Rusholme
Wind Farm

ENVIRONMENTAL STATEMENT

May 2004

VOLUME 2: THE ENVIRONMENTAL STATEMENT TEXT

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1 INTRODUCTION

1.1 FOREWORD

1.1.1 Wind Prospect Developments Ltd (Wind Prospect) proposes to erect twelve wind turbines and ancillary structures on and around Rusholme in the parish of Newland (approximately 10.5km southeast of Selby and 3.4km northeast of Goole) for the purpose of generating electricity from wind energy. **Figure 1, Volume 3** shows the site location and regional context of the proposals.

1.1.2 This project is one of several wind power schemes currently being developed and/or constructed by Wind Prospect. **Table 1.1** refers to projects recently commissioned and currently under construction:

Table 1.1 Recent projects developed and/or constructed by Wind Prospect

Wind Farm	Location	Capacity	No. of turbines	Turbine capacity	Status
Out Newton	Holderness, England	9 MW	7	1.3 MW	Commissioned February 2002
Bowbeat	Peebles, Scotland	31 MW	24	1.3 MW	Commissioned November 2002
Tangy	Kintyre, Scotland	12 MW	15	850 kW	Commissioned February 2003
Llangwyryfon	Aberystwyth, Wales	9 MW	11	850 kW	Commissioned October 2003
Winscales	Workington, England	6.8 MW	8	850 kW	Pre-construction works
Stags Holt	March, England	15 MW	9	1.75 MW	Pre-construction works
Deeping St Nicholas	Spalding, England	14 MW	8	1.75 MW	Pre-construction works
Glass Moor	Whittlesey, England	14 MW	8	1.75 MW	Pre-construction works
Gedney Marsh	Spalding, England	10.5MW	6	1.75MW	Pre-construction works
Bicker Fen	Boston, England	26MW	13	2MW	Pre-construction works

1.1.3 This Environmental Statement has been prepared to accompany a planning application for the Rusholme Wind Farm to Selby District Council.

1.1.4 There are no existing or approved but as yet unconstructed wind farm developments in Selby District. East Riding of Yorkshire Council has granted 'conditional assent' to an application for a wind farm development, to be located on Goole Fields, 7 km south-east of the proposed Rusholme site, as indicated on **Figure 10.1 Volume 3.** This prospective wind farm comprises 16 wind turbines, each 125 m high to blade tip.

1.2 APPROACH TO ENVIRONMENTAL ASSESSMENT

1.2.1 Wind Prospect and their consultants have worked together in the development of this proposal, reviewing alternative design solutions in the light of the various environmental issues identified both as a result of their own work and in response to discussions with the local planning authority, the local community, and other interested parties. These environmental considerations have been built into the design process throughout.

1.2.2 This Environmental Statement has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999. Its scope was discussed in advance with the local planning authority, with letters relating to the scoping being included in **Appendix 1**.

1.3 CONSULTATIONS

1.3.1 The following statutory and other consultees have been approached for information and guidance in the course of the development of this project and Environmental Statement preparation:

- Selby District Council
- English Nature
- RSPB
- Selby Internal Drainage Board
- Environment Agency
- North Yorkshire Highways Department
- Ministry of Defence
- Civil Aviation Authority
- Coal Board Authority
- Other consultees as identified in the relevant Sections of this Environmental Statement**.**

1.4 THE CONSULTANCY TEAM

1.4.1 This Environmental Statement has been prepared by the following consultancy team:

Woolerton Dodwell Associates
Consultant: Mrs S Dodwell BSc (Hons) MA
5 Sandes Avenue, Kendal, Cumbria LA9 4LL

1.4.2 Mrs Dodwell is a Chartered Landscape Architect (Design) and holds a Master of Arts degree in Landscape Design (University of Sheffield) and the Honours Degree of Bachelor of Science in Geography (University of Liverpool).

1.4.3 She is a Director of Woolerton Dodwell Associates Limited (an independent landscape consultancy) and has undertaken a wide range of landscape design and environmental planning work over a period of more than 20 years. Mrs Dodwell has undertaken projects on behalf of government agencies, local authorities and private organisations. She also has considerable experience in landscape appraisal and in assessing the landscape and visual effects of development. This includes experience of the issues relating to wind energy developments. She has provided landscape and visual guidance in connection with some 20 wind turbine developments in the UK and Ireland, including operational sites located in Cumbria, the East Riding of Yorkshire and in Donegal. In addition, Mrs Dodwell has given evidence on the landscape and visual aspects of wind turbine developments at a number of Public Inquiries. She is a Member of the Landscape Institute.

Ecology Consulting
Consultant: Dr S Percival *BSc Biology (Ecology) PhD Zoology*
71 Park Avenue, Coxhoe, County Durham, DH6 4JJ

1.4.4 Dr Steve Percival is the principal of his own ecological consultancy practice which specialises in ornithological and ecological habitat survey and assessment, and in bird conservation management. He has worked on over 70 wind farm projects to date, in the UK and Ireland, which have included three major offshore developments. His particular experience in relation to the assessment of wind farm proposals has included the development of the Scottish Natural Heritage/British Wind Energy Association methodology for the assessment of bird impacts of wind farms, and the production of several reviews on the subject. Dr Percival has published extensively in internationally referred journals.

1.4.5 Prior to Ecology Consulting, Dr Percival was a senior lecturer at the University of Sunderland's Ecology Centre, a senior research fellow at the University of Durham and a higher scientific officer at the British Trust for Ornithology. He is a member of the Institute of Ecology and Environmental Management, British Ecological Society and British Ornithologists' Union.

ACIA
Consultant: I. Bennett *BSc CEng MIOA*
99 Wellington Road, North, Stockport, SK4 2LP

1.4.6 ACIA is an independent firm of consulting engineers, established in 1989, specialising in noise measurement, prediction and control. Mr Bennett, one of the founding partners, has been an acoustic consultant since 1982. Before that he worked on the design and installation of noise-control equipment in a wide variety of industries. He has taken part in the design of new projects to ensure that noise criteria are met, including around 30 wind energy schemes over the past ten years. He has presented evidence at several Public Local Inquiries and in the County Court.

1.4.7 Mr Bennett is a corporate member of the Institute of Acoustics, and is a Chartered Engineer. He is also Editor of the UK Institute of Acoustics' bimonthly magazine *Acoustics Bulletin*.

Northern Archaeological Associates
Partner: P Cardwell *BA*
15 Redwell Court, Harmire Road, Barnard Castle, County Durham DL12 8BN

1.4.8 Northern Archaeological Associates (NAA) is an independent firm which undertakes a wide range of consultancy services for both private and public sector clients throughout Northern England. The firm has particular experience in designing and implementing mitigation strategies in support of both planning applications and associated Environmental Statements. The firm is a member of the Institute of Environmental Management and Assessment.

1.4.9 Peter Cardwell has twenty years professional archaeological experience and is one of the two founding partners of Northern Archaeological Associates. He specialises in the preparation of cultural heritage impact assessments for Environmental Statements and archaeological assessment studies, as well as the management of excavation and survey projects. This has included the preparation of detailed archaeological mitigation strategies for a wide range of developments, including ten wind farm proposals. He has prepared Proofs of Evidence for, and acted as an expert witness at, Public Inquiries into two of these wind farm proposals.

Hickling Gray Associates
Consultant: Patrick Gray, DipTP MRTPI
11 Saturday Market, Beverley, East Yorkshire HU17 8BB

1.4.10 Patrick Gray is a Partner in Hickling Gray Associates, Chartered Town Planners, a consultancy established in 1996. He has over 25 years experience of town planning in a professional capacity, having worked for County and District planning authorities and in the private sector since 1990.

1.4.11 The practice has carried out work for both private and public sector organisations, including local planning authorities. The Partners also have experience in the design and presentation of training courses on behalf of the Royal Town Planning Institute delivered through a sister practice, The Planning Cooperative.

1.4.12 Mr Gray has been a member of the Royal Town Planning Institute since 1983 and holds a Diploma in Town and Country Planning from the Gloucestershire College of Art and Design (now Gloucestershire Institute of Further Education).

1.4.13 He has been actively involved with wind turbine development applications in East and West Yorkshire, Cambridgeshire and Lincolnshire and has presented evidence at a number of Public Inquiries.

1.5 FORM AND CONTENT OF THE ENVIRONMENTAL STATEMENT

1.5.1 The Environmental Statement has been prepared in four volumes, and comprises:

Volume 1

- A Non-Technical Summary

Volume 2 (this volume)

- The Environmental Statement Text

Volume 3

- Figures

Volume 4

- Appendices

2 THE PROPOSED RUSHOLME WIND FARM

2.1 INTRODUCTION

2.1.1 The proposed development consists of a wind farm of twelve wind turbines, together with access tracks, crane hardstandings, a temporary construction compound, appropriate site signs, an underground cable network, a small switchgear building, and a wind monitoring mast, . The wind farm, designed to be monitored remotely, would have an installed capacity of approximately 24 Megawatts (MW).

2.2 LOCATION

2.2.1 The wind farm would be located within arable land, 2km east of the village of Drax; 1km northwest of Airmyn; and 10.5km southeast of Selby. It would be situated on land at Rusholme Farm and Pease Farm, Little Airmyn. **Figure 2, Volume 3** shows the site with associated works in a local context, whilst a more detailed wind farm site plan is included in **Figure 3.1, Volume 3**.

2.2.2 The National grid reference for the wind turbines can be seen in the table below:

Table 2.1: Wind turbine locations

Turbine No	NGR	Turbine No	NGR
1	469670 425710	7	470920 426400
2	469850 426010	8	471120 426100
3	470110 425770	9	471280 426560
4	470240 426060	10	471650 426500
5	470530 426160	11	471830 426030
6	470780 425970	12	471500 425970

2.3 TURBINES

2.3.1 The turbines proposed for the development are the 2 MW Vestas V80 or similar, a sample specification of which is included in **Appendix 2** and illustrated in **Figure 3.4, Volume 3**. They are three bladed variable speed pitch regulated wind turbines, with the rotor and nacelle mounted on a cylindrical steel tower. Each turbine is no more than 100m to tip height (when the blade is in the vertical position), it is 60 metres to hub height, with blades up to 40 metres long. The turbines start to generate at a wind speed of 4 m/s and cut out in wind speeds greater than 25 m/s. The blades rotate at between 9 and 19 rpm, depending on wind conditions. The nacelles and rotors of the turbines rotate so as always to be facing the wind.

2.3.2 These are typical wind turbines of their type; alternative turbines from other manufacturers would be very similar in appearance, size and in all major characteristics.

2.4 SITE ACCESS

2.4.1 Access to the site would be gained from the Rusholme Grange Farm entrance, off Rusholme Lane.

2.4.2 The construction route would leave the M62 at junction 36 and take the A614 west and then onto the A645. The route would then turn right onto New Lane and continue to Brier Lane where it would turn left towards the village of Drax. The route would then turn right onto Rusholme Lane and continue to the site entrance.

2.4.3 The construction route is illustrated in **Figure 2, Volume 3**, with a detailed description in **Appendix 3**.

2.4.4 New Lane is currently closed and would be re-opened in order to access the site. The entrance onto New Lane would be staffed during construction working hours, then gated and locked at all other times.

2.4.5 Traffic management would be required only when the turbines are being delivered to the site. This would consist of temporarily stopping traffic when any long vehicle carrying wind turbine components enters the site. Temporary lights will only be used if required by the local highway department.

Internal Access Tracks

2.4.6 Internal tracks are proposed as part of the development their route is illustrated in **Figure 3.1, Volume 3**.

2.4.7 Each track would be approximately 5 metres wide, with areas of hardstanding adjacent to each turbine for use by cranes during construction. The tracks, a cross section of which is illustrated in **Figure 3.5, Volume 3**, would be surfaced with approximately 250 - 500 mm depth of stone. From the approximate total of 5.33km of internal access track, approximately 3.42km would be new track, whilst the rest would utilise existing track**.**

2.4.8 The tracks, crane hardstandings and new drain crossings would be retained throughout the operational life of the wind farm to allow periodic maintenance of the turbines.

Temporary Construction Compound

2.4.9 A temporary construction compound would also be constructed this would be approximately 75m x 25m in area and would be constructed to the same standards as the access tracks.

2.4.10 The construction compound would be reinstated after the construction of the wind farm has been completed.

2.5 SITE SIGNS

2.5.1 A site sign would be located at the entrance to the site. This would provide both information about the turbines and the companies involved in the project together with essential safety information and telephone numbers.

2.6 SITE ELECTRICAL SYSTEM

2.6.1 The electricity produced would be transformed up to the appropriate voltage by a small transformer to be located within, or immediately adjacent to, each turbine.

2.6.2 Underground cables would be installed at a depth of approximately 1.2m below the ground surface to conduct the electricity from the turbines to a small switchgear building. The electricity would then be conducted underground as described in **section 2.7**.

2.6.3 The switchgear building would be a single storey building measuring approximately 15 x 8 metres. The switchgear equipment will be located as shown in **Figure 3.1, Volume 3.** Shown in **Figure 3.6, Volume 3** is a typical switchgear building and compound.

2.6.4 The flood risk assessment, shown in **Appendix 4,** describes the measures taken to ensure that the electrical equipment is protected from flooding. This assessment states that the proposed development is not within a functional floodplain and that the risk of flooding is less than 0.5%. The floor level of the switchgear building would be a minimum of 300mm above ground level and all electrical equipment would be placed 400mm above floor level.

2.7 EXPORT POWER LINE

2.7.1 The proposed connection path would conduct the electricity from the switchgear building underground to one of the three proposed connection points. These are:

- an 11kV connection at Goole
- a 33kV connection at the Kirkhaw Lane substation, Snaith or
- a 33kV connection on one of the Osgodby to Thorpe Road, Howden circuits

2.7.2 The point of connection will be determined by Yorkshire Electricity Distribution Limited when an application for connection is made.

2.7.3 All electrical cabling will largely follow the route of public roads and will be buried underground.

2.8 WIND MONITORING

2.8.1 A 60 m wind anemometry mast would be located north of Turbine 2 and at grid reference 469850, 426240, as shown in **Figure 2** and **Figure 3.1, Volume 3**. This will provide necessary information for the control and monitoring of the site. The specification of the mast is illustrated in **Figure 3.6, Volume 3**.

2.9 MAINTENANCE REQUIREMENTS AND OPERATION

2.9.1 Once the turbines were in operation, they would be monitored remotely, and not staffed. Maintenance personnel would make routine visits by car approximately once a month, with intermediate visits as and when necessary.

2.9.2 Major planned maintenance would be carried out approximately twice a year. This would involve one maintenance van on site for approximately three weeks.

3 THE NEED FOR THE DEVELOPMENT

3.1 INTRODUCTION

3.1.1 Government policy provides for the encouragement of energy generation from renewable sources, in order to reduce harmful atmospheric emissions and to meet future demand for energy with diverse and secure supplies. This section examines the environmental consequences of fossil fuel energy generation, and the commitments made both nationally and internationally to limit damage to the environment, which together underpin the need for the development of the Rusholme Wind Farm.

3.1.2 **Chapter 14, Volume 2** entitled "The Planning Policy Context" examines in detail the specific planning guidance and policies relevant to this proposal.

3.2 ENERGY FROM FOSSIL FUELS AND GLOBAL CLIMATE CHANGE

3.2.1 The likelihood and consequences of Global Climate Change have been the subject of extensive research for three decades. As the work has progressed, models have improved and with them the understanding of the processes which bring about global climate change and the likely consequences.

3.2.2 The current consensus on Global Climate Change is summarised in the Government's review paper Climate Change Scenarios for the United Kingdom: The UKCIP02 Briefing Report (DEFRA April 2002). It states:

- *The UK climate will become warmer. By the 2080s annual temperature …may rise by between 2 deg C … and 3.5 deg C ….*
- *High summer temperatures will become more frequent and very cold winters … increasingly rare … by the 2080s about two summers in three may be as hot as, or hotter than, the exceptionally warm summer of 1995.*
- *Winters will become wetter and summers may become drier everywhere … In the south and east … summer precipitation may decrease by 50% or more by the 2080s and winter precipitation may increase by up to 30 %.*
- *Snowfall amounts will decrease throughout the UK.*
- *Heavy winter … rain and snow will become more frequent.*
- *Relative sea level will continue to rise around most of the UK's shoreline … by the 2080s, sea level may be … between 26 and 86 cm above the current level in southeast England.*
- *Extreme sea levels will be experienced more frequently. For some east coast locations, extreme sea levels could occur between 10 and 20 times more frequently by the 2080s …*

3.2.3 Reflecting increasing public and governmental concern, these issues are being addressed at all levels, from international treaties cascading down to EU policy, national policy, regional and local planning policy.

3.3 THE INTERNATIONAL CONTEXT

3.3.1 The United Nations "Earth Summit ", held in Rio de Janeiro in 1992, first established the need to control greenhouse gases and other emissions, in the light of rising levels of global warming and pollution referred to above.

3.3.2 At Kyoto in December 1997 the 174 parties to the convention considered what should be the next step. In an historic agreement a new Protocol was drawn up. This aimed to reduce developed country emissions of a basket of the six principal man-made greenhouse gases overall to 5.2% below the 1990 levels over the period 2008-2012. This target is legally binding.

3.3.3 The Kyoto Protocol has had a number of significant policy consequences for most developed countries. In particular it has led to the widespread adoption of measures to encourage the generation of electricity from renewable resources. The result has been the rapid development of renewables, in particular wind energy, throughout Europe and North America.

3.4 THE EUROPEAN CONTEXT

3.4.1 The Protocol permits countries to undertake commitments jointly; the Member States of the European Community agreed to undertake an 8% reduction and to increase the contribution made to energy supplies from renewable sources from 4% to 8% by the year 2005. In June 1998, European Environment Ministers agreed how this target would be shared out between Member States. The UK agreed to take on a reduction target of 12.5%.

3.4.2 The White Paper on Renewable Energy Sources published in 1998 by the Commission and endorsed by both the Council of Ministers and the European Parliament then called for a target of 12% of gross domestic energy consumption to be met by renewables by 2010.

3.4.3 In August 2001 EU policy took a significant step forward with the publication of a Directive of the Parliament and the Council of Ministers on the promotion of electricity produced from renewable resources. Its preamble states:

The Community recognizes the need to promote renewable energy sources as a priority measure given that their exploitation contributes to environmental protection and sustainable development …… and make it possible to meet Kyoto targets more quickly.

3.4.4 The Directive sets the UK target at 10% of gross electricity consumption by 2010 (see below). It also requires the Commission to assess progress towards these national targets and if necessary submit proposals for mandatory targets should progress not be sufficient.

3.4.5 Meanwhile the development of wind energy throughout the world has accelerated dramatically, with a 30% increase in capacity installed during 2002. By July 2003 the world total of installed wind energy capacity exceeded 32,000 MW.

3.5 THE UK CONTEXT

3.5.1 Government Renewable Energy Policy was first defined in Energy Paper Number 55, "Renewable Energy in the UK: The Way Forward" (June 1988):

"*The Government intends to stimulate the development and application of renewable sources of energy wherever they have prospects of being economically competitive and environmentally acceptable*".

3.5.2 This was first quantified in the White Paper "This Common Inheritance" September 1990. It stated:

."*… the Government will work towards a figure of renewable electricity generating capacity of 1000 MW in 2000*".

3.5.3 In November 1992 the Renewable Energy Advisory Group (REAG) made a strong recommendation to increase the targets for renewable energy by underwriting a floor level of 1500 MW Declared Net Capacity (dnc)[1] for new projects by the year 2000. This was to be achieved through the Non Fossil Fuel Obligation, established under the Electricity Act of 1989, which provided for premium prices to be paid by the regional electricity companies for the supply of contracted amounts of electricity from renewable sources. A parallel arrangement for Scotland, The Scottish Renewables Obligation was also established.

3.5.4 The Government accepted this recommendation and Energy Paper Number 62 (March 1994) confirmed that Government policy was to work towards 1500 MW declared net capacity of new electricity generating capacity from renewable sources for the UK by 2000.

3.5.5 Five rounds of competitive bidding for NFFO contracts then ensued.

3.6 SUPPLIER OBLIGATION AND THE CLIMATE CHANGE LEVY

3.6.1 The present government has committed itself to a target of at least 15% of electricity supplies to come from renewable sources by 2015.

3.6.2 The advent in 2000 of a revised UK electricity market (the New Electricity Trading Arrangements) rendered further use of the NFFO mechanism impossible for structural reasons. The Government therefore embarked on

[1] Declared Net Capacity (dnc) is an indicative measure of the capacity factor of renewable energy plant in comparison with conventional plant, recognising that an energy source such as wind is intermittent in nature. For wind, 1 MW installed = 0.43 MW (dnc) where installed capacity is the maximum output of the plant.

extensive consultation on a successor mechanism and in August 2001 announced the final form of the new Renewables Obligation.

3.6.3 The Renewables Obligation, which came into force in April 2002, is an obligation on all UK electricity supply companies to source a certain percentage of electricity from renewable sources each year, or face a financial penalty (known as "buying out"). Starting at 3% of their total energy turnover in 2001/3, the required percentage will rise to 10.4% in 2010/11. In December 2003 the government increased the percentage by a further 50% to 15.4% by 2015 and this level will remain at least until 2026/7.

3.6.4 To achieve these obligations, and taking account of the predicted growth in UK electricity demand, the production of electricity from renewable sources will need to increase from 9.4 Terawatt hours (TWh) in 2001/3 to 33.6 TWh in 2010/11 and 49TWh by 2015. Onshore and offshore wind are expected to account for about half of this increase, and this requires more than 500 MW of wind generation capacity to be installed each year for the next eight years.

3.7 THE ENERGY WHITE PAPER

3.7.1 The latest Government thinking at national level on energy is embodied in the Energy White Paper, "Our Energy Future – Creating a Low Carbon Economy", published in February 2003. This represents a radical development of UK energy policy and recognises three major challenges;

- Climate change
- Decline of indigenous energy supplies
- The need to update the energy infrastructure

3.7.2 The overriding new policy commitment is "*that the UK should put itself on a path towards a reduction in carbon dioxide emissions of some 60% from current levels by about 2050*"(1.10)"

3.7.3 This represents a very substantial policy commitment beyond the existing requirements of the Kyoto Protocol.

3.7.4 Renewables are seen as a key part of the strategy. "*If we are to achieve a 60% reduction in carbon emissions by 2050, we are likely to need renewables by then to be contributing at least 30% to 40% of our electricity generation and possibly more. We therefore need to develop a framework which encourages the development of a wide range of renewable options and to make significant changes to our institutions and systems*" (4.5).

3.7.5 The current small contribution of renewables and the need for rapid deployment is highlighted. "*We produce less electricity from renewables than a number of our European partners. In 2000, renewables (excluding large hydro plant*

and mixed waste incineration) supplied only 1.3% of our electricity, compared to 16.7% in Denmark ……. To hit the 10% target we will need to install approximately 10,000MW of renewables capacity by 2010, an annual build rate of over 1250MW" (4.9).

3.7.6 The current target of 10% of electricity supplies to come from renewable sources by 2010 is restated (4.11) and the Government goes on to state that "*our aspiration is by 2020 to double renewables' share of electricity from our 2010 target and we will pursue policies to achieve this*" (4.11).

3.7.7 The White Paper specifically addresses planning as *"one of the big obstacles to new renewables"*. It confirms that the Office of the Deputy Prime Minister (ODPM) will shortly publish new planning guidance on renewables (PPS22) (4.30). *"These documents will provide guidance to local planning authorities and developers about the best way to promote renewables through the planning system as well as encouraging a strategic approach to the deployment of renewable projects through regional planning guidance and development plans. We will also be consulting on a new regional-level strategic approach to energy issues, including renewables, which we expect will incorporate regional targets."*

3.7.8 The specific role of onshore wind energy within the market-based grid backbone of the electricity system is recognised in a vision of the energy system in 2020 (page 18). Onshore wind is also singled out as the one renewables technology that is already economic with support from the Renewables Obligation. (4.43).

3.7.9 It is clear that this White Paper indicates a positive change in the Government's commitment to renewables. In the short term, it reaffirms the target of 10% of electricity supplies to come from renewable sources by 2010 and in the medium term it aspires to 20% of electricity supplies to come from renewable sources by 2020. In the longer term, it looks to a 30-40% contribution from renewables by 2050. It recognises onshore wind as an essential component of the future generation mix.

3.7.10 These targets and aims greatly reinforce the need for wind energy developments in suitable locations.

3.8 YORKSHIRE AND HUMBER REGION RENEWABLE ENERGY POLICY AND TARGETS

3.8.1 In parallel with the creation of the Renewables Obligation, the Government has recognised the important role the planning system has to play in delivering these demanding targets. A series of statements led in October 1999 to specific proposals for the development of regional targets for renewable energy. In response to the Twelfth Report of the Lords Select Committee on European Communities "Electricity from Renewables", the Government said "*In order to facilitate the setting of regional targets we have asked the Government*

Offices for the Regions to set in motion the process of preparation of regional assessments and targets for renewable energy provision… Government Offices will be encouraging local planning authorities to make positive proposals in their plans for renewable energy provision in their areas".

3.8.2 In February 2000, the Department of the Environment, Transport and the Regions published its "Guidance on Preparing Regional Sustainable Development Frameworks". This further elaborated the approach and set out plans for regional targets which the Government wished to see in place by the end of 2000. It led to the commissioning of a series of studies and consultation exercises in each region, resulting in reports recommending targets. These are intended to feed into Regional Planning Guidance and then cascade down through to Structure and Local Plans in due course.

3.8.3 In the Yorkshire and Humber Region this study took the form of a report to the Government Office for Yorkshire and Humber "Development of a Renewable Energy Assessment and Targets for Yorkshire and the Humber", published in July 2002. The study recommends that the region could generate 670MW of electricity from renewable resources by 2010 and 1850MW of electricity from renewable resources by 2020.

3.8.4 The report then breaks down the targets by renewable energy generation type and size and by county. The 2010 target would require the development of 7 new wind farms consisting of 10-20 wind turbines (200MW) with four of these being in North Yorkshire (100MW). The breakdown of the type and size of renewable energy generation by 2010 can be seen in **Table 3.1.**

3.8.5 Clearly these targets will now need to be revised in light of the new government target to produce 15% of electricity from renewable sources by 2015.

Table 3.1: Indicative scenario for sub-regional breakdown of renewable energy electricity across Yorkshire and the Humber by 2010.

Indicative Renewable Energy Generation Type/Size	EXISTING	NEW				
	Existing Schemes	Humber	North Yorkshire	West Yorkshire	South Yorkshire	TOTAL
Offshore Wind Farms (60-100MW ; 20-30 turbines)	0	2 (160)	0	0	0	2 (160)
Wind Farms (25MW; 10-20 Turbines)	3 (24.15)	2 (50)	4 (100)	1 (25)	0*	10 (200)
Small Wind Clusters (6 MW; 4-10 Turbines)	1 (1.2)	6 (36)	4 (24)	1 (6)	1 (6)	13 (73)
Single Large Wind Turbines (1.5 MW)	4 (0.78)	6 (9)	6 (9)	4 (6)	4 (6)	24 (31)
Single Small Wind Turbines/Chargers (0.03 MW)	?	6 (0.18)	4 (0.12)	12 (0.36)	8 (0.24)	30 (0.9)
Co-firing of Biomass in Existing Fossil-Fuelled power stations	0	0-1 (0-20)	0	0-1 (0-20)	1 (30)	2 (50)
Large CHP / Electricity Plants Fuelled by the Combustion of Energy Crops and/or Agricultural & Forestry Biomass (AFB) (20+ MW)	1 Wood (10) 1 Chicken Litter (16.7)	1 Straw (20)	1 Wood (20) 1 Straw (20)	0*	1 Wood (42)	3 Wood (72) 2 Straw (40) 1 Chicken Litter (16.7)
Small CHP Plants Fuelled by the Combustion of Energy Crops and/or AFB (5-10 MW)	0	0*	1 Wood (5)	0*	1 Wood (5)	2 Wood (10)
Anaerobic Digestion Plants Fuelled by Farm Biogas (0.5 MW)	0	1 (0.5)	1 (0.5)	0*	0*	2 (1)
Small-Scale Hydro Power(0.1 MW)	0	0	11 (2.2)	2 (0.4)	2 (0.4)	15 (3)
Domestic PV Installations (1.5-3kW$_p$)	?	1300 (2.0)	1100 (1.6)	2800 (4.2)	1800 (2.7)	7000 (10.5)
Commercial PV Installations (50kW$_p$)		12 (0.6)	8 (0.4)	26 (1.3)	16 (0.8)	62 (3.1)
Motorway PV Installations (160kW$_p$/km)		5 (0.8)	0*	5 (0.8)	5 (0.8)	15 (2.4)
Total	**10 (53)**	**24/25 + PV (280/300)**	**33 + PV (183)**	**20/21 + PV (44/64)**	**18 + PV (94)**	**106 + PV (674)**

Each cell within the table above gives an indication of the number of schemes and the potential installed electricity capacity from those schemes, in the form {Schemes (Installed Capacity)}

*The analysis summarised in Table 10 cannot predict with certainty where schemes will appear and their actual scale, but rather shows prospects for deployment based upon key indicators such as resource availability and the presence of constraints. For example, the pattern of existing wind energy developments within the region is somewhat different from the pattern implied above, and a "zero" does not imply that future schemes of certain scales are out of the question.

3.9 ELECTRICITY PRODUCTION

3.9.1 The twelve wind turbines at the Rusholme site would provide 24 MW of installed capacity, equating to 12% of the suggested recommended regional target for wind farms (10-12 wind turbines) in the Yorkshire and Humber region and 24% of the recommended target for wind farms (10-12 wind turbines) in North Yorkshire. They will generate, on average, enough electricity to meet the domestic needs of 14,500 households.

3.10 REDUCTION OF GREENHOUSE GAS EMISSIONS

3.10.1 The development of the proposed wind farm would make a significant contribution to the reduction of atmospheric pollution, though not necessarily in the immediate locality.

3.10.2 For a given level of national electricity demand, every kilowatt-hour (KWh) produced from a non-polluting source such as a wind turbine replaces one produced by a fossil fuel power station.

3.10.3 The impact of the proposed Rusholme Wind Farm on atmospheric pollution can be calculated as follows.

3.10.4 The Parliamentary Office of Science and Technology quotes the following emission figures typical of coal-fired plant (it should be noted that these figures are slightly different to those given by the British Wind Energy Association, due to differing calculation methods):

CO_2	936-1079	grammes per kWh
SO_2	14-16.4	grammes per kWh
NO_x	2.5-5.3	grammes per kWh

3.10.5 The following formula can then be applied:

Emission Reduction (tonnes per annum) = (A x B)/1000

where,

A is the predicted site output in Megawatt hours (MWh) per year

B is the avoided emission for each substance per kWh

3.10.6 The predicted site output per year (A) is calculated as follows:

Predicted site output per year (A) = C x 0.3 x 8760

where,

C is the rated capacity of the wind farm in MW, being the amount of electricity produced by the wind farm when each wind turbine is operating at full power. In the case of the proposed development assuming that twelve Vestas V80 wind turbines are utilised, this is 24MW.

0.3 is a constant, the capacity factor, which takes into account the intermittent nature of the wind, the availability of the wind turbines and array losses.

8760 is the number of hours in a year.

3.10.7 The proposed scheme would generate about 63,072 MWh per year. From the above calculation, it would result in the following reductions in levels of atmospheric emissions avoided:

CO_2	*59,035 - 67,865*	*tonnes per annum*
SO_2	*883 - 1034*	*tonnes per annum*
NO_x	*158 - 334*	*tonnes per annum*

3.10.8 It is estimated that the energy input required to manufacture and erect a wind turbine would be recovered from its output in between three and six months.

3.11 REDUCTION OF TRANSMISSION LOSSES

3.11.1 Electricity generated by the proposed wind farm will be fed into the electricity distribution network by one of the options described in **section 2.7**. This means that the electricity would be consumed close to where it is generated.

3.11.2 As a local provider of electricity, wind farm developments of the scale proposed here make a significant contribution to reducing losses associated with transmitting and distributing electricity across the country from large centralised power generation plants.

3.11.3 The 2001 Digest of Energy Statistics (paragraph 5.75) states that;

"*It is estimated that about 5,600 GWh (1.5% of the electricity available) were lost from the high voltage transmission system of the National Grid and 22,200 GWh (6%) between the grid supply point (the gateways to the public supply system's distribution network) and customers' meters.*"

3.11.4 Embedded generators such as this wind farm completely avoid the 1.5% high voltage transmission losses associated with traditional generation by offsetting imports from outside the local area. There may also be a reduction in the 6% distribution losses but this is more difficult to quantify and depends on the exact configuration of the local distribution network.

3.12 SUMMARY AND CONCLUSIONS

3.12.1 The need for generation of electricity from renewable resources stems from the need to combat global climate change. Renewables are internationally recognized as providing a direct and readily available means of reducing greenhouse gas emissions.

3.12.2 As a result, strong and effective policies to encourage the development of renewables have emerged at European, UK and regional levels, cascading down through the planning system to specific targets for each region. The proposed target for onshore wind in the Yorkshire and Humber Region would require the development of 7 new wind farms consisting of 10-20 wind turbines (200MW) with four of these being in North Yorkshire (100MW) by 2010.

3.12.3 In this context the proposed development represents a significant contribution to regional and national targets, meeting 24% of the target for wind farms consisting of 10-20 wind turbines for North Yorkshire. It would, on average, meet the equivalent domestic needs of 14,500 households in the area and avoid the emission of around 59,035 - 67,865 tonnes of carbon dioxide per year.

4 PLANNING THE DEVELOPMENT

4.1 INTRODUCTION

4.1.1 This section describes the evolution of the Rusholme Wind Farm proposal which involved planning, design and appraisal work at two distinct levels:

Strategic Site Selection in order to identify an area within which a wind farm could be developed, through the analysis of a wide range of technical and environmental criteria.

Detailed Site Design of the wind farm, involving the design of the site layout, access arrangements, type and finish of the turbines and all ancillary structures, in order to best respond to various technical, operational, and environmental constraints to development within the identified study area.

4.1.2 The development has been planned, consultations conducted and the Environmental Impact assessed in accordance with the Best Practice Guidelines for Wind Energy Development of the British and European Wind Energy Associations.

4.2 STRATEGIC SITE SELECTION

4.2.1 A range of factors have been considered that affect the suitability of an area for a wind farm and could potentially constrain development. These include the following technical, planning, land use and environmental considerations:

- All wind energy developments require sufficient wind resource.
- A wind farm development requires capacity within and ease of connection to the electricity distribution network. On a broad scale, areas remote from overhead transmission lines, individual dwellings or settlements are unlikely to offer feasible opportunities for grid connection.
- Designated areas of national and local importance together with other landscape, nature conservation, archaeology and heritage considerations.
- The Landowners willingness to make the land available for the development.
- The availability of an access route to the site that is able to accommodate the long vehicles required to transport the wind turbine components. General ground conditions suitable for constructing wind turbines.

- Separation from individual residential properties and settlements in order to ensure visual and noise impacts are at acceptable levels.

- Separation from telecommunication links to ensure that the movement of wind turbine blades does not disrupt signals.

- Avoidance of areas subject to Ministry of Defence or Civil Aviation Authority operations.

4.2.2 The Rusholme site was assessed as being potentially suitable because:

- Rusholme benefits from an extremely flat landscape over a large area, with a relatively smooth surface (i.e. uncluttered by urban centres, blocks of trees or other obstacles that could disrupt airflow). It therefore has potential as commercially viable wind resource.

- The area is remote from national and locally important designated areas. The nearest statutory protected sites are the Humber Flats and Marshes: Upper Humber SSSI (2.2km), Barn Hill Meadows SSSI (2.3km) and the River Derwent SSSI (3.1km).

- It has been possible to achieve wind turbine separation distances of over 500metres from Rusholme Grange (the closest property) and 750 metres or more from other residential properties.

- Capacity within and ease of connection to the electricity grid are difficult to assess at an early strategic stage because of the complexity and variety of connection options that may be available. However electrical connection to the Rusholme wind farm appears to be feasible to one of three possible connection points

- There is suitable access from the A645 via New Lane, onto Brier Lane and along Rusholme Lane to the site.

- The landowners are agreeable to making land available for the installation of wind turbines.

- Results of consultations with telecommunication link operators indicated that only one link crossed the site which could be avoided through micrositing of the wind turbines.

- Consultations with the Ministry of Defence (MoD) and the Civil Aviation Authority (CAA) concluded with no objections being raised.

4.2.3 Following these initial studies, it became evident that, in terms of technical and environmental issues, the site at Rusholme was suitable for wind energy development.

4.3 DETAILED SITE DESIGN

4.3.1 Having established the Rusholme site as being essentially suitable for a wind farm development, a design process reflecting specific design criteria was undertaken.

4.3.2 A description of the elements of the proposed development, which together comprise a wind farm, can be found in **Chapter 2** of this volume.

Operational Requirements

4.3.3 A number of the elements of a wind farm have operational requirements which influence their siting, as follows;

- **Turbines** should, as far as possible, be located on existing tracks or field boundaries to minimise disruption to the primary agricultural use of the land.

- **Turbines** should be placed such that the best balance between the total site area and minimal interference to the wind flow between the turbines is obtained.

- **Turbines** should be placed such that they do not impinge on the operation of telecommunication signals.

- **Switchgear building** should be located adjacent to the point of export of the electricity from the site into the electricity distribution system.

- **Site Access** should utilise existing roads where possible in order to minimise the need to build new roads. The access point should be approximately 5 metres wide with an appropriate splay (where required) in order to accommodate turbine deliveries and site construction vehicles.

- **Internal Access Tracks** should interlink each turbine, and be constructed to 5 metres in width, at a gradient suitable for use by heavy plant.

Environmental Requirements

4.3.4 In addition to the strictly technical needs of the wind farm, the following environmental requirements which bear directly on site design were identified:

- **Separation from Dwellings**. The turbines should be located so that no dwelling could suffer noise nuisance. PPG22 states that experience from mainland Europe has shown there is unlikely to be a significant noise problem for any residential property situated farther than 350-400 metres from the nearest turbine. PPS22 recommends that the methods stipulated in ETSU-R-97 should be used to assess and rate noise from wind energy developments. There is currently no statutory separation distance required between wind turbines and dwellings.

- **Colour**. An appropriate colour for the turbine towers and blades should be identified in the light of the main views and backgrounds likely to be experienced.

- **Visual Amenity**. The turbines should be located so that no dwelling could suffer shadow flicker effects. This is discussed in **Chapter 8**, the 'Impacts on Landscape and Visual Amenity'.

- **Other environmental issues**, in particular, impact on landscape, archaeology, ecology and public amenity.

Public Consultation

4.3.5 Local residents are considered to be important stakeholders in the wind farm development process. Their detailed local knowledge and interest form a vital input to design considerations. In order to be informed of their views, an extensive public consultation exercise began in July 2003. This is briefly detailed in the paragraphs below.

4.3.6 In July 2003 Newland Parish Council was advised of the proposal and offered a presentation on its detail. To date (April 2004) the Council has not taken advantage of this offer or entered into any discussions relating to the proposal.

4.3.7 During August 2003 letters outlining the proposal and offering a presentation were sent to Newland, Airmyn, Drax, Long Drax, Asselby and Barmby Parish Councils. Also enclosed, for information, was a copy of a newsletter

subsequently sent to local households. As a consequence, a presentation was given to Airmyn Parish Council on 10th September 2003

4.3.8 Shortly after contacting the parish councils (see paragraph 4.3.7) the newsletter was distributed to more than 2000 households in the locality. It gave details of the proposal and invited all to attend the forthcoming Information Day (see **Appendix 5**). An explanatory leaflet on wind energy was also enclosed (see **Appendix 5**).

4.3.9 The Information Day, held on 3rd September 2003 in Drax Village Hall, was advertised in the local press. Approximately 100 people attended to learn about the proposed development and give their views, and 25 people completed and returned a questionnaire that invited comments on wind energy in general and the Rusholme proposal in particular. Full questionnaire results are shown at **Appendix 6**.

4.3.10 In summary, the overall questionnaire response indicated that:

64% of respondents thought wind energy should play an important role in the UK and 36% believed the Rusholme Wind Farm to be a positive development.

40% of respondents did not raise queries; of the remainder there were concerns about the construction traffic route, site noise and property devaluation.

4.3.11 Feedback from the Information Day showed that many residents were concerned that crime levels may increase in the area if New Lane was reopened as the site access route. Alternative routes where considered and it was found that the access through New Lane remained the most suitable option (see **Appendix 3**). In order to mitigate against increased crime the entrance to the lane will be staffed during working hours and gated and locked at all other times. A second newsletter updating residents on the proposal, the results of consultations and environmental studies was sent in February 2004 (as seen in **Appendix 5**).

4.3.12 The newsletter also advertised a second series of exhibitions that were held on the 24th, 25th and 26th February 2004 at Barmby, Airmyn and Drax respectively. These exhibitions provided local residents with information on the proposal including detailed plans and results of the environmental studies. Approximately 150 people attended the exhibition over the scheduled three days.

4.3.13 In addition, since the proposal's announcement, many responses have been made to individual enquiries and to questions from Drax and Barmby Parish Councils.

Evolution of Design

4.3.14 All of the above factors were analysed in relation to the operational, environmental and safety requirements of each element of the potential wind farm development. This led to a process of design development which is outlined below. The series of layout designs referred to below are illustrated in **Figures 4, Volume 3**.

4.3.15 ***Design 1*** represents the original technically-based desk design for the site. It consists of fourteen wind turbines, located in lines running approximately east west.

4.3.16 This layout was designed to take account of the telecommunications link which runs from Goole (473000, 236000) to Osgodby (463400, 433100). A separation distance of 150m had to be maintained between the line of sight of the link and the wind turbines (see **Chapter 12**).

4.3.17 ***Design 2*** was reached after a presentation to Airmyn Parish Council. Feedback suggested that the wind turbine sited closest to the village was of the most concern to local residents. Analysis of photomontage and wireline graphic material illustrating views from Airmyn confirmed that turbine 14 was likely to result in significant visual impacts in some views. After discussions with members of the consultancy team, the company responded with Design 2, a 13 turbine layout omitting turbine 14.

4.3.18 The final layout of 12 wind turbines was reached after consultation with the landowners. One further turbine was removed and changes were made to the siting of other turbines in order to minimise disruption to farming activities, to maximise the use of existing farm tracks and to minimise the impact on drainage. This resulted in ***Design 3.***

4.4 CONCLUSION

4.4.1 All information and consultation responses were analysed in relation to the operational, environmental and safety requirements of each element of the potential wind farm development. This led to a process of design development as the relevant factors were taken fully into account, as detailed knowledge of the site was accumulated and as the results of public consultation became clear. The final location and design is submitted in the planning application.

5 CONSTRUCTION

5.1 INTRODUCTION

5.1.1 This section describes the likely environmental impacts of construction. Anticipated impacts arising from the works undertaken in the development of the wind farm have, where possible, been identified and suitable mitigation measures proposed.

5.1.2 It is anticipated that the wind farm would take approximately 43 weeks to construct.

5.2 PRE-CONSTRUCTION WORKS

5.2.1 Prior to the main construction contract commencing, a number of enabling works would be undertaken, including:

- Excavation of trial pits for geotechnical investigations
- Construction of site access points
- Installation or modification of land drainage as required

5.3 CONSTRUCTION WORKS

5.3.1 The principal components of the construction activity on site would be as follows:

Site Access

5.3.2 Several of the corners on the site access route between the A645 and the site entrance would require widening and strengthening. These are detailed on **Figure 3.3, Volume 3.** Soil would be removed from these areas, to a depth between 250 – 500mm(depending on the ground conditions encountered during the geotechnical investigations), and then replaced with a geotextile, a compacted crushed rock layer and a reinforcement finish of fine graded material as a top dressing.

Access Tracks

5.3.3 This would involve the widening and strengthening of existing tracks wherever necessary and the construction of new site tracks. Soil would be removed to a depth between 250 – 500mm(depending on the ground conditions encountered during the geotechnical investigations), and then replaced with a geotextile, a compacted crushed rock layer and a

reinforcement finish of fine graded material as a top dressing. At the request of the landowners, top soil is to be stored on site at convenient locations for re-use on the farm.

5.3.4 Existing access tracks would be widened to 5m and new tracks would be constructed where necessary. The locations of these tracks are shown on **Figure 3.1, Volume 3**. A typical cross-section of the access track is illustrated in **Figure 3.5, Volume 3**.

5.3.5 At the site access point statutory warning signs would be erected, as agreed in advance with the local highways department.

Temporary Construction Compound

5.3.6 A temporary construction compound would also be constructed this would be approximately 75m x 25m in area and would be constructed to the same standards as the access tracks.

Crane Hardstandings

5.3.7 Areas of hardstanding would be constructed adjacent to the turbines. Each area would consist of a primary hardstanding for the larger main lift crane, with approximate dimensions of 35m by 18m, and a secondary hardstanding for the smaller auxiliary crane, with dimensions of 26m by 12m. A typical arrangement is illustrated in **Figure 3.2, Volume 3**. Each pair of hardstandings would be approximately 1000m^2 in area, with the exact arrangement being modified to suit the specific requirements of each turbine.

5.3.8 Construction of the hardstandings would be to the same specification as the new site access tracks, except those areas directly under the main crane outrigger pads. In order to carry the greater loads the construction of these areas would involve excavation to the depth of up to 1500 mm (depending on the prevailing ground conditions) with a replacement by compacted crushed rock reinforced with layers of geotextile. If no suitable load bearing strata was located at these depths during the pre-construction work, then bored or driven piles may be required to carry these crane outrigger loads.

Turbine Bases

5.3.9 A detailed geotechnical investigation would be undertaken to establish the nature of the sub soil condition at each turbine location upon which the most appropriate foundation detail would be designed. The turbine foundation would be either a large gravity foundation or a piled foundation design.

5.3.10 If a competent load bearing strata were located within 2 to 5 m of the surface, then a gravity type foundation would be adopted. This would involve the excavation and removal of material down to the load bearing strata and back

filling with compacted engineering fill to a level of 2m from the surface. This would necessitate, at worst, the excavation and disposal of approximately 1300 cubic metres of material. A 16 x 16 x 1m reinforced concrete foundation would then be constructed on top of this engineering fill, as illustrated in **Figure 3.5, Volume 3**.

5.3.11 Alternatively, if no competent load bearing strata were located within 2 to 5 m of the surface, a piled foundation design would need to be utilised. This would involve the construction of a piling hardstanding over the proposed turbine location, requiring an excavation of approximately 250 cubic metres of ground material. An arrangement of 9 to 16 evenly spaced augured or driven piles would be installed to a depth sufficient to engage a competent load bearing strata. These piles would be terminated 2m below ground level upon which a smaller reinforced concrete foundation, of approximate dimension 10 x 10 x 1m, would be constructed.

5.3.12 For the reinforced concrete foundation the construction would involve the placing of shuttering and steel reinforcement followed by the compaction of concrete within the shuttering to form the base in situ. The upper surface of each base would finish approximately 1 metre below ground level with the central pedestal extending 200mm above existing ground level to receive the bottom tower section. Selected suitable excavated material would be compacted in layers on top of the concrete foundation to terminate flush with the existing ground level, leaving sufficient room to allow topsoil reinstatement.

5.3.13 As the topsoil is Grade I, it would be retained by the landowner and redistributed across the agricultural land as required by the landowner to ensure its continued use. Ground material needed for backfill would be compacted and stored temporarily in bunds adjacent to the excavations until required. Any remaining excavated material would be removed from site to an approved tip.

Electrical Connection

5.3.14 Following base construction, the site electrical infrastructure would be installed. This would include the underground cabling and earthing between the turbines and the switchgear building. The cables would be located in the bottom of cable trenches approximately 1.2m deep and 1m wide. Both would be built onto raft foundations to a depth of 1m. A typical switchgear building is shown in **Figure 3.6, Volume 3.**

5.3.15 The export line from the switchgear building would lead underground to Rusholme Lane, where it would be routed in the road verge to the point of connection.

Turbine Erection

5.3.16 The components for each turbine would be delivered to the site on up to 6 trailers. The method of construction would involve the use of a small auxiliary 150 tonne crane for vehicle off loading and preliminary assembly. A larger 800 tonne main lift crane and the 150 tonne trailing crane would be utilized to erect the turbines once preliminary assembly has been completed. The overall erection process will take approximately 1-2 days dependent upon the prevailing weather conditions.

Site Traffic

5.3.17 The vehicles likely to be involved in construction activities include:

- Articulated trailer lorries - to bring initial establishment equipment (port-a-cabins etc.) on to site and later to bring the turbines themselves.
- Low loaders - to transport the civil construction equipment to and from the site
- Tipper trucks - to bring stone for the access tracks and to remove spoil.
- Concrete mixers - to bring concrete for the bases.
- Cranes - one 150 tonne crane for assembling the turbines on the ground and one 800 tonne crane plus three support vehicles for the short period required for erecting the turbines.
- Piling rig and support equipment to install the piles if required in the foundations
- Miscellaneous vehicles and handling equipment, including cars belonging to the construction workforce.

Storage and Disposal of Materials

5.3.18 It is proposed that the topsoil be stripped, stored and redistributed on site as required by the landowner. All topsoil would be moved and stored in accordance with the DEFRA Good Practice Guide for Handling Soils.

5.3.19 Subsoil would be retained as far as practical for backfilling and as required by the landowner for farming operations, with any excess removed offsite to an approved disposal site.

5.3.20 If diesel were to be stored on site it would be in proprietary double skinned bundied tanks to ensure that in the event of any leakage the diesel would be contained.

5.4 POTENTIAL IMPACTS

5.4.1 The principle impacts of any construction activity lie in the noise and traffic which are temporarily generated, together with any disruption of services, and inconvenience which may be caused to other users of the site, including those who may wish to gain access across it. These impacts are considered as follows:

Noise

5.4.2 The impacts due to noise during construction would be minimal. The equipment used would include road going tippers, dump trucks, ready-mix concrete trucks, racked excavators and vibratory compaction equipment.

5.4.3 Lorry-based equipment, either construction dump trucks or road going vehicles, would conform to the relevant Road Traffic Acts and the Construction Regulations, and would all be fitted with effective diesel exhaust silencers.

5.4.4 The civil excavation equipment would be powered by conventional turbocharged diesel engines of outputs comparable to those for agricultural purposed and of a similar output. In the UK, noise emissions from these machines are controlled by European Directives and the maximum permissible sound power output is 104dBA. This will be further tightened over the next few years and new equipment will be quieter in anticipation of new regulations.

5.4.5 Piled foundations will be necessary for each of the turbines. It is expected that the piles will be installed using continuous flight auger (CFA) piles (which are concrete piles cast in-situ) rather than using conventional driven piles. The CFA process is relatively quiet, with the typical piling rig emitting a noise level of around 82dBA at a distance of 1m. This means that the overall sound power emitted by a piling rig is comparable with that from a single turbine, except that the noise sources on a piling rig are close to the ground. The effects of distance, ground effects and air absorption mean that the resulting noise level at the nearest residential property in will be a maximum of approximately 30dBA, the typical minimum separation distances being 750 to 800 metres. The piling operation at an individual turbine foundation would take no more than a day or two, but even in a flat calm this would not be in excess of the daytime background noise level, and would thus be completely acceptable.

5.4.6 The guidelines laid down in BS5228 on noise from construction activities would readily be met, because construction of the wind farm and its

infrastructure would only require the use of a very few machines at any given time.

Site Traffic

5.4.7 All construction traffic would be routed from the A645 onto Rusholme Lane via New Lane and Brier Lane, as shown on **Figure 2, Volume 3.** The most significant impacts are likely to occur during the construction of the access roads and turbine bases, when there would be an increase in volume of construction traffic, traffic noise and, possibly, mud deposited on the local roads. The worst-case scenario would be if pad foundations were used for all turbines, leading to a four-month period when an average of approximately 30 trucks per day (given a 5-day working week) would be expected to enter the site. If the concrete foundations and access tracks are laid on the same day, then a maximum of 65 truck trips to site would be expected on no more than 12 days.

5.4.8 During the two-month delivery period when the turbine components would be entering the site, the slow and long loads approaching the access point would interrupt the flow of traffic along the A645 and the local lanes used to reach the site.

Disruption to Drainage

5.4.9 All turbines foundations will be constructed at least 7m away from main drains

5.4.10 The drains would be crossed at 5 locations (4 crossings will be over Internal Drainage Board drains and 1 over the landowners private drains), which would lead to short term impact on the drains during the construction of the access tracks. All drain crossings would be constructed in consultation with and to the specification of the Internal Drainage Board and the landowner.

5.4.11 Excavation of the turbine foundations and cable trenches may have an impact on the field drainage pattern. These drains will be diverted in advance of the civil works commencing such that the integrity and effectiveness of the existing drainage would be unaffected. Any ground water collecting within excavations will be pumped into settlement tanks and filtered before controlled discharge into existing water courses. Any impact of the immediate ground water level would be minimal and temporary, with the groundwater returning to pre-excavation levels between two to three months after the foundations are completed.

Storage and Disposal of Materials

5.4.12 All residual materials (cable off cuts, housings, containers etc) would be collected in appropriate containers before being removed from the site at the end of the construction period, and disposed of at an appropriate licensed tip.

Landscape

5.4.13 Construction phase changes in landscape resources would also occur over a period of approximately 43 weeks duration, while the site is under construction. These changes include:

- the establishment of a temporary works compound approximately 1 hectare in area, to be located as indicated on **Figure 3.1, Volume 3**;
- storage of materials and arisings (spoil);
- the presence and movement of cranes, construction plant, heavy vehicles and other contractor's vehicles associated with the construction of the site.

5.4.14 The changes will create a range of new landscape features that will generally be at odds with existing features. The scale or magnitude of resulting effects would be low, reflecting the temporary and entirely reversible nature of construction phase changes in landscape resources. The sensitivity of the site's landscape to construction phase changes would also be low, and overall impacts on landscape resources would be of very low or negligible significance.

Inconvenience to site users

5.4.15 The works would not impinge on farm workers on the site, as usage of the site can be readily and safely maintained throughout the construction period.

5.5 MITIGATION MEASURES

Noise

5.5.1 It is considered unlikely that specific measures, other than the use of modern machinery with the manufacturer's standard noise control devices in place and in good repair, would be required in mitigation of the effects of construction noise. Noise from the site will be similar in character to noise from conventional agricultural machinery, due to the use of diesel engines. In fact, the levels of sound emitted by the construction machinery would be rather lower than present-day tractors and combine harvesters, which are allowed to operate on agricultural land without time restrictions as to days of the week, or working hours.

Site Traffic

5.5.2 The impacts of construction traffic would be mitigated through adoption of following routing and control measures:

- All construction vehicles on and off site would be via the approved route from the A645 to the site entrance (**Figure 2, Volume 3**), at times to be agreed with the local planning authority

- Statutory warning road signs would be erected as agreed with the highways department on the A645 and the local roads leading up to the site entrances and at the site entrances

- The entrance to New Lane from the A645 would be widened and improved as agreed with the highways department

- The entrance onto New Lane from the A645 would be staffed during working hours and gated and locked at all other times.

- The use of only one site entrance from Rusholme Lane

- Vehicles transporting long loads would be subject to movement orders and escorted on to site as required by the local police.

- Excess sub-soil, concrete, used oils and other chemicals to be disposed of off-site at approved licensed tips

Disruption of Drainage Board Drainage and Field Drainage

5.5.3 All turbines foundations will be constructed at least 7m away from main drains

5.5.4 All drains likely to be disrupted by construction works would be as far as is possible, diverted in advance of the civil works commencing or temporarily maintained using appropriate lengths of piping. The drainage system would be reinstated such that the integrity and effectiveness of the drainage systems would remain unimpaired upon completion of the civil works.

Storage and Disposal of Materials

5.5.5 No waste materials of any sort would be left on site.

5.5.6 All topsoil would be moved and stored in accordance with the DEFRA Good Practice Guide for Handling Soils.

5.5.7 All diesels would be either delivered daily to site using licensed diesel tankers or stored in bundied tanks.

5.6 RESIDUAL IMPACTS

5.6.1 Due to the mitigation measures to be adopted by the developer, the construction activities required to develop the wind farm would not result in any residual effects on the site or in its vicinity.

5.7 SUMMARY AND CONCLUSIONS

5.7.1 The construction of the wind farm would be completed over a period of approximately 43 weeks. Prior to construction, a number of works would be undertaken, including excavation of trial pits for geotechnical investigations, construction of site access signs, and pre-construction drainage.

5.7.2 Construction of site access roads, turbine bases, switchgear building, the installation of electrical cabling, and the assembly and erection of the turbines would lead to a number of impacts; principally due to construction noise and site traffic.

5.7.3 Noise impacts would be very slight during the construction phase of the development, thus special mitigation measures other than good site management practice are unlikely to be necessary. The construction of individual turbines would not constitute a noise nuisance.

5.7.4 The impact of construction traffic would be mitigated through the adoption of specific routing and control measures.

5.7.5 All drains disrupted by construction works would be diverted, or temporarily maintained prior to reinstatement after completion of the construction works, except for culverts under access tracks.

5.7.6 The construction activities required to develop the wind farm would not result in any residual effects on site or in the vicinity, other than those considered in the subsequent sections of this Environmental Statement.

6 DE-COMMISSIONING

6.1 INTRODUCTION

6.1.1 This section considers the works that would be involved in the de-commissioning of the wind farm at the end of its operational life, (which is anticipated at some 25 years duration) in order to restore the site to its present use as arable land.

6.1.2 The **turbines** would be dismantled and removed from site for scrap. The bases would be cut back to below ploughing level, topsoil reinstated and the land returned to agricultural use.

6.1.3 The **access tracks and site access modifications**, if not required for farming purposes, would be removed. As they are to be constructed on a geotextile layer, this operation would be straightforward. Topsoil would then be replaced and reinstated, and the land returned to its former use.

6.1.4 The **underground cables** are below ploughing depth and contain no harmful substances. They can be recovered if economically attractive or left in the ground. Terminal connections would be cut back to below ploughing levels.

6.1.5 The **switchgear building** would be dismantled, all equipment removed, topsoil re-spread and the land returned to agricultural use.

6.1.6 All such decommissioning work would be the responsibility of the developer. Experience in Denmark and The Netherlands shows that scrap and other value of the turbines and electrical components would more than meet the cost of decommissioning.

6.2 POTENTIAL IMPACTS

Noise

6.2.1 Noise created as a result of decommissioning would be minimal. The dismantling and removal of the turbines and switchgear building and the reinstatement of access tracks would create noise primarily as a result of the use of machinery.

6.2.2 Lorry-based equipment would conform to the relevant Road Traffic Acts and the Construction Regulations, and would all be fitted with effective diesel exhaust silencers.

Site Traffic

6.2.3 Turbine components would be cut up and removed from the site using the construction route.

6.3 MITIGATION MEASURES

Noise

6.3.1 It is considered unlikely that specific measures, other than the use of modern machinery with the manufacturers' standard noise control devices in place and in good repair, would be required in mitigation of the effects of noise during decommissioning. Noise from the site will be similar in character to noise from conventional agricultural machinery, due to the use of diesel engines. In fact, the levels of sound emitted by the machinery would be rather lower than present-day tractors and combine harvesters, which are allowed to operate on agricultural land without time restrictions as to days of the week, or working hours.

Site Traffic

6.3.2 The impacts of traffic during decommissioning would be mitigated through adoption of the following measures:

- All vehicles on and off site will be via the approved route to the site entrance (**Figure 2, Volume 3**), at times to be agreed with the local planning authority
- Statutory warning road signs will be erected as agreed with the highways department on the route leading up to the site entrance and at the site entrance
- The use of only one site entrance
- The use of temporary lighting at the site entrance if required by the local highways department

6.4 SUMMARY AND CONCLUSIONS

6.4.1 Noise impacts would be very slight during the decommissioning phase and special mitigation measures other than good site management practice are unlikely to be necessary.

6.4.2 The impact of traffic during the decommissioning phase would be mitigated through the adoption of specific routing and control measures.

6.4.3 The Rusholme Wind Farm is likely to have an operational life of approximately 25 years. After this time, the development would be de-commissioned in order to return the site to its former use as agricultural land. There will be no residual environmental effects arising from the decommissioning of the wind farm.

7 LAND USE

7.1 INTRODUCTION

7.1.1 This section describes the existing land use of the proposed wind farm site and surrounding area, the likely impact of the wind farm and its associated facilities on the land use and the measures proposed to mitigate these impacts.

7.2 LAND QUALITY AND USE

7.2.1 The application site is located within Grade I arable land.

7.2.2 The land is used to grow crops such as wheat, barley, potatoes and sugar beet as can be seen in **Figure 9, Volume 3**.

7.3 THE IMPACT OF THE WIND FARM

7.3.1 The twelve turbines of the Rusholme Wind Farm are situated on a landholding of approximately 325 hectares. The area of land-take would consist only of that required for the footprints of each of the twelve turbines, the crane hardstandings, the access tracks, the wind monitoring mast, and, for the switchgear building. Together these amount to approximately 4.1 hectares of arable land.

7.4 MITIGATION

7.4.1 The landowners have been consulted during the design phase and the wind turbines have been sited adjacent to existing access tracks and field boundaries where possible, in order to minimise the take of agricultural land. Land disturbed in the course of construction of the turbine bases would be reinstated for future agricultural use and cultivation would be possible up to the edge of the turbine foundations and crane hardstandings.

7.4.2 All top soil removed during the construction of the wind farm will be conserved. After re-instatement, any remaining top soil would be reused and distributed over nearby arable land in agreement with the landowners.

7.4.3 Existing tracks would be used where possible and the switchgear building and anemometer would also be located next to access tracks to minimise take of agricultural land, as illustrated on **Figure 3.1, Volume 3**.

7.4.4 The landowners will be financially compensated for the loss of land through the rental of the land from the wind farm.

7.5 RESIDUAL IMPACTS

7.5.1 Following re-instatement residual loss of land from agricultural use would be confined to the areas occupied by the twelve turbines and their foundations, the crane hardstandings, the new access tracks, the wind monitoring mast and the switchgear building. This would amount to approximately 4.1 hectares. The magnitude of loss of land within the agricultural holdings would not be significant, with 1.3% of land within the landholding available for agricultural use. The land required for the proposed wind farm would be restricted to the duration of the project life, following which the development would be decommissioned and the land would once again be available for agricultural use.

7.6 SUMMARY AND CONCLUSIONS

7.6.1 Following construction, land surrounding each of the turbine foundations, hardstandings and tracks would be reinstated for future agricultural use.

7.6.2 Approximately 4.1 hectares of arable land would be lost to agricultural use for the duration of the economic life of the wind farm. This magnitude of loss of land within the agricultural holding would not significantly affect farm productivity. The landowners will be financially compensated for the loss of land through rental from the wind farm and all top soil displaced by the development will be distributed through the farm at the landowners discretion. The wind farm would not therefore have a significant adverse impact on land use.

8 LANDSCAPE AND VISUAL AMENITY

8.1 INTRODUCTION

8.1.1 This section of the Environmental Statement provides an assessment of the potential effects of the Rusholme wind farm on the landscape and visual amenity. The assessment considers a study area within approximately 20 km of the site, as illustrated on **Figure 5, Volume 3.**

8.1.2 The assessment is based on guidance provided by a range of sources, notably:

- 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA) (Landscape Institute and the Institute of Environmental Management and Assessment, second edition 2002.).

- 'Landscape Character Assessment: Guidance for England and Scotland', (Countryside Agency and Scottish Natural Heritage 2002)

Appendix 7 sets out an assessment methodology statement.

8.1.3 The section is arranged into 6 parts:

Context Information which describes the general location of the site and its broad geographical setting, identifies a range of existing studies that are relevant to the assessment and reviews the planning policy context, including landscape designations, within which the proposal is to be considered.

Baseline studies that describe the particular characteristics of the site, the general landscape and visual character of the local area, location of recreation routes and sites, and landscape and visual receptors that could potentially be affected by the development.

Description of the wind farm proposal, describing characteristics of the development that could cause potential landscape and visual effects, taking into account the various measures proposed as part of the project design in order to reduce those effects.

Identification and assessment of potential landscape and visual effects of the proposed Rusholme wind farm as a 'stand-alone' development, including assessment of landscape value, the sensitivity of the landscape resource and of various types of viewer to the proposed development, the scale or magnitude of likely landscape and visual impacts and the overall significance of likely residual effects on character and visual amenity.

Potential cumulative effects of the proposed Rusholme wind farm in combination with the approved Goole Fields wind farm that is to be located approximately 7 km to the south-east of the site.

Summary and Conclusions as to the impact of the proposed Rusholme wind farm on the landscape and on visual amenity.

8.1.4 A series of Figures illustrate, within the study area, valued landscape areas and features (**Figure 5, Volume 3**), broad landscape character types and Countryside Character areas (**Figure 5, Volume 3**) regional recreation routes (**Figure 2, Volume 3**) and viewpoint locations **(Figure 10.1, Volume 3**). **Figure 2 Volume 3** illustrates the site and adjacent area in more detail, identifying properties and locations referred to in the assessment. Various reference photographs illustrate the character of and features within the local area. A study area that extends approximately 20 km from the site (a distance considered to represent the limit of visual influence of the proposed wind turbines) has been used to assess the effects of the Rusholme wind farm. The assessment of landscape and visual effects also draws on photographs, photomontages and wireframes (**Figure 7-10.11, Volume 3**) that illustrate 11 no. viewpoints that have been agreed with the local planning authority.

8.2 CONTEXT INFORMATION

Geographical Context of the Site

8.2.1 The site is located on Rusholme Grange and Pease Farm, 1.5 km east of Drax village, within Selby District, North Yorkshire. It lies in the Wharfe – Ouse river floodplain, on a tapering tongue of land defined by the confluence of the rivers Ouse and Aire. The villages of Camblesforth and Carlton lie 4.5 km to the east and south-east respectively, with Hemingbrough 5 km to the north-west. Within the neighbouring East Riding of Yorkshire district, the river port of Goole is located 2 km to the south-east of the site, with Airmyn village 1km to the east and Howden 2.5 km to the north-east. Thorne, within Doncaster MBC area is 11.5 km to the south of the site, and Scunthorpe in North Lincolnshire is 21 km to the south-east. **Figure 2, Volume 3** indicates the local context of the Rusholme wind farm site.

8.2.2 Landscape in the vicinity of the wind farm site is essentially flat and very low-lying at 3-5m AOD, which is at or below the mean high water level of the major tidal rivers that drain the area. Much of it is open arable farmland, large in scale and subdivided by farm tracks and a network of dykes that form part of an extensive pumped drainage system. Tree cover occurs in places along flood relief embankments, around farms and villages and as occasional farm woodlands.

8.2.3 Industrial and built developments of various types are evident in the local landscape and has influenced its character to the extent that it may be characterised as a *'power station and transport'* landscape. Important large scale features include:

- the M18 and M62 motorways on embankment, the elevated M62 road bridge over the River Ouse, the Doncaster – Hull railway line, the canalised Dutch River and Aire and Calder Navigation, all of which form part of a strategic transport corridor. The M62 junction 36 is located 2 km to the south of the wind farm site;

- several power stations such as the one at Drax, approx 3.5 km W of the site, with associated chimney stack(259 m tall), cooling towers (115 m tall) and 400 kV overhead transmission lines and pylons. The Eggborough power station near Selby (approx 12 km distant) and the Ferrybridge power station at Knottingley are also visible from within the surrounding area;

- urban and industrial development at Goole, where tall chimneys and permanently installed cranes on river docks are distinctive features of the skyline;

- the remnant disused pit heads of Thorne Colliery which are distinctive engineered features of the landscape to the south of Goole.

8.2.4 The conditionally assented but as yet unconstructed Goole Fields wind farm, located approximately 1.2 km to the south of Goole will soon contribute 16 wind turbines to the local landscape, each 125m high to blade tip. The location of the Goole Fields wind turbines is indicated on **Figure 10.1, Volume 3.**

Existing Studies

8.2.5 A number of documents have been published which assist in an appreciation of the landscape character of the area surrounding the wind farm site. These include regional character descriptions contained in **'Countryside Character Volume 3: 'Yorkshire and The Humber** (Countryside Agency 1998), and more detailed descriptions contained in **'Landscape Assessment of Selby District'** (Woolerton Dodwell Associates 1999), **'Our Landscape - Today for Tomorrow: An Assessment of the Landscape North and South of the Humber** with guidelines for its future management' (Gillespies 1996), and **'Landscape Assessment of Doncaster Borough'** (DTA Environment and Ashmead Price 1994). These documents have been referred to on in preparing the baseline descriptions of local landscape character. These assessments are all confined to the administrative boundaries of the local authorities that commissioned them, and each adopt slightly different approaches to classification and appraisal.

Landscape Designations

8.2.6 There are no nationally designated landscapes located within or close the proposed wind farm site. The closest such landscape is Lincolnshire Wolds AONB located approximately 47 km to the south-east of the site, and is of an entirely different character.

8.2.7 In terms of local landscape designations, the draft Selby District Local Plan (Deposit version) designates 'Locally Important Landscape Areas' (LILAs) under policy ENV15. The closest such area to the site is the Hambleton Hough LILA located to the west of Selby, approximately 11 km distant, as indicated on **Figure 5 Volume 3.**

8.2.8 Within the wider study area, the Doncaster UDP identifies Areas of Special Landscape Value (ASLV) around Fishlake (8 km SSW) and on the lowland peat Thorne Moors, to the east of Thorne (9.5 km SSE). The North Lincolnshire Local Plan also designates the Isle of Axholme, centred on Epworth (16 km SE) as an Area of Historic Landscape Value (AHLV). These are illustrated on **Figure 5 Volume 3**. The Yorkshire Wolds AHLV / Area of Landscape Protection as identified in the East Yorkshire Wolds LP, Boothferry Borough LP, and Beverley Borough LP is located outside of the study area.

8.3 BASELINE STUDIES

Landscape Character assessment - study area

8.3.1 The wind farm site lies within the Humberhead Levels regional character area (no. 39) described in 'Countryside Character' Volume 3: 'Yorkshire and The Humber'. The general character of the landscape exhibits a range of 'Key Characteristics' including:

- *'Broad floodplains of major navigable rivers draining to the Humber estuary with extensive areas of washlands and some alluvial flood meadows.*
- *Essentially flat, very open character with occasional rising ground formed by ridges of sand and outcrops of Mercia mudstone.*
- *Very large open fields divided by dykes with relatively few hedgerows or field trees.*
- *Modern motorways on embankments and large installations, notably power stations, which are often prominent in the flat landscape.'*

8.3.2 The regional character description notes in respect of 'The Changing Countryside' that:

- *'Intensification of agriculture has resulted in the removal of hedges, trees, small woods and remaining grasslands to make a traditionally open landscape even more so.'*
- *'Industrial activity has had a major impact notably through the construction of power stations in the open landscape.'*

- *'Construction of new motorway routes, to provide improved access to Humber ports, has also had an impact and the roads and embankments are particularly conspicuous in this flat landscape.'*

8.3.3 The baseline assessment of landscape character within approximately 20 km of the wind farm is a composite assessment that draws on and interprets several detailed landscape appraisals (refer to paragraph 8.2.5). It has been supplemented by a field assessment of the general character and quality of the local landscapes, carried out during June, July and August 2003.

8.3.4 **Figure 6, Volume 3** illustrates the broad landscape types that occur within the study area, based on the composite assessment referred to above. Brief descriptions of the character and quality of various landscape types occurring within the study area are set out in **Table 8.1**. These form the baseline against which the potential impacts of the Rusholme wind farm on landscape character and quality have been assessed.

Table 8.1: Summary of Local Landscape Character and Quality

Countryside Character Area	Landscape Type	General Description of character	Landscape Quality
Humberhead Levels	River Corridor Farmland	Flat open very low-lying (gen. less than 5m AOD) arable farmland of high agricultural quality. Heavily drained with ditches forming field divisions. Woodland generally absent but flood embankments, often with scrub cover may limit wider views. Sub-type River Corridor Farmland with Infrastructure occurs along the River Aire corridor, and along the River Ouse corridor downstream of the River Derwent confluence. Character in the sub-type is influenced by many industrial features including the M62/M18 motorways, the elevated M62 bridge over the river Ouse, rail and canal links, the Eggborough (and Ferrybridge) power stations with cooling towers, chimneys, pylons, the adjacent presence of the Drax power station, industrial and dockland development at Goole.	Medium-low
Humberhead Levels	Open Lowland Farmland	Flat arable farmland, low-lying (gen. less than 10m AOD) and medium-large in scale. Woodland sparse, but frequent lines of hedgerow trees and scrub vegetation, particularly to the east of Selby.	Medium
Humberhead Levels	Wooded Farmland and Heath	Flat wooded arable farmland and semi-natural lowland heath on sandy acidic soils in the vicinity of Skipwith. Unimproved grasslands along the R. Derwent valley.	Medium
Humberhead Levels	Semi-enclosed lowland farmland	Flat semi-enclosed arable farmland with scattered small woods and shelterbelts, frequent lines of hedgerow trees and scrub on lighter sandy soils over Bunter Sandstone outcrops. Includes several villages such as Drax, Camblesforth and Carlton. Woodland belts help to accommodate the large scale Drax power station installation within the area.	Medium
Humberhead Levels	Low sandstone ridge	Low but distinctive Bunter Sandstone ridge that extends between two wooded hills, Brayton Barff (55m AOD) and Hambleton Hough (35m AOD). Characterised by mixed broadleaf woodland, by undulating arable farmland and by parkland associated with Gateforth Hall.	Medium-high
Southern Magnesian Limestones	Magnesian Limestone ridge	Low limestone ridge (up to 65m AOD) that frames the western side of Selby District. Essentially rural character with large scale rolling arable farmland with large blocks of broadleaf and mixed woodland in places. Scattered villages and several historic parklands associated with large country houses. Apart from a number of stone quarries, esp. near Tadcaster, industrial development is absent.	Medium-high
Humberhead Levels	Peat Moorlands	Large scale flat open landscape, low-lying, characterised by high quality heavily drained farmland and areas of former peat workings, remnant lowland raised bog and scrub woodland. 'Empty' landscape with few dwellings but pylons and the disused pit heads of Thorne Colliery are prominent features. Little obvious activity or movement. Much of Thorne Moors and the Hatfield Moors are designated SSSI and NNR for their conservation interest	Medium
Humberhead Levels	Isle of Axholme	Medium scale gently undulating pasture and arable farmland enclosed within a pattern of hedged fields with hedgerow trees.	Medium-high

Landscape character - the Rusholme wind farm site and environs

8.3.5 The wind farm site is located on flat fields of arable land in Newland parish, on a tongue of land that extends between the south bank of the river Ouse and the north/west bank of the river Aire. The land is very low-lying at approximately 3-4 m AOD, set below the level of adjacent minor roads. It is very open and typically large or very large in scale, divided only by drainage ditches and by field tracks. The tract of land containing the site is devoid of any significant features apart the occasional scattered tree and a pole-mounted overhead electricity transmission line [Reference photo in **Figure 9, Volume 3**]. Landscape quality is considered to be medium-low.

8.3.6 A number of farmsteads and individual properties are located in the vicinity of the wind farm site. These properties, which are potential visual receptors, are considered further in paragraph 8.3.13. Their presence as features of the local landscape is often emphasised by groups of mature trees. Similar belts of mature trees typically fringe local villages such as Drax, 1.5 km west of the wind farm.

8.3.7 A network of minor roads link the villages and scattered properties. It is limited by a lack of river bridging points, so that roads, including Rusholme Lane and the road to Little Airmyn, often terminate in a 'dead end'.

No rights-of way cross the site. The local network of footpaths and other routes is relatively sparse, but includes the Trans Pennine Trail footpath that runs along the north bank of the river Ouse, and the public footpath on the south bank of the river Aire, that passes through Airmyn on a raised flood embankment. Paragraph 8.3.16 identifies the rights of way and other recreation routes available in the local area;

Visual character - the Rusholme wind farm site and environs

8.3.8 Visually, the agricultural landscape in the vicinity of the site has a relatively simple character. Landform is essentially flat, and there are broad expanses of open fields subdivided by ditches, for field hedgerows and hedgerow trees are almost entirely absent. In some places the presence of woodland and tree belts around settlements, and flood defence embankments with fringing trees and scrub provide a degree of local visual containment that restricts wider views,

8.3.9 Wide or panoramic views of relatively flat countryside below a broad expanse of sky are characteristic of the area. These views often include large scale industrial/engineered features which make a strong contribution to the local landscape. The most prominent feature in many views of and from the site is the Drax power station, the largest coal-fired plant in the UK. Located to the north of Drax village, the scale, nature and character of the complex is distinctively industrial, and includes the main chimney stack (259 m tall), cooling towers (115m tall) and associated 400 kV overhead transmission lines and pylons. The stack and

cooling towers in particular form distinctive landmark features that are widely visible within the local area [Reference photographs in **Figures 7 and 8, Volume 3**].

8.3.10 Other visually prominent large scale features include the Eggborough and Ferrybridge power stations (and associated transmission lines), the M62 and M18 motorways and infrastructure including bridges elevated over the river Ouse, cranes at Goole docks, and various large industrial buildings on the edge of Goole including the ceramics factory with its prominent chimney [Reference photographs in **Figures 7 and 8, Volume 3**].

Potential Visual Receptors

8.3.11 Potential visual receptors of the wind farm include residents of individual dwellings, villages and larger settlements, those using the landscape for recreation, travellers passing through the area, and workers, both indoor and outdoor. The sensitivity of these groups to views of the wind turbines is discussed in **Appendix 9**.

8.3.12 **Individual dwellings** and scattered farmsteads in the vicinity that have some existing views towards the site. **Figure 2 Volume 3** indicates the locations of a selection of these properties, and other locations referred to below. They include:

- Ferry Farm and Pease Farm in Little Airmyn;
- Newland 'village', a collection of approximately 40 properties that extend in a loose ribbon along the road to Little Airmyn from its junction with Brier Lane;
- Properties on Brier Lane (outside of Newland) including Council Houses (4 pairs of semi-detached houses), Halfway Houses – 2 /3 houses set within tree belts, Scurff Cottages - 3 properties located at the junction of Brier Lane with Rusholme Lane;
- Scurff Hall on Rusholme Lane [Reference photo 4 in **Figure 8, Volume 3**)]; and
- Other properties on Rusholme Lane, including Scurf Hall Cottage, Rusholme Hall, Diamond Cottage and Rusholme Grange Farm

8.3.13 **Villages and small settlements** are also dispersed throughout the area. These include the larger villages of Hemingbrough, Camblesforth, Carlton, Snaith, and Hatfield, and numerous small villages such as Drax, Airmyn, Rawcliffe, Asselby, Barmby on the Marsh, and Knedlington. **Small towns** include Thorne and Howden,

8.3.14 The closest **larger town** to the wind farm site is Goole, 2 km to the SE, and separated from the site by the river Aire and by the M62 motorway. Selby lie approx 9.3 km to the north-west, also within the 20 km study area.

8.3.15 **Public Rights of Way and publicised recreation routes** occur throughout the study area, although not within the site. Rights of way in the vicinity of the site include public footpaths between Scurff Hall and Council Houses on Brier Lane, between New Lane and Newland, between Rusholme Lane and Drax village, and along the south bank of the river Aire, passing through Airmyn on a raised flood embankment.

8.3.16 There are no National Trails within the study area; the nearest is the Wolds Way which passes approximately 22.5 km to the east of the site.

8.3.17 Several recreational routes and countryside recreation sites occur within the study area. These are:

- the Trans Pennine Trail (footpath) on the north bank of the river Ouse (300 m min)
- the Howden 20 (footpath) on the north bank of the river Ouse (300 m min)
- the York and Selby Path (footpath) that runs between the two cities (9.5 km min)
- the National Cycle Route No. 65 (Trans Pennine Trail) that runs through the area along the Barmby in the Marsh – Howden minor road. (1.5 km min)
- Waymarked circular walks on permissive footpaths on Thorne Moors and Crowle Moors within the Humberhead Peatlands National Nature Reserve (7 km min) which may become access land under the Countryside and Rights of Way Act 2000.
- The Barmby Tidal Barrage amenity site (EA) with picnic site, facilities for disabled people and access to river banks (3.1 km)

8.3.18 **Roads** also providing viewing opportunities. These include the M62 and M18, major roads such as the A 63(T) A163 A 614, A 645, and minor roads in the vicinity of the site. Several **railway lines** cross the study area, including the Selby – Hull line (4.5 km to the north of the site) and the Pontefract – Goole – Hull line that passes within 3.5 km of the site to the south.

8.4 THE WIND FARM PROPOSAL

8.4.1 Technical information concerning type, specification and layout of the wind turbines and ancillary development proposed for the construction of Rusholme wind farm is presented in **Chapter 2**. The 12 turbine scheme has evolved through consideration of a range of factors, the preliminary assessment of impacts, and measures to avoid or ameliorate impacts as part of the overall design process.

8.4.2 Each of the wind turbines would be a three-bladed horizontal axis machine mounted on a tapering tubular steel tower 60 m to hub height, with a maximum blade tip height of 100m above surrounding levels. Ten turbines would form a double staggered row aligned roughly SW-NE, and the remaining two wind turbines would be located towards the eastern end of the site. The colour and finish of the wind turbines will be agreed with the local planning authority. As they would generally be viewed against a backdrop of sky, it is anticipated that the wind turbines would be off-white/pale grey in colour with a semi-matt surface finish designed to minimise potential for reflection.

8.4.3 The proposed wind turbines will turn to track wind direction and rotate at between 9 and 19 rpm. This relatively slow rotation speed would be less distracting and appear to be more harmonious in the landscape than the frantic movement of rapidly rotating early wind turbines, which operate at speeds of up to 48 rpm.

8.4.4 The site entrance would be constructed from the Rusholme Grange Farm entrance off of Rusholme Lane. In order to minimise disturbance to the landscape fabric and to current farming practices, this track and several other existing farm tracks would be widened to approximately 5m and utilised to access the wind farm site. In addition to the improved tracks, a further 3.4 km of new access tracks will need to be constructed, and areas of hardstanding would be required near each turbine position in order to accommodate cranes needed for site construction and for maintenance purposes.

8.4.5 A lattice wind anemometry mast, 60 m in height, would be erected close to wind turbine 2, as indicated on **Figure 3.1, Volume 3**.

8.4.6 An electrical switchgear building/substation, approximately 15m x 8m with a maximum height of 5m would be constructed in the location shown on **Figure 3.1, Volume 3.** The building finished to look similar to other agricultural buildings in the area. Power generated by the wind turbines would be conducted to the switchgear building via underground cables, and exported via further underground cables to one of three possible connection points to the regional grid. **Figure 3.1, Volume 3** illustrates the various components of the scheme and **Chapter 2** of the Environmental Statement provides further details.

8.4.7 The design of the scheme incorporates various measures to avoid or ameliorate impacts, including:

- the continued use of existing farm access tracks, widened as necessary, to minimise the need for new construction;

- construction of new access tracks, where needed, to have the appearance of farm tracks that are familiar features of the area

- the siting of wind turbines to respond to separation zones identified between wind turbines and the closest residential properties to the site.

- the omission of two of the wind turbines originally proposed (nos. 13 and 14), in order to mitigate predicted visual effects on residents of Airmyn.

8.4.8 As the measures described in 8.4.7 have been taken into account in the final design of the wind farm scheme, the potential impacts described below are to be considered as residual impacts of the wind farm that would last for the duration of its operational life.

8.5 IDENTIFICATION AND ASSESSMENT OF POTENTIAL EFFECTS

Landscape Value, Sensitivity and Capacity

8.5.1 Landscape value is concerned with the *relative value* attached to different landscapes. '*Landscape Character Assessment: Guidance for England and Scotland*' (2002) contains current Countryside Agency / Scottish Natural Heritage advice as follows:

'In a policy context the usual basis for recognising certain highly valued landscapes is through the application of a local or national landscape designation. Yet a landscape may be valued by different communities of interest for many different reasons without any formal designation, recognising for example, perceptual aspects such as scenic beauty, tranquillity or wilderness; special cultural associations; the influence and presence of other conservation interests; or the existence of a consensus about importance, either nationally or locally'.

8.5.2 The flat open arable farmland that characterises land in the vicinity of the site is widespread within and typical of the Humberhead Levels, and so represents a common, rather than a rare landscape resource. Due to the pressure to maximise agricultural productivity on high quality land, the River Corridors Farmland with Infrastructure landscape type is typically open and featureless. It generally lacks both landform and landscape features such as field hedgerows, hedgerow trees and farm woodlands that could help to provide it with pattern and structure.

8.5.3 The rural character of the River Corridors Farmland with Infrastructure is enhanced by the rivers Ouse and Aire, and by a number of historic villages, including Drax and Airmyn, which typically enjoy wooded settings. However its character and quality have been considerably modified and its quality partly degraded by widespread human influences, particularly the large scale infrastructure, widely visible within the local area that has created this 'power

station and transport landscape'. The prospective Goole Fields wind farm will add to the range of engineered or industrial features within the Humberhead Levels landscape.

8.5.4 In summary, the River Corridors Farmland with Infrastructure landscape type in which the site is located is not regarded as a landscape of high value or importance to society in terms of its scenic quality, and (apart from the Isle of Axholme AHLV in North Lincolnshire) it is not subject to any landscape designation of either national or local value identified and consulted upon as part of the local planning process. Neither can it be considered to have 'wilderness' qualities or to be particularly tranquil, such is the influence on it of a wide range of engineered or landscape features, including the M62 motorway that passes nearby. Nor does the River Corridors Farmland with Infrastructure landscape type have a particular sense of place or possess important special interests, such as conservation or heritage interests, that could significantly influence perception and appreciation of the landscape. Overall the value of the local River Corridors Farmland with Infrastructure landscape is considered to be of no more than medium-low.

8.5.5 The foregoing assessments of landscape character and value leads on to judgements concerning the likely *sensitivity* of the local landscape to the changes which would result from the erection of 12 wind turbines, and its ability or *capacity* to accommodate the proposal without significant effects on its character. Consideration must therefore be given to the capacity of the site and the local area to accommodate the development. *Landscape Character Assessment: Guidance for England and Scotland*' (2002) contains current Countryside Agency / Scottish Natural Heritage advice as follows:

'Landscape capacity refers to the degree to which a particular landscape character type or area is able to accommodate change without significant effects on its character, or overall change of landscape character type. Capacity is likely to vary according to the type and nature of change being proposed.'

8.5.6 The revised 'Guidelines: Landscape and Visual Impact Assessment' (GLVIA) published jointly by the Institute of Environmental Assessment and the Landscape Institute note at 2.28 that '*landscapes vary in their capacity to accommodate different types of development. Sensitivity is thus not absolute but is likely to vary according to the existing landscape, the nature of the proposed development and the type of change being considered.'*

8.5.7 The intensive nature of local land use, the general lack of structure and pattern in the landscape that could otherwise reduce its large scale and openness, the presence of a wide range of large scale infrastructure features that will help to accommodate the wind turbines in the landscape, and the lack of particular value placed on the local countryside make it less, rather than more sensitive to the wind farm proposals than some other areas of Selby District, and of the Humberhead Levels. Overall the sensitivity of the River Corridors Farmland with

Infrastructure landscape type to the introduction of 12 wind turbines is considered to be medium-low, and its capacity to accommodate the changes envisaged without *'significant effects on its character'* or *'overall change of landscape character type'* is assessed as at least **medium-high.**

Photomontages (Simulated Views)

8.5.8 Assessment of the likely impacts of the wind farm on the character of the landscape and on visual amenity has drawn on a series of photomontages prepared for 11 selected viewpoints in the study area. The photomontages illustrate the predicted appearance of the proposed wind farm in the landscape and are reproduced in **Volume 3** of this Environmental Statement. Approximate distances between the viewpoints and the nearest proposed wind turbine of the wind farm are indicated in each case.

8.5.9 The viewpoints are all publicly accessible, and have been subject to consultation with and agreement by Selby District Council. They are intended to illustrate typical views towards the site from a range of local settlements, roads and rights of way, at a variety of viewing distances, and from varying directions within the study area.

8.5.10 An analysis of the viewpoints including assessments of effects on landscape character and visual amenity, is included in **Appendix 8**.

8.5.11 The tall chimney stack (259 m tall) and cooling towers (115m tall) of Drax power station have been used as reference features in preparing the photomontages and in analysing the views. By way of comparison, the proposed wind turbines have 60m towers (hub height) and a maximum blade tip height of 100m above surrounding levels.

8.5.12 As the Goole Fields wind farm has been 'conditionally assented' by the local planning authority, it is considered, for the purposes of this assessment, to form part of the 'base-line' character of the Humberhead Levels landscape against which the Rusholme wind farm proposal is assessed. The Goole Fields wind farm has therefore been depicted in context on existing views and on predicted views included as **Figures 10.4, 10.8, 10.11 and 10.12, Volume 3.** Information submitted as part of the Goole Fields wind farm Environmental Statement has been used to prepare the illustrations.

Table 8.2 Viewpoints

No	Viewpoint	Location	Viewing direction / distance	Landscape character type	Receptors
1	Airmyn	On public footpath elevated on riverside flood embankment	NW 1km	River Corridor Farmland with Infrastructure	Walkers on footpath, Residents
2	Newland	Adjacent to the Little Airmyn road	NE 1.4 km	River Corridor Farmland with Infrastructure	Residents
3	Asselby	Where public footpath meets minor road (National Cycle Route No. 65 to east of Asselby village	SW 2.8 km	River Corridor Farmland with Infrastructure	Residents, Walkers on footpath, Road Users (incl. cyclists)
4	Drax	Where public footpath meets minor road to north of Drax	ESE 2.2 km	Semi-enclosed lowland farmland / River Corridor Farmland with Infrastructure	Residents, Walkers on footpath, Road Users
5	Goole	Adjacent to the A614 road	NW 2.5 km	Urban	Residents, Road Users
6	Howden	On Broad Lane, from bridge above M62 (also Howden 20)	SW 4.2 km	River Corridor Farmland with Infrastructure / Open lowland farmland	Road Users Walkers on Howden 20
7	Heming-brough	Adjacent to A63(T) Selby Road	SE 5 km	River Corridor Farmland with Infrastructure / Open lowland farmland	Road Users Residents
8	Snaith	A1041 road, on eastern edge of Snaith	NE 9km	River Corridor Farmland with Infrastructure	Road Users Residents
9	Barlow	SW end of village	5.2 km	Semi-enclosed lowland farmland	Road Users Residents
10	Selby	On A1041(T) Bawtry Road	SE 9.8 km	Open lowland farmland	Road Users Residents
11	Crowle	Adjacent to minor road on N edge of Crowle	NW 11.5 km	River Corridor Farmland with Infrastructure	Residents Road Users

Note: Viewing distance indicated is to the closest wind turbine.

Direct Impacts on the Landscape

8.5.13 The main change in landscape resources/fabric would result from the introduction of 12 wind turbines and ancillary development into the River Corridor Farmland with Infrastructure landscape. This is more appropriately considered as an indirect effect on existing character.

8.5.14 *Direct long term changes in landscape resources* would be restricted to the loss of 4.3 ha. of arable farmland arising from the construction of the necessary additional 3.4 km of access track, of spurs and hard standing areas, widening of existing tracks and from the loss of land to be occupied by the towers of the wind turbines (refer to **Figure 3.1,Volume 3**). There would be no loss of landscape features as a result of the development.

8.5.15 Flat arable farmland is a common landscape resource within the local area, and the effect on the landscape of the loss of 4.3 ha. as a result of the proposal would be low/negligible in magnitude and of no significance.

Indirect Impacts on the Landscape

8.5.16 **Impacts on existing landscape character** would also occur as a result of the Rusholme wind farm proposal. The effect of the wind farm on landscape character would largely depend on the key characteristics of the receiving environment, the extent to which the wind farm may be considered to be consistent with /at odds with those characteristics, and how it would be perceived in the landscape, taking into account the influences of distance, viewing (weather) conditions, and the appearance of the proposal in its own right.

8.5.17 The principal effect on landscape character and quality involves the introduction of 12 tall man-made wind turbines as new elements of the local landscape. Impacts would be due principally to the non-agricultural or engineered character of the turbines, their overall height and the movement of their rotor blades and would last for the life of the wind farm (ie long term effects). Changes would occur in the composition of features that characterise the local landscape, particularly in the River Corridors Farmland with Infrastructure landscape type within which the site is located. **Figures 10.2 – 10.12, Volume 3** include predicted views that illustrate the effect of the addition of the proposed wind turbines as new landscape elements.

8.5.18 Within the wind farm and in close proximity to it (within an area encompassed by the rivers Ouse and Aire to the N, E and S and by Brier Lane to the west) existing landscape character would be subject to changes of high magnitude. This would be due to the scale and engineered nature of the proposed wind turbines, which would be larger and more prominent than any other element in the immediate vicinity. This part of the River Corridors Farmland with Infrastructure landscape type would be modified so that the group of 12 wind turbines would become the

principal determining element of character, resulting in a localised 'wind farm landscape'. This would be the case with all wind farms, irrespective of the landscape character type in which the wind farm is located. The high magnitude of predicted impacts in combination with medium-low sensitivity/ of the River Corridors Farmland with Infrastructure landscape type to the proposal may result in effects of 'moderate' or 'substantial-moderate' significance on landscape character in the immediate vicinity, which is a 'borderline' level in terms of representing a 'significant impact' as referred to in the Environmental Impact Regulations 1999.

8.5.19 Further afield, within 3 km or so of the wind turbines, changes in the character of River Corridors Farmland with Infrastructure and Semi-enclosed Farmland types are likely to be of high-medium or medium magnitude resulting from the introduction of tall engineered structures that are not substantially uncharacteristic of the receiving landscape. Predicted views in **Figures 10.3 to 10.5**, **Volume 3** illustrate the resulting effect. The significance of these localised impacts on the character type is likely to be 'moderate' or moderate-slight, reflecting the medium-low sensitivity/medium-high capacity of the River Corridors Farmland with Infrastructure to the proposed wind farm. This level of impact would not represent a 'significant impact' as referred to in the Environmental Impact Regulations 1999.

8.5.20 At a broader scale, the wind turbines would be unlikely to result in impacts on character of more than moderate-slight or slight significance, or to alter the overall character of the wider Selby district / Humberhead Levels landscape which already contains a number of tall vertical and obviously engineered features. Again, this level of impact would not represent a 'significant impact' as referred to in the Environmental Impact Regulations 1999.

8.5.21 Overall the wind farm would create a new feature on the skyline of the River Corridors Farmland with Infrastructure landscape, one of a range of large scale features in the view. It would be seen in the context of, but not at odds with other large-scale infrastructure features established in the area. Impacts on landscape character would occur; within and in very close proximity to the site these may be 'borderline' in terms of representing a 'significant impact' as referred to in the Environmental Impact Regulations 1999. Generally however, impacts on the landscape character of the River Corridors Farmland with Infrastructure landscape, and its wider context of the Humberhead Levels, would not be 'significant impacts' under the Regulations.

8.5.22 There will be no indirect **impacts on designated landscapes** at either the national or local level, as a result of the wind farm development. The nearest nationally designated landscape is Lincolnshire Wolds AONB, more than 47 km distant and too remote therefore to experience change as a result of the Rusholme wind farm. In terms of local landscape designations, the closest designated area to the site is the Area of Special Landscape Value designated around Fishlakes, 8 km south-west of the site in the Doncaster UDP area. The presence of the wind farm would not disturb the historic character of this enclosed landscape.

8.5.23 In terms of indirect **impacts on local landscape value**, impacts are more difficult to predict, and much depends on individual perceptions. Some people may regard the wind turbines as features that could further degrade local landscape value, which is judged to be medium-low at present, while for others they could make a positive contribution to the local landscape, adding features of interest and drama to the scene. Recent surveys of public opinion concerning wind turbine developments have consistently found that 77% of the public are in favour of wind energy. A summary of recent surveys is included in **Appendix 10.**

Approach to the Assessment of Impacts on Visual Amenity

8.5.24 This section assesses the potential visual impacts of the wind farm on local residents and on those viewing the site from roads, footpaths and other recreational resources in the vicinity.

8.5.25 The approach used in this assessment is based on a synthesis of guidance offered by a range of sources, tailored to the requirements of the project. The use of this approach allows a balanced view to be taken of the likely impacts of the development. The handbook 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA) prepared jointly by the Institute of Environmental Assessment and The Landscape Institute is of particular relevance. **Appendix 7** provides further details.

8.5.26 Using the approach to assessment set out at **Appendix 7,** the likely **magnitude or degree of visual impact** (i.e. level of change in essential visual character) is correlated in relation to the **sensitivity** of the viewer/viewpoint under consideration to the construction of the Rusholme wind farm as proposed. This approach enables broad conclusions to be drawn concerning the **overall significance** of the wind farm's visual impacts. Note that *high magnitude impacts* occur above a threshold level that is defined by the descriptions given in paragraphs 1.14 and Table B of **Appendix 7**. The categorisation 'high magnitude' therefore encompasses a range of possible impact levels. In circumstances where the potential impacts of the Rusholme wind farm are assessed as being of high magnitude, this relates to the definitions given, and does not imply that impacts are of the *highest* magnitude possible.

8.5.27 Visual effects resulting from visual intrusion have been predicted by reference to the likely appearance of wind turbines in the landscape using the computer-generated photomontages of the proposed wind farm when viewed from 11 selected viewpoints and field assessment of the local landscape. **Appendix 8** presents an analysis of the viewpoints. The assessment of visual effects set out below draws on Table A9.1 of **Appendix 9.** Zones of Visual Influence analyses (ZVIs) have not been prepared due to the very limited usefulness of such analyses within flat or relatively flat landscapes. Broad-brush ZVIs are based on topographic features only, with no account taken of surface features such as intervening woodland, hedgerows and trees, buildings, and minor variations in

landform which are often so important in confining, interrupting or filtering local views in the Humberhead Levels.

Assessment of Visual Effects

8.5.28 The wind farm would potentially be widely visible within the local landscape of the Humberhead Levels, including from principal roads, minor roads and lanes, and from rights-of-way in the area. The extent to which views would be available on the ground will depend largely on local circumstances, including the presence of intervening buildings, trees woodlands and hedgerows, and minor landform.

8.5.29 Distant views of the turbines may also be available from unobstructed viewpoints in a range of locations and in conditions of good visibility. These locations include the Hambleton Sandstone Ridge to the west of Selby, from the West Selby Ridge on the district boundary, and from the hills of the Yorkshire Wolds to the north-east, (20+ km distant). In these views the wind farm would appear as a relatively small element in a wide panorama in which many other features, including other large scale features, compete for the attention of the viewer.

8.5.30 Clear views of the wind turbines would undoubtedly occur in places, as predicted views included in **Figures 10.2-10.12, Volume 3**, illustrate. In common with all other wind farms, the Rusholme wind farm would be a prominent feature in some unobstructed views from scattered farms and individual properties located close to the site. There are relatively few such properties surrounding the Rusholme site; those that do include Ferry Farm and Pease Farm in Little Airmyn, properties along Brier Lane and along Rusholme Lane, and from Newland 'village' (viewpoint 2). Residents of these properties may experience visual effects of substantial or substantial-moderate significance in unobstructed views, due to the close proximity of the wind turbines. Table A9.1, **Appendix 9** provides an analysis of potential visual effects on selected properties and settlements.

8.5.31 The wind farm would generally have a relatively limited effect on views from residential properties in Drax and Airmyn, two of the closer settlements to the site. Views from many properties in Drax village would be largely filtered or screened by fringing tree cover, and from Airmyn, flood embankments, intervening buildings and trees would typically interrupt views. Where views do occur, for example from some properties on the western side of Airmyn, visual effects may be of substantial or substantial-moderate significance, if unobstructed, due to the close proximity of the wind turbines. **Figure 10.2, Volume 3** illustrates a view towards the site from the elevated river flood embankment at Airmyn, in which the wind turbines are viewed at a minimum range of 885m, against a backdrop provided by the Drax power station. Views from Rawcliffe, 2.9 km to the south of the wind farm, are similarly confined by flood embankments, tree cover fringing the river, and by built development in the village. Where unobstructed views are available, visual effects of substantial-moderate significance may occur.

8.5.32 Impacts of substantial significance may also occur in unobstructed views from several small settlements to the north of the wind farm site, including from the southern edge of Asselby village and from the western edge of Knedlington. From Barmby in the Marsh, a few properties on the southern edge of the village have potential for views of the wind farm, although the significance of visual effects in unobstructed views would be no more than substantial-moderate or moderate, as the effect of the wind farm would be diminished by the intervening 400 kV transmission lines. **Figure 8, Volume 3** includes a view from the southern edge of Barmby in the Marsh.

8.5.33 From the villages of Camblesforth and Barlow, located to the west of the wind farm site, views towards site are either dominated by the intervening built form of the Drax power station or interrupted by woodland. Visual effects would generally be nil, possibly rising to 'slight' significance in leafless winter conditions. From Carlton village, 5 km to the SW of the site, dense woodland belts associated with the Carlton Towers estate, and intervening buildings within the village obstruct most views towards the wind farm. As a result the potential for views of the wind turbines is restricted to the NE sector of Carlton, where visual effects of substantial-moderate significance may occur in some unobstructed views. From Snaith, located approximately 6.4 km from the wind farm, intervening woodland belts established close to the town will interrupt some views towards the site. Where uninterrupted views occur, visual effects are likely to be of no more than substantial-moderate or moderate significance.

8.5.34 Hemingbrough, on the A63(T) road, is located. 4.7 km north-west of the wind farm. Views of the wind turbines will generally be restricted to properties on southern fringes of village, where existing views include the Drax power station within a broad panorama. Visual effects in unobstructed views would be 'substantial-moderate' or 'moderate' at most. Similar visual effects would also be experienced in some views from Howden, also in the A63(T) and located approximately 3km NE of the wind farm.

8.5.35 From Goole, the potential for views of the wind farm will largely be limited to properties on the west side of the town, due to obstruction by intervening buildings within the urban area. As the predicted view of **Figure 10.6, Volume 3** indicates, where views do occur the wind turbines would be seen across the M62 motorway (on embankment) with Drax power station behind. Resulting visual effects in unobstructed views would be of no more than 'moderate' significance.

8.5.36 Selby is located approximately 9.3 km to the north-west of the site. Views towards the site from Selby are dominated by the intervening Drax power station, and will also be interrupted by road traffic on the Selby bypass, currently under construction. Any wind turbines visible would be seen as distant features of the landscape, partly interrupted or obstructed by woodland. Any visual effects that do occur would be of no more than 'slight' significance.

8.5.37 There would also be changes in existing views from roads, rights of way and amenity locations in the area arising from the appearance of the wind farm in the view. The sensitivity of roads as viewpoints varies in this assessment, according to whether they are:

- Motorways and trunk roads including M62 motorway, M18 motorway, the A63(T), A1041(T), A614(T) or other principal local route on which the relatively high speed and volume of traffic reduces the road's sensitivity as a viewpoint to medium-low levels

- Other 'A' and 'B' roads – medium sensitivity

- minor roads and lanes e.g. Rusholme Lane, Newland with generally low speeds and traffic volumes. May be used as recreation routes by walkers/horse riders - high-medium sensitivity to impacts.

8.5.38 Although there is potential for views towards the wind farm from roads in the local area, much will depend on local circumstances including the extent to which roadside hedges and trees and intervening woodland filter or obstruct views towards the site. The potential for impacts to occur in views from roads and rights of way is restricted to views that occur when travelling *towards* the wind farm site.

8.5.39 In unobstructed views from local minor roads in close proximity to the site, such as Brier Lane, and Rusholme Lane, visual effects of 'substantial' or 'substantial-moderate' significance are likely to occur.

8.5.40 Impacts in views from traffic passing the site at speed on the M62 motorway (1.7 km minimum distance) would be of no more than moderate significance, reducing with distance. From the M18, views towards the site would be at a minimum of 5 km with the M62 motorway intervening. Visual effects would generally be of slight significance or nil. Similarly minor effects would occur in views from the A1041(T) road.

8.5.41 From both the A63(T) and A 645 roads, roadside trees and buildings are likely to filter many views of the wind farm. As a result the visual effects on views available to passing motorists may be of 'slight' or 'moderate' significance respectively.

8.5.42 The impact of the wind farm on views from rights-of-way and from public amenity locations, considered to represent high sensitivity viewpoints, has also been assessed.

8.5.43 Visual impacts would occur in some views available in relatively close proximity to the wind farm site including from:

- the Trans Pennine Trail (footpath) on the north bank of the river Ouse (viewpoint 5);
- the Howden 20 (footpath) on the north bank of the river Ouse
- public footpaths between Scurff Hall and Council Houses on Brier Lane, between New Lane and Newland, and between Rusholme Lane and Drax village, along the south bank of the river Aire in the vicinity of Airmyn (viewpoint 1);
- the National Cycle Route No. 65 (Trans Pennine Trail); and
- the River Ouse

8.5.44 The significance of visual effects in views from these routes would vary from 'substantial' to slight or nil, depending on viewing distance and on the extent of intervening tree cover, buildings and flood embankment structures that intermittently interrupt or filter views when moving through the landscape. Where unobstructed views are available, the magnitude of effects would be high, and of substantial significance.

8.5.45 The Barmby Tidal Barrage amenity site (EA) located near Barmby on the Marsh provides a picnic site and parking area that is set within trees and sited below the flood relief embankment of the river Ouse. The visual effects of the wind turbines in filtered views from these areas are not likely to be of more than slight significance.

8.5.46 In conditions of good visibility the wind farm is also likely to seen in more distant views from rights of way, from permissive footpaths on Thorne Moors and Crowle Moors, and from the York and Selby Path. In these views it would appear as a relatively small element in a wide panorama that contains many other features, including other large scale elements. Impacts are unlikely to be of more than medium-low magnitude and of no more than slight significance.

8.5.47 Potential visual effects of the wind farm also include the occurrence of **shadow flicker** effects, and calculations have been made of the potential for shadow flicker to affect the amenity of nearby properties. These confirm that the only property with potential for shadow flicker effects is Rusholme Grange Farm, located to the north of the site, and occupied by the wind farm's landowner.

8.5.48 The expected period for shadow effects on the Rusholme Grange farmhouse has been calculated to extend between 8th November – 4th February, with incidents of shadow flicker predicted to last between 3 to 37minutes. These calculations do not take account of the effect of intervening farm buildings and tree cover at Rusholme Grange Farm, which would limit the occurrence of shadow flicker within the farmhouse property. Given the relatively limited occurrence predicted, and the

mitigatory effect of intervening features, shadow flicker effects would not be a significant visual impact of the wind farm development proposals,

8.6 POTENTIAL CUMULATIVE EFFECTS

8.6.1 Following the recent approval of the Goole Fields wind farm of 16 wind turbines, on a site located approximately 1.2 km to the south of Old Goole, it is relevant to consider the potential for the proposed Rusholme wind farm to result in future cumulative landscape and visual effects. This analysis considers the Goole Fields wind farm as if it were constructed, using information submitted by the developer in the Environmental Statement that accompanied the Goole Fields wind farm planning application. It is also assisted by the illustrations (existing view and predicted view) included as **Figures 10.2 – 10.11, Volume 3** of this Environmental Statement.

8.6.2 The Goole Fields and Rushome wind farms would be located approximately 7km apart. Cumulative effects would potentially occur due to additional changes to the character of the landscape and to visual amenity arising from the proposed Rusholme wind farm in combination with the Goole Fields wind farm. They include effects on views from specific locations and, more generally, effects on impressions of the landscape character of an area which may be gained whilst travelling through it, even where wind farms are not intervisible.

Cumulative Landscape Effects

8.6.3 In terms of landscape character, the Goole Fields wind farm is to be located in the Peat Moorlands landscape type while the Rusholme wind farm is proposed within the River Corridor Farmland with Infrastructure type. The landscape types share a number of common characteristics in that both are generally flat, lowlying, open, large in scale, heavily drained and intensively farmed. The principle differences between these two landscape character types concern:

- **the character of underlying deposits/soils**: with the Peat Moorlands type characterised by dark peat deposits, while the River Corridor Farmland with Infrastructure type is characterised by alluvium deposited by adjacent rivers.

- **the presence/absence of 'built' features and activity in the landscape:** With the exception of the western part of the Peat Moorlands where Thorne and Moorends are located, much of the landscape type currently has a relatively 'empty' and 'remote' sense of place, with few roads or significant built features in the landscape, other than scattered dwellings, the disused pit heads of Thorne Colliery, and the M18 and M180 road corridors that cross the area.

8.6.4 In contrast the River Corridor Farmland with Infrastructure where the Rusholme site is located has a busier and more developed character, containing many industrial or engineered features that make a strong contribution to character. These include the M62 motorway, the elevated M62 bridge over the river Ouse, and several motorway junctions including the M62/M18 interchange. The Drax power station overlooks the landscape type and influences its character. The riverside cranes at the port of Goole rise as features of the skyline and there are industrial estates, rail and canal links and a considerable number of scattered farms, villages and small towns, as well as the urban centre of Goole.

8.6.5 Both wind farms will lead to changes within and in the immediate vicinity of the wind turbines that will give rise to localised wind farm landscapes. Cumulative effects on the landscape are likely to occur, due to the proximity of the two wind farms. However the key issue to be considered is whether or not the combined presence of the two wind farms is strong enough to over-ride the differences in character between the two landscape types identified above, to the extent that wind turbines become the strongest influence on character in this part of the Humberhead Levels landscape.

8.6.6 The two wind farms would be physically separated by approximately 7 km overall. Between the Goole Fields wind farm and the Rusholme site, this distance would be characterised by an expanse of open featureless Peat Moorland farmland, by large scale warehousing and cranes at Goole docks, by urban and industrial development on the western outskirts of Goole, by a major infrastructure corridor including Junction 36 of the M62, by locally wooded farmland and by built development at Airmyn, on the river Aire, before the farmland of the Rusholme site is reached. It is considered that a combination of distance and the contrasting characteristics of intervening land would provide sufficient separation between the two wind farms for each to be individually influential on local character without 'merging' of the character types.

Cumulative Visual Effects

8.6.7 **Appendix 8** includes analyses of the potential cumulative effects of the Rusholme wind farm proposal in combination with the Goole Fields wind farm in views from representative viewpoints 1-11. The analyses indicate that from the viewpoints where cumulative impacts may occur, the addition of the proposed Rusholme wind farm would increase the presence of wind turbines in the landscape, leading to cumulative effects.

8.6.8 **Intervisibility** or the occurrence of views of more than one wind farm development from fixed viewpoints (although not necessarily within a single view), will occur in some places. It is anticipated that there will be many opportunities for views in which the two wind farms would be intervisible, due to the generally large scale and open character of the Humberhead Levels landscape, which lacks significant landform that could otherwise limit views. However the extent to which intervisibility would occur will depend largely on circumstances

local to the viewpoint, including the presence of buildings, trees woodlands and hedgerows, and minor landform that could intervene in views.

8.6.9 **Appendix 8** provides an analysis of each of the 11 agreed viewpoints. Cumulative visual effects are judged to occur from Viewpoints 3 (Asselby), 7 (Hemingbrough) and 10 (Crowle). Although the Rusholme wind farm proposal would lead to cumulative visual effects in views from these viewpoints, the level or magnitude of cumulative effects would not significantly exceed those for which the Rusholme wind farm has been assessed as a 'stand alone' development.

8.6.10 Other fixed viewpoints would also occur from which the two wind farms would be intervisible, not necessarily within a single view. The cumulative effects experienced from other fixed viewpoints are likely to be of the same general order and significance as those assessed for the agreed viewpoints.

8.6.11 Cumulative effects also include **increased perceptions of wind turbines,** gained through the recurrence of views of wind turbines experienced sequentially when moving through the landscape, even where the wind farm developments are not intervisible.

8.6.12 The addition of the 12 Rusholme wind turbines to the 16 wind turbines to be constructed at Goole Fields would lead to increased perceptions of wind turbines in the landscape by people moving through the area, in so far as larger numbers of wind turbines would be seen in two distinctly separate developments on the land around Goole.

8.6.13 As far as travellers on the M62 motorway are concerned, the two wind farms are unlikely to be experienced sequentially. Due to the generally open character and lack of significant landform in the Humberhead Levels landscape, the two wind farm developments are likely to come into view at approximately the same point, and disappear from view at approximately the same point (in the vicinity of M62 junction 36), assuming views are not interrupted by local features. The issue of 'recurring images' of wind turbines is therefore unlikely be experienced when travelling through the landscape on this principal route.

8.6.14 There will be opportunities to view the Rusholme and Goole Fields wind farms in sequence from some routes in the local area, including :

- when travelling northwards on the M18 before going east on the M62
- when travelling on the A614 between Thorne and Howden
- when travelling on the A161/A614 between Crowle and Howden.

8.6.15 In these situations the second wind turbine development to be viewed and passed when travelling on these routes will be encountered relatively soon after the first,

and although cumulative visual effects will occur, they are unlikely to create the impression of repeated wind turbine installations located within the wider landscape.

8.6.16 The slower rate of progress experienced when travelling by boat on the River Ouse or when walking on the Trans-Pennine Trail along the north bank of the River Ouse will increase the time interval between passing the wind farms in sequence. This is likely to increase perceptions of 'recurring images' of wind turbines.

Conclusions concerning Cumulative Effects

8.6.17 Guidance offered by Cumbria County Council in the document 'Wind Energy Development in Cumbria' (1997) is considered to be helpful in drawing conclusions about likely cumulative effects. It states that:

'the approach adopted in this guidance in relation to cumulative impact is to ask whether a proposal or proposals will merely create a new feature within a landscape which otherwise retains its essential characteristics, or whether by virtue of the presence of other wind energy developments in the area, the new proposal(s) would lead to a fundamental change in the character of the landscape.'

8.6.18 The guidance suggests that there are three potential stages of wind turbine development, separated by two potential thresholds. These stages and thresholds are set out graphically in the following table:

Stage	**Threshold**
There is a wind development in this landscape	
	Wind development becomes a significant characteristic of the landscape concerned
This landscape contains a number of wind developments/ significant number of turbines	
	Wind development becomes the dominant characteristic by which the landscape would be described
This is a wind energy landscape	

8.6.19 The Rusholme wind farm proposal would lead to cumulative effects in combination with the approved Goole Fields wind farm. It is considered however that at most, the local landscape in this part of the Humberhead Levels would be characteristic of the second stage of wind energy development indicated by the 'Wind Energy Development in Cumbria' guidance ie a landscape that contains a significant number of wind turbines. It would not have crossed the threshold between stages two and three whereby '*wind development becomes the dominant*

characteristic by which the landscape would be described', and would not have become a '*wind energy landscape'*.

8.7 SUMMARY AND CONCLUSIONS

8.7.1 The wind farm site is located on Rusholme Grange and Pease Farm, 2.2 km east of Drax village, in Selby District, North Yorkshire. The river port of Goole is 2 km to the south-east of the site and the city of Selby is some 10km to the north-west. The site lies on the Wharfe – Ouse river floodplain within the Humberhead Levels regional character area. It is not located within a landscape designated at national, regional or local level.

8.7.2 The character of the local landscape is considerably influenced by industrial and built development, notably large scale infrastructure features including several power stations (such as the one at Drax, approx 3.5 km W of the site), the M18 and M62 motorways on embankment, and urban and industrial development at Goole.

8.7.3 Hamlets and small villages are a feature of the rural landscape. They are often set within mature tree belts that provide shelter and further emphasise their presence as features of the landscape. Settlements and scattered properties are linked by a network of minor roads, lanes and by rights-of way.

8.7.4 Much of the local landscape is of the River Corridor Farmland with Infrastructure type, large in scale and open in character. The wind farm site itself is located on very flat and low-lying fields of arable crops, within a tapering tongue of land that is defined by the confluence of the rivers Ouse and Aire. The fields are very open and almost featureless, and are crossed by an overhead electricity transmission lines (11kV), by ditches and by several farm tracks. Wide or panoramic views are available over long distances across open countryside.

8.7.5 Twelve wind turbines, each with 60 metre towers and 40 metre blades are proposed for construction at the Rusholme site. The design of the wind farm has incorporated a number of measures that would help to reduce or mitigate effects on the landscape and visual character of the local area. This includes the omission of two of the wind turbines originally proposed, in order to mitigate the predicted effects of the wind farm in views from Airmyn.

Predicted Impacts

8.7.6 Assessment of the predicted impacts of the wind farm has been assisted by the preparation of photomontages that simulate the appearance of the 12 wind turbines from a number of local viewpoints.

8.7.7 The assessment of landscape impacts has taken into account

- the existing character, quality and value of the landscape,

- its sensitivity to the wind farm development.

8.7.8 The construction of 12 wind turbines in Newland parish would create a group of tall vertical structures within the open countryside of the Humberhead Levels. The wind farm would be seen in the context of, but not appear to be at odds with power stations, 400kV overhead lines, motorways and associated structures, and industrial development at Goole, all of which are widely visible and located in the vicinity of the site. It would add to the existing range of large scale infrastructure that is already an established characteristic of the local landscape. These features make the local area rather less sensitive to a wind turbine development of this type than some other parts of the Humberhead Levels landscape.

8.7.9 There would be effects on landscape character. Within and in close proximity to the site, where the degree of change would be greatest, effects on character are likely to be of 'moderate' or 'substantial-moderate' significance, which is a 'borderline' level in terms of representing a 'significant impact' as referred to in the Environmental Impact Regulations 1999. Further afield, up to 3-5 km or so of the wind turbines, localised impact on character is likely to be of no more than moderate-slight significance, which is not a 'significant impact' in terms of the 1999 regulations. The Rusholme wind farm would not have a 'significant impact on the overall character of the Selby district / Humberhead Levels landscape.

8.7.10 In general terms, the wind farm would potentially be widely visible within the local landscape, except where minor landform (including flood defences), tree cover, woodlands and built development interrupt views. In many of these views, the wind turbines would be seen against the skyline. From many locations in villages and towns, potential views towards the site are often screened by intervening buildings, and by mature tree cover that often fringes local settlements.

8.7.11 In conditions of good visibility the wind farm may be seen in relatively distant views, including from the Hambleton Sandstone Ridge to the west of Selby, from the West Selby Ridge on the district boundary, from Thorne Moors and Crowle Moors to the south-east, and from the hills of the Yorkshire Wolds to the north-east, (20+ km distant). In these views the wind farm would appear as a relatively small element in a wide panorama that contains many other features, including other large scale elements.

8.7.12 The assessment of visual impacts has taken into account

- the magnitude or degree of impact, which varies with viewing distance and the relative proportion of the field of view which is occupied by turbines

- the sensitivity of the viewpoint

8.7.13 Visual impacts would vary; glinting may occur, but is unlikely to be of great significance. There is potential for shadow flicker to occur at Rusholme Grange Farm, but given the relatively limited occurrence predicted, shadow flicker effects would not be a significant visual impact of the wind farm development proposals. Visual intrusion of the wind turbines in existing views would be the main visual impact.

8.7.14 Within and in close proximity to the site, including from 2 farmsteads at Little Airmyn and from properties in Newland 'village', on Brier Lane and on Rusholme Lane, the wind farm would be a prominent feature in unobstructed views. Visual impacts of substantial or substantial-moderate significance may occur in some views, due to the close proximity of the wind turbines.

8.7.15 The wind farm would generally have a relatively limited effect on views from residential properties in Drax and Airmyn, two of the closer settlements to the site. Views from many properties in Drax village would be largely filtered or screened by fringing tree cover and from Airmyn, flood embankments, intervening buildings and trees would typically interrupt views. Where unobstructed views do occur, impacts may be of substantial or substantial-moderate significance due to the close proximity of the wind turbines. Similar impacts are also likely in unobstructed views from some properties in Asselby village, Barmby in the Marsh, and Knedlington, all located to the north of the river Ouse.

8.7.16 Views towards the site from other locations, including from Goole and Selby would often be interrupted by or seen in the context of tree/woodland cover, and large scale infrastructure including the Drax power station and the M62 motorway. Impacts in views from properties in Goole would be of no more than moderate significance and generally limited to the western edge of the town. In views from Selby, impacts of the wind turbines would be of no more than slight significance, due to distance and to the intervening presence of the Drax power station and the new Selby bypass.

8.7.17 Visual impacts will also occur in some views from local rights of way, recreation routes and amenity sites, particularly the Trans Pennine Trail (footpath) and the Howden 20 route, both on the north bank of the river Ouse, the footpath along the south bank of the river Aire in the vicinity of Airmyn, the National Cycle Route No. 65 through Asselby, as well as a few local footpaths between Drax village and the wind farm. The significance of impacts in views from these routes would vary from 'substantial' to slight or nil, depending on the distance of view and the extent of intervening tree cover, buildings and flood embankment structures that intermittently interrupt or filter views when moving through the landscape. Impacts of no more than slight significance may also occur in filtered views towards the wind farm from the picnic site and parking area of the Barmby Tidal Barrage amenity site.

8.7.18 Apart from the minor 'cul de sac' roads that lead from Drax village to Newland and Little Airmyn and to Rusholme Grange Farm, the most prominent views of

the wind farm from the road network would be obtained by passing motorists on the M62 and from the A645 road, due to the proximity of the wind turbines. Generally the wind turbines would be seen in the context of the Drax power station, road infrastructure and industrial development at Goole, which would tend to reduce the visual impact of the wind turbines. Resulting visual impacts in unobstructed views would be of no more than moderate significance, although intervening roadside trees and buildings would often interrupt views of the wind turbines from other roads in the area, such as the A63(T), and levels of impact would often be reduced to no more than slight significance.

8.7.19 Overall, the Rusholme wind farm would be located within a landscape that is of relatively low sensitivity to the proposal and has a relatively high capacity to accommodate it. No nationally or locally designated landscapes would be affected. The tall engineered structures of the wind turbines would be generally consistent, rather than at odds with, the other large scale infrastructure features that are acknowledged to be '*key characteristics*' of the local landscape. 'Significant impacts' (in terms of the Environmental Impact Regulations 1999) would be restricted to landscape effects within the site and immediate vicinity, which would be of 'borderline' significance, and to visual effects in unobstructed views from some residential properties and some footpath routes up to 5-6km from the wind farm. There would be variations in impacts on views caused by local circumstances including the localised effects of vegetation and buildings in interrupting potential views. At greater distances, landscape and visual impact significance would generally reduce to moderate or moderate-slight levels which are not regarded as 'significant impacts' in terms of the Environmental Impact Regulations 1999.

9 NATURE CONSERVATION

9.1 INTRODUCTION

9.1.1 An ecological and ornithological assessment was commissioned by Wind Prospect Developments Limited to provide information on the ecological and ornithological interest of the proposed wind farm site at Rusholme, North Yorkshire, and how this may be affected by the proposed development.

9.1.2 The specific objectives were to:

- Undertake breeding bird surveys of the Rusholme proposed wind farm site, to determine the numbers of birds present, and approximate breeding locations.
- Undertake wintering bird studies to determine the birds that may be affected by the proposed development at that time of year.
- Undertake a Phase 1 vegetation survey and identify the National Vegetation Classification (NVC) communities present.
- Collate appropriate additional information on the site's bird populations through consultations and a review of the literature.
- Evaluate the conservation importance of the site, assess the potential effects of the development on the site's ecology and recommend mitigation measures if necessary.

9.2 THE STUDY AREA

9.2.1 The site is located 3km north-west of Goole, in North Yorkshire. The ecological study areas were chosen to include all areas within the potential zone of ecological influence of the proposed wind farm, including the potential bird flight routes along the river Ouse and Aire corridors. This was defined to include the area within at least 800m of the proposed turbine locations for the wintering bird study (the 'wintering bird study area', covering an area of 9.6km^2), and within 300m for all of the other surveys (the 'main ecology study area', covering an area of 3.3km^2). The extent of these study areas is shown in **Figure 2 and Figure 11, Volume 3**.

9.2.2 Both the main ecology and the wintering bird study areas were predominantly arable farmland, with a range of crops including winter cereals, sugar beet, rape and potatoes. The wintering study area also held a small amount of improved pasture, and an area of broad-leaved woodland (on Asselby Island). The field boundaries included typical marginal vegetation, numerous wet ditches, scattered bushes, trees and a few hedgerow remnants. Most of the ditches are cleared regularly for drainage purposes. The River Ouse flows along the northern edge of the main ecology study area, and the River Aire along the southern edge of the wintering study area; their confluence lies on the eastern edge of the main ecology study area. The banks of both these rivers supported marginal riparian vegetation and narrow strips of grassland.

9.3 CONSERVATION DESIGNATIONS IN THE VICINITY OF THE STUDY AREA

9.3.1 There are no statutorily protected sites within the main ecology or the wintering bird study areas, nor any within 2km of the proposed wind turbine locations. There are three such sites between 2km and 5km from the nearest proposed wind turbine and these can be seen in **Appendix 12**:

- Humber Flats and Marshes: Upper Humber – 2.2km east – Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) and Ramsar site - this very extensive inter-tidal area holds internationally important numbers of a range of wintering and migrant bird species and internationally important estuarine and saltmarsh habitats. The internationally important SPA designation has been recently extended to include the estuary lying to the east of the proposed development (2.2km from the nearest proposed turbine location at its closest point). The main conservation interest is the internationally important waterfowl populations that use the estuary outside the breeding season, though some breeding species of interest do occur, including marsh harrier (see **Table 9.1**).

- Barn Hill Meadows – 2.3km north-east – SSSI – an area of unimproved neutral grassland designated for its botanical interest.

- River Derwent – 3.1 km north-west – SSSI – important aquatic flora and invertebrate and fish fauna. It also supports a notable breeding bird community, and, in association with the adjacent Lower Derwent Valley SPA, holds an internationally important wintering Bewick's swan population.

9.3.2 In addition there are two further SPAs 5-10km from the proposed wind farm:

- Lower Derwent Valley SPA – 5.8km north – SSSI, SPA, Ramsar site – an important wetland for a range of waterbird species throughout the year (see **Table 9.1**).

- Thorne, Crowle and Hatfield Moors SPA – 6.4km south - designated as a (SPA) and (SSSI) for its bird populations, also an internationally important peatland site designated as a candidate Special Area for Conservation. The main bird interest is the breeding nightjar population (66 pairs, 1.9% of the GB population).

Table 9.1. Citation species for the Humber Flats, Marshes and Coast SPA , the Lower Derwent Valley SPA and the Thorne, Crowle and Hatfield Moors SPA.

Species	Protection status	Time of year	Importance
Humber Flats, Marshes and Coast			
Little tern	Schedule 1	Breeding	National
Marsh harrier	Schedule 1	Breeding	National
Bar-tailed godwit	Annex 1	Wintering	National

Species	Protection status	Time of year	Importance
Bittern	Annex 1, Schedule 1	Wintering	National
Golden plover	Annex 1	Wintering	National
Hen harrier	Annex 1, Schedule 1	Wintering	National
Redshank		Wintering, Passage	International
Sanderling		Passage	International
Dunlin		Wintering	International
Knot		Wintering	International
Shelduck		Wintering	International
Shoveler		Wintering	International
Wintering waterfowl community >20,000 individuals		Wintering	International
Lower Derwent Valley			
Corncrake	Annex 1, Schedule 1	Breeding	National
Ruff	Annex 1, Schedule 1	Breeding, Wintering	National
Spotted Crake	Annex 1, Schedule 1	Breeding	National
Bewick's swan	Annex 1	Wintering	National
Bittern	Annex 1	Wintering	National
Golden plover	Annex 1	Wintering	National
Teal		Wintering	International
Wintering waterfowl community >20,000 individuals		Wintering	International
Thorne, Crowle and Hatfield Moors			
Nightjar	Annex 1, Schedule 1	Breeding	National

Annex 1 = listed on Annex 1 of the EU Birds Directive, Schedule 1 = listed on Schedule 1 of the 1981 Wildlife and Countryside Act.

9.4 BREEDING BIRD SURVEY

9.4.1 The bird survey was carried out using a standardised timed method. Two survey visits were made, the first in early May and the second in mid June 2003. All bird locations and behaviour were mapped to 1:10,000 scale, using the standard Common Birds Census notation. Supplementary behavioural observations and notes were made to determine breeding locations as accurately as possible. The area was subdivided into half-kilometre square areas. Birds were recorded systematically for 20-25 minutes in each of these areas, standardising the search effort per unit area. The surveys were carried out between 0830 and 1800 hours, avoiding strong winds, heavy rain, fog and low cloud. Birds were located by walking, listening and scanning by eye and with binoculars. Birds were considered to be breeding if singing, displaying, carrying nest material, nests or young found, repetitively alarmed adults, disturbance displaying, carrying food or in territorial dispute.

9.4.2 The survey data were used to obtain population estimates for all of the bird species breeding on the site (**Table 9.2**). Maps were produced of the breeding pairs recorded during each visit and these were combined to produce an estimate of the overall breeding population for each species. Pairs were considered separate from each other if greater than 1km (waterfowl), 500m (woodpigeon, gamebirds, carrion crow and cuckoo) or 200m (all other species) apart, with this distance reflecting the relative distance that birds might move between survey visits.

Table 9.2. Breeding bird population estimates in the Rusholme breeding bird study area, 2003.

Species	Map symbol	Number of pairs	Density (pairs per km^2)
Mallard	MA	8	2.4
Red-legged Partridge	RL	6	1.8
Grey Partridge	P	2	0.6
Pheasant	PH	6	1.8
Moorhen	MH	1	0.3
Coot	CO	2	0.6
Lapwing	L	4	1.2
Stock Dove	SD	6	1.8
Woodpigeon	WP	43	13.0
Great Spotted Woodpecker	GS	2	0.6
Skylark	S	102	30.9
Meadow Pipit	MP	25	7.6
Yellow Wagtail	YW	19	5.8
Wren	WR	5	1.5
Robin	R	2	0.6
Blackbird	B	4	1.2
Reed Warbler	RW	1	0.3
Lesser Whitethroat	LW	1	0.3
Blackcap	BC	1	0.3
Blue Tit	BT	6	1.8
Great Tit	GT	1	0.3
Magpie	MG	1	0.3
Carrion Crow	C	7	2.1
House Sparrow	HS	2	0.6
Tree Sparrow	TS	5	1.5
Chaffinch	CH	9	2.7
Goldfinch	GO	1	0.3
Linnet	LI	12	3.6
Reed Bunting	RB	14	4.2
Corn Bunting	CB	17	5.2
Additional species seen over-flying/using the site:		*Peak count*	
Cormorant	CA	3	
Grey heron	H	5	
Black-headed gull	BH	5	
Feral pigeon	FP	114	
Swift	SI	3	
Swallow	SL	5	
Jackdaw	JD	5	
Rook	RO	140	
Starling	SG	14	

9.4.3 The distribution of the breeding birds within the study area is shown on **Figures A13.1 to A13.8 in Appendix 13**. The more abundant species (those with more than 10 pairs) have been presented separately for clarity. Woodpigeon (**Figure A13.1**) were abundant, with most found within the small wooded patches and hedgerow remnants. Skylark (**Figure A13.2**) were the most abundant species, and were found across the whole study area. Meadow pipits (**Figure A13.3**) and yellow wagtails

(**Figure A13.4**) were similarly widely distributed but at a lower density. Indeed all of the other more abundant species (linnet – **Figure A13.5**, reed bunting – **Figure A13.6** and corn bunting – **Figure A13.7**) were also widely distributed across the study area without any particular concentrations.

9.4.4 Of the less abundant species (**Figure A13.8**), greatest numbers were found around the farm buildings and along the river margins. The open arable fields did hold a range of other species though, including grey partridge and lapwing.

9.4.5 One species protected from disturbance during breeding under Schedule 1 of the Wildlife and Countryside Act may breed within the study area, though was not seen during any of the surveys, barn owl. This nocturnal species could have been over-looked, though there were not any suitable nest sites (large trees or farm buildings) in the vicinity of the proposed wind turbine locations.

9.5 WINTERING BIRDS

9.5.1 Following consultations with English Nature and RSPB, a detailed programme of winter fieldwork has been carried out. The main possible issue identified at scoping was waterfowl movements, which EN considered may over-fly the site in sufficient numbers (particularly between the Humber Estuary and Lower Derwent Valley SPAs) to pose a significant collision risk. A wintering bird study area was defined to include all the land within at least 800m of the proposed wind farm. Twelve survey visits were carried out at approximately fortnightly intervals during October-early April. During each visit all of the following were counted and mapped on a field by field basis:

- All waders (including lapwing and golden plover)
- All ducks, geese, swans, cormorants, gulls, coot and grebes
- All birds of prey and owls
- Large flocks (>100 birds) of other species

9.5.2 In addition, flight observations were carried out from two vantage points over-looking the proposed development site (at SE 717253 and at SE 705266). All bird species noted over-flying were recorded, including their direction and height of flight, and position in relation to the proposed wind farm. These observations were made during standard 30-minute periods (Morrison 1998), with a total of 28 of these carried out in total.

9.5.3 The counts for each species using the wintering study area during each visit are summarised in **Table 9.3**. The Table gives the total count for each species for each date on which a survey was undertaken. Overall only low numbers of wintering birds were encountered during the field surveys, and no important concentrations of birds were noted.

Table 9.3. **Wintering bird populations in the Rusholme winter study area, 2002-03. Note: the table includes all waterfowl and birds of prey, plus other abundant species (occurring in >100 individuals). The first number in each cell is the total count of birds using the study area, the number in square brackets is the total count including birds just over-flying, and '-' indicates that species was only seen over-flying on that visit.**

Species	03/10/02	30/10/02	17/11/02	02/12/02	18/12/02	27/12/02	12/01/03	02/02/03	14/02/03	06/03/03	21/03/03	04/04/03
Cormorant	2 [8]		- [5]	- [23]	6 [21]	- [23]	5 [8]	- [1]	3 [7]	6 [7]	7 [9]	4 [6]
Grey Heron		1 [1]		1 [1]	6 [6]	[5]	4 [4]	4 [4]	9 [9]	2 [2]		
Mute Swan			3 [3]									
Whooper Swan											- [94]	
Pink-footed Goose			- [180]									
Shelduck									- [3]		2 [2]	
Wigeon				18 [18]		92 [92]	55 [55]		125 [125]	17 [17]	58 [58]	
Gadwall			- [2]									
Teal			3 [28]	42 [100]	30 [30]	51 [97]	37 [37]	136 [136]	73 [73]	2 [2]	9 [9]	
Mallard	- [110]		- [15]	12 [30]	39 [44]	86 [118]	95 [123]	51 [51]	105 [109]	33 [33]	29 [37]	7 [8]
Goosander							- [3]		2 [2]			
Sparrowhawk			1 [10]	1 [1]								
Peregrine			1 [1]	1 [1]								
Kestrel	2 [2]			1 [1]	1 [1]	1 [1]	1 [1]			1 [1]		[1]
Merlin	- [1]											
Moorhen	2 [2]				2 [2]		1 [1]			2 [2]	1 [1]	
Coot									1 [1]			
Oystercatcher											4 [4]	
Golden Plover			53 [53]	12 [12]	23 [148]	457 [457]	270 [270]					
Lapwing	50 [257]		15 [74]		- [2]				32 [32]	1 [1]		3 [3]
Redshank			1 [1]	1 [1]	5 [5]	1 [1]	2 [2]	1 [3]	2 [3]	1 [4]	1 [1]	
Black-headed Gull	750 [950]	200 [200]	[100]	- [21]	72 [72]		8 [8]	8 [17]	55 [57]	78 [82]	222 [222]	16 [20]
Common Gull		30 [30]		6 [6]		2 [2]	4 [22]		55 [56]	25 [27]	25 [28]	
Less. Black-backed Gull		1 [1]			1 [1]							
Herring Gull						- [1]						
Stock Dove				51 [169]	221 [221]	340 [418]	170 [170]	32 [32]	34 [34]	3 [3]		
Woodpigeon				270 [500]	210 [210]	500 [1250]	170 [265]	378 [378]		100 [100]		
Fieldfare		280 [280]	899 [899]	80 [285]		482 [636]	132 [132]	24 [24]	136 [136]		[7]	
Jackdaw										100 [100]		

Species	03/10/02	30/10/02	17/11/02	02/12/02	18/12/02	27/12/02	12/01/03	02/02/03	14/02/03	06/03/03	21/03/03	04/04/03
Rook				175 [205]						100 [100]		
Starling			100 [100]	520 [565]	830 [913]	50 [168]		18 [18]	3 [3]	113 [113]	390 [475]	

9.5.4 The overall status of each of the key species of conservation interest noted during the 2002/03 winter fieldwork has been summarised in **Table 9.4**. This included 4 of the SPA qualifying species (shelduck, teal, golden plover and redshank) and 5 further species that form part of the SPA assemblages (cormorant, wigeon, mallard, oystercatcher and lapwing), plus an additional 4 species (whooper swan, pink-footed goose, peregrine and merlin) that occurred in regionally important numbers (on the basis of their peak count).

Table 9.4. Wintering bird populations (SPA species and those in regionally important numbers) recorded in the study area during October 2002-April 2003. Note: no species was recorded in internationally or nationally important numbers.

Species	Mean count	Peak count	Importance (based on local numbers)	Comments on occurrence in the study area winter 2002/03
Key qualifying species:				
Shelduck	<1	3		Only very low numbers recorded.
Teal	43	136	Regional	Largely restricted to River Ouse around Asselby Island.
Golden plover	78	457	Regional	Flock of 450 recorded on one occasion, on northern edge of study area in field north of R. Ouse. Smaller numbers scattered on wind farm site and over-flying.
Redshank	2	5		Very small numbers along margins of R. Ouse.
Other SPA assemblage spp				
Cormorant	10	23	Regional	Small numbers on the rivers and over-flying. Most flight activity along rivers.
Wigeon	30	125	Local	Small flock noted regularly around Asselby Island.
Mallard	57	123	Local	Small numbers on the rivers and over-flying. Most flight activity along rivers.
Oystercatcher	<1	4		Very small flock of 4 on R. Ouse margin on one date and 2 seen over-flying.
Lapwing	31	257	Local	Peak ground count of 50, with no notable concentrations. More birds seen over-flying but numbers still low.
Other species in at least regionally important numbers:				
Whooper swan	n/a	94	Regional	Single migrant flock of 94 seen heading NNW over Asselby Island on 21 March.
Pink-footed goose	n/a	180	Regional	Single migrant flock of 180 seen heading ESE on 17 November, 1km SE of the study area.
Peregrine	<1	1	Regional	Single individuals seen hunting over the study area on two dates.
Merlin	<1	1	Regional	Single record of a single bird flying over the southern part of the study area on 3 October.
Black-headed gull	158	950	Regional	High numbers in October following plough, thereafter may fewer.

Flight Movements

9.5.5 The rates of bird movement observed across the study area during the vantage point observations are summarised in **Table 9.5**. This Table gives the mean rate observed per hour observation for all the species seen over-flying the area.

Table 9.5. Movement rates observed in the Rusholme wintering bird study area, winter 2002-03.

Species	Mean over-flying rate per hour	Species	Mean over-flying rate per hour
Cormorant	4.9	Stock Dove	14.1
Grey Heron	0.5	Woodpigeon	21.8
Shelduck	0.1	Gt Spotted Woodpecker	0.1
Gadwall	0.1	Skylark	1.4
Mallard	13.5	Meadow Pipit	1.4
Kestrel	0.3	Pied Wagtail	0.5
Merlin	0.1	Wren	0.1
Peregrine	0.2	Fieldfare	29.9
Red-legged Partridge	0.2	Song Thrush	0.4
Grey Partridge	0.1	Redwing	7.6
Pheasant	0.1	Mistle Thrush	0.1
Oystercatcher	0.1	Carrion crow	0.1
Golden Plover	18.9	Magpie	0.2
Lapwing	19.4	Jackdaw	5.7
Snipe	0.3	Rook	31.4
Redshank	0.2	Starling	20.3
Black-headed Gull	57.1	Chaffinch	0.4
Common Gull	8.6	Linnet	0.4
Lesser Black-backed Gull	0.1	Reed Bunting	0.6

9.5.6 Overall the rates of bird flight movement across the site were low. The species composition was similar to that found in the field counts, with most movements comprising gulls, pigeons, thrushes, crows and starlings. Movement rates of species on the Humber Estuary and Flats and Lower Derwent Valley SPA citations were low, with only small numbers of cormorant, mallard, golden plover, lapwing and redshank. Shelduck and oystercatcher were also recorded during these observations but only a single observation of a single individual of each.

9.5.7 The only distinct bird flight routes noted during the vantage point observations were along the river corridors (mostly the River Ouse). Most of the waterbird species flew primarily along the river, though the total numbers involved were only small.

Conservation Evaluation: breeding birds

9.5.8 The breeding bird survey data was evaluated to determine the conservation value of the birds breeding on the site. This was based on the criteria adopted by English Nature in Guidelines for Selection of Biological SSSIs (JNCC 1995), using 1% of the resource to define national and regional importance. The national and regional breeding populations were taken from Gibbons *et al.* (1993). A further category of 'local importance' was used for species that did not reach regional importance but were still of some ecological value. For bird species this included all species on the red or amber lists of the RSPB' *et al.'s* (2002) 'Birds of Conservation Concern' that did not reach national or regional importance at the site. As the site was entirely farmland with no semi-natural habitats, it was not appropriate to use the standard English Nature scheme to evaluate the overall breeding bird assemblage.

9.5.9 The conservation importance of the breeding bird populations using the study area is summarised in **Table 9.6**. This Table includes all the species noted during the surveys that have at least low conservation value (i.e. at least low sensitivity using the criteria in **Table 9.8** below). The species included in the Table are those that occurred within the possible zone of impact of the proposed wind farm. For the purposes of this assessment, this was taken as the maximum distance at which disturbance effects have been found at existing wind farms, 300m for breeding birds and 800m for wintering birds (Pedersen and Poulsen 1991, Gill *et al*. 1996, Percival 2000). Additional species that were only observed over-flying the study area, rather than specifically using it, have also been considered.

9.5.10 The breeding bird community within the study area was not particularly notable, with no species listed on Schedule 1 of the Wildlife and Countryside Act, no EU Birds Directive Annex 1 species, 4 UK BAP priority species (skylark, linnet, reed bunting and corn bunting; all 4 are also on the RSPB *et al.'s* Red List) and a further 5 amber-listed species (shelduck, lapwing, stock dove, starling and goldfinch). The UK BAP and amber-listed species are species that have declined widely across Britain but are still common and widespread.

Conservation Evaluation: wintering birds

9.5.11 The conservation importance of the wintering bird populations using the study area is summarised in **Table 9.6**. The wintering bird study area (and the area that could be potentially affected by the proposed wind farm) did not support any particularly important wintering bird populations. Nine of the species for which the Humber Estuary and Flats and the Lower Derwent Valley have been designated as SPAs were recorded but only in low numbers, both using and over-flying the site. A further five medium sensitivity species were also recorded, but the area did not support any notable concentrations of any of these either.

Table 9.6 **Conservation evaluation of the bird populations in the Rusholme wintering and breeding bird study areas. Note: the Table includes all species of at least low sensitivity recorded.**

Species		SPA species	>1% regional pop-ulation	EU Birds Directive Annex 1	Red List	Amber List	UK BAP priority species	Sensitivity
Breeding species:	**Breeding pairs within 300m**							
Grey partridge	1				✓		✓	Medium
Lapwing	3					✓		Low
Stock Dove	5					✓		Low
Skylark	57				✓		✓	Medium
Meadow pipit	16					✓		Low
Yellow wagtail	8					✓		Low
House sparrow	0				✓			Low
Tree sparrow	2				✓		✓	Medium
Linnet	6				✓		✓	Medium
Reed Bunting	12				✓		✓	Medium
Corn Bunting	10				✓		✓	Medium
Non-breeding species:	**Peak count**							
Cormorant	23	✓	✓					Very high
Mute swan	3					✓		Low
Whooper swan	94		✓	✓		✓		Medium
Pink-footed goose	180		✓			✓		Medium
Shelduck	3	✓				✓		Very high
Wigeon	125	✓				✓		Very high
Gadwall	2					✓		Low
Teal	136	✓	✓			✓		Very high
Mallard	123	✓						Very high
Peregrine	1		✓			✓		Medium
Merlin	1		✓		✓			Medium
Kestrel	2					✓		Low
Oystercatcher	4	✓				✓		Very high
Golden plover	457	✓	✓	✓			✓	Very high
Lapwing	257	✓				✓		Very high
Snipe	1					✓		Low
Redshank	4	✓				✓		Very high
Black-headed gull	950		✓			✓		Medium
Common gull	56					✓		Low
Lesser black-backed gull	1					✓		Low

Species		SPA species	>1% regional pop-ulation	EU Birds Directive Annex 1	Red List	Amber List	UK BAP priority species	Sensitivity
Herring gull	1					✓		Low
Swallow	5					✓		Low
Fieldfare	899					✓		Low
Redwing	71					✓		Low

9.6 HABITAT SURVEY

9.6.1 An extended Phase 1 survey of the study area was carried out during May 2003, with additional notes made to identify the National Vegetation Classification (NVC) communities present, following English Nature guidelines (JNCC 1993). The survey route was planned to ensure that all visually distinct habitats within the survey boundary were visited. The habitats were recorded as both Phase 1 habitat definitions (for the purpose of mapping) and NVC category (where appropriate). A species list was compiled for each habitat to assist with this (see **Appendix 14**) and a series of representative quadrats were sampled in each (following the standard NVC method of Rodwell *et al*. 1991). Specific searches were made for rare, uncommon and local plants.

9.6.2 The following criteria were used to determine national rarity. All follow the English Nature procedural recommendations (1) nationally rare; found in no more than fifteen 10x10km squares in Great Britain, and (2) nationally scarce; found in between sixteen and one hundred 10x10km squares in Great Britain (data on national distribution from Preston *et al*. 2002). In addition a species or community was considered important at the national scale if more than 1% of the national resource was found at the site, or if it was protected under Schedule 8 of the Wildlife and Countryside Act (1981). Regional value was defined as more than 1% of the county resource, and local value as noteworthy ecological value but not sufficient to reach regional importance.

9.6.3 The Phase 1 survey map is shown in **Figure 11.1, Volume 3**. Each of the Phase 1 habitats and the National Vegetation Classification communities that were recorded at the site are described in **Table 9.7**. Details of all the vegetation data collected from each of the main habitats are given in **Appendix 14**.

Table 9.7. Phase 1 habitats and NVC communities recorded in the Rusholme ecology study area

Phase 1 class	NVC category	Dominant species, comments and status.
Neutral grassland (river bank, field and track margins)	MG13	A grassland community typical of damper ground conditions. Widely distributed through lowland Britain.

Wet ditches and main drain, and river margin	S4/S26	Common reed, nettle and creeping bent abundant (though aquatic vegetation generally reduced by drain clearance). Widespread throughout the British lowlands.
Hedgerows and scattered trees	W21	Hawthorn and crack willow, with other woody species. Generally patchy and sparse, quality below threshold for importance under 1997 Hedgerows Regulations.
Broad-leaved plantation woodland	n/a	Planted woodland with sycamore dominant.
Arable land	n/a	Includes winter-sown cereals, sugar beet, potatoes and rape.

9.6.4 **Rare species**: No plant species were found that are nationally or regionally scarce. The plant species generally were typical of farmland habitats, and are widespread and common. Two species were found that were determined to be locally important; both are aquatic/wetland species:

- Intermediate starwort *Callitriche intermedia* – occasional in the wetter ditches/drains with permanent water.
- Fen bedstraw *Galium uliginosum* – occasional on ditch and river banks.

9.6.5 **Community evaluation**: all of the vegetation communities found on the site are common and widespread both within the region and across England as a whole (Rodwell *et al*. 1991, 1992 and 1995). They are typical of those found more widely in the region. None have any specific conservation value.

9.7 ECO-HYDROLOGY

9.7.1 A scoping study, including a site visit, was carried out to identify if there were any hydrological issues relating to ecology associated with the development at the site that may need further investigation.

9.7.2 The River Ouse flows along the northern edge of the main ecology study area, and the River Aire along the southern edge of the wintering study area; their confluence lies on the eastern edge of the main ecology study area. There are numerous and widespread drainage ditches, which constitute many of the field boundaries. The only open standing water within the proposed wind farm site is a small pond at SE709265. The locations of all these features are shown on **Figure 11.2, Volume 3**.

9.7.3 The main hydrological sensitivity within the site is the numerous drain systems, and the adjacent rivers. The development has been designed to ensure that there is no significant impact on these features. No turbines or site tracks will be located within 100m of the river banks. No turbines will be located in close proximity to any drains (all lie more than 7m from any drain), the site tracks have been routed at least 2m from any drains and site track drain crossings have been avoided where possible.

9.8 OTHER ECOLOGICAL ISSUES

9.8.1 This section of the ecological assessment reviews the information available on other protected species that may be affected by the proposed wind farm.

9.8.2 **Water vole**: this species is protected under Schedule 5 of the 1981 Wildlife and Countryside Act and is a priority species for conservation in the UK Biodiversity Action Plan. This protection covers damage/destruction of their place of shelter/protection and disturbance to the animals whilst they are in these shelters. They have been reported to have declined widely in Britain but are still widespread in their distribution. They live primarily in close (within 1m) proximity to water, along ditches and riverbanks (Corbet and Harris 1991, Lawton and Woodruffe 1991). During the site visits the main drains were walked and signs of water vole activity searched for, and none were seen, though a comprehensive survey was not undertaken. The numbers of this species are highly variable between years and seasons, so they may be present in the other ditches/drains in the proposed wind farm area. All of the larger permanently wet drains in particular would provide them with suitable habitat.

9.8.3 The only possible impacts that the proposed development may have on this species would be where the site tracks cross existing ditches: this would be the only component of the development that would take place within this species' habitat. Thus the only issue with this species would be during the construction of these tracks. As their populations are so variable, current numbers and locations would not necessarily reflect that at the time that construction took place, so it would not be reliable to base mitigation measures on such data. Instead it a more detailed water vole survey of potential impact areas will be undertaken immediately prior to construction, and mitigation measures will be based on this more up-to-date information, ensuring compliance with the Wildlife and Countryside Act and avoiding any possibility of any significant impact on this species (see Mitigation section below).

9.8.4 **Badger**: this species is protected under the 1992 Protection of Badgers Act, which makes it illegal to kill or injure the animals themselves and to damage their setts. English Nature (2002) state in their guidelines that heavy machinery should not be used within 30m of a sett. Signs of badger activity within the study area were searched for during the site visits and none were found, though a comprehensive badger survey was not undertaken. This species can develop new setts over a short period of time, and there is a possibility that they may move in to the proposed wind farm site prior to construction.

9.8.5 The main potential for impact on this species would be during the construction of the site tracks and wind turbine bases, and cable under-grounding. The walkover survey undertaken as part of the baseline work

suggests that the area generally is not important for badgers, but does not preclude the possibility that this species may be present in the development area at the time of construction. Therefore a further detailed badger survey of potential impact areas will be undertaken immediately prior to construction, and mitigation measures will be based on this more up-to-date information, ensuring compliance with the Badgers Act and avoiding any possibility of any significant impact on this species (see Mitigation section below).

9.8.6 **Great crested newts**: is protected under Schedule 5 of the Wildlife and Countryside Act 1981 and is a priority species for conservation in the UK Biodiversity Action Plan. Great crested newts breed in ponds, particularly temporary ones that dry out in summer. They feed on a variety of invertebrates both in the water and on land, and favour large, shallow well-vegetated ponds and other wetland habitats that are devoid of fish (Beebee and Griffiths, 2000). There is no such habitat sufficiently close to the proposed development site that would be likely to be affected by the development (the pond at SE709265 would be unaffected), so no specific field survey work has been undertaken on this species. All of the development works will be on cultivated arable land, which would not include any suitable Great Crested Newt habitat.

9.8.7 No other protected species would be likely to be affected by the proposed development.

9.9 ASSESSMENT OF ORNITHOLOGICAL EFFECTS

9.9.1 The methodology on which this ecological assessment is based is given in full in **Appendix 11**.

9.9.2 There are three ways in which the proposed wind farm might have an adverse effect on birds: direct loss of habitat, increased mortality rate through collision with the turbines and the overhead wires of the grid connection and loss of habitat through disturbance. Each is discussed in turn.

Direct habitat loss

9.9.3 This would be an effect of negligible magnitude, with only a very small area taken up by the turbine bases and access tracks. The more sensitive wet ditch habitat has been avoided, with the take including only arable land and marginal vegetation (of no particular conservation importance). This selection of routes for the access tracks and the turbine locations has ensured that such effects on the local bird populations would be of very low significance, and would therefore not be significant.

Collision risk

9.9.4 There have been a number of wind farms that have caused bird mortalities through collision but their characteristics are very different to those at the proposed Rusholme site. Most notably, at Altamont Pass in California, large numbers of raptors have been killed (Orloff and Flannery 1992, Thelander and Rugge 2000). The main difference between Rusholme and Altamont lies in the numbers of birds involved and the characteristics of the turbines. In California, the site is located in an important raptor foraging area, and has over 7,000 turbines with fast blade rotation speeds and guyed/lattice towers, placed close together creating a 'wind wall' effect, which increased collision rates substantially. Overall the evidence from existing wind farms for waterfowl species suggests that the numbers of these birds that would need to be passing regularly through a wind farm would need to be very high in order for significant mortality to occur. At Kreekrak in the Netherlands, for example, a coastal wind farm immediately adjacent to the Oosterschelde SPA, with a local population of 2-6,000 waterfowl only 1.9-4.6 collisions per turbine per year were estimated (Musters *et al*. 1995 and 1996). This study concluded that the level of mortality was not significant, and recommended that a further 15 turbines could be constructed without an adverse impact on the local bird populations. Very low collision rates have been reported from the Blyth Harbour wind farm, where 4,500 waterfowl regularly occur (Still *et al*. 1995) and which falls within the Northumberland coast SPA. This study reported an average of 1.3 collisions per turbine per year, apparently declining in some species as birds habituated to the presence of the turbines (Painter *et al*. 1999).

9.9.5 With the generally low densities of birds in and around the proposed Rusholme wind farm site, the facts that the development is small (only 12 turbines) and that bird numbers over-flying the site are low, mean that it is unlikely that bird collisions would be a problem at this site. In addition, the risk of collision will be further reduced as the turbines will be widely spaced, and the towers will be tubular and not guyed.

9.9.6 In order to further inform the determination of the likelihood of potential impacts occurring, collision modelling has been carried out to determine the numbers of key species that would need to over-fly the site in order for their to be a risk of a potentially significant impact (taken in this case as a non-negligible magnitude effect). The collision risk model used in this assessment is the one developed by SNH and BWEA (Percival *et al*. 1999, Band 2001). Details of the model are given in these two publications. The model runs as a two-stage process. Firstly the risk is calculated making the assumption that flight patterns are unaffected by the presence of the wind turbines, i.e. that no avoidance action is taken. This is essentially a mechanistic calculation, with the collision risk calculated as the product of (i) the probability of a bird flying through the rotor swept area, and (ii) the probability of a bird colliding if it does so. This probability is then multiplied by the estimated numbers of bird movements through the wind farm rotors at the risk height (i.e. the height of

the rotating rotor blades) in order to estimate the theoretical numbers at risk of collision if they take no avoiding action.

9.9.7 The second stage then incorporates the probability that the birds, rather than flying blindly into the turbines, will actually take a degree of avoiding action (as has been shown to occur in all studies of birds at existing wind farms, with avoidance rates typically well in excess of 99%, Percival 2000). To determine the avoidance rate, a collision risk model is run for the parameters of the study wind farm to estimate the number of collisions that would have occurred without avoidance. The collision rate is then calculated as the ratio of the actual number of collisions to the number predicted without avoidance, and the avoidance rate is simply the collision rate subtracted from one. These rates were determined on a worst-case basis (i.e. from the study with the highest reported collision rate) from the Blyth Harbour study for cormorant and for the wildfowl (Still *et al*. 1996, Painter *et al.* 1999) and from a study in the Netherlands for lapwing and golden plover (Winkelman 1992). Body sizes were taken from Cramp (1998), and flight speeds from Campbell and Lack (1985). Baseline mortality rates were taken from Peach *et al*. (1994) for lapwing and from Cramp (1998) for all other species.

9.9.8 Birds differ markedly in their demographic characteristics, and hence also differ in their susceptibility to changes to mortality rates. Any additional mortality would be most likely to adversely affect species with high adult survival and low breeding rate, as they would be less able to replace any losses. Similarly species that were unable to compensate for any losses incurred, for example by increased survival or breeding rate (i.e. populations regulated in a density-independent way) would be more susceptible (Percival 2000).

9.9.9 **Table 9.8** summarises the collision risk analysis for each of the very high sensitivity species that use the site in non-negligible numbers. The Table gives the total local SPA populations for each of these species, their baseline annual mortality rate, the additional annual mortality that would be required in order to give a 1% increase over this baseline (i.e. to reach at least a low magnitude impact) and (from the collision risk model) the number of flights through the wind farm that would be required to result in sufficient collisions to reach this 1% increase in mortality over the baseline. The Table also gives the predicted annual collision rate for each of these species.

Table 9.8. Collision risk modelling predictions for the key bird populations in the area.

Species	Total local SPA population size	Baseline annual survival rate (source: Cramp 1998)	No of flights per year through wind farm required to give 1% increase over baseline mortality	No of flights per year through wind farm required to give single collision	Observed flight rate (flights per year)	Predicted number of collisions per year
Cormorant	143	88%	9,950	58,000	10,600	0.15
Wigeon	13,839	53%	377,000	5,800	0	0
Teal	6,819	45%	236,000	6,300	0	0
Mallard	5,880	52%	291,000	10,300	29,200	2.4
Golden plover	35,847	64%	12,500,000	97,000	40,800	0.36
Lapwing	30,172	75%	7,240,000	96,000	41,900	0.38

9.9.10 For wigeon, teal, mallard, golden plover and lapwing it is clear that the observed flight rates would fall well below the threshold for a potentially significant impact (taken as a 1% increase over the baseline mortality). Hence even in this worst case it is clear that the risk of collision for these species would be of negligible magnitude and not significant. The confidence that can be attached to this conclusion is increased further when the actual collision rates of these (and similar) species are considered; most reported collision rates have actually been very low indeed and well below the worst-case values used in the modelling exercise. The most likely outcome would be no collisions at all.

9.9.11 The only exception to this was cormorant, where the predicted worst case collision rate was at about the same level as that which would result in a 1% increase over the baseline mortality. For this species, therefore the magnitude lies on the low/negligible border. As a low magnitude impact would be of medium significance (given this species' very high sensitivity), this needs further consideration. This species has been shown to have a very low risk of collision of wind turbines: even at Blyth Harbour, where the only reported collision occurred (a single immature bird) about 50-100 birds were flying through the wind farm on a daily basis - and only a single collision was reported in a study lasting over 6 years (Painter *et al.* 1999). In addition to this, even with this worst case the predicted annual collision rate at Rusholme was very low (0.15 birds per year). Hence for this species too the most likely outcome would be a negligible magnitude impact, which would not be significant.

9.9.12 Of the medium sensitivity species, six were breeding and/or resident in the study area: grey partridge, skylark, tree sparrow, linnet, reed bunting and corn bunting. Only small numbers of these occurred in the vicinity of the proposed

wind turbine locations, so none would be at more than a low risk of collision (and more likely negligible), and there would no be a likelihood of a significant impact.

9.9.13 Five additional medium sensitivity species were recorded over-flying the study area; whooper swan and pink-footed goose (only single flocks on migration), peregrine and merlin (single individuals on 1-2 occasions) and black-headed gull (large flocks when ploughing activity within the study area, smaller numbers at other times). As the first four of these occurred in only small numbers, they would be very unlikely to collide with the proposed wind turbines. Collision effects on these species would be likely to be of at most low magnitude, and hence not significant. Black-headed gulls were present in higher numbers but their over-flying rate through the whole winter was still relatively low (about 60 birds per hour). No specific concentrations were found, with most flocks being temporarily associated with fields where ploughing was taking place or had recently been completed. Hence for this species too the magnitude of any collision effect would be of at most low magnitude and not significant. Only very low collision rates for this species have been reported at existing wind farms (Winkleman 1992, Musters *et al.* 1996, Painter *et al.* 1999, Percival 2000).

9.9.14 A further medium sensitivity species could potentially breed within the study area, barn owl. If this species were present only very small numbers would be involved, and this species has not been shown to be particularly prone to collision risk with wind turbines (e.g. Erickson *et al*. 2001). Therefore the magnitude of the collision risk would be at most low and there would not, be a likelihood of any significant collision impact.

9.9.15 The five low sensitivity breeding/resident species (lapwing, stock dove, meadow pipit, yellow wagtail and house sparrow) similarly occur in small numbers and would be at low/negligible risk of collision, so significant impacts on these species would not occur.

9.9.16 Therefore overall it is predicted that the risk of collision for any species of conservation importance would be at most low (and more likely negligible), and no significant impacts are predicted.

Indirect habitat loss (disturbance)

9.9.17 This could potentially affect a rather greater area than direct habitat loss. The maximum distance that wind turbines have been shown to affect breeding birds is 300m and for birds outside the breeding season the equivalent distance is 800m, though many studies have found no disturbance effect at all (Gill *et al*. 1996, Percival 2000). For the purpose of this assessment, these distances have been used as a worst case, to determine what the impacts would be if displacement of birds from these zones did occur. The bird populations that would be affected in such a case have been summarised in **Table 9.6** above.

9.9.18 Nine very high sensitivity species were found during the winter within the 800m buffer around the site: cormorant, shelduck, wigeon, teal, mallard, oystercatcher, golden plover, lapwing and redshank. Three of these, shelduck, oystercatcher and redshank, occurred in only very low numbers and would therefore clearly not be at risk of a significant disturbance impact. Possible disturbance effects on the other 6 species are discussed below:

- Cormorant – this species was present in low numbers, using the two main rivers for feeding and roosting on adjacent trees/telegraph poles/wires. It has been shown to roost in close proximity to wind turbines at Blyth, and indeed roosts on turbines themselves at the offshore wind farm at Tuno Knob in the Danish Baltic (personal observation). Hence any disturbance effect would be of at most negligible magnitude and not significant.

- Wigeon and teal – both these species were largely restricted to the River Ouse around Asselby Island. With such small numbers involved in relation to the local SPA populations (peaks of 125 and 136 respectively with SPA populations of 13,800 and 6,800 for each, Pollitt *et al.* 2003) and with their distribution centred away from the proposed wind farm, any disturbance effect on these species would be of at most negligible magnitude and not significant.

- Mallard – this species was more widespread that the other duck species, but was still mostly found along the two main rivers. As for wigeon and teal, the local peak count (123) was very small in relation to the SPA populations (5,900). Any disturbance effect on this species would be of at most negligible magnitude and not significant.

- Golden plover and lapwing – these species had the highest peak counts of the very high sensitivity species, though were only recorded intermittently within the study area (on about only half of the surveys) and most counts were considerably lower than the peaks. They used the open farmland habitats, which exist across most of the area and would be able to readily accommodate the relatively low numbers of displaced birds should any such displacement occur. Thus even this worst-case effect would be one of negligible magnitude (and not significant). This conclusion is strengthened further when one takes into account the general behaviour of these species wintering at existing UK wind farms, where no disturbance effects at all have been reported. For example, at Haverigg (SGS Environment 1994), several hundred plovers were reported regularly roosting within the windcluster, and at Siddick, where a recent study has found 4-500 birds regularly roosting and feeding within that windcluster within 100m of the turbines (Percival and Cameron, in prep.). The most likely outcome is that there will be no disturbance effect at all.

9.9.19 The nearest proposed wind turbine location is more than 2km from the Humber Flats, Marshes and Coast SPA and over 5km from the Lower Derwent Valley SPA, so there would be no possible disturbance effect directly into these protected areas.

9.9.20 Six medium sensitivity species (but no Schedule 1 species) were breeding within the potential disturbance zone: grey partridge, skylark, tree sparrow, linnet, reed bunting and corn bunting. Only small numbers of these species were found, so any disturbance effects would be of at most low magnitude impact even taking a worst-case approach. Experience from existing wind farms (Thomas 1999, Percival 2000) suggests that for these types of species such impacts would be unlikely, so in reality such a worst case would probably not occur, but even if it did, the impact would not be significant.

9.9.21 There were no additional species of conservation importance found wintering in the area that could be potentially subject to significant disturbance effects. Overall even if the birds within the potential disturbance zone were displaced, the extensive availability of similar alternative habitat in the area and its surrounds means that the ecological consequences for these highly mobile species would be of at most low magnitude, and not significant.

9.9.22 A further potential disturbance effect could be disruption to important flight lines. Birds may see the wind farm and change their route to fly around (rather than through) it. This would reduce the risk of collision but could possibly have other effects, for example potentially making important feeding areas less attractive (by acting as a barrier to the birds reaching them) and (if diversions were of a sufficient scale) resulting in increased energy consumption.

9.9.23 The distance needed to divert around the proposed 12-turbine wind farm would be only small and would not be expected to act as a major barrier to movements, as it occupies only a 1km wide corridor in the direction of most bird movements (along the rivers). Hence the ecological consequences of any such changes in flight lines would be of negligible magnitude and not significant.

9.10 ASSESSMENT OF ECOLOGICAL EFFECTS: VEGETATION AND OTHER ECOLOGY

9.10.1 As the study area does not support any particularly important habitats (i.e. it is of low/negligible sensitivity) and the magnitude of any effects would be low/nil, the proposed wind farm would not have any significant effect on the study area's vegetation communities. No hedgerows defined as important for wildlife in the 1997 Hedgerow Regulations would be affected.

9.10.2 The access tracks and turbine bases would avoid all the watercourses by at least 2m and 7m respectively, hence the magnitude of their effect should be low (provided the proposed good practice is followed with regard to the

avoidance of potentially polluting activities during construction). No effects would occur on the river systems as these have been avoided by at least 100m.The hydrological sensitivity in relation to ecology would be low and hence any effects on the study area's eco-hydrological interest would be of low significance (and not significant).

9.11 MITIGATION OF IMPACT

9.11.1 The main mitigation measure undertaken has been to locate the wind turbines outside the main areas of specific ecological interest in the region. As a result, in terms of ornithology, only low numbers of both wintering and breeding birds are found within the zone of potential disturbance, collision risk is low/negligible and no significant impacts are likely.

9.11.2 Though no bird species protected under Schedule 1 of the Wildlife and Countryside Act were found breeding in the study area, one (barn owl) could potentially breed there given the habitats available. Therefore in order to ensure that none would be disturbed by the wind farm construction activity, a further survey for these species should be undertaken immediately prior to construction, if construction were planned for the bird breeding season (April-July). If any were found then potentially disturbing activities should be suspended for the breeding season within an appropriate zone (dependent on the location of the birds).

9.11.3 The proposed development will not affect any vegetation communities or habitats of particular ecological value. The wind farm has been designed to avoid the immediate vicinity of the watercourses, with no turbines within 7m of any of the drains within the site (and none within 100m of the main rivers). This measure also means that any effects on water voles would be very unlikely. A pre-construction water vole survey will be carried out within 50m of where the drain crossings are proposed. If any are located in this area, no construction activity would be undertaken that would damage any active water vole burrows during their breeding season (March-October). This species should also benefit from the proposed grassland strip creation alongside the drains and ditches, through increased potential foraging habitat and through the improvement of water quality.

9.11.4 The area within 30m of the turbine locations and the access tracks and underground cable route will be checked again prior to construction to ensure that no badger setts are damaged during construction, to comply with the 1992 Protection of Badgers Act. If any were found in this zone the turbines/tracks will be micro-sited away from such setts to ensure a 30m minimum separation.

9.11.5 All of the new access tracks that are proposed as part of the development that run alongside ditches will be located at least 2m from those ditches. As a result a minimum 2m-wide strip of land will be taken out of agricultural production, and it is proposed to restore these to grassland. The access tracks and the

grassland strips will provide a buffer between the ditches and the agricultural practices that may affect the ditch habitats. This grassland will be sown with a species-rich grass mix and managed to maximise its conservation value.

9.12 MONITORING

9.12.1 Given the generally low bird numbers in proximity to the proposed wind farm and that no significant impact is likely, a monitoring programme would not be strictly necessary. However, given the general lack of information about how birds are affected by wind farm developments in lowland farmland areas, and the current interest in the region as a wind resource area, a basic programme of bird monitoring will be undertaken in order to better understand any effects that may occur. Two years' breeding bird surveys after construction will be carried out, using the same methodology as the baseline data collection for the ES. Bird distributions before and after construction will then be compared, in relation to the distance from the wind turbines, to determine whether any disturbance effect has taken place. Collision monitoring would be unlikely to yield any useful results, given the low bird numbers over-flying the site, and it is not therefore proposed. Similarly the low numbers of birds (and low frequency of occurrence) recorded during the wintering bird study would mean that it would be unlikely that a winter monitoring programme would yield any useful results, so this is not proposed either.

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10 CULTURAL HERITAGE

10.1 INTRODUCTION

10.1.1 This section describes the predicted impact of the proposed Rusholme wind farm upon the cultural heritage resource. The aim of this section is to identify any significant cultural heritage constraints within the study area, identify any predicted impacts and propose appropriate mitigation strategies.

10.1.2 The section addresses the predicted impact of the proposed development upon the built historic environment, and in particular upon any Listed Buildings and Conservation Areas within the study area. This section also considers the impact upon all recorded archaeological remains, including Scheduled Monuments and other designated sites (such as Registered Parks and Gardens or Battlefield Sites). The potential for previously unrecorded archaeological remains within the proposed development boundary is also assessed.

10.1.3 The boundaries of the study area upon which the assessment is based include both the footprint of the proposed wind farm and a study area extending up to 1.5km from the application boundary (**Figure 12.1, Volume 3**). The predicted impacts upon the settings of Listed Buildings, Conservation Areas and Scheduled Monuments within 3-4km of the proposed wind farm is also assessed, although this does not include any Listed Buildings within the historic centres of Howden and Goole (**Figure 12.2, Volume 3**). The study area includes parts of both the Selby District of North Yorkshire and the East Riding of Yorkshire.

10.1.4 The section describes the assessment and prediction methodology with respect to the cultural heritage and the baseline environment within the study area. The potential impacts of both the construction and operation of the development upon the cultural heritage are set out, together with associated mitigation measures and the resultant residual impacts.

10.2 METHODOLOGY AND INFORMATION SOURCES

10.2.1 The assessment represents a comprehensive desk-based review of published and readily accessible documentary, cartographic and aerial photographic information relating to archaeological sites and the built heritage within the study area. The information derived from this review was supplemented by a walkover inspection of the areas that would be affected by the proposed development and a site inspection of those sites and buildings whose settings or character could also potentially be affected by the proposals.

10.2.2 The principal aims of the cultural heritage assessment are:

- to identify known cultural heritage and archaeological sites within or in the vicinity of the proposed wind farm

- to identify areas within the application boundary with the potential to contain any previously unrecorded archaeological remains

- to assess the physical and visual effects of the proposed development upon Listed Buildings, Conservation Areas or archaeological sites and their settings

- to propose appropriate mitigation measures which could be built into the development proposals to avoid, reduce or remedy any potential adverse effects identified

- to assess the suitability of the development proposals with respect to cultural heritage in relation to local plan policies and national planning guidance

Conservation Areas and Listed Buildings

10.2.3 The closest Conservation Area to the site is at Rawcliffe (2.7km). Plans indicating the extent of the Rawcliffe Conservation Area and a schedule of the location of Listed Buildings within it were obtained from the East Riding of Yorkshire Council. There is also a designated Conservation Area within Howden (3.4km distant). A plan indicating its extent was also obtained from the East Riding of Yorkshire Council.

10.2.4 Schedules of Listed Buildings located within 4km of the wind farm site were also supplied by North Yorkshire and the East Riding of Yorkshire County Councils. Clusters of Listed Buildings occur at Airmyn, Boothferry, Asselby, Barmby on the Marsh, Knedlington and Newland. The information was supplemented by visits to the study area.

Archaeological Sites

10.2.5 The assessment is based upon a review of existing available information and desk studies. The following organisations or individuals were consulted in relation to archaeological interests:

- North Yorkshire County Council (Heritage Unit)

- Humber Archaeology Partnership

- English Heritage

- North Yorkshire County Council Records Office

- Borthwick Institute of Historical Research, University of York
- local studies libraries (Selby and Goole)
- the landowners (Mr Roberts and Mr Hinchcliffe)
- Mr J Hunter

10.2.6 The following data sources were utilised for the assessment:

- Sites and Monuments Records (for North Yorkshire and East Riding of Yorkshire)
- National Monuments Record
- vertical and oblique aerial photographs
- published and unpublished historical and archaeological studies
- cartographic sources (enclosure, tithe and historic Ordnance Survey maps)
- statutory list of Scheduled Monuments
- English Heritage Battlefield Register
- English Heritage Register of Historic Parks and Gardens

10.2.7 Site walkover inspections of the areas to be affected by the proposed development were made in April and May 2003. On both occasions fields had mostly either been recently cultivated or contained recently sprouted arable crops, and ground conditions for the identification of surface artefacts were good.

10.2.8 The assessment has been prepared in accordance with guidance on the preparation of Environmental Statements (1995) and guidance on the preparation of desk-based assessments prepared by the Institute of Field Archaeologists (1999).

10.2.9 A draft of this section was submitted to both the Heritage Unit of North Yorkshire County Council and English Heritage for informal comment prior to finalisation of the assessment report.

Prediction Methodology

10.2.10 The criteria for predicting the significance of the effects of the impacts of the proposed development on the archaeological and historic resource are as shown below:

Major Substantial direct impact on a nationally or regionally important archaeological site or historic building where the significance of the elements directly affected is considered to be high. Development would destroy or significantly compromise its integrity. Mitigation measures would not significantly remove or modify such effects.
Impact on the setting of sites, buildings, monuments or landscapes of national or regional importance that would result in their character or appearance being compromised to the extent that appreciation or understanding is destroyed or substantially diminished.

Moderate Direct impact on a regionally or nationally important archaeological site or historic building which would partially damage or compromise but not destroy its integrity. Adequate partial or total mitigation measures can be specified.
Impact on the setting of sites, buildings, monuments or landscapes of national or regional importance that would result in their character or appearance being compromised to the extent that appreciation or understanding is partially diminished.

Minor Impact on a regionally or nationally important archaeological site or historic building which would not substantially compromise the integrity of the site. Impact on a locally important archaeological site or historic building which would destroy or substantially compromise its integrity. Adequate partial or total mitigation measures can be specified.
Impact on the setting of sites, buildings, monuments or landscapes of regional or national importance which would result in their character or appearance being compromised.
Impact on the setting of sites, buildings, monuments or landscapes of local importance that would result in their character or appearance being compromised to the extent that their appreciation or understanding is substantially or partially diminished.

Negligible No appreciable impact upon archaeological sites or historic buildings and their settings, and the integrity or understanding of the sites or buildings would not be affected.

10.3 EXISTING FEATURES OF CULTURAL HERITAGE INTEREST

Conservation Areas and Listed Buildings

10.3.1 The Rawcliffe Conservation Area is the closest such area to the proposed wind farm and is located approximately 2.7km to the south-west of the site, on the southern bank of the River Aire (**Figure 12.2, Volume 3**). The Conservation Area encompasses much of the older part of Rawcliffe village and contains seven Listed Buildings, all Grade II. These generally comprise 17th century and early 18th century brick-built houses with pantile roofs, together with the mid-19th century Church of St James which occupies a prominent position on the village green. The A614 Goole to Doncaster road bisects the Conservation Area. To the north of the A614, the Conservation Area extends in places to Riverside, a road that marks the northern edge of the village and which is bounded by a 1.5m high wall on the northern side. This wall retains flood embankments constructed along the River Aire. Considerable tree and scrub vegetation, principally willow, is established along the river, particularly on the northern bank.

10.3.2 The Conservation Area in Howden lies in the centre of the town, 3.4km from the wind farm site. It includes Howden Minster, which dates from the 13th century, and one other Scheduled Monument, together with a range of 18th and 19th century brick-built houses and cottages, some of which are Listed Buildings. The southern boundary of the Conservation Area is defined by Pinfold Street, Treeton Road and Hailgate, beyond which, in the direction of the wind farm, are the Buttfield Road and Boothgate housing estates. Other designated Conservation Areas in the local area include Hemingborough, Snaith and Selby, between 4km and 9km from the proposed wind farm site.

10.3.3 There are no Listed Buildings within the proposed Rusholme wind farm site.

10.3.4 The most important of the Listed Buildings in the local area is the Grade I listed Church of St Peter and St Paul in Drax village. Dating from the 12th century, the church is centrally located in the village on the north side of Main Street, approximately 2.2km west of the nearest wind turbine (turbine 1). It is set within a tree-lined churchyard that contains a Grade II listed cross base and shaft.

10.3.5 The closest Listed Buildings to the site are those located at Airmyn, on the eastern bank of the River Aire and within 800m of the wind farm (turbine 12). All are Grade II buildings, including several 17th century and early 18th century brick-built houses located along the High Street on the western edge of the village, adjacent to the River Aire. Others are the Church of St David, set back from the High Street within a tree-lined churchyard, and a

commemorative clock tower and school building, both located close to the river bank at the corner of the High Street. The western side of the High Street is bounded by a low wall and grassy flood embankment which together rise to approximately 2m high.

10.3.6 A small group of Grade II Listed Buildings is centred on Booth Farm at Boothferry, on the north side of the River Ouse, approximately 1.3km from the wind farm. It lies within a small cluster of farm outbuildings and dwellings located behind and below the River Ouse flood embankments and close to the modern A614 road bridge crossing of the river.

10.3.7 Clusters of Listed Buildings also occur in Knedlington, Asselby and Barmby on the Marsh, a string of historic villages located along a minor road on the north side of the River Ouse. On the western edge of Knedlington, 2.2km from the wind farm, is Knedlington Old Hall, a Grade II* 17th century Listed Building described by Pevsner (1972) as 'the finest small manor house in East Riding'. Associated with it are several Grade II buildings including Gamekeeper's Cottage to the west of the Hall and loose boxes etc to the north.

10.3.8 Three Grade II Listed Buildings are located along the Main Street in Asselby approximately 1.6km north of the wind farm (turbines 9 and 11), including two late 18th century farmhouses and the Black Swan public house.

10.3.9 Barmby on the Marsh contains eight Listed buildings, including a range 18th-19th century farmhouses, all Grade II and all located along the High Street, at a distance of approximately 2.5km (turbine 2) or more from the wind farm. On the southern edge of the village is St Helen's Church, also Grade II, which is set within a churchyard.

10.3.10 Two Listed Buildings also occur at Newland, to the south-west of the wind farm approximately 1km from the closest wind turbines (turbine 1). These are the Grade II Newland Hall, and a pigeoncote at Manor Farm, also Grade II.

Registered Parks and Gardens of Special Historic Interest

10.3.11 Carlton Towers is the closest Registered Park and Garden of Special Historic Interest to the proposed wind farm and is located approximately 4.5-5.5km to the south-west of the site, in the village of Carlton. The registered landscaped park and pleasure grounds extend to approximately 100 hectares and are contained by peripheral belts of woodland. They provide the setting to the Grade I listed Carlton Towers house, above which rises a clock tower that is clearly visible from the surrounding countryside. There are also a number of other Grade II listed structures, including gate piers and railings, and a folly known as the Water House.

10.3.12 Other Registered Parks and Gardens of Special Historic Interest include Escrick Park, near York (17km distant), Normanby Park near Scunthorpe

(approximately 19km distant) Byram Hall near Castleford (20km distant), and Everingham Park near Market Weighton (20km distant). No further assessment of these properties has been made due to their considerable distance from the proposed wind farm.

Archaeological Remains

10.3.13 Archaeological sites and finds recorded within the area of the proposed wind farm and the surrounding study area are listed in **Table 10.1** and their location indicated on **Figure 12.1, Volume 3** (areas of extant and former ridge and furrow cultivation are indicated on **Figure 12.1, Volume 3** but are not listed in **Table 10.1**). Sites within the study area have been allocated an individual number (their relevant North Yorkshire or Humber Sites and Monuments Record (SMR) number or National Monuments Record (NMR) number is included within **Table 10.1** where applicable). If the site relates to a number of individual SMR records, then only one site number has been allocated to it in **Table 10.1**. Individual SMR sites which research for the assessment study has indicated to be modern (19th century or later) in date have not been included within **Table 10.1** (as noted in the text below). A central grid reference, suggested classification and date are provided for all sites, which are graded (excluding findspots) in archaeological significance as of 1 (national), 2 (regional) and 3 (local) importance. Grading is based upon professional judgement and the criteria set out in Annex 4 of Planning Policy Guidance Note 16 on Archaeology and Planning (DoE 1990). Designated archaeological sites (Scheduled Monuments) within the wider study area are indicated on **Figure 12.2, Volume 3**.

Table 10.1: Archaeological Sites within Study Area

Site	SMR	Grid reference	Classification	Period	Grade
1	-	SE 7054 2586	Possible flint flake (find)	Prehistoric	-
2	-	SE 7070 2650	Flint flake (find)	Prehistoric	-
3	-	SE 7270 2690	Flint scraper and flakes (finds)	Prehistoric	-
4	-	SE 7280 2740	Flint flakes (find)	Prehistoric	-
5	10076	SE 6907 2598	Farmstead	Romano-British	2
6	10081	SE 6916 2597	Building debris	Romano-British	2
7	10082	SE 6903 2607	Building	Romano-British	3
8	10075	SE 6914 2590	Pottery (finds)	Romano-British	-
9	-	SE 7170 2760	Pottery (finds)	Romano-British	-
10	10083	SE 6903 2607	Chapel (St Wilfrid's)	10th century	2
11	-	SE 7235 2530	Settlement (Little Airmyn)	Medieval	2
12	9	SE 7260 2540	Settlement (Airmyn)	13th century	2
13	15721	SE 7250 2530	Pottery (finds)	Medieval	-
14	10084	SE 6875 2630	Moated site (Scurff Hall)	14th century	1*
15	10075	SE 6875 2620	Pottery (finds)	Medieval	-
16	10104	SE 6925 2660	Moated site (Rusholme Hall)	Medieval	2
17	8	SE 7220 2450	Moated site (Hall Garth)	13th century	2
18	10121	SE 7018 2660	Grange (Rusholme Grange)	Medieval	2
19	-	SE 7150 2540	Building (Lane House)	14th century	3
20	-	SE 6950 2525	Road (Quarter Gate Lane)	15th century	3
21	-	SE 7200 2740	Pottery (find)	Medieval	-
22	-	SE 7220 2740	Pottery (find)	Medieval	-
23	-	SE 7230 2750	Pottery (find)	Medieval	-
24	-	SE 7280 2740	Pottery (find)	Medieval	-
25	-	SE 7029 2654	House (Birketts House)	Post-medieval	3
26	13833	SE 7251 2548	Hall (Airmyn Hall)	18th century	3
27	13831	SE 7257 2540	Walled garden (Airmyn Hall)	18th century	3
28	13832	SE 7280 2550	Park (Airmyn Hall)	18th century	3
29	6411	SE 7310 2635	Farmstead (Booth Farm)	17th century	2
30	13834	SE 7310 2610	Farmstead (Boothferry House)	19th century	3
31	13835	SE 7311 2630	Public House (Percy Arms)	19th century	3
32	-	SE 6892 2487	Farmstead (Manor Farm)	18th century	2
33	-	SE 6985 2461	Farmstead (Newland Hall)	18th century	2
34	-	SE 6836 2485	Mill	19th century	3
35	-	SE 7242 2585	Mill (windmill)	19th century	3
36	-	SE 7215 2580	Fort Hill	17th century	2
37	-	SE 6990 2570	Cropmark	Uncertain	-
38	10097	SE 7130 2730	Cropmarks	Uncertain	-

*Scheduled Monument

10.3.14 Of the 38 sites and findspots recorded within the study area (as plotted on **Figure 12.1, Volume 3**) no definite sites and only two possible findspots are

located within the immediate vicinity of the proposed turbines. The nearest site with a formal designation (such as Scheduled Monuments or Registered Battlefield Sites) to the proposed wind farm is the medieval moated site at Scurff Hall (SM 30117) which is located some 1km to the west of the nearest turbine positions (turbines 1 and 2).

Prehistoric

10.3.15 No definite sites of prehistoric date are recorded within the study area, with evidence of prehistoric activity being limited to surface finds of prehistoric flint tools or waste flakes. A possible flint flake was recorded within the application boundary (Site 1) during the site walkover inspection, with a further flake recorded to the east of Rusholme Grange during earlier fieldwalking surveys by the Humber Wetlands Project (Site 2). The latter surveys identified a further six flints to the north-east of the proposed wind farm at two separate locations in Asselby parish (Sites 3 and 4), the former including a complete long end scraper (Van de Noort and Ellis 1999, 152).

10.3.16 Given the extensive areas of warp deposited across the study area (usually between 1m and 2m in depth) during the 19th century (see paragraph 10.4.42 below and **Figure 12.1, Volume 3**), the potential for previously unrecorded prehistoric and later activity to be sealed beneath these deposits remains a possibility. The study area falls within an area of palaeoenvironmental and archaeological surveys undertaken by the Humber Wetlands Project (HWP). A series of boreholes and augered transects undertaken as part of these surveys (indicated on **Figure 12.1, Volume 3**) suggests a considerable change to the surface topography within the study area since the onset of the Holocene (post-glacial) period, with previous undulations within the former early post-glacial ground surface being at least partially obscured by both natural alluvial deposition and warp. These and earlier surveys have identified discrete exposures or 'islands' of sands of the 25-Foot Drift derivation over Sherwood Sandstones to the north of the River Ouse (outwith the study area) on which existing settlements such as Barmby on the Marsh, Asselby and Knedlington are located, with residual levée sands exposed to the south of the River Aire between Rawcliffe and Goole (*ibid*, 152). Within the study area lesser exposures of post-lacustrine levée sands are also situated to the south of the Ouse immediately to the east of Rusholme Grange. These consist of a low linear ridge running in an easterly direction from the area of the farmstead (the approximate extent is plotted on **Figure 12.1, Volume 3** based upon information provided by the landowner and from mapping by the British Geological Survey). The exposed upper part of this ridge has not been subjected to warping and consequently survives as a topographical feature, although the lower edges are masked by later alluvial and warp deposits. The location of the ridge is also reflected in field names such as Sand Hill and Far Sand Hill on the 1838 tithe award map. Such names are significant both in terms of understanding the underlying geology as well as the former topography in an area with otherwise minimal surface relief. Another smaller

ridge of sand is mapped by the British Geological Survey to the south of Rusholme Grange, while further field names such as Sand Beds Corner, High Sand Beds and Low Sand Beds at the eastern extent of Newland (opposite Asselby Island), as well as information provided by the landowners, indicate further subsurface deposits of sand within the area of the proposed wind farm that have been sealed by warping.

10.3.17 The area has in the past been subject to the effects of fluctuating sea levels with a migration of river channels within the wider floodplain. The floodplain of the River Ouse within the study area appears to originally have had a maximum width of some 1km. Palaeoenvironmental analyses on the edge of the floodplain adjacent to Landing Lane (on the north bank of the existing course of the river) include radiocarbon determinations and indicate channel aggradation from the late Mesolithic, with the basal organic horizon (at a depth of some 8.8m below the existing ground level) developing from 5300-4900 cal BC. Peaty horizons with alluvial mixing reflect periodic innundation of the developing peats (Van de Noort and Ellis 1999, 52). Peat formation in a borehole on the northern edge of this floodplain (at a depth of some 2.9m below existing ground level) are dated to 2180-1920 cal BC, and suggest a lateral spread of peat formation over three millennia from the later Mesolithic to the early Bronze Age. The biogenic sediments on the north side of the Ouse near Asselby reflect wetland development from the Neolithic to Bronze Age periods, although from the pollen analysis there is an absence of evidence for human impact. The boreholes within the area of the proposed wind farm principally identified deposits of sands, clays or a combination of sands and clays extending to depths in excess of 2.5m. No detailed analysis was undertaken, or radiocarbon dates obtained, for these deposits.

10.3.18 The surveys have demonstrated the potential for the preservation of archaeological and ecofactual materials from the Mesolithic through to the early Bronze Age periods (between 5000 – 2000 BC) with wetland development occurring across this temporal range. Periodic innundation and the cessation of organic deposits is demonstrated, although fen-carr peats develop on the channel margins until about 2000 BC. The preservation of the palaeoenvironmental resource is good, with between 2m and 3m of alluvium capping the organic floodplain sediments. This survival is further demonstrated by the occasional organic deposits noted in the edges of some of the drainage cuts within the area to the proposed development during the site inspection survey, including either large branches or the trunks of smaller trees (at a depth of up to some 3m) in the drainage cut north of Little Airmyn pumping station (SE 716 258).

10.3.19 In addition to these surveys, documentary evidence suggests that the course of the River Aire may formerly have separated the area of Drax from the site of the proposed wind farm, which was originally therefore cut off from the area to the west, probably along the course of the lane immediately to the east of Scurff Hall (Smith 1961, 14-15; Wilson 1966, 685-686).

10.3.20 On the basis of the results of earlier surveys it is considered that any human activity during this period is most likely to have been confined to the outcropping drift deposits and areas of post-lacustrine levée sands. As raised and better drained ridges these would have been attractive for past human activity and settlement, while the surrounding wetter intertidal environments may have been utilised for hunting and gathering. A ridge of sand of this type survives within the area of the proposed wind farm to the east of Rusholme Grange. Although no evidence of settlement on or adjacent to this ridge is recorded as cropmarks from aerial photographic evidence, and no prehistoric remains have been identified within the study area despite the cutting of an extensive network of warping drains during the 19th century, it may perhaps be of note that the only certain prehistoric flint artefact (Site 2) recorded within the area of the proposed development is from the northern margin of this sand levée. Despite the sand ridge and its margins being considered to have a greater potential as a focus for prehistoric activity, because the exposed surface of the ridge has not been subjected to warping any surviving archaeological remains may have been subjected to a higher degree of agricultural damage and degradation than elsewhere on the site. The areas on the margins of the ridge may therefore have a greater potential to contain better preserved but previously unrecorded sites or finds. The potential for finds or other remains to survive beneath the alluvial and warp deposits elsewhere within the application boundary cannot, however, be discounted. More deeply buried sediments and any underlying peat deposits are also potential sources of palaeoenvironmental material, and therefore information about past landscapes and land use changes during the prehistoric and later periods.

Romano-British

10.3.21 The only recorded settlement site of Romano-British date recorded within the study area is located to the south-east of Scurff Hall. Excavation within this area has identified the remains of a farmstead, together with the remains of a further possible building and other associated features at a depth of some 0.5m below the existing ground level (Wilson 1966). The farmstead (Site 5) consisted of a building of six rooms with an external corridor or verandah facing onto a walled courtyard. The main range of buildings measured some 34m by 14m with the courtyard extending a further 8m along the principal south-eastern side of the range. The building had substantial stone foundations with masonry walls. More than one phase of construction was noted, with the original timber verandah being replaced in stone and an additional room added during the use of the building. No floor levels were recorded with the exception of stone surfaces in one of the rooms, the corridor and courtyard. Other features identified were occasional post-holes, a single pit, a possible kiln or oven and some areas of charcoal or burning. The excavated pottery recovered from the farmstead suggested the building was constructed in the mid 3rd century and abandoned in the late 4th century.

10.3.22 To the east of the farmstead a large area of undressed stone with pieces of iron, iron ore and charcoal, together with some Roman pottery, was recorded (Site 6). There was no evidence of walling or foundation trenches and the area was interpreted as a builder's dump.

10.3.23 In addition to surface scatters of Romano-British pottery identified within the area of the farmstead prior to excavation, further scatters of pottery were identified within the area to the south-east (Site 8).

10.3.24 Cropmarks of enclosures and ditches recorded by aerial photography in the area surrounding the farmstead (SMR 10091) represent former field boundaries of post-medieval date (and recorded on maps dating from 1754) and do not appear to be related to the excavated site.

10.3.25 The only other evidence of Romano-British activity recorded within the study area is pottery identified by the Humber Wetlands Project surveys to the north of the River Ouse (Site 9), and reports of a hoard of Roman coins to the west of Rusholme and a possible Roman ford near to the present location of Asselby Island (J Hunter, pers. comm).

Medieval

10.3.26 The only medieval site of pre-Conquest date recorded within the study area is that of the chapel of St Wilfred (Site 10). A charter dated 959 refers to a chapel at the confluence of the Aire and the Ouse. On the basis that the River Aire has altered its course subsequent to this date, this chapel has been equated with the chapel of St Wilfred of Stanhill, referred to in a Charter Roll of 1311, which indicates that the site of the former chapel was granted to Drax Priory sometime before 1181 (Wainwright 1954, 398). On the evidence of field names (and particularly Stannels or 'stone hill') the site of the chapel has been located to the south-east of Scurff Hall. While the stone previously evident in this area may have been derived from the former Romano-British farmstead (Site 5), trenches excavated to the north-west of the farmstead on the suggested location of the chapel identified nine large post-holes cut into the natural clay at a depth of some 0.9m below the existing ground level. No pottery was recovered from this building, which was interpreted as the remains of a timber structure considered to be the site of the chapel of St Wilfred (Wilson 1966, 680-681).

10.3.27 Other evidence of occupation within the study area prior to the Norman Conquest is based solely upon place name evidence. Both Rusholme and Scurff may have Old Norse origins, the former probably being derived from 'Hrut's island or watermeadow' and the latter from a cutting or water channel, possibly that linking the former course of the Aire with the Ouse (Smith 1961, 15).

10.3.28 A manor at Drax (to the west of the study area) is recorded at the time of the Domesday Survey in 1086 (Faul and Stinson 1986, 379b), although lands within this manor may have extended eastwards. Drax was the principal settlement within the vicinity during the medieval period, with the Priory being founded in 1128 and an adulterine castle built at Castle Hill in about 1140 but demolished in 1154 (Tyler 1979, 2). There appears to have been a deliberate attempt to found a borough in the mid-13th century, but its success appears to have been limited and was probably not aided by the establishment of Airmyn, located on the River Aire to the east, at the same time.

10.3.29 A manor at Airmyn is recorded in the Domesday Book, and this is presumed to refer to Little Airmyn (Site 11), although Little Airmyn is not specifically referred to until the 15th century (Smith 1961, 14). Airmyn (Site 12) appears to have been deliberately founded by St Mary's Abbey in York sometime prior to 1253, its location on the River Aire taking advantage of the opportunities of fishing, fowling and carriage, and particularly of the nearby ferry across the Ouse at Boothferry. The settlement was located within the parish of Snaith, and although a church at Airmyn is recorded from 1318 burials continued to be made at Snaith (it was not until 1726 that Airmyn had its own churchyard). No identified medieval remains are recorded within either Airmyn or Little Airmyn, although medieval (and post-medieval) pottery has been recovered from Airmyn (Site 13).

10.3.30 The area of the proposed wind farm is located within the historic township of Newland. The name denotes land newly reclaimed from the marsh and is first documented in the 13th century, referring to the low-lying land enclosed by the Ouse and the Aire which was probably originally cut off to the west by the former course of the Aire (Smith 1961, 14). Settlement within the township appears to have been dispersed, but was primarily located along the north bank of the River Aire. No concentration of settlement was established until the modern period (within the south-western part of the study area).

10.3.31 A number of moated settlement sites of medieval date are recorded with the study area. The site at Scurff Hall (Site 14) is located to the west of the proposed wind farm and the buried and earthwork remains of the moated manor consists of a relatively small rectangular inner moat surrounded by a more extensive outer moat. The inner moat and southern half of the outer moat are scheduled (SM 30117). The area was recorded as being assarted (or reclaimed from the fenland) before 1286 and Scurff was described as a vill in 1364 (Le Patourel 1973, 127). The inner moat measures some 75m by 55m and has been dated by excavation to the late 14th or early 15th century (Wilson 1966, 681-686). This has partially been infilled, probably when the medieval hall was demolished in the 18th century and a new hall (remodelled and enlarged in the mid-19th century) and farm buildings built to the west. The outer moat encloses an area of nearly 8ha, and is thought to date to soon after the inner moat. The earthwork remains of ridge and furrow survive within the scheduled area in the southern half of the enclosure, but that within the

northern half has been levelled by ploughing. Medieval pottery (Site 15) has been recovered to the south of the enclosure, and is presumed to derive from manuring.

10.3.32 Rusholme Hall, located to the north-east of Scurff Hall, is also sited within a medieval moated enclosure (Site 16). This moat has largely been destroyed, although two sides of the moat survived as earthworks in the mid-19th century (Le Patourel 1973, 127).

10.3.33 A further moated site (Site 17) is recorded at Hall Garth to the south of Airmyn. This was a large seignorial site established prior to 1253 by St Mary's Abbey in York, with the moat enclosing an area some 5ha in extent. Buildings appear to have been arranged around the northern and eastern sides of the enclosure (*ibid*, 122). All earthwork remains were destroyed in 1963 when the entire site was cleared and levelled and the moat infilled.

10.3.34 Other settlements or buildings of medieval date within the study area include a possible grange (Site 18) at Rusholme Grange. However, this attribution is based upon place name evidence and there are no further documentary sources to support either the identification of the site as a grange or its medieval origin.

10.3.35 Lane House (Site 19) is recorded in documentary sources from the mid-14th to the early 16th century. References to 'Lanhoses' suggest a group of houses to the north of the road running along the north bank of the River Aire, the location of which is based upon field names in the 1838 tithe award (Smith 1961, 14). The houses may have formed one of a number of groups of buildings within Newland along the north bank of the Aire (see 10.3.30 above)

10.3.36 With the exception of Scurff Hall there is no evidence for any settlements or buildings of medieval date other than those recorded adjacent or close to either the Ouse or the Aire. The location of Quarter Gate Lane (Site 20), recorded as 'Thwatergate' from the early 15th century, indicates a road running transversely across strip fields, and particularly those to the north of the area of Newland (*ibid*, 15). In addition, the extensive areas of former ridge and furrow cultivation (now mostly ploughed out) indicate arable cultivation in the vicinity of the settlements at Scurff Hall, Rusholme Hall, Airmyn, Little Airmyn and Boothferry in particular (**Figure 12.1, Volume 3**). Only on the north bank of the Ouse within Asselby parish do areas of ridge and furrow extend some distance from the village. While the lack of evidence for ridge and furrow cultivation within the remainder of the study area largely correlates with the recorded extent of later warp deposits (BGS 1994), this is not exclusively the case (**Figure 12.1, Volume 3**). The lack of recorded ridge and furrow further from recorded settlements, the location of most of the recorded settlement sites on the banks of the Ouse or the Aire, and the lack of identified sites within areas that have not been warped (see 10.3.43) would all suggest a limited potential for previously unrecorded sites of medieval date to survive

within the area of the proposed wind farm despite the later warping of this area, although the possibility of either sites or finds of this date cannot be totally discounted. No stray finds of medieval date are recorded within the area to the south and east of Rusholme Grange, the only such finds recorded during the Humber Wetlands Project surveys being in areas which had not been warped to the north of the River Ouse (Sites 21 to 24), but each of these was represented by single sherds of pottery and were probably derived from manuring.

Post-Medieval and Modern

10.3.37 Evidence for changes to settlement patterns during the post-medieval and modern periods is largely based upon cartographic evidence. Within the area of the proposed wind farm and its immediate vicinity the only additional site recorded is at Birketts House (Site 25), a farmstead or group of buildings to the south-east of Rusholme Grange. These were built some time prior to the 1838 tithe award survey but are no longer extant by the early 20th century.

10.3.38 More significant changes in settlement are the expansion of Airmyn during the post-medieval and modern periods and the more recent but limited expansion of Newland in the second half of the 20th century. The expansion of Airmyn relates in particular to the inheritance of the village and estate by the Percy family, later the Dukes of Northumberland and Earls of Beverley, in the mid-18th century, although Airmyn Hall (Site 26) may have its origins in the late 17th century, with its associated garden and park (Sites 27 and 28) being later. In addition to the gradual enlargement of the village, settlement also expanded within the area of Boothferry (Sites 29-31). Settlement at Newland has only more recently expanded, although farmsteads on the north bank of the River Aire were either rebuilt or established during 18th century (Sites 32 and 33).

10.3.39 The only other structures of post-medieval and modern date identified within the study area are mills at Newland and Airmyn (Sites 34 and 35), the latter being a post mill that was replaced by a tower mill in the late 19th century (Galloway 1984).

10.3.40 References to Fort Hill (Site 36) are only recorded from the mid-19th century on Ordnance Survey maps, and at the time of the 1838 tithe award survey the area is referred to as Post Hill. The site, which would have commanded the confluence of the Rivers Ouse and Aire, may be post-medieval in date, and it is suggested that the site was extant at the time of the English Civil War and was subsequently demolished later in the 1640s (J Hunter, pers. comm.). The exact location or extent of the fort remains unclear, and there are no existing topographical features to indicate the position of the former site.

10.3.41 Occasional scatters of post-medieval and modern pottery, brick and tile have been identified at a number of locations within the study area, including four

areas within the boundaries of the proposed wind farm. The earliest pottery identified consists of brown glazed coarsewares of 17th-19th century date, of which most is probably of 19th century date (P Didsbury, pers. comm). This is considered to represent material derived from manuring during this period and has not accordingly been listed in **Table 10.1** or plotted on **Figure 12.1, Volume 3**.

10.3.42 The field pattern within the area of the proposed wind farm and elsewhere within the study area appears largely to have been established by the early 19th century, and within the western part of the area by at least the mid-18th century. The majority of the field boundaries within the footprint of the proposed wind farm pre-date 1845 and any surviving associated hedgerows would therefore qualify as "important" with respect to archaeology and history under the terms of the Hedgerow Regulations (1997, as amended 2002). However, no such hedgerows survive within or adjacent to the proposed location of either turbines or access tracks. Although having a limited effect upon the actual field pattern, the most significant change during this period was extensive warping across most of the study area. This involved the deliberate flooding of the fields with sediment held in suspension in river waters, which had the two-fold purpose of covering them with a light, fertile well-drained soil and raising the level of the land above those of the tides and so reduce the impacts of seasonal floods (Van de Noort and Ellis 1999, 95). The majority of the land between the Ouse and the Aire to the east of Drax has been warped, some of it prior to 1860 and the remainder by 1886. This involved establishing compartments defined by man-made banks and then linking these to the rivers with drains. Areas of woodland to the south of Rusholme Grange were also cleared and a number of additional fields demarcated, including some which have subsequently been removed and are now only recorded as cropmarks (SMR 10120). Other cropmark sites of uncertain date (Sites 37 and 38) probably also relate to this period of warping, although the sinuous nature of the former could indicate that it represents the course of an earlier stream channel.

10.3.43 Evidence for warping within the area of the proposed wind farm includes the type of soils, the remains of earthwork embankments and differences in field levels. Existing studies suggest that much of the area of the proposed wind farm site, with the exception of an area in the centre of the site (in the vicinity of turbines 4, 5 and 6), has been warped (BGS 1994, 129; **Figure 12.1, Volume 3**). Borehole data derived from the Humber Wetlands Project indicate a depth of warp in excess of 1m in depth within those parts of the site surveyed (Van de Noort and Ellis 1999, 100-101). In some areas, however, there are thin ploughsoil horizons over sand levée deposits (as at SE 705 263), reflecting the former topography of the area, while the exposed areas of the sand ridge itself have remained more elevated than the surrounding warp deposits. The site inspection survey identified a number of substantial earthwork banks retaining warp deposits, and particularly along field boundaries to the south-east of Rusholme Grange which define the area within the central part of the

site that has not been warped. Within many parts of the study area a number of former field boundaries have been removed during the course of the 20th century and fields amalgamated, although the majority of the principal warping drains and the course of the trackways within the area remain intact or have been only slightly altered.

10.4 IMPACT OF THE WIND FARM

Impacts on Conservation Areas

10.4.1 The Rusholme wind farm proposals would have no direct impacts on the Rawcliffe Conservation Area.

10.4.2 There is significant physical separation (approximately 2.7km) between the Rawcliffe Conservation Area and the wind farm site. Views from the Conservation Area towards the wind farm site are largely interrupted or screened by intervening flood embankments and tree cover established along the meandering River Aire. Buildings and other structures also intervene in views towards the site, including the A645 road bridge that crosses the River Aire on embankment approximately 1.5km to the north of Rawcliffe.

10.4.3 Vistas available along streets and buildings within the Conservation Area including Riverside, Chapel Lane, Bell Lane, the Green and High Street (A614) would not be affected by the wind farm proposal. Neither the Conservation Area nor the seven individual Listed Buildings within it would appear to be located in the same context as the wind farm. It is concluded that there would be no impacts on the historic settings of individual Listed Buildings, or on the overall character of the Rawcliffe Conservation Area.

10.4.4 The Rusholme wind farm proposals would have no direct impacts on the Howden Conservation Area.

10.4.5 There is significant physical separation (approximately 3.4km) between the Howden Conservation Area and the wind farm site. Views from the Conservation Area towards the wind farm site are largely interrupted or screened by intervening urban development within the Buttfield Road and Boothgate housing estates. Other scattered buildings, tree belts, woodland cover established on Asselby Island, and the River Ouse also intervene in views towards the site.

10.4.6 Vistas available along streets and buildings within the Conservation Area including Pinfold Street, Bridgegate, Parson's Lane and Hailgate would not be affected by the wind farm proposal. The Conservation Area and its individual Listed Buildings share an intimate setting that is essentially urban in character and that would not appear to be located in the same context as the wind farm. It is concluded that there would be no impacts on the historic settings of individual Listed Buildings, or on the overall character of the Howden Conservation Area.

Impacts on Listed Buildings

10.4.7 The Rusholme wind farm proposals would have no direct impacts on any Listed Building.

10.4.8 The closest Listed Buildings to the wind farm are located at Airmyn, within the context of other built development within the village. They would be physically and visually separated from the nearest turbine by distance (approximately 0.8-1.1km), by the intervening presence of the River Aire and its associated flood embankments, and by farm buildings at Little Airmyn, on the west bank of the river. Potential views of the proposed turbines from these Listed Buildings are likely to be limited to upper storeys by the flood embankments, and may be further interrupted by intervening tree cover and buildings. Even where opportunities for views occur, there would be no impacts on the settings of individual Listed Buildings in Airmyn.

10.4.9 There would be no impacts on Listed Buildings located in Asselby or in Barmby on the Marsh, where surrounding buildings within the villages provide the settings to these Listed Buildings. Neither would there be any impacts on the Grade I listed Church of St Peter and St Paul in Drax, the setting of which is provided by the church's tree-lined churchyard and by adjacent buildings and trees within the village.

10.4.10 Listed Buildings at Knedlington, including the Grade II* Old Hall, lie within a discrete grouping located on the north side of a minor road. The setting of the Listed Buildings is provided by other (unlisted) buildings within the group, and by associated gardens and yards, defined on the southern side by an old brick wall. Although there would be some views of the wind farm towards the south at a minimum distance of 2.2km, these Listed Buildings would not be seen in the same context as the wind farm and there would be no impacts on their historic settings.

10.4.11 At Newland, the historic setting of the pigeoncote at Manor Farm is provided by other farm buildings and would not be affected by the wind farm proposal. The setting of the Grade II listed Newland Hall includes an adjacent orchard and gardens and may also extend to nearby farm buildings. Although views of the proposed turbines are likely to be experienced from Newland Hall at a minimum distance of 1km, this Listed Building would not be seen in the same context as the wind farm and there would be no impacts on its individual historic setting.

Impacts on Registered Parks and Gardens of Special Historic Interest

10.4.12 The Rusholme wind farm proposals would have no direct impacts on the Carlton Towers Registered Park and Garden of Special Historic Interest.

10.4.13 The setting of Carlton Towers registered park and garden is provided by the village of Carlton itself and by adjacent flat arable farmland. There is significant physical separation (approximately 4.5-5.5km) between Carlton Towers and the wind farm site. Views from the registered parkland towards the site are largely screened by mature tree belts established on the park's boundary; where they do occur, scattered woodlands within open farmland and the A645 road intervene in the view. Neither the registered park and garden, nor the individual Listed Buildings within it, would appear to be located in the same context as the wind farm. There would be no impacts on the historic settings or overall character of the Carlton Towers Registered Park and Garden of Special Historic Interest.

Impacts on Archaeological Remains

10.4.14 The potential direct physical impacts of the construction of the wind farm would relate to the turbine foundations, hardstandings for cranes adjacent to each turbine position, the switchgear building, the site compound and the access tracks between the turbine locations (or existing tracks upgraded). Underground electrical cabling between the turbine positions would be laid adjacent to the proposed access tracks. Excavation for access tracks, hardstandings and the switchgear building would not normally extend below 0.5m in depth. Construction of the turbine bases would either involve excavation to a depth of some 5m for a pad foundation, or if prior geotechnical investigation indicated no load bearing strata at this depth then a piled foundation design would be used. This would involve excavation to a depth of about 1m with an arrangement of 9 to 16 evenly spaced augured piles inserted, upon which a concrete pile cap would be laid.

10.4.15 On the basis of the current evidence the proposed wind farm would have no direct impacts upon any recorded archaeological sites. No archaeological sites are recorded either on the site of, or immediately adjacent to, any of the proposed turbine positions with the exception of the possible drain or former stream channel (Site 37) adjacent to the access track between turbines 2 and 3, and the temporary contractor's compound located to the south of Rusholme Grange (Site 18) and south-west of Birketts House (Site 25). There are no documentary sources to support the identification of a grange or its medieval origin at Rusholme other than the name (see paragraph 10.3.34) although the survival of remains associated with such a site cannot be totally discounted. The compound will not impact upon the recorded location of Birketts House. In addition, no evidence of the former ridge and furrow cultivation recorded both on the proposed site of the contractor's compound and the location of turbine 9 now survives, both areas having been under arable cultivation for some time. Only two possible or probable flint flakes of prehistoric date are recorded within the vicinity of turbine positions (Sites 1 and 2), and such isolated finds are considered to be indicative of background activity rather than specific sites.

10.4.16 Previous borehole surveys undertaken as part of the Humber Wetlands Project have indicated the potential for palaeoenvironmental evidence of Mesolithic to Bronze Age date to survive throughout much of the application boundary at depths of up to 3m below the existing ground level (and at a greater depth adjacent to the River Ouse). Turbine construction would therefore have an impact upon deposits containing ecofactual material, although if a piled foundation design were to be utilised this would have less of a direct impact upon such deposits than a pad foundation design. However, any such impact would not be upon a defined archaeological 'site', but would be limited to a small proportion of a much more extensive environmental resource, the overall integrity of which would remain unaffected by the construction of the wind farm. Given the existing water levels within the proposed development area it is not anticipated that a pad foundation design would have any indirect impact upon surrounding palaeoenvironmental deposits as a result of dewatering, while the indirect impacts of augered piles upon the groundwater would be limited to an area up to 1-2m from the pile location and is therefore considered to be negligible (see **section 5.3**).

10.4.17 The potential for previously unrecorded archaeological remains to be encountered within the area of the proposed turbines and ancillary works has been assessed. It is considered that there is some limited potential for prehistoric and Romano-British remains to be present within the area.

10.4.18 The potential for previously unrecorded archaeological remains of prehistoric date to survive within the area of the proposed wind farm is considered to be linked to the subsurface topography, and in particular the sand levée to the south of the River Ouse to the east of Rusholme Grange. This raised ridge is likely to have been more attractive to earlier settlement than surrounding areas, and the location of the only certain prehistoric flint flake (Site 2) from this area could be regarded as indicative of at least some activity on the ridge during this period. There is accordingly considered a greater potential for turbines located either on or adjacent to the margins of the ridge (and turbine 7 in particular) to have an impact upon previously unrecorded prehistoric remains than within other parts of the application boundary. It is not anticipated that there will be any impact upon the smaller sand ridge to the south as the proposed access track between turbines 4 and 5 is located within an area of warp deposits.

10.4.19 There is considered to be some potential for previously unrecorded archaeological sites of Romano-British date within the proposed site boundaries. Given the recorded location of the Romano-British farmstead (Site 5) at a distance of some 650m and 750m to the west of the nearest turbine positions (turbines 1 and 2 respectively) it is possible that features associated with this site, such as field or enclosure boundaries, may extend towards or into the area of the proposed wind farm.

10.4.20 Despite the masking effects of recent warp deposits the potential for unrecorded remains dating to the medieval and post-medieval periods is considered to be low. Borehole surveys have indicated the varied depth of warp deposits and the level at which palaeoenvironmental information survives, while previous excavations have indicated the depth of archaeological horizons to the west of the area (at a depth of 0.5m and 0.9m below the existing ground level for Site 5 and Site 10 respectively). Archaeological sites have been identified and recorded within the study area both from finds of surface artefacts and aerial photography within areas of known warp deposits, and on this basis the lack of recorded sites within the area of the proposed turbines cannot simply be regarded as being the result of the masking effect of the warp (**Figure 12.1, Volume 3**). Supporting documentary and cartographic sources for the medieval and post-medieval periods would suggest that there is a low potential for significant previously unrecorded archaeological sites of these periods to be affected by the proposed development. Although a turbine is proposed to the north-west of Fort Hill (Site 36), the potential for unrecorded archaeological remains at this location is considered to be low.

10.4.21 The predicted impact upon the setting of archaeological monuments of national importance during the operation of the wind farm would be either negligible or none. The nearest Scheduled Monument to the proposed wind farm is the moated site at Scurff Hall (SM 30117) which is located some 1km to the west of the nearest turbine positions (**Figure 12.2, Volume 3**). The moated platform is located within a larger moated enclosure which forms the immediate setting of the monument. The platform has been partially levelled in order to build the existing hall and the farm buildings to the east. Much of the boundary of the outer enclosure is defined by mature trees that screen or significantly interrupt wider views. As a consequence open views from the site are restricted to those available through a gap in the vegetation that is maintained to enable principal views to the south from the existing 19th century Scurff Hall. Although turbines will generally be visible in views towards the site from the west, the earthwork remains of the moated site do not form a prominent landscape feature in those views and the integrity, appreciation and understanding of the monument would not be compromised. The impact of the proposed wind farm upon Scurff Hall moated site is accordingly considered to be negligible.

10.4.22 The moated site at Castle Hill (SM 30108) is located immediately to the south of Drax at a distance of some 2km to the west of the nearest turbine position. Much of the site and its boundaries are wooded, and as a consequence there are only limited views towards the proposed location of the wind farm. While there may be limited views of some turbine positions from the monument, the physical separation and presence of intervening trees and buildings is such that the integrity, appreciation and understanding of the monument would not be compromised. The impact of the proposed wind farm upon Castle Hill moated site is accordingly considered to be negligible.

10.4.23 Two Scheduled Monuments are located within the Howden Conservation Area; these are the ruined eastern end of Howden Minster (St Peter's Church) (ER116) the Bishop's Manor (ER117). The monuments are situated centrally within Howden and have an urban setting that is provided by other buildings within the Conservation Area, and more widely, by other development in the town. The Scheduled Monuments are separated from the wind farm site by intervening housing estates that form the southern part of the village, by farmland with tree belts, and by the River Ouse, over a distance of 3.4 km. Given this level of separation and intervening development, it is not considered that the Rusholme wind farm would have any impact upon the settings of these monuments.

10.4.24 Further Scheduled Monuments within the wider vicinity of the proposed wind farm include Drax Augustinian Priory (SM 32628) and Hall Garth moated site (SM 30129), located some 3.5km to the north-west and 4.1km to the east of the nearest turbine positions respectively. Given the landscape setting of both sites and the distance from the proposed wind farm it is not considered that there would be any impact upon the setting of either monument.

10.5 MITIGATION

10.5.1 The construction of the proposed turbines and associated access tracks and other infrastructure will have no predicted impacts upon recorded archaeological remains and in relation to such sites it is not considered that any specific mitigation proposals either in advance of or during construction are necessary.

10.5.2 The assessment study has, however, identified areas within the boundaries of the proposed wind farm where there is a potential for construction works (and specifically excavation or piling for the foundation of turbine bases) to encounter previously unrecorded archaeological remains. These areas are the sand levée running eastwards parallel to the River Ouse to the east of Rusholme Grange in the vicinity of the recorded prehistoric flint flake (Site 2) and the area to the east of the Romano-British farmstead (Site 5). A turbine is also proposed within the vicinity of the recorded location of Fort Hill (Site 36) and a temporary contractor's compound to the south of Rusholme Grange (Site 18), although the potential for unrecorded archaeological remains at both locations is considered to be low.

10.5.3 The potential impact upon these areas, and the palaeoenvironmental resource that extends throughout much of the study area, will be dependent to a degree upon the type of turbine foundations utilised during construction, which will not be known until geotechnical investigation of the proposed turbine locations has been undertaken. As a consequence mitigation proposals need to based upon a staged approach which allows for whichever type of foundation design may be utilised, and the consequent variation in the predicted impacts and construction methodologies.

10.5.4 A staged approach to the archaeological mitigation strategy is therefore proposed in order to further evaluate the potential for unrecorded archaeological remains within the identified areas of potential as well as other areas of the development. This will consist of trial trenching at the proposed locations of turbines 1, 2, 5, 7 and 12 as well as at the proposed location of the temporary contractor's compound. The trenches would also establish the potential for warp deposits to obscure previously unrecorded archaeological remains. The excavations would be linked to the proposed geotechnical ground investigations should this be feasible, and would also involve both a geoarchaeological and palaeoenvironmental assessment of any sealed palaeoenvironmental deposits encountered within the trenches.

10.5.5 Dependent upon the results of the initial trial trenching investigation, a strategy to mitigate the potential impact of construction works upon previously unrecorded archaeological remains and palaeoenvironmental deposits would be finalised. As a minimum requirement, however, any deeper excavations for turbine bases should be monitored (a 'watching brief') by a geoarchaeologist in order that information obtained can be used to supplement previous palaeoenvironmental surveys undertaken within the area of the proposed wind farm by the Humber Wetlands Project.

10.5.6 An outline methodology statement indicating the scale and scope of both the proposed trial trenching and any subsequent archaeological watching brief (or any additional mitigation measures) is included in **Appendix 15** and has been agreed with the Heritage Unit of North Yorkshire County Council (archaeological advisors to Selby District Council).

10.6 SUMMARY AND CONCLUSIONS

10.6.1 There would be no impacts on the character or appearance of Rawcliffe Conservation Area, the closest designated area to the site, nor to the Howden Conservation Area, located 3.4km to the north-east of the wind farm.

10.6.2 At Rawcliffe, there is significant physical and visual separation (approximately 2.7km) between the town and the proposed wind farm, and views from the Conservation Area towards the site are largely interrupted or screened. Vistas available along streets and buildings within the Conservation Area would be unaffected by the proposal. There would be no impacts on the historic settings of the seven individual Listed Buildings of the Rawcliffe Conservation Area, nor on its overall character.

10.6.3 At Howden the physical and visual separation between the Conservation Area and the proposed wind farm is greater (3.4km), and views from the Conservation Area towards the site are largely interrupted or screened by intervening development and tree cover. Vistas available along streets and buildings within the Conservation Area would be unaffected by the proposal. There would be no impacts on the historic settings of the individual Listed

Buildings located in the Howden Conservation Area, nor on its overall character.

10.6.4 No Listed Buildings are located within the wind farm site. There will therefore be no direct impacts on Listed Buildings.

10.6.5 The nearest Listed Buildings are located at Airmyn. Their setting is provided by the village itself in its location on the banks of the River Aire. Although the wind turbines may be visible in some views from Listed Buildings, their physical separation from the wind farm, and the intervening presence of the river Aire and its flood embankments and of farm buildings at Little Airmyn means that no impacts on the historic settings of individual Listed Buildings would occur.

10.6.6 Neither would there be any impacts on the settings of individual listed buildings located at a rather greater distance from the wind farm site in Barmby on the Marsh, Asselby, Knedlington and Newland, or on the Grade I listed church in Drax.

10.6.7 No Registered Parks and Gardens of Special Historic Interest are located within the wind farm site. Carlton Towers, the closest registered site to the proposed wind farm, enjoys a setting provided by the village of Carlton itself and by adjacent flat arable farmland, and is physically and visually separated from the wind farm by 4.5km of arable farmland. There would be no impacts on the setting or character of the Carlton Towers Registered Park and Garden of Special Historic Interest.

10.6.8 The nearest Scheduled Monuments to the proposed wind farm are the medieval moated sites at Scurff Hall and Castle Hill, at a distance of 1km and 2km to the west of the wind farm respectively. Given the existing nature of these monuments and their immediate landscape settings it is considered that the impact of the wind farm upon their settings would be negligible.

10.6.9 No recorded archaeological sites of finds of prehistoric, Romano-British, medieval or post-medieval date will be affected by the construction of the proposed wind farm.

10.6.10 The potential for previously unrecorded archaeological remains to be encountered during construction is considered largely to be limited to sites or finds of prehistoric date, and particularly to turbines on or adjacent to the sand ridge to the east of Rusholme Grange. Areas of lesser potential include the turbines to the east of a Romano-British farmstead and in the vicinity of Fort Hill, a possible Civil War structure.

10.6.11 In addition to archaeological sites, previous borehole surveys have demonstrated the potential for deposits of Mesolithic to Bronze Age date

containing ecofactual material and palaeoenvironmental information to be sealed beneath alluvial and warp deposits throughout much of the application boundary. Any impacts upon these deposits would be dependent upon the foundation design used for the construction of the turbine bases, but would be limited in extent and affect only a small proportion of an extensive resource.

10.6.12 As the proposed turbine foundation design has yet to be established, a staged programme of mitigation is proposed which will allow further evaluation of selected turbine locations by means of archaeological trial trenching based upon the results of the assessment study. The evaluation would include a geoarchaeological and palaeoenvironmental assessment of the subsurface deposits. The results of the evaluation will allow a more detailed mitigation strategy to be formulated in conjunction with the planning authority which relates both to any identified impacts and the preferred construction methodology.

10.7 REFERENCES

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1773 Enclosure Plan of the Township and Parish of Drax (Brynmor Jones Library, University of Hull DDJ 16/9)
1833 The Plan of Scurff Hall Estate in the Township of Newland and Parish of Drax in the West Riding of the County of York belonging to the Viscount Downe (NYCRO ZDS M 4/12)
1838 A Plan of the Parish of Drax comprising the Townships of Newland, Drax with Newhay, Long Drax and Camblesforth in the West Riding of the County of York (BIHR TA 56 L)
1856 Ordnance Survey First Edition 6" map Yorkshire Sheet 237
1907 Ordnance Survey Second Edition 25" map of Yorkshire sheets 237/6, 237/7 and 237/10

Aerial Photographs (Verticals and Obliques)

14.06.67 Meridian Airmaps Ltd. West Riding Area 3 – 59 67 082 and 59 67 135
07.05.75 NMR SE 7025/1/12, SE 7025/1/13 and SE 7025/1/18
21.09.84 AJC 031/05-06
30.07.85 AJC 050/20-23
25.04.87 AJC 106/07-08

11 NOISE

11.1 INTRODUCTION

11.1.1 ACIA was commissioned by Wind Prospect Developments Ltd to undertake a survey of ambient noise around the site of the proposed wind turbine development at Rusholme, North Yorkshire, near Drax Power Station. The levels of noise likely to occur at local residential properties as a result of the operation of the turbines could then be calculated, and the environmental implications considered.

11.1.2 The results are assessed against the guidelines available for wind farm developments, including the DETR documents PPG22 draft PPS22 and PPG24, and especially the ETSU-R-97 report *The Assessment and Rating of Noise from Wind Farms*, specifically designed for the purpose.

11.2 SURVEY DETAILS

Dates and times

11.2.1 Automatic noise monitoring took place for various periods at three locations near the site, from 19:40h on Saturday 5 July 2003 until 10:30h on Saturday 19 July 2003. Wind data was obtained from a temporary 10m high meteorological mast located centrally on the turbine site in accordance with ETSU-R-97 recommendations.

Instrumentation

11.2.2 The instruments used for automatic noise monitoring were Rion NL-31 data logging sound level meters, each fitted with a type UC-53A condenser microphone and a shower-proof outdoor windshield assembly. The microphones were mounted on robust stands at a height of 1.2 metres above ground. The sound level meters were powered by high-capacity external battery packs, all were housed in sealed weatherproof cases to prevent tampering. Ambient noise levels expressed in the form of 10 minute L_{A90} (correctly $L_{A90,10min}$) values dB were recorded continuously 24 hours a day throughout the survey period. The results were downloaded to a desktop PC at the end of the survey.

11.2.3 Calibration of the instruments was checked before and after the measurements using an appropriate electronic calibrator. No significant drift was observed. All instrumentation had been subject to laboratory calibration traceable to national standards within the last 12 months.

11.2.4 Wind data was collected from the temporary meteorological mast (anemometer and weather vane) which was set up on land belonging to Pease Farm. The information was downloaded and collated with the noise data from

the automatic noise monitors, with any data obviously corrupted by rainfall or other outside influences being discarded. In practice this means that data points for which the ambient noise levels were in excess of 40dBA with a wind speed of below 8ms^{-1} were disregarded.

Measurement locations

11.2.5 The locations used for measurement and noise predictions are shown in **Table 11.1**, together with the identification number of the nearest proposed turbine in each case, and its distance from the location. The measurement and noise prediction locations can be seen in **Figure 2, Volume 3**.

Table 11.1: Separation distances for noise monitoring and prediction locations

Property	Noise monitoring ?	Nearest turbine	Separation distance, m
Pease Farm	✓	T12	870
Lodge Farm	✓	T6	740
Rusholme Grange	✓	T4	550
Rusholme Hall	×	T2	860
Airmyn village, north end	×	T12	830
Airmyn village, SW end	×	T12	1170
houses on Little Airmyn Lane	×	T3	820
Newland Hall	×	T1	1100

Results of background noise survey

11.2.6 The results of the automatic monitoring of noise and wind speed are presented graphically in the appendices. **Graphs 1.1 to 1.3 in Appendix 17** shows noise level and wind speed histories for each of the locations monitored. Data regarded as doubtful because of rainfall or other extraneous noise is included in the time histories, but discarded thereafter as recommended by ETSU-R-97, see **Appendix 16 Noise Assessment Criteria**. It can be seen that the measured noise levels were dependant on the wind speed.

11.2.7 **Graphs 2.1 to 2.3 and Graphs 3.1 to 3.3 in Appendix 17** show scatter plots for each location for both the day and night, with noise levels plotted against wind speed, and doubtful data removed. The best-fit curve is superimposed on the data in each case in order to derive the typical wind-dependant background noise levels as recommended by ETSU.

- At Pease Farm, the trend line for quiet daytime background noise levels varied from 42dB $L_{A90,10min}$ at a wind speed of 4ms^{-1} towards 48dB at 10ms^{-1}. Noise levels at this location were dominated by what was

thought to be industrial noise from a site across the River Aire. This was later discovered to be a generator operating temporary traffic lights at road works in Airmyn.

- At Lodge Farm the trend line for quiet daytime background noise levels varied from 36dB $L_{A90,10min}$ at a wind speed of 4ms^{-1} to 45dB at 10ms^{-1}.

- At Rusholme Grange the trend line for quiet daytime background noise levels varied from 37dB $L_{A90,10min}$ at a wind speed of 4ms^{-1} to 44dB at 10ms^{-1}.

11.2.8 At the other locations used for noise predictions, but for which there is no specific background data, the typical background noise at an appropriate survey location was substituted as follows. Rusholme Grange noise data was used for Rusholme Hall. Pease Farm data was judged appropriate for all locations in Airmyn village, and individual noise prediction points towards the north and south ends of the village were adopted. However, because of the presence of the temporary traffic lights generator, which was clearly affecting the measured noise levels, it was decided to use background data from Lodge Farm as this was more likely to be truly representative in the absence of the generator. Lodge Farm noise data was also used for Newland Hall and Little Airmyn Lane, both of which locations represented a number of residential properties in the vicinity.

Weather during the survey period

11.2.9 The three noise surveys began in the early evening of Saturday 5 July 2003. The meters had already been set up, but wind speed data was unavailable until that time. There were some windy days and occasional rainfall: the wind speeds ranged from zero to 16 ms^{-1}. Based on the data for this period the prevailing wind direction is westerly to south-westerly, the wind being in those sectors for 43% of the time. There were also significant easterly winds, 15% of the data samples being in that sector.

11.3 ASSESSMENT PROCEDURE

Characteristics of wind turbine noise

11.3.1 Noise from wind turbines is typically made up of three distinct elements: a reasonably steady, broad-band noise of aerodynamic origin, which depends on blade tip speed; a tonal noise element from mechanical components within the nacelle; and a regular, pulsed element resulting from the interaction of blade and tower.

Turbine noise data

Certified sound power data

11.3.2 It is Wind Prospect's intention to use twelve Vestas V80 (or similar) wind turbines at this site. The Vestas V80 is a pitch-regulated upwind wind turbine with active yaw and a three-blade rotor 80m in diameter. The hub height can be 60m, 67m, 78m or 100m above ground level, but this project will have 60m high hubs. The swept area of the blades is 5027m^2 and the rotor is governed to a maximum of 19rev/min. Its cut-in wind speed is 4ms^{-1}, nominal speed is 16.7ms^{-1}, and the blades stop moving once wind speeds reach 25ms^{-1}. The turbine generator is rated at 2.0MW.

11.3.3 The base data for the wind turbine was taken from actual measurements conducted (by others) on a production prototype on behalf of Vestas. The method used to obtain sound power data conformed with International Energy Agency (IEA) recommended practice, the most commonly used procedure, which calls for measurements close enough to the turbine that background noise is insignificant. Spherical sound radiation was assumed, as the microphone used for the measurements was relatively close to the turbine, in accordance with the method.

11.3.4 The design of the Vestas V80 turbine and its control software makes it possible to change the machine's operating parameters, thus programming its sound emissions characteristics before installation. The sound output can be varied by adjusting the speed of revolution and the pitch angle of the turbine blades.

11.3.5 The Vestas V80 wind turbines can be configured for a maximum overall sound power level of 105dBA at the reference wind speed of 8ms^{-1}. The sound power depends on wind speed and the rate of change (dB per ms^{-1}) varies between wind speeds. At wind speeds below 6ms^{-1}, the noise from the turbine is designed to drop at a greater rate so as to allow for low background levels in rural areas. Between 6 and 10 ms^{-1} the rate of change is small and above 10ms^{-1} the rate increases, as the background noise levels with winds over that speed are usually sufficiently elevated that turbine noise is well masked.

11.3.6 The turbine has a directivity index of 0dB in all directions, so the noise source itself has no significant directional characteristics. Based on the test data it was determined that this turbine does not have tonal noise components which would warrant a tonal penalty as described in ETSU-R-97.

Calculation procedure

11.3.7 The method adopted for the prediction of noise from the wind farm was the IEA method supplemented with air absorption data extracted from the EEMUA 140 guidance. The model assumes hemispherical sound radiation with no significant attenuation by ground effects, as is customary for a receiver in the acoustic far-field of an elevated sound source. Air absorption varies with frequency and distance, and the predictions are carried out in octave bands.

11.3.8 In order to calculate the steady noise from the proposed site the combined effect of 12 wind turbines at each monitoring location is calculated. ETSU-R-97 guidance suggests that the steady nature of the noise emitted by wind turbines is such that the level difference between L_{Aeq} and L_{A90} is typically 2dB. This is confirmed by readings from several wind farms in various types of terrain. A 2dB deduction was therefore made from the sound power level to yield the typical L_{A90} for calculation purposes.

Effect of wind direction

11.3.9 The direction of the wind makes the noise from the turbines effectively directional since downwind, the noise from the wind farm will appear to increase with wind speed, and upwind, the noise will be attenuated with increasing wind speed. To take this effect into account, an additional computation is made to assess the attenuation values for eight sectors of the compass at various distances. The measurements made during the certification noise tests were made downwind of the turbine, so a cross-wind would give an attenuation which also depends on the distance from the source, and at an upwind location, double this attenuation would apply. The values used in the calculation procedures originate from CONCAWE 4/81, which investigates the propagation of noise up to 2km by comparing experimental data with theoretical sound propagation models. However it must be noted that the attenuation due to wind direction is also affected by air temperature and the topography of the area, so the actual effect of wind direction may be subject to a small variation.

Noise limits

11.3.10 No planning conditions with regards to noise limits have yet been agreed for this proposed development. ETSU-R-97 suggests that noise from wind farm developments in terms of the 10 minute L_{A90} index should be limited to 5dB above background (also $L_{A90,10min}$) during the period 07:00h to 23:00h, with the background noise level being determined from the 'quiet daytime' periods only. This is subject to the further qualification that if the background level plus 5dB is less than 35dB, then the limit is a flat 35dB. This is typically the case at lower wind speeds.

11.3.11 The ETSU-R-97 guidance discusses the need for a night-time noise limit for wind turbine developments. For conventional industrial noise sources, the small hours of the night are the time when the potential for noise nuisance is at its maximum, because the background noise is at its minimum. Night-time noise limits are therefore usually more stringent. The premise does not apply to a wind turbine: these machines only operate when the wind is blowing, and the background noise even at night can never be at its minimum under such conditions. Moreover, the greatest potential for noise annoyance occurs when

residents are outdoors, as would be expected during summer evenings and at weekends.

11.3.12 ETSU-R-97 suggests a limit no lower than 43dB $L_{A90,10min}$, between 23:00h and 07:00h. At night, residents are indoors and higher levels of external noise would be acceptable. At levels of around 43dB, L_{A90}, the noise from the turbines will be sufficiently attenuated by the building envelope to reduce the levels to less than 30dB, even through an open window. The latest World Health Organisation guidelines suggest that levels of 30dB or less in a bedroom do not give rise to sleep disturbance.

11.3.13 It should be noted that this does not mean that noise levels will increase at night, as the turbines will operate with exactly the same control parameters at all times. A recent planning consent for a wind turbine development in the Fens limited the night-time noise emissions to a flat 38dB L_{A90}.

11.4 PREDICTIONS

Results

11.4.1 The predicted worst-case noise levels for each of the three monitoring locations are presented graphically in **Appendix 17** (Graphs 4.1 to 4.8 and 5.1 to 5.8). For the properties local to the proposed location of the wind farm where monitoring did not take place, estimates of the existing daytime and night-time background levels were made based on the average noise levels measured at nearby locations. The results of the calculations for the daytime are summarised in Table 2.

Table 11.2: Worst-case noise levels L_{A90} dB at different wind speeds, daytime

location, wind speed ms^{-1}	background	turbines	Difference	below limit?
Pease Farm				
4	36.1	26.7	-9.4	✓
5	38.0	31.9	-6.1	✓
6	39.7	33.9	-5.8	✓
8	42.4	35.4	-7.0	✓
10	44.6	37.3	-7.3	✓
Lodge Farm				
4	36.1	30.4	-5.7	✓
5	38.0	35.6	-2.4	✓
6	39.7	37.6	-2.1	✓
8	42.4	39.1	-3.3	✓
10	44.6	41.0	-3.6	✓
Rusholme Grange				
4	36.9	33.3	-3.6	✓
5	38.6	38.5	-0.1	✓
6	40.0	40.5	0.5	*
8	42.4	42.0	-0.4	✓
10	44.3	43.9	-0.4	✓
Rusholme Hall				

	4	36.9	28.2	-8.7	✓
	5	38.6	33.4	-5.2	✓
	6	40.0	35.4	-4.6	✓
	8	42.4	36.9	-5.5	✓
	10	44.3	38.8	-5.5	✓
Airmyn (north end)					
	4	36.1	27.6	-8.5	✓
	5	38.0	32.8	-5.2	✓
	6	39.7	34.8	-4.9	✓
	8	42.4	36.3	-6.1	✓
	10	44.6	38.2	-6.4	✓
Airmyn (south end)					
	4	36.1	26.4	-9.7	✓
	5	38.0	31.6	-6.4	✓
	6	39.7	33.6	-6.1	✓
	8	42.4	35.1	-7.3	✓
	10	44.6	37.0	-7.6	✓
Little Airmyn Lane					
	4	36.1	29.3	-6.8	✓
	5	38.0	34.5	-3.5	✓
	6	39.7	36.5	-3.2	✓
	8	42.4	38.0	-4.4	✓
	10	44.6	39.9	-4.7	✓
Newland Hall					
	4	36.1	26.2	-9.9	✓
	5	38.0	31.4	-6.6	✓
	6	39.7	33.4	-6.3	✓
	8	42.4	34.9	-7.5	✓
	10	44.6	36.8	-7.8	✓

*ETSU-R-97 says that turbine noise up to 43dB is likely to acceptable at locations occupied by those with a financial interest in the wind farm.

Noise limits

Daytime limits

11.4.2 It can be seen from Table 2 that at some locations the noise of the turbines will in the worst case be at a level approaching the existing background noise trendline, meaning that from time to time they may just be audible. However, the ETSU recommendation limiting $L_{A90,10min}$ values to no more than 35dB or 5dB above background noise, whichever is the greater, during 'quiet daytime' hours would be achievable at all residential locations.

Night-time limits

11.4.3 The noise levels from the turbines will in most cases be substantially below the minimum recommended noise limit of 43dB, $L_{A90,10min}$ in the ETSU report. The exception is Rusholme Grange, where according to ETSU-R-97 the noise here may be marginal at higher wind speeds, the maximum of 43dB L_{A90}, can just be achieved.

11.5 CONCLUSIONS

11.5.1 The wind speed dependent noise levels predicted at the properties nearest the proposed wind farm site are comparable with the existing background levels at the same wind speed. Noise from the turbines at houses will remain within the 'flat' limit of 35dB, or 5dB above the background levels, whichever is the greater.

11.5.2 The Vestas V80 machines currently proposed are the latest generation of wind turbines from a well-established company. They are electrically and aerodynamically very efficient, and are constructed with noise emissions in mind. The improvements introduced over the years have led to a highly developed design with minimum acoustic impact.

11.5.3 The ETSU recommendation for limiting noise from wind farms, which would restrict the noise emissions in terms of $L_{A90,10min}$ values to no more than 5dB above the quiet daytime background, could be met by the proposed site design.

11.5.4 Noise from the operational wind farm would not be detrimental to the amenity of local residents.

12 ELECTRO-MAGNETIC SIGNALS AND AVIATION

12.1 INTRODUCTION

12.1.1 Microwave and other electromagnetic signals are transmitted throughout the country by a wide range of operators, including both statutory agencies and commercial companies. There is potential for interference to the transmission of these signals from any large structure, including wind turbines, which may be developed close to the signal path. This section describes the existing situation with regard to the proposed Rusholme site, potential interference effects and possible mitigation measures.

12.2 EXISTING SITUATION

12.2.1 In order to establish the location and nature of microwave, broadcast and other radio links in the vicinity of the site, the following bodies and operators have been consulted and their observations are summarised in **Table 12.1** below.

Table 12.1: Observations and comments on EMI consultation responses

Consultee	Observation	Response Date
Civilian and Military Air Safety		
Ministry of Defence – Defence Estates	No objections to proposal. Ref:D/DE/43/10/1/Y	19/02/2003
Civil Aviation Authority	No objections to proposal.	19/12/2003
NATS	No objections to proposal.	24/7/2002
Finningley Airport	Finningley airport safeguarding footprint extends around a 30km radius. The proposal is within this area. The proposal is not within 10° of the flight path and therefore does not pose a major threat on air safety. Still awaiting a formal response.	8/9/2003 23/3/2004
Television Reception		
ntl	Predict that no re-broadcast link or super high frequency link will be affected.	14/08/2003
Independent Television Commission (ITC)	ITC is responsible for the protection of domestic TV reception in this area. It may be possible that Belmont viewers in the area could experience reflection from any of the turbines and a more detailed study is required.	24/7/2002
Crown Castle International	Letter forwarded to ntl	22/7/2002
Telecommunication Links		
Radiocommunications Agency	Identified five links that could be	8/8/2002

	affected. Link operators were consulted and results are discussed in **section 12.3**	
Yorkshire Electricity Distribution Limited	Operator for RA Link 26674. Requires 150m separation distance between line of site and wind turbines.	20/9/2002 - 04/06/2003
Atkins Telecoms	Development would not impact on any Cable & Wireless links and therefore would not raise any objection	3/10/2002
Home Office	No objections to proposal	16/10/2002
Maritime and Coastguard Agency	No objections to proposal	25/7/2002
Trinity House Lighthouse Service	No objection, as installation would be sufficient distance from stations	26/7/2003

12.2.2 ITC has a watching brief to protect television services in this area and ntl acts for ITC in some of these matters.

12.2.3 In this area television viewers will most likely be using the Emley Moor or Belmont transmitters.

12.2.4 The Radiocommunications Agency identified five telecommunication links in the vicinity of the wind farm. These operators were consulted and only link number 26674 crosses the site; it is operated by Yorkshire Electricity Distribution Limited.

12.3 POTENTIAL IMPACTS

12.3.1 No objections were raised to the development on the basis of military and civilian air safety.

12.3.2 ntl, have confirmed that they predict no problems of interference with re-broadcasting links (RBL) or super high frequency links (SHF).

12.3.3 ITC consider that there is some risk of interference to viewers in the local area using the Elmley Moor and Belmont transmitters.

12.3.4 Telecommunications link number 26674 crosses the site; a clearance zone of 150m radius is required from the line of sight of the link to the wind turbines to ensure that there is no interruption to the services.

12.4 MITIGATION

12.4.1 As is usual with wind farm planning applications, Wind Prospect is prepared to remedy any interference to domestic TV or radio reception should it occur.

12.4.2 The wind turbines have been placed 150m away from the line of sight of link 26674.

12.5 SUMMARY

12.5.1 There is a possibility of degradation of TV signals in the immediate vicinity of the site. In view of this potential risk, Wind Prospect is prepared to resolve any such problems should they arise as a result of construction of the wind farm.

12.5.2 No impacts on microwave signals would occur.

13 SOCIO-ECONOMIC ISSUES

13.1 INTRODUCTION

13.1.1 Selby is the southern most district in the predominately rural county of North Yorkshire. The local economy has relied heavily on power generation from coal and agriculture, both of which has experienced recent uncertainty.

13.1.2 This section examines the contribution that the proposed wind farm could make, both directly and indirectly, towards the economic and social well-being of the local community.

13.2 POTENTIAL IMPACTS

13.2.1 The development of this project would have a number of socio-economic impacts within the local area during both the construction and subsequent operation of the wind farm. These would be all beneficial, and include:

Opportunities to Participate

13.2.2 It is proposed that local residents would be able to invest in the project through an independent company. The shares are to be offered under arrangements developed by Wind Prospect. Priority would be given to people living in the parishes surrounding the wind farm.

Enhanced agricultural viability

13.2.3 Wind farms are a form of farm diversification that would provide a valuable guaranteed rental income for the landowners and their tenants for the duration of the life of the wind turbines, thus increasing the viability of the farming unit. Apart from the small amount of land occupied by access tracks, the turbine towers and ancillary equipment, the land would continue to be fully available for agricultural use.

Local investment and employment opportunities

13.2.4 Wind Prospect intends to place as much of the construction work as possible in the local area. Suitable local civil and electrical contractors would be identified. Their involvement in maintenance operations could continue throughout the operational life of the wind farm.

13.2.5 It is estimated that contracts worth approximately £3,000,000 would be placed with local companies.

Income to the Local Authority

13.2.6 The development would additionally pay rates according to the national formula for wind generating plant.

Diversification of Power Generation

13.2.7 Selby has traditionally relied heavily on power generation from coal and is already home to project ARBRE, the first willow burning power station in the UK. This proposal will further complement the districts power generation portfolio in line with current government thinking.

Educational Benefits

13.2.8 The wind farm would be of potential benefit as an educational resource for local schools and interest groups. Other wind farms have already proved to be of considerable educational value to schools in the study of technology, sustainability and the broader issues of our influence on the environment.

13.3 SUMMARY AND CONCLUSIONS

13.3.1 The economy of the local area, which generally relies on a combination power generation from coal and agriculture, has experienced recent uncertainty.

13.3.2 The development of the proposed wind farm would be consistent with this policy, and would result in a number of socio-economic effects on the local economy, which would be largely beneficial. These include:

- Opportunity to participate in the projects through investment.
- Enhanced agricultural viability of farms through rental income from the wind farm.
- Local employment and contracts in both the construction of the wind farm and in its subsequent maintenance, which would be to the value of approximately £3,500,000.
- Income to the local authority through liability for rates.
- Diversification in power generation
- Benefits of the wind farm as an educational resource for local schools.

14 PLANNING POLICY CONTEXT

14.1 INTRODUCTION

14.1.1 The planning policy context under which proposals for the establishment of renewable sources are to be considered is set at National level (in England) by Planning Policy Guidance Note 22 entitled "Renewable Energy". Regional Planning Guidance for Yorkshire and the Humber exists in the form of RPG12. At local level policy is set out by the North Yorkshire County Structure Plan and Selby District Local Plan.

14.1.2 Section 54A of the Town and Country Planning Act 1990 (as amended) places a duty on local planning authorities to make decisions in accord with planning policies forming part of an approved development plan unless material considerations indicate otherwise. The weight to be ascribed to other planning policy guidance may vary according to the status of that advice.

14.1.3 In addition to the principal elements of planning policy other advice contained in Planning Policy Guidance Notes may be of relevance to the submitted proposal. This includes:

- PPG1 General Policy and Principles
- PPG7 The Countryside - Environmental Quality and Economic and Social Development
- PPG8 Telecommunications
- PPG9 Nature Conservation
- PPG15 Planning and the Historic Environment
- PPG16 Archaeology and Planning
- PPG21 Tourism
- PPG24 Planning and Noise

14.1.4 Emerging replacement national policy statements (PPS) may also be material considerations and carry weight in determination of applications for planning permission.

14.2 NATIONAL PLANNING GUIDANCE

14.2.1 The principal source of planning policy guidance relating to renewable energy schemes in England is PPG22 issued in 1993. New guidance to replace PPG22 has recently been published in Draft Planning Policy Statement 22.

14.2.2 PPS22 is entitled 'Renewable Energy'. It was subject to consultation until January 2004. Until such time as the replacement document becomes formal planning policy the existing PPG is relevant to determination of a planning

application in the context of more recent government policy (see below). The proposed replacement document will, however, carry weight in determination of the proposed development.

14.2.3 PPG22 is supportive of renewable energy schemes in the context of current European and National intentions to reduce greenhouse gases. An annex to the PPG provides detailed guidance about the technology of harnessing wind energy to help in forming policies within development plans and in the framework of development control.

14.2.4 PPS2 has been produced, as the Government believes there remains a strong requirement for a distinct set of national planning policies that address the particular circumstances of renewable energy. However, it considers that a considerable amount of the material in PPG22, particularly in its annexes, is out of date and/or inappropriate for a shorter, focused statement of national planning policy.

14.2.5 The scope of PPS 22 is limited to consideration of planning issues relating to renewable energy projects. A companion guide is to be produced to accompany the PPS. This will include a technical annex, which gives more details about particular technologies, as well as including a range of good practice guidance on planning and renewable energy.

14.2.6 The overriding policy commitment is "*that the UK should put itself on a path towards a reduction in carbon dioxide emissions of some 60% from current levels by about 2050*". In order to achieve this renewables "*need by then to be contributing at least 30% to 40% of our electricity generation and possibly more*". In 2000 renewables supplied only 1.3% of our electricity

14.2.7 The objective of PPS22 is to provide a clear, up to date Statement of national Planning Policy for renewable energy in England; to ensure that the planning system plays its part in delivering Government policy on energy as set out in the Energy White Paper published in February 2003 entitled "Our Energy Future – Creating a Low Carbon Economy".

14.2.8 Many of the policies in draft PPS22 are based on policies in PPG22, updated as appropriate. However, there is a clearer focus on assisting the UK to meet national and international targets for the reduction of emissions of greenhouse gases, including the goal to cut the UK's carbon dioxide emissions by some 60% by 2050, with real progress by 2020. There are also new policies proposed on the use of regional targets for renewable energy, buffer zones, and an emphasis on clear, criteria based policies for use in regional planning guidance and development plans.

14.2.9 Planning Policy Guidance Note 1 (PPG1), "General Policy and Principles" emphasises the Government's commitment to the concept of sustainable

development. PPG1 links the role of the planning system in regulating the use of land in the public interest to the achievement of sustainable development, *".by helping to provide for necessary development in locations which do not compromise the ability of future generations to meet their needs".*

14.2.10 In the present case it is particularly relevant since:-

- Power from wind turbines helps reduce the production of harmful greenhouse gases;
- Wind turbine developments do not themselves produce harmful emissions;
- Wind turbine developments do not sterilise valuable land reserves;
- Following completion, wind turbine developments create very little traffic;
- Wind turbine developments have relatively minor effects on wildlife and ecology;
- Land taken for wind turbine developments may revert back to previous use(s) at any time without any adverse effects on productivity and land quality.

14.2.11 Government policy is to stimulate the exploitation and development of renewable energy sources wherever they have the prospects of being economically attractive and environmentally acceptable, in the interests of sustainable development.

14.3 REGIONAL PLANNING GUIDANCE

14.3.1 The Government published Regional Planning Guidance for Yorkshire and the Humber in the form of RPG12 in October 2001. It is for the period to 2016 and revised the RPG adopted in 1995 which provided a framework for strategic planning in the region to 2006.

14.3.2 The RPG provides a regional spatial strategy for the preparation of development plans and local transport plans. However, it is also intended to guide the preparation of other relevant strategies with land-use implications including, among other things, the plans of infrastructure and service providers.

14.3.3 The current RPG12 identifies a number of topics where there is likely to be a need to build on the policy framework within the context of the overall spatial strategy set out in the current document. One of these is for additional locational guidance in relation to renewable energy schemes.

14.3.4 Although in general the RPG was prepared in line with guidance in PPG11, "Regional Planning", it was acknowledged that further work would be needed to make it more regionally specific in some policy areas and an early review

would be required. This resulted in a draft revised RPG published as a public consultation document in June 2003 (see below).

14.3.5 The current RPG12 contains policies relevant to the determination of a renewable energy development proposal. It confirms the Government's target of 10% electricity production from renewable energy sources by 2010.

14.3.6 Policy S5 of RPG12 is concerned with the "Wise use of n-renewable resources". It contains specific reference to energy generation from renewable resources. *Local authorities should:-*

a) Include policies and proposals in their development plans to assist the achievement of the UK's legally binding target to reduce greenhouse gas emissions by 12.5% below 1990 levels over the period 2008-2012 and move towards the domestic goal of a 20% cut in carbon dioxide emissions below 1990 levels by 2010, and to achieve at least 10% of energy generation from renewable resources by the same date by applying the policies in Policy R6.

RPG12 goes on to state;
"Renewable energy can play a substantial part in reducing greenhouse gas emissions as well as contributing to the regional economy. The Lancashire and Yorkshire Renewable Energy Study showed that there is considerable scope for the development of renewable sources of energy in the region. This will be the subject of further research to feed into the next review of RPG. The Regional Sustainable Development Framework identifies the need to develop a sustainable integrated energy strategy to cover renewable energy, provide demonstration projects and evaluate the potential contributions of energy crops, waste as fuel, integration of renewable energy into developments, combined heat and power (CHP) and good practice on clean coal technology."

14.3.7 The revised Draft RPG12 was issued for public consultation between July and September 2003. Public examination is anticipated in early 2004 with the Government aim of issuing the revised document in December 2004.

14.3.8 In the revised draft the policy on energy generation, transmission and supply (Policy R6) has been given greater emphasis, and has been bolstered by the intended introduction of policies concerned with climate change and the sustainable use of physical resources. The proposed RPG also introduces specific targets for the production of energy from renewable energy sources.

14.3.9 Policy R6 of the current RPG is proposed to be revised such that it introduces specific targets for the amount of energy to be secured from renewable sources by 2010. In the case of North Yorkshire the target is 183MW of capacity.

14.3.10 It also seeks to "maximize" the use of renewable resources and introduces additional policies concerned with Climate Change and the Sustainable Use of Physical Resources. These place considerable emphasis on LPA's to include policies and proposals in development plans to achieve a regional generation

target of at least 9.4% of energy consumption from renewable resources by 2010 and 22.5% by 2020, by applying the policies in Policy R6.

14.4 LOCAL PLANNING GUIDANCE

The Structure Plan

14.4.1 North Yorkshire Structure Plan (SP) was approved by the Secretary of State for the Environment in November 1980.

14.4.2 There have been three statutory Alterations to the original 1980 SP; Alteration No.1, January 1987; Alteration No.2, August 1989, and; Alteration No.3 in October 1995. As a result of the final Alteration the SP is intended to cover the period to 2006.

14.4.3 The current document is effectively a series of policies with no written justification other than contained in the letters of approval issued by the Department of Environment and Transport. It contains no policies directly concerned with, and few related to, a renewable energy development scheme outside areas of acknowledged importance, e.g. Green Belts. Those related policies only refer to the protection of agricultural land, (Policies A1, A2, and A3)

14.4.4 A full scale review of the Plan was being prepared jointly with the City of York Council and the North York Moors and Yorkshire Dales National Park Authorities to roll the Plan period forward to a new end date of 2016. The Pre-Deposit Consultation Draft of the replacement SP was published in January 2003 with a view to the SP being placed on formal deposit in early 2004. However, due to the intended changes to the development plan system further work on the production of a replacement SP has now been shelved.

Selby District Local Plan

14.4.5 Selby District Council adopted the Rural Areas Development Plan (RADP) in 1990. This was subject to a formal Alteration in 1993 and intended to guide development in part of the district up to 1996. Despite its age it still forms the adopted basis for development control decisions in the area where it is proposed to construct the Rusholme Wind Farm.

14.4.6 The RADP contains no policies directly concerned with renewable energy development. It also has few other policies of relevance to a proposed wind turbine scheme. Those that are material to determination of a formal application are concerned with Nature Conservation and Rural Diversification.

Proposal CC1
In determining proposals for development, the local planning authority will have regard to impact upon sites of local heritage, geological or ecological importance. In

particular development which would adversely affect the most important nature conservation sites identified on the proposals map will not normally be permitted. In such cases, applicants will be expected to demonstrate significant and overriding reasons why the nature conservation interests should be set aside.

Proposal CC5
Where suitable lesser quality land is available, the best and most versatile farmland should not be irreversible lost to non-agricultural development.

14.4.7 The RADP also contains a policy concerned with industrial development in the countryside although this is primarily aimed at proposals involving the development of buildings.

Proposal IND4
Planning permission will not normally be granted for industrial development in the countryside. Exceptions will however be made for proposals to convert a redundant rural building to industrial or business use, unless the development would create or compound traffic safety problems in the area or would have a significant adverse impact upon residential amenity or the appearance of the building or its landscape setting.

14.4.8 The current development plan is about to be replaced by the Selby District Local Plan (LP). This is intended to cover the period 1996 – 2006 and was produced as a Deposit Draft in July 1997.

14.4.9 Objections to the draft LP were considered at a Public Inquiry and the Inspector's report was received in May 2002. Proposed Modifications to the LP were placed on deposit from 19 June until 31 July 2003.

14.4.10 The LPA announced in November 2003 that it had resolved to adopt the LP without further modification. The Statutory Notice was published indicating that the LP would be adopted from 1 January 2004, subject to any possible legal challenge in the following 6 weeks. However, due to intervention by the First Secretary of State on matters of proposed Housing policy formal adoption of the LP has been delayed.

14.4.11 Despite this the replacement LP has already been 'adopted' by the LPA for the purposes of development control. To all intents the policies contained in the replacement plan superseded the current adopted LP document as they have not been challenged in the final process towards formal adoption.

14.4.12 One of the primary aims of the new LP is to promote sustainable development. The Key Objectives in pursuing this aim, as proposed to be adopted, are;

1) To balance competing demands on a finite quantity of land and make the best use of resources.

2) To ensure an adequate supply of suitable land for employment, housing and other purposes whilst safeguarding environmental and natural resources from inappropriate development.
3) To facilitate economic recovery and diversification in a way which enhances environmental quality.
4) To ensure full and effective use of land and property within existing settlements and to maintain the quality of the countryside.
5) To assist in meeting the national goal of reducing harmful CO2 emissions.
6) To encourage energy efficient forms of development and renewable forms of energy.

14.4.13 The new LP contains a section entitled "Renewable Energy". This refers to the District Council's acknowledgment of the national commitment to stimulate the development of new and renewable energy sources wherever they have the prospects of being economically attractive and environmentally acceptable.

14.4.14 Whilst it suggests that the District may be unsuitable for some types of renewable energy schemes, and cites the possibility that average wind speeds may be insufficient to make wind turbines viable, it refers to planning consent having been granted for some schemes and indicates that other proposals may come forward.

"Proposals to harness renewable energy can display a variety of factors peculiar to the technology involved. Moreover, such schemes can have particular locational constraints since, in many cases, the resource can only be exploited where it occurs. The District Council will need to consider both the immediate impact of renewable energy projects on the local environment and their wider contribution to reducing emissions of greenhouse gases."

14.4.15 The District Council has accepted a number of recommendations made in the Inspector's report on objections to the LP. As a result, the section in the new LP concerned with renewable energy is proposed to be modified by the insertion of an additional paragraph and amendment to the deposit draft Policy ENV6 as follows;

"Proposals for renewable energy schemes will need to be balanced with the need to protect other important environmental features. PPG22 makes it clear for example that renewable energy proposals in designated areas will be subjected to rigorous examination, and in the case of Green Belt, very special circumstances will be needed to justify development. In addition, of the Local Plan policies to protect nationally and locally important features will be taken into account when considering proposals. These will include Locally Important Landscape Areas, historic parks and gardens, archaeological sites, listed buildings, scheduled monuments, conservation areas, nature conservation sites and historic battlefields."

Policy ENV6
Proposals for the development of renewable energy will be permitted provided that:

1) The scheme will not have a significant adverse effect on the immediate and wider landscape;
2) The scheme is located in close proximity to the electric grid or user buildings and new power lines are kept to a minimum;
3) The proposal would not give rise to a nuisance by virtue of noise, vehicular movements, emissions and electro-magnetic interference;
4) The proposal would achieve a high standard of design, materials and landscaping; and
5) Adequate measures are incorporated to safeguard local amenity and highway safety during construction

Where appropriate planning conditions will be used to secure the restoration of the site in the event of subsequent decommissioning.

14.4.16 The draft LP contains a number of other proposed policies which may, in whole or in part, be relevant to determination of a planning application for the erection of a wind farm development. The LPA may regard the following Policies as being material to determination;

DL1 – Development in the countryside
ENV1 – General environmental considerations
ENV2 – Noise nuisance
ENV5 – Flood Risk
ENV9 – Locally important nature conservation sites
ENV10 – General nature conservation considerations
ENV14 – Protected species
ENV20 – Strategic landscaping
ENV21 – Landscaping requirements
ENV22 – Development affecting Listed Buildings
ENV25 – Development affecting conservation areas
ENV28 – Archaeology.
EMP5 – Non-conforming industrial/business use.
EMP11 – Exceptional major and industrial developments
EMP12 – Agriculture and related development.
T1 – Development in relation to the highway network.

14.4.17 The weight to be ascribed to any aspects of relevance to a wind turbine development scheme within these policies is a matter for assessment in the formal determination process.

15 LIST OF APPENDICES IN VOLUME 4

Appendix 1	Environmental Statement Scoping Correspondence
Appendix 2	Vestas 2MW Turbine Specifications
Appendix 3	Rusholme Construction Route: Visual Inspection Report
Appendix 4	Flood Risk Assessment
Appendix 5	Rusholme Wind Farm Newsletter
Appendix 6	Information Day Questionnaire Responses
Appendix 7	Landscape Methodology
Appendix 8	Viewpoint Analysis
Appendix 9	Assessment of Visual Effects
Appendix 10	Public Opinion Surveys
Appendix 11	Ecological Assessment Methodology
Appendix 12	Map of Conservation Designations in the vicinity of the wind farm
Appendix 13	Ecological Assessment Surveys and Figures
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Appendix 15	Method Statement for Archaeological Investigations
Appendix 16	Noise Assessment Criteria
Appendix 17	Noise Assessment Figures

GLOSSARY

Anemometer	An instrument used for measuring the wind speed
Anemometry Mast	Mast on which an anemometer is fixed
Backfill	The replacement of excavated earth into a trench around/against basement foundation
Blade glint	The regular reflection of the sun off rotating turbine blades
Background Noise	All encompassing sound associated within a given environment at a specified time
Borrow Pit	The temporary excavation of stone on or near a construction site
Declared Net Capacity (DNC)	Maximum rating of the generating station less the power required by itself at which the station can run continuously if required
Electricity Distribution Network	An actively managed electrical network operated at medium voltage for the purpose of distributing smaller amounts of electrical power from grid supply points to end users
Electricity grid	The network of power lines, stations, substations and distribution lines that provide electricity to consumers. The majority of the installed power of wind turbines in the world is grid connected, i.e. the turbines feed their electricity directly into the public electrical grid
Electricity Transmission Network	An actively managed electrical grid operated at high voltages for the purpose of transmitting large amounts of electrical power from generation points to grid supply points
Environmental Impact Assessment (EIA)	The process of identifying the future environmental consequences of a proposed development. To be taken into consideration by the planning authority before a decision is made whether to grant planning permission or not
Environmental Statement (ES)	The document (submitted with the planning application) outlining the developer's assessment of anticipated

	impacts of the scheme, together with any mitigation details
Embedded generator	A smaller generator which connects to the DN rather than the TN usually at medium voltage
Geotechnical Investigation	Sub Strata investigation into the underlying solid and superficial geology of the site
Geotextile	A tightly woven fabric used to restrict the flow of fine soil particles and other contaminants while allowing water to pass through freely
Hardstanding	Area adjacent to the turbine position used to erect, maintain and decommission turbine
Holocene	The current geological epoch beginning at the end of the last Ice Age about 11,000 years ago and characterized by the development of human civilizations
Hub	The hub of the rotor is attached to the low speed shaft of the wind turbine
Installed Capacity	The total capacity of electrical generation devices in a power station or system
Landform	The slope and elevation of the subject land area
Landscape character	Landscape character is the result of physical, biological and social components, such as topography, land use, land cover, landscape elements, field and settlement patterns, combined with aesthetic and perceptual factors, such as balance, texture, colour, diversity, unity, form, tranquillity, security, stimulus and pattern
Landscape quality	Landscape quality is an interpretation of: Distinctiveness - the relative extent to which the distinctive character of a landscape type is expressed in a landscape unit. Integrity - the relative integrity (or intactness) of the landscape. Scenic beauty and condition of the landscape
m/s	Metres per second (used as an indicator of wind speeds)

Nacelle	The nacelle contains the key components of the wind turbine, including the gearbox, and the electrical generator. Service personnel may enter the nacelle from the tower of the turbine
Pitch	The property of sound that varies with variation in the frequency of vibration
Photomontage	An arrangement of photographs with wind turbines superimposed onto the view to give an impression of the predicted landscape with turbines
PPG	Planning Policy Guidance
Quadrats	Small sample areas, e.g. 2x2 m where the cover of all the plant species can be determined
Ramsar	Site's designated for the protection of wetland areas
Rated Capacity	the amount of electricity produced by the wind farm when each wind turbine is operating at full power
Rotor	The blade and hub assembly of a wind generator
Shadow Flicker	Wind turbines, like other tall structures will cast a shadow on the neighbouring area when the sun is visible. If you live very close to the wind turbine, it may be annoying if the rotor blades chop the sunlight, causing a flickering (blinking) effect while the rotor is in motion
Site compound	Temporary area to be used during construction for welfare facilities, storage, refueling operations and parking
SPA	A Special Protection Area (SPA) is the land classified under Directive 79/409 on the Conservation of Wild Birds
SSSI	A Site of Special Scientific Interest (SSSI) is the land notified as an SSSI under the Wildlife and Countryside Act (1981)
Switchgear building	The building which houses the turbine management equipment and electrical switchgear
Warping	The deliberate flooding of the fields with sediment held in suspension in river waters, which had the two-fold

	purpose of covering them with a light, fertile well-drained soil and raising the level of the land above those of the tides and so reduce the impacts of seasonal floods
Yaw	The direction, given in degrees that the rotor face faces. The wind turbine is said to have a yaw error, if the rotor is not perpendicular to the wind. A yaw error implies that a lower share of the energy in the wind will be running through the rotor area