

CFA Archaeology Ltd

archaeological consultants

Advice on Archaeology & Planning

Environmental Impact Assessment

Interpretation, Design & Display

Finds/ Environmental Analysis

Field Evaluation & Excavation


Historic Building Recording


Site & Landscape Survey

Geophysical Survey

Crystal Rig Substation Extension

Cultural Heritage

 0131 273 4380

 0131 273 4381

 info@cfa-archaeology.co.uk

 www.cfa-archaeology.co.uk

CFA ARCHAEOLOGY LTD

The Old Engine House
Eskmills Business Park
Musselburgh
East Lothian
EH21 7PQ

Tel: 0131 273 4380

Fax: 0131 273 4381

email: info@cfa-archaeology.co.uk

web: www.cfa-archaeology.co.uk

Author	Hannah Tweedie BA MPhil MCIFA FSA Scot
Illustrator	Shelly Werner BA MPhil PhD MCifa
Editor	Andrew Dunwell BA MCifa FSA FSA Scot
Commissioned by	MWH Global
Date issued	September 2013
OASIS Reference	cfaarcha1-264560
Grid Ref	NT 664 693

This document has been prepared in accordance with CFA Archaeology Ltd
standard operating procedures.

Crystal Rig Substation Extension

Cultural Heritage

1. ARCHAEOLOGY AND CULTURAL HERITAGE

A desk-based assessment and walk-over field survey were conducted to identify the cultural heritage interests within a study area centred on the location of the proposed extension to the 400kV grid substation at Crystal Rig Wind Farm; and considers the likely impacts of the proposals on cultural heritage interests. The cultural heritage assessment was informed by comments and information provided by Historic Scotland (HS), East Lothian Council Archaeology Service (ELCAS) and Scottish Borders Council Archaeology Service (SBCAS).

1.1. Cultural Heritage Study Area

The cultural heritage study area was divided into two zones – an Inner Study Area and an Outer Study area, as illustrated on Figures 16 and 17.

The Inner Study Area consists of the proposed development area plus a 200 m buffer. This area was considered sufficient to identify cultural heritage assets close to, or within, the development footprint, and to provide additional background information on the archaeological potential of the proposed development area. A field survey was carried out within the Inner Study Area. Figure 16 depicts the proposed development area and the 200 m buffer, together with the locations of cultural heritage assets identified by the cultural heritage study within the Inner Study Area. A gazetteer of cultural heritage assets located within the Inner Study Area, detailing the current baseline condition and an assessment of the cultural heritage importance of each asset, is provided in Appendix C.

The Outer Study Area consists of a 4 km buffer centred on the proposed development area, and is the area in which the potential impacts of the proposals on the setting of cultural heritage assets have been assessed. This study area was defined taking into account the conclusions of the LVIA assessment which states that there is unlikely to be any significant impact at distances of more than 4 km from the proposed substation extension. Figure 17 shows the Outer Study Area, together with the Zone of Theoretical Visibility (ZTV) and the locations of key cultural heritage assets. A list of assets within the Outer Study Area, and an assessment of the likely indirect impacts upon them resulting from the construction and operation of the proposed development, is presented in Appendix D.

1.2. Potential Impacts

The following potential impacts have been assessed in full:

- Direct impacts on recorded cultural heritage assets and on as yet undiscovered assets within the Inner Study Area;
- Indirect impacts on the setting of designated cultural heritage assets present within the Outer Study Area.

1.3. Methodology

1.3.1. Consultation

Consultation letters were sent to ELCAS and SBCAS on 19th April 2013, to introduce the project, to provide details of the proposed approach to appraisal, and to obtain opinion on the likely effects on historic environment interests of the proposed development. A letter was sent by MWH to Historic Scotland on 5th June 2013, providing details of cultural heritage sites and features identified within the proposed development area, and details of the mitigation measures which are proposed to be adopted for the scheme.

A reply was received from East Lothian Council Archaeologist (1st May 2013), who stated that they were content with the proposed methodology for the assessment. The potential for

impacts upon remains of the farmstead and enclosures at Boonslie (HER No.MEL1682) was noted. It was also noted that the remains at Boonslie are currently under assessment to potentially be designated as a scheduled monument, and therefore in the assessments the site should be considered as being of schedulable quality.

A reply was received from Scottish Borders Council Archaeologist (26th April 2013) who stated that they were content with the proposed methodology for the assessment, and that there were no specific cultural heritage issues with regard to the project, which they wished to highlight.

MWH received a reply from Historic Scotland (13th June 2013) who confirmed that the proposal will not impact on the location or settings of any cultural heritage assets with statutory designations.

1.3.2. Data Collection

A desk-based study and reconnaissance walk-over field survey were undertaken in order to identify cultural heritage constraints and to assess the archaeological potential of the site of the proposed Crystal Rig Substation Extension.

No intrusive archaeological investigations have been carried out as a part of this appraisal.

Desk-based Study

Up-to-date information was obtained from appropriate sources on the locations, and extents where known, of cultural heritage assets with statutory protection and non-statutory designations within both the Inner and Outer Study Areas.

- Details of the locations and extents of Scheduled Monuments, Listed Buildings, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields and Conservation Areas were downloaded in GIS from the Historic Scotland Data Warehouse (Historic Scotland 2013).
- Information on known cultural heritage assets within the Inner Study Area was obtained from the East Lothian Historic Environment Record (HER) and Scottish Borders Historic Environment Record (HER).
- Additional information on the character and condition of known archaeological sites and features within the Inner Study Area was obtained from the Royal Commission on the Ancient and Historical Monuments of Scotland database (RCAHMS 2013a).
- Ordnance Survey maps (including 1st and 2nd Edition maps and subsequent map editions), and other published historic maps held in the Map Library of the National Library of Scotland were examined for the Inner Study Area.
- An assessment was made of vertical aerial photographs held by the RCAHMS (Sorties from 1959 were examined) and modern aerial photography (Google Earth™) for the inner study area.
- Reports concerning previous archaeological work in the area with regard to the Crystal Rig Wind Farm (Jones 2008), the existing Crystal Rig Wind Farm substation (Hill & Suddaby 2007), and the proposed onshore works for the Neart na Gaoithe Wind Farm (CFA 2012) provided information on previous work which had occurred within the Inner Study Area.
- The Historic Land-Use Assessment Data for Scotland (HLA Map) (RCAHMS 2013b) has not yet been fully completed for this area. Within the wider area surrounding the proposed development the land is characterised as having been in use for rough grazing from the prehistoric period through to the present day.

- The Scottish Palaeoecological Archive Database (SPAD) (Coles *et al.* 1998) which records the distribution of known palaeoenvironmental sites across Scotland, was consulted for information on such sites within or adjacent to the proposed grid connection route. There were no such sites recorded within or in the vicinity of the Inner Study Area.

Reconnaissance Field Survey

A walk-over reconnaissance field survey was undertaken within the Inner Study Area (the proposed development area plus a 200m buffer), in order to:

- Assess the baseline condition of the known cultural heritage assets which had been identified through the desk-based assessment;
- Identify any further sites or features of cultural heritage interest which were not detected by the desk-based assessment; and
- Identify areas with the potential to contain currently unrecorded buried archaeological remains.

Identified cultural heritage assets were recorded on pro-forma monument recording forms and by digital photography. Their positions (and where appropriate their extents) were logged using a Global Positioning System (GPS) accurate to +/- 1-2m.

1.4. Impact Assessment Methodology

1.4.1. Assessment of Effects

The types of impact on cultural heritage interests which might result from the proposed development have been assessed in the following categories:

- Direct, where there may be a physical impact on an asset caused by the construction of the proposed development. Direct effects tend to have permanent and irreversible adverse impacts upon cultural heritage remains.
- Indirect, where elements of the development affect the setting of cultural heritage features present in the vicinity.

Effects have been assessed in terms of their magnitude (Table 8.2), permanence (permanent / temporary), reversibility, and nature (adverse / neutral / beneficial).

Beneficial effects are those that contribute to the value of an asset through enhancement of desirable characteristics or the introduction of new, positive attributes. Neutral effects occur where the development can be accommodated comfortably by the receiving environment while neither contributing to nor detracting from the value of the asset. Adverse effects are those that detract from the value of an asset through a reduction in or disruption of valuable characteristics, or the introduction of new inappropriate characteristics.

Assessing Significance of Impact on Cultural Heritage Assets

The significance of an impact depends upon the importance of a cultural heritage asset (Table 8.1), combined with the magnitude of the predicted impact (Table 8.2).

Cultural heritage assets represent a non-renewable resource that are often fragile and suffer from constant attrition, from both natural and human causes. The assessment of importance of archaeological and heritage assets reflects the relative weight given to them in SHEP and SPP. Table 8.1 summarises the relative importance of those types of cultural heritage asset relevant to this study.

Table 8.1: Importance of Cultural Heritage Assets

Cultural Heritage Importance	Site Types
National / International	Sites of national or international importance, including: Scheduled Monuments, and sites proposed for scheduling;
Regional	Sites of regional importance, including: Archaeological sites and areas of distinctive regional importance;
Local	Sites of local importance, including: Archaeological sites and areas of local importance;
Lesser	Sites of little or no importance including: Artefact find-spots; Poorly preserved examples of particular types of feature.
Unknown	Sites and features where there is insufficient baseline information to determine more reliably the relative importance of the identified feature.

Criteria for assessing the magnitude of an impact, which measures the degree of change to the baseline condition of the heritage asset that could result from the construction of the proposed substation extension, are presented in Table 8.2.

Table 8.2: Magnitude of Impacts

Magnitude	Definition
High	A fundamental material change to the baseline condition of the asset, leading to total loss or major alteration of its character or setting.
Medium	A material, partial loss or alteration of character or setting.
Low	A slight, detectable, alteration of the baseline condition or setting of the asset.
Imperceptible	A barely distinguishable change from baseline conditions.

The importance of the asset defined in Table 8.1 and the magnitude of the predicted impact in Table 8.2 are used to inform the professional judgement of the likely significance of the effect. Table 8.3 summarises the criteria for assessing the significance of an effect. Major and moderate effects are considered to be significant.

Table 8.3: Significance of Effects

Magnitude of Impact ▼	Importance of Asset ►				
	National / International	Regional	Local	Lesser	Unknown
High	Major	Major	Moderate	Minor	Unknown
Medium	Major	Moderate	Minor	Negligible	Unknown
Low	Moderate	Minor	Negligible	Negligible	Unknown
Imperceptible	Minor	Negligible	Negligible	Negligible	Unknown

1.5. Baseline Conditions and Analysis of Importance

1.5.1. General

Three cultural heritage assets have been identified within the Inner Study Area. The locations and extents of these assets are shown on Figure 16, and Appendix C provides detailed gazetteer information on their character and baseline condition, together with an assessment of the relative cultural heritage importance of each.

Numbers in brackets refer to site numbers provided on Figure 16 and in Appendix C.

1.5.2. Cultural Heritage Assets within the Inner Study Area

There are no Scheduled Monuments or Listed Buildings within the Inner Study Area, and no part of the Inner Study Area would intersect with a Conservation Areas, Inventory Historic Battlefield or Inventory Garden and Designed Landscape.

The East Lothian HER and / or RCAHMS database holds records for two sites within the Inner Study Area. Records of three archaeological events (EEL 497, EEL 591 & EEL 589) which relate to field survey and evaluation works carried out prior to the construction of the existing substation, reconnaissance field survey prior to the construction of Crystal Rig Wind Farm, and a watching brief at Crystal Rig II Wind Farm, are held by the HER. The findings from these works are recorded under other HER Nos. and these event records are therefore not mentioned further in this report.

Examination of historic maps identified one further site within the Inner Study Area.

Field survey provided further information on the baseline condition of the sites and features which had been identified through the desk-based assessment.

The three cultural heritage sites and features recorded within the Inner Study Area all relate to the medieval or later agricultural exploitation of the land.

An area of drainage ditches (1) has previously been investigated through an archaeological evaluation, which formed part of the archaeological mitigation works for the construction of the existing substation. The area has also since been disturbed by the construction of the substation, and the use of the adjacent area as a construction compound. Field bank (2) was recorded by field survey (Jones 2008), but was not recorded by the current (2013) field survey. As the bank lies within the outer fence enclosing the existing substation, it is assumed that the bank has been destroyed by construction activities in the area. Both the area of drainage ditches (1) and the former location of the field bank (2) are considered to be of lesser cultural heritage importance.

The remains of a trackway (3) are visible to the west of the proposed substation extension, as a hollow-way running on a roughly north-south orientation with a slight bank visible on the

eastern side. The trackway is depicted on the First Edition Ordnance Survey map (Haddingtonshire, Sheet XVI, 1855, 6" to 1 mile) and is considered to be of local cultural heritage importance as it forms part of a wider system of trackways which connect with The Herring Road, which lies further to the west, and which was used in the 18th and 19th centuries to transport herring from Dunbar to the markets in Lauder, and to carry home salted herring for use over the winter months.

1.5.3. Assessment of Archaeological Potential of the Inner Study Area

The current land-use character of the development area is moorland and rough pasture, with the majority of the area having been disturbed by construction activities for the existing substation and the Crystal Rig Wind Farm.

There is little evidence for prehistoric activity within the proposed development area, and evidence for prehistoric settlement is generally confined to the lowland areas further to the north and east. Settlement in the area is first depicted on Roy's Military Survey map (1747-55), with farmsteads such as Boonslie, to the north of the proposed substation, being shown.

The archaeological trial trench evaluation prior to the construction of the existing substation provided evidence that the land in this area had not been subject to significant or extensive development, but that it had been progressively enclosed and partially improved. Taking these results, and the lack of substantial recorded remains in the vicinity of the proposed substation extension into account, it is considered that there is a low potential for previously undetected, buried remains to survive within the proposed development area.

1.5.4. Cultural Heritage Assets within the Outer Study Area

There is one cultural heritage asset located within 4km of the proposed substation extension from which the substation extension would theoretically be visible (Figure 17). This asset is:

- Enclosures and farmstead at Boonslie (Site of Schedulable Quality, HER No. MEL 1682).

1.6. Predicted Effects

1.6.1. Direct Effects

The potential for direct effects was assessed using the criteria detailed in Tables 8.2 and 8.3. All direct effects are considered to be permanent, irreversible and adverse, unless otherwise stated.

There is a potential for a direct effect upon track **(3)** which lies in close proximity to the proposed development area, due to vehicle movements and other construction activities. The potential direct effect would likely be of low magnitude. The effect is assessed to be **negligible and therefore not significant**.

No impact is predicted for an area of drainage ditches **(1)** although this lies within the proposed development area. This site has been effectively destroyed by the archaeological trial trenching which formed part of the archaeological mitigation for the construction of the existing substation, and was then disturbed by construction activities during the construction of the substation. The effect upon the area of drainage ditches is therefore assessed to be **not significant**.

No impact is predicted for bank **(2)** although it lies within the proposed development area, as this site no longer survives. The effect upon bank **(2)** is assessed to be **not significant**.

1.6.2. Indirect Effects

Using the methodology described above, Appendix D details the findings of the assessment of operational (indirect) impacts of the proposed substation extension.

Enclosures and farmstead at Boonslie (HER No.MEL1682), a site considered by East Lothian Council to be of schedulable quality, is predicted by the ZTV to have theoretical visibility of the proposed substation extension.

Boonslie enclosures and farmstead comprises an extensive area of earthworks which are visible on aerial photographs, and which include the remains of farmsteads, enclosures and rig and furrow cultivation remains which are believed to date to the late medieval period. The site is located on unimproved ground which slopes down towards the burn to the east, and which is largely overgrown with heather vegetation. From the majority of the site both the existing substation and the proposed extension would be visible. In very limited areas the new substation extension only would be visible, these areas lie in close proximity to the line of the burn. For some parts of the site, along the line of the burn, and at the northern end of the site either no part of the existing or proposed extension to the substation would be visible, or for other parts, only the existing substation would theoretically be visible. The setting of the enclosures and farmstead remains is its location within the more sheltered land of the burn valley, and this would not be affected by the proposed development. The wider landscape around Boonslie already includes the existing substation and the Crystal Rig Wind Farm. The proposed substation extension would lead to a barely distinguishable change from the existing baseline conditions, causing an impact of imperceptible magnitude, The effect is assessed to be **minor and therefore not significant**.

1.7. Mitigation

The emphasis in planning policy is for preservation in situ of important remains. Where that is not possible, the excavation and recording of any affected sites would be required in advance of construction, at the developer's expense.

In accordance with planning policy, where sites lie in close proximity to the proposed construction works, as in the case of trackway (3), they would temporarily be either entirely fenced off or visibly marked out to signal the presence of the site and to prevent accidental damage occurring during construction activities in the vicinity. Area of drainage ditches (1) has already been the subject of archaeological mitigation, and along with the former location of a field bank (2) then suffered disturbance during the construction of the existing substation. These sites have been effectively destroyed, and therefore no mitigation is proposed.

Written guidelines would be issued for use by all construction contractors, outlining the need to avoid causing unnecessary damage to known sites. That document would contain arrangements for calling upon retained professional support in the event that buried archaeological remains of potential archaeological interest (such as building remains, human remains, artefacts etc.) are discovered during construction works. The guidance would make clear the legal responsibilities placed upon those who disturb artefacts or human remains.

Any archaeological mitigation works requested by East Lothian Council before or during construction works would be included in a Written Scheme of Investigation (WSI) produced for approval prior to the commencement of construction works. Provision would be made for the excavation and recording of any archaeological remains identified as a result of any mitigation works that could not be preserved in situ. This provision would include the consequent production of written reports on the findings of the archaeological work conducted, with post-excavation analyses, publication and archiving of the results of the work, where appropriate.

No mitigation measures are proposed in relation to the predicted indirect effects.

1.8. Residual Effects

The assessment of the residual effects has been carried out with reference to the proposed development layout as shown on Figure 16.

1.8.1. Residual Direct (Construction) Effects

The completion of the programme of archaeological mitigation works which are set out above would minimise the loss of the archaeological resource which would occur as a result of the construction of the proposed substation extension. Following the implementation of the proposed mitigation measures, the residual effect is assessed to be **not significant**.

1.8.2. Residual Indirect (Operational) Effects

No mitigation is proposed, and therefore the predicted residual impacts remain as predicted above. The residual effect is assessed to be **minor and therefore not significant**.

1.9. Archaeology and Cultural Heritage Summary

Up-to-date information on the locations and extents of cultural heritage assets were obtained for an Inner Study Area, consisting of the proposed development area plus a 200m buffer. Detailed desk-based assessment and reconnaissance field survey was also carried out for this area.

This work identified three assets of cultural heritage interest within the Inner Study Area, which are of either local or lesser cultural heritage importance.

A potential impact upon trackway (3) was predicted due to construction activities. Temporary fencing off or demarcation of this site would mitigate this potential impact. Following the implementation of the proposed mitigation measures, the residual effect is assessed to be **not significant**.

The potential for the proposed development area to contain previously unrecorded remains of archaeological significance is considered to be low.

One indirect (operational) impact of minor significance is predicted for the site of Boonslie, enclosures and farmsteads (MEL 1682), a site considered by East Lothian Council to be of schedulable quality. The residual indirect effect is assessed to be **not significant**.




Appendix C – Cultural Heritage Assets within the Inner Study Area

Site no.	Site Name & Type	Easting	Northing	HER No. / RCAHMS Database No.	Source(s)	Description	Cultural Heritage Importance
----------	------------------	---------	----------	-------------------------------	-----------	-------------	------------------------------

Site no.	Site Name & Type	Easting	Northing	HER No. / RCAHMS Database No.	Source(s)	Description	Cultural Heritage Importance
1	Friardykes Dod / Crystal Rig Wind Farm; Drainage ditches	366358	669275	MEL9696	HER	<p>Aerial photographs show possible remains of rig and furrow cultivation in this area. Field survey (Jones 2008) visited the area and recorded some linear traces in the vegetation which were considered to be a possible indication of the cultivation remains. An archaeological evaluation (Hill & Suddaby 2007) was undertaken by CFA Archaeology Ltd in November 2007 across the area of a proposed substation for the Crystal Rig Windfarm, where the possible cultivation remains had been identified.</p> <p>Two types of drainage ditch were recorded. The first ran obliquely across the slope, collecting surface water from the higher slopes of Friardykes Dod and diverting it away from the flatter grassland below, and the second located on the flat grassland and intended to drain it. No dating evidence for either kind of ditch was recorded during the evaluation.</p> <p>Following the evaluation it was concluded that the remains seen on aerial photography are not the remains of rig and furrow cultivation, but the remains of drainage ditches. The northern part of the area of drainage ditches (to the north of the existing substation) was not subject to evaluation but has been impacted by vehicle movements and the construction compound used during the construction of the existing substation.</p>	Lesser

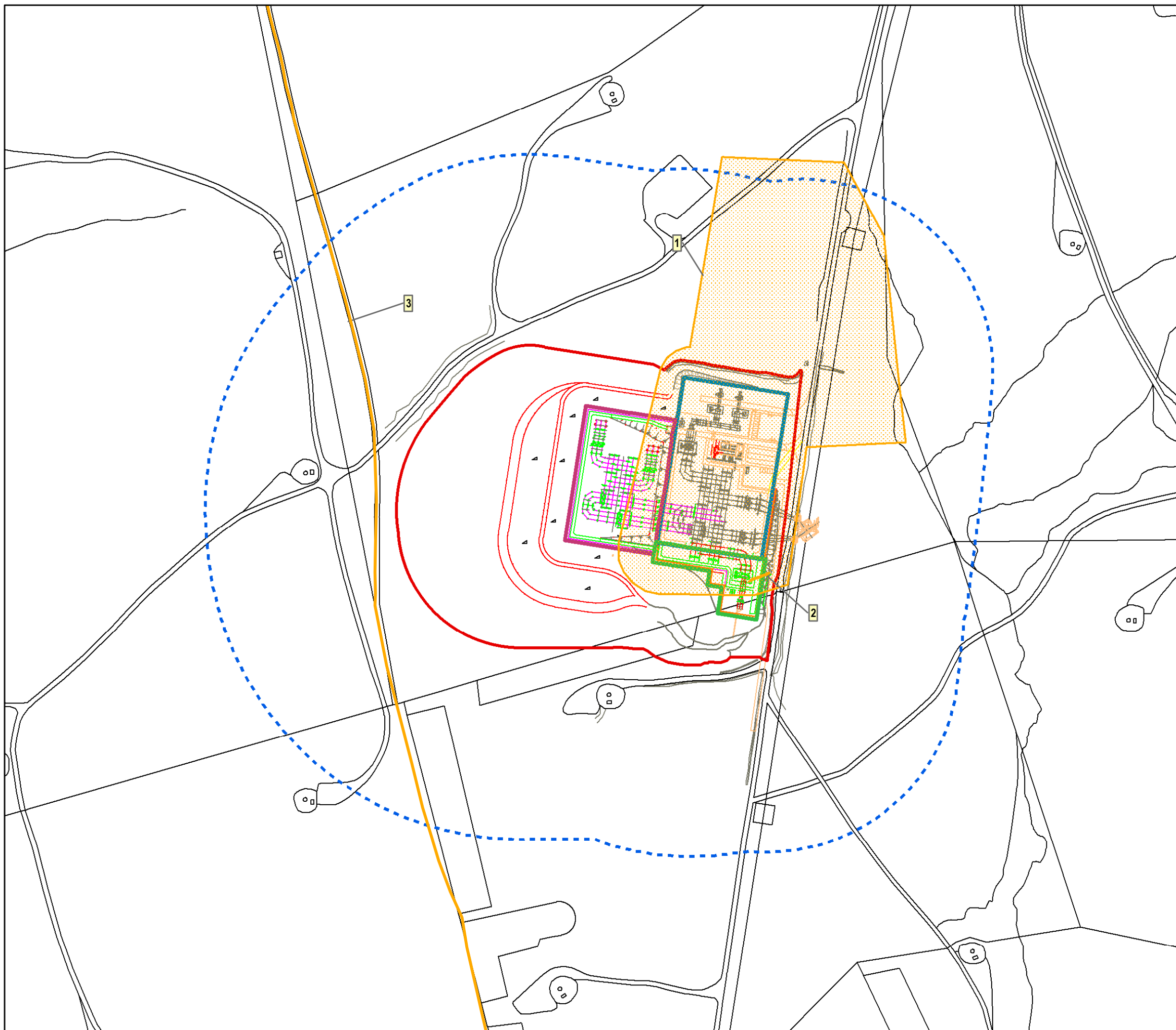
Site no.	Site Name & Type	Easting	Northing	HER No. / RCAHMS Database No.	Source(s)	Description	Cultural Heritage Importance
2	Friardykes Dod; Bank (earthwork)	366403	669147	MEL9941	HER; Field Survey	<p>Field survey in 2008 (Jones 2008) identified the degraded remains of a small section of turf bank to the east of Friardykes. The bank was 0.3m high and 1.5m wide and was orientated east to west.</p> <p>The current field survey (2013) failed to identify any upstanding remains of this turf bank, the location of which is now within the outer fence surrounding the existing Crystal Rig substation.</p>	Lesser
3	Trackway	365949 366054	669501 668892		Historic Maps; Field Survey	<p>The field survey identified the remains of a trackway surviving as a hollow-way a maximum of 0.2m deep and 3.5m wide with a low bank on the eastern side which was approximately 0.2m high and 2m wide. The trackway is depicted on the First Edition Ordnance Survey map (Haddingtonshire, Sheet XVI, 1855, 6" to 1 mile), and the northern part of it continues to be depicted on the current (2012) edition of the Ordnance Survey map.</p>	Local



Appendix D – Cultural Heritage Assets within the Outer Study Area
with predicted theoretical visibility of the proposed Crystal Rig
Substation extension

Site no.	Site Name & Type	Status	Easting	Northing	Importance of receptor	Setting	Magnitude of Impact	Significance of Effect
----------	------------------	--------	---------	----------	------------------------	---------	---------------------	------------------------

Site no.	Site Name & Type	Status	Easting	Northing	Importance of receptor	Setting	Magnitude of Impact	Significance of Effect
MEL 1682	Boonslie, Enclosure(s) and Farmstead(s)	Site of Schedulable Quality	366500	669900	National	The site at Boonslie comprises an extensive area of earthworks, visible on aerial photographs, which include the remains of farmsteads, enclosures and rig and furrow cultivation remains, which are believed to date from the late medieval period. The site is located on unimproved ground which slopes down to the burn to the east. The site is overgrown with heather vegetation. From the majority of the site both the existing substation and the proposed extension would be visible. Some limited areas of the site are predicted to have visibility of only the proposed extension. The baseline setting of the monument already includes the existing substation and the turbines and other infrastructure of the Crystal Rig windfarm.	Imperceptible	Minor



Legend

- Proposed Development Area
- Existing Substation
- Proposed Substation
- Substation Extension for Aikengall II Windfarm Connection
- Inner Study Area
- Cultural Heritage Site (linear)
- Cultural Heritage Site (area)



Project: **Crystal Rig Windfarm, proposed extension to 400kV grid substation**

Figure: **Cultural Heritage: Constraints**

Figure By: S Werner Date: 26 JUN 2013

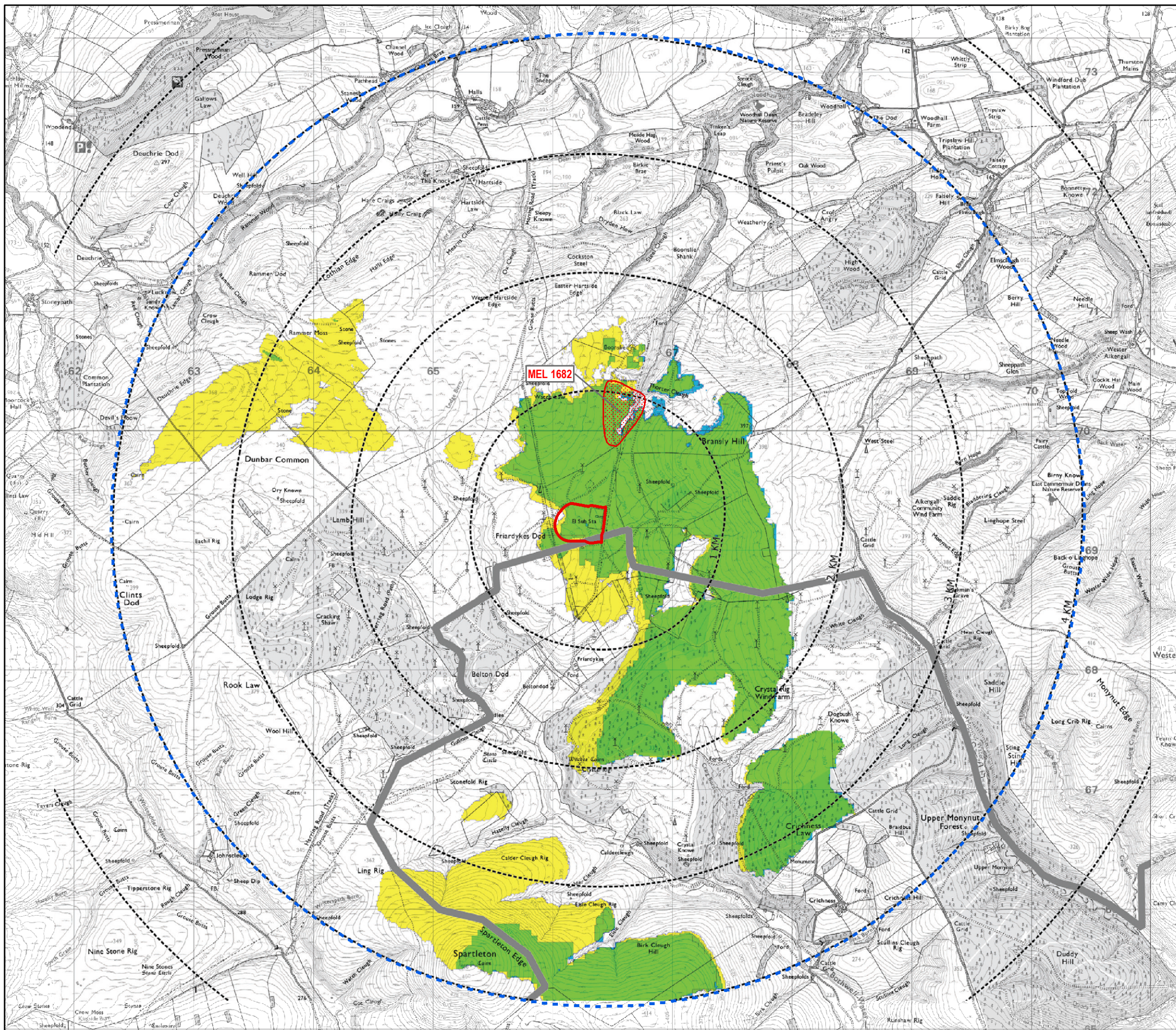
Checked By: H Tweedie Date: 26 JUN 2013

Approved By: Date: 26 JUN 2013

Figure: **Figure 17** Revision: **1**

Drawing Scale: 1:4000

Plot Size: A3



Legend

- Proposed Development Area
- Administration Boundary
- Outer Study Area
- Site of schedulable quality
- Theoretical Visibility of existing Crystal Rig Substation
- Theoretical Visibility of proposed Crystal Rig Substation Extension
- Combined Theoretical Visibility



Project:

Crystal Rig Windfarm, proposed extension to 400kV grid substation

Figure:

Cultural Heritage: External Receptors and ZTV

Figure By: S Werner

Date: 26 JUN 2013

Checked By: H Tweedie

Date: 26 JUN 2013

Approved By:

Date: 26 JUN 2013

Figure:

Figure 18

Revision:

1