timing and Vehicle Movements

1.4.1 The construction programme (see Table 1.1 at the end of this Section) will consist of the following main operations, with certain operations taking place concurrently:

- Construct site entrance off the Higher Calderbrook Road
- Construct the new access track to the wind farm area and construct new track to wind turbine locations and substation
- Construct temporary site compound and install accommodation
- Excavate the wind turbine and monitoring mast foundations and construct the turbine and mast bases
- Construct crane hardstanding areas at wind turbines
- Construct substation and compound
- Excavate cable trenches and lay the power and instrumentation cables

- Install the grid connection
- Erect and commission the wind turbines
- Erect the monitoring mast and
- Carry out reinstatement works, remove temporary accommodation and clear the site.

1.4.2 The installation of the grid connection would be the responsibility of United Utilities.

1.4.3 The construction of the Crook Hill Wind Farm would be completed in approximately 12 months. An outline construction programme is presented in Table 1.1 at the end of this section.

1.4.4 The total number of vehicle movements to and from the site for the twelve month period would be 3,870.

1.4.5 The most intense period of vehicle activity would be during the pouring of concrete for the turbine bases. Each base would require approximately 55 ready mix concrete deliveries a 1 day (assuming a single pour). It is expected that during the days for concrete pouring the working day would be at least 12 hours to ensure a single pour and therefore it is estimated that on average there will be a return trip for a concrete truck every 13 minutes. It is estimated that one of the four bases would be completed in any one week. In addition, other lorries and personnel would also be required to travel to site at regular intervals during the same day; however these would be minimized to days when concrete pouring is taking place.

1.4.6 Given that the average number of vehicle movements involved in the construction of the wind farm has been estimated at approximately 10 per day (based on a 6 day working week), impacts upon normal vehicle movements has been estimated at 55 in any one day, which would be experienced over 12 hours when the concrete for the turbine bases is being delivered on five non-consecutive days over an 15 week timeframe. During these days, impacts upon normal vehicle movements should be regarded as moderate. Further consultations with policy and the local Highways officers will establish a clear approach and methodology to managing vehicles entering and leaving the site so that potential congestion and accidents are avoided.

1.5 Description of the Proposed Wind Farm Site

1.5.1 The site is located approximately 2.5km north west of the centre of Littleborough and approximately 5km north-north-east of Rochdale city centre. The wind turbines would be located on Crook Hill and Shore Moor in the Metropolitan Boroughs of Rochdale and Calderdale. Watergrove Reservoir is located approximately 1km south west of the nearest wind turbine.

1.5.2 Crook Hill and Shore Moor is an exposed area of upland moorland surrounded by urban development, namely Rochdale, Wardle, Littleborough and Waldsden. To the north the site extends towards Inchfield Moor which is also open moorland.

1.5.3 The key characteristics of the area around the site, as defined by the Countryside Character Map for the Southern Pennines, are:

- Large-scale sweeping landform with an open character created by exposed gritstone moors at an altitude of 400 m – 450 m, deeply trenched by narrow valleys and wooded cloughs.
- Mosaic of mixed moorland and blanket bog with enclosed pasture of varying qualities at lower elevations, largely defined by dry stone walls.
- Valuable wildlife habitats on the open moorland and the moorland fringe including semi-natural boggy mires, acid flashes and wooded cloughs.
- Reservoirs common throughout the area.
- Densely populated valley bottoms with stone buildings extended along valley sides set against the backdrop of the moorland tops.
- Gritstone towns centred around key features of industrial heritage such as textile mills and other industrial development mainly in the valley but with a group of older settlements on the moorland fringe.
- Main road, rail canal routes located along valley bottoms. Historic packhorse trails traversing the exposed moorland tops.

- Intrusive features, including windfarm developments, numerous transmission masts, overhead power lines and sandstone, gritstone and clay quarries, mainly on the fringe of the area.
- Extensive views from elevated locations in all directions.

1.5.4 The land use is generally agricultural grazing on common land but is also used for amenity by walkers and horse riders. The majority of the site is typified by poor quality peat bog habitat, which has been drained for agriculture.

1.5.5 The solid geology of the site consists predominantly of the Upper Carboniferous age Lower Coal Measures. The Lower Coal Measures in the area of Crook Hill consist of Woodhead Hill Rock and Bullion Mine Rock sandstones and grits interbedded with the Lower Mountain Mine, Lower Foot and Bassy coal seams. Seven geological faults transect the site. These are clustered in the southern section of the site. One of the larger faults trends north east to south west to the north of Turn Slack Dam. From this fault three faults radiate from it trending north west to south east generally.

1.5.6 The drift geology of the site comprises peat soils and Boulder Clay between frequent outcrops of the Lower Coal Measures.

1.5.7 Soils across the flatter areas of the site predominantly belong to the Winter Hill association, described as thick very acid raw peat soils, perennially wet and hagged and eroded in places. Remaining soils in peripheral areas comprise the Belmont Association (coarse loamy very acid upland soils over a wet peaty surface horizon and thin iron pan) and Rivington 2 Association (well drained coarse loamy soils over bedrock). To the south west of the site towards Watergrove Reservoir soils are classified as the Wilcocks 1 Association being slowly permeable seasonally waterlogged fine loamy and loamy over clayey upland soils with a peaty surface horizon.

1.5.8 The site area was formerly forested but was cleared for agriculture and game shooting. The site also has a history of coal mining and there are extensive underground mine workings and visible surface mining features.

1.6 The Developer

1.6.1 The Crook Hill Wind Farm proposal is proposed by Coronation Power Limited (the Developer) which is a London-based company developing wind projects in the UK. The company states that its goal is to “*develop, own and operate wind farms that strike a fair balance between sustainability, the environment and economic investment, and at all times work in partnership with local communities*”.

1.6.2 The Crook Hill Wind Farm proposal site was selected in line with the Developer’s site selection philosophy to avoid nationally designated landscapes and ecologically significant areas. Through Geographical Information Systems (GIS) constraints mapping of the entire North East and North West of England region, followed by more detailed site reconnaissance visits, a number of potential wind farm development areas were identified in the regions. Of the potential sites selected, a number went forward for detailed feasibility studies. Where a potential site was deemed suitable for wind energy development, the Developer approached the landowners to determine whether they would be interested in the potential for a wind energy development on their land. Where the landowners were interested in such potential, the Developer entered into an agreement to develop the land subject to the statutory planning and environmental requirements.

1.7 Purpose of the Environmental Statement

1.7.1 The full Environmental Statement (ES), including this NTS, has been prepared by Dulas Ltd to accompany planning applications by the Developer to Rochdale and Calderdale MBCs under the Town and County Planning Act 1990. This ES presents the information that will enable Rochdale and Calderdale MBCs, Statutory Consultees, non statutory interest parties and members of the public to assess the environmental effects and benefits of the Crook Hill Wind Farm proposal.

1.7.2 This NTS and ES have been prepared in accordance with the requirements of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations

1999 (Statutory Instrument 1999 No. 293). It was the understanding of the Developer that a full Environmental Impact Assessment (EIA) would be required for this proposal as it clearly exceeded the threshold criteria stated in DETR Circular 02/99 (Annex A: A15, "... EIA is more likely to be required for commercial developments of five or more turbines, or more than 5MW of new generating capacity."), which further refines and interprets the Schedule 2 criteria laid out in Statutory Instrument 1999 No. 293.

1.7.3 In fulfilment of the Scoping Opinion and the obligation to conduct an Environmental Impact Assessment, this ES sets out to:

- Explain the site selection process that has determined the identification of the Crook Hill Wind Farm site, and justify the selection of the site and its components in light of national, regional and local planning policy guidance.
- Describe the physical characteristics of the proposed wind turbines, their land use requirements during construction, operation and decommissioning, and the associated ancillary infrastructure required for establishment and operation of the site.
- Describe the existing environmental character of the application site and the surrounding area in respect of the environmental attributes likely to be affected by the proposal.
- Assess and predict the possible environmental effects of the wind turbines and associated infrastructure.
- Describe the measures which will be taken, or have been incorporated at the design stage, to avoid, offset, reduce or remedy significant adverse environmental effects.
- Provide Rochdale and Calderdale MBCs and consultees with sufficient information to help them come to a decision on the planning application for the proposed Crook Hill Wind Farm.
- Provide the public with detailed information on the proposal and how it will affect their locality, to enable them to formulate their opinion on the

proposal and submit their responses to Rochdale and Calderdale MBCs.

1.7.4 The Crook Hill Wind Farm site was identified through an extensive site selection exercise undertaken by the applicant, which analysed both the technical and environmental issues pertaining to the project, enabling the selection of a wind farm site with minimal constraints and which is technically and economically viable.

1.7.5 It is the belief of Dulas Ltd that mitigation should be undertaken iteratively through the design and scaling of the proposal rather than as a back-end response. Consequently, the proposal being put forward has sought to avoid or mitigate environmental impacts at the design and layout stages. The Crook Hill Wind Farm proposal has therefore resolved any significant problems associated with its development in advance of its implementation, should planning consent be awarded.

1.8 Structure of the Environmental Statement

1.8.1 The Environmental Statement has been prepared in four (4) main volumes:

1.8.2 **Volume 1 – Non Technical Summary:** this volume is a summary of the information provided in the main report, in a manner accessible to all members of the community. The Non Technical Summary (NTS) presents the proposed development and the likely environmental effects of Crook Hill Wind Farm, and the proposed impact avoidance and mitigation measures.

1.8.3 **Volume 2 – Written Statement:** the written statement comprises:

- An introduction and description of the applicant and the consultation process.
- The reasons for site selection and a description of the proposed development.

1.8.4 For each environmental issue identified through the Scoping exercise for the Environmental Impact Assessment (EIA) the following is provided:

- A description of the prevailing baseline conditions.
- An assessment of the likely effects of Crook Hill Wind Farm during construction, operation and decommissioning.
- The measures proposed to avoid or mitigate possible adverse environmental effects.

1.8.5 **Volume 3 – Figures:** Volume 3 comprises the Figures which show the site location, site layout, landscape character maps, the Zone of Theoretical Visibility (ZTV), photomontages and wireframes, sites of ecological and archaeological sensitivity, and mitigation plans. In addition, project plans and schematics relating to the wind turbine types, access roads, hardstandings, substation and other civil engineering construction drawings are supplied.

1.8.6 **Volume 4 – Appendices:** including supporting information relevant to the environmental assessments presented in Volume 2.

1.8.7 In addition to the four volume Environmental Statement, a Planning Appraisal has also been undertaken:

1.8.8 **The Planning Appraisal:** the purpose of the Planning Appraisal is to examine the proposed development in the context of the requirements of the Town and Country Planning Act 1990. The appraisal takes into account:

- Local planning policies
- Regional planning policies
- UK Government energy and environmental policies, including international commitments to reduce greenhouse gas emissions

1.8.9 On this basis, the appraisal assesses the balance between local effects and the local, national and global benefits of wind energy development. In the context of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999, the Planning Appraisal does not form part of the ES.

1.9 Scope of the Assessment

1.9.1 The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (Statutory Instrument No. 293 1999), Part II (1) define an Environmental Statement as a document:

“(a) that includes such of the information referred to in Part I of Schedule 4 as is reasonably required to assess the environmental effects of the development and which the applicant can, having regard in particular to current knowledge and methods of assessment, reasonably required to compile, but

(b) that includes at least the information referred to in Part II of Schedule 4.”

1.9.2 It is noted that presently consultation papers have been issued by the Department for Communities and Local Government that are relevant to this proposal. These papers include the *Amended Circular on Environmental Impact Assessment* and *Environmental Impact Assessment: A guide to good practise and procedures*. The former document, as well as providing prescriptive guidance on screening, scoping, submission procedures and establishing the adequacy of the information provided, presents in Annex C a guide to information to be included in an Environmental Statement, which is relevant to this proposal. The latter document provides guidance to those developments that seek consent through the Town and Country Planning system, also relevant to this proposal.

1.9.3 Further guidance on changes to the development control system, issued again by the Department for Communities and Local Government, has been reviewed, particularly in respect of the requirement for design and access statements to accompany planning applications. Such a statement will accompany the planning application for this proposal.

1.9.4 In respect of the Scoping exercise and the Parts cited above, the Scope of the ES has been developed in the context of Local, Regional and National planning policies, in consultation with the planning officers of Rochdale MBC, and with respect to the comments received from Statutory Consultees

and non-statutory consultees.

1.9.5 A formal scoping meeting was held at the Rochdale MBC offices on the 8th August 2005, attended by representatives of Rochdale MBC and Lancashire County Council. The purpose of this meeting was to facilitate the formulation of a formal Scoping Opinion by Rochdale MBC as required under Part IV of Statutory Instrument 1999 No. 293. The formal Scoping Opinion of Rochdale MBC was subsequently issued in September 2005. The Statutory Consultees and Non-Statutory Consultees listed in sub-Section 1.10 largely provided their inputs through written responses.

1.9.6 The Scoping exercise was clearly undertaken through Rochdale MBC. This was at the time that the wind farm proposal comprised five wind turbines. Since this time the potential capacity of the wind farm site has increased considerably due to the Developer securing additional land in order to increase the size of the proposed scheme and hence the clean energy generation benefits. The increased area of the proposed site now encompasses part of the administrative area of Calderdale MBC. However, for the purposes of the EIA, the Scope of environmental assessments required did not need to be altered except in respect of surveying and assessing effects to the additional land area.

1.9.7 On this basis, the main issues considered in the ES are:

- site selection and project evolution
- construction, operation and decommissioning of the wind farm
- landscape and visibility
- noise
- ecology, including ornithology
- geotechnical issues, particularly past mine workings
- archaeology
- air safeguarding and electro-magnetic interference (EMI)
- ground water protection
- public and private safety, including rights of way

- socio-economic effects and global environmental benefits
- impact avoidance and mitigation measures

1.9.8 The relative importance of each of these issues varies and this is reflected in the level of assessment undertaken in each case. The key issues outlined in the Scoping Opinion were as follows:

1.9.9 **Site Selection and Project Evolution:** a full description of the site selection process for identifying the site, a justification for the selection of the site and its components, and details pertaining to the evolution of the wind farm site design and final wind farm layout.

1.9.10 **Construction, Operation and Decommissioning:** the ES should include details of the construction programme, methodology, site requirements, construction materials, temporary works and highways considerations to allow a sufficient appraisal of the proposal. This should include an assessment of the potential impacts of construction and operational traffic and vehicle access to the site.

1.9.11 **Landscape and Visual Effects:** a full Landscape and Visual Assessment (LVA) should be commissioned over a 20km radius taking into consideration landscape character, landscape designations and main visual receptors. An assessment of the effects to landscape character and visibility, the latter in regard to the main visual receptors, should be undertaken. The landscape and visual assessment should be conducted by an accredited Landscape Architect in accordance with the Landscape Institute and Institute of Environmental Management and Assessment (IEMA) Guidelines for Landscape and Visual Impact Assessment (2002). This will include an assessment of impacts to the historic landscape, listed buildings, historic parks and gardens and conservation areas.

1.9.12 **Noise:** a full noise impact assessment should be undertaken in accordance with the Assessment and Rating of Noise from Wind Farms, DTI Noise Working Group (ETSU R-97). This should include a background noise monitoring exercise of existing noise levels in the area and a prediction of the expected noise impacts to neighbouring properties. The noise

monitoring locations should be agreed with the Environmental Health Department of Rochdale MBC.

1.9.13 **Ecology:** an Ecological Assessment should be undertaken to include a Phase 1/NVC Habitat Survey, mammals (including bats), amphibian and ornithological surveys should be commissioned and an assessment of potential impacts presented.

1.9.14 **Geotechnical and Mines:** a survey of the past use of the site for mining purposes and an assessment of the geotechnical capability of the site to accommodate a wind farm.

1.9.15 **Archaeology:** an archaeological desk-top survey and site walkover should be commissioned, and an assessment of potential impacts conducted in line with the guidelines provided by the Institute of Field Archaeologists.

1.9.16 **Public Safety and Amenity:** an assessment of risks to public access and safety should be undertaken, particularly in relation to public footpaths, bridleways, rights of way and wayleaves and in consultation with the Borough Public Rights Of Way Officer and the County Council. This should include shadow flicker, driver distraction, buried and unexploded ordnance and pollution

1.9.17 **Electromagnetic Interference (EMI) and Air Safeguarding:** potential effects to EMI transmissions and air safeguarding interests should be assessed.

1.9.18 **Socio-Economic Effects and Global Environmental Benefits:** the expected impact on the local economy of the proposal should be assessed, including an overall appraisal of the local tourist industry and employment opportunities.

1.9.19 **Ground Water Protection:** an assessment of potential polluting effects to Groundwater Source Protection Zone 2 should be undertaken, together with avoidance and mitigation of any potential effects.

1.9.20 **Avoidance and Mitigation Measures:** a description of the recommended avoidance and mitigation measures to reduce potential negative impacts to acceptable levels should be provided,

including proposals to reinstate hedgerows and tree planting in the local area as appropriate.

1.10 Consultations

1.10.1 Statutory and Non-Statutory Consultations

1.10.1.1 The following consultees have been approached for information and guidance in the course of the preparation of the Scoping Opinion and ES:

- Rochdale MBC Planning Services
- Rochdale MBC Environmental Health Department
- Lancashire County Council Public Rights of Way Officer
- Lancashire County Council Environment and Transport Services
- Lancashire County Council Archaeological Services
- English Nature
- English Heritage
- Lancashire Wildlife Trust
- Royal Society for the Protection of Birds
- Highways Agency
- Environment Agency
- GO North West

1.10.1.2 In addition, air safeguarding and electro-magnetic interference consultations were undertaken with the following bodies:

- Ministry of Defence
- National Air Traffic Services
- Civil Aviation Authority
- Crown Castle (for BBC Research)
- Castle Transmission
- Radio Communications Agency (now OfCom)
- Home Office
- ITC (now OfCom)
- O₂

- Mercury Communication
- NTL
- British Telecom
- MLL Telecom
- T Mobile
- Vodafone
- Orange
- Cable and Wireless

1.10.2 Public Consultation:

1.10.2.1 In addition to the consultations with the planning authority and the statutory consultees, public consultations were undertaken by the Developer and these included:

- Set up of online public enquiry and feedback internet facility through the Coronation Power website, which has been advertised to the public throughout the development of the wind farm site. This facility has allowed the public to directly contact the Developer with comments and questions on the proposed wind farm scheme.
- Appointment of a Community Liaison Officer who has been the point of contact between the Developer and local communities and individuals throughout the development of the proposal.
- Public exhibitions at the Coach House, Littleborough May 17th and 18th and again on 9th and 10th November 2006.
- Community meetings as follows:
 - 6th July, Wardle Community Centre, Wardle Society
 - 14 July and 23 August, Coach House Littleborough, Littleborough Community Forum
 - 30th August, Rochdale Police Station, Rochdale Police Inspector's Advisory Group
 - 20th September, home meeting, Allerscholes Residents Group
 - 6th September, Lobden Golf Club, Crook Hill Commoners

- Ongoing presentations to interested local groups.

1.10.2.2 The purpose of the two public exhibitions was to introduce the potential scheme, to seek an understanding of the issues that were a concern to local residents and, in the case of the pre planning exhibition, to discuss final plans and to consider any recommended issues or comments in the finalised layout of the proposed wind farm. The initial exhibitions allowed the Developer to consider any recommended issues or comments in the finalised layout of the proposed wind farm.

1.10.2.3 The Developer undertook considerable effort in the publicity relating to the exhibitions, as follows:

- Press release to local media
- Send out of letters to all consultees
- Distribution of exhibition posters to shops, libraries, council offices and the exhibition venue
- Distribution of exhibition hand bills
- Mailshot to local councilors and MPs

1.10.2.4 It has been estimated that approximately 100 people attended the first of the exhibitions and approximately 100 people attended the second exhibition.

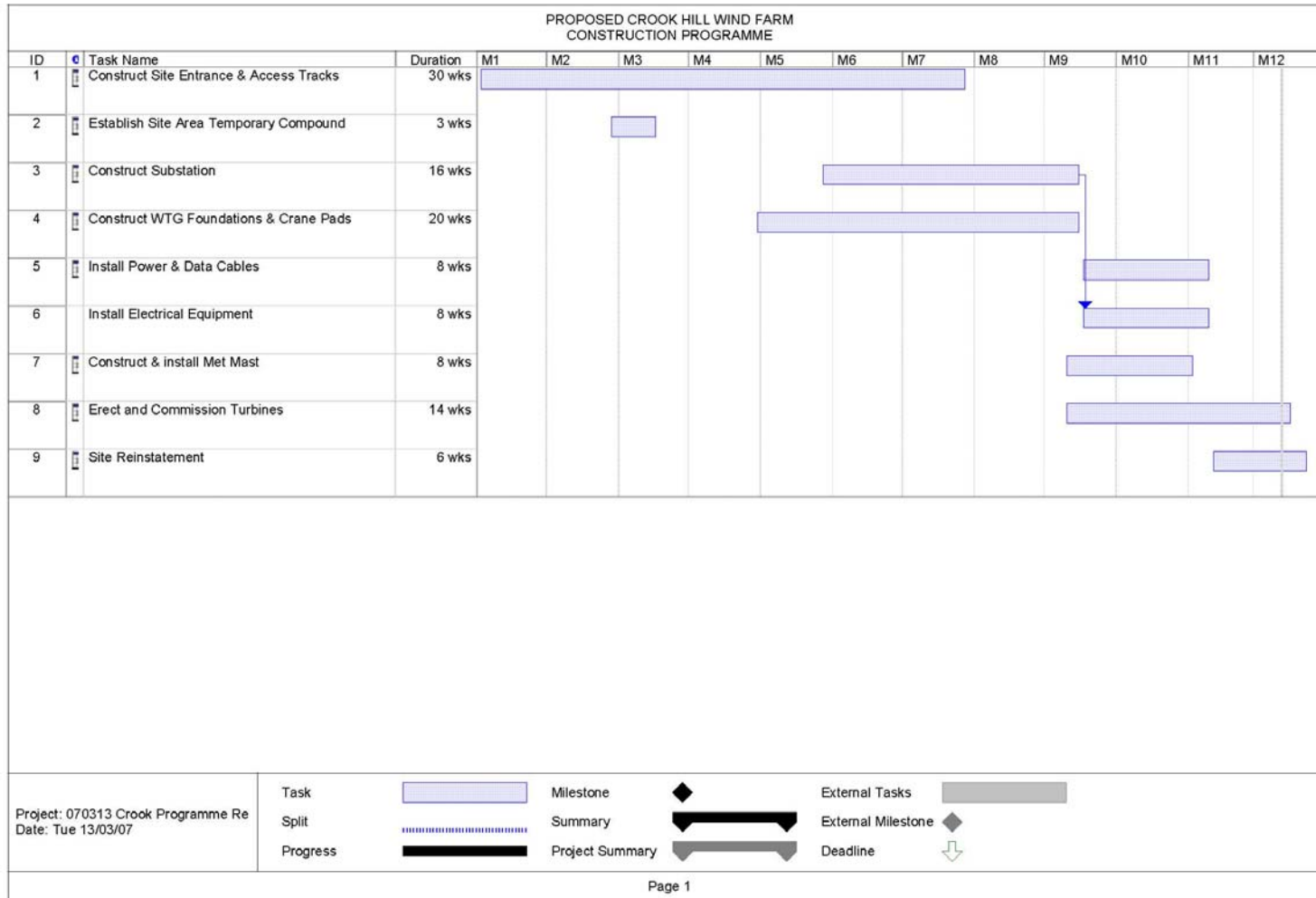
1.10.2.5 The main questions raised by those persons attending the exhibitions centred on the following broad areas:

- Hydrology – what would be the impact on private potable water supplies and the general hydrology of the area?
- Ecology – what would be effect to upland birds, kestrel and peat bog habitats?
- Foundations – how big will the foundations for the wind turbines be?
- Property Prices – what evidence is there of wind farms affecting property prices?
- Visuals – what would the wind farm look like from their property and why did the wind turbines have to be so large?
- Site Selection and Layout – why is the Developer looking at a scheme at this

- site and what has influenced the siting of wind turbines?
- Electricity Generation – what would be the output of the scheme, how many homes would this be equivalent to, and would the electricity be exported from the area?
 - Proliferation of wind farms – will there be other wind farms in the area through the same developer?
 - Transport – how will construction vehicles get to the site?

1.10.2.6 The Developer has sought to address these issues by commissioning Dulas Ltd to ensure that such issues are considered and assessed in an Environmental Statement. Where issues have not been addressed, both in terms of Scoping responses and public requests, the individual assessments explain why this is so.

Table 1.1: Outline Construction Timetable



2 ENVIRONMENTAL ASSESSMENT

2.1 Introduction

2.1.1 In the following sub-Sections summaries are given of the site selection process, how the wind farm layout has evolved over time, and the findings of the specific environmental assessments undertaken of the final proposed wind farm scheme.

2.2 Site Selection

2.2.1 Background to Site Selection

Site Selection Process

2.2.1.1 In 2004, IT Power was commissioned by the Developer to identify areas in the North West region, comprising Cumbria, Lancashire, Greater Manchester, Merseyside and Cheshire, and western parts of Yorkshire where technical and environmental constraints exist that would be likely to prevent wind farm developments. The objective of the regional assessment was therefore to identify areas in the North West of England where wind farms would be appropriate in the context of the current guidance at that time. Particular attention was given to International planning designations (e.g. RAMSAR sites under the Wetland Convention), National designations (e.g. National Parks and Areas of Outstanding Natural Beauty) and Local designations, and a review of County Structure plans.

2.2.1.2 Technical constraints were also addressed, including Electromagnetic Interference (EMI), aeronautical interests such as radar and air traffic control, and existing wind energy projects. Further technical constraints, which have little or no implication on the planning process, but will have an effect on the viability of developments, including the local proximity of the electricity distribution network and windspeeds, were also examined.

Constraints Mapping

2.2.1.3 A Geographic Information System (GIS), ArcView, was employed to map the technical and environmental constraints, which

allowed areas with few constraints to be readily identified. The existence of a few constraints in an area did not necessarily preclude its selection, although areas with a high concentration of a particular feature (e.g. SSSIs) were avoided.

2.2.2 Technical Criteria

2.2.2.1 The following technical criteria were considered in the selection of the Crook Hill Wind Farm site:

Electrical Connection

2.2.2.2 A study by Econnect (specialists in grid distribution systems) has confirmed that there are two potential options for connecting the Crook Hill Wind Farm to the 33kV network, both of which would be suitable for a wind farm of 36MW capacity: a 33kV busbar connection at Whitworth 33/6.6kV substation; and 33kV busbar connection at Littleborough 33/11kV substation. The first option would require a new line of approximately 3.5km to the substation at Whitworth, predominantly across moorland. The second option would require routing of the grid connection to Littleborough for a distance of approximately 3km, across open moorland somewhere between Clough and Calderbrook to the Littleborough substation.

Road Access

2.2.2.1 All equipment and plant will access the wind farm site via the M62, A640, A6644 and A58. A route would then be taken onto the Calderbrook Road from the A58. Generally the access arrangements along the Calderbrook Road are viable for the movement of turbine delivery and construction vehicles, although strict traffic management procedures would need to be in place to ensure safety on the roads and to avoid periods of congestion.

2.2.2.2 On the Higher Calderbrook Road, a new site entrance bellmouth would be constructed next to the church to accommodate the turbine transportation and construction vehicles.

Wind Resource

2.2.2.3 The Department of Trade and Industry

wind speed database (ETSU NOABL) contains estimates of the annual mean wind speed throughout the UK. The data is the result of an air flow model that estimates the effect of topography on wind speed. There is no allowance for the effect of local thermally driven winds such as sea breezes or mountain/valley breezes. The model was applied with 1km square resolution and makes no allowance for topography on a small scale or local surface roughness (such as tall crops, stone walls, or trees), both of which may have a considerable effect on the wind speed. The data can only be used as a guide and should be followed by on-site measurements for a proper assessment.

2.2.2.4 Each value stored in the NOABL database is the estimated average for a 1km square at options of 10m, 25m or 45m above ground level. The database uses the Ordnance Survey grid system for both Great Britain and Northern Ireland.

2.2.2.5 Investigation of the NOABL database provided a preliminary confirmation that there are high enough wind speeds at the site to generate electricity economically.

2.2.2.6 Whilst the economic viability of the site based on the available wind resource is largely a matter for the developer, the NOABL reading for the centre of the site (NGR 389, 422) is 7.8 metres per second at a 45 metre hub height. This windspeed, if modelled upwards to the proposed 80m hub height of the Crook Hill Wind Farm turbines, clearly exhibits that a viable wind resource is available for effective operation and performance of the wind farm site. Typically, wind energy developers seek sites with a minimum 6 metres per second wind speed in order to ensure the economic viability of a wind farm. The Crook Hill Wind Farm proposal is clearly in exceedance of this figure.

Current Land Use

2.2.2.7 The development site is given over primarily to grazing use, and comprises common access land under the Countryside Rights of Way Act 2000. No current land uses would preclude the development of a wind farm scheme on the Crook Hill site. With delineation of the working areas, careful programming and close liaison with the landowner and commoners, the existing land use at the

development site can be retained during the construction period thereby presenting minimal impact upon existing practices.

2.2.2.8 Public rights of way through the site would be subject to temporary diversions during the construction of the wind farm site, if necessary.

2.2.2.9 One further use of the proposed site that is relevant to the proposal is the presence of a model airplane flying club which occasionally uses the south east corner of Crook Hill.

2.2.3 Wind Farm Evolution at Crook Hill

2.2.3.1 Once the site selection process identified the Crook Hill Wind Farm site as a suitable location for wind energy development, provisional designs and layouts of the wind farm were drawn up. The designs informed the Scoping exercise whereby Rochdale MBC and Statutory Consultees could review the provisional layouts and provide guidance on the issues to be covered by this Environmental Impact Assessment.

2.2.3.2 A number of iterative changes to the site design and layout have occurred since the Scoping consultations. This is because the individual assessments have informed the generation of new wind farm designs and layouts so that environmental and technical media, particularly existing telecommunications links, ecological constraints, footpath provisions, the noise environment, hydrology features, previous mine working and slopes too great for wind farm infrastructure could all be accounted for. Any proposed changes to the wind farm design and layout required further assessment by the independent consultants to highlight any issues which may need to be considered.

2.2.3.3 Central to the changes that have taken place to the site design and layout was the acquisition of an additional area which could be included as part of the wind farm scheme. This noticeably increased the site area and therefore the opportunity to increase the output of a potential scheme.

2.2.3.4 Wind turbine locations are dictated by a number of environmental factors as well as technical issues. For example, it is necessary to space wind turbines between 3 and 5 rotor diameters apart, depending on the wind turbine

make and model, in order to minimise wake effects between the wind turbines so that they do not hinder the performance of other wind turbines. Where wind turbines are spaced too closely together, they can interfere with natural wind flows and consequently create greater turbulence between the wind turbines. This will reduce their generating performance whilst increasing the potential wear and tear on the wind turbines. This in turn would create greater Operation and Maintenance costs, which should be avoided through adequate wind turbine spacing if possible.

2.2.3.5 Iterations to the wind farm layout were further influenced by the following constraints:

Hydrology

2.2.3.6 In the centre of the site flowing south from Stubble Cross Hill is a tributary to Tarn Slack Dam. This tributary is heavily incised into the bed rock and forms along the Lower Foot Coal Seam. Considerable scree banks of up to 9.0m were observed along this tributary and under high rainfall this tributary may have significant flow. This area should be avoided for the location of wind turbines and access tracks.

2.2.3.7 It was recommended that the area around Blue Pot Brook is avoided as this is another significantly incised tributary that may have considerable flow in high rainfall. Blue Pot Brook also feeds into a small reservoir and Long Clough Brook.

2.2.3.8 It was also recommended that wind turbines be located in areas away from deep tributary gullies and coal seams to prevent increases in the sediment load of the tributaries and to prevent water quality from deteriorating. This is important as many of the tributaries feed small reservoirs.

2.2.3.9 Micro-siting of turbines was required to ensure there is a sufficient buffer between them and gullies / streams on site. A recommended minimum of 15-20m stand off has been accommodated.

2.2.3.10 It was further noted that extensive peat deposits are present across the site and that appropriate construction and engineering designs be used to protect the overall integrity of the peat habitat.

Mines

2.2.3.11 The mining assessment has indicated that the site is extensively undermined by old coal mining and also by mining of fireclay.

2.2.3.12 There are significant hazards to the proposed development, in the form of old shafts and adits, uncharted crop workings, crow n-holes, collapse of shallow mine workings and subsidence from deeper workings.

2.2.3.13 There are also numerous small quarries, some of which appear to be partially backfilled, and could also pose a risk to the development.

2.2.3.14 On the basis of the available information, hazard zones have been defined which are the areas most at risk from the mining hazards.

2.2.3.15 Following a walk-over survey, it has been possible to further refine the hazard zone boundaries. The proposed turbine locations and access tracks do not appear to be currently affected by shafts, adits, crow n-holes or subsidence features.

Ecology

2.2.3.16 The principal constraint to wind farm development at the Crook Hill Wind Farm site is upland breeding waders. Upland waders with protective status have been identified as nesting during the breeding bird season on site. Exclusion zones around these nesting sites have been established to avoid disturbance effects to nest sites.

2.2.3.17 In addition, extensive peat deposits across the site have been identified. The quality of the peat habitats has been assessed as poor due to overgrazing and land improvement over time. However, the overall integrity of the peat habitats should be respected where possible through the consideration of suitable construction and engineering designs.

Archaeology

2.2.3.18 Low sensitivity archaeological remains have been identified but these have not impacted on the layout of the proposed wind farm.

Noise

2.2.3.19 Throughout all the iterations to the layout of the Crook Hill Wind Farm potential

noise effects have been assessed in conjunction with the specialist noise consultant Hayes-McKenzie Partnership Ltd. This informed the Developer as to the suitability of the new wind turbine locations in terms of preventing any potential noise nuisance.

2.2.3.20 The Developer has applied the same noise criteria for landowner properties occupied by tenants as for private residences. This was achieved by striking a balance between noise effects and visual impact. It was seen that by improving site design, noise at nearby properties can be kept within the limits set out in the DTI Noise Working Group Guidance (ETSU R-97). This is the standard methodology, endorsed by PPS22, for the undertaking of noise impacts assessments for wind farms.

Public Rights of Way and Common Land

2.2.3.21 Due to the network of public rights of way throughout the site it has not been possible to accommodate a fall over distance of wind farms from public footpaths. However, given that the majority of the site is open access under CROW 2000, such a fall over distance would not achieve the potential safety requirements given that the public will be able to walk up to the wind turbine bases. It has, however, been possible to avoid oversail of the public rights of way by wind turbine blades.

2.2.3.22 In the case of the Pennine Bridleway, a separation distance of 300 metres has been accommodated, greater than the distance recommended by the British Horse Society.

2.2.3.23 It should be noted that in the history of wind turbine operation in the UK, there has not been one incident of injury or threat to users of public rights of way.

Final Layout Design

2.2.3.24 The final layout of the Crook Hill Wind Farm proposal has taken account of the known constraints discussed above in the siting of wind farm infrastructure. Through avoidance of these known constraints, significant impacts to the environmental attributes of the site have been negated. Lesser residual impacts may still arise, proposals for the mitigation for which and included in this NTS and the ES.

2.3 Project Construction, Operation and Decommissioning

2.3.1 The civils design and wind farm layout for the Crook Hill Wind Farm would be technically viable given the site conditions as long as construction and operational requirements are undertaken in accordance with relevant legislation and guidance, and in consultation with the planning authority and other relevant consultees.

2.3.1.1 Whilst it has been determined that the construction of the Crook Hill Wind Farm would be technically achievable without causing unacceptable impacts to the environment (as established through the environmental assessments presented in the ES – the summary results of which are reported in this NTS), the following design modifications and considerations have been recommended by the civils consultant and consequently incorporated into the design and layout of the Crook Hill Wind Farm proposal:

- All construction works will be carried out in accordance with British Standard 5228, Parts 1 and 2:1997 and Part 4: 1992; Noise and Vibration Control on Construction and Open Sites in order to minimise loss of amenity.
- The Developer will appoint an experienced environmental liaison officer to establish and maintain effective communications between the Developer, contractors, commoners, local community, conservation groups and other users of the development site. In addition the liaison officer shall monitor compliance with the commitments made in the ES and ensure that an Environmental Management Plan is prepared prior to construction of the development.
- It is proposed to incorporate security measures such as a gate at the entrance to the site to prevent unauthorized vehicular access, such proposals being developed in consultation with the Environment Agency and landowners.

- The turbines would be new and of modern design with an expected operational availability of 97%.
- The transformers would be contained within the turbines so that additional external features are not present in the landscape and improve safety and security.
- After commissioning of the Crook Hill Wind Farm, the areas around the tracks and the hardstandings will be reinstated to match the surrounding habitat in accordance with details to be approved by Rochdale and Calderdale MBCs and Natural England (formerly Countryside Agency and English Nature). Though it would be necessary to maintain the state of the access tracks in case a crane is needed for essential maintenance, to a width of 4 metres, the tracks could be allowed to naturally re-vegetate from the construction width of 5 metres. This would reduce the overall land take of the wind farm and allow re-establishment of species at the track edges.
- The Developer is willing to enter into a legally binding agreement to undertake any modifications that may be required and to repair any damage that may occur as a direct result of the temporary highways works.
- The construction of the Crook Hill Wind Farm would incorporate a turbine communication system, which would enable remote monitoring of numerous turbine functions and minimises the need for on-site attendance.
- All onsite 33KV cables between the turbines and the substation would be installed underground, which avoids landscape and visual impact.
- It is recognised that the risk of contaminants coming into contact with the land and entering the water table is highest during the construction period. Control of Substances Hazardous to Health Regulations (COSHH) (2002) would be complied with at all times and with appropriate procedures the risk of contamination will be minimised. A full Method Statement, including management of on-site potential contaminants, will be agreed with Rochdale and Calderdale MBCs prior to construction.
- During construction, the contractors would be limited only to storing sufficient diesel fuel for the plant on site. Surface water drainage within the site compound will drain to the lowest point of the compound and a collection pit incorporating a silt trap will be installed at this point to prevent any contamination of the surrounding watercourses. The storage of diesel fuels and oils would be within a bunded area in accordance with Environment Agency Pollution Prevention Guidelines: Above Ground Oil Storage Tanks (PPG 02). In the event of a spillage, the procedures recommended in PPG 21: Pollution Incident Response Planning would be adopted. Fuller details on the proposed incorporation of this pollution prevention guidance would be provided in a detailed Method Statement to be agreed with relevant authorities in the event that planning consent is awarded.
- The foundation concrete specified is of high strength structural grade, which is not prone to significant leaching of alkalis. The concrete delivery vehicles would be controlled in their washing out on site after pouring thereby ensuring the duty of care is maintained by the contractor.
- Proper draining and containment would be employed during routine servicing of the turbines to prevent spillage of lubricants or hydraulic fluid.
- The turbine transformers to be used in the development will be either sealed units containing non-toxic cooling oil or dry resin transformers. The turbine nacelle or tower base will contain any leakages or spills during operation.
- There would be no long-term storage of lubricants or other petrochemical

products on site during the operations phase. Operation and Maintenance personnel will bring these onto site as and when required and waste coolants will be removed from site after routine maintenance and replaced and disposed of in accordance with environmental guidelines.

- A sustainable building design has been followed for the substation incorporating local materials, solar panels, toilet and rainwater harvesting.
- Construction of turbines will take account of the recommendations for the Ecological Assessment regarding breeding birds. Groundworks activities will be undertaken outside the breeding birds period to avoid disturbance to breeding birds.

2.3.1.2 The above design and layout modifications, combined with appropriate mitigation measures to avoid significant environmental impacts, should ensure the technical and environmental viability of the Crook Hill Wind Farm proposal. However, reference to the other environmental assessments presented in the ES (and summarised herein) will determine the acceptability of such impacts.

2.4 Landscape and Visual Assessment

2.4.1 The landscape and visual assessment (LVA) was undertaken for a study area with a radius of 20km from the centre of the site. The assessment process has been based upon published guidance in 'Guidelines for Landscape and Visual Impact Assessment' (Landscape Institute and Institute of Environmental Management and Assessment (2002)). In addition, reference has been made to 'Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity' (The Countryside Agency/Scottish Natural Heritage (2004)) and 'Guidance for the Cumulative effect of Windfarms' (Scottish Natural Heritage (2004)).

2.4.2 The landscape character assessment has been based on the following published

assessments and site visits:

- Countryside Commission (1998) Countryside Character Volume 2: North West
- Lancashire County Council (2001) A Landscape Strategy for Lancashire;
- Standing Conference of South Pennine Authorities (SCOSPA) The Landscape Character Assessment;
- Standing Conference of South Pennine Authorities (SCOSPA) The Landscape Guidelines;
- Standing Conference of South Pennine Authorities (SCOSPA) The Countryside Design Guide;
- Lovejoy (2005) Landscape Sensitivity to Wind Energy Developments in Lancashire (Lancashire County Council, Blackpool and Blackburn with Darwen Borough Councils), and
- Lancashire County Council (July 2005) Revised Draft Supplementary Planning Guidance: Landscape and Heritage

2.4.3 Planning permission is being sought for a temporary period of 25 years, after which time all turbines and infrastructure would be removed and the land reinstated. Therefore, landscape and visual effects will be temporary and there would be no long term impacts.

2.4.4 The cumulative assessment has considered the in-combination, in-succession and sequential effects of the proposed development with other existing, consented and proposed wind farm developments within a 40km study area.

2.4.5 Effects on Landscape Fabric

2.4.5.1 Generally, the elements of landscape fabric that would be affected are frequently occurring across a wide geographical area and therefore have a low sensitivity to change in a local and regional context. The loss of small areas of this habitat would have a low magnitude of effect resulting in a slight to negligible adverse impact.

2.4.5.2 The proposed access tracks would result in the most significant impact upon the

landscape fabric due to the length of new access track required and the effect upon existing stone walls along the access track and field boundaries on the lower slopes of Shore Moor. The access track would introduce a new feature into the landscape that would have slight adverse impacts due to the removal of boundaries and its relationship with existing features.

2.4.5.3 The turbines themselves would become a component of the landscape fabric for a temporary period of 25 years prior to decommissioning. Following removal, the areas would be reinstated to moorland vegetation restoring the landscape fabric.

2.4.6 Effects on Landscape Character and Quality

2.4.6.1 Twenty seven character areas have been considered. The proposed wind farm at Crook Hill would have no material effect upon the landscape character of twenty of these areas, either because it would not be visible or would be a minor component in views across adjacent landscapes that form an important characteristic of an area.

2.4.6.2 Three of the remaining areas would experience slight or slight to minor effects on landscape character, two would experience moderate effects on landscape character, and two areas (South Pennine Moors and Fragmented Moors) would experience major or major to substantial effects.

2.4.7 Effects on Landscape Designations

2.4.7.1 Eight of the proposed turbines at Crook Hill are located inside the Green Belt for Rochdale MBC and five are located within a Special Landscape Area (SLA) as defined in the Calderdale UDP.

2.4.7.2 Whilst the proposed wind farm at Crook Hill would introduce large scale structures into and immediately adjacent to the green belt the upland landscape is of such a scale that the openness and purpose of the green belt would not be compromised given the number of turbines involved. This is supported to some degree by the approval, at appeal, of the Scout Moor wind farm which is located within the same area of green belt and is a significantly

large site.

2.4.7.3 The proposed turbines at Crook Hill would introduce large scale structures within the green belt and SLA. This local non statutory designation covers a large area of moorland tops and other areas not covered by green belt policy reference previously. The designation seeks to conserve and enhance the landscape and visual quality of the area.

2.4.7.4 The proposed turbines would have minimal direct effects on any physical features that define the character and quality of the area since there would be negligible loss of vegetation, demolition of existing structures or re-contouring of the ground. Therefore, potential impacts would be on the wider perception of the landscape. To some extent any such perception will be conditioned by whether the viewer is favourably disposed to wind farms or not.

2.4.7.5 Notwithstanding differences in perception the landscape of the green belt and SLA is of a sufficiently large scale and simple form to accommodate large engineered structures such as the proposed turbines without being out of scale with the pattern of the landscape. Turbines whilst highly visible within the designated areas would occupy a small proportion of panoramic views.

2.4.8 Effects on Visual Amenity

2.4.8.1 It should be noted that the assessment of visual effects is based on viewpoints selected because they generally have direct uninterrupted views towards the site. Whilst the theoretical ZTVs extend over large areas, in reality the visibility of the development would be considerably reduced by intervening vegetation, landform and structures. The visual impact of the turbines would also diminish with distance. The assessment is based on good weather conditions and good visibility and as such represents an upper limit to the significance of effect. The following text uses the viewpoint analysis to draw conclusions on the overall effect of the proposed development on the visual amenity of a number of receptor types.

Residential Receptors

2.4.8.2 The study area comprises a unique

settlement pattern that has evolved in part during the industrial revolution. Settlement is concentrated in the valleys that cut through the moorland plateaux with isolated properties and farms located on the uplands slopes. Residential property is generally absent from the moorland tops. There are extensive urban areas located to the south of the proposed site which contains many potential visual receptors.

2.4.8.3 The potential residential receptors to the north, east and west of the site are located within the deeply incised valleys and would have views towards the proposed Crook Hill wind turbines largely screened by intervening buildings or the topography of the valleys sides.

2.4.8.4 Views towards the turbines would generally be restricted to properties on the higher valley sides or settlement edge and would experience a moderate significance of impact as a result of the Crook Hill turbines on the distant skyline.

2.4.8.5 There are very few isolated properties on the lower slopes of the moorland tops in close proximity to the turbines. Where views are possible they would be seen in the context of broader panoramas.

2.4.8.6 The main receptors are located to the south of the site within and on the edge of the urban areas of Rochdale and Littleborough where turbines will be a prominent feature on the skyline from certain viewpoints. Views would be intermittent due to intervening development and main impacts would occur at the edges of these areas or where views of the site are framed/focussed by existing development. A photomontage illustration of a specific view of the proposed wind farm from Rushey Hill is presented in Figure 4.

Tourism, leisure and public rights of way

2.4.8.7 The South Pennine Moors is a popular recreational and tourist area due to its proximity to urban settlements and cultural associations. The study area is crossed by numerous public rights of way and strategic recreational routes that provide access on to the moorland tops from the enclosed valleys. This includes the Pennine Way and Pennine Bridleway which are both National Trails. These well used footpaths and recreational routes are the main sensitive visual receptors in the study area. Watergrove

Reservoir and Hollingworth Lake are popular tourist and recreational destinations.

2.4.8.8 Routes generally follow the undulating landform and users will have a range of visual experiences along their length from enclosed views due to landform to 360 degree panoramic views from localised high points. The main impact upon footpath users will occur at localised vantage points or where views are focussed toward the turbines for a proportion of the route.

2.4.8.9 The significance of effect on users of the footpath network would generally range from moderate to major. However, in localised areas such as the Pennine Way on Langfield Common to the east, Todmorden Centenary Way to the west and Calderdale Way to the north there would be major to substantial effects due to the proximity/scale and number of turbines visible from these sensitive recreational routes.

2.4.8.10 Turbines would influence the majority of skyline surrounding Watergrove Reservoir to the north and east. This would have major to substantial effect upon views experienced by visitors. Visitors and users of Hollingworth would experience moderate effects due to the distance to turbines on the skyline, influence of pylons on the skyline and the more active recreation undertaken by users

2.4.9 Cumulative effects

2.4.9.1 The proposed wind farm would have cumulative effects both in combination and in succession with existing, consented and proposed wind farms. The most significant cumulative effects would occur from viewpoints to the north-east and south-west where the turbines would be seen in combination and succession with the proposed Reaps Moss and Todmorden Moor turbines stretching along the skyline. In views from the south-east and north-west cumulative effects would be reduced due to the alignment of developments and reduced proportion of the skyline influenced.

2.4.9.2 Due to the separation of existing and consented sites there would only be minor cumulative effects with the proposed turbines at Crook Hill.

2.4.9.3 The proposed wind farm would be seen in combination with or in succession to a number of other operational consented or proposed wind farms from the major road network in the study area. However, the locations where this would be possible are limited and dispersed over a wide geographical area. Therefore, the frequency with which these views will be attained on a journey would be low and would not result in substantial sequential cumulative impacts from the major road network

2.4.10 Acceptability of significant effects

2.4.10.1 It is unlikely that a proposal to site a new wind energy development in the UK would not result in some significant landscape and visual effects in the general locality of the site. However, significant effects are not necessarily unacceptably adverse.

2.4.10.2 Wind turbines are a relatively recent addition to our environment and there is no consensus of opinion on the most appropriate types of landscape in which to site the various scales of wind energy development. There is also no consensus of opinion on the threshold above which significant changes in the view would have an unacceptable effect on visual amenity. This will vary from person to person, with those in favour of wind energy in their local area likely to accept much greater changes to their visual amenity than those who do not find wind turbines aesthetically pleasing.

2.4.10.3 For an individual, this threshold of acceptability can be different, depending on the location and size of the installation. For example, some consider small groups of turbines preferable to larger groups, even though a much greater number of installations would be required to achieve an equivalent energy output. Some prefer to see turbines in rural locations away from centres of population, whilst others consider installations in industrial or urban settings, or in countryside close to urban centres, more appropriate for this type of development, even though a much greater number of residents would see them.

2.4.10.4 Furthermore, peoples' opinions on wind energy can also vary over time, as the result of changes in their understanding of the technology or their increasing familiarity with a

particular scene. Public attitude surveys have consistently concluded that the majority of people do not think that they are going to like a wind farm when one is proposed in their locality, but consider the development acceptable once it is constructed. In some of these surveys, residents living near wind farms have also suggested that they would be happy to see extensions or additional wind farms in their locality.

2.4.10.5 The proposed turbines would become a feature of the landscape and be prominent in views from certain locations for the lifetime of the wind farm. The turbines would not fundamentally alter the exposed upland character of the area either alone or in combination with any other consented or constructed wind farms, however it would reduce the sense of isolation and wilderness of the site.

2.5 Noise Assessment

2.5.1 An assessment of the potential noise impact from the proposed Crook Hill Wind Farm has been performed. This assessment has followed the guidance contained within the report by the DTI Working Group on Noise from Wind Turbines and which is detailed in ETSU-R-97. ETSU-R-97 is the current guiding methodology for determining noise outputs from wind farms, which establishes the thresholds of acceptability of predicted noise outputs. The purpose ultimately of ETSU is ensure the protection of residential amenity.

2.5.2 Background noise measurements were made at selected dwellings neighbouring the development. These locations were identified through preliminary noise predictions and through discussions with the Local Authority Environmental Health Department.

2.5.3 Analysis of the measured data has been performed to determine the pre-existing background noise environment at the measurement locations, in accordance with the guidance contained within ETSU-R-97.

2.5.4 Predictions of wind turbine noise have been made, based upon a warranted sound power level and a calculation procedure which is considered to be worst-case.

2.5.5 The predicted wind turbine noise and measured background noise levels indicate that for all dwellings neighbouring the proposed development, wind turbine noise will meet the Upper Absolute Noise Criteria proposed within ETSU-R-97 during the Daytime Amenity Period.

2.5.6 Predicted internal noise levels will be below recognised sleep disturbance levels of 35 dB L_{Aeq} at all properties.

2.6 Ecological Assessment

2.6.1 Ecological surveys using standard methodologies were carried out at Crook Hill to describe baseline ecological conditions and identify sensitive species. Possible impacts were identified from experience at other sites and from replies to a scoping exercise.

2.6.2 The main habitat was of species poor acidic grassland, and parts have been degraded by vehicles.

2.6.3 There was a sparse breeding bird population. Curlew were the only species considered sensitive to the development. The layout has been planned to avoid the main curlew breeding area.

2.6.4 Few birds were recorded during vantage point surveys, and no species known to be particularly vulnerable, and therefore collision risk is considered to be very slight.

2.6.5 Bat surveys showed a low level of usage and no roosts on the site. Given the lack of knowledge on the effects of wind farms on bats in the UK it is not possible to give a conclusive assessment and monitoring is recommended. However, given the low level of activity on this site any affect should be low.

2.6.6 Following mitigation and habitat management the residual effect will be the loss of a very small area of degraded habitat.

2.6.7 Management of the proposed wind farm site will improve the overall conservation interest. Overall, there should be a net conservation gain if improved grazing regimes are instigated.

2.7 Hydrological Assessment

2.7.1 The hydrological assessment comprised an information review and site visit in order to establish potential risks associated with the development regarding local hydrology, water features and users of these resources. A further issue is the presence of peat deposits with considered conservation value.

2.7.2 Identified risks were assessed according to a hydrological assessment methodology, devised by the contractor, Sinclair Knight Merz, and mitigation measures have been stipulated to eliminate those risks.

2.7.3 The site comprises approximately 4.3km² of peat and pasture land across Rough Hill and Crook Hill, crossing a number hydrological sub-catchments containing springs, streams. The site is predominantly underlain by the Carboniferous age Lower Coal Measures.

2.7.4 Fifty private water supply abstractions and 5 licensed abstractions were identified within 2km of the site. Ten private water supplies and two licensed abstractions are considered to be in areas which may be hydraulically connected to the site.

2.7.5 Peat deposits of over 0.5m thickness were identified across much of the site where wind farm infrastructure is planned. Peat hydrology is complicated and very sensitive to changes in groundwater levels. Any changes can have implications for local hydrological processes and the natural peat moor habitat. Peat depth also has implications for turbine construction pad design and access track construction.

2.7.6 Mitigation measures have been devised to prevent impacts to groundwater and surface water resources (including private water supplies) and peat deposits as far as is practicable during the construction and operational phases of wind farm development. These measures focus on reducing and controlling runoff from the access track (to reduce potential for increasing suspended solids within water courses) and preventing/managing spills, leaks or concrete contamination of ground and surface water. Measures have also been devised to address the issue of dewatering of peat deposits during construction of turbine pads

and access tracks.

2.7.7 Risks associated with both construction and operation phase activities are estimated as negligible to minor. When considered in the context of mitigation measures proposed to address these issues, residual risks to groundwater, surface water and peat deposits from the Crook Hill Wind Farm development are expected to be negligible.

2.8 Archaeological Assessment

2.8.1.1 An archaeological assessment of a proposed wind farm site at Crook Hill, near Rochdale, was undertaken in order to assess the impact of the proposed wind farm on sites of built and buried cultural heritage and their settings and to assess the impact on the wider historic landscape.

2.8.1.2 A desk-based survey was undertaken to review the information held within accessible public archives. This information allowed the compilation of a catalogue of known sites of archaeological and cultural heritage interest within and around the development area. A total of some 103 known sites of potential archaeological sensitivity are recorded within the proposed development area. The assessment revealed that four of these sites, two 19th century boundary stones, a medieval trackway and a length of stone walling, of low significance were likely to be directly affected by the proposed development. The boundary stones should be fenced off prior to the commencement of groundbreaking works in order to ensure that on-site works avoid them.

2.8.1.3 Apart from the 73 late post-medieval Listed Buildings within 3 km of the proposed wind farm, in particular within the town of Littleborough to the south, the majority of cultural heritage remains in the immediate vicinity of the site derive from post-medieval coal-mining, quarrying and farming. Flint finds and a Bronze Age barrow (**Site No. 78**) provide evidence for prehistoric activity from the Mesolithic onwards. There is a low probability that hitherto unknown archaeological remains of a similar nature or date might be concealed beneath the current ground and/or vegetation at Crook Hill. However, such remains might be disturbed by ground breaking works by the

development. It is therefore recommended that a watching brief is undertaken on the site during a ground breaking works. In particular any disturbance of the medieval trackway that crosses the west of the wind farm development (**Site No. 168**) will require archaeological intervention.

2.8.1.4 The significance of visual effects on the Conservation Areas, Historic Park and Garden and the Listed Buildings in the vicinity range between *none, negligible, low* and *moderate*, particularly as topography and urban structures combine to limit views of the wind farm from these sites.

2.9 Electromagnetic Interference and Air Safeguarding

2.9.1 A wide range of operators of microwave and other communication links has been consulted in the early phases of the environmental impact assessment for the Crook Hill Wind Farm. Five communication links were identified as potentially being affected by the proposed wind farm. Further consultation with the operators of these links has confirmed that no impacts are expected.

2.9.2 BBC has indicated potential effects to localised television and radio reception. In the event that interference does arise, the Developer will be responsible for rectifying such problems and would reasonably be expected to commit through a planning condition with Rochdale and Calderdale MBCs to rectify any television interference problems, if it they arise. Technical solutions to such potential impacts are available and the Developer will adopt such appropriate solutions as are necessary in the event that negative impacts arise.

2.9.3 The MOD, CAA and NATS have been consulted and they have not raised any objections with respect to the proposed Crook Hill Wind Farm.

2.10 Public Access, Recreation, Safety and Shadow Flicker

2.10.1 All the factors that could compromise private and public use, safety and amenity have

been assessed in respect of the Crook Hill Wind Farm proposal. These factors include private use of the land, public access and amenity, public safety, driver distraction and shadow flicker.

2.10.2 It has been established that public access, private residences, recreation and public safety would not be significantly affected by the Crook Hill Wind Farm proposal. There will be a small consequent loss to agricultural land use amounting to 4 ha post construction; however, this is insignificant in terms of the overall size of the site survey boundary (approximately 0.93 per cent) and the overall area of upland moors comprising Shore Moor, Crook Moor and Ramsden Hill.

2.10.3 The minor loss to the area of common land as a result of the construction and operation of the wind farm will be offset by a compensatory area of land for which the Developer must seek the approval of the Secretary of State for Environment, Food and Rural Affairs.

2.10.4 The construction of the wind farm will affect PRow users on two main footpaths – the Long Causeway (FP193) and LitFp5b which is located to the south east of the proposed wind farm site. At the points at which the wind farm access tracks cross such PRow's stringent health and safety practices should be put in place by construction staff to ensure the safety of amenity users. In addition, mitigation should include warning boards on either side of the access track to alert amenity users to construction traffic. Right of way should rest with amenity users and they should be permitted to continue with the enjoyment of the countryside unabated by wind farm construction.

2.10.5 The public is most at risk during the construction phase through the movement of on site construction vehicles. Public safety would be best guaranteed by the formulation of a Traffic Management Plan within a wider Construction Method Statement for the site. This should be formulated in the event that the wind farm is consented. Once operational, there should be no risk to the public from the wind turbines; research has established that there are no reported incidences of injury to the public as a result of wind turbine operation.

2.10.5.1 Three properties are predicted to

potentially witness shadowing effects from wind turbines. Mitigation should take the form of a wind turbine control system, which, combined with the real time monitoring of rotor orientation and sunlight strength by sensors mounted on each turbine, will allow the control system to predict possible shadow flicker at nearby properties and shut the wind turbine down for the required period of incident.

2.10.6 Wind turbines should be coloured semi-matt light grey to minimise the potential for reflected light in the sunshine.

2.11 Socio economic and Environmental Benefits of the Proposed Scheme

2.11.1 The Crook Hill Wind Farm proposal would provide substantial benefits, both financially and environmentally. Suitably qualified local contractors will have the opportunity to bid for the civil and electrical works and the provision of site services; a potential investment of up to £7,000,000. The proposal would also provide permanent part time employment for a site manager and fitter during Operation and Maintenance.

2.11.2 The proposal would provide a reliable income stream for the landowner, an educational resource for local schools and colleges, and following construction the Developer would register local community interest in community regeneration and energy efficiency schemes. Such a scheme would aim to facilitate the distribution of funds for such schemes to local communities. For the 36MW wind farm, up to £900,000 will be made available to the community through operational revenues. The energy efficiency measures could potentially be significantly increased with match funding from other national energy efficiency schemes.

2.11.3 No conclusive evidence is yet emerging of the effects to property prices arising from wind farms, even in the light of the research undertaken by The Royal Institute of Chartered Surveyors and the British Wind Energy Association, but anecdotal evidence to date demonstrates that there is no clear evidence of a correlation and that actual studies of residents at existing wind farms show that property prices

are not affected by such developments. More research is required to determine whether effects to property prices can be correlated to wind farms. However, it should be noted that this, technically, is not a land use planning issue and should not rightfully enter the balance of opinion in determining the planning application.

2.11.4 The development of more renewable energy should go some way to improving human rights through amelioration of the effects of climate change to inhabitants of low lying areas prone to the effects of sea level rise. It would also contribute towards measures to reduce the effects of acid rain and environmental pollution, whilst comprising a source of locally embedded electricity supply, which would be beneficial in terms of the possible disruption to fuel supplies from overseas.

2.11.5 The Developer will enter into a long term Power Purchase Agreement with an electricity supplier. This agreement will allow the financing of the wind farm to take place and thus the construction and operation.

2.11.6 Wind farms are generally seen as neutral or slightly positive in terms of effects on tourist numbers. To date, there is no evidence through numerous public opinion surveys to indicate that wind farms are detrimental to tourism.

2.11.7 Wind turbines are recognised as having a positive energy balance. Over their lifetime they can repay at least 50 times the energy used in their manufacture and installation. Wind turbines also provide benefits through their 'embedded value' as a local generator.

2.11.8 Crook Hill Wind Farm proposal comprises twelve (12) wind turbines and will produce sufficient electricity to provide for the equivalent needs of over 20,000 households. This is equivalent to over 12% of the total Rochdale and Calderdale councils' domestic needs. Crook Hill Wind Farm would make a significant contribution to the reduction of emissions that are known to cause global warming and acid rain (CO₂ – carbon dioxide, SO₂ – sulphur dioxide, NO_x – Nitrogen Oxides). Based conservatively on a 3MW wind turbine, these would amount to:

CO₂ 81,362 tonnes p.a.

SO₂ 946 tonnes p.a

NO_x 282 tonnes p.a

2.11.9 Over a 25 year lifetime it will displace:

CO₂ 2,034,050 tonnes

SO₂ 23,650 tonnes

NO_x 7,050 tonnes

2.12 Avoidance and Mitigation Measures

2.12.1 Site Selection

2.12.1.1 The site selection process itself is probably the most important avoidance and mitigation tool in developing renewable energy proposals. The site selection philosophy of the Developer for selecting sites was to avoid sites that would be located in environmentally sensitive areas, such as National Parks or SSSIs, whilst fulfilling the technical criteria necessary for the construction of a wind farm. Technical safeguarding concerns, such as air-safeguarding and microwave links, have also been considered in the site selection and wind farm design approach employed by the developer. In this way significant effects to nationally important resources and technical features are avoided, leaving residual impacts to local resources and features to be mitigated, as proposed in the following sub-Sections.

2.12.1.2 Measures to mitigate the impacts to the environment identified in this NTS are as follows:

2.12.2 Crook Hill Wind Farm Construction, Operation and Decommissioning

Crook Hill Wind Farm Construction

Highway Considerations

2.12.2.1 Primarily, site access is a major determinant in the siting of wind farms. If a developer cannot get to site using the existing road network for the delivery and construction of wind turbines there is little point in developing a site. The large structures require suitable access conditions and whilst minor changes to road systems can be made to improve

access, major changes usually cannot be undertaken due to the prohibitive cost of such works and the inconvenience to the road network. Consequently, developers will assess the viability of a potential wind farm site based on the potential access implications. In the case of the Crook Hill Wind Farm proposal, the Developer has established that there is a suitable road network in place for the delivery and construction of wind turbines.

2.12.2.2 The site selection procedure has avoided any major impacts to the highways network. Where minor modifications are required, such as the temporary removal or relocation of street furniture, these will be undertaken at the Developer's expense and agreed with the competent Highways authority in accordance with their requirements. The Developer will therefore commit to entering into a legally binding agreement to undertake such modifications as are required and to repair any damage that may occur as a direct result of the temporary highways works.

On-site Access

2.12.2.3 All track routes within the site area have been purposefully limited in length and width to reduce the overall landtake of the proposed wind farm. This is to ensure minimum damage to the agricultural and ecological value of the site.

Local Resources

2.12.2.4 Stone and other aggregates for on-site construction of the site tracks, hardstandings and construction compound will mostly be sourced, locally from existing quarries. Such sourcing of stone and aggregates would ensure that the aggregate is of suitable quality, acidic value and chemical composition as not to cause environmental or ground contamination in variance with the local soil or geological conditions. This would also provide commercial benefits to the local quarry operators and concrete suppliers.

Waste Arisings

2.12.2.5 There are a number of possible waste arisings from activities related to the Crook Hill Wind Farm construction: these may include packaging materials, manufactured components, cable offcuts, timber shuttering, and other general waste items. It should be noted that none

of these materials would be hazardous or contaminated. Such waste arisings would be disposed of a manner that would be least detrimental to the environment. The wind farm construction contractor will be expected to reuse or recycle materials where possible and all other waste would be deposited at a local suitable landfill. Guidance from the local planning authorities and the Environment Agency will be sought in respect of waste disposal.

Land Use

2.12.2.6 During the construction period two footpaths would be directly affected by the proposed scheme. Appropriate traffic management practices, including information boards at the points where access tracks cross footpaths, and instructions to construction staff to permit the right of access for walkers, should be put in place if consent is awarded to the proposal as part of the wider Construction Method Statement.

Contaminants

2.12.2.7 Control of Substances Hazardous to Health Regulations (COSHH) (2002) would be complied with at all times and with appropriate procedures the risk of contamination will be minimised. A full CMS, including management of on-site potential contaminants, will be agreed with Rochdale and Calderdale MBCs and the Environment Agency prior to construction.

Turbine Foundation Construction on Peat Bog

2.12.2.8 The foundations for the turbines will be founded directly onto the subsoil/rock approximately 2.5 to 3.0m below existing ground level (subject to confirmation during detailed site investigations. Excavations for the turbine bases would be strictly controlled in accordance with Environment Agency guidelines and advice. The Developer would ensure that suspended solids would not be released into controlled waters. Details of the on-site construction activities and pollution prevention would be agreed with the Environment Agency in the form of an agreed CMS.

2.12.2.9 Any dewatering or additional runoff arising from foundation construction should be directed into appropriately designed temporary settlement ponds to avoid any sediment load or

contaminants entering the surrounding natural aquatic environment. Outlets from such ponds should be controlled and monitored.

2.12.2.10 Following the completion of construction, the turbine foundation excavation should be backfilled with well compacted granular material of a specified minimum density to just beneath ground level. Further backfilling would take place to ground level using the original topsoil/peat material excavated from the turbine base.

2.12.2.11 Prior to pouring of the turbine foundations, the foundation excavation base will be blinded with either a thin layer of concrete, or, a layer of well compacted crushed stone. Any fractures or voids present in the ground beneath the turbine foundation base may provide a pathway for cementitious material to migrate into the ground water close to the turbine foundation. This will however be very limited in duration as once the concrete sets within the excavation the pathway will effectively be sealed.

Temporary Site Infrastructure

2.12.2.12 After commissioning of the Crook Hill Wind Farm the temporary compound, including portacabins etc. would be removed and the area reinstated to its former condition. The whole site area would be cleared of all contractor's materials, plant, equipment and rubbish associated with the wind farm. Areas of ground affected during construction would be reinstated with topsoil or in accordance with the needs of the landowner.

2.12.2.13 The site entrance would be retained for the lifetime of the project. The crane hardstandings adjacent to the turbines would be reduced in size to 25m x 18m through the removal of the hardcore and restoration of the reclaimed area. Site tracks would be reduced to 4 metres width and the former width areas reinstated in accordance with recommendations of the ecological assessment.

Wind Farm Operation

Highways

2.12.2.14 During the operational lifetime of a

wind farm, the main access requirements to the site would be for Operation and Maintenance personnel. Their responsibility is to ensure the smooth and efficient running of the wind turbines, and therefore regular maintenance of the turbines moving parts is required. Typically, this is required, on average, twice a month. Access to the site is likely to be via four wheeled drive or similar O & M vehicle; the quantity of visits required will not affect traffic movements in the vicinity of the site in any way.

2.12.2.15 For more substantial O & M work, such as the unlikely event of nacelle or blade replacement, a crane and support vehicles would be required. For this reason, the site entrance and site access tracks need to be retained after commissioning of the wind farm. However, only a small amount of vehicles will be required, and there will only be one movement of the vehicles on to site and one movement off-site. This will not add appreciably to vehicular movements in the vicinity of the site.

2.12.2.16 It should be noted that the construction of the wind farm would incorporate a turbine communication system, which would enable remote monitoring of numerous turbine functions. This therefore minimises the need for on-site attendance. In addition, the turbine, as with most modern wind turbine generators, would be of modern design with an expected operational availability of 97%. This again limits the requirement for on-site O & M, and therefore less vehicle movements to and from the site.

Land Use

2.12.2.17 The existing land use of the site is for the purposes of grazing and amenity. This will continue around the areas taken up by the proposed development, throughout its operational life.

2.12.2.18 Given the small percentage of land required by the wind farm, there will be limited impact on agricultural activity throughout the sites operational phase.

2.12.2.19 For amenity users, the area is open access land under CROW 2000 so once construction is completed walkers would be able to walk up to the base of the wind turbines. The limited landtake of the scheme will result in a very negligible loss of available land for

amenity users.

Polluting Materials

2.12.2.20 Polluting materials likely to arise during the wind farm operation are linked to the Operation and Maintenance of the wind turbine generators, albeit in limited quantities. O & M personnel need to change oils and coolants in the nacelles of the turbines to optimise performance, during the servicing of the wind turbines every 18-24 months. These materials can be highly damaging to ecology and hydrological systems. It will be a specific requirement of the O & M contract awarded that all potentially polluting materials will not be stored on site but rather completely removed from the site and disposed of in a manner that conforms with Environment Agency guidance, namely Pollution Prevention Guidance 1: General Guide to the Prevention of Pollution, and Pollution Prevention Guidance 6: Safe Storage and Disposal of Used Oils. This requirement will be strictly enforced by the developer and operator of the site.

Visual Elements

2.12.2.21 All onsite construction machinery and vehicles will be removed from the site once the wind farm is commissioned. The temporary construction compound will be removed and the land reinstated to its former condition. Landscaping, where required as a condition to planning consent, would be undertaken to improve the appearance of the site.

2.12.2.22 Modern wind farm design ensures that the transformers, which are responsible for increasing the voltage from the turbines from 690V or 1000V to 33kV, would be contained within the turbines so that these additional external features are not present as additional visual impacts and clutter of the site.

Wind Farm Decommissioning

2.12.2.23 The priority for avoiding issues related to the decommissioning of the wind farm would be to complete this exercise in as short a time as possible so that disruption to agricultural activities and highways networks is minimised. It is estimated that three to four months would be required for complete decommissioning of the site, and removal of on-site infrastructure.

2.12.3 Noise Issues during Construction and Decommissioning

2.12.3.1 The predicted wind turbine noise and measured background noise levels indicate that for all dwellings neighbouring the proposed development, wind turbine noise will meet the Upper Absolute Noise Criteria proposed within ETSU-R-97 during the Daytime Amenity Period. Consequently, no mitigation measures are required.

2.12.4 Hydrology

Construction Phase

Access tracks

2.12.4.1 Construction of access tracks and continued use during the remainder of the construction phase may potentially generate turbid runoff. Measures described in EA PPG notes, CIRIA guidance and Forest and Water Guidelines will be formalised within a sediment management plan for the site, which the contractors will be required to comply with.

2.12.4.2 The access track layout is designed to minimise land take area and construction will depend upon substrate and gradient conditions.

2.12.4.3 Across those parts of the site where peat deposits are relatively thick, a 'floating road' will be used comprising grid-like sections that would allow surface water infiltration and reduce run off. Use of a floating road should be considered for peat thickness of 1m or more.

2.12.4.4 In areas where bedrock is relatively shallow, tracks will be stone-based and either possess a camber to ensure rapid drainage (to avoid ponding and rutting which generates turbid water), and/or buffer strips adjacent to tracks will allow filtering of runoff through vegetation.

2.12.4.5 The relatively steep section of the access track from the entrance road (the junction between Calderbrook Road and Higher Calderbrook Road) towards the site boundary is likely to see increased surface run off velocities. A system of shallow perpendicular trackside trenches leading to soakaways will be employed to reduce scouring of the track and help prevent increasing sediment loads entering near by

watercourses.

2.12.4.6 At the watercourse crossing, an under track culvert will be used to prevent any impacts from the track on the streambed. Sufficient bund and embankment features will be incorporated on the sides of the crossing structure and along the adjacent stream banks to prevent track runoff from directly entering the stream and potentially the trout fishery below.

Wind turbine and crane pad

2.12.4.7 Turbine foundations will be formed through the pouring of concrete. Concrete should therefore be brought to site ready mixed and should enter and leave the site through a dedicated entrance. Temporary bunds should be placed around pouring operations to contain spillages and a spill response protocol should be developed for use by contractors.

2.12.4.8 Prior to concrete bunding of turbine excavations, the degree of weathering of bedrock should be assessed. It may be necessary to use a protective liner within the excavation to ensure liquid concrete does not come into contact with underlying strata and groundwater.

2.12.4.9 Groundwater may be encountered during construction of the turbine foundations. Any groundwater should be pumped to a small holding sump to allow removal of suspended sediments. Once the solids have been removed, groundwater should either be discharged to a nearby watercourse, or direct to surrounding vegetation or a small down slope trench allowing infiltration back into the ground. Any discharge should be in agreement with the EA or in accordance with EA discharge licensing conditions.

Wind turbine and crane pad

2.12.4.10 Turbine foundations will be formed through the pouring of concrete. Without controls on this process, concrete spillages could potentially result in pollutants coming into contact with local groundwater or surface water features. Concrete will be brought to site ready mixed and will enter and leave the site through a dedicated entrance. Temporary bunds will be placed around pouring operations to contain spillages and a spill response protocol will be developed for use by contractors.

2.12.4.11 Prior to concrete bunding of turbine excavations, the degree of weathering of bedrock will be assessed. It may be necessary to use a protective liner within the excavation to ensure liquid concrete does not come into contact with underlying strata and groundwater.

2.12.4.12 Groundwater may be encountered during construction of the turbine foundations. Any groundwater will be pumped to a small holding sump to allow removal of suspended sediments. Once the solids have been removed, groundwater will either be discharged to a nearby watercourse, or direct to surrounding vegetation or a small down slope trench allowing infiltration back into the ground. Any discharge will be in agreement with the EA or in accordance with EA discharge licensing conditions.

Site activities

2.12.4.13 Oils, fuels and other substances will be stored within a temporary storage compound. Potentially polluting substances will be stored within impervious storage bunds with 110% capacity, to ensure complete spill/leak retention where possible. Refuelling of machinery will be undertaken within designated areas where spillages could be easily contained. Machinery will be routinely checked to ensure they are in good working order.

2.12.4.14 Best working practices incorporating measures to protect the water environment, particularly EA PPG recommendations will be adopted throughout the construction phase.

Peat

2.12.4.15 Peat hydrology is very sensitive to changes in water inputs. Prolonged reduction in groundwater level may cause changes in peat structure such as drying and shrinkage of upper layers which could lead to changes in the local hydrological system.

2.12.4.16 During excavation work on relevant turbines, a barrier system (such as sheet piling or an impermeable geomembrane) will be installed to reduce seepage losses from the peat as far as is practicable.

Operational Phase

Access tracks

2.12.4.17 Routine maintenance of tracks should be employed to further reduce potential for increased suspended sediment levels within nearby watercourses.

Site activities

2.12.4.18 All vehicles visiting the site will be equipped with sand trays to place below any oil or fuel filling activities and will be equipped with emergency oil spillage kits.

2.12.5 Ecological Issues

2.12.5.1 In order to minimise the impact of habitat loss during construction the following safeguards should be adopted during construction:

- Initial clearance of habitat should take place outside of the bird breeding season (i.e. not between early March and early August).
- Care should be taken to ensure that tracks, turbine base excavations and other constructions are kept to the proposed sizes and there is no overspill onto surrounding habitat.
- Spoil from excavations should be disposed of offsite.

2.12.5.2 Areas of temporary habitat loss should be restored after construction. For all temporary construction areas topsoil should be removed before construction starts (and outside of the bird breeding season). After construction, any hardcore and other materials used should be removed and the topsoil spread back over the area. The area should be fenced to exclude grazing livestock while the natural vegetation re-instates itself.

2.12.5.3 Crane hardstanding and exposed concrete bases of turbines should be covered with a layer of topsoil and allowed to re-vegetate naturally.

2.12.5.4 Edges of tracks should be re-instead with topsoil spread along the margins to soften the edges and any overspill hardcore removed.

2.12.5.5 The areas that have been degraded by vehicles and motorbikes can be improved by exclusion of vehicles if possible, and reduction or removal of grazing stock to allow initial re-vegetation. Care must be taken that track infrastructure for this development does not allow increased use of vehicles on this site, and consultations with the local planning authorities and landowners should investigate ways of excluding motorised traffic from the site.

2.12.5.6 There is little direct intervention that can improve the mat grass habitat, but long term control of grazing levels using a mix of grazing animals, if possible, could maintain the structure in a suitable form for nesting curlew and snipe, and possibly improve species richness in the long term. This could contribute towards the local BAP target to bring more of this habitat into favourable conservation status.

2.12.5.7 The construction of a few small scrapes to provide standing water in the wetter areas would improve food supply for wader chicks.

2.12.5.8 It is recommended that a long term management plan be drawn up with all stakeholders including the landowner, Rochdale and Calderdale MBCs, Great Manchester Ecology Unit and Natural England.

2.12.6 Archaeological Issues

2.12.6.1 It is recommended that should the main site access track necessitate the disturbance of part of the wall on Cuckoo Hill, this be subject to recording prior to demolition. The commissioning of dry stone wallers to reinstate areas of wall damaged during the construction works should also be considered.

2.12.6.2 The proposed access track will pass in close proximity to Handle Hall, Lower Calderbrook and the Church of St James Littleborough. Listed buildings must not be altered without prior permission from the local authority and care must be taken during construction works to prevent inadvertent damage to these structures.

2.12.6.3 In addition to the known remains, there is also a possibility that currently unknown buried remains might be disturbed by ground-breaking works on site. Accordingly it is

recommended that all ground breaking works are subject to an archaeological watching brief during the development. Furthermore it is recommended that the route of the medieval track is recorded prior to any groundworks in its vicinity and that disturbance to it is kept to a minimum. Furthermore, Site Nos. 176, 177 and 258 should be fenced off during construction works to prevent any inadvertent damage to them.

2.12.7 Electromagnetic Interference and Air Safeguarding Issues

2.12.7.1 Five communication links were identified as potentially being affected by the proposed wind farm. Further consultation with the operators of these links has confirmed that no impacts are expected.

2.12.7.2 BBC has indicated potential effects to localised television and radio reception. In the event that interference does arise, the Developer should be responsible for rectifying such problems and would reasonably be expected to commit through planning condition with Rochdale and Calderdale MBCs to rectify any television interference problems, if it they arise.

2.12.8 Land Use, Public and Private Safety and Shadow Flicker

2.12.8.1 At the points at which the wind farm access tracks cross such PRow's stringent health and safety practices should be put in place by construction staff to ensure the safety of amenity users. In addition, mitigation should include warning boards on either side of the access track to alert amenity users to construction traffic. Right of way should rest with amenity users and they should be permitted to continue with the enjoyment of the countryside unabated by wind farm construction.

2.12.8.2 The public is most at risk during the construction phase through the movement of on site construction vehicles. Public safety would be best guaranteed by the formulation of a Traffic Management Plan within a wider Construction Method Statement for the site. This should be formulated in the event that the wind farm is consented. Once operational, there should be no risk to the public from the wind turbines; research has established that there are

no reported incidences of injury to the public as a result of wind turbine operation.

2.12.8.3 Three properties are predicted to potentially witness shadowing effects from wind turbines. Mitigation should take the form of a wind turbine control system, which, combined with the real time monitoring of rotor orientation and sunlight strength by sensors mounted on each turbine, will allow the control system to predict possible shadow flicker at nearby properties and shut the wind turbine down for the required period of incident.

2.12.8.4 The wind turbine control system should utilise a computer model of the Crook Hill Wind Farm layout together with the details of the nearby properties' window sizes, elevations and orientations. This would be combined with a model of the sun's path over the course of the year (including yearly variations due to solar cycle being 365.25 days). This model combined with the real time monitoring of rotor orientation and sunlight strength by sensors mounted on each turbine will allow the control system to predict possible shadow flicker at nearby properties and shut the wind turbine down for the required period of incident.

2.12.8.5 Due to the presence of the control system, shadow flicker effects at nearby residences will be avoided. The Developer should enter into a planning condition enforcing the installation of such a control system into the Crook Hill Wind Farm scheme.

2.12.8.6 Wind turbines should be coloured semi-matt light grey to minimise the potential for reflected light in the sunshine.

2.13 Conclusions

2.13.1 In accordance with the requirements of Statutory Instrument 1999 No. 293, throughout the environmental assessment process, advice from consultants and consultees has been taken into consideration to ensure that the potential effects of the Crook Hill Wind Farm proposal on the environment and technical safe-guarding criteria are avoided altogether or reduced to a level that would not cause significant impact or damage. Such measures have been incorporated into the final wind farm layout and design as

information became available during the course of the assessment. The site layout utilised the existing tracks as much as possible, all turbines were located to prevent the oversail of features such as PROWs, and the location of turbines in the blanket bog area was avoided.

2.13.2 Through the application of a thorough environmental assessment process, the Developer has devised a wind farm site that has avoided significant and unacceptable environmental and technical impacts, as concluded by the individual environmental assessments conducted on the wind farm proposal. The Developer would be expected to fully commit to these measures if the wind farm application gains planning consent and should enter into legally binding agreements with the local planning authority to enforce them.