Millour Hill Community Windfarm, Dalry

North Ayrshire

Archaeological assessment and mitigation strategy

For

Community Windpower

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Millour Hill Community Windfarm, Dalry

North Ayrshire

Archaeological assessment and mitigation strategy: March 2010

(project AA. 1870)

by Amanda Gow and Tanja Romankiewicz

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Millour Hill Community Windfarm, Dalry
North Ayrshire

Archaeological assessment and mitigation strategy

1. Introduction

i. General

Addyman Archaeology was contracted by Community Windpower Ltd (contact Richard Buckland) in order to complete first phase of archaeological works in advance of the potential development of a six-turbine windfarm at Millour Hill Community Windfam, near Dalry in North Ayrshire. The archaeological works included an archaeological assessment, walkover survey and mitigation plan. This was in response to a planning condition placed upon the proposed development of the site by North Ayrshire Council, and in discussion with the West of Scotland Archaeology Service (WoSAS), who advise the council in matters relating to archaeological and cultural heritage.

The planning condition stated that the mitigation strategy was to include proposals for the avoidance of known archaeological features and to allow for a watching brief during construction works, in order to mitigate the impact of the development against any previously unknown sites of potential archaeological interest.

A desk-based assessment was undertaken prior to the walkover survey to identify any previously known archaeological sites or other features of cultural heritage interest within the development site and in the surrounding area. The initial baseline survey was undertaken by Community Windpower Ltd. Addyman Archaeology reviewed and expanded the report, including the consultation of historic maps and aerial photographs for the proposed development site.

A one-day walkover survey was undertaken on 22 March 2010 by Amanda Gow and Tanja Romankiewicz. The aim of this walkover survey was to assess the character, extent and condition of the sites, monuments and landscape features identified by the desk-based assessment. The survey also aimed to identify any other features of cultural heritage interest not identifiable by the desk-based assessment alone.

To the immediate W of the proposed development site is the six turbine Dalry Community Windfarm, located in Wardlaw Wood. This windfarm, also managed by Community Windpower, became operational in 2006. There does not appear to have been any planning conditions placed upon this development, other than the basic baseline survey to identify known cultural heritage sites within the development area; none were identified. [i]

ii. Setting

The proposed site of the Millour Hill Community windfarm lies approximately 4km NW of Dalry in North Ayrshire, centred on NS 2600 5280. The proposed development area covers an area surrounding Cockrobin Hill (345m) and Baidland Hill (334m). The site is bounded by 20th century coniferous plantation to the N and by an access track to the S, leading westwards from Baidlandhill farm. The western side of the development area is directly adjacent to the Wardlaw Wood windfarm. The eastern edge of the site runs southwards from the SE corner of the forestry plantation in the N to Baidlandhill Farm in the S.

[i] Community WindPower 2004, Environmental Assessment – Wardlaw Wood, Dalry.

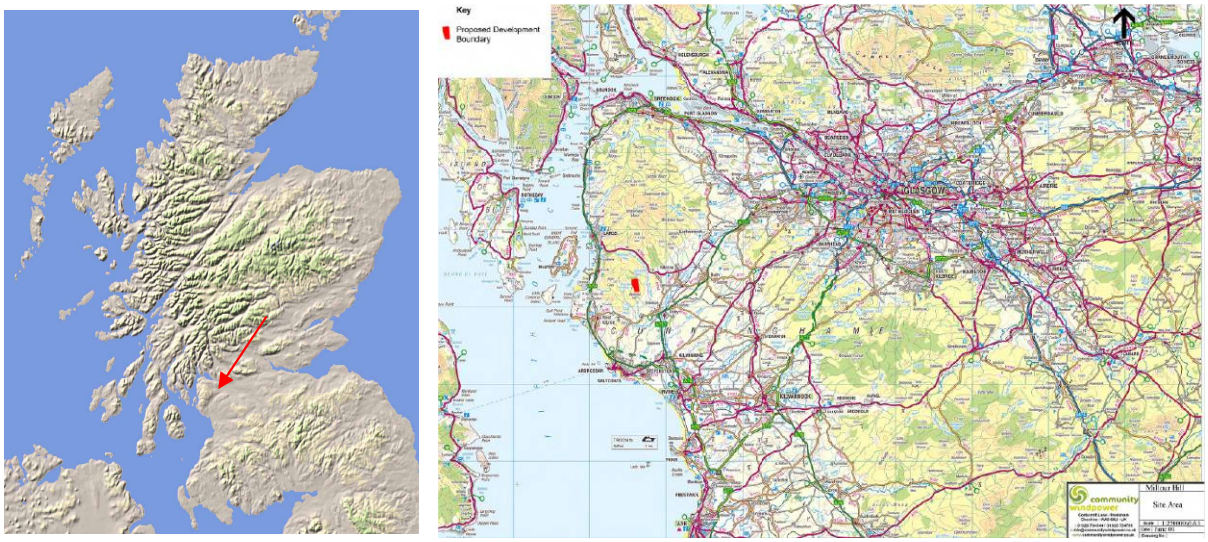

Figure 1: Site location map
Figure 2: Site location map, Community Windpower

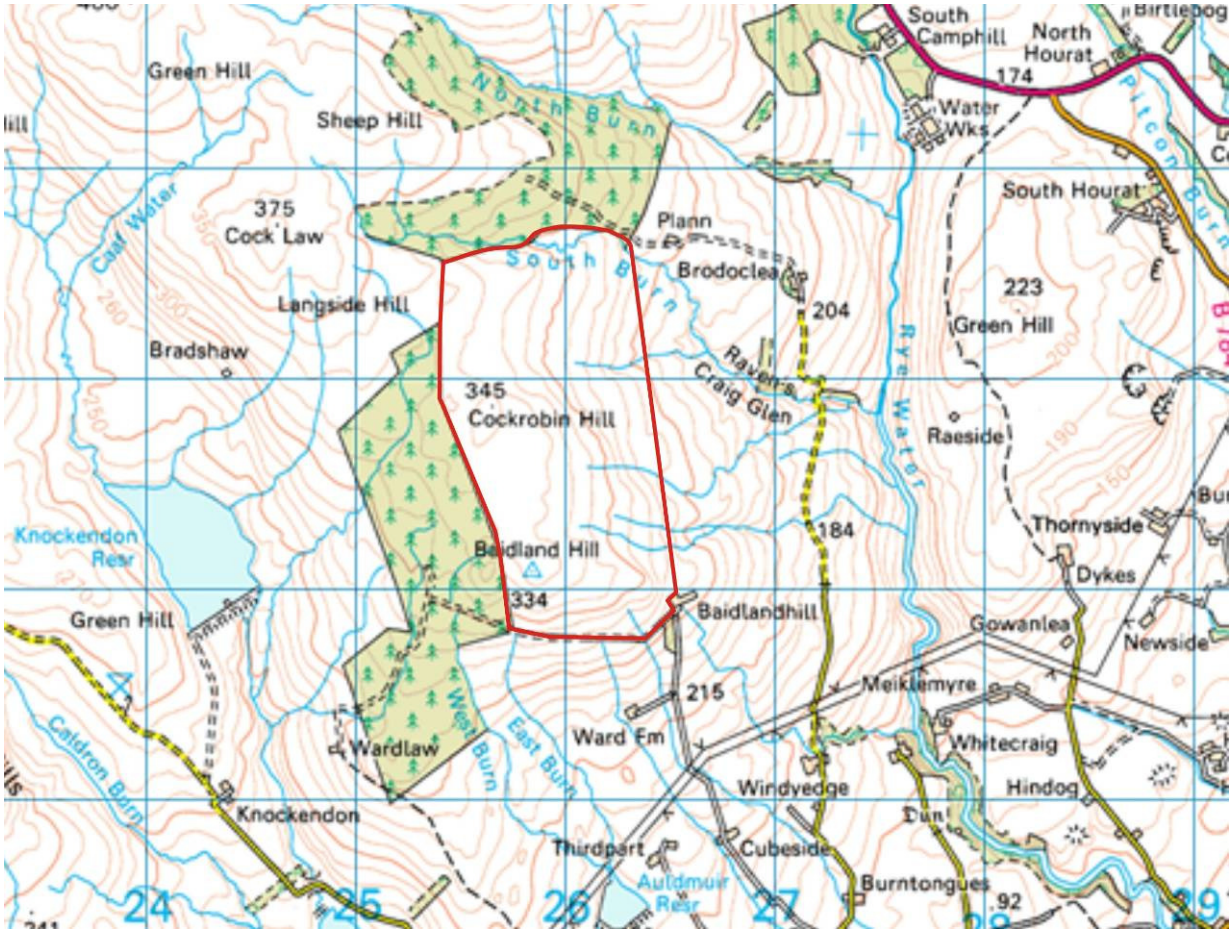

Figure 3: Site location map, main site area outlined in red

The Millour Hill windfarm development will utilise the same access road used during the construction of the Dalry Community Windfarm to enter the site at the centre of its western boundary. There will thus be no new impacts to the environment or cultural heritage resource in this respect. The site access tracks will extend from the centre of the W side of the proposed development site, running southwards and northwards to access the six proposed wind turbines (Figure 4).

2. Historical Assessment

A baseline survey of known cultural heritage sites was undertaken by Community Windpower Ltd in advance of the current archaeological assessment. This involved the consultation of the material held at the Royal Commission on the Ancient and Historic Monuments of Scotland (RCAHMS), utilising CANMORE and PASTMAP; the West of Scotland Archaeological Service (WOSAS) Sites and Monuments Record (SMR) and the North Ayrshire Councils list of Listed Buildings, Scheduled Ancient Monuments, Archaeological and Industrial sites, Designed Landscapes and Historic Gardens and Conservation Areas.
This baseline survey is intended to identify known sites of cultural historic interest within the proposed development area and for an area extending outwards for 4km. A number of sites of cultural heritage interest are identified within the 4km search area, but no site was found within the proposed development area. Each of the identified sites was allocated a unique identifier number and compiled within a gazetteer (see Appendix B).

Further research by Addyman Archaeology complemented and extended this baseline by consulting historic maps and aerial photographs covering the area of the proposed development site

iii. Known prehistoric occupation activity

The baseline survey did not identify any sites of known archaeological interest within the proposed development area. However, of the ten sites identified within the 4km search area, there are several which indicate the presence of prehistoric occupation activity. These include defensive sites such as Aitnock Fort (NMRS site no. NS25SE 8, baseline survey MH 1) and a possible dun of probably Later prehistoric, most likely Iron Age or Early Historic date, located just outwith the 4km search area to the SE, centred on NS 279 509. The latter is a Scheduled Ancient Monument (SAM - number 2866).

In addition, a number of cairns have been identified just outwith the 4km search area. These comprise Cauldron Hill cairn, to the SW of the search area boundary (NGR NS 2290 5115, NMRS site no. NS 25SW 8, MH 4), Little Cauldron cairn (NGR NS 2315 5100, NMRS site no NS25SW 12, MH 6), and a former cairn at Kaim Hill, outwith the search area to the W (NGR NS 2271 5342, NMRS site no NS 25SW 7, MH 3). At the S edge of the search area, at NGR NS2662 5069, lies Law Hill Cairn (NMRS site no. NS25SE 10, MH 23). Cairns are generally interpreted as early prehistoric burial markers.

There are also a number of find spots within or just outwith the search area, again indicating the presence of past human occupation activity in the general area. These include a gold torque found at Crosbie Hill (NGR NS 231 511, NMRS site no. NS25SW 9, MH 5), an early Bronze Age flat axe found at Knockendon Hill (NGR 243 510, NMRS site no. NS25SW 18, MH 9), a stone axe found at Hourat (NGR 28 54, NMRS site no. NS25SE 4, MH 13), a stone whorl and perforated slate disc at Ravenscraig (NGR NS 269 528, NMRS site no. NS25SE9, MH 14), and a slate whorl at Camphill Reservoir (NGR NS 268 556, SMR site no. 5723). See Appendix B for site locations and additional information.

In addition, a mound (possibly a fort) has been identified to the E of the proposed access track route, at Auldmuir, S of the development area (NGR NS 2641 4985, NMRS site no. NS24NE 1).

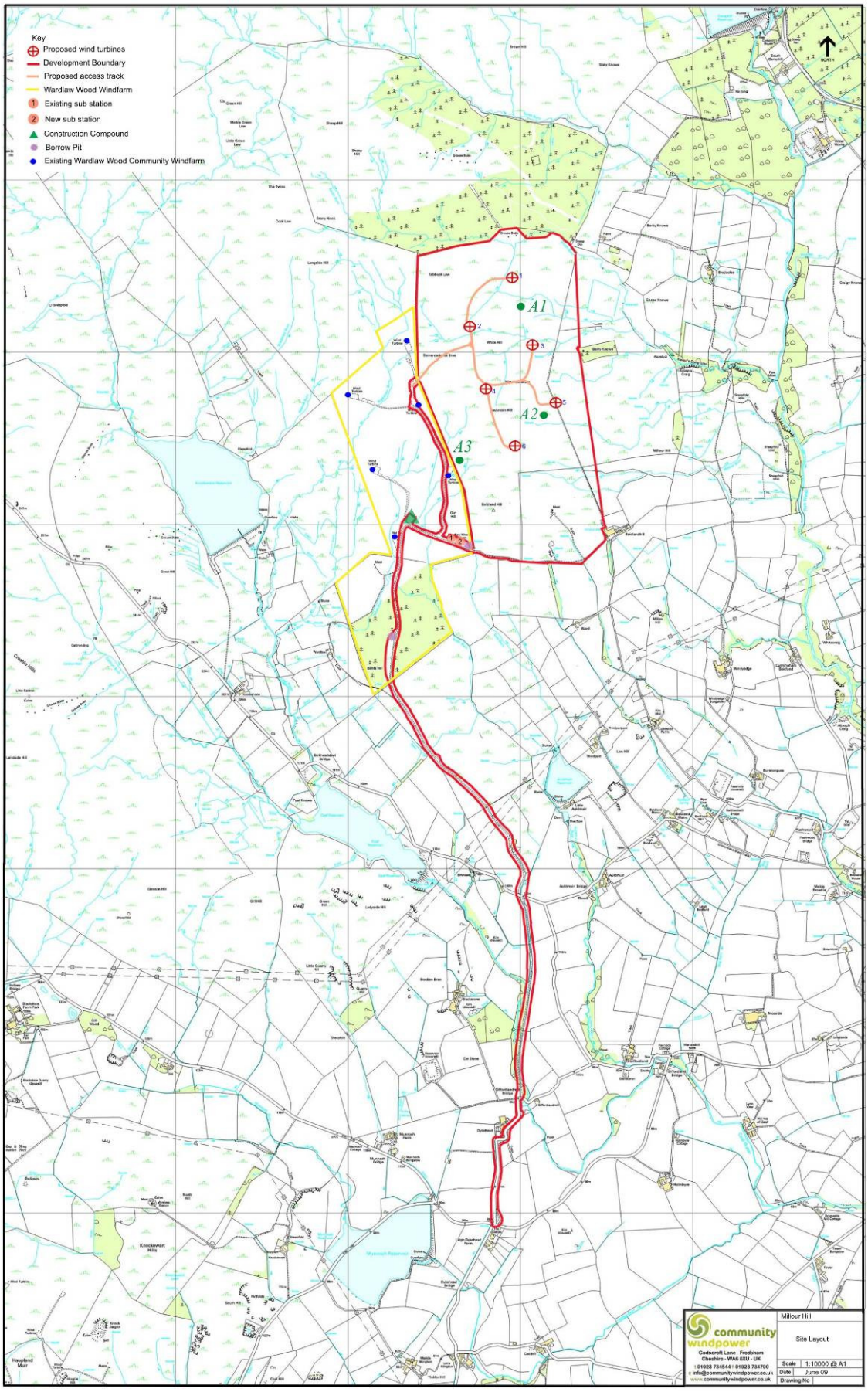

Figure 4: Proposed windfarm layout, with potential sites identified from aerial photographs marked.

iv. Potential prehistoric occupation activity – aerial photograph evidence

Consultation of the aerial photograph evidence (at TARA: The Aerial Reconnaissance Archives, held at RCAHMS) for the development site and the surrounding area revealed a small number of sites that could potentially be of archaeological and cultural heritage significance. Three potential features that could be of cultural heritage significance were recognised (A1-A3).

On the aerial photographic coverage from 1957[ii] a potential feature was identified in the N half of the site, on the S side of an east-west running burn (feature A1 - see Figure 4). This shows as a circular feature with linear marks extending southwards from either side. The 1972[iii] aerial photograph coverage revealed another potential site further to the S (feature A2); this was a circular feature, open on its W side. A similar potential feature was identified on the W side of the development area (feature A3), visible on the aerial photograph coverage from 1947.[iv]

It must be stressed that the ground conditions of the present development limits the identification of potential sites using aerial photographs. The very marshy ground and the different types of bog lands render it difficult to differentiate between possible archaeological and natural features. The walkover survey is designed to inspect these features in the field in order to make a more informed decision regarding their heritage significance. Previously unidentified sites and features of potential archaeological or cultural heritage significance within the development area, which have not and cannot be identified through desk-based assessment alone, should also be recognised during the walkover survey.

The features identified on the aerial photographs that could potentially be of archaeological and cultural heritage significance are not directly impacted upon by the proposed windfarm layout. No further mitigation action is therefore considered necessary with regards to these sites.

v. Historical occupation activity – map evidence

The pre-Ordnance Survey mapping of the area lacks the detail to directly identify evidence of human occupation activity. This might imply that there were few features meriting detailed mapping within the development area. The early maps show the principal roads (those leading from Dalry) and water courses in the area, such as the Rye Water and other smaller burns. General Roy's Military Survey of Scotland, 1747-55 map sheet for this area is blank, apart from a small marshy area and is therefore not included in the present report. Andrew Armstrong's map of 1775 (Figure 5) also shows the development area as blank, with three hills depicted to the N. The residence at Beedland, to the W of the Rye Water, is shown in landscaped grounds at the end of a long drive leading from the principal route from the W into Dalry. This is likely to be Baidland Manor (Listed building HB no. 1195, category C(S) listed, MH 2). The listings entry held by Historic Scotland describes this building as a 17th century single storey and attic 3-bay house. It is located just outwith the 4km search area to the S.

John Thomson's Atlas of 1832 (Figure 6) simply shows the development area depicted as marshy ground. Beedland Manour appears only as a name on the map marking a settlement spot ('Bedland'), while a larger house is now depicted further to the SE, associated with the name 'Birkett'. A house/farm depicted as Bedlandhill is now shown to the N of Windy Edge (visible on the previous map); this is likely to be the same hamlet / farm currently known as Baidlandhill, which forms the SE corner of the development site.

[ii] Library reference B-0431, Sortie S43-0010
[iii] Library reference OS-72/086, Sortie OS72-060
[iv] Library reference B-0172, Sortie CPE,UK.0261

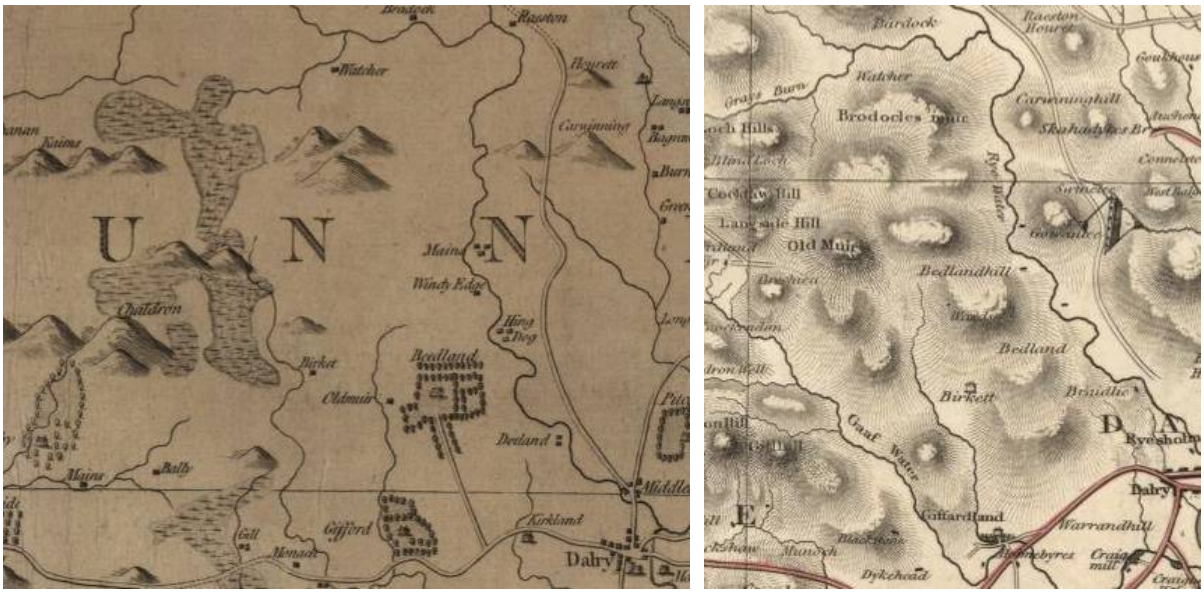

Figure 5: Andrew Armstrong's map of 1775, National Library of Scotland
Figure 6: Detail of John Thomson's Atlas of 1832, National Library of Scotland

The 1st Edition Ordnance Survey map of 1856 (Figure 7) shows the development area in detail. The site still appears generally void of any archaeologically or culturally significant sites or features. Only two significant sites apart from Baidlandhill farm are identified; Hillend Well to the NW of the farm and Black Quarry (a whinstone quarry) on the S side of an east-west running tributary for the Millour Burn.

There is little else shown within the development area on the 1st Edition OS map. The place name of 'Stoneroadends Brae', at the W side of the development area, just beyond the centre point, is interesting to note as this could indicate the former location of a road end. Immediately outwith the development area at the SE corner the farm of Baidlandhill is shown as a structure rectangular in plan, together with two smaller buildings at its NW corner. The farm buildings are set along the S boundary of a large square enclosure (Figure 8).

The only development since the publication of the 1st Edition OS map was the construction of a communications mast in the SE corner of the site, to the NW of Baidlandhill farm and improvement of a track approximately following the boundary of the development area in the E. This track is already outlined on the 1st Edition OS Map. The lack of development might be due to the marshy ground conditions.

3. Walkover survey

The walkover survey was designed to inspect the potentially archaeologically significant features identified in the desk-based assessment and in the analysis of the aerial photographic evidence. Any other, previously unidentified archaeological features might also be recognised.

The walkover survey was undertaken on Monday 22 March, 2010, by Amanda Gow and Tanja Romankiewicz. After the unusual heavy snow that occurred during the first months of 2010, the ground had eventually cleared of snow, but the conditions on the day of the survey were very foggy at the start. The fog lifted during late morning, and conditions improved allowing for sufficient assessment of the above-ground evidence of potential archaeological features.

Figure 7: 1st Edition Ordnance Survey map Ayrshire Sheet VII, six inch to the mile,
National Library of Scotland.

Figure 8: Detail of 1st edition Ordnance Survey map Ayrshire Sheet VII, six inch to the mile, showing Baidlandhill and Hillend Well, at the SE corner of the development area,
National Library of Scotland.

In general, the ground consists of bogland, the majority of it wet modified bog, and some patches of blanket bog along the SW boundary of the development area (compare Figure 5). The level ground on the plateau between Cockrobin Hill in the north / centre and Baidland Hill to the south is also covered with modified blanket bog, with some drier areas drained and grazed by sheep. The development site is identified as drained rough grazing on the Historic Landuse Map HLMAP, produced by Historic Scotland and RCAHMS, the improvement works most likely of post-medieval or modern date.

Along the W edge of the site, near a now removed plantation (Wardlaw Wood), there are a series of wetter boggy patches. On the E side of the site the ground slopes gently downwards to the E and a number of small tributary burns flow down the slope, joining the South Burn and the Rye Water outwith the proposed development area.

The hydrological and ecological survey undertaken as part of this windfarm project identified the land along the southern boundary and a large triangular area in the NE corner of the site as marshy grassland. A small triangular pocket of improved grassland is located in the SW corner of the site, directly associated it seems, with the use of the farm. Two larger areas in the centre / E part of the site contain springs and have been assigned as acid or neutral in character. While some drainage cuts were noted, the latter areas associated with the springs are particularly wet under foot.

The three areas (A1-A3) identified in the assessment of aerial photographs were targeted during the walk over survey. Site A1 was located in the northern part of the development site, within an area of flush/spring ground. It appeared as an oval / amorphous-shaped area of improved grasslands, but still relatively wet under foot. The site identified as A2, lies in close vicinity of the proposed wind turbine no. 5, in the centre-east area of the site. On inspection no landscape feature could be related to the evidence from the aerial photographs. It may be that the feature on the aerial image was simply a vegetation anomalism that has disappeared since the aerial photograph has been taken, or that ground conditions changed which obscured the identified feature. Nothing of potentially archaeological significance was identified in the immediate vicinity of the proposed turbine no. 5. Site A3 situated in close proximity of the western site boundary was identified as a circular feature, open to the W. The feature is a peat cutting of roughly circular form, with the relatively freshly cut edges indicating that this peat bank was in use in modern times.

The areas around the other wind turbines (nos. 1-4, 6) were also inspected, but no visible remains or indication of possibly buried archaeological features were recognised.

The only additional features identified in the walkover survey are three quarries (B1-B3), of which two were tentatively marked as cliff edges on the 1st Edition OS Map. These lie directly to the W of the track that roughly follows the eastern boundary of the development site. The quarries exploit the natural cliff edge, probably for building stone and chippings for the construction of the modern tracks in the area. Anecdotal evidence confirms that quarry site B2 was opened recently, probably within the last 50 years. The quarry marked on the 1st Edition OS Map as Black Quarry (B4) was not found during the walkover survey, but is assumed to have been on the eastern slopes of Baildland Hill.

The well to the NW of Baidlandhill farm was identified as a stone-set structure, now in the immediate vicinity of modern farm buildings. The original farmhouse and adjacent steading, probably of early to mid-19th century date are in good repair and have neatly dressed and tooled margins around the openings. While the main farmhouse building is painted in a yellow-cream, the steading to the E of it is painted in white. The farm buildings are not included in the development area.

Appendix A contains the photographs illustrating the discussed sites and areas.

4. Archaeological potential, impact and mitigation strategies

vi. Archaeological potential

The site generally consists of boglands. The growth of peat or boglands is generally associated with periods of worsening climate conditions at the end of the Neolithic period at around 2500BC (Whittington/Edwards 2003, 21f). Existing Neolithic and Early Bronze Age upland settlements above 200m OD were in general abandoned at around this time, due to the worsening ground conditions. Since no archaeological remains could be identified by surface inspection, it can be assumed that any archaeology buried under the bog, will most likely be early prehistoric in date. Such evidence can only be identified after the removal of the overlying bog deposits.

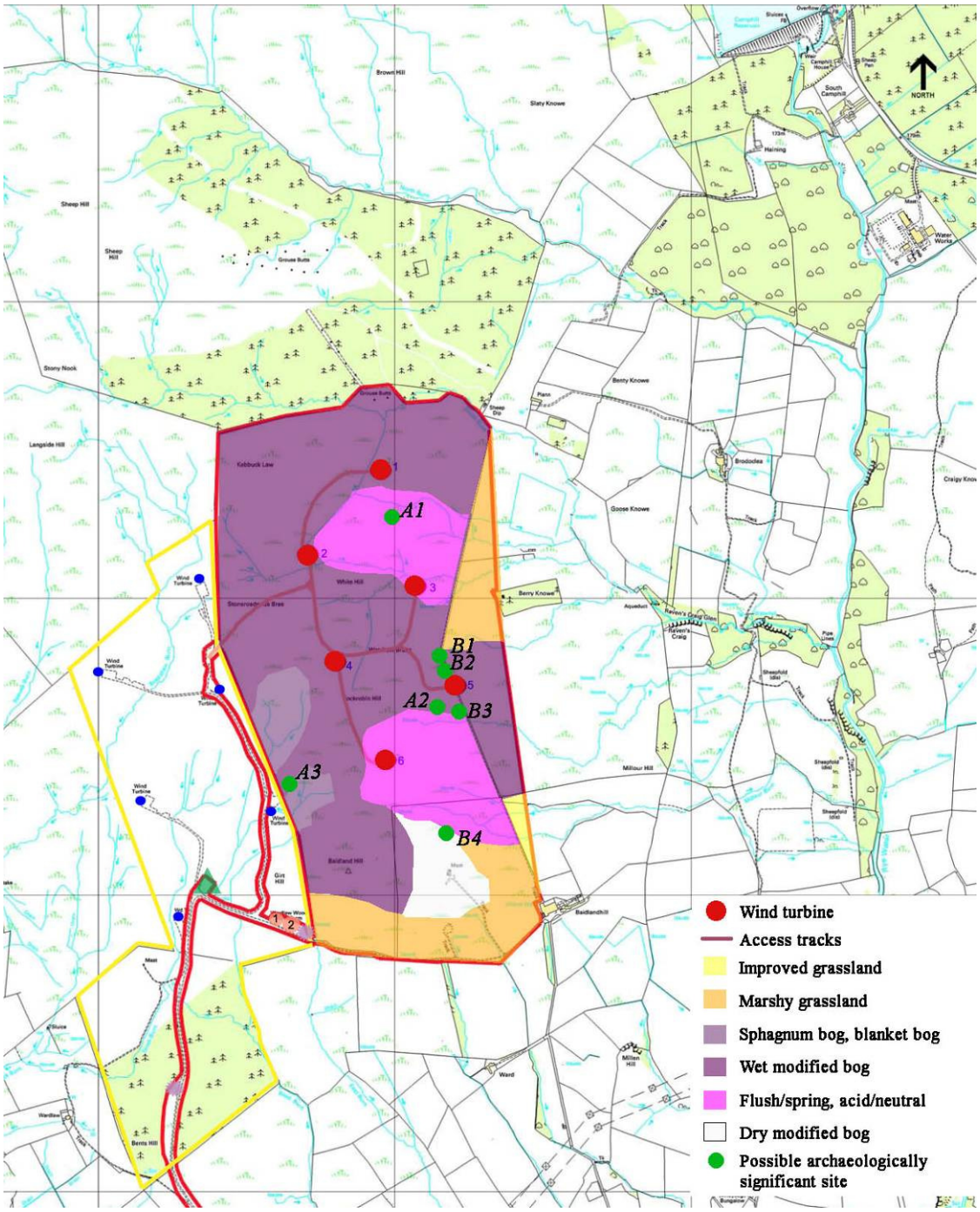

Figure 9: Development area and associated ground conditions and soil types in relation to identified sites of possible archaeological significance (see Appendix C).

vii. Direct development impact

Several direct impacts from the construction of the proposed windfarm upon possibly surviving evidence of archaeological and cultural heritage significance have been identified. Impacts may result from the construction of the turbine foundations, the excavation work, the construction of the access track, movement of heavy machinery and the installation of cables and/or services. As no sites of archaeological or cultural heritage significance have been identified within the development area by desk-based assessment and walkover survey, it is not possible at present to outline a mitigation strategy for any yet unrecognised sites, buried underneath the bog.

However, it may be the case that, once intrusive ground works begin, sites of potential archaeological or cultural heritage value are exposed and impacted upon. It is for this reason that the planning condition relevant to this development has already identified the need for an archaeological watching brief during construction works to mitigate the impact on potentially preserved archaeological features (see section 5 for further discussion).

viii. Mitigation strategies

If any sites of potential archaeological or cultural heritage significance are identified during the watching brief of the construction works, there are a number of options available in order to mitigate against the impact of the proposed development on the archaeological resource. These include avoidance, further evaluation, excavation, and further watching briefs. The most appropriate approach would need to be decided on a site-by-site basis and in consultation and agreement with WoSAS.

Avoidance

If any features of potential archaeological or cultural heritage significance are identified during the watching brief phase of the development, the first mitigation option to be considered should be avoidance. This would involve altering the proposed location or course of the construction aspect causing the direct impact on the archaeological feature. The alteration of the course and layout would have to be of a sufficient amount that it no longer causes a direct impact upon the archaeological feature in question.

Further evaluation

If the nature of potentially significant archaeological features is uncertain in the first instance, further investigation may be required. An archaeological evaluation would be designed to test the nature and extent of these archaeological remains in order to make an informed decision about the most appropriate mitigation strategy.

Excavation

Depending upon the nature of the archaeological sites/features identified during the watching brief and/or evaluation, and depending on the nature of the construction impacting upon them, it may be the case that 'preservation by record' is deemed the most appropriate mitigation method. This would involve the excavation, recording and study of archaeological sites by suitably qualified archaeologists, conforming to an accepted methodology (see section 5 for further discussion).

Watching brief

There is the potential for previously unknown sites of archaeological significance being revealed during the construction phase of the development. It is for this reason that the planning condition relevant to this development has already identified the need for an archaeological watching brief during construction works (see section 5 for further discussion).

5. Recommended mitigation strategy - watching brief and excavation

The planning condition placed on the windfarm development requires an archaeological watching brief to be carried out during the construction of the windfarm. This would involve the monitoring of any ground breaking works, such as the excavation of the turbine foundations, the installation of cables and services and the creation of the access track (although as the access track from the Dalry Windfarm will be re-used only the newly constructed sections will have to be monitored).

ix. Watching brief

As detailed above, any works which involved the excavation of ground would be required to be monitored by a suitably qualified archaeologist. The ground breaking works will be undertaken by the contractor, who will also be responsible for soil removal, but works will be monitored by a qualified archaeologist under watching brief conditions. If archaeologically significant remains are identified during the Watching Brief, a qualified archaeologist will take over formal investigation of the feature(s). Any archaeological remains encountered will need to be recorded and investigated / sampled as per recording standards which comply with the Institute for Archaeologists (IfA) recording standards.

If archaeological finds are recovered during the watching brief stage, they will have to be formally recorded, cleaned / conserved where necessary and studied appropriately.

The proposed archaeological watching brief will have to be reported upon and all material, drawings, reports, site records and photographs will have to be catalogued and deposited in a suitable archive, most suitably with the National Collection of buildings, archaeology and industry held by the *Royal Commission on the Ancient and Historical Monuments of Scotland* (RCAHMS). A short description of the works will also need be submitted for the annual edition Discovery & Excavation Scotland (DES), published by *Archaeology Scotland*.

A Written Scheme of Investigation will need to be prepared in advance of the Watching Brief and agreed with WoSAS, in advance of the work commencing. This will identify the objectives, scope, geographical area and means of dissemination of the watching brief.

ii. Excavation

The identification of archaeologically significant material *in situ* during monitoring may result in the requirement for formal archaeological excavations. This will be determined after monitoring works have commenced and in consultation with WoSAS. The archaeological remains being excavated will need to be recorded and sampled as per recording standards agreed with WoSAS.

With the excavation of archaeologically significant features, there is the potential for archaeologically significant artefacts or anthropogenic material to be recovered which may require separate study and scientific analysis. The anticipated minimum level of work from any excavation would entail some degree of post-excavation work such as the processing, cataloguing and study of recovered finds and environmental samples. This would normally be assessed after the completion of the excavation work and would require the submission of a Post-Excavation Project Design proposal. If substantial significant archaeological remains are found, the post-excavation requirements may be substantial.

If significant archaeological remains are recovered and studied as part of the post-excavation analysis, it may become a condition to publish the results from this analysis. Any pre-publication work such as writing, editing and illustrations will have to be assessed separately, along with a new project design proposal for post-excavation analysis. This work might require further historical research, possibly of primary sources, which will have to be agreed at any future stage of the project.

References

Whittington, G., Edwards, K.J., 2003, 'Climate Change', in: *Scotland after the Ice Age. Environment, Archaeology and History, 8000 BC – AD 1000*, Edwards, K.J., Ralston, I.B.M., (eds.), Edinburgh University Press, Edinburgh, 11-22.

Appendix A

Site photographs

Plate 1: Baidlandhill farm buildings from S.

Plate 2: Small burn running southwards to W of Baidlandhill farm.

Plate 3: Modern communication mast in S area of the development site.

Plate 4: General view to NE at communication mast.

Plate 5: View to SE of development site with on which communication mast is situated and roofs of Baidlandhill farm (to left).

Plate 6: View to SE from western boundary of development site, showing trig point and communication mast

Plate 7: View to E, drystone wall in foreground marks western boundary of development site. Some drainage cuts were noted in this area.

Plate 8: View along western boundary of development site to NNW, wind turbines of Wardlaw Wood windfarm.

Plate 9: Area of possible site A3, peat cuttings.

Plate 10: Central area of development site with wind turbine marker No. 4.

Plate 11: Area to NW of development site, position of turbine marker 2, looking NE.

Plate 12: View to NW of site towards Stoneroadendsbrae.

Plate 13: View to NE boundary of site, area A1 in distance (arrow)

Plate 14: Detail of area A1, improved land.

Plate 15: Area A1 in background, wind turbine marker 1 in foreground.

Plate 16: Quarry B1 at E part of development site, along the E track.

Plate 17: Quarry B2, at E part of development site, along the E track, south of B1.

Plate 18: Quarry B3, at E part of development site, along the E track, to S of B2.

Plate 19: Wind turbine marker no. 5, immediately to E of track.

Plate 20: Area of marker 6, S of central area of site.

Plate 21: Possible area for Black Quarry site, to SE of communication mast.

Plate 22: View of Baidlandhill farm to S from track in E.

Plate 23: Area of Hillend well to NW of Baidlandhill farm.

Plate 24: Detail of Hillend well site.

Appendix B

Baseline survey – Archaeology and Cultural Heritage assessment

SECTION 11 ARCHAEOLOGY AND CULTURAL HERITAGE

11.1 INTRODUCTION

This section summarises the results obtained from an archaeological desktop assessment of the Millour Hill Windfarm site, extending outwards to cover a 4km search area. For any archaeological sites within this area, recommendations are made to reduce the impact of the windfarm on these sites and the requirements for further evaluation and mitigation of any potential impacts. The limits of the study area are shown in Figure 11.1

11.2 AIMS AND OBJECTIVES

The aim of this section is to make an assessment of the proposed Millour Hill development on the known and possible archaeological sites within the study area of 4km around the centre point of the windfarm site. The main objectives of the assessment are:

- To identify and define archaeological and heritage resources within the search area.
- To establish the likely archaeological potential of the study area, from existing evidence and resources.
- To provide recommendations on the need for further study, evaluation and mitigation for archaeological resources, where necessary.

11.3 LEGISLATION AND POLICIES

STATUTORY LEGISLATION

Table 11.1 indicates the statutory legislation, which is currently in place, to protect the archaeological and cultural heritage of Scotland, which are relevant to the contents of this chapter.

Table 11.1 – Statutory legislation for the protection of archaeological and heritage sites.

Legislation	Jurisdiction	Key points
Ancient Monuments and Archaeological Areas Act 1979	Historic Scotland/ Scottish Office	Provides statutory protection for all scheduled ancient monuments of national importance. It is a criminal offence to work on or near a scheduled ancient monument without written consent from Scottish Ministers.
Town and Country Planning (Scotland) Act 1997	Scottish Office/ North Ayrshire Council	Establishes the framework for determining planning applications, the role of the local planning authority and the role of Development (Structure and Local) Plans within the process.
Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997	Scottish Office/ North Ayrshire Council	Provides statutory protection for Listed Buildings and conservation areas. Listed building consent is required for all internal and external works affecting the character of the building.
Treasure Trove 'bona vacantia'	Historic Scotland	All finds must be reported to the Treasure Trove Advisory Panel to be assessed.

NON-STATUTORY PROTECTION

The table below (Table 11.2) identifies the non-statutory protection and various documents available for the protection of archaeological and cultural heritage sites in Scotland.

Table 11.2 – Non-statutory protection for archaeological and heritage sites

Document	Jurisdiction	Key points
Scottish Planning Policy 23- Planning and the Historic Environment	Scottish Government	Sets out the national planning policy for historic environment with a view to its protection, conservation and enhancement.
National Planning Policy Guideline 5 – Archaeology and Planning	Scottish Office/ North Ayrshire Council	Sets out Government policy on how archaeological remains/discoveries are dealt with within the existing development plan and development control processes
Planning Advice Note (PAN) 42 –Archaeology and Scheduled Monument Procedures.	Scottish Office	Supports NPPG5 (see above) Provides advice on the handling of Archaeological matters within planning process.
National Planning Policy Guideline 18 – Planning and the Historic Environment	Scottish Office/ North Ayrshire Council	Government policy on planning and the historic environment (e.g. listed buildings, conservation sites, historic parks & gardens, world heritage sites and battlefields) within existing legislative framework.
The Inventory of Gardens and Designed Landscapes in Scotland (1987)	Historic Scotland/ North Ayrshire Council	Planning Authorities must consult Scottish Ministers if a development affects 'an historic garden or designed landscape' listed in the Inventory.
The Treatment of human remains in archaeology, Historic Scotland Operational Policy Paper 5	Historic Scotland	Provides framework for responding to discoveries of human remains during archaeological excavations, in accordance with Scots Law.

DEVELOPMENT PLAN POLICY

The North Ayrshire Local Plan and the Ayrshire Joint Structure Plan both include policy and guidance on Cultural Heritage. They provide protection through the planning process for Conservation Areas, Listed Buildings, Scheduled Ancient Monuments, archaeological sites, Designed Landscapes and Historic Gardens and local landscapes of historic interest. These policies are listed and summarised- in tables 11.3a and 11.3b below:

Table 11.3a – Development Plan Policies from the North Ayrshire Local Plan

Document	Key Points
Countryside and Natural Environment Policy ENV 5A: Clyde Muirshiel Regional Park	Provides for the protection of Clyde Muirshiel Regional Park including the protection of its built heritage.
Built Environment Policy BE 1: Development in Conservation Areas	Provides for the protection of the historical/ architectural character of a conservation area.
Built Environment Policy BE 2: Development adjacent to conservation areas	Provides for the protection of the historical/ architectural character of conservation areas from the significant adverse effects of development proposals adjacent to these areas.
Built Environment Policy BE 5: Listed Buildings	Provides for the protection of the development of a Listed Building or its setting or any features of special architectural /historical interest. Provides for the extension of or alterations to Listed Buildings. Existing architecture & building materials should be maintained and restoration carried out.
Built Environment Policy BE 9: Scheduled Ancient Monuments	Provides for the protection of Scheduled Ancient Monuments.
Built Environment Policy BE 10: Archaeological Sites	Provides for the protection of sites of archaeological significance. If preservation cannot be achieved, excavation and recording of the site will be required before any development may proceed.
Built Environment Policy BE 11: Designed Landscapes and Historic Gardens	Provides for the protection of Historic Gardens and Designed Landscapes.
Built Environment Policy BE 12: Local Landscapes of Historic Interest	Provides for the protection of landscapes of local historic interest, identified by the Garden History Society.

Table 11.3b – Development Plan Policies from the Ayrshire Joint Structure Plan

Document	Key Points
Environment Policy ENV 1	Provides for the protection and enhancement of local characteristics including historic landscapes.
Environment Policy ENV 6	Provides for the protection of Listed Buildings of architectural and historic interest, designated conservation areas, historic gardens and landscapes and archaeological locations.
Environment Policy ENV 7	Provides for the protection international and national natural heritage designations.

National Planning Policy Guidance

In preparing the detailed environmental impact assessment for the proposed windfarm, Community Windpower Ltd will be guided by all relevant national planning policies and local authority development plan policies.

Relevant national planning policy guidance includes:

- Renewable Energy: SPP 6.
- Planning and the Historic Environment: SPP 23.
- The Planning System: NPPG 1.
- Archaeology and Planning: NPPG 5.
- Renewable Energy Developments: NPPG 6.
- Planning and Waste Management: NPPG 10.
- Natural Heritage: NPPG 14.
- Rural Development: NPPG 15.
- Planning and Historic Environment: NPPG 18.
- Renewable Energy Technologies: PAN 45.
- Archaeology and Scheduled Monuments Procedures: PAN 42.
- Planning and Noise: PAN 56.
- Design Statements: PAN 68.
- Development in the Countryside and Green Belts: SDD Circular 24/1985.
- Agricultural Land: SDD Circular 18/1987.
- Habitats Directive: SOED Circular 6/95 (as revised June 2000).
- Scottish Executive Interim Guidance on European Protected Species, Development Sites and the Planning System.

11.4 STUDY METHODOLGY

In this section only the physical impacts of the windfarm proposal on archaeological and cultural heritage sites are considered. The visual impacts have been assessed and discussed separately.

DESK-BASED ASSESSMENT

A desk-based assessment was carried out for this chapter, with data collected from the following sources:

Table 11.4 – Data sources used in the desk-base assessment of archaeological and heritage sites.

Data Source	Evidence obtained
Royal Commission on the Ancient and Historic Monuments of Scotland (RCAHMS). The PASTMAP and CANMORE services used	Scheduled Ancient Monuments National Monuments Record of Scotland – list of known sites/monuments of archaeological interest (NMRS) Statutory List of Buildings of Special Architectural or Historic Interest Historic Gardens and Designed Landscapes
West of Scotland Archaeological Service	Scottish Sites and Monuments Record – list of known sites/monuments of archaeological interest (SMR)
North Ayrshire Council	List of Listed Buildings List of Scheduled Ancient Monuments List of Archaeological and Industrial Archaeological sites Designed Landscapes and Historic Gardens & Local Landscapes of Historic interest Conservation Areas

11.5 Gazetteer

All the sites identified in the desk-based assessment have been allocated a unique identification number (e.g. MH site 1) and they have been incorporated into a gazetteer. In the gazetteer there are details of each archaeological site and record, their importance, the likely impact of the proposal on these archaeological sites and the proposed mitigation. The gazetteer is included as Appendix 11.1.

11.6 Assessment of Impact

The archaeological and heritage resources identified in the gazetteer have been classified to reflect their relative importance, based on the available information, in correlation with the criteria defined in Table 11.5.

Table 11.5 – Criteria for defining the importance of Archaeological and heritage sites and associated mitigation response.

	High	Medium	Low	Negligible	Unknown
Description	Internationally and nationally important resources, legally protected and non-scheduled	Regionally important resources not legally protected of a reasonably defined extent, nature and date and significance	Locally important resources of low or minor importance	Resources which have little or no archaeological value, or where remains have been previously destroyed	Resources whose archaeological importance is unknown, sites of uncertain character or date
Examples	Scheduled Ancient Monuments, Listed Buildings	Burial Sites, Deserted Medieval villages, Roman roads, dense scatters of finds	Field systems, ridge and furrow, old field boundaries	Modern field boundaries, drains and ponds	Single find spots, unidentified features on aerial photographs

IMPACT

The impact of the proposed development has been assessed, by comparing its land-take against the locations of the known archaeological and heritage resources. The magnitude of any impact has been assessed according to the scale outlined in Table 11.6.

Table 11.6 – Criteria for determining the magnitude of impacts

Magnitude	Description
Large	Complete or almost complete destruction of deposits.
Medium	A high proportion of deposits are destroyed or damaged.
Small	A small proportion of the surviving deposits are damaged or destroyed.
Negligible	Deposits will not be affected, because of distance or method of construction.
Uncertain	The extent or nature of the deposits is unknown, or construction techniques have not yet been determined.

The significance of any impact created by the proposal has been assessed by comparing the importance of the known archaeological resources against the magnitude of the impact upon them. The significance of impact has been quantified in relation to Figure 1.2 in Section One.

11.7 Limitations of the Assessment

DATA SOURCES

The information held by public data sources is usually considered to be up to date and reliable, however the Sites and Monuments Record (SMR) is considered to be more limited. This is because it depends on random opportunities of research, fieldwork and discovery. Also there is often a lack of dating evidence for sites of archaeological interest. Therefore, it must be remembered that this report can only assess the evidence, which is currently available. Consequently, there are may be archaeological sites and heritage features whose existence cannot be detected without more detailed survey; and previously unrecorded sites could survive within the area affected by the proposed windfarm.

IMPACT ASSESSMENT

The limitations of the impact assessment include:

- The lack of clarity surrounding the extent of some sites, which makes it difficult to provide a precise assessment of potential impact;
- The possibility that unknown sites will be discovered.

The development of mitigation strategies should take these points into consideration.

11.8 Existing Environment

The data gathered for the 4 km study area during the desk based assessment identified that there are no sites of archaeological and cultural heritage significance within the proposed windfarm site boundary, and ten sites are located in the whole study area. A further 18 sites are identified outside the study area, but in close proximity to it. Details of these sites and their significance are included in the gazetteer in Appendix 10.1 and their location is shown on Figure 10.1

Scheduled Ancient Monuments

According to Historic Scotland (HS), the National Monuments Records for Scotland (NMRS), North Ayrshire Council and the West of Scotland Archaeology Service (WoSAS), there are no Scheduled Ancient Monuments (SAM) within the 4 km study area, however there is one SAM (Aitnock Fort), which is approximately 250m outside the study area.

Listed Buildings

The records from HS, NMRS, WoSAS and North Ayrshire Council show that there are no Listed Buildings within the study area, although there is one approximately 300m outside this area, which is the 17th century Baidland Manor.

Historic Parks and Gardens

According to the HS, NMRS, WoSAS and North Ayrshire Council, there are no Historic Parks and Gardens within the Study Area.

Non-scheduled Archaeological Sites and Monuments

Of all the 28 sites identified, none of them are within the boundary of the proposed windfarm and only 10 sites are actually within the 4 km study area. These ten sites consist of five sites of unroofed buildings, some of which are attached to walls and may have originally been sheepfolds (MH 10, MH 15, MH 16, MH 19, MH 25), one turf bank (MH 8), one cairn (MH 23) and three sites where discoveries have been made of various items (MH 7, MH 9, MH 14).

The remaining sixteen sites are all located outside the 4 km study area, but are within close proximity to it, and include three cairns, six sites of unroofed buildings/sheepfolds (MH 17, MH 18, MH 20, MH 26), two of which are actually underwater due to the damming of Rye Water (MH 11 and 12), a crop mark of a former enclosure (MH 21), a well which is dedicated to St. Finan (MH 22), a limekiln (MH 28). There are also four sites where items have been found which include a slate whorl (MH 27), human bones (MH 24), a gold Torc (MH 5) and a stone axe (MH 13).

11.9 Archaeological Potential

The majority of the identified archaeological and cultural heritage sites are located in the southern half of the study area, with none located in the area outlined for the proposed wind turbine locations. The data collected suggests that there is a low possibility of additional archaeological sites being present within close proximity to the proposed turbine locations. Any undiscovered archaeological or heritage resources are more likely to be encountered in the southern area of the study area, closer to areas of settlement.

11.10 Assessment of Impacts

The impact of the proposed development on archaeological and cultural heritage sites within the study area has been assessed by comparing the location of each site against the proposed locations of the turbines, access track and construction compound. The activities, which are associated with the construction of the proposed windfarm, which could impact on these archaeological and cultural heritage sites include:

- Construction of the turbine foundations
- Excavation work
- Construction of the access track
- Movement of heavy machinery
- Installation of the cables

However, of the known archaeological or cultural heritage sites, there are none within the proposed windfarm boundary. For the ten known sites within the 4 km study area, they are

considered to be too far from the proposed development for there to be any significance of impact, which is also the case for those sites located outside the study area.

Construction Phase – Direct Impact

There are no known sites of archaeological or cultural heritage interest within the proposed windfarm boundary, on which development would have a direct impact.

Construction Phase – Indirect Impact

There are no known sites of archaeological or cultural heritage interest within the boundary of the proposed windfarm on which development may have an indirect impact.

Operation Phase

The operation of the proposed windfarm development would not have any impact on any known or potential archaeological or cultural heritage sites in this area.

11.11 Potential Archaeological Remains and Cultural Resources

In addition to the known archaeological and heritage resources, it is possible that the study area contains further archaeological remains within the proposed development boundary and 4 km study area. There is always the potential for undiscovered archaeological sites and remains to be found, which the proposed development could have an impact on.

11.12 Proposed Mitigation

In general, it is proposed that a range of mitigation procedures are followed in order to avoid, reduce or offset the possible impacts, which could occur. The recommended approaches to archaeological mitigation in accordance with NPPG5 are as follows:

- Avoidance - Where possible, archaeological and cultural heritage sites should be avoided by the scheme with modifications to the turbine locations and construction work.
- Further evaluation – It may be appropriate to undertake further work on certain sites to determine the potential nature and extent of the archaeology prior to construction works commencing.
- Excavation – It may be appropriate to record certain sites, prior to construction through a programme of archaeological excavation carried out in advance of any construction works commencing.
- Watching Brief – There is always a possibility for previously undiscovered archaeological sites to be found during fieldwork. So to ensure that any such sites are adequately identified and recorded, an archaeological watching brief may be necessary during the construction phase.

Construction Phase

Prior to construction within the proposed windfarm site boundary, it is recommended that a written scheme of investigation for archaeological mitigation work is prepared for approval by the Planning Authority, which will include:

- The provision of a watching brief on all ground breaking construction works and for the excavation and recording of any archaeological discoveries which are made during this.

Post Excavation

On completion of all archaeological fieldwork associated with the watching brief carried out during construction and site-specific mitigation, a comprehensive programme of post-excavation assessment, analysis, reporting and publication will be implemented. The post-excavation programme will also be subject to a written scheme of investigation, to be discussed and approved by the Planning Authority.

11.13 Residual Impacts

The overall impact of the proposed windfarm scheme on the archaeological and cultural heritage resources of the study area is considered to be of negligible significance.

Appendix 11.1 Gazetteer of Archaeological and Cultural Heritage

Millour Hill (MH) site number	Site Classification	National Grid Reference	Site	Description	Site Importance	Site Impact	Significance	Recommendations
MH 1	Scheduled Ancient Monument Index No. 2866	NS 279 509	Aitnock Fort (Dun)	Ruins of an old fort, approx. 30 ft in diameter, defended by stone wall and a horse-shoe shaped ditch.	High	Negligible	None	None
MH 2	Listed Building HB No. 1195 Category C(S) local interest	NS 268 503	Baidland Manor, Dalry	17th Century single storey and attic 3-bay house	High	Negligible	None	None
MH 3	NMRS No. NS25SW.7. SSMR No. 5808	NS 2271 5342	Kaim Hill, 'Standing Jock'	Former Cairn	Low	Negligible	None	None
MH 4	NMRS No. NS25SW.8. SSMR No. 5809	NS 2290 5115	Caldron Hill	Cairn	Low	Negligible	None	None
MH 5	NMRS No. NS25SW.9. SSMR No. 5810	NS 231 511	Crosbie Hill	A gold Torc (twisted ring) found here	Unknown	Negligible	None	None
MH 6	NMRS No. NS25SW.12. SSMR No. 5785	NS 2315 5100	Little Cauldron	Turf-and-moss covered cairn	Low	Negligible	None	None
MH 7	NMRS No. NS25SW.36. SSMR No. 41792	NS 2378 5160	Green Hill	Five World War II spigot mortar mountings spread over slope	Unknown	Negligible	None	None
MH 8	NMRS No. NS25SW.17. SSMR No. 5790	NS 2398 5152	Green Hill	Fragmented, curvilinear turf bank	Low	Negligible	None	None
MH 9	NMRS No. NS25SW.18. SSMR No. 5791	NS 243 510	Knockendon Hill	Early Bronze Age flat axe found	Unknown	Negligible	None	None
MH 10	NMRS No. NS25SW.39. SSMR No. 41520	NS 2451 5189	Bradshaw Burn	Farmstead and two unroofed buildings	Low	Negligible	None	None
MH 11	NMRS No. NS25NE.18.	NS 2716 5503	Camphill Reservoir	Former farmstead and two unroofed buildings, currently underwater due to damming of Rye Water	Low	Negligible	None	None
MH 12	NMRS No. NS25SE.21.	NS 2717 5490	Camphill Reservoir	One unroofed building, currently underwater	Low	Negligible	None	None
MH 13	NMRS No. NS25SE.4.	NS 28 54	Hourat	Stone axe found	Unknown	Negligible	None	None
MH 14	NMRS No. NS25SE.9.	NS 269 528	Ravenscraig	Stone whorl and perforated slate disc found	Unknown	Negligible	None	None

MH 15	NMRS No. NS25SE.28.	NS 2723 5273	Rye Water	Remains of unroofed building/ sheepfold attached to wall	Low	Negligible	None	None
MH 16	NMRS No. NS25SE.29.	NS 2727 5253	Rye Water	Unroofed building	Low	Negligible	None	None
MH 17	NMRS No. NS25SE.30.	NS 2750 5246	Rye Water	Unroofed building/sheepfold	Low	Negligible	None	None
MH 18	NMRS No. NS25SE.33.	NS 2760 5206	Rye Water	Unroofed structure attached to a wall	Low	Negligible	None	None
MH 19	NMRS No. NS25SE.32	NS 2722 5202	Rye Water	Unroofed building attached to a wall	Low	Negligible	None	None
MH 20	NMRS No. NS25SE.27.	NS 2785 5281	Rye Water (Raeside)	Farmstead comprising one unroofed building, two roofed buildings	Low	Negligible	None	None
MH 21	NMRS No. NS25SE.13.	NS 2817 5101	Hindog	Crop mark of a former enclosure	Low	Negligible	None	None
MH 22	NMRS No. NS25SE.12.	NS 28 51	St. Finan's Well	Well dedicated to St. Finan	Low	Negligible	None	None
MH 23	NMRS No. NS25SE.5.	NS 2662 5069	Law Hill	Cairn	Low	Negligible	None	None
MH 24	NMRS No. NS25SE.10.	NS 2686 5027	Baidland Mains	Human bones discovered AD1800	Medium	Negligible	None	None
MH 25	SSMR No. 17698	NS 2451 5190	Bradshaw	Unroofed building	Low	Negligible	None	None
MH 26	SSMR No. 41523	NS 2752 5229	Rye Water	Unroofed building/sheepfold attached to a wall	Low	Negligible	None	None
MH 27	SSMR No. 5723	NS 268 556	Camphill Reservoir	Slate whorl found	Unknown	Negligible	None	None
MH 28	SSMR No. 51407	NS 2820 5118	Hindog	Limekiln	Low	Negligible	None	None

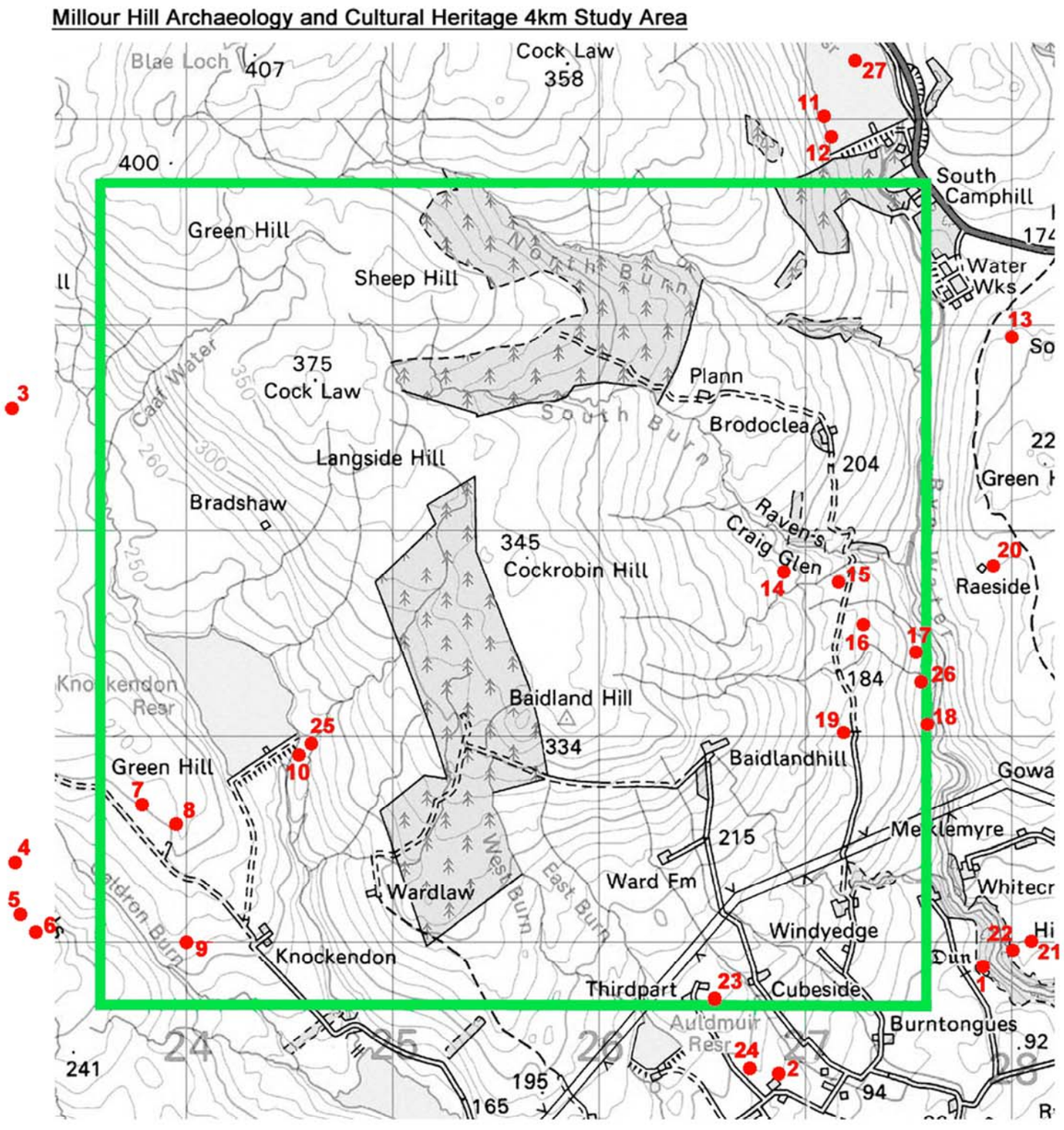

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Figure 1 - Map of the proposed Millour Hill Community Windfarm and surrounding area, showing the 4km study area used for the search of Archaeological and Cultural Heritage sites and the location of these sites.

Key

- Boundary of 4km study area
- Archaeological site
- 6 Millour Hill (MH) Site Number

0 1km 2km

Scale 1:50 000

Millour Hill Community Windfarm

Environmental Statement

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Appendix C

Site Hydrology and Ecology assessment

Section 9 Site Hydrology and Ecology

9.1 Introduction

This section identifies the potential impacts of the construction and operation of the windfarm to the site hydrology and designs appropriate measures to mitigate these impacts. The assessment was undertaken by RSK ENSR Group plc during the design phase of the project so that any major potential impacts could be minimised or removed. Their report is presented here in its entirety.

The importance of protecting watercourses generally and any potential impacts on the nearby reservoirs have been minimised from the outset of the project. Section 6 addresses the construction methods that would be adopted at the site. This includes the track, foundation and other infrastructure designs for the various elements of the project. Typical methods for the avoidance of water contamination are well understood from forestry, SEPA and windfarm industry guidelines and include a variety of measures including attenuation ponds, appropriate drainage and other recognised prevention methods.

It is not possible, prior to consent of a project, to adequately undertake a full site investigation of the site to a level required for the detailed design of the site. For this reason the following approach is proposed:

Following consent of the project, should this be forthcoming, a detailed site investigation, including a geotechnical assessment and other surveys of the site, would be commissioned as part of the pre construction works at the site. These surveys would inform the detailed construction designs for the individual elements of the site.

Measures to minimise and avoid the potential for any pollution event arising that could affect the water quality of adjacent water courses would be discussed and agreed, where appropriate, with the relevant statutory parties prior to the conclusion of the construction method statement for the site.

Furthermore, it should be noted that construction methods would comply with the relevant guidelines published by SEPA. The methods identified in these documents would be adopted, including the relevant consultations required, with respect to the construction of the windfarm. Where relevant, experience from the construction of Wardlaw Wood windfarm would help to inform the construction method statement to ensure that best practice is being adopted and an appropriate protection of watercourses is maintained.

This section also includes a Phase I Habitat survey, which classifies and maps the specific vegetation of the site area. Central Environmental Services carried out this survey during the design phase of the project so that any major potential impacts could be minimised or removed. Their report is presented here in its entirety.

This part of the work had three specific aims:

- To identify and map the vegetation communities within the study area to Phase 1 habitats and identify the National Vegetation Communities (NVC) present.
- To describe the location and extent of any rare or notable plant species present.
- To assess the potential effects of the proposed wind farm on the site's vegetation communities and
- Discuss how any adverse effects may be minimised.

Throughout the design phase of the site, infrastructure has been located to avoid potentially sensitive habitats.

DRAINAGE STATEMENT

1. EXECUTIVE SUMMARY

A hydrological impact assessment has been undertaken for the proposed Millour Hill Community Windfarm to assess the potential for site-generated pollutants to reach local watercourses and subsequent private drinking resources in the area. The most significant potential pollutants identified were silt runoff from road construction materials and material storage areas and general soil erosion caused during the construction of the windfarm. However these can be successfully mitigated through incorporation of detailed site drainage, including the installation of a system of cut off ditches and a series of attenuation ponds built in accordance with best practice procedures. Provided the above measures are in place, that the 'Pollution Prevention & Incident Response Plan' is adhered to and a reputable contractor is appointed to construct the windfarm there will minimal impact to the water quality during construction and operation of the windfarm.

2. INTRODUCTION

Impermeable surfaces collect pollutants from a wide variety of sources including cleaning activities (vehicles), wear from car tyres, deposition from vehicle exhausts, vehicle oil leaks, general atmospheric deposition and from maintenance of landscape areas.

The pollution that occurs due to runoff from impermeable surfaces is known as diffuse non-point pollution. This is the case with the potential pollution from the access roads and hardstanding areas associated with the proposed Millour Hill Community Windfarm.

Of particular concern is the potential for site-generated pollutants to enter local watercourses and subsequent private drinking resources in the area.

3. IMPACTS

The diffuse non-point pollution will exhibit some of the following characteristics:

- Discharges enter receiving waters at varying timescales and levels of pollution both are dependent on rainfall.
- The pollution is generated over a wide area and is transported to the receiving waters.
- The source is very difficult to control or monitor at the point of origin.
- Individual pollution generators may be minor but collectively they are significant.
- There may be a time lapse between the onset of pollution and the resulting impact.

The most important pollutants are suspended solids, nutrients and toxic compounds including oil and heavy metals. The types of pollutants and their sources that may occur during the construction and operation of the proposed windfarm are summarised in the table below. These are listed with the most significant for this site first.

Source	Typical pollutants	Comments	Significance	Risk
Silt runoff from road construction materials and materials storage areas	Sediment	Handling and placing of imported granular materials as well as excavation works generate significant levels of fine particles that can be mobilized by surface water runoff.	Significant The most significant risk on this site and in particular during the construction phase.	High Risk
Soil Erosion	Sediment Phosphorous, Nitrogen, Herbicides, Insecticides, Fungicides	Runoff from poorly engineered landscaped or other areas can wash onto impervious surfaces and cause pollution of runoff.	Significant A significant generator of silt runoff	Medium Risk
Traffic - Leaks and spillages	Hydrocarbons, Phosphates, Heavy metals, Glycols, Alcohols	Engines leak oil and spillages occur when refuelling. Lubricating oil can contain phosphates and metals that are present in performance additives. Accidental spillages of fuel or oil may occur. Leakage of hydraulic fluids and de-icing fluids.	Significant/Moderate More significant during construction	Medium Risk Traffic levels would be generally low.
Illegal disposal of chemicals and oil into drainage	Hydrocarbons Various chemicals	Illegal disposal of used engine oils or other chemicals	Moderate Potentially significant risk during construction work	Low Risk
Cleaning activities	Sediment Phosphorous, Nitrogen, Detergents	Washing vehicles, windows, bins or pressure washing yards leads to silt, organic matter and detergents entering the surface water drainage.	Moderate Potentially significant risk during construction work	Medium Risk
Traffic - wear and corrosion	Sediment Heavy metals (lead, chromium, copper nickel and zinc)	Abrasion of tyres and corrosion of vehicles deposits pollutants onto the road or car parking surfaces.	Moderate More significant during construction	Low Risk Traffic levels would be generally low.
Traffic - exhausts	Hydrocarbons MTBE, Cadmium, Platinum, Palladium, Rhodium	Vehicle emissions include polycyclic aromatic hydrocarbons (PAH) and unburnt fuel and particles from catalytic converters.	Moderate More significant during construction	Low Risk Traffic levels would be generally low.
Roofs –corrosion	Heavy metals (copper, lead and zinc), bacteria, organic matter (BOD)	Roof water is often regarded as clean. It can however, contain significant concentrations of heavy metals resulting from atmospheric deposition or the corrosion of metal roofing or from other coatings such as tar. Other pollution includes Atmospheric deposition, bird droppings and vegetation (eg moss)	Minor	Low Risk
Litter/animal faeces	Bacteria (for example faecal coli-form) Viruses Phosphorous, Nitrogen	Litter deposits can contain items such as drinks cans, paper, food, cigarettes, animal excreta, plastic and glass. Some of this will break down and cause pollutants to be washed off the site.	Minor	Low Risk Construction activity may concentrate these pollutants but the levels will be low.
Vegetation / landscape maintenance	Phosphorous, Nitrogen Herbicides, Insecticides Fungicides Organic matter (BOD)	Fallen leaves and grass cuttings can fall onto impervious surfaces and cause pollution of runoff.	Minor	Low Risk Minimal risk

De-icing activities	Sediment Chloride Sulphate Heavy metals (iron, nickel, lead and zinc) Cyanide phosphate	De-icing salt is commonly used for de-icing roads and car parks in the UK. Rock salt for this purpose comprises predominantly sodium chloride (91 per cent) and insoluble residue (9 per cent), although the exact composition will vary depending on the source. Urea and ethylene glycol may also be used in some limited situations.	Minor Significant impact if reaching water supply	Low Risk Unlikely to be in great use on this site.
Atmospheric deposition	Phosphorous Nitrogen Heavy metals (lead, cadmium, copper, nickel, zinc)	Industrial activities, traffic air pollution and agricultural activities all contribute to atmospheric pollution. This is deposited as particulates on surfaces. Rain also absorbs pollutants from the atmosphere.	Minor	Low Risk Overall minimal risk

4. MODE OF IMPACT

To address the potential effects of pollution as described above, the way in which the pollutants could reach the local watercourses and subsequent drinking water resources needs to be assessed.

To do this surface water flow paths were determined from Ordnance Survey topographical data. These paths are shown on drawing LDE 1000. It can be seen that the existing topography is crossed by a number of watercourses, some of which will need to be crossed by the access roads to the turbines.

The primary mode of impact is due to the number and proximity of these watercourses to the access roads this will present a risk of direct contamination of these watercourses. Their presence also indicates that groundwater sources may be close to the surface.

The secondary impact is that of infiltration of contaminants into the underlying groundwater.

5. MITIGATION

All works will need to be carried out in accordance with the procedures set in Scottish Environmental Protection Agency Pollution Prevention Guidelines 5 and 6 (*Works In, Near or Liable to Affect a Watercourse* and *Working at Construction and Demolition Sites*).

For this site control of silt runoff and to a lesser degree vehicle related pollutants is essential. The closeness of the watercourses requires that care be taken during construction to suitably segregate runoff from the site from the background surrounding runoff.

The access road to the turbines will in part introduce potential impounding structures and a two part drainage network will be included that will collect and channel overland flows beneath the roads as well as separately collecting and attenuating road surface flows. Thus separating the natural waters from that which may become contaminated.

As part of the scheme a system of cut-off ditches are to be provided up slope of the proposed access road. These ditches will intercept the natural runoff and direct this to culverts under the road. The locations of which will be governed by the topography and location of existing watercourses. These culverts will allow the runoff to pass beneath the road construction. Inclusion of land drainage at regular intervals will aid the up slope drainage and minimise the concentration of flows at the outfalls. All outfalls should incorporate granular rip-rap areas to dissipate the flows over wider areas, slowing the flow and minimising the creation of new channels.

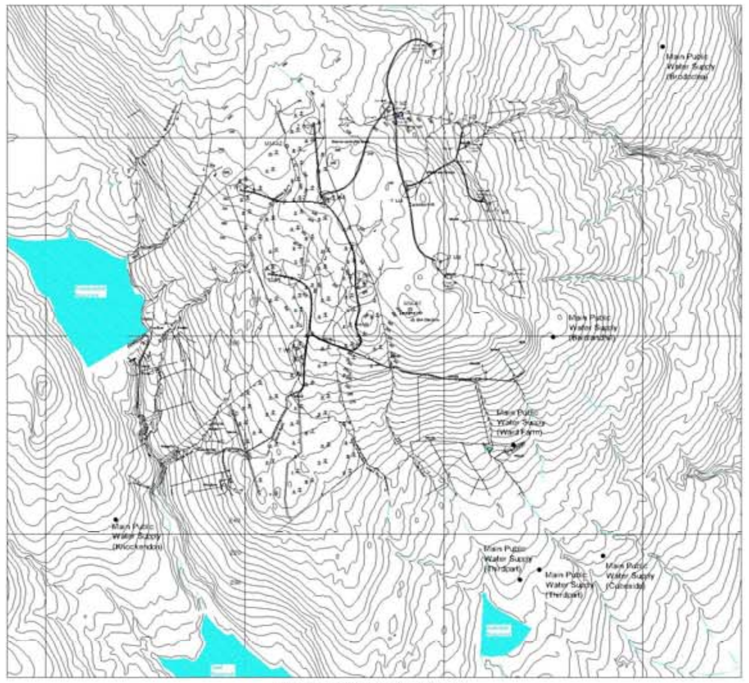
Although the proposed access roads are to be of a granular construction and hence permeable, due to the site topography some steep gradients will be present which will lead to surface water runoff that will need to be attenuated. By constructing attenuation ponds at the low points of the access roads these flows can be collected and the sediment allowed to precipitate out. The ponds will be constructed in advance of the main access roads works so that they can also be used as settlement areas for construction runoff from unconsolidated road surfaces and storage of materials. All site drainage is to be directed to a system that incorporates an attenuation pond.

These basins will be designed in accordance with best Sustainable Drainage practice to maximise the water quality improvement potential. As such they will incorporate a sediment forebay to allow the precipitation of suspended solids prior to discharge into the existing watercourses. The sediment forebays are to be lined to prevent contamination reaching the underlying soils and groundwater. Waters would then flow to the attenuation basin before discharge to a watercourse.

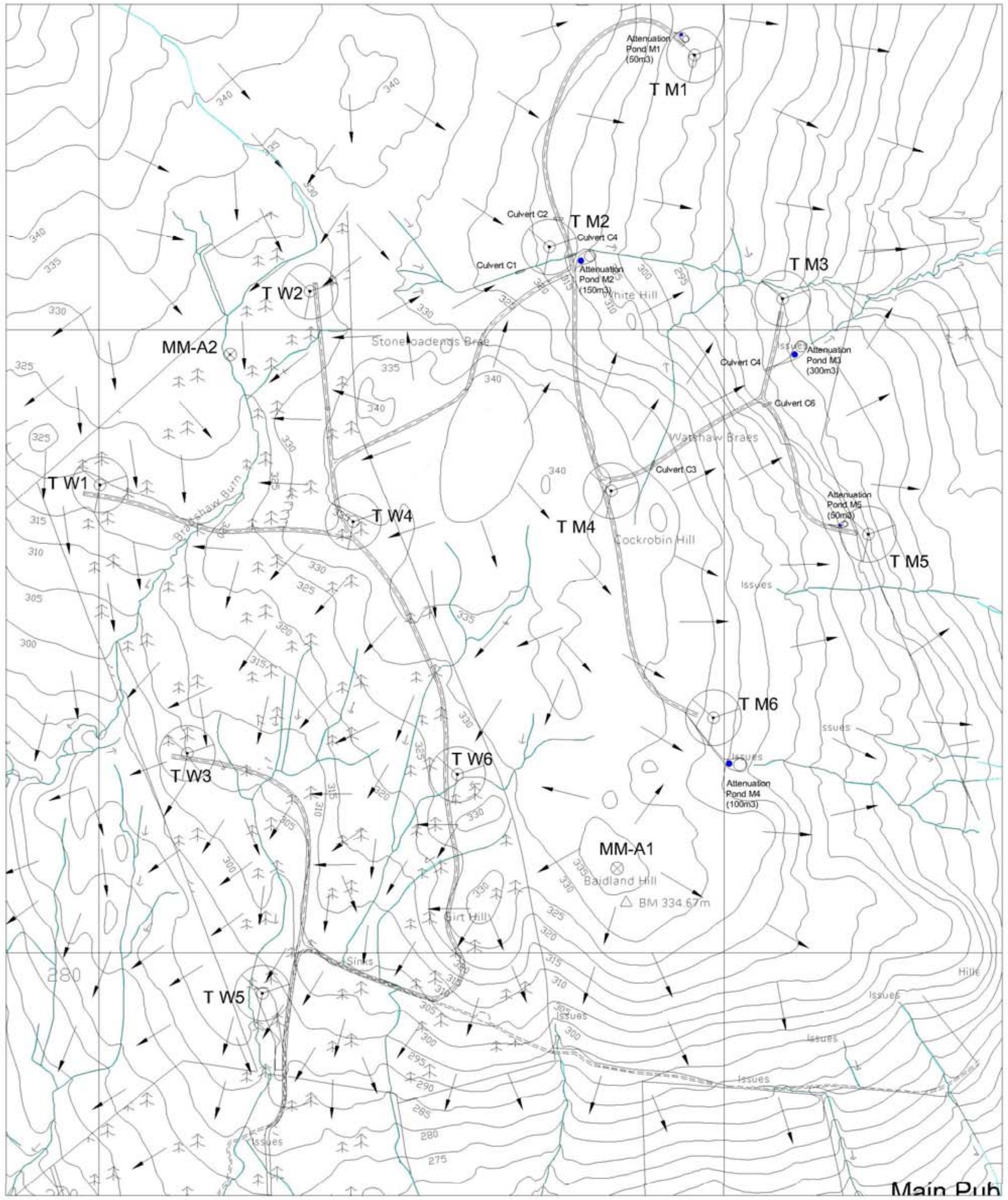
6. DESIGN CRITERIA

The design of the attenuation features should be in accordance with best practice and in particular the CIRIA guidance C521 "Sustainable Urban Drainage Systems – Design Manual for Scotland and Northern Ireland".

The design shown on drawing LDE 1000 includes 5 No. attenuation features. These should be located and sized to accommodate the runoff from particular lengths of the access road as well as other hardstanding areas such as construction compounds, buildings and parking areas. The sediment forebay should also be sized according to the area to be drainage. It may also be advantageous to design the sizes of some of the features to suit emergency containment volumes for fuel storage and other contaminated liquids that could be mobilised following an accident.



Existing Abstractions Plan
Scale 1:10000



Site Drainage Plan
Scale 1:2500

NOTES:

1. Drawing produced based on Ordnance Survey digital Contour data.
2. Millour proposed layout based on Community Windpower Ltd data.
3. Wardlaw Wood windfarm details taken from Mott MacDonald drawing 222210/001 (Rev AB) dated November 2005.
3. Locations of existing Water Abstraction Points taken from North Ayrshire Council's "Private Water Supplies Register" Jan 2004.
4. Proposed drainage mitigation measures to be in accordance with best practice and the recommendations of CIRIA guidance C521 "Sustainable Urban Drainage Systems - Design Manual for Scotland and Northern Ireland" and C523 "Sustainable Urban Drainage Systems - Best Practice Manual".
5. For typical construction details for the access roads see drawing LDE 1020.

Overland Surface Water Flow Paths

Attenuation Feature with Sediment Pool

Culvert — Culvert under new road construction to allow existing watercourses or impounded overland flows to pass

Rev.	Date	Amendment	Drawn	Chkd	Appd
P2	11/07/06	Access Road Layout Revised	RB	CLP	CLP

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LAND AND DEVELOPMENT ENGINEERING LIMITED
16 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RX, United Kingdom
Tel: +44 1442 437500

Client: Community Windpower Ltd

Project Title: Millour Hill Community Windfarm

Drawing Title: Access Roads Preliminary Drainage Layout

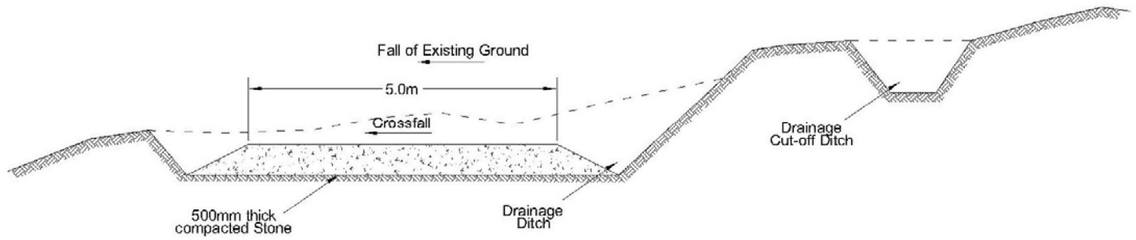
Drawn	Date	Checked	Date	Approval	Date
CP	21/04/06				

Scale	Drg Size	Dimensions
1:5000	A0	m

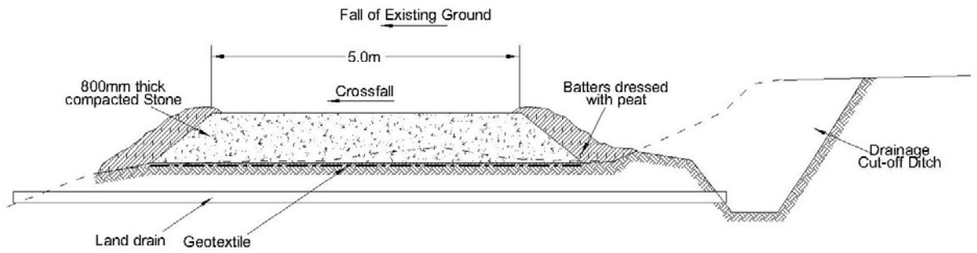
Project No.	Drawing File
130375	Drainage

Drawing No.	Rev.
LDE 1000	P2

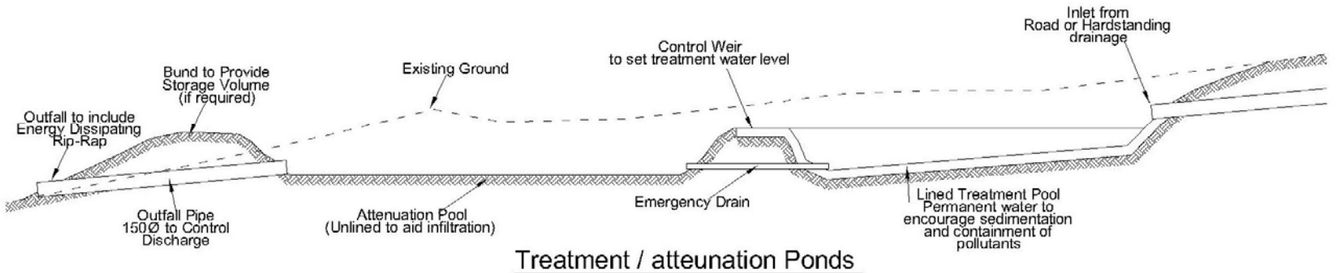
Drainage



Access Track - In cut



Access Track - Floating



Treatment / atteunation Ponds

NOTES:

1. Proposed drainage mitigation measures to be in accordance with best practice and the recommendations of CIRIA guidance C521 "Sustainable Urban Drainage Systems - Design Manual for Scotland and Northern Ireland" and C523 "Sustainable Urban Drainage Systems - Best Practice Manual".

Rev.	Date	Amendment	Drawn	Chkd	Appd.

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United Kingdom

Client
Community Windpower Ltd

Project Title
Millour Hill
Community Windfarm

Drawing Title
Access Road
Construction Details

Drawn Date	Checked Date	Approved Date
CLP 26/04/06		
Scale: as shown	Orig Size: A1	Dimensions: m
Project No.: 130375	Drawing File: Millour Hill	
Drawing No.: LDE 1020		Rev: P1

Millour Hill

Central Environmental Surveys
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Vegetation survey of proposed Millour Hill windfarm site adjacent to Wardlaw Wood.

Introduction

Community Windpower Ltd are undertaking an Environmental Impact Assessment (EIA) in preparation of an Environmental Statement to support their Planning application for a six-turbine windfarm near Dalry in North Ayrshire.

As part of the EIA, Central Environmental Surveys has been commissioned to undertake a Phase 1 Habitat Survey at the proposed Millour Hill Community Windfarm site, which is adjacent to the existing Wardlaw Wood windfarm.

It is important to assess the condition of the surrounding habitat next to any proposed windfarm site so that potential impacts can be fully considered.

The Phase 1 Habitat Survey is a technique for environmental audit (JNCC, 1990) provides a standard methodology of classifying and mapping the study site, and ensures that surveys are carried out to a consistent level of detail and accuracy. The methodology is for a trained surveyor to visit every parcel of land within the study site classifying the vegetation in terms of some ninety habitat categories, and mapping on field maps at a scale of 1:5000, with a minimum polygon size of approximately 0.1hectares. A digitised habitat polygon map is created by converting the field map information into ArcView shapefiles. This is achieved by redrawing the field maps onto digital maps that are overlain by rectified aerial photographs. The location of target notes and associated digital photographs are also recorded as ArcView shapefiles.

Description of vegetation

The proposed site of the Millour Hill Community Windfarm covers an area surrounding Cockrobin Hill (345m) and Baidland Hill (334m). The level ground on the plateau between these two hills supports modified blanket bog of the M17 *Scirpus – Eriophorum* type. The dominant species are *Eriophorum vaginatum, E. angustifolium, Juncus squarrosus* and stunted *Calluna vulgaris* and *Vaccinium myrtillus.* The *Sphagna* layer is quite good in places with *Sphagnum capillifolium* and *S. papillosum* providing much of the cover with a little *S. tenellum.* On some of the drier areas, there is frequent *Cladonia spp.* suggesting the M17b *Cladonia spp.* sub-community. It is however, heavily grazed by sheep and extensively drained giving rise to the dominance of *E. vaginatum, J. squarrosus* and sparse ericoid coverage. The drains are active but the majority blocked by *S. fallax.*

Along the western edge of the site, next to the plantation, there are a series of much wetter patches of bog with a marked increase in *S. papillosum* and frequent *Vaccinium oxycoccos* resembling the M18 *Erica – Sphagnum* mire.

Moving east to more gently sloping ground, the modified bog is punctuated by increasingly frequent acid flushing dominated by *Juncus effusus* (M6b). This occupies quite large areas of ground in the drainage basins of the easterly flowing streams. Moving further east, out of the proposed site itself, the acid flushing changes to sheep pasture heavily infested by *J. effusus* and further small areas of progressively modified blanket bog. The southern fringes of the site also support cattle grazed marshy pasture dominated by *J. effusus.* More steeply sloping ground to the south east supports *J. squarrosus* dominated vegetation interspersed with small patches of acid grassland.

The neighbouring plantation itself is being felled and access roads being built. Much of the area is covered in brash.

Protected Species

No species with enhanced statutory protection were found during the vegetation survey of the site.

Target Notes

X co-ord	Y co-ord	Grid Ref	Note
225835	652150	NS25835215	Modified M17 type blanket bog dominated by *Eriophorum vaginatum, Juncus squarrosus, Eriophorum angustifolium* with stunted *C. vulgaris* and *Vaccinium myrtillus.* Frequent *Sphagna* mainly *S. capillifolium* and *S. fallax.* Wetter depressions hold *S. papillosum* and *Vaccinium oxycoccos.* Frequent patches of *Juncus effusus.* Heavily grazed and drained although drains mostly blocked with *Sphagna.*
225695	652674	NS25695267	Wetter area with surface water. Marked increase in *S. papillosum* and *V. oxycoccos* resembling M18 bog
225992	652727	NS25995272	Steeper ground supports drier modified bog dominated by *J. squarrosus, Nardus stricta, Juncus effusus, Polytrichum commune, Sphagnum fallax, Pleurozium schreberi* and *Eriophorum vaginatum.* Heavily grazed and extensively drained. Frequent M6 flushing.
225917	652294	NS25915229	Modified bog dominated by *E. vaginatum, Calluna vulgaris, Vaccinium myrtillus, Sphagnum capillifolium, Polytrichum commune, S. papillosum, Pleurozium schreberi, Rhytidiadelphus loreus, Potentilla erecta, Deschampsia flexuosa.* Heavily grazed and drained.

Photographs

Photo1: General view looking north

Photo2: Looking west over the former coniferous plantation

Photo3: Drainage ditch blocked with *S. fallax*

Photo4: The former plantation covered in brash

Photo 5: A wetter area of blanket bog with frequent *S. papillosum*

Photo 6: Transition from wet area of blanket bog to drier modified bog

Photo 7: Active drain becoming filled with *S. fallax*

Photo 8: View looking north from middle of site.

Ecological Surveys, Environmental Assessments, Natural Resource Management Planning, Ecological Monitoring, Biological Computing, GIS and Database

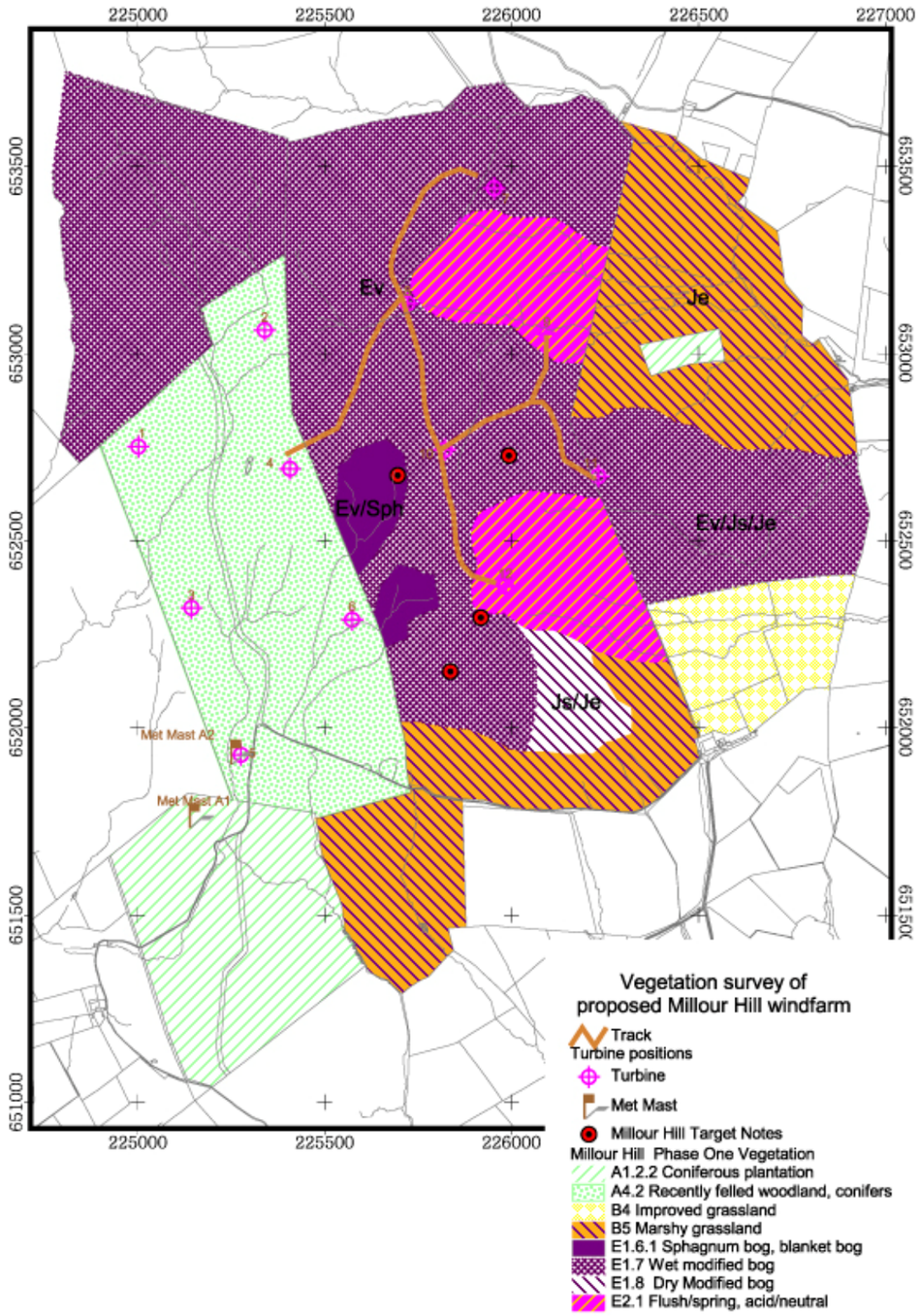
Photo 9: View looking north-east to *Juncus* infested pasture

Photo 10: *Juncus* dominated acid flushing

Signed

Alan Booth MSc MIEEM
Principal Central Environmental Surveys

pp Fraser Milne


225000
225500
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Ev
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Ev/Sph
Ev/Js/Je
Js/Je
Met Mast A2
Met Mast A1
Vegetation survey of
proposed Millour Hill windfarm
Track
Turbine positions
Turbine
Met Mast
Millour Hill Target Notes
Millour Hill Phase One Vegetation
A1.2.2 Coniferous plantation
A4.2 Recently felled woodland, conifers
B4 Improved grassland
B5 Marshy grassland
E1.6.1 Sphagnum bog, blanket bog
E1.7 Wet modified bog
E1.8 Dry Modified bog
E2.1 Flush/spring, acid/neutral