Chapter 7: Archaeology and Cultural Heritage

7 ARCHAEOLOGY AND CULTURAL HERITAGE

7.1 Introduction

This chapter of the ES quantifies the impact of the development on the historic environment, looking specifically at archaeology and utilising information gathered by Oxford Archaeology North (OA North). A desk-based assessment was carried out by Kathryn Blythe in 2009 and updated by Vicki Bullock in September 2010, whilst Peter Schofield undertook the site visits. The study area for the desk-based assessment comprises an area 500m in radius surrounding the outlined development site, although this was extended to 1km for statutory designated sites that may be affected indirectly (Figure 7.1 in Volume 3). The wider environs have also been considered in terms of enabling the proposed development site to be understood within its historical and archaeological context.

7.2 Consultation

The following consultations have been carried out:

Lancashire Historic Environment Record (HER): the HER (known formerly as the Sites and Monuments Record), maintained by Lancashire County Council in Preston, holds records of archaeological sites within the county. A record, including grid reference and description, was obtained for each of the known (up to September 2010) cultural heritage sites within the defined study area and added to a gazetteer (see Appendix 7.1).

Lancashire County Record Office, Preston (LRO): the LRO in Preston was visited to consult historic maps of the study area, including the tithe map and relevant Ordnance Survey (OS) maps. A search was also made for any relevant historical documentation. Several secondary sources and archaeological or historical journals were also consulted, and the results of this have been incorporated into the historical background (Appendix 7.2).

Oxford Archaeology North: OA North has an extensive archive of secondary sources relevant to the study area, as well as numerous unpublished client reports on work carried out both as OA North and in its former guise of Lancaster University Archaeological Unit (LUAU). These were consulted where necessary and included a desk-based assessment of the study area (OA North 2009).

Lancashire County Archaeology Service (LCAS): Peter Iles of LCAS is the principal consultee for heritage matters within the county; he was consulted and his feedback taken into account.

7.3 Guidance and Legislation

7.3.1 Planning Policy Framework

In order to be able to consider the archaeological potential of the site, the statutory constraints, and archaeological requirements for the proposed development, it is necessary to understand the relevant policies, both at a national and local level. For significant archaeological and cultural heritage sites, planning policy at a national level is provided by PPS5*: Planning for the Historic Environment* (DCLG 2010). Local planning policy is provided by the *Lancaster District Core Strategy* (adopted July 2008) and the *Lancaster District Local Plan* (adopted 2004). These plans contain specific policies with regard to the protection of archaeological and cultural heritage resources.

National Planning Policy: PPS5 (DCLG 2010) sets out advice on the appropriate management of archaeological matters in the planning process, and provides a full statement of Government policies for the identification and protection of historic buildings, Conservation Areas and other elements of the historic environment and built heritage resource. Developers are encouraged to consult with the local planning authority and other statutory bodies at any early stage where development proposals may affect historic sites, the built heritage resource and, in particular, statutory designated sites (Conservation Areas and Listed Buildings). Within PPS5, Policy HE1: *Heritage Assets and Climate Change*, is particularly relevant to the present project. Section HE1.3 states that, where conflict between climate change objectives and the conservation of heritage assets is unavoidable, the public benefit of mitigating the effects of climate change should be weighed against any harm to the significant heritage assets in accordance with the development management principles in this PPS and national planning policy on climate change. Policy HE6 (*Information requirements for applications for consent affecting heritage assets*) of PPS5 states that, where an application site includes, or has the potential to include, heritage assets with archaeological interest, planning authorities should require developers to provide with the application, as appropriate, a desk-based assessment and sometimes also a the results of a field evaluation. Other policies within PPS5 that are of particular relevance to the proposed development site are HE10 (*Additional policy principles guiding the consideration of applications for developments affecting the setting of a*

designated heritage asset) and HE12 (*Policy principles guiding the recording of information related to heritage assets*) (DCLG 2010).

The PPS sets out the Government's objectives for the historic environment and the rationale for its conservation. It recognises the unique place the historic environment holds in England's cultural heritage and the multiple ways it supports and contributes to the country's economy, society and daily life. The PPS also identifies the historic environment as a non-renewable resource. Conserving this resource for future generations accords with the principles of sustainable development. The government places a priority on conservation and has set out tests to ensure that any damage or loss is permitted only where it is properly justified. These objectives for the historic environment are also reflected in *Planning Policy Statement 1: Delivering Sustainable Development* (PPS 1; ODPM 2005), which says that:

…planning should facilitate and promote sustainable and inclusive patterns of urban and rural development by (amongst other things) protecting and enhancing the natural and historic environment, the quality and character of the countryside, and existing communities.

Consideration should also be given to the setting of a heritage asset, whether designated or not (PPS 5; policy HE10). Setting is the surrounding in which the heritage asset is experienced. The extent and importance of a setting is often expressed by reference to visual considerations but is also influenced by other environmental factors, including spatial associations. For the purposes of spatial planning, any development or change capable of affecting the significance of an heritage asset can be considered as falling within its setting. Understanding the significance of a heritage asset will enable a contribution to be made by its setting to be understood. The effect on its significance can then be assessed using the principles set out in PPS5 policies HE7-9.

When assessing the impact of a proposed development, consideration should be given to all archaeological remains deemed to be of significance, although any Scheduled sites should be considered a priority (PPS5, policies HE8 and HE9). Guidance on the assessment of significance of heritage assets and implementation of PPS5 policies is provided in a practice guide; PPS5 *Planning for the Historic Environment: Historic Environment Planning Practice Guide* (DCLG 2010). Preservation of the archaeological evidence in situ is the preferred solution, or if this is not justified, the provision of adequate resources for an appropriate level of investigation and recording before and during development that would allow preservation by record of the affected portion of the archaeological remains.

Policies E44-E46 (Archaeology) of the *Lancaster District Local Plan* (LDLP 2004) state that development proposals should take into account archaeological considerations and need to safeguard important sites from damage or destruction. Development proposals that would have an adverse impact on the site or setting of a Scheduled Monument or other monument of national importance will not be permitted and other sites of archaeological importance will also be protected. When development affecting such sites is acceptable in principle, a scheme for mitigation of damage should be secured to preserve the remains *in situ*, or where preservation is not justified adequate provision for investigation and recording is required.

A number of additional guidance papers were also consulted with particular reference to wind energy and the historic environment (English Heritage 2005; English Heritage 2008a; English Heritage 2008b; English Heritage 2008c; English Heritage 2009; Entec 2008).

7.3.2 Legislative framework

Archaeological sites (including historic buildings), possessing a statutory designation are protected under a legal framework, depending on their category. There are a number of statutory designations used for sites of architectural or historic significance in the UK, which are made depending upon the importance of the site in a local, regional, national or international context. These are detailed below for those relevant to sites in England (Appendix 7.3):

- World Heritage Sites (WHS);
- Scheduled Monuments (SM);
- Listed Buildings (LB): Conservation Areas;
- Parks and Gardens of Special Historic Interest (RP); and
- Historic Battlefield sites.

7.4 Assessment Methodology

A detailed methodology for the assessment is presented in Appendix 7.4. Essentially, the assessment aimed to:

- Give consideration to the potential for archaeological remains on the development site;
- To put the site into its archaeological and historical context; and
- Identify, collate and present all statutory sites (including Scheduled Monuments, Listed Buildings, Registered Historic Parks and Gardens, and Conservation Areas) within 1km of the proposed scheme, and non-statutory sites within a 500 m radius of the development site (Appendix 7.1 and Figure 7.1).

The desk-based assessment was carried out in accordance with the relevant IfA and English Heritage guidelines (Institute for Archaeologists 2008, *Standard and Guidance for Archaeological Desk-based Assessments*; English Heritage 2006, *Management of Research Projects in the Historic Environment* (MoRPHE) and. comprised a search of both published and unpublished records held by:

- The Lancashire Historic Environment Record (HER) in Preston;
- The Lancashire Record Office (LRO) in Preston; and
- The archives and library held at OA North.

In addition, a site visit was undertaken on Thursday 24th September 2009, to relate the existing topography and land use with the results of the desk-based assessment (Plates 1-9, in Appendix 7.5), and on Monday 15th March 2010 to assess the impact on the setting of the listed buildings within the study area and 1km buffer zone. The visits also allowed an understanding of areas of impact by the proposed development, as well as areas of more recent disturbance that may affect the potential for the survival of archaeological deposits.

The results of the assessment will identify the significance of any environmental impacts on archaeology, in accordance with the legislative framework. In order to assess adequately the potential impact and resulting residual impacts of the development, a comparative approach to other environmental factors has been employed. These have been adapted from those set out in Guidance on the Methodology for Multi-Modal Studies, DETR (2001) as they prove to be most effective, and increasingly widely accepted, although they were compiled for transport developments. The method of assessment is limited to:

- Assessing in detail any impact and the significance of the effects arising from the proposals;
- Reviewing the evidence for past impacts that may have affected an archaeological or historical site;
- Outlining suitable mitigation measures to avoid, reduce or remedy adverse impacts, including operational impacts.

Such impacts on the identified archaeological or historical sites may be:

- Positive or negative;
- Short, medium or long term;
- Direct or indirect; and
- Reversible or irreversible.

Key impacts have been identified as those that would potentially lead to a change to the archaeological or historical site significantly outside the existing range of environmental baseline conditions. Each potential impact has been determined as the predicted deviation from the baseline conditions during both the construction and operational phases of the development, in accordance with current knowledge of the site and development.

The impact is assessed in terms of the sensitivity or importance of the site and the magnitude of change or scale of impact during the development. Table 7.1, below, shows the sensitivity of the site scaled in accordance with its relative importance using the following terms for the archaeological or historical issues. However, the magnitude (scale) of an impact is often difficult to define, but will be termed as large, medium, small, and negligible as shown in Table 7.2, below. The methodologies employed for determining the importance of sites and the scale of impact can be summarised as follows:

Table 7.1 Criteria used to determine Importance of Receptors or Sites of Archaeological or Historical Significance.

Importance	Examples of receptor
High	World Heritage Site, Sites of International importance. Scheduled Monuments (SMs), Grade I, II*, and II Listed Buildings, Sites of National importance.
Medium	Conservation Areas, Registered Parks and Gardens (Statutory Designated Sites), Sites of Regional/County importance.
Low	Sites with a local or borough interest. Sites with a borough value or interest for education or cultural appreciation. Sites that are so badly damaged that too little remains to justify inclusion into a higher grade.
Negligible	Sites or features with no significant value or interest. Sites which are so badly damaged that too little remains to justify inclusion into a higher grade.
Unknown	Sites or features where the survival or extent has not been determined and therefore the significant value or interest is unknown.

Table 7.2 Criteria used to determine Scale of Impact

Magnitude of Impact	Description of Change
Large	Significant change in environmental factors. Complete destruction of the site or feature. Change to the site or feature resulting in a fundamental change in ability to understand and appreciate the resource and its cultural heritage value/historical context and setting, or causing statutory objectives to be exceeded.
Medium	Significant change in environmental factors. Change to the site or feature resulting in an appreciable change in ability to understand and appreciate the resource and its cultural heritage value/historical context and setting.
Small	Change to the site or feature resulting in a small change in our ability to understand and appreciate the resource and its cultural heritage value/historical setting.
Negligible	Negligible change or no material change to the site or feature. No real change in our ability to understand and appreciate the resource and its cultural heritage value/historical context and setting.
Unknown	The change to the site or feature has not been determined or where the importance of a feature or site is unknown, and therefore the magnitude of the impact is also unknown.

The interaction of the scale of impact (Table 7.2) and the importance of the receptor (Table 7.1) produce the impact significance (Table 7.3). This is calculated by using the matrix table as shown below:

Table 7.3 Impact Significance Matrix

Magnitude of Change	Importance of Receptor			
	High	Medium	Low	Negligible
Large	Large/ Very Large	Moderate/ Large	Moderate/ Slight	Slight
Medium	Moderate/ Large	Moderate	Slight	Slight/ Neutral
Small	Slight/ Moderate	Slight	Slight/ Neutral	Slight/ Neutral
Negligible	Slight	Slight/Neutral	Neutral	None
Unknown	Unknown	Unknown	Unknown	Unknown

The effects are categorised according to the established scale and terminology of Major, Intermediate or Minor, Beneficial, Adverse or Neutral.

The impact significance category for each identified site or feature will also be qualified, providing that recommended mitigation measures will be implemented. Any measures to reduce any impact will be promoted in the report. It is also normal practice to state that impacts above moderate significance are regarded as significant impacts. It is very important that the residual impact assessment takes into consideration the ability of the mitigation to reduce the impact.

It is considered important to attribute a level of confidence by which the predicted impact has been assessed. For the purpose of this assessment, the criteria for these definitions are set out in the Table 7.4.

Table 7.4 Impact Prediction Confidence

Confidence Level	Description
High	The predicted impact is either certain, i.e. a direct impact, or believed to be very likely to occur, based on reliable information or previous experience.
Low	The predicted impact and its levels are best estimates, generally derived from the experience of the assessor. More information may be needed to improve the level of confidence.

Following on from the assessment of the importance of sites of archaeological interest detailed in Section 7.7.2, the significance of impact during construction has been determined, based on the knowledge of the proposed development and the present condition of the archaeologically and historically significant sites. If proposed activities and processes are to change in the future, then the assessment will require further review. This assessment of impact is dependent upon adherence to the recommendations for mitigation (Section 7.8).

7.5 Baseline Description

7.5.1 Location Topography and Geology

The 500m study area and 1km buffer zone surrounding the proposed development area (centred on NGR SD 4904 5742; Figure 7.1) is situated to the south of Lancaster, within the parish of Scotforth. Lancaster University's South West Campus lies a short distance to the west, separated from the proposed development area by the north/south aligned M6 motorway, which forms the western boundary of the site. Hazelrigg Lane, which crosses under the motorway, forms the southern boundary of the proposed development area. This lane then curves round to head northwards towards Lancaster proposed development area. Hazelrigg Farm is located on the west side of the lane immediately outwith the boundary of the site. A thick band of trees separates the proposed development area from the farm, and further north the area is bounded by farm fields. The north-east portion of the proposed development area is occupied by the University of Lancaster's Meteorological Station (Site 28, Figure 7.1). Blea Tarn reservoir is located a short distance to the north of the proposed site. The River Conder, aligned in this area approximately south-west/north-east is located a short distance to the south of Hazelrigg Lane, and a small stream runs down the eastern boundary of the proposed site.

Beyond the immediate boundaries of the development site, land to the north (with the exception of Blea Tarn Reservoir), east and south is largely rolling farmland used for grazing, intersected by narrow lanes and sporadic residential development. The area of the proposed site gradually slopes from c 40m AOD at its south end to c 96m AOD at its north end (OS 1974). The fields that occupy the proposed site are currently in use as pasture. The site does not fall within any national landscape designation and is simply allocated as a Countryside Area in the Lancaster District Local Plan, although the site is within 1.4 km from the Forest of Bowland Area of Outstanding Natural Beauty.

The solid geology of the area consists of mudstones, probably of the Crossdale Mudstone Formation, of the Upper Carboniferous Millstone Grit series, dating to the Namurian geological era, 250 million years ago (Crofts, 1992). Overlying the solid geology, the drift geology is essentially boulder clays, laid down approximately 10,000 years ago following last glaciation. The soils of the area belong to the Brickfield Association, which are cambic stagnogleys (Jarvis *et al*, 1984). The resulting landscape is one of mixed arable and pastoral agricultural land.

The following section presents a summary of the historical and archaeological background of the general area. This is presented by historical period, and has been compiled in order to place the study area into a wider archaeological context.

7.5.2 Archaeological Context

The following section outlines only the most basic elements of the archaeological context of the development site; a more detailed archaeological background to the development area is provided in Appendix 7.2.

Table 7.5 Summary of British archaeological periods and date ranges

Period	Date Range
Palaeolithic	30,000 – 10,000 BC
Mesolithic	10,000 – 4,000 BC
Neolithic	4,000 – 2,200 BC
Bronze Age	2,200 – 700 BC
Iron Age	700 BC – AD 43
Romano-British	AD 43 – AD 410
arly Medieval	AD 410 – AD 1066
Late Medieval	AD 1066 – AD 1540
Post-medieval	AD 1540 – c1750
Industrial Period	cAD1750 – 1901
Modern	Post-1901

During the assessment, 41 heritage assets were identified within the study areas around the proposed development site. Details of each are provided in Appendix 7.1, and are summarised in Table 7.6, below.

Table 7.6 Number of archaeological sites within the study area around the development site, by period

Period	No of Sites	Site Type
Prehistoric	1	Bronze axe findspot (**12**)
Romano-British	1	Road (**13**)
Early medieval	0	-
Medieval	4	Field system (**04**), ridge and furrow and a field boundary (**18**). Possible medieval or post-medieval sites: ridge and furrow (**17**), township boundary (**23**)
Post-medieval/ Industrial Period	18	Ponds/pits (**08** and **24**-**25**), former field boundaries and tracks (**16**, **20**-**22** and **27**), a ditch/culvert and associated embankment (**05** and **06**), a cropmark (**07**), two farmsteads (**09** and **26**), a former settlement site (**10**), a former orchard boundary (**11**), Listed farmhouses (**14** and **33**), Listed houses (**15** and **34**), a Listed sundial (**32**), Listed boundary stones (**29** and **30**), a Listed milestone (**35**), a Listed stile (**31**), and a banked enclosure (**19**)
Modern	1	Cropmark (**01**), weather station (**28**)
Undated	2	Watercourse (**02**), enclosure (**03**), possible kiln/furnace (**36**), linear boundary (**37**), possible enclosures (**38**), possible agricultural feature (**39**), possible trackways (**40**), L-shaped feature (**41**), possible pits (**42**)

Prehistoric Period: Sites of Mesolithic, Neolithic and Iron Age date are known from the wider area, but there is only one known prehistoric site, of Bronze Age date, within the study area. This is the findspot of a bronze axe (Site **12**; Appendix 7.1), and it is considered that there is a moderate potential for further finds or features of Bronze Age date to be located within the study area.

Romano-British Period: There is a single site of Romano-British date within the study area (Site **13**), and several more within the near vicinity of the development area. Site **13** is a Roman road, believed to have run from Walton-le-Dale, near Preston, to a fort at Overburrow, to the north-east of Lancaster. In 2003 an archaeological excavation was carried out on land to the south of Barker House Farm (centred at SD 4836 5694, c 580m to the west of the south end of the proposed development area) in advance of the development of Lancaster University's South West Campus access road (OA North 2004, 4). The main focus of the excavation comprised a large round house with twin entrances and a double eaves drip gulley. It was located on top of a low promontory in the east of the site at 42m AOD, overlooking the River Conder. The site was identified as a late prehistoric/Romano-British farmstead, and is among the rarest, and most significant, archaeological finds in the area. The proximity of the Barker House Farm Romano-British site to the proposed development area therefore indicates a moderate to high potential for further sites of this period to be located within the study area.

Early Medieval Period: Although there is toponymic evidence for early medieval activity in the vicinity of the development , there are no known sites of this date within the study area; the potential for sites from this period within the study area is therefore considered to be low.

Medieval Period: There are two sites of possible medieval date within the gazetteer: a field system (Site **04**), located in an area now occupied by university buildings at the south-west extent of the study area; and a field boundary and area

of ridge and furrow (Site **18**) located at the south-east extent of the study area. In addition, two further sites, a second area of ridge and furrow (Site **17**), adjacent to Site **17**, and the township boundary between Scotforth and Ellel (Site **23**), located at the southern end of the proposed development area may be medieval in date. The evidence from the gazetteer sites suggests that at least some parts of the study area were in agricultural use in the medieval period. It is therefore considered that there is moderate potential for finds or features relating to this activity in the medieval period to be identified within the proposed development area.

Post-medieval and Industrial Period: Twenty-five sites of probable post-medieval date were identified within the study area (Appendix 7.1, and Figure 7.1.) and predominantly comprise agricultural features, such as relict boundaries and tracks (Sites **11**, **16**, **20**-**22** and **27**), boundary and mile stones (Sites **29**-**30** and **35**), former pits and ponds (Sites **08** and **24**-**25**), a ditch and bank (Sites **05** and **06**), a cropmark (Site **07**), and a former woodland enclosure bank (Site **19**). In addition, a number of settlement sites were identified, including houses and farmhouses (Sites **09**, **14**-**15**, **26** and **33**-**34**), and a former settlement identified as an earthwork and confirmed through documentary research to be post-medieval in date (Site **10**). Two sites were located within the churchyard at Ellel: a stile (Site **31**) and a sundial (Site **32**). A number of these sites are discussed below in the map regression, which traces the development of the study area over the past 200 years (Section 7.5.2). It is considered that there is a moderate to high potential for further finds or features relating to agricultural activity in the post-medieval and industrial periods to be located within the proposed development area.

Undated and modern: There are two sites of modern date within the study area (Appendix 7.1). Site **01**, an unspecified cropmark in the vicinity of the university, and Site **28,** the university's weather station. Site **03** is an undated earthwork at Barrow Greaves, comprising low earthen banks and Site **02** is an undated former watercourse near Banton House (Appendix 7.1). In addition, seven undated sites (**36**-**42**; Appendix 7.1), were identified as a result of the geophysical survey of the development area. Amongst these, Site **36**, a putative kiln on the western edge of the development area, is of particular interest. The date of these features cannot be established without intrusive investigation, but they include several features that may be part of the medieval or post-medieval agricultural landscape, including the putative furrow of Site **39** and the Site 40 tracks. Linear Boundary Site **37** and the enclosures of Site **38**, at the southern end of the development area, are again likley to represent agricultural features, but in the case of the latter and, given the proximity of the Barker House farm Romano-British farmstead, may be much older. Site **42** comprises a scatter of putative pits across the development area: individually these may belong to a variety of periods, but towards the centre of the site the pits formed an alignment that suggested that they may have been contemporary with each other.

7.5.3 Map Regression Analysis

A number of cartographic sources were examined at the LRO, together with some held at OA North's offices. All Map Extracts are shown in Appendix 7.6, and all sites referenced in this section are shown in Appendix 7.1.

William Yates' map, 1786 (Appendix 7.6, Map Extract 1): This county map is small scale, and therefore contains a limited amount of information about the area at this time. An area of open moorland is depicted on the north side of the River Conder, and appears to run along a north-east/south-west aligned ridge. To the south of this, a winding road (named 'Bailrigg Road' on the enclosure map of 1809, is shown from 'Borrough' in the west, to the river Conder in the east. North of this road is a long, narrow clearing, within which is a wood in its south-western portion and an unnamed building, which is likely to be Hazelrigg (Site **26**), on its eastern boundary. The road, which now runs a northward on the east side of Hazelrigg is not depicted. To the south-east of the clearing, 'Bantons' (later Banton House, Site **09**) is depicted, along with an unnamed building to its south-west (Site **10**). To the west of the northern end of the clearing, 'Bigg Ford' (later Big Forth) farm is named, and further to the west the small settlement of Bailrigg is depicted. Ashton Hall is marked a short distance to the west of the study area, with Archibald Hamilton named as the land owner.

Scotforth Moor and Bailrigg Moor Enclosure Award, 1809 (LRO AE/5/11) (Appendix 7.6, Map Extract 2): An Enclosure Act for Scotforth Moor and Bailrigg Moor was passed in 1806. The resultant enclosure map of 1809 shows the former area of moorland now partially divided into fields, with new, straight roads crossing it. Bailrigg Road (shown on Yates' 1786 map) is clearly the boundary (Site **23**) between Scotforth township and the township of Ellel, which is marked to its south. A road, named Galgate Road, heads north from Bailrigg Road, passes to the east of Hazelrigg (Site **26**), and then heads north-eastwards. This road meets a north-west/south-east aligned road to the north of the study area named Scotforth Road. Blea Tarn is depicted to the south-west of this road, with a short stretch of road named Blea Tarn Road depicted on its north-west side. The rectangular clearing shown on Yates' map of 1786 is still depicted on this map, and is labelled 'Hazelrigg. The Duke of Hamilton and Brandon'. This therefore indicates that the proposed development area, which is mostly contained within this clearing, was part of the lands owned by the Duke of Hamilton

and Brandon of Ashton Hall. As such, it appears to have been excluded from the parliamentary enclosure. Two buildings are depicted in the area of Hazelrigg (Site 26) on the eastern boundary of the clearing.

Hennet's map, 1830 (Appendix 7.6, Map Extract 3) : As with Yates' 1786 map, this map is a small-scale county map and is limited in detail. It has less detail than the enclosure map of 1809, as it does not show field boundaries. However, it does show two bands of north/south aligned woodland, which are still largely extant today. Hazelrigg (Site **26**) is named, and as with the enclosure map of 1809, is depicted as two buildings.

Scotforth Tithe Map, 1841 (LRO DRB 1/173) (Appendix 7.6, Map Extract 4): This map shows that the proposed development area had been divided into fields by this time. The majority of these field boundaries are still extant, but four field boundaries which have subsequently been removed were added to the gazetteer as a result of consulting the tithe map (Sites **20**-**22** and **27**). The owners of the land are listed as 'TA and W Dewhurst', indicating that it was no longer part of the Duke of Hamilton and Brandon's land. The occupier of the land is listed as 'WJ Redmayne'. The names of the fields are all variations on 'Old Lands' or 'Long Lands' (see Medieval section, above). The use of the fields (e.g. pasture, arable) was not given. Hazelrigg (Site **26**) is depicted as a group of three buildings, and a track heads north-westwards from the farm through the woodland to these fields. A group of three ponds or pits (Site **25**) is shown within the proposed development area, immediately east of the western band of woodland. A pond or pit (Site **24**) is also shown in the north-eastern corner of the proposed development area and there is a further pond or pit to the north of the proposed development area (Site **08**).

Ordnance Survey, First Edition, 6" to 1 mile, 1847 (Appendix 7.6, Map Extract 5): This map is fairly similar to the tithe map. Some changes have taken place at Hazelrigg, with modifications and additions to the buildings depicted on the tithe and two new buildings depicted on the opposite side of the road. The group of three ponds within the proposed development area (Site **25**) is not depicted on this map, but the pond or pit in the north-east corner of the proposed development area (Site **24**) is depicted, and that to the north is labelled 'pit' (Site **08**).

Ordnance Survey First Edition, 25" to 1 mile, 1895 (Appendix 7.6, Map Extract 6): This map shows few changes from the 1847 OS map. The buildings at the farm at Hazelrigg (Site **26**) have again been altered. The pit to the north of the proposed development area (Site 08) is labelled 'old clay pit' and is surrounded by trees. Trees are also shown within hollows in the area of the three ponds or pits (Site **25**) depicted on the tithe map of 1841.

Ordnance Survey, 25" to 1 mile, 1912 (Appendix 7.6, Map Extract 7): Some further changes to the ponds/pits in the vicinity of the proposed development area had taken place by the time of this mapping. The old clay pit (Site **08**) is depicted as further planted with trees, and enclosed within a boundary. The pond/pit (Site **24**) in the north-east corner of the proposed development area has also been enclosed within a circular boundary, and planted with trees. The three pits/ponds shown on the tithe of 1841 (Site **25**) and depicted as planted with trees on the 1895 OS map, are again cleared and shown as hollows or possibly ponds.

Ordnance Survey, 25" to 1 mile, 1932 (Appendix 7.6, Map Extract 8): This map is very similar to the 1912 map. The northernmost two ponds within the group of three (Site **25**) are now shown as enclosed, and this area adjoins the wood to its west.

Ordnance Survey, 6" to 1 mile, 1955: **(Appendix 7.6, Map Extract 9)**: No significant changes to the proposed development area since the 1932 map are shown on this mapping.

Ordnance Survey, 6" to 1 mile, 1973 (Appendix 7.6, Map Extract 10): The M6 had been constructed by the time of this mapping, and is shown cutting through the woodland on the west side of the proposed development area. The route of the Bailrigg road to the south of the proposed development area was changed as a result. A new stretch of road, which takes a direct route under the motorway is shown to the south of a portion of the original road, and forms the southern boundary of the proposed development area. The original road (Site **23**) is depicted as a short stretch of track leading into the fields on either side of it. The buildings at Hazelrigg (Site **26**) have been further altered, and a new building to the south-west on the opposite side of the road is labelled Eastrigg. In the north-east portion of the proposed development area a track leads to a construction which is labelled 'Met Station (University of Lancaster) (Site **28**), and the field boundary shown in this area from the 1841 tithe onwards (Site **27**) has been removed. There are no significant changes within the proposed development area.

7.5.4 Aerial Photographs

1960s and recent aerial photograph coverage (*http://www.mario.lancashire.gov.uk/ and google Earth*): vertical black and white photographs from the 1960s, that covered the whole of the proposed development area, were consulted along

with present day photographs available from Google Earth. No features were added to the gazetteer as a result of consulting the aerial photographs.

7.5.5 Historic Landscape Characterisation (HLC)

The HLC is provided by the Lancashire HER, and was devised to characterise 'the distinctive, historic dimension of today's urban and rural environment in Lancashire'. An extensive programme of data gathering and analysis was carried out that resulted in a report published in 2002, which identifies 21 separate historic landscape types, and makes recommendations on enhancing and safeguarding each type (Ede and Darlington, 2002, iv). The majority of the study area (including all of the proposed development area) is identified as 'Post-Medieval Enclosure'. The southern part of the study area, south of the township boundary (Site **23**, Figure 7.1), is identified as 'Ancient Enclosure'. North of this on the west side of the M6 the majority of the study area is taken up with the university, identified as 'Modern Settlement', although a narrow band of 'Ancient and Post-Medieval Wood' is situated to the immediate west of the motorway towards the northern end of the university campus. North again, in the vicinity of Bailrigg, is an area defined as 'Modern Enclosure'.

'Ancient Enclosure' is defined as land enclosed before c 1600 and is most easily recognised by its irregular shaped fields and dispersed settlement. A need to encourage the retention of the small irregular fields and surviving areas of ridge and furrow has been identified in order to conserve this enclosure type (op cit, 97, 99 and 102-103). 'Post-Medieval Enclosure' is defined as land enclosed between c 1600 and c 1850. This includes some irregular fields, derived from early piecemeal enclosure, plus areas of more regular straight edged fields derived from later large scale enclosure. The report recommends conservation of those features which define these areas of enclosure such as stone walls and stock enclosures (op cit, 106-107 and 112-113).

7.5.6 Previous Archaeological Work

LUAU 1993: the North Western Ethylene Pipeline was constructed to the immediate east of the proposed development area in 1991. A programme of archaeological works was carried out in advance of the pipeline, and four of the sites in the study area gazetteer are a result of this work (Sites **10** and **16**-**18** Appendix 7.1). Site 10 is the site of a post-medieval settlement; Site **16** is a cobbled track and former field boundary; and Sites **17** and **18** are areas of medieval/post-medieval ridge and furrow.

Neil 1995a (HER 23636 and 23645): three sites in the gazetteer were identified during the assessment phase of the archaeological work in advance of the University extension (Sites **04**-**06** Appendix 7.1). Site **04** is a medieval field system, Site **05** is a ditch or culvert and Site **06** is an embankment associated with Site 05.

OA North 2004 (HER 27040): in 2003 an archaeological excavation was carried out on land to the south of Barker House Farm (centred at SD 4836 5694) in advance of the development of Lancaster University's South West Campus access road. The work was informed by an archaeological desk-based assessment of the overall site, undertaken by Nigel Neil in December 1995 (Neil 1995a; 1995b), followed by a programme of trial trenching in June and July 2002 (OA North 2002), across the extent of the proposed South West Campus development area. Further evaluation work was carried out by OA North in November 2002 in the south-west of the development area, targeting apparent Romano-British activity revealed in the initial trial trenching, which culminated in the final evaluation stage in March 2003 (OA North 2003), centred on a ring ditch initially highlighted by a geophysical survey undertaken by GSB Prospection (GSB 2002). The western end of the proposed South West Campus access road was scheduled to cross these remains, and thus a programme of full excavation was instigated within its boundaries, carried out by OA North between July and August 2003.

The main focus of the excavation comprised a group of features located on top of a low promontory in the east of the site at 42m AOD, overlooking the river Conder, identified as a late prehistoric/Romano-British farmstead. A combination of a few cultural indicators and radiocarbon dating identified this site as being active in the first to early fourth centuries AD. The main elements comprised the remains of a roundhouse, a circular enclosure, and associated linear arrangements of postholes interpreted as fence lines. The farmstead was bound by a ditch to the west, beyond which a large water hole was identified. The evaluation identified further apparently Romano-British activity to the north, suggesting the settlement extended northwards beyond the limits of the excavation.

OA North 2006 (HER 26248): a watching brief was carried out during the replacement of 1.1km of a gas pipeline between Blea Tarn Road (NGR SD 47778 59057) and Lancaster University (NGR SD 48816 57880). The base of a stone field boundary wall of possible nineteenth century origin was discovered beneath a current hedgerow. A variety of

post-medieval domestic finds were collected during the watching brief, which are thought to have been derived from midden material, but no deposits of archaeological significance were identified.

OA North 2009: a desk-based assessment was carried following proposals for the installation of two MM82 wind turbines on land to the east of the University's South West Campus (centred on NGR SD 4904 5742). Segen Ltd, acting on behalf of the University, carried out an Environmental Impact Assessment (EIA), to accompany the planning application. The archaeological desk-based assessment was required as part of the EIA to inform the planning process as to the potential impact of the proposed development on the cultural heritage resources. In total, 35 sites were identified within the study area, of these 26 were identified from the HER, nine of which were Grade II Listed Buildings. One site was identified during a site visit and the remaining sites were identified from cartographic sources.

Stratascan 2010: In January 2010 Stratascan undertook a magnetic gradiometer survey of the present study area, which then comprised approximately 20.4ha of pasture beside the M6 motorway, adjacent to Lancaster University (NGR SD 490 575). The results of a desk-based assessment (OA North 2009) were made available to Stratascan which provided information on previous and potential activity of Bronze Age, Romano-British, Medieval and Post-medieval date. A detailed magnetic survey (gradiometry) was used as an efficient and effective method of locating archaeological anomolies.. The survey results were dominated by modern activity, with construction-related anomolies in the north of the study area and modern agricultural furrows in the central region. The southern part of the survey showed more of potential archaeological interest that may warrant further investigation, with two possible enclosures and one possible thermoremanent feature, which may represent a former kiln or other form of intense burning. A general scatter of possible pits may also be considered for sampling. As a result of the survey, a further seven sites were added to the gazetteer (Appendix 7.1).

7.5.7 Site Visit

All Sites and Plates referred to below can be found in Appendix 7.1 and Appendix 7.5 (respectively) and shown on Figure 7.1.

A general site visit was undertaken on Thursday 24th September 2009 (Appendix 7.5, Plates 1-9). For ease of reference the fields noted within the proposed development area were labelled A-E (Figure 7.1).

Table 7.7 Summary of site visit results; All plates are presented in Appendix 7.5 in Volume 3

Field No	Location	Description
Field A	South side of former Bailrigg road, now a track (Plate 1)	No additional notable features
Field B	East side of former Bailrigg road, now track (Plate 2)	The southern portion of the stream marked the boundary between the townships of Scotforth to the north and Ellel to the south on the Enclosure map of 1809 (Site **23**; Appendix 7.1).
Field C	Further east of track, separated from Field B by a narrow stream (Plates 3 and 4)	No additional notable features
Field D	To the north of Field B (Plate 5), bounded to the east and west by woodland	On the west side of the wood, at its southern end, the south and east sides of an enclosure were noted (Site **19**; Appendix 7.1 and Appendix 7.5 Plates 6 and 7). The enclosure comprises low earthern mounds, *c* 0.4m in height and *c* 1m in width. The southern bank measures *c* 30m in length and the eastern boundary 20m. The present-day southern extent of the woodland is now bounded 20m to the north of this enclosure by a post and wire fence. Mature trees along the banks and within the area they enclose suggest that the wood once extended as far as these banks. Also two of three former ponds noted on 1841 tithe map (Site **25**; Appendix 7.1). No sign of third pond noted.
Field E	Northern part of the proposed development area (Plate 8)	Separate area in north-east corner demarcated by parallel post and wire fences (Appendix 7.5: Plate 9). The double fence follows the line of eastern portion of former field boundary (Site **20**; Appendix 7.1) and northern portion of former field boundary Site **21**. Pair of gateposts noted in south-west corner of fenced off area.

A second site visit was undertaken on Monday 15th March 2010 to visit the nine individual statutorily designated sites within the study area and wider 1km buffer zone of the proposed development (Sites 14-15 and 29-35), which are all Grade II Listed Buildings. The purpose was to assess the impact on their setting. In terms of visual impact within the Zone of Theoretical Visibility (ZTV) this has been assessed in Chapter 6, Landscape and Visual Impact Assessment, of the ES.

The results of the assessment of impact on the setting of the Grade II Listed Buildings are summarised in Table 7.8, below. In addition, the cumulative impact of the proposed scheme, when considered alongside other wind farm sites in the area, has also been assessed and is discussed below.

Table 7.8 Designated sites considered for visual impact

Site no	Type/ Ref no	NGR	Brief description	Approx. distance from T sites	Description of impact on setting	Assessment
14	LB II 16370	348610 458215	Bailrigg Farmhouse, Bailrigg	0.4km to NW	Blade tips and nacelle of Turbine will be visible	Close proximity to Turbine (c 700m). Visual setting of LB will be affected
15	LB II 25752	348494 457936	Bailrigg House, Bailrigg Lane	0.4km to W	Blade tips and nacelle of Turbine will be visible	Close proximity to Turbine (c 695m). Visual setting of LB will probably be affected
29	LB II 182255	348063 457343	Boundary Stone, A6 - near Lancaster University	1km to W	Blade tips and nacelle of Turbine will probably be visible	Visual setting of LB already compromised. Little further additional visual effects from the present development
30	LB II 13867	348109 456997	Boundary Stone, A6 - Ou Beck Ellel	1km to W	Blade tips and nacelle Turbine will probably be visible	Visual setting of LB already compromised. Little further additional visual effects from the present development
31	LB II 16232	348613 456165	Stile, Church Lane, Ellel	1km to SW	Blade tips and nacelle of Turbine will not be visible, as they are obscured by nearby buildings	Visual setting of LB will not be affected
32	LB II 182172	348644 456164	Sundial, Church Lane, Ellel	1km to SW	Blade tips and nacelle of Turbine will not be visible, as they are obscured by nearby buildings	Visual setting of LB will not be affected
33	LB II 182176	348395 456717	Barker House Farmhouse, Green Lane, Ellel	0.75km to SW	Blade tips and nacelle of Turbine will not be visible as they are obscured by nearby buildings	Visual setting of LB will not be affected
34	LB II 182224	350017 457630	Dam Head, Quernmore	0.8km to E	Blade tips and nacelle of Turbine will probably be visible	Visual setting of LB will probably be affected
35	LB II 182290	348101 457116	Milestone, A6 - Ellel	1km to W	Blade tips and nacelle of Turbine will probably be visible	Visual setting of LB already compromised. Little further additional visual effects from the present development

7.6 Information Gaps

7.6.1 Data Source Limitation

The limitations of data have been considered during this assessment, which comprises a desk-based assessment supported by a site visit. Generally, information held by public data sources is usually considered to be reliable, but certain limitations might include:

- The HER can be limited because it depends on random opportunities for research, fieldwork and discovery. There can often be a lack of dating evidence for sites;
- The usefulness of aerial photographs depends upon geology, land use and weather conditions when the photographs were taken. Some types of remains do not produce crop, soil or vegetation marks. Aerial photographs necessarily involve some subjective interpretation of the nature of sites;
- Documentary sources are rare prior to the medieval period, and many historic documents are inherently biased; and primary sources, especially older records, often fail to accurately locate sites and can be subjective in any interpretation;
- The conditions and circumstances of the visual inspection were governed by the weather, access restrictions, and health and safety concerns that meant not all sites listed on the HER or identified during the desk-based assessment were visited and that potential previously unknown sites were not identified.

- Geophysical survey on archaeological sites is a rapid non-invasive, non-destructive data gathering method that does not disturb the topography or the archaeological record of the site. Factors such as soil type, local geology, previous human activity and disturbance from modern services can affect the results of the magnetic survey. Moreover, for reasons of access and unsuitability of ground, it was not possible to survey the area immediately around the proposed site for the turbine. Following a geophysical survey of the study area in 2010 (Stratascan 2010) an additional six sites were added to the gazetteer, but local conditions (such as those at the northern end of the development area, where was a significant amount of interference associated with modern construction works in the area) may mean further anomalies were undetected.

7.6.2 Limitations of the Impact Assessment

Due to the nature of the data sources' limitations identified above, it is possible that previously unrecorded archaeological sites will survive within the study area. There is, therefore, an element of uncertainty over the nature, frequency and extent of the archaeological resource surviving within the study area that may be impacted upon by the installation of the wind turbine. Grading of archaeological sensitivity and significance of impact may therefore be revised following further evaluation and assessment.

7.7 Assessment of Potential Effects

7.7.1 Introduction

In total, forty-two sites have been identified within the study area, details of which are presented in Appendix 7.1. Sites 01-18 and 28-35 were identified from the HER, and include nine Grade II Listed Buildings (Sites 14-15 and 29-35). One site was identified during the first site visit (Site 19), eight sites (Sites 20-27) were identified during the map regression and a further seven sites (Sites 36-42) were identified following a geophysical survey of the study area (Stratascan 2010).

7.7.2 Importance of Gazetteer Sites

Using the criteria outlined in Table 7.1, each of the sites listed in the gazetteer (Appendix 7.1) has been assessed for importance as a site of archaeological interest. Sites 14-15, and 29-35 are considered to be of high importance, due to their Grade II Listed status. Sites 03-06, 09-10, 12-13, 17–18, 23 and 26 are rated as being of medium importance, as they are of county or regional interest. The remaining sites (Sites 01-02, 07-08, 11, 16, 19-22, 24-25, 27-28 and 36-42) comprise features related to local agricultural use and land management of the area of post-medieval or unknown date, and, therefore, are considered to be of low or unknown importance.

Table 7.9 Assessment of the importance of each site identified in the gazetteer

Site name	Site no	Importance
Cropmark, Lancaster University	**01**	Low
Watercourse, near Banton House, Hazelrigg Lane	**02**	Low
Enclosure, Barrow Greaves, Ellel	**03**	Medium
Field system, Thorney Fall	**04**	Medium
Ditch/culvert, Green Lane and Thorney Fall	**05**	Medium
Embankment, Green Lane	**06**	Medium
Cropmark, Blea Tarn Farm, Hazelrigg Lane	**07**	Low
Pit, Bailrigg	**08**	Low
Farmstead and well, near Banton House, Hazelrigg Lane	**09**	Medium
Building platform, south of Eastrigg, off Hazelrigg Lane	**10**	Medium
Boundary, Banton House, Hazelrigg Lane	**11**	Low
Findspot, Banton House Farm, Hazelrigg Lane	**12**	Medium
Lancaster to Overburrow Roman road	**13**	Medium
Bailrigg Farmhouse	**14**	High
Bailrigg House, Bailrigg Lane	**15**	High
Cobbled trackway and field boundary, south-west of Blea Tarn	**16**	Low
Ridge and furrow, between Barrow Greaves and Higher Kit Brow	**17**	Medium
Field boundary and ridge and furrow, west of Higher Kit Brow	**18**	Medium
Banked enclosure, south-west of Hazelrigg	**19**	Low
Former Field Boundary, north-west of Hazelrigg	**20**	Low

Site name	Site no	Importance
Former Field Boundary, north-west of Hazelrigg	**21**	Low
Former Field Boundary, south of Hazelrigg	**22**	Low
Boundary between Scotforth and Ellel townships	**23**	Medium
Former Pit/Pond, north of Hazelrigg	**24**	Low
Three Former Pits/Ponds, west of Hazelrigg	**25**	Low
Hazelrigg Farm	**26**	Medium
Former Field Boundary, north of Hazelrigg	**27**	Low
University weather station	**28**	Low
Boundary Stone, A6 - near Lancaster University	**29**	High
Boundary Stone, A6 - Ou Beck Ellel	**30**	High
Stile, Church Lane, Ellel	**31**	High
Sundial, Church Lane, Ellel	**32**	High
Barker House Farmhouse, Green Lane, Ellel	**33**	High
Dam Head, Quernmore	**34**	High
Milestone, A6 - Ellel	**35**	High
Possible kiln/furnace	**36**	Unknown
Linear feature/possible field boundary	**37**	Unknown
Possible small enclosures	**38**	Unknown
Possible agricultural feature	**39**	Unknown
Possible tracks	**40**	Unknown
L-shaped feature	**41**	Unknown
Putative pits	**42**	Unknown

7.7.3 Potential Effects

Following on from the assessment of the importance of sites of archaeological interest detailed in Section 7.7.2, the significance of impact during construction has been determined, based on the knowledge of the proposed development and the present condition of the archaeologically and historically significant sites. If proposed activities and processes are to change in the future, then the assessment will require further review. This assessment of impact is dependent upon adherence to the recommendations for mitigation (Section 7.8).

The proposed development consists of a single wind turbine that will have a mast height of 59m, a blade length of 41m, a rotor diameter of 82m and a maximum ground to tip height of 100m. The turbine rotor and nacelle will be mounted on a tapered steel tower (approximately 3m – 3.8m wide), supported on reinforced concrete foundations approximately 15m x 15m with an overall depth of 3m. The wind turbine will be located at NGR 349175 457789 at the northern end of the site at c 87m AOD (Figure 7.2 in Volume 3). Ancillary development will comprise an access track and access alterations; a crane hard-standing pad; underground electrical cables between the turbine and an electricity substation on the main university campus; and a temporary construction compound. It is currently proposed to house the new transformer unit and switch gear within the base of the turbine towers, removing the need for a standalone control building at the site.

The scheme is designed with an operational life of 25 years. When the scheme ceases operation, all major equipment would be removed from site. The upper sections of the foundation structures would be removed to below ground level and the area would be reinstated to pasture. Underground cables would be left in place as removing them would cause unnecessary environmental disturbance.

7.7.3.1 Construction Phase - Direct Impacts

Eleven of the archaeological sites identified within the study area could be impacted by the groundworks during the construction of the wind turbine (Sites 13, 20, 22, 23 and 27, Figure 7.1). Sites 20, 22 and 27, all former field boundaries, are considered to be of low importance. As these sites are linear in nature it is likely that any impact on them would be partial, and therefore the magnitude of impact has been considered to be small. Sites 13, the putative route of a Roman road, and Site 23, the route of a township boundary, are considered to be of medium importance. The route of the road through this area is unknown, and therefore the potential impact of the proposed development remains uncertain. In addition, excavations to the immediate west of the study area uncovered the remains of a Romano-British settlement site in 2003. The proximity of this site to the proposed development area, and the similarities in topography (e.g. low lying and between 300-400m from the north bank of the River Conder) of the two sites suggests that there is some potential for further Romano-British archaeological remains to be uncovered at the proposed development area.

Sites 36-42 identified following a geophysical survey within the study area (Stratascan 2010) are considered to be of unknown importance. The magnitude of impact, therefore, is also considered to be unknown.

7.7.3.2 Construction Phase - Indirect Impacts

There are nine Grade II Listed Buildings within 1km of the proposed development (Sites 14-15 and 29-35), of which the settings of six will be visually effected by the installation of the wind turbines (Sites 14, 15, 29-30 and 34-35, Figure 7.2). These sites are considered to be of high importance, but as the impact of the proposed scheme on them would be indirect and temporary, the magnitude of impact has been considered to be negligible, in the case of Sites 29-30 and 35, and small in the case of Sites 14-15 and 34.

7.7.3.3 Operational Phase - Direct Impacts

No further direct impacts during the operational phase of the scheme are anticipated on the Grade II Listed Buildings within 1km of the proposed development or on the remaining gazetteer sites.

7.7.3.4 Operational Phase - Indirect Impacts:

The indirect impacts of the proposed scheme during its operational phase are considered to be the same as for the construction phase.

7.7.3.5 Decommissioning Stage - Direct Impacts

Unless groundworks are required in previously undisturbed areas, no further direct impacts during the decommissioning phase of the scheme are anticipated.

7.7.3.6 Decommissioning Stage - Indirect Impacts

No further indirect impacts during the decommissioning phase of the scheme are anticipated.

Impact Summary: the assessment concluded that the setting of six of the nine Listed Buildings within 1km of the proposed development would be indirectly affected. Sites 31, 32 and 33 would not be impacted due to the line of site from these buildings to the proposed turbine site being blocked by buildings in the immediate area. In addition, it was concluded that although the proposed development would be visible from Sites 29, 30 and 35, this is considered to be negligible in terms of impact. The sites comprise two boundary stones and a milestone on the side of the A6. The settings of the sites are, therefore, already compromised by their situation alongside this busy dual carriageway. However, Sites 14, 15 and 34 would be visually impacted by the proposed turbine. As each of these sites is a house or farmhouse it must be considered that setting plays a part in its location and current significance.

Table 7.10 Assessment of the impact significance on each gazetteer site (during construction, operation and decommissioning, unless otherwise stated)

Site no	Nature of Impact	Importance	Magnitude of Impact	Significance of Impact	Confidence Level
01	No impact	Low	Negligible	Neutral	High
02	No impact	Low	Negligible	Neutral	High
03	No impact	Medium	Negligible	Neutral	High
04	No impact	Medium	Negligible	Neutral	High
05	No impact	Medium	Negligible	Neutral	High
06	No impact	Medium	Negligible	Neutral	High
07	No impact	Low	Negligible	Neutral	High
08	No impact	Low	Negligible	Neutral	High
09	No impact	Medium	Negligible	Neutral	High
10	No impact	Medium	Negligible	Neutral	High
11	No impact	Low	Negligible	Neutral	High
12	No impact	Medium	Negligible	Neutral	High

Site no	Nature of Impact	Importance	Magnitude of Impact	Significance of Impact	Confidence Level
13	The route of the Roman road is uncertain. There is therefore a possibility that it lies within the proposed development area, and could be impacted by groundworks	Medium	Uncertain	Uncertain	Low
14	Possible visual impact	High	Small	Slight/ Moderate	High
15	Possible visual impact	High	Small	Slight/ Moderate	High
16	No impact	Low	Negligible	Neutral	High
17	No impact	Medium	Negligible	Neutral	High
18	No impact	Medium	Negligible	Neutral	High
19	No impact	Low	Negligible	None	High
20	Possible impact by groundworks	Low	Small	Slight/ neutral	High
21	No impact	Low	Negligible	None	High
22	Possible impact by groundworks	Medium	Small	Slight	High
23	Possible impact by groundworks	Low	Small	Slight/ neutral	High
24	No impact	Low	Negligible	None	High
25	No impact	Low	Negligible	None	High
26	No impact	Medium	Negligible	Neutral	High
27	Possible impact by groundworks	Low	Small	Slight/ neutral	High
28	No impact	Low	Negligible	None	High
29	Possible visual impact	High	Negligible	Slight	High
30	Possible visual impact	High	Negligible	Slight	High
31	No impact	High	Negligible	Slight	High
32	No impact	High	Negligible	Slight	High
33	No impact	High	Negligible	Slight	High
34	Possible visual impact	High	Small	Slight/ Moderate	High
35	Possible visual impact	High	Negligible	Slight	High
36	Possible impact by groundworks	Unknown	Unknown	Unknown	High
37	Possible impact by groundworks	Unknown	Unknown	Unknown	High
38	Possible impact by groundworks	Unknown	Unknown	Unknown	High
39	Possible impact by groundworks	Unknown	Unknown	Unknown	High
40	Possible impact by groundworks	Unknown	Unknown	Unknown	High

Site no	Nature of Impact	Importance	Magnitude of Impact	Significance of Impact	Confidence Level
41	Possible impact by groundworks	Unknown	Unknown	Unknown	High
42	Possible impact by groundworks	Unknown	Unknown	Unknown	High

7.8 Mitigation

In terms of the requirement for further archaeological investigation and mitigation, it is necessary to consider only those sites that will be directly affected by the proposed development. Current legislation draws a distinction between archaeological remains of national importance and other remains considered to be of lesser significance. Those perceived to be of national importance may require preservation in situ, whilst those of lesser significance may undergo preservation by record.

Given the potential for Romano-British remains within the proposed development area, and the possibility that the Roman road crosses through this area, a phased programme of iterative archaeological works will be undertaken in order to inform a suitable mitigation strategy. The methodology for each stage of this programme of works should be agreed in advance with the Lancashire County Archaeology Service (LCAS).

In the first instance, the results of this study, the geophysical survey (Stratascan 2010) and the final detailed development proposals will be used to determine a programme of archaeological investigaton that meets the requirements of LCAS. The intrusive archaeological investigation would be concentrated only within those areas that will be directly affected by groundworks undertaken as part of the final development plan; archaeological sites that lie within the nominal development area, but outside of defined zones of development impact, could be preserved in situ, without further investigation. The programme of intrusive archaeological investigation will provide information on the nature of the buried archaeological resource within the site and will allow the establishment and agreement with LCAS of an appropriate mitigation strategy for any required further works (e.g. preservation of significant remains in situ, archaeological excavation in advance of construction, or a watching brief during construction).

7.9 Residual Effects

7.9.1 Introduction

The residual impacts of the proposed scheme on the cultural heritage and archaeology are:

- Permanent and negative, where archaeological remains cannot be preserved *in situ*. However, any such excavated archaeological remains will be preserved by archaeological record resulting from the implemented programme of iterative works, which will inform a mitigation strategy. As a residual effect, this will have a beneficial impact as they will contribute to the archaeological and historical knowledge of the area; and
- Long-term, visual impact on the setting of cultural heritage sites.

The residual effects of each of the sites considered to be potentially impacted by the proposed scheme are outlined in Table 7.11 below. The significance of the effects is given based on the assumption that the proposed mitigation outlined in Section 7.8 is carried out in full. The proposed scheme has been considered to have a slight adverse residual effect on four of the potentially directly impacted sites (Sites **20**, **22**, **23** and **27** Appendix 7.1 and Figure 7.1). Sites **20**, **22**, and **27** are considered to be of low importance, and Site **23** is considered to be of medium importance. As these are all linear sites, however, the impact on them would be partial. The impact of the proposed scheme on the putative route of a Roman road (Site 13 Appendix 7.1 and Figure 7.1), considered to be of medium importance, is uncertain and the residual impact is, therefore, also considered to be uncertain. In addition, there is some potential for previously unknown Romano-British remains to be discovered within the proposed development area. Recommendations have therefore been made for a programme of further evaluation works, comprising trial trenching in the first instance, in the areas that will be disturbed by the proposed groundworks. Mitigation by design, resulting in the preservation in situ of any archaeological remains within these areas would be the preferred option. However, if any areas of archaeological interest are unavoidable, any excavated remains will be preserved by archaeological record, which would have a slight beneficial impact as this would add to the archaeological understanding of the area.

Six sites identified during a geophysical survey of the study area (Sites **36**-**42**) are of unknown importance and the scheme has been considered to have an uncertain residual effect. The proposed scheme has also been considered to have a slight adverse residual effect on six sites, within a 1km radius of the proposed scheme, which would be potentially indirectly effected (Sites **14**, **15**, **29**-**30** and **34**-**35** Appendix 7.1 and Figure 7.1) (Section 7.5.5 Table 7.7). However, as this impact is visual it will only impact the sites for as long as the turbine is operational.

Table 7.11 Summary of the residual effects during the construction and operational, and decommissioning phases, or as specified

Site no	Description of Effect	Residual Effects	
		Duration	Significance
13	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Uncertain
14	Potential visual impact on Grade II Listed Building	Long term - operational phase of wind turbine	Slight adverse effect
15	Potential visual impact on Grade II Listed Building	Long term - operational phase of wind turbine	Slight adverse effect
20	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Slight adverse effect
22	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Slight adverse effect
23	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Slight adverse effect
27	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Slight adverse effect
29	Potential visual impact on Grade II Listed Building	Long term - operational phase of wind turbine	Slight adverse effect
30	Potential visual impact on Grade II Listed Building	Long term - operational phase of wind turbine	Slight adverse effect
34	Potential visual impact on Grade II Listed Building	Long term - operational phase of wind turbine	Slight adverse effect
35	Potential visual impact on Grade II Listed Building	Long term - operational phase of wind turbine	Slight adverse effect
36	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Uncertain
37	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Uncertain
38	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Uncertain
39	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Uncertain
40	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Uncertain
41	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Uncertain
42	Potential disturbance of archaeological remains during construction and decommissioning	Permanent	Uncertain

7.9.2 Cumulative Effects

The six Grade II Listed Building sites that will have impacts on their setting by the proposed scheme (Sites **14**-**15**, **29**-**30**, and **34**-**35 Figure 7.2** in Volume 3) have been assessed in terms of cumulative impact by including other wind turbines

in the area (Figure 6.07). Dewlay Cheese Wind Energy Scheme has been consented, and will comprise one turbine located c 13km to the south of the proposed scheme. This would be visible from four of the sites (Sites **15**, **29**-**30** and **35**). Caton Moor Wind Farm, located approximately 10km to the north-east of the proposed scheme, comprises 8 turbines, but would not be seen from any of the Listed Buildings potentially impacted by the proposed scheme.

In addition, three other proposed wind farms have been considered in the cumulative impact of the proposed scheme (Figure 6.08). These comprise BT, Heysham, located 7.5km to the north-west of the proposed scheme; Eagland Hill, located c 13km to the south-west of the proposed scheme; and Claughton Moor, located c 12km to the north-east of the proposed scheme. The current status of these schemes is that Heysham and Claughton Moor are in the planning/scoping stages, whilst Eagland Hill has been refused. Table 7.12 summarises the cumulative impact of all five of these sites on the six potentially visually impacted Grade II Listed Buildings within 1km of the proposed scheme.

In addition, five other proposed wind farms have been considered in the cumulative impact of the proposed scheme (Figure 7.2). These comprise BT, Heysham and also Heysham South, each located c 7.5km tothe west-north-west of the proposed scheme, as well as Port of Heysham, to be sited a further 1.5km to the west-north-west; Eagland Hill, located c 13km to the south-south-west of the proposed scheme; and Claughton Moor, located c 12km to the north-east of the proposed scheme. The current status of these schemes is that all three of those at Heysham, together with that at Claughton Moor, are in the planning/scoping stages, whilst Eagland Hill has been refused. Table 7.12 summarises the cumulative impact of all seven of these sites on the six potentially visually impacted Grade II Listed Buildings within 1km of the proposed scheme.

Table 7.12 Summary of cumulative impacts

Site no	No of operational and proposed turbines the site is impacted by
14	2
15	2 (including Dewlay Cheese)
29	3 (including Dewlay Cheese)
30	3 (including Dewlay Cheese)
34	0
35	3(including Dewlay Cheese)

Overall, five of the six protected sites within the 1km buffer zone of the proposed scheme, and potentially impacted by it, have been found to be potentially impacted by one or more additional proposed or operational wind farms (Sites **14-15**, **29**-**30**, and **35**, Figure 7.2). However, none of the sites is closer than 5km to any of the additional wind farm sites. This suggests that the presence of the wind farms in the landscape will be part of a wider view from these areas. As with the proposed scheme, it is assumed that these additional wind farms are temporary and, therefore, the sites will only be impacted for as long as the turbines are operational.

7.10 Statement of Significance

For full details of the site referred to below refer to Appendix 7.1 and for the significance of impact please refer to Table 7.9.

The desk-based assessment addresses the direct and indirect impacts of the proposed development on the historic environment. The study reviewed relevant databases, as well as published, documentary, map and aerial photographic sources and was supplemented by a site visit.

A Bronze Age axe findspot (Site **12**) was located within the study area, and there is further evidence for Bronze Age activity in the wider area. The putative route of a Roman road (Site **13**) passes to the north of the study area, and a Romano-British settlement site is located to the west of the study area. With the exception of a possible hearth or bonfire pit excavated at Barker House Farm, there are no early medieval sites within or close to the study area, and, as yet, there is little known evidence from this period for the area. The potential for discoveries of sites or features from this period is therefore unknown but probably low. Medieval activity in the area appears to have been largely agricultural with a field system (Site **04**) and area of ridge and furrow (Site **18**) identified in the study area. A further area of medieval/post-medieval ridge and furrow (Site **17**) was also identified, as well as the township boundary between Scotforth to the north and Ellel to the south (Site **23**). The date of this boundary is unknown, but it could be medieval.

Post-medieval sites include relict boundaries and tracks (Sites **11**, 1**6**, **20**-**22** and **27**), former pits and ponds (Sites **08** and **24**-**25**), a ditch and bank (Sites **05** and **06**), a cropmark (Site **07**), a former woodland enclosure bank (Site **19**), and nine Grade II Listed Buildings (Sites **14**-**15** and **29**-**35**). Within the study area there is also a modern unspecified cropmark (Site **01**), a modern weather station (Site **28**), an undated earthwork (Site **03**), and an undated former watercourse (Site **02**).

Eleven of the identified sites could be impacted by the groundworks during the construction of the wind turbine (Sites 13, **20**, **22**, **23**, **27** and **36**-**41**). Sites **20**, **22**, **23** and **27** are considered to be of low importance, the significance of impact as slight/neutral and no specific further work to mitigate the impact of the proposed scheme on these has been recommended. Site **23** is considered to be of medium importance, the significance of impact as slight/neutral, however as it is a linear site, any impact on it is likely to be partial, and therefore there are no recommendations for specific further work to mitigate the impact of the proposed scheme on it. Site **13**, the putative route of a Roman road, is considered to be of medium importance and the significance of impact as uncertain. The route of the road through this area is unknown and therefore the potential impact of the proposed development remains uncertain. In addition, the proximity of the Romano-British settlement site excavated in 2003 to the proposed development area, suggests that there is some potential for further Romano-British archaeological remains to be uncovered at the proposed development area. Such remains would be of high importance, particularly where they can be related to the known Romano-British settlement identifed at Barker House Farm. The remaining six sites identified during a geophysical survey of the study area are of unknown date, character and extent (Sites **36**-**42**). They were identified, however, within the central and southern portion of the study area. The sites have therefore been classified as of unknown importance and the significance of impact as uncertain. These features may be of high importance if they relate to the pre-modern land use of the area, and particularly so if they appear to be related to the known Roman-British settlement identified at Barker House Farm

In light of this, a programme of archaeological works is proposed. In the first instance, the results of this study, the geophysical survey (Stratascan 2010) and the final detailed development proposals will be used to determine a programme of archaeological investigaton that meets the requirements of LCAS. The intrusive archaeological investigation would be concentrated only within those areas that will be directly affected by groundworks undertaken as part of the final development plan; archaeological sites that lie within the nominal development area, but outside of defined zones of development impact, could be preserved in situ, without further investigation. The programme of intrusive archaeological investigation will provide information on the nature of the buried archaeological resource within the site and will allow the establishment and agreement with LCAS of an appropriate mitigation strategy for any required further works (e.g. preservation of significant remains in situ, archaeological excavation in advance of construction, or a watching brief during construction).

The indirect impact of the installation of the wind turbine has also been considered in this assessment. Nine Grade II Listed Buildings within 1km of the proposed scheme (Sites **14**, **15**, and **29**-**35**) have been assessed in terms of the visual impact on their settings. The settings of six of the sites considered may be indirectly affected by the proposed scheme. The sites are all considered to be of high importance, but as the impact of the proposed scheme on them would be indirect and temporary, the magnitude of impact has been considered to be negligible in the case of Sites **29**-**30** and **35**, and small in the case of Sites **14-15** and **34**.