

FULLABROOK WIND FARM

Non Technical Summary Vol 4 of 4

September 2004



A NON TECHNICAL SUMMARY OF THE ENVIRONMENTAL ASSESSMENT FOR FULLABROOK WIND FARM

INTRODUCTION

The preparation of a Non-Technical Summary (NTS) is required by the EA legislation and is expressly intended to help the general public and interested parties to participate in the decision making process from an informed position. The NTS contains summary descriptions, cross-referenced back to the full ES, and outlines the main conclusions and how they were reached. The summary is comprehensive, containing a brief description of the project and the environment, an account of the main mitigating measures to be undertaken by the developer, and a description of any remaining or residual impacts. A brief explanation of the methods by which these data were obtained and an indication of the confidence, which can be placed in them, is also included.

The summary also contains an outline of the alternatives studied and an indication of the main reasons why the site and design were chosen.

This Environmental Statement was prepared jointly by ADAS and Burges Salmon, summarising the work of the individual specialists.

1 THE PROPOSED DEVELOPMENT

1.1 Location and Extent

1.1.1 The Site is located in North Devon (See attached plan1) about 6km south of Ilfracombe. The Full OS grid reference of the centre of the site is 253664 141139

1.2 Site Description

1.2.1 The Site is currently in agricultural use for grazing and arable land and forms part of several farming units. Virtually all of the site is in either improved grassland or arable cultivation and there are few habitats of any value.

1.3 General Project Description

- 1.3.1 The development would consist of 22 wind turbines each rated at 3 megawatts. The layout of the turbines is shown on the attached plan 2.1. Turbines would be 65m to the nacelle and the blades would have a swept diameter of 90m with a rotation speed of 16 to 19rpm. Lighting would be agreed with the MoD, but the perimeter turbines would be illuminated with navigation warning lights consisting of either a low intensity red light, or medium/high intensity dual red and white light. The turbines would be painted in a colour to be agreed, which is usually a grey or off white colour.
- 1.3.2 Access to the site would be from the minor road running south from Hore Down Cross to Prixford. A site entrance would be created just north of Burland Cross.
- 1.3.3 The turbines would be connected together by an underground electrical cable buried at least 1.2 m deep laid, together with a communication and low voltage cable. The cables would be laid adjacent to a hardcore track used for construction of the turbines and to provide access for maintenance. This track network would consist of tracks 5m wide with 300mm depth of compacted stone to form a load bearing surface. Temporary hard standings to support the cranes during construction would be created adjacent to the track network. Following construction the hardstandings would be removed and the top 50mm of stone from the tracks would be removed and replaced with topsoil stripped from the track area. The replaced topsoil would be seeded with a grass mixture and maintained as grass for the duration of the operational life of the site.
- 1.3.4 In addition to the turbines and the tracks, there would be a substation and control room located to the south of the site (see plan 2.1), which would provide housing for the control equipment necessary to connect monitor the performance of the turbines. Plans and elevations are included in Plan 6.10, Chapter 6 of the full environmental statement (ES).
- 1.3.5 Connection to the grid is not covered by this application, as it is determined under a separate consent procedure. However, the grid connection is

planned to be via two underground 33kv cable runs to the site substation. From the substation a new 132kV line would be constructed to the Barnstaple Bulk Supply Point (Grid Ref 256150 131800).

2 ALTERNATIVES

- 2.1 Legislation requires that a developer considers alternatives to the development. This could be alternative sites, or alternative ways of providing the same outcome, for example using a different technology. In this instance the wind resource over the whole county was mapped over the major landscape constraints. Where there was sufficient wind and no constraints, a broad scale landscape assessment was carried out to determine the capacity of the landscape to accept wind turbines.
- 2.2 Under Revision 2004 Devon has been set a target of 103 MW of energy generation from onshore wind turbines. Therefore, the developer considered scenarios across the county whereby this target could be reached.
- 2.3 The conclusion of the study was that only two areas were judged to be able to accommodate large scale developments (i.e. over 15 large turbines of over 100m in height), they were the Downland Plateau in North Devon and the Dartmouth Plateau in South Devon. These landscapes are broadly similar in character and have a similar landscape scale, although, the field patterns in the Dartmouth area are finer in grain and in better condition. Like the Downland Plateau, this landscape type is surrounded by landscapes with designations reflecting their high value. However, whereas in North Devon the coastal AONB tends to fall away, and very little land covered by this designation looks over the landscape type, in South Devon the AONB covers land that is on the plateau. This has the potential to increase the impact of any development on the AONB.
- 2.4 For these reasons, the Downland Plateau in North Devon was considered to be able to accommodate more development than the Dartmouth Area.

- 2.5 Whilst these two landscape types are relatively extensive, it was considered unlikely that either would be able to accommodate more than one major wind farm. It was anticipated that 60mw would be capable of being generated on the Downland Plateau, and 15-20mw from the less extensive and more visually constrained Dartmouth Area.
- 2.6 The study also found that medium scale clusters of 5-15 turbines of 1-2 MW output with heights of between 90-100m to tip are likely to be able to be accommodated in plateau and ridge-top areas which are medium to large in scale and less extensive than those capable of accommodating large wind farms. The landscape assessment and capacity study highlighted that the Plateau and Washford Pyne Ridge Top to the West of Tiverton and the Crediton Ridge Top to the West of Exeter are likely to be able to accommodate some medium-scale turbines. There is only potential for relatively small clusters due to the lack of extent of the receiving landscapes.
- 2.7 It was assessed that there is the potential for 2-3 clusters of 5-15 turbines. These areas do have constraints in terms of their proximity to settlements. The development of medium-scale wind farms is more efficient in landscape and visual amenity impact terms than many small scale ones; however, there is still likely to be an impact on a large number of near receptors would have a more significant visual impact.
- 2.8 Finally, the study found that small-scale 1-1.3mw turbines in small groups, of 1-3 turbines have been approved in two locations and these are considered to be appropriate in the rolling medium-scale farmland landscape types of Devon. There are five areas which display these rolling, medium scale patterns in Devon. These areas are:

- The Rackenford Moor Plateau north of the A361
- The High Rolling Farmland to the West of Tiverton
- The Gentle Rolling Farmland West of Exeter
- The Rolling Farmlands South of Barnstaple
- The Gently Rolling Land near Bradworthy

- 2.9 The Rolling Farmlands South of Barnstaple and Gently Rolling Land near Bradworthy are the most extensive areas of this type of landscape, and therefore likely to be capable of accommodating more small-scale developments than the less extensive land to the west of Tiverton and Exeter and around the A361.
- 2.10 However, issues of cumulative landscape impacts and cumulative visual impacts are likely to be very great if any significant proportion of the target is to be met by this means. Most significant effects are close to turbines. More distant effects tend to be lower. More scattered turbines would lead to greater spread of significant effects public and private receptors, and a greater change in landscape character.
- 2.11 It was concluded that to meet much of the sub-regional target through many small-scale developments, like the two already consented at Bradworthy and Darracott, an unacceptable level of cumulative visual and landscape impacts would arise. The landscape would become cluttered, especially when the high number of telecommunications masts being erected in the landscape is also considered.
- 2.12 Given the three areas where turbines could be located and the need to generate 103MW (less the 7 MW already consented) from onshore wind turbines, the following scenarios were considered to be the only possible ways of meeting the target. The study considered which was likely to be the most acceptable.
- 2.13 The following scenarios were considered:
- Place all the turbines in a few large developments using large turbines in large-scale landscapes to minimise the numbers of turbines and hence the geographical extent of the development. Using 3MW turbines would mean that developments accommodating about 32 turbines would need to be built in these landscapes.
 - Locate the turbines in one strategic site and smaller clusters throughout the county. This would require a higher number of turbines as the size of turbine, and hence its output would reduce if turbines were sited in smaller scale landscapes

- Develop clusters in medium scale landscapes using 2 MW turbines; about 48 turbines would be required.
- Provide the capacity by using small clusters and small turbines throughout the small scale landscapes within the county. This would require about 75 turbines to be erected.
- Use a mixture of development scales across all landscape types exploiting suitable locations where they occur.

2.14 Given the proximity of the AONB and National Parks to the two areas of large-scale landscapes, it was assessed to be unlikely that more than 80MW could be generated from the two areas in two developments. Additional developments would impact on the AONB and National Park and there could also be issues of intervisibility that would lead to an unacceptable change to the landscape character. Additional capacity would be required from medium and small scale landscapes to provide the remaining 16 MW of contribution.

2.15 Developing clusters in the medium-scale landscapes identified in the study would yield a maximum of 45 turbines. This because the three areas which could accommodate such clusters are small and could not accommodate more than one development. There would still need to be five smaller turbines located outside of these areas.

2.16 Locating the turbines within the smaller scale landscapes would require the maximum number of turbines of any option and the cumulative impact of this scenario is likely to be greater than any other option.

2.17 The study concluded that the most acceptable solution to meeting the target would involve a strategic site within North Devon. Consequently the developer pressed ahead with the design of a site at Fullabrook.

2.18 Having identified a suitable site the following aspects of the receiving environment were studied in detail:

- The design, construction and decommissioning of the site.
- The landscape
- Noise
- Tourism
- Ecology
- Cultural Heritage Chapter
- Archaeology Chapter
- Electro-Magnetic Signals
- Socio-economic impact
- Community Benefit
- Grid Connection

2.19 The work carried out and the results of the work are discussed in the following chapters.

3 DESIGN, CONSTRUCTION AND DECOMMISSIONING

3.1 Design

3.1.1 The design of the development was an iterative process that was informed by the environment of the site and the outcome of public consultation. The design underwent a number of changes from the initial concept. The principal changes were:

- The removal and relocation of turbines to ensure the development met noise standards.
- The relocation of the turbines away from hedges to prevent any danger of collision with bats
- Changes to the track layout to avoid badger setts

- The addition of more land within the centre of the site and removal of the most northerly turbines to make the site more homogenous and compact.

3.1.2 The final design represents the outcome of over a year's development and is the optimal layout to maximise the contribution to the sub regional target whilst minimising environmental impact.

3.2 **Construction**

3.2.1 The aspect of the work considered the route of the delivery vehicles, the number and type of loads and the off site works required to local road network.

3.2.2 The physical elements of the projects are made up as follows:

i) the installation of 22 No. Wind Turbines including excavation for turbine bases,

ii) the installation of 1 No. Monitoring Mast,

iii) the construction of an 33 kV/132 kV electrical sub-station and associated switchgear,

iv) trenching and cable installation for the supply and distribution of generated electricity,

v) the construction of on-site access tracks crossing the Site to facilitate the wind farm development, and the creation or widening of 45 gates requiring the removal of 255m of hedge,

vi) off-site road improvements to provide passing places and ease transportation issues at junctions, which would necessitate the removal of 195m of hedges,

vii) the construction of a temporary site compound with associated services for the duration of the construction phase,

viii) the installation of an on-site concrete batching plant to facilitate the turbine base construction, and

ix) the reinstatement of areas affected by the construction of temporary access tracks, contractors compound and concrete batching plant.

3.2.3 The overall construction programme would take about 30 weeks. During that time each of the above construction activities at the site would require the following number of loads in total :

i) initial site set-up: approximately 15 HGV movements,

ii) access track construction: approximately 925 deliveries,

iii) turbine base construction: approximately 1200 HGV deliveries would be needed to deliver cement, sand and stone to the batching plant area,

iv) Electrical equipment: the supply of transformer, cabling and associated switchgear would require approximately 15 HGV deliveries,

v) Sub-station control building construction: this would require approximately 21 HGV deliveries,

vi) Turbine components: each turbine would require 7 HGV/trailer deliveries to cover tower sections, nacelle, blades, cables, controllers and generator. This makes a total of 154 HGV deliveries,

vii) Monitoring Mast: this would require approximately 5 deliveries, including mast sections, cabling and equipment and concrete for the base,

viii) Craneage: 2 mobile crane units plus associated support vehicles would be required.

3.2.4 All vehicles would follow one of two routes either by road from the M5 motorway to Junction 27, then via the A361(T) road to the Aller Cross roundabout, north along the A399, then west via the A3123, or by sea-going

vessel into the River Taw as far as Chivenor, offload to land on the MOD property known as RMB Chivenor, by road onto the A361 west of Barnstaple, then east along the A3123.

3.2.5 Both routes would then use approximately 2.7 km of unclassified road from Hore Down Gate to the site.

3.2.6 To prove the suitability of the route a trial run was completed with a 51m long vehicle to simulate the longest load. The run was completed successfully apart from the tight corner at Berry Down Cross. This corner would require the construction of a temporary track in the garden of the house on the cross. An agreement has been concluded with the owner of the house. Apart from Berry Down Cross, works would be required to the bridge at Brayford. Although the route was successfully completed, lowering the parapet would ease the passage of vehicles.

3.2.7 Improvement works would be required to the site entrance at Burland Cross and Hoare Down Gate to allow abnormal loads to pass freely and passing bays would be constructed along the unclassified road between Hoare Down gate and Burland Gate.

3.3 Decommissioning

3.3.1 Decommissioning of the wind farm would include the following activities:

i) dismantling and removal of the monitoring mast and turbine's blades, nacelle and tower, down to and including the tower's base sections which would have been cast into each of the concrete bases,

ii) removal of the full depth of the stone making up the access tracks and working areas, down to and including the geotextile membrane on which the stone was laid,

iii) full reinstatement of the access tracks and working areas utilising subsoil recovered from the areas in which it was originally spread.

iv) disconnection and abandonment of the underground cables laid from the northern-most turbine to the final point of connection at the sub-station site,

v) demolition and removal of the sub-station's control building, transformer slab, stone surfaced areas, perimeter fence and associated electrical equipment,

vi) full reinstatement of the area making up the sub-station with imported subsoil and topsoil as necessary

vii) removal of field gates introduced to facilitate access through field boundaries that are no longer required, together with fencing and/or replanting of hedges to close the affected areas.

3.3.2 The concrete bases for the turbines would be cut back to plough depth to allow cultivation over them.

3.3.3 These activities would generate some 43,000 tonnes of waste the bulk of which is stone from the access tracks, the disposal of which will depend on the practicality of recycling materials 25 years into the future.

3.3.4 However, a cost for decommissioning would be calculated and agreed with the DTI and funds would be accumulated to ensure that sufficient money would be available at the end of the development to ensure the restoration of the site.

4 NOISE

4.1 Work Undertaken

4.1.1 The noise assessment was undertaken to assess the impact of noise from the proposed Fullabrook wind farm development. The aim of the noise assessment was to determine the impact of the proposed wind farm development on the noise climate under wind farm operational conditions relative to nearest wind farm neighbours. The noise levels predicted were

assessed against appropriate noise criteria and guidance relevant to this unique form of renewable energy.

4.2 Objectives of the Work

4.2.1 The objectives of the noise impact assessment were:

- Determine typical background noise levels at the nearest neighbouring properties correlated to wind speed to enable an assessment of impact under different operational wind conditions to be provided.
- Predict the cumulative effect of noise levels from the wind farm turbines at the nearest neighbours under different wind speed and wind direction conditions.
- Predict the noise impact of typical construction works relating to the wind farm development at the nearest wind farm neighbours.
- Where necessary, provide recommendations for amelioration measures necessary to maintain reasonable noise conditions for the wind farm operation.

4.3 Noise Criteria:

4.3.1 There has been considerable debate about the most appropriate criteria to use, BS 4142 or the specifically developed *ETSU* method. Historically both methods have been employed but the recently issued PPS 22 now recommends that the *ETSU* method should be used.

4.4 Noise from the Development:

4.4.1 To establish the likely noise levels resultant from the operation of the wind farm facility, detailed noise prediction modelling calculations were undertaken. The results of these calculations have shown the following:

4.4.2 The predicted noise levels for the operation of the wind turbines at nearest wind farm neighbour positions indicate that noise levels would be within the ETSU-R-97 daytime noise criteria range.

- 4.4.3 The predicted noise levels would at all positions would be below the ETSU-R-97 night-time noise criteria.
- 4.4.4 There is one property where the daytime level may exceed the general noise criteria range during low wind speeds and under specific wind direction conditions. This property however, has a financial interest in the development and therefore the predicted noise level is within the ETSU-R-97 criteria of 45dB(A) L90.
- 4.4.5 Taking into account the characteristics of modern wind turbines, the design layout and existing background noise under wind turbine operating conditions, the study concluded that the operation of the wind farm would be able to achieve the relevant noise criteria for daytime and night-time operation in accordance with guidance within ETSU-R-97.
- 4.4.6 Additionally, the predicted noise levels are likely to be well within other guidance for acceptable planning and social noise limits provided within BS4142: 1997 (bar one marginal instance) PPG24: 1993, BS8233: 1999 and World Health Organisation guidance levels to prevent community annoyance

4.5 Noise from Construction Activities

- 4.5.1 The noise sources from the construction activities listed at 4.2.2 above would vary from day to day and may be in use at different stages of the development for relatively short durations. Calculations of noise generated at the closest approach to properties have been undertaken using the methodology given in BS 5228: Part 1, 1997.
- 4.5.2 The results of the calculations indicate that the noise levels produced during the period of construction would not be significant at the nearest property positions. The highest community noise levels are likely to be created during the soil movements and construction of the trenches when they are close to exposed site boundaries. This would be well within the level of noise

normally found to be acceptable for an activity of this type and duration. Noise generated during the turbine erection would involve short-term noise generation from the movement of cranes and large transporters.

- 4.5.3 Given the design and proposed mitigation the operation of the wind farm would meet appropriate and reasonable noise criteria relevant to the proposed development and would therefore not give rise to a significant effect.

5 LANDSCAPE

5.1 Work Undertaken

- 5.1.1 The landscape assessment involved assessing the impact of the development on the landscape character of the area as well as public and private views and historic landscape and listed buildings. The work involved site visits and the use of computer generated zones of visual influence and photomontages of the proposed development.
- 5.1.2 Two separate assessments were carried out, an assessment of the impact on landscape character and an assessment of the visibility of the site from public and private viewpoints. These studies used methods published by the Landscape Institute and other official bodies.

5.2 Findings

- 5.2.1 Due to the nature of the proposed development and the character of the receiving landscape, some substantial effects were recorded. However, substantial effects are not necessarily adverse or unacceptable. Within the the local and structure plans, there are three main planning policies which define what changes to the landscape through development are acceptable. These policies set out that development must be sensitive to the local environment, contribute to the sense of place and local distinctiveness and not have an adverse effect on the local character and distinctiveness of the area. Any development of this scale and form would result in some adverse and substantial effects. However the as the consideration of the alternative

scenarios for meeting the governments targets demonstrated, these would be less on this site than for other scenarios.

5.2.2 In addition, through the evolution of the design, the scale of the effects has been minimised although substantial effects were identified from some near public rights of way and from dwellings in close proximity to the site. They have also been recorded for traffic on the near A39. These substantial effects are concentrated on the local visual receptors, and are broadly contained within 4-5km of a proposed turbine location. The scale of the landscape is large, in the local area of the Plateau Downland landscape type, and the simple and sculptural form of the development would add interest to a relatively bland landscape without creating clutter or detracting from the simple agrarian patterns. Moderate to substantial effects have been recorded for receptors generally from 2-4km from a proposed turbine. These effects on the visual amenity of the receptors were assessed as being significant but acceptable for the overall conclusion reached below that the impacts of this scheme are sufficiently localised. Moderate effects were recorded up to 8km distant; these effects were not considered significant.

5.2.3 The assessment of effects on the landscape demonstrated that there were likely to be some substantially adverse effects on the landscape fabric of the site. Moderate effects were assessed as being likely on the landscape character within the 20km study area, these were considered to be well within the range of acceptability. Nearer to the site the effects are greater, and the assessment concluded that there would be a localised change in character through the addition of this development within the landscape type.

5.2.4 It was concluded that the development relates well to the receiving landscape character and the perception of the landscape. A development of this nature in this location would not adversely detract from the sub-regional landscape character or the diversity of landscape character beyond the local context.

6 TOURISM

6.1 Objectives

6.1.1 The aims of the research were to provide evidence and analysis of the:

- attitudes of tourists towards renewable energy in general and wind energy in particular
- impact of existing wind farms in areas popular with tourists
- potential impact on visitor numbers of a wind farm in North Devon
- potential impact on the tourist experience of a wind farm in North Devon
- potential impact on the local tourism economy of a wind farm in North Devon
- and to assess the views of tourists relating to the development of wind farms as tourist attractions

6.2 Work Carried Out

6.2.1 The major activity was to collect adequate data from which conclusions could be drawn about the effect wind energy projects would have on tourism. This was achieved by undertaking interviews with tourists in three areas. Two of the areas where wind farms existed and the third area was north Devon. A total of 379 questionnaire based interviews were carried out, 196 in Devon, 90 in Cornwall and 93 in Wales. Interviews were also carried out with tourism officers and academics to provide qualitative corroboration to the results.

6.3 Findings

6.3.1 The conclusions drawn from the study are that:

1. No overall negative impact on visitor numbers

- 6.3.2 The survey of visitors to North Devon found that 93.9% of those surveyed would not be discouraged from visiting the area if there was a wind farm. Only four respondents (2%) from a sample of 196 stated that they would be 'strongly discouraged' from visiting the area if there was a wind farm. Eight respondents or 4.1% stated that they would be marginally discouraged from visiting. Although 6.1% stated that they would be 'marginally' or 'strongly' discouraged from visiting, a higher percentage (7.2%) stated that they would be more encouraged to visit if there was a wind farm. No effect is therefore predicted on visitor numbers.

2. No overall detrimental impact on the tourist experience

- 6.3.3 The majority of respondents (58.2%) in North Devon thought that wind farms have 'no overall impact' on the tourist experience. A total of 18.4% of those questioned thought that wind farms actually have a positive impact on the tourist experience while only 14.8% thought that wind farms have a negative impact on the tourist experience. No effect is therefore predicted on visitor numbers.

3. No overall decline in tourism expenditure

- 6.3.4 The figures related to impact on numbers of tourists indicate that there would be no overall financial loss in tourism-related earnings as a result of the wind farm development. No effect is therefore predicted on visitor numbers.
- 6.3.5 In addition, the majority of respondents welcomed the development of renewable energy sources and the majority also felt that wind farms could be tourist attractions in their own right.

7 ECOLOGY

7.1 Scope of Work

7.1.1 An initial scope of ecological works was developed which examined those features which could be significantly affected by the proposals. The following ecological receptors were scoped into the study:

- General Habitat Assessment;
- Hedges (ecological value);
- Birds;
- Bats;
- Badger;
- Otter; and
- Water vole.

7.1.2 Birds were considered to be of special significance and were reported on in a separate chapter.

7.2 Work Carried Out

7.2.1 To assess the ecological resource a number of surveys were carried out. They were a modified Phase 1 Survey to assess the general habitats; hedges were surveyed using a technique developed by ADAS which essentially records the number of woody species within a 30m length of hedge and recording plant species. Bats were assessed, with the agreement of English Nature, through a literature review and a review of a radio tracking survey of greater horseshoe bats commissioned by English Nature. Badgers, otters and water voles were assessed by specific surveys for these species.

7.3 Findings

Habitats

- 7.3.1 The majority of the site is dominated by intensively managed agricultural land which is a mix of arable and improved grassland. Only small areas of more valued habitats were recorded and these were: semi improved grassland at Luscott Barton, adjacent to Knowle Water and a Beara Charter on the steep fields to the west and south of Bera Charter Farm.
- 7.3.2 Due to the low value of the receptor habitats and the small area of land taken in relation to the size of the site, the impact of the loss of habitat was considered to be low.

Hedges

- 7.3.3 Of the hedges surveyed, 47 (20%) hedges appeared to fall within the current Hedgerow Regulations based on ecological criteria. These are mainly located in the Luscott Barton and Beara Charter survey areas. Two hedges in Fullabrook are protected based solely on the presence of Bluebell (*Hyacinthoides non-scriptus*) under Schedule 8 of the Wildlife & Countryside Act 1981.
- 7.3.4 The proposals require the loss of 450m of hedgerow. This is made up of 40 new gateways of 6m wide, five widened gates (by 3m) and 195 m for safety sight line at the site entrance.
- 7.3.5 In terms of total hedgerow within the site, this was considered to a relatively low impact, however in terms of ecological connectivity the loss was considered to be a moderate impact. This would act on a receptor which is considered to have at least importance at a county level. Thus a significant effect is predicted for the unmitigated proposals of Moderate Significance.

- 7.3.6 To mitigate this effect 190m of Devon Bank would not be removed but relocated, thus significantly reducing the loss of hedge banks, and where new accesses are made through existing hedges, trees would be planted to provide canopy cover over the new gateway.
- 7.3.7 In the light of such mitigation, the remaining effect was considered not to be significant.

Badgers

- 7.3.8 The development of the wind farm has the potential to affect badgers either directly, through the loss of habitat or damage to a sett or indirectly through disturbance effects.
- 7.3.9 The aspects of the proposals which have the potential to affect badgers are the construction stages, the development of the turbine bases and the access roads.
- 7.3.10 Experience shows that badgers are not affected by the operational phase of wind farms.
- 7.3.11 In order to inform the layout of the turbines and access roads and avoid potential impacts the site was surveyed for the presence of badgers.
- 7.3.12 During the survey, 17 sets of badger holes were located within the study site. These included one main sett area, 10 other active areas (normally single holes) and 6 inactive areas.
- 7.3.13 The locations of the turbine bases and the access roads were chosen so that none would be within 30m of the nearest badger hole. The 30m value is based on English Nature's guidelines on badgers and construction sites. It is considered that this separation is adequate to prevent direct and indirect effects on the local badger population.

- 7.3.14 No impacts were predicted on badgers through the proposed development. The design mitigation has enabled potential impacts to be avoided. There are therefore no significant effects to report.

Otter and Water Voles

- 7.3.15 No water voles were recorded on site, although one otter spraint was recorded close to the original site for the sub-station. As a result the location of the substation was moved and consequently the impact of the development on otters was considered to be low.

Bats

- 7.3.16 At the request of English Nature, greater horseshoe bats were included in the study due to the proximity of the Caen Valley SSSI which is 5km to the south west of the site.
- 7.3.17 From previous radio tracking studies, it is known that greater horseshoe bats forage up to six km from their roost site although they have not been tracked on the site. The closest approach to the site was the disused Fullabrook mine. (Grid ref: SS518398).
- 7.3.18 The site offer limited opportunities for either foraging or roosting although the site does have a significant length of hedge banks which are known to be favoured by bats for foraging.
- 7.3.19 Although the greater horseshoe, or other bat species, have not been recorded on site, the location of the turbines was carefully chosen to minimise collision risk with turbines. This was achieved by siting the turbines at least 95m from any significant hedge bank, providing a horizontal separation of 50m from the end of the blade to hedge. As greater horseshoe bats fly at 0.3 and 6m from the ground, the risk of collision with turbines was considered to be low. Other bat species which fly at tree top level, may be at risk from

collision as the base of the blade would be 25m from the ground and tree top level is assumed to be about 20m. However, the 50m separation distance would still provide sufficient separation which would make the risk of collision low.

7.3.20 There was some concern that the turbines may emit ultrasound which could confuse bats and lead to an increased collision risk. However, ultrasound dissipates rapidly over distance, a feature vital to bat if they are not to be confused by other bats, and consequently the risk was considered low even if the turbines did produce some level of ultrasound. However, the noise consultants to the project indicate that the turbines would not produce ultrasound in the range used by bats.

8 BIRDS

8.1 Scope Of Work

8.1.1 The guidance produced about birds and wind turbine developments agree that there are three main potential effects of wind turbines on bird populations. These are:

- Collision risk;
- Direct loss of habitat due to infrastructure and construction; and
- Indirect loss of habitat or feeding opportunities due to disturbance, either during construction or the operational stage.

8.1.2 These aspects were covered by the study, although not all land was included in the study and further work will be carried out over winter 2004 to assess the remaining area of the southern part of the site's value for wading birds.

8.2 Work Carried Out

8.2.1 Due to the proximity of the Taw Estuary which is a SSSI and an important bird area survey work was carried out to assess the use of the site by wading birds so that the risk of collision and disturbance could be assessed. The

work involved visiting the site nine times over the winter to record the numbers and types of birds using the site.

8.3 Findings

- 8.3.1 In total 37 species were recorded on site although only two were considered to be particularly important due to the presence of large numbers on site and the level of protection they are afforded, they were Golden Plover and Lapwing.
- 8.3.2 The risk of collision was considered to be low as previous studies with golden plover and lapwing have not indicated any significant risk.
- 8.3.3 The risk of disturbance from the noise and movement of the turbine blades was considered to be an issue. It was assumed that disturbance could be caused at distances up to 250m from a turbine. If this proved to be the case then the vast majority of the site would be unavailable for golden plover and lapwing.
- 8.3.4 However, when the loss of around 400 hectares of foraging area is considered against the potential foraging area of the Taw estuary of 20,000 ha the possible loss amounts to only 2.3% of the total area. It was therefore concluded that this level of displacement for a limited period of the year would not have a significant effect on local or national populations.
- 8.3.5 To offset any potential impacts the land in areas of the site free from turbines would be managed to promote conditions suitable for lapwing and golden plover.
- 8.3.6 The loss of agricultural habitat to the development in the form of turbine bases, access roads, construction and temporary worksites is not considered to be a significant effect on golden plover and lapwing. This view is based on two main factors, firstly, the magnitude of loss, in comparison with the total habitat resource both within the site and locally is very small. Secondly, if it is accepted that the golden plover and lapwing will be

displaced by disturbance from the turbines then the small loss of habitat within the zone of displacement can not be significant, the effect has been taken into account under the heading of displacement.

8.3.7 Further work will be carried out over the winter to assess the level of use of the southern part of the site.

9 ARCHAEOLOGY

9.1 Scope Of Work

9.1.1 The study covered the entire area of the site apart from the land utilised by turbines 6, 9 and 10. These areas are being assessed in the near future.

9.1.2 The method used followed guidance issued by the Institute of Field Archaeologists: Standards and Guidance for Archaeological Desk Based Assessments (revised 1999).

9.2 Work Carried Out

9.2.1 The work was carried out primarily by literature search and review of the main sources of historical data supplemented by a walk over survey of the area where turbines bases will be placed. In some cases these have changed and the work will be updated to reflect this.

9.3 Findings

9.3.1 Based on the information available the assessment concluded that the impact would be low, mainly due to the low value of the site. However, little information exists for this area and some remains may have been missed. Consequently , a geophysical survey was recommended of each turbine base to ensure no remains would be damaged. Even if remains were found, it was considered that it would be possible to slightly move any turbine to avoid remains. Such a survey would also add to the knowledge of the area.

9.3.2 If the survey identified potentially important remains, a trial excavation would be carried out to evaluate the remains.

10 ELECTRO MAGNETIC SIGNALS

- 10.1 After extensive consultations only one possible effect was identified, that of a microwave link which crosses the site. The turbines were moved to ensure that the link would not be interfered with.
- 10.2 No other interference is anticipated, however, if interference is caused, the developer would mitigate any effects.

11 SOCIO ECONOMIC EFFECTS

- 11.1 There is an increasing body of data that supports the conclusion that every megawatt of renewable generating capacity installed creates a significant number of new jobs, in the local, national and European market. These are related to both the installation and subsequent operation of the developments, including wind farms. Fullabrook will be no exception with the expectation that it will match comparable wind farm schemes in the UK that have recorded £5m sourced through local contracts, with some 100 people employed during construction and four permanent service jobs thereafter.
- 11.2 In addition to these benefits, the wind farm will also make the direct contribution of business rates which, depending on the final capacity installed is likely to yield a minimum figure in the region of £150,000 pa, potentially rising as a result of the Valuation Office's 5 yearly property revaluation, due in April 2005.

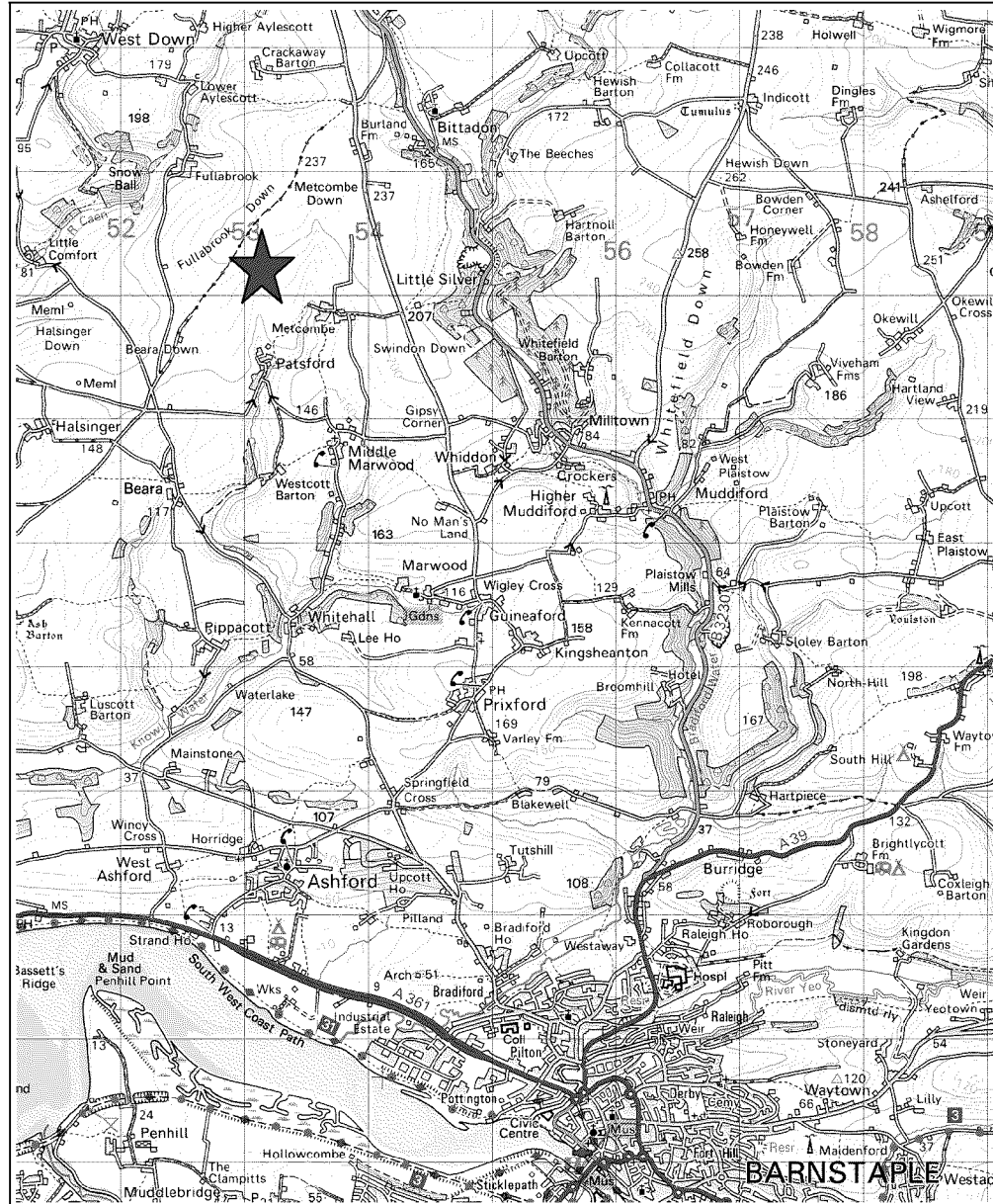
12 SHADOW AND FLICKER

- 12.1 Shadow flicker refers to the shadows cast by the rotor blades as they pass a window. This can cause a nuisance when the sun is low in the sky and the shadow is being cast over windows of nearby houses.
- 12.2 It is thought that the intensity of flicker from wind turbines is only potentially a problem at distances closer than ten turbine rotor diameters and this is the distance

normally used in calculations. Although in this case a calculation has been made for 10 times the blade tip height as well.

- 12.3 An initial assessment was carried out to evaluate the worst case possibilities for the nearest properties. This assumed clear skies all year and that the houses contained a 5m by 5m window on each elevation. The results of the work indicated that three properties could experience shadow and flicker for more than half an hour (maximum 31 minutes) on more than half the days of the year but only at distances of 10 times the blade tip height. For properties to the east of the site, the effect would be experienced between 3pm and 7pm. For properties to the west of the site the effect would be experienced between 5am and 10 am. No properties to the north or south of the development would be affected.
- 12.4 Further work will be carried out to determine more precisely what the effect would be, this work would take into account the weather conditions and the size and orientation of the windows of the affected properties.

Fullabrook Wind Farm – Location Plan



Not to scale.

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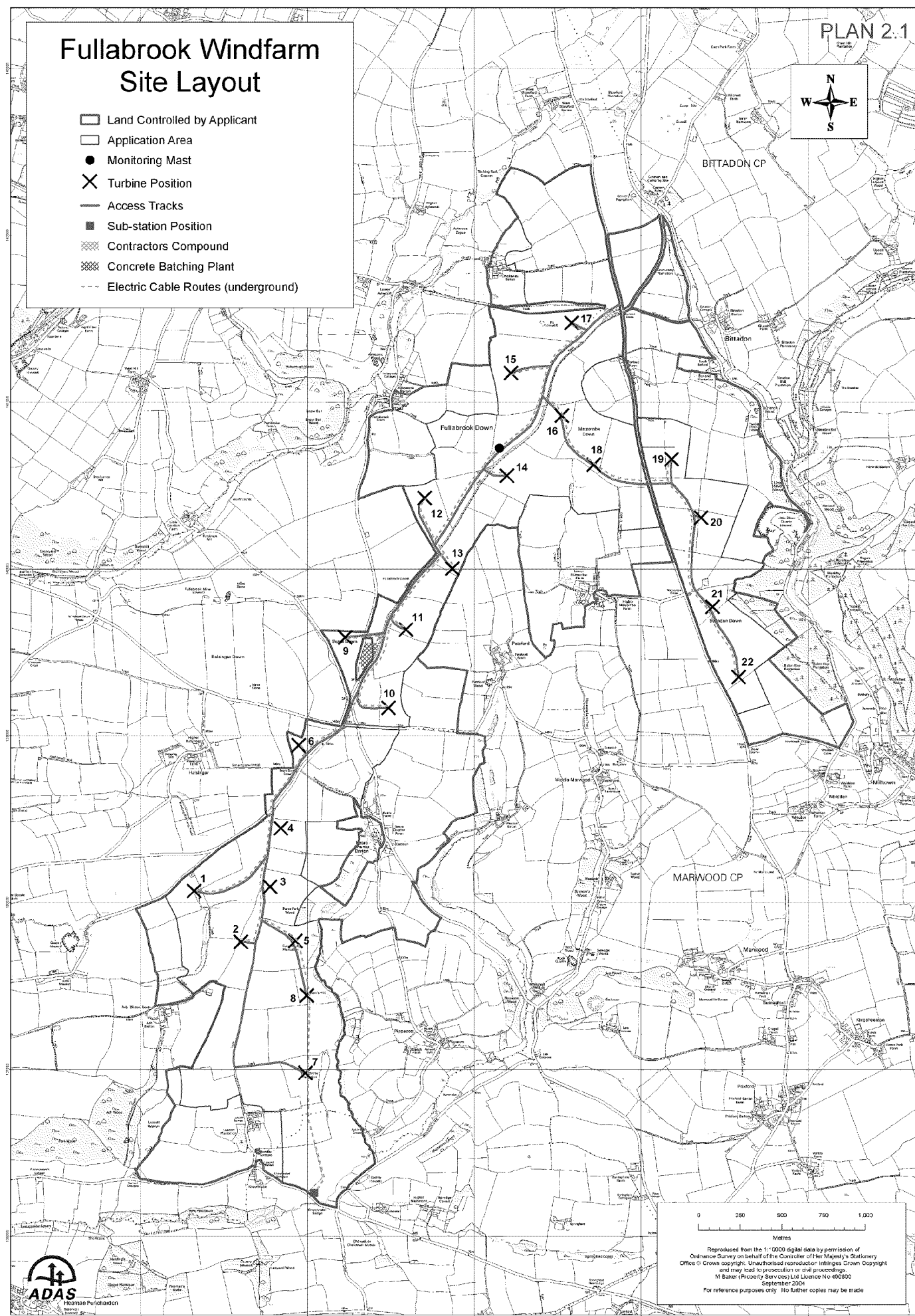
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Fullabrook Windfarm Site Layout

PLAN 2.1



- Land Controlled by Applicant
- Application Area
- Monitoring Mast
- Turbine Position
- Access Tracks
- Sub-station Position
- Contractors Compound
- Concrete Batching Plant
- Electric Cable Routes (underground)



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