

An archaeological evaluation and mitigation strategy for land at Bradwell-on-Sea and Tillingham Marshes, Essex

**report prepared by
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**commissioned by
NPower Renewables Ltd**

CAT project ref.: 04/5a
NGR: TM 022 052 (c)



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CAT Report 303
December 2004

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1 Introduction

This report outlines proposals for evaluation and mitigation of a site at Bradwell-on-Sea and Tillingham Marshes and it is to be read in conjunction with the archaeological desk-based assessment (CAT Report 275, completed December 2004). Both reports were commissioned by NPower Renewables Ltd and will form part of an Environmental Impact Assessment being prepared for a proposed on-shore wind farm.

The 1150-hectare site is centred on National Grid Reference TM 022 052 (c) and mainly occupies reclaimed coastal marshland, within the parishes of Bradwell-on-Sea and Tillingham. It is a flat, remote area, largely under arable cultivation.

2 Aim

The aim of the strategy is to propose methods of archaeologically evaluating the site and mitigating the impact of the development on the archaeological remains.

3 Archaeological background

Archaeological sites within the application area and its environs include standing monuments, buildings, excavated and evaluated archaeological sites, chance discoveries of archaeological material, archaeological sites known from documentary sources, and cropmark sites. The site is bordered to the north by the Roman fort of Othona which is a scheduled ancient monument, and St Peter's Chapel which is a listed building. Although bordered by important archaeological features, the application site itself has received very little archaeological study. It has the potential to have preserved significant remains which can only be located and understood through field evaluation. The full description of the archaeology presented in the archaeological desk-based assessment (CAT Report 275).

4 Methodology

The results of the archaeological desk-based assessment have been studied and the details of the nature and scale of the proposed wind farm have been assessed to establish the impact that the development may have. The nature, depth and extent of the likely archaeological remains have been used to suggest appropriate methods of evaluation and mitigation.

5 The impact of the development

The following information was provided by Jamie May (pers comm) of RWE. Twenty-five to thirty wind turbines are envisaged. There is no definitive plan of where the turbines and tracks will be located, but several possible layouts have been produced. The turbines will not be located on the perimeter of the application site and will be sited away from settlements. If possible, the turbines will not be constructed in the centre of fields, but neither will they be located less than 8m from the edge of a field. The nearest turbine to St Peter's Chapel will be situated in excess of 1km away from it.

Each turbine will have a mast height of 70m and a blade length of 40-46m. A concrete base will be required for each turbine. A trench 15m square and 2m deep will be dug to accommodate each concrete base. Augered concrete piles will be used; piling depth is likely to be between 5m and 25m, but this will vary across the site. Turbines on the eastern side of the application site, where the London Clay is at a greater depth, will require deeper piles than those to the west.

Temporary crane platforms, 20m square, will be situated adjacent to each turbine structure. These will be constructed of crushed stone and will be 500mm in depth.

The turbines are to be linked by tracks 5-6m wide. These may require 500mm of topsoil to be stripped off or, alternatively, the tracks may be raised. The tracks will follow the edges of fields where possible but will be sited at least 3m away from the tops of field banks.

The main access to the site is anticipated to be from the north-west, utilising and widening the existing track south-east of Delameres (TM 0020 0640). Where the track passes underneath the overhead power line (TM 0085 0580), a control building and a one-storey 20m x 20m sub-station will be located. This area will also be used for the building compound as work progresses.

Cables will connect the turbines and lead to the sub-station. These will follow the lines of the unmetalled tracks, and it is anticipated that trenches 0.5-1m in depth and width will be required. The areas surrounding the turbines will be kept as cultivated land.

If one takes the area needed to accommodate the turbines as approximately 400 hectares, it is calculated that only 0.0053% of this area will be disturbed by the turbine bases, crane platforms and sub-station. Obviously, trenching for the cables and possible soil-stripping for the new trackways need to be taken into consideration as well, but the effect of these works is likely to be minimal.

6 Proposed evaluation and mitigation strategy

6.1 Some form of field evaluation will be required to locate, identify and assess the quality and extent of surviving archaeological remains on the site. This will be required before planning permission is determined. It will be up to the archaeological officer advising the Local Planning Authority (LPA) to decide on the level of field evaluation to take place.

Two options are proposed here, limited evaluation or full evaluation:

6.2 Limited evaluation

The disturbance caused by the wind farm to below-ground archaeological deposits would be extremely low in relation to the site area (see section 5), and therefore it may be decided by the LPA's archaeological advisor that this level of disturbance does not merit full archaeological evaluation. In this case, the most effective approach would be to only evaluate each element of scheme, as follows:

- a) A simple walkover (not a fieldwalking survey) of the fields where turbines are to be located should be carried out approximately two weeks after the fields have been ploughed (and ideally, harrowed). This should reveal any Iron Age and Roman salt-making sites ('red hills'), showing up as burnt spreads of earth in the ground. The walkover should inform the siting of the turbines.
- b) Trial-trenches would then be excavated, but only on the spots where the turbines, sub-station and control building are to be located. For example, a 5% sample of each turbine base would require a trench measuring 1.5m in width and 7.5m in length.
- c) If archaeologically significant remains were recorded in the trial-trench, the turbine or building could then be relocated to a part of the field where archaeological remains are absent or any damage to them would be acceptably low. However, this would require another trial-trench to test the alternative site.
- d) If it were not possible to relocate the turbine, the trench for the concrete base (and, if necessary, the crane platform area) could be fully excavated archaeologically.

The cost of this programme would be substantially less than evaluating the whole area (see section 6.3), and therefore would be the preferred option in terms of cost.

6.3 Full evaluation

Given the large area and its unknown archaeological potential, a full suite of field-evaluation techniques may be required. Usually fieldwalking (involving walking ploughed fields in transects and picking up surface artefacts) and geophysical surveys are followed by excavation of 3%-5% of the site by trial-trenches. Quick provisional estimates of the cost of evaluating a 400-hectare area are £30-50,000 for fieldwalking, £200,000 for a geophysical (magnetometer) survey and £1,000,000 for 3% trial-trenching. The following evaluation techniques are proposed:

- a) A fieldwalking survey of ploughed fields at least two weeks after they have been ploughed and harrowed will target red hills, medieval settlement and industrial areas on the former marshland. Earlier settlements, corresponding with cropmark sites, may be detected on the higher ground, ie along the southern side of Eastend Road and around the edge of the marsh. It is unlikely that any lithics or pottery from deeply buried Mesolithic or Neolithic peat deposits and buried land surfaces will have been ploughed up, and therefore these sites are unlikely to be detected by fieldwalking. It is also unlikely that they will be detectable by geophysics (see below).
- b) Geophysical survey should be carried out on selected areas, perhaps focusing on red hills and sites identified by fieldwalking. Magnetometer survey would be the quickest and probably most effective method as a scan can be carried out, followed by more detailed survey. Magnetometer survey should detect pits, ditches, kilns, hearths, ferrous debris, briquetage, pottery wasters, bricks and burnt material. However, magnetometer survey is unlikely to detect small features if they are more than 1m beneath the surface, and it does not usually detect structures. Alluvial cover may also have a bearing on the effectiveness of this technique. Magnetic susceptibility may be used in conjunction with magnetometer survey to locate areas of occupation or industrial activity. This technique may prove especially effective in locating ploughed-out red hills. Resistivity survey may locate WW2 anti-aircraft batteries or other structures.
- c) A programme of trial-trenching would subsequently be carried out in order to investigate features detected by fieldwalking and geophysics as well as to sample 'blank' areas. Again, the LPA's archaeological advisor would need to be consulted on the sample dug and their positions. It is suggested that target sites should include a red hill (to assess what damage has been caused by ploughing); an old sea wall; the ploughed-out duck decoy west of Glebe Farm; WW2 anti-aircraft sites; and undated earthworks seen within the SSSI field. Peat deposits and ancient land surfaces dating to the Mesolithic and Neolithic periods may occur on the site, buried under several metres of alluvium. If these deposits are present within the trial-trenches, soil samples can be taken to ascertain what type of environmental information they preserve and the degree of waterlogging. Some of these deposits, however, may lie at too great a depth to be sampled safely. If boreholes are drilled as part of a geotechnical survey prior to the development, the results should be made available to the archaeological curator and contractors concerned because this would give valuable information on the deeper deposits.

All work should be carried out following The Institute of Field Archaeology's *Standard and guidance on field evaluations* (revised 1999) and the Essex County Council's *Fieldwalking in Essex method statement* (1994).

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Checked by: Philip Crummy
Date: 10.12.04

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