Dean Moor
Solar Farm

Appendix 4.1 Agricultural Land and Soil Scoping Analysis of the EIA Scoping Report

on behalf of **FVS Dean Moor Limited**

August 2023

Prepared by: **Kernon Countryside Consultants Limited**
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APPENDIX 4.1

DEAN MOOR SOLAR FARM

AGRICULTURAL LAND
AND SOILS
SCOPING ANALYSIS

August 2023

Authorised By APK 08/23

Greenacres Barn, Stoke Common Lane, Purton Stoke, Swindon SN5 4LL
T: 01793 771333 Email: info@kernon.co.uk Website: www.kernon.co.uk

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*Directors - **Tony Kernon** BSc(Hons), MRAC, MRICS, FBIAC **Sarah Kernon***
*Consultants – **Ellie Chew** BSc(Hons) **Amy Curtis** BSc(Hons)*

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Appendices

1 INTRODUCTION

1.1 This analysis considers the agricultural impacts of the Dean Moor Solar Farm (the "Proposed Development") on land at Dean Moor (the "Site"). In particular it considers the agricultural land quality and soils and considers whether there is likely to be a significant adverse effect on agricultural resources.

1.2 It is concluded that there is not likely to be a significant adverse effect on agricultural resources as a result of the construction, operation and decommissioning of the Proposed Development and therefore the topic is proposed to be scoped out of the ES in support of the DCO application.

1.3 This analysis is structured as follows:

- section 2 sets out the planning policy context;
- section 3 sets out the Site of the Proposed Development;
- section 4 sets out known information on agricultural land and soils;
- section 5 sets out the assessment process to determine what is significant development;
- and section 6 considers whether there are likely to be significant adverse effects on agricultural land and soils;
- with conclusions set out in section 7.

1.4 This analysis has been carried out by Tony Kernon. Tony is a Chartered Surveyor and a Fellow of the British Institute of Agricultural Consultants. He has been carrying out agricultural input to Environmental Assessments nationwide for over 35 years.

2 PLANNING POLICY CONTEXT

National Policy Statement for Energy (EN-1) (July 2011)

2.1 Paragraph 5.10.8 advises that applicants should seek to minimise impacts on best and most versatile agricultural land (land in Grades 1, 2 and 3a of the ALC) and preferably use land in areas of poorer quality (Grades 3b, 4 and 5). Applicants should seek to minimise impacts on soil quality taking account of any mitigation measures proposed.

Draft National Policy Statements (March 2023)

2.2 Paragraphs 1.2.1 and 1.2.2 of the **Overarching National Policy Statement for Energy (EN-1)** (draft March 2023) may be a material consideration for all applications. The extent to which the NPS will be relevant will depend upon a case-by-case judgement depending upon the extent to which the matters are already covered by existing planning policy.

2.3 The current consultation draft EN-3 for **Renewable Energy Infrastructure** sets out at paragraph 3.10.14 that while land type should not be a predominating factor in determining the suitability of the site's location, applicants should, where possible use non-agricultural land. Where the use of agricultural land has been shown to be necessary, poorer quality land should be preferred to higher quality land.

2.4 The development of ground mounted solar arrays is not prohibited on land of ALC Grades 1, 2 or 3a paragraph 3.10.15 advises, but the impacts must be considered.

2.5 Further advice is provided as follows:

- soil stripping and handling (3.10.72), noting that topsoil and subsoil should be stripped, stored and replaced separately to minimise soils damage and to provide optimal conditions for site restoration;
- drainage and watercourses (3.10.77), noting that given the temporary nature of solar PV farms, sites should be configured so as to minimise impacts on existing drainage systems;
- biodiversity relative to intensive agricultural use (3.10.80), noting that solar farms have the potential to increase the biodiversity value of a site, especially if the land was previously intensively managed;
- mitigation and soil preservation (3.10.118), cross-referencing Defra's Construction Code of Practice for the Sustainable use of Soils, (2009) and advising on mitigation measures to minimise soil carbon loss and maximise soil biodiversity.

2.6 Paragraph 3.10.136 advises that the Secretary of State should take into account the economic and other benefits of BMV agricultural land. The Secretary of State should ensure that the applicant has put forward appropriate mitigation measures to minimise the impacts on soils or soil resources.

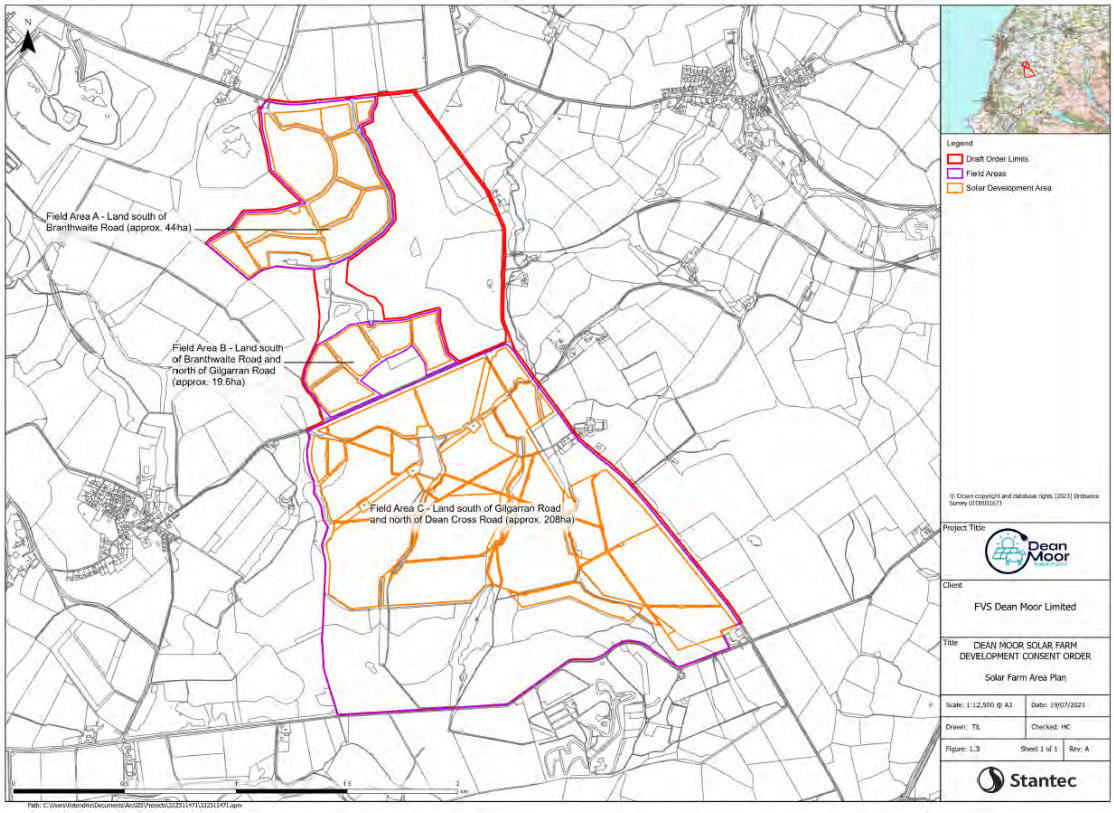
National Planning Policy Framework

2.7 The National Planning Policy Framework (NPPF) (July 2021) advises that the economic and other benefits of BMV land should be recognised (paragraph 174 (a)). The NPPF defines BMV in Annex 2.

3 THE SITE AND THE PROPOSED DEVELOPMENT

3.1 The site is described as Areas A, B and C, as per the plan below.

Insert 1: The Site



3.2 Views across the southern part are shown below, from Google Streetview (2021 image).

Insert 2: Looking West over Southern Part of the Site

3.3 The northern part of the Site is similar in terms of land use. Part of the Site, as can be seen, is rough grazing.

Insert 3: Looking South over Northern Part of the Site

3.4 Parts of Area A have been used as access tracks for wind turbines, as shown below.

Insert 4: Aerial Image of Area A

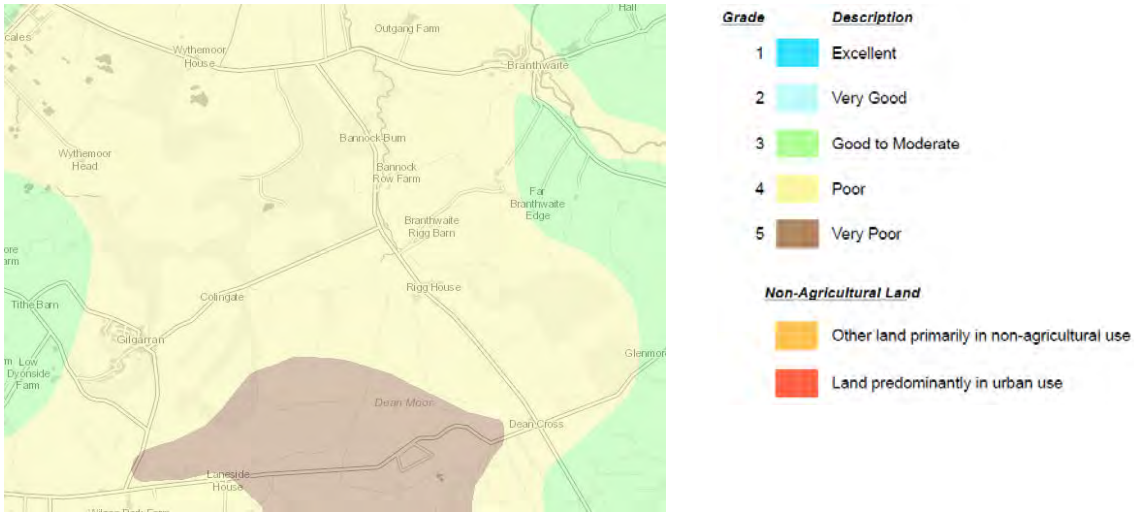
4 AGRICULTURAL LAND QUALITY

4.1 The Agricultural Land Classification (ALC) system divides land into five grades, with grade 3 subdivided into two subgrades.

4.2 Grades 1, 2 and 3a are defined as the "best and most versatile" agricultural land in the National Planning Policy Framework (2021). Grades 3b, 4 and 5 are poorer quality land.

4.3 The Site is shown on the "provisional" ALC maps from the 1970s as falling into Grade 4 and Grade 5, hence "poor" quality and "very poor" quality land, as shown below. As explained in Natural England's Technical Information Note TIN049, copied at **Appendix KCC1**, these maps were produced in the 1970s under a different system of ALC and are therefore not capable of being relied upon. Whilst the maps have since been reprinted, the base plan is unchanged.

Insert 5: Provisional ALC



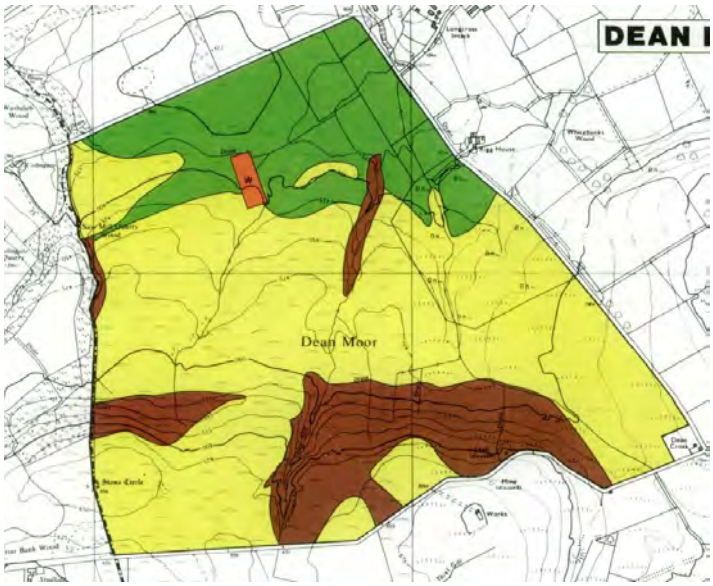
4.4 The Site is shown on the "likelihood of BMV" maps produced by Natural England in 2017 as falling into the "low likelihood" of BMV, as shown below.

Insert 6: Predictive BMV

4.5 Where detailed ALC field survey has been carried out by MAFF or its agencies, this is available on www.magic.gov.uk. For the majority of the Site, detailed ALC survey information is available. This was carried out in 1990 by MAFF. The ALC report and plans are set out in **Appendix KCC2**.

4.6 The southern part of the Site was found to comprise mostly of Grade 4, with some Grade 5 to the south and Subgrade 3b to the north. This is shown below.

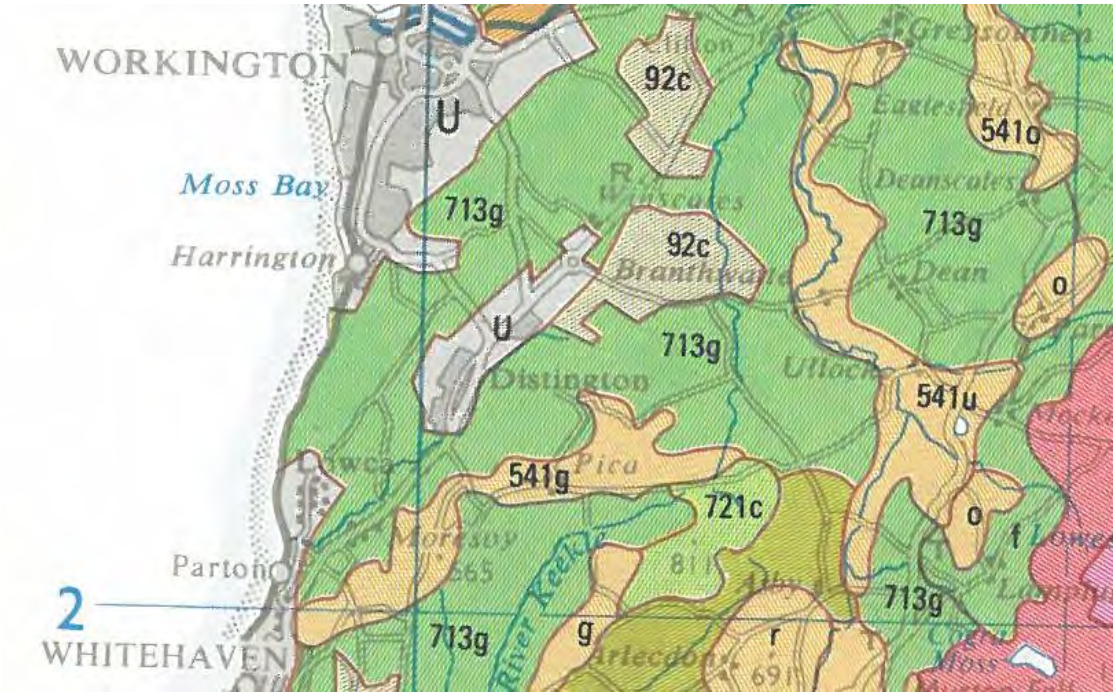
Insert 7: Extract from MAFF ALC



Agricultural Land			
Agricultural Grades		Agricultural Land Quality	Area within the site (ha.)
Grade 1		Excellent	Nil
Grade 2		Very Good	Nil
Grade 3		Good	Nil
		Moderate	41·7
Grade 4		Poor	128·7
Grade 5		Very Poor	35·1

4.7 The National Soils Map (SSEW, 1983) shows the northern part of the Site to be soils of the 713g Brickfield 3 Association, similar to those of the northern part of the area surveyed by MAFF, as shown below. These are also shown as Brickfield 3 Association soils, described as "*slowly permeable seasonally waterlogged fine loamy, fine loamy over clayey and clayey soils*".

Insert 8: Extract from Soil Map



4.8 MAFF identified a climatic limitation from a combination of rainfall and temperature on land between 110m and 130m AOD (see **Appendix KCC2**). Area B (see Insert 1 above) lies above 110mAOD and so is limited to no better than sub-grade 3b in the ALC.

4.9 The un-surveyed Area A (see Insert 1) lies below 110mAOD. Area A is shown as 713g Brickfield soils. In the ALC of Area C MAFF identified the Brickfield 3 soils within the area they surveyed that fell below 110m AOD as falling into Wetness Class IV. It is considered highly likely that the un-surveyed areas below 110m AOD, which are also shown as Brickfield 3 Association soils, will likely be similarly wet. The soils are medium or heavy clay loams. Under the ALC guidelines in this area where the FCD is in excess of 225, clay soils in Wetness Class II or below are limited to Subgrade 3b.

4.10 It is therefore concluded that the soils below 110m AOD in the un-surveyed area, which account for 44ha of the Site, are limited by a combination of climate and soil wetness to no higher than Subgrade 3b.

4.11 Therefore none of the site can be better than sub-grade 3b, and none of the site can be of BMV quality therefore.

5 ASSESSING SIGNIFICANT DEVELOPMENT FOR AGRICULTURE

5.1 In considering whether to scope an assessment of likely significant effects on agricultural land and soils into, or out of, the Environmental Statement in support of the DCO application, consideration needs to be given to the sensitivity of the resource and the magnitude of the impact.

5.2 Based on criteria for assessing land and soils set out by the Institute for Environmental Management and Assessment's (IEMA's) "A New Perspective on Land and Soil in Environmental Impact Assessment" (February 2022) (the IEMA Guide) land of ALC Subgrade 3b is of medium sensitivity and land of ALC Grades 4 and 5 is of low sensitivity. The table normally used in as follows.

Table 1: Sensitivity of Agricultural Land

Sensitivity	**ALC Grade**
Very high	ALC Grades 1 and 2
High	ALC Subgrade 3a
Medium	ALC Subgrade 3b
Low	ALC Grades 4 and 5
Negligible	Indirect effects only

5.3 In terms of both sensitivity and magnitude, the NPS statement EN-3 (consultation March 2023) and national planning policy provides no special protection for land of poorer quality.

5.4 In terms of magnitude, the IEMA Guide sets out that a major magnitude of impact is a "*permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading) over an area of more than 20 ha*".

5.5 As set out in Natural England's Technical Information Note 049 (December 2012), Natural England should be consulted where the loss of 20 ha or more of BMV land is proposed.

5.6 The IEMA Guide defines magnitudes of impacts on agricultural land as follows.

Table 2: IEMA Magnitude Assessment

Magnitude	**Description**
Major	Loss of more than 20 ha
Moderate	Loss of between 5 and 20 ha
Minor	Loss of less than 5 ha
Negligible	No loss

6 ASSESSMENT OF LIKELY SIGNIFICANCE

6.1 This section considers:

(i) the likely sensitivity of the agricultural land and soils;

(ii) the likely magnitude of effect;

(iii) therefore the likely significance of the effect.

Sensitivity

6.2 The land quality of the majority of the Site is known in detail, from the 1990 ALC survey. It is land of Subgrade 3b and Grades 4 and 5. Such land is of medium and low sensitivity.

6.3 As set out in **Appendix KCC2**, land above 110m ALC is limited by climatic variables to no higher than Subgrade 3b. The un-surveyed Block B is limited to no better than Subgrade 3b, which is at best of medium sensitivity.

6.4 For Block A of 44ha, which is un-surveyed, the land quality will depend upon soil wetness. Based on the soil maps (this being similar soils to the soils surveyed by MAFF in 1990), and based on the available evidence of land use, there is a high likelihood that the land will be no better than Subgrade 3b, which is land of medium sensitivity. In this climatic area clay soils in Wetness Class II or worse are limited to Subgrade 3b. MAFF identified these soils as Wetness Class IV in their ALC.

6.5 It is considered unlikely that any of the land would be of Subgrade 3a "good quality".

Magnitude

6.6 The magnitude of impact is also important. The assessment needs to consider the quantum of land sealed over or irreversibly developed.

6.7 The installation of solar panels involves generally small machinery, and the mounting frames do not cause damage to the soil. This can be seen in the following photographs.

Inserts 9 - 11: Solar Panels Being Installed

6.8 It is generally accepted that the installation of solar panels does not adversely affect agricultural land except for the areas of tracks, the inverters etc. Recent decisions on solar farms have confirmed this. For example:

(i) in the decision on the Nationally Significant Infrastructure Project at Little Crow, Lincolnshire, which included 36.6 ha of subgrade 3a, the Secretary of State agreed with his Inspector that the effect would be "*medium term, reversible, local in extent and of negligible significance during the operational phase with a moderate beneficial effect*

for the quality of soils because intensive cropping would be replaced with the growing of grass" (para 4.50);

(ii) in the appeal decision for the solar farm at Bramley, Hampshire (APP/H1705/W/22/3304561) the Inspector, noting that 53% of the site was of BMV, noted (para 58) "*The agricultural land would not be permanently or irreversibly lost, particularly as pasture grazing would occur between the solar panels. This would allow the land to recover from intensive use, and the soil condition and structure to improve. The use of the soils for grassland under solar panels should serve to improve soil health and biodiversity and the proposed LEMP, which could be secured by a condition attached to any grant of planning permission, includes measures to improve the biodiversity of the land under and around the panels*";

(iii) in Natural England's response to a solar farm at Thaxted, Uttlesford, which involved 19 ha of Grade 2 and 35.9 ha of subgrade 3a BMV land, they commented: "*the proposed development would not appear to lead to the loss of over 20 ha 'best and most versatile' agricultural land) para 170 and 171 of the National Planning Policy Framework). This is because the solar panels would be secured to the ground with limited soil disturbance and could be removed in the future with no permanent loss of agricultural and quality likely to occur. Therefore, we consider that the proposed development is unlikely to lead to significant and irreversible long-term loss of best and most versatile agricultural land, as a resource for future generations*".

6.9 The magnitude of impact for most solar farms is therefore a small number of hectares. It is normally limited to areas required for tracks, for the bases of inverters, and for the sites for battery storage and any substation. This is typically 2 - 3% of the site.

6.10 The magnitude of impact is likely to be low (<5 ha) or at the lower end of medium (5 - 20 ha).

Assessing Significance

6.11 Therefore a low or medium magnitude effect on a resource of low or medium sensitivity will result in a moderate adverse effect, based on the IEMA Guide.

6.12 This is not significant in EIA terms (it being a modest quantum of poorer quality land).

Mitigation

6.13 Whilst there is not expected to be a significant adverse effect in EIA terms, the soil resource should still be protected so far as possible. For this Site, handling the soils when they are suitably dry will be important. A Soil Management Plan, which could be controlled by DCO requirement, is suggested.

7 CONCLUSIONS

7.1 The majority of the Site has been surveyed as poorer quality land. As set out above, all of the northern part of the Site is likely to also be moderate or poor quality land (Subgrade 3b or 4).

7.2 The magnitude of effect is also likely to be low or medium, as only the area for tracks, inverter bases and the substation are likely to be affected.

7.3 Overall there will not be a significant adverse environmental effect on agricultural land.

7.4 The soils are clayey and wet. Therefore it is recommended that a Soil Management Plan be required by DCO requirement to ensure that, so far as possible, soils are not damaged during construction.

7.5 On the basis of the above, it is proposed to scope out an assessment of the likely significant effects on agricultural land and soils.

APPENDIX KCC1

Natural England Technical Information Note TIN049

Natural England Technical Information Note TIN049

Agricultural Land Classification: protecting the best and most versatile agricultural land

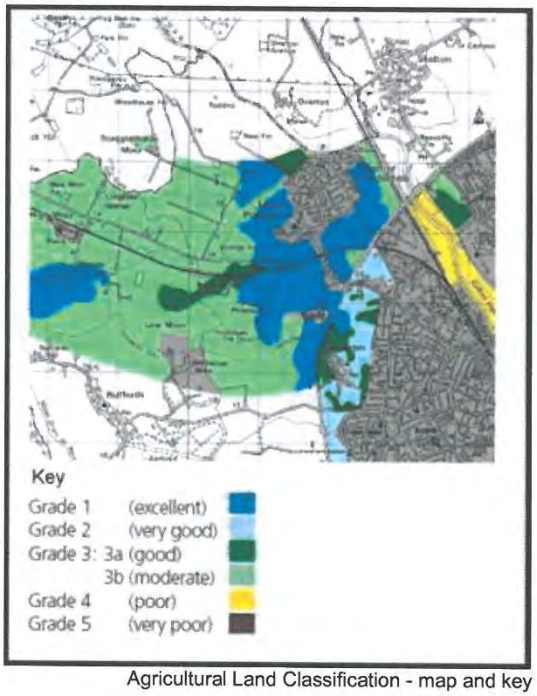
Most of our land area is in agricultural use. How this important natural resource is used is vital to sustainable development. This includes taking the right decisions about protecting it from inappropriate development.

Policy to protect agricultural land

Government policy for England is set out in the National Planning Policy Framework (NPPF) published in March 2012 (paragraph 112). Decisions rest with the relevant planning authorities who should take into account the economic and other benefits of the best and most versatile agricultural land. Where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of higher quality. The Government has also re-affirmed the importance of protecting our soils and the services they provide in the Natural Environment White Paper The Natural Choice:securing the value of nature (June 2011), including the protection of best and most versatile agricultural land (paragraph 2.35).

The ALC system: purpose & uses

Land quality varies from place to place. The Agricultural Land Classification (ALC) provides a method for assessing the quality of farmland to enable informed choices to be made about its future use within the planning system. It helps underpin the principles of sustainable development.



Agricultural Land Classification - map and key

Second edition 19 December 2012
www.naturalengland.org.uk

NATURAL ENGLAND

Agricultural Land Classification: protecting the best and most versatile agricultural land

The ALC system classifies land into five grades, with Grade 3 subdivided into Subgrades 3a and 3b. The best and most versatile land is defined as Grades 1, 2 and 3a by policy guidance (see Annex 2 of NPPF). This is the land which is most flexible, productive and efficient in response to inputs and which can best deliver future crops for food and non food uses such as biomass, fibres and pharmaceuticals. Current estimates are that Grades 1 and 2 together form about 21% of all farmland in England; Subgrade 3a also covers about 21%.

The ALC system is used by Natural England and others to give advice to planning authorities, developers and the public if development is proposed on agricultural land or other greenfield sites that could potentially grow crops. The Town and Country Planning (Development Management Procedure) (England) Order 2010 (as amended) refers to the best and most versatile land policy in requiring statutory consultations with Natural England. Natural England is also responsible for Minerals and Waste Consultations where reclamation to agriculture is proposed under Schedule 5 of the Town and Country Planning Act 1990 (as amended). The ALC grading system is also used by commercial consultants to advise clients on land uses and planning issues.

Criteria and guidelines

The Classification is based on the long term physical limitations of land for agricultural use. Factors affecting the grade are climate, site and soil characteristics, and the important interactions between them. Detailed guidance for classifying land can be found in: *Agricultural Land Classification of England and Wales: revised guidelines and criteria for grading the quality of agricultural land* (MAFF, 1988):

- **Climate:** temperature and rainfall, aspect, exposure and frost risk.
- **Site:** gradient, micro-relief and flood risk.
- **Soil:** texture, structure, depth and stoniness, chemical properties which cannot be corrected.

The combination of climate and soil factors determines soil wetness and droughtiness. Wetness and droughtiness influence the choice of crops grown and the level and consistency of yields, as well as use of land for grazing livestock. The Classification is concerned with the inherent potential of land under a range of farming systems. The current agricultural use, or intensity of use, does not affect the ALC grade.

Versatility and yield

The physical limitations of land have four main effects on the way land is farmed. These are:

- the range of crops which can be grown;
- the level of yield;
- the consistency of yield; and
- the cost of obtaining the crop.

The ALC gives a high grading to land which allows more flexibility in the range of crops that can be grown (its 'versatility') and which requires lower inputs, but also takes into account ability to produce consistently high yields of a narrower range of crops.

Availability of ALC information

After the introduction of the ALC system in 1966 the whole of England and Wales was mapped from reconnaissance field surveys, to provide general strategic guidance on land quality for planners. This Provisional Series of maps was published on an Ordnance Survey base at a scale of One Inch to One Mile in the period 1967 to 1974. These maps are not sufficiently accurate for use in assessment of individual fields or development sites, and should not be used other than as general guidance. They show only five grades: their preparation preceded the subdivision of Grade 3 and the refinement of criteria, which occurred after 1976. They have not been updated and are out of print. A 1:250 000 scale map series based on the same information is available. These are more appropriate for the strategic use originally intended and can be downloaded from the Natural England **website**. This data is also available on 'Magic', an interactive, geographical information website **http://magic.defra.gov.uk/**.

Since 1976, selected areas have been re-surveyed in greater detail and to revised

guidelines and criteria. Information based on detailed ALC field surveys in accordance with current guidelines (MAFF, 1988) is the most definitive source. Data from the former Ministry of Agriculture, Fisheries and Food (MAFF) archive of more detailed ALC survey information (from 1988) is also available on **http://magic.defra.gov.uk/**. Revisions to the ALC guidelines and criteria have been limited and kept to the original principles, but some assessments made prior to the most recent revision in 1988 need to be checked against current criteria. More recently, strategic scale maps showing the likely occurrence of best and most versatile land have been prepared. Mapped information of all types is available from Natural England (see *Further information* below).

New field survey

Digital mapping and geographical information systems have been introduced to facilitate the provision of up-to-date information. ALC surveys are undertaken, according to the published Guidelines, by field surveyors using handheld augers to examine soils to a depth of 1.2 metres, at a frequency of one boring per hectare for a detailed assessment. This is usually supplemented by digging occasional small pits (usually by hand) to inspect the soil profile. Information obtained by these methods is combined with climatic and other data to produce an ALC map and report. ALC maps are normally produced on an Ordnance Survey base at varying scales from 1:10,000 for detailed work to 1:50 000 for reconnaissance survey

There is no comprehensive programme to survey all areas in detail. Private consultants may survey land where it is under consideration for development, especially around the edge of towns, to allow comparisons between areas and to inform environmental assessments. ALC field surveys are usually time consuming and should be initiated well in advance of planning decisions. Planning authorities should ensure that sufficient detailed site specific ALC survey data is available to inform decision making.

Consultations

Natural England is consulted by planning authorities on the preparation of all development plans as part of its remit for the natural environment. For planning applications, specific consultations with Natural England are required under the Development Management Procedure Order in relation to best and most versatile agricultural land. These are for non agricultural development proposals that are not consistent with an adopted local plan and involve the loss of twenty hectares or more of the best and most versatile land. The land protection policy is relevant to all planning applications, including those on smaller areas, but it is for the planning authority to decide how significant the agricultural land issues are, and the need for field information. The planning authority may contact Natural England if it needs technical information or advice.

Consultations with Natural England are required on all applications for mineral working or waste disposal if the proposed afteruse is for agriculture or where the loss of best and most versatile agricultural land agricultural land will be 20 ha or more. Non-agricultural afteruse, for example for nature conservation or amenity, can be acceptable even on better quality land if soil resources are conserved and the long term potential of best and most versatile land is safeguarded by careful land restoration and aftercare.

Other factors

The ALC is a basis for assessing how development proposals affect agricultural land within the planning system, but it is not the sole consideration. Planning authorities are guided by the National Planning Policy Framework to protect and enhance soils more widely. This could include, for example, conserving soil resources during mineral working or construction, not granting permission for peat extraction from new or extended mineral sites, or preventing soil from being adversely affected by pollution. For information on the application of ALC in Wales, please see below.

Further information

Details of the system of grading can be found in: *Agricultural Land Classification of England and Wales: revised guidelines and criteria for grading the quality of agricultural land* (MAFF, 1988).

Please note that planning authorities should send all planning related consultations and enquiries to Natural England by e-mail to **consultations@naturalengland.org.uk**. If it is not possible to consult us electronically then consultations should be sent to the following postal address:

Natural England
Consultation Service
Hornbeam House
Electra Way
Crewe Business Park
CREWE
Cheshire
CW1 6GJ

ALC information for Wales is held by Welsh Government. Detailed information and advice is available on request from Ian Rugg (**ian.rugg@wales.gsi.gov.uk**) or David Martyn (**david.martyn@wales.gsi.gov.uk**). If it is not possible to consult us electronically then consultations should be sent to the following postal address:

Welsh Government
Rhodfa Padarn
Llanbadarn Fawr
Aberystwyth
Ceredigion
SY23 3UR

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For further information contact the Natural England Enquiry Service on 0300 060 0863 or e-mail **enquiries@naturalengland.org.uk**.

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APPENDIX KCC2

MAFF ALC Survey (1990)

AGRICULTURAL LAND CLASSIFICATION

CUMBRIAN COAL LOCAL PLAN
DEAN MOOR, BRANTHWAITE

MAFF LEEDS REGIONAL OFFICE

September 1990
Ref 2FCS 50/9

Lds.AL2.Dean.Moor

CONTENTS

Lds.AL2.Dean.Moor

AGRICULTURAL LAND CLASSIFICATION

CUMBRIAN COAL LOCAL PLAN:- DEAN MOOR, BRANTHWAITE, CUMBRIA

1. Introduction and Site Characteristics

Dean Moor is located about 7 km south east of Workington centred around grid reference NY 047230, immediately south of the existing Potato Pot open cast coal site. The eastern, northern and southern boundaries are formed by the minor roads, whilst woodland forms much of the western boundary. It covers a total area of 206.6 hectares, nearly all of which is currently in agricultural use.

ALC survey work was carried out in September 1990 when soils were examined using hand auger borings at points predetermined by the National Grid. The density of borings was one per hectare. In addition small soil examination pits were dug to study soil structure in more detail.

1.1 Relief and Climate

Average altitude is about 140 m a.o.d. but ranges from a minimum of 110 m a.o.d. on the northern boundary to a maximum of 210 m a.o.d. on the southern edge of the site.

Salient climatic parameters at Dean Moor vary according to altitude and are as follows:-

Altitude (m)		110	130	200
Average Annual Rainfall (mm)		1359	1418	1627
Accumulated Temperature above 0°C (Jan-June)		1282	1259	1180
Field Capacity Days		289	297	327
Moisture Deficit (mm)	Wheat	53	46	25
	Potatoes	30	21	0

The above combinations of rainfall and temperature place an overall climatic limitation of subgrade 3b on land between 110 m and 130 m a.o.d and Grade 4 on land above 130 m a.o.d.

Relief is moderately undulating on the central and northern parts of the site and slopes are rarely steep enough to limit the use of agricultural machinery. The southern part of the site, however, consists of a steeply to very steeply sloping (16-30°) north facing hillside cut by a narrow gill with precipitous slopes exceeding 36°. In much of this area gradient imposes an overall limitation on ALC grade.

1.2 Geology, Soils and Drainage

North of the hillside forming the southern part of the site, the underlying Coal Measures are largely hidden by a superficial layer of glacial and post glacial drift. This consists mainly of medium to heavy textured, moderately stony boulder clay. Topsoils tend to be of medium, sometimes peaty clay loam, over a clay loam or sandy clay loam, slowly permeable subsoil (Soil Wetness Class IV or V). Moderate stoniness is common throughout many soil profiles and often makes augering below 80 cm depth difficult.

The steeply sloping escarpment in the south is underlain by Coal Measure shales at the foot of the hillside and by the reddish Whitehaven Sandstone on the higher ground. Soils on the Coal Measure consists of medium or heavy, sometimes humose clay loam topsoils over gleyed, slowly permeable clay or shale subsoils (Wetness Class V). Soils on the sandstone vary from deep peat (Wetness Class VI) to thin peaty soils over sandstone rubble.

1.3 Land Use

The northern and eastern lower lying parts of the site, below about 150 m a.o.d, are almost all under productive improved pasture. The high ground in the south consists largely of rough moorland vegetation containing a

few partially improved areas. There is also an area of rough boggy ground in the north west corner of the site and a small patch of newly planted woodland in the central northern area.

1.4 Agricultural Land Classification

1.4.1 Subgrade 3b (41.7 hectares, 20% of total area)

Subgrade 3b land is widespread on the lower lying land in the north. Topsoils consist of medium clay loam or silty clay loam over a similar or heavier textured slowly permeable subsoil (Wetness Class IV). Soil wetness along with the overriding climatic limitation are the principal limiting factors on this land.

1.4.2 Grade 4 (128.7 hectares, 62.5% of total area)

Grade 4 land occurs across the central part of the site below the escarpment and as smaller areas on the high ground adjoining the southern boundary. Soils on the lower lying land are similar to those in the subgrade 3b area, but are limited to Grade 4 by the overall climatic limitation applying to all land above 135 m a.o.d. On the higher ground soils consist generally of thin peaty topsoils over relatively free draining sandy loam or sandstone rubble. These are also restricted to Grade 4 by the overall climatic limitation. The smaller area of Grade 4 land in the north west corner is restricted to this grade by wetness.

1.4.3 Grade 5 (35.1 hectares, 17% of total area)

Land in this Grade occurs mainly on the sandstone area in the south. Soils on the gently and moderately sloping areas consists of deep peat or peaty topsoils over waterlogged gleyed slowly permeable heavy clay loam subsoils. Soils of this type fall within Wetness Class VI and are restricted to the Grade by severe wetness problems which are very

difficult to remedy. On the very steeply sloping ground, especially in Thief Gill, soils are relatively well drained, but are restricted to Grade 5 by slopes in excess of 18°.

1.4.4 Non Agricultural Land (1.1 hectares) 0.5% of total area.

This consists of the area of newly planted woodland in the central northern part of the site.

Resource Planning Group
Leeds Regional Office

CUMBRIAN COAL LOCAL PLAN
DEAN MOOR, BRANTHWAITE

Agricultural Land Classification

Agricultural Land

Agricultural Grades	Agricultural Land Quality	Area within the site (ha.)
Grade 1	*Excellent*	Nil
Grade 2	*Very Good*	Nil
Grade 3 (Sub-Grade 3a)	*Good*	Nil
Grade 3 (Sub-Grade 3b)	*Moderate*	41·7
Grade 4	*Poor*	128·7
Grade 5	*Very Poor*	35·1

Land in Other Categories

		Area within the site (ha.)
Urban *Including housing industry, commerce, derelict land, sports facilities, transport.*		Nil
Non-agricultural *Including golf courses, parks, sports fields, allotments, airfields.*		Nil
Woodland *Farm woodland*	W	1·1
Commercial woodland		Nil
Agricultural buildings *Including glasshouses*		Nil
Open water		Nil
Land not surveyed		Nil

SCALE – 1:10,000

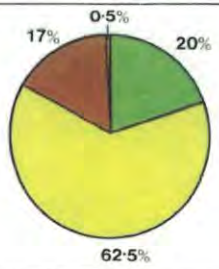
100 0 100 200 300 400 500 600 700

Metres

Statistics

Area of Agricultural Land : 205·5ha.

Area of Other Land: 1·1 ha.



MAFF Ministry of Agriculture, Fisheries and Food.

Method of Classifying Agricultural Land

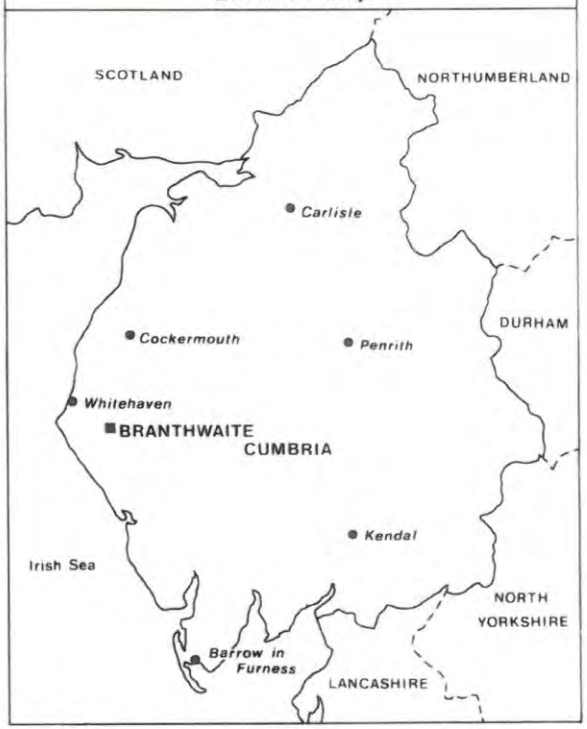
The physical limitations to agriculture are assessed:
1 CLIMATE, TOPOGRAPHY, SOIL

The most limiting factor is identified and it's degree of limitation assessed:
2 NO or MINOR → VERY SEVERE

The degree of limitation determines:
3 FINAL AGRICULTURAL GRADE

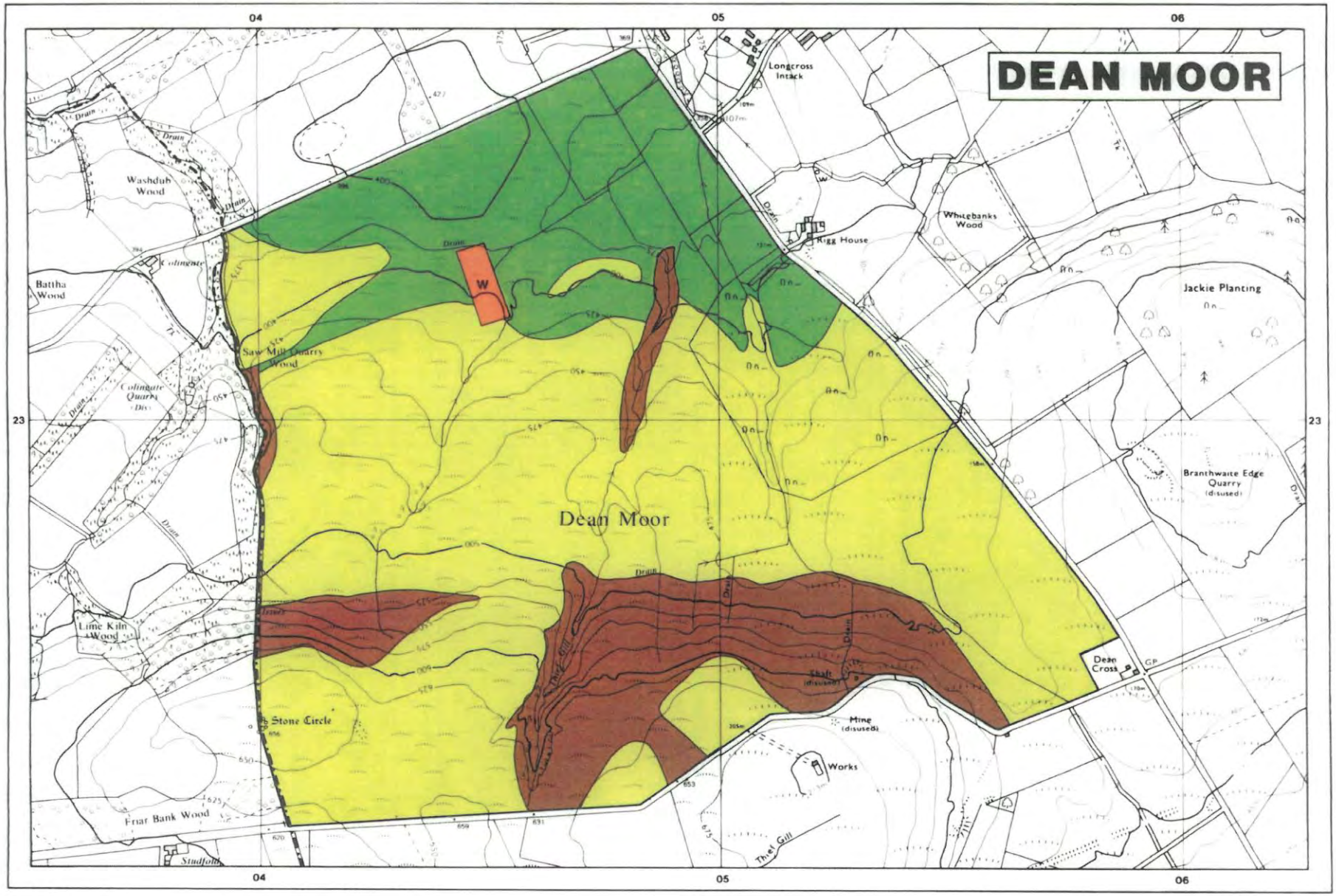
Further details contained in revised Agricultural Land Classification MAFF 1988

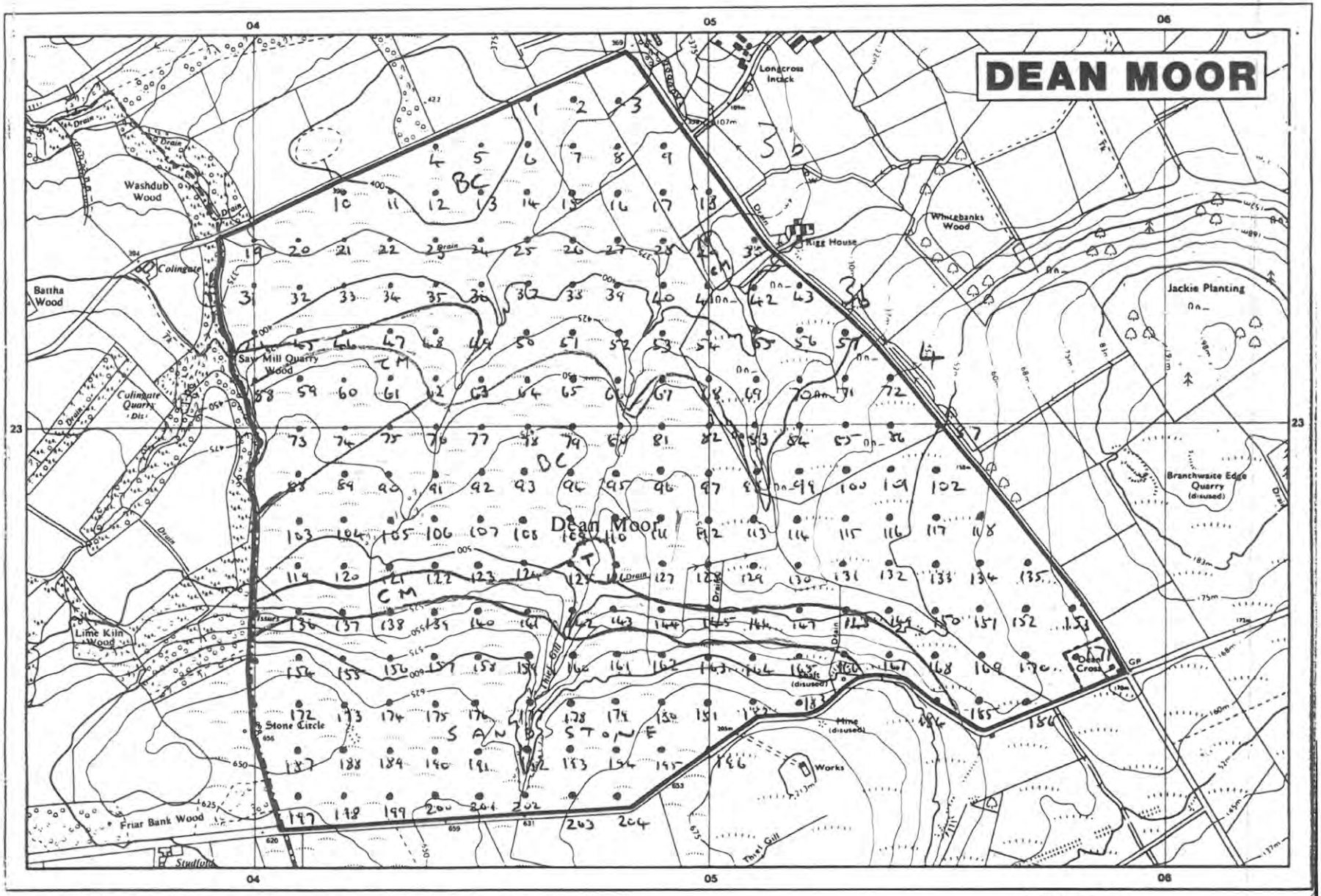
Location Map



Information compiled by Resource Planning Group, Farm and Countryside Service, Leeds R.O.
Map produced by Resource Planning Cartographic Unit
Project Number **84/90**
Ordnance Survey maps reproduced with the permission of the Controller H.M.S.O.

SOURCE MAPS	
1:10,000	1:10,000
NY02 SW	NY02 SE


DEAN MOOR
Dean Moor
Washdub Wood
Battha Wood
Saw Mill Quarry Wood
Colingate Quarry
Lime Kiln Wood
Friar Bank Wood
Stone Circle
Studfold
Longcross Intack
Rigg House
Whitebanks Wood
Jackie Planting
Branthwaite Edge Quarry (disused)
Dean Cross
Shaft (disused)
Mine (disused)
Works
Thief Gill
W
04
05
06
23



PHILLIPA HAS PARTIALLY COMPLETED A.L.C. FINAL ARTWORK.

1:10,000

Greenacres Barn, Stoke Common Lane, Purton Stoke, Swindon, Wiltshire SN5 4LL
Telephone: 01793 771333 • Email: info@kernon.co.uk • Website: www.kernon.co.uk

Dean Moor
Solar Farm

Appendix 4.2 Transport Meeting Correspondence of the EIA Scoping Report

on behalf of **FVS Dean Moor Limited**

August 2023

Prepared by: **Stantec UK Limited**
PINS Ref: **EN010155**
Document Reference: **EN010155/APP/4.03**
Revision: **0**

Firma Energy

ib vogt

[redacted]

From: [redacted] <[redacted]@Cumberland.gov.uk>
Sent: 12 June 2023 15:17
To: [redacted]
Cc: [redacted]; [redacted]
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting
Attachments: Dean Moor Solar Farm Accident Record.docx

Follow Up Flag: Follow up
Flag Status: Completed

Good afternoon, [redacted]

Please see the attached accident data.

Happy to agree the minutes.

The road names as follows will be acceptable, best to keep them as shown on maps I guess.

- C2054 103 – Branthwaite Road
- C2954 102 – Branthwaite Edge Road
- U2186 101 – Gilgarran Road
- C4006 110 – Dean Cross Road

I can confirm that we are happy for transport to be scoped out of any EIA.

Kind regards

[redacted]

[redacted]
Development Management Officer | Highways Development Management & LLFA
Place, Sustainable Growth & Transport | Cumberland Council
Parkhouse Building | Baron Way | Carlisle | CA6 4SJ

M. [redacted]
cumberland.gov.uk

Please be aware that I work flexible hours, so whilst this is a convenient time for me to send this email to you, I do not expect a response from you outside your normal working hours.

Visit the Flood Hub, a website to help increase flood resilience across the North West

Twitter: @TheFloodHub

From: [redacted] <[redacted]@cumbria.gov.uk>
Sent: 07 June 2023 09:43
To: [redacted] <[redacted]@cumbria.gov.uk>
Subject: FW: Dean Moor Solar Farm - Transport Scoping Meeting

Morning [redacted],

Are you okay to deal with this one to confirm the minutes of the meeting and respond as necessary? I can pull off the accident data if you don't have it on HIAMS, but would be useful if you can access it as well.

Regards

[redacted]
Lead Officer | Highways Development Management & LLFA
Place, Sustainable Growth and Transport | Cumberland Council
Parkhouse Building | Carlisle | CA6 4SJ

m. [redacted]
www.cumberland.gov.uk

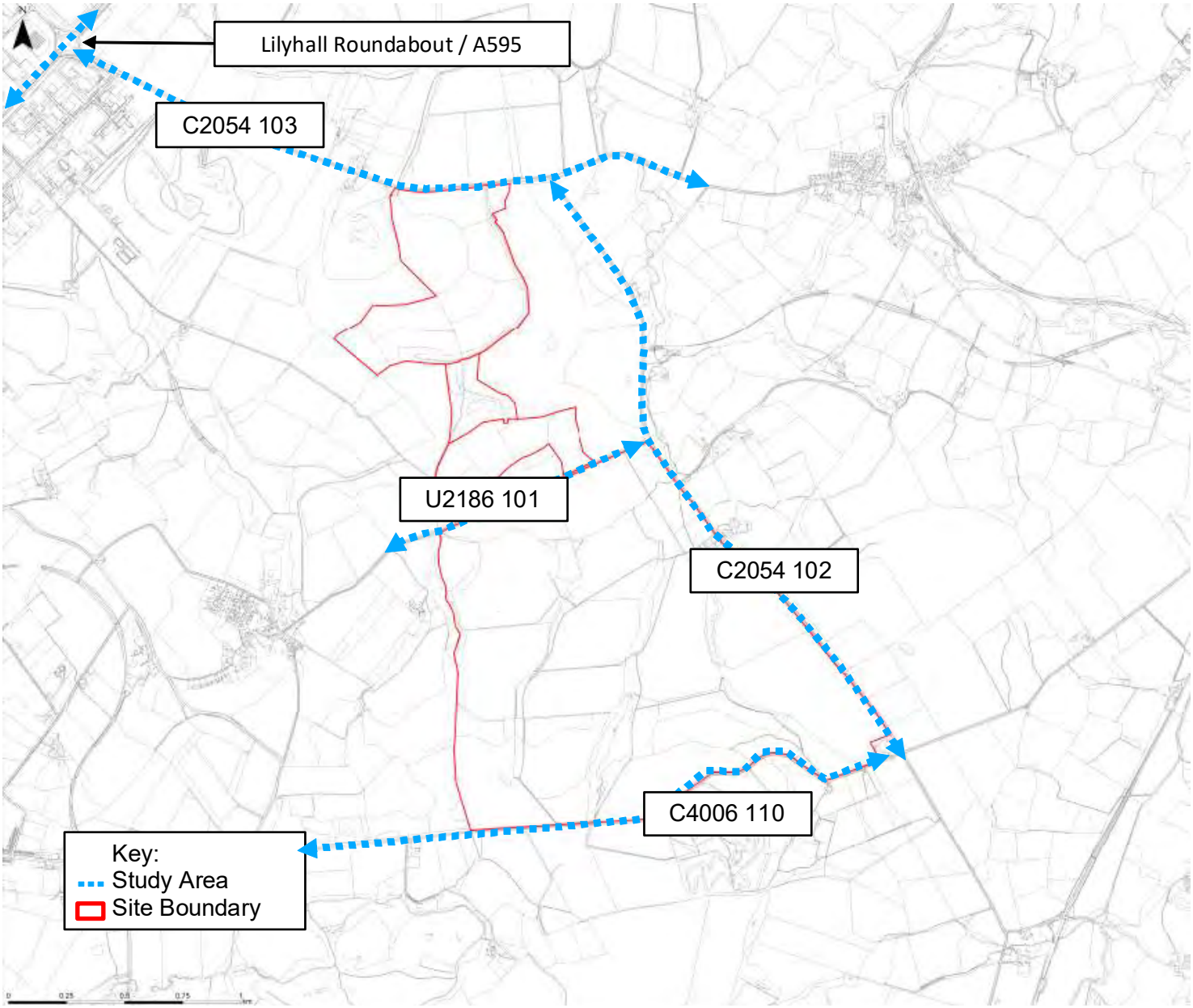
From: [redacted] <[redacted]@stantec.com>
Sent: 05 June 2023 15:39
To: [redacted] <[redacted]@cumbria.gov.uk>
Cc: [redacted] <[redacted]@stantec.com>
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting

Hi [redacted],

Please find attached the draft minutes from our recent transport scoping meeting. Your feedback and comments would be appreciated. If possible, please could we have comments back by the end of Wednesday 14th June – please let me know if this causes a problem for you.

In addition to our previous requests for accident data and highway extents information (see email below) we're also keen to confirm a schedule of local road names to help us all know which bit of the local road network we're referring to! Below are some naming suggestions that correlate to the map below and we would appreciate your feedback on the appropriate name.

- C2054 103 – Branthwaite Road
- C2954 102 – Branthwaite Edge Road or Asby Road?
- U2186 101 – Gilgarran Road
- C4006 110 – Pica Road or Dean Cross Road?



Best regards,

[redacted]

[redacted]
Associate

The Stills, 1st Floor, 80 Turnmill Street
London EC1M 5QU
Direct: [redacted]
Mobile: [redacted]
[redacted]@stantec.com

Please visit stantec.com/uk to learn more about how Stantec designs with community in mind.

Better Together, Even If We're Apart. Read more about Stantec's COVID-19 response, including remote working and business continuity measures.

From: [redacted]
Sent: Thursday, June 1, 2023 3:04 PM
To: [redacted] <[redacted]@Cumberland.gov.uk>
Cc: [redacted] <[redacted]@stantec.com>
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting

Hi [redacted],

We're just awaiting internal sign off for our meeting minutes before we send them to you for comment. In the meantime, I believe you were happy to supply us with accident information covering the road network in study area (slide 5) for the last five years? We also need to obtain highway extents information for the same area – are you also able to provide this?

Thanks for your help.

Best regards,
[redacted]

[redacted]
Associate

The Stills, 1st Floor, 80 Turnmill Street
London EC1M 5QU
Direct: [redacted]
Mobile: [redacted]
[redacted]@stantec.com

Please visit stantec.com/uk to learn more about how Stantec designs with community in mind.

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From: [redacted] <[redacted]@Cumberland.gov.uk>
Sent: Thursday, May 11, 2023 4:15 PM
To: [redacted] [redacted]@stantec.com>
Cc: [redacted] <[redacted]@stantec.com>; [redacted] <[redacted]@stantec.com>
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting

Hi [redacted],

I can do anytime between 9am and 4.30pm Wed, Thur or Fri next week.

Regards

[redacted]
Lead Officer | Highways Development Management & LLFA
Place, Sustainable Growth and Transport | Cumberland Council
Parkhouse Building | Carlisle | CA6 4SJ

m. [redacted]
www.cumberland.gov.uk

From: [redacted] <[redacted]@stantec.com>
Sent: 11 May 2023 10:36
To: [redacted] <[redacted]@cumbria.gov.uk>
Cc: [redacted] <[redacted]@stantec.com>; [redacted] <[redacted]@stantec.com>
Subject: Dean Moor Solar Farm - Transport Scoping Meeting

Dear [redacted],

Stantec is providing technical advice to a client proposing a solar farm development at land near Gilgarran and Branthwaite. The proposed development would generate 150MWe of sustainable electricity to the national grid and could include an element of Battery Energy Storage.

The emerging proposals are to be the subject of a Development Consent Order process and will be supported by the various pieces of technical evidence, including Transport Planning advice and an access strategy. My colleagues have recently met with Land Use Planning colleagues at Cumberland Council and so we would like to meet with you to outline

the proposals for the Transport Planning evidence and to discuss the basis for the access strategy to the development for construction and decommissioning and the operational phases of the development.

Prior to the meeting we will send over a transport scoping document for you to review.

Would you be able to meet (via Microsoft Teams) in the latter half of next week?

Kind regards,

[redacted]
Graduate Transport Planner

[redacted]@stantec.com

Stantec
First Floor 80 Turnmill Street
London EC1M 5LG

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ICT Service Desk immediately. Never open an attachment or click on a link within an email if you are not expecting it or it looks suspicious. Do not forward chain emails.

[redacted]

From: [redacted] <[redacted]@highwaysengland.co.uk>
Sent: 14 June 2023 09:33
To: [redacted]
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting

Hi [redacted]

Yes, that's right, my mistake. Thanks for double checking!

[redacted]

[redacted]
Spatial Planning Team
National Highways | Piccadilly Gate | Store Street | Manchester | M1 2WD
Tel: [redacted]
Web: http://www.nationalhighways.co.uk
GTN: [redacted]

From: [redacted] <[redacted]@stantec.com>
Sent: Wednesday, June 14, 2023 9:31 AM
To: [redacted] <[redacted]@highwaysengland.co.uk>
Cc: [redacted] <[redacted]@stantec.com>
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting

Hi [redacted] – thanks for the quick response, much appreciated.

Just wanted to check did you mean to say in the third sentence below that you're happy for transport to be excluded (rather than included) in the EIA so long as all the matters discussed are taken into account in the TA? Which we're happy to agree to.

Thanks
[redacted]

From: [redacted] <[redacted]@highwaysengland.co.uk>
Sent: Wednesday, June 14, 2023 8:35 AM
To: [redacted] <[redacted]@stantec.com>
Cc: [redacted] <[redacted]@stantec.com>
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting

Hi [redacted]

Thanks for sending that over, the notes look fine with me. The key thing for us is to make sure that assessment work of Lilyhall is carried out in the TA, which we can review with WSP to assess potential impacts. Happy with transport being included in the EIA as long as all the matters we discussed are taken into account when carrying out the TA work.

As a side to this, colleagues and I yesterday were discussing DCO applications in the NW, mainly around the Hynet Pipeline scheme which I mentioned to you on our call. It did however raise the point that we'll need to take a look at the wording of the DCO for this one (and all DCO applications) very carefully with our legal team who will provide us with advice. It's just an early heads up for you to inform your client of this, and early sight of the DCO would be helpful to avoid any delays in progress.

Kind regards

[redacted]
[redacted]
Spatial Planning Team
National Highways | Piccadilly Gate | Store Street | Manchester | M1 2WD
Tel: [redacted]
Web: http://www.nationalhighways.co.uk
GTN: [redacted]

From: [redacted] <[redacted]@stantec.com>
Sent: Tuesday, June 13, 2023 11:36 AM
To: [redacted] <[redacted]@highwaysengland.co.uk>
Cc: [redacted] <[redacted]@stantec.com>
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting

Hi [redacted] – hope you're good.

Please find attached the draft minutes from our recent transport scoping meeting. Your feedback and comments would be appreciated. If possible, please could we have comments back by the end of the week (16th June) – please let me know if this causes a problem for you.

As you'll see we're looking to agree to scope transport out of the EIA. Cumberland Council have now confirmed that they're happy to scope out transport (email attached), so hopefully you're happy to agree as well?

Best regards,
[redacted]

[redacted]
Associate

The Stills, 1st Floor, 80 Turnmill Street
London EC1M 5QU
Direct: [redacted]
Mobile: [redacted]
[redacted]@stantec.com

ee as well?

From: [redacted] <[redacted]@highwaysengland.co.uk>
Sent: Thursday, June 1, 2023 8:45 AM
To: [redacted] <[redacted]@stantec.com>
Cc: [redacted] <[redacted]@stantec.com>
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting

Hi [redacted]

Thanks for sending across those slides which are helpful to give an idea of the transport elements to the proposal.

From a brief look, I don't see many issues other than with the Lilyhall roundabout junction during the construction phase, which we may look to request a more detailed assessment of. I'll run this past our consultants at WSP to get their thoughts.

Kind regards

[redacted]
Spatial Planning Team
National Highways | Piccadilly Gate | Store Street | Manchester | M1 2WD
Tel: [redacted]
Web: http://www.nationalhighways.co.uk
GTN: [redacted]

From: [redacted] <[redacted]@stantec.com>
Sent: Wednesday, May 31, 2023 4:17 PM
To: [redacted] <[redacted]@highwaysengland.co.uk>
Cc: [redacted] <[redacted]@stantec.com>
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting

Hi [redacted],

Thanks again for the quick response and confirming your availability for Tuesday next week.

Please find attached some slides we have prepared on transport scoping for the Dean Moor Solar Farm project to help aid discussions during the meeting. As you'll see we are estimating 1-2 vehicle trips per week during the operational phase of the development and during the construction phase a peak of 40 two-way HGV movements and 16 two-way LGV movements. Based on the existing flows on the A595 and A66 over the course of an average weekday we believe this is likely to result in an imperceptible change on the network.

Hopefully this is helpful – if you need any further information prior to the meeting please let me know.

Kind regards,

[redacted]

Graduate Transport Planner
[redacted]@stantec.com
Stantec
First Floor 80 Turnmill Street
London EC1M 5LG

From: [redacted]
Sent: Wednesday, May 31, 2023 10:26 AM
To: [redacted] <[redacted]@highwaysengland.co.uk>
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting

Hi [redacted],

10am next Tuesday sounds good! I have just sent an MS Teams invite, and will send over a scoping note to you by the end of today or early tomorrow.

Look forward to speaking with you next week.

Kind regards,

[redacted]
Graduate Transport Planner
[redacted]@stantec.com
Stantec
First Floor 80 Turnmill Street
London EC1M 5LG

From: [redacted] <[redacted]@highwaysengland.co.uk>
Sent: Wednesday, May 31, 2023 9:43 AM
To: [redacted] <[redacted]@stantec.com>
Cc: [redacted] <[redacted]@stantec.com>
Subject: RE: Dean Moor Solar Farm - Transport Scoping Meeting

Hi [redacted]

Thanks for your email.

I'd be happy to meet to discuss these proposals, I have availability next Tuesday at 10am if that works?

It would be helpful if you could send across the scoping note as soon as possible, so I can gauge whether or not this is something we will need support with from our spatial planning consultants at

WSP. Once I have an idea of the potential impacts on the SRN that we will need to look at, I'll be able to invite them along to the call if needs be.

Kind regards

[redacted]
Spatial Planning Team
National Highways | Piccadilly Gate | Store Street | Manchester | M1 2WD
Tel: [redacted]
Web: http://www.nationalhighways.co.uk
GTN: [redacted]

From: [redacted] <[redacted]@stantec.com>
Sent: Tuesday, May 30, 2023 4:18 PM
To: [redacted] <[redacted]@highwaysengland.co.uk>
Cc: [redacted] <[redacted]@stantec.com>
Subject: Dean Moor Solar Farm - Transport Scoping Meeting

Dear [redacted],

Stantec is providing technical advice to a client proposing a solar farm development at land near Gilgarran and Branthwaite. The proposed development would generate 150MWe of sustainable electricity to the national grid and could include an element of Battery Energy Storage.

The emerging proposals are to be the subject of a Development Consent Order process and will be supported by the various pieces of technical evidence, including transport planning advice and an access strategy. We have recently met with transport planning colleagues at Cumberland Council and so we would like to meet with you to outline the proposals for the transport planning evidence and to discuss the basis for the access strategy to the development for construction and decommissioning and the operational phases of the development.

Would you be able to meet (via Microsoft Teams) next week Tuesday-Thursday?

Prior to the meeting we will send over a transport scoping document for you to review.

Kind regards,

[redacted]
Graduate Transport Planner

[redacted]@stantec.com

Stantec
First Floor 80 Turnmill Street
London EC1M 5LG

National Highways Limited | General enquiries: 0300 123 5000 |National Traffic Operations Centre, 3 Ridgeway, Quinton Business Park, Birmingham B32 1AF | https://nationalhighways.co.uk | info@nationalhighways.co.uk

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Dean Moor
Solar Farm

Appendix 4.3 Transport Scoping Meeting Minutes of the EIA Scoping Report

on behalf of **FVS Dean Moor Limited**

August 2023

Prepared by: **Stantec UK Limited**
PINS Ref: **EN010155**
Document Reference: **EN010155/APP/4.03**
Revision: **0**

Firma Energy

ib vogt

Meeting Minutes

Meeting Title: Dean Moor Solar Farm – Transport Scoping Meeting

Required Invitees: [redacted] (TH) Stantec (STN)

[redacted] (FL) (STN)

[redacted] (SG) Cumberland Council (CC)

[redacted] (MR) (CC)

Date of Meeting: 18 May 2023

Location: **Virtual meeting** (Microsoft Teams)

Job Number: 332511471

Item	Subject	Actions

1.	**Introduction:**
	
	The purpose of the meeting was to discuss with Cumberland Council (CC) as the Local Highway Authority, the transport scoping of the Dean Moor Solar Farm (DMSF) project. Topics discussed included:
	▪ Overview of the Project
	▪ Site Location & Order Limits
	▪ Baseline conditions
	▪ Construction, operation, decommissioning
	▪ Approach to the DCO & Transport Scoping
	  ▪ Environmental Statement
	  ▪ Transport Statement
	  ▪ Construction Traffic Management Plan
	TH provided a copy of the project information slides, which are appended to the minutes.
	
	SG confirmed that CC had previously dealt with several solar farm projects (mostly in Allerdale), although they were not as large in scale as DMSF.	

2.	**ATC Survey Results:** TH presented the traffic count and speed data from the ATC surveys undertaken in the vicinity of the DMSF site. SG / MR agreed that these were as expected and did not identify any specific issues that would cause concern from CC's perspective. SG / MR commented that Branthwaite Edge road is used as a cut-through road for traffic travelling from Sellafield Nuclear Facility, particularly if there has been disruption on the A595. The roads along Branthwaite Edge / Branthwaite are good quality and have sufficient width for two vehicles to pass one another safely. It was noted that some sections of these roads have been resurfaced recently. SG added that traffic along these roads can travel at relatively high speed – this is reflected in the ATC survey results.	

Meeting Minutes

Item	Subject	Actions
	TH outlined the proposed working hours and construction programme. SG confirmed that the hours and construction phase appear to be reasonable.	
3.	**Accident Data:** Accident data on the local road network from Crash Map was reviewed during the discussions and no specific issues or areas of concern were raised by CC. SG confirmed that CC would be able to provide accident data to cover the extent of the road network in the identified study area.	SG to provide accident data
4.	**Operational and Decommissioning Phase:** Based on the anticipated vehicle and staff numbers for the operational phase of DMSF, SG commented that CC would likely not have any issues or comments to make. Similarly, the decommissioning phase of DMSF does not pose any issues for CC, particularly with the timescales involved.	
5.	**Vehicle Routeing:** TH presented the anticipated designated construction vehicle routes at both a regional and local level. Regarding operational issues with the A595, SG responded that there are no material impacts although the road gets busy at peak times. SG added that CC is unlikely to object to the vehicle routeing. SG stated that the most concern is going to be on the minor roads, particularly the unnamed road which runs from Gilgarran to Branthwaite Edge (Road Section U2186 101, referred to as 'Gilgarran Road'). The Pica road to the south of the site has been used to access open cast mines previously, so this route could potentially be feasible for vehicle routeing if required. Regarding the access point to the three wind turbines in the north part of the Site, CC is not aware of any issues with the access and there are no issues regarding visibility.	
6.	**Branthwaite / Branthwaite Edge Road:** MR noted that there is a scrapyard business on the Branthwaite Edge road and CC refuse vehicle use the road regularly. MR added that the 'Gilgarran Road' which is signed as 'unsuitable for long vehicles' is only a recommendation. Regarding the bridge on Branthwaite Edge road, MR responded that there are no weight restrictions on the bridge. There could potentially be an issue with articulated HGVs grounding on the crest of the bridge. MR added that the bridge could potentially be an old railway bridge.	

Meeting Minutes

Item	Subject	Actions
	CC would require a dilapidation (pre-construction) survey along Branthwaite / Branthwaite Edge roads. The extent of the survey would need to be agreed in due course. *Post meeting note: the bridge on Branthwaite Edge Road has been confirmed as an old railway bridge. Formerly part of the London and North Western and Furness Joint Railway*	Dilapidation survey to be included as a requirement of the DCO
7.	**Gilgarran Road:** TH commented that the outline CTMP for DMSF will propose a series of measures to ensure compounds have sufficient space, turnaround points, wheel wash facilities, radio coordination of vehicles. MR indicated that they do not recommend implementing vehicle passing bays as these could attract problems e.g. fly tipping and overnighting and would become a maintenance and management burden to the Council. They recommend that other measures such as vehicle scheduling, traffic marshals and vehicle release from site coordinated via radio. SG added that Gilgarran road is fairly straight so managing vehicles effectively is feasible, and people have good visibility of vehicles ahead. TH asked if (other than road width) are there any issues with the Gilgarran road. SG responded that the number of vehicles that use the road is very limited and the only likely issue for construction and decommissioning traffic resulting from DMSF is potential verge damage from cars meeting HGVs. As such, a dilapidation survey is crucial. It is unlikely residents in Gilgarran would use the Gilgarran road as it is not a preferred local route. SG added that if new accesses are created for DMSF, these will need to be surfaced (gravel etc), and in principle, this is not an issue.	Stantec to propose non-physical vehicle control mechanisms Dilapidation survey to be included as a requirement of the DCO
8.	**General Points:** SG anticipates that most members of the public will understand DMSF will have only short-term impacts, and therefore is not likely to result in complaints during construction, operation and decommissioning. Complaints are usually only received by CC in built-up residential areas, or where cars have to pass close by HGVs. SG added that the DMSF proposals will need to be mindful of glare and impact on local road users, and solar photovoltaic panels will need to be positioned so as to not impact drivers. TH confirmed this is being addressed in the Glint and Glare Assessment in support of DMSF. TH commented that in terms of a transport appraisal, he does not consider traffic modelling to be necessary in support of DMSF. The DCO application will focus on managing traffic during the construction and decommissioning phases and TH noted that there will be a preference not to include passing bays.	

Meeting Minutes

Item	Subject	Actions
	SG/MR confirmed they were happy with the proposed approach.	
9.	**Approach to the DCO & Transport Scoping:** TH confirmed that it was proposed to scope transport out of the Environmental Statement, as likely significant transport effects are not anticipated as a result of DMSF. CC suggested this could be possible given the lack of transport impacts, but this would need to be confirmed by environmental colleagues. CC is happy with the outlined details of the transport scoping and does not believe that there will be significant feedback from stakeholders on the transport elements, as the impacts are expected to be minimal. STN and CC agree that traffic modelling will not be required for the transport scoping of DMSF. STN and CC agree that a dilapidation survey / pre-construction survey will be necessary as a requirement of the DCO.	CC to confirm it is happy for transport to be scoped out of the EIA. Dilapidation survey to be included as a requirement of the DCO

Meeting Minutes

Meeting Title: Dean Moor Solar Farm – Transport Scoping Meeting – National Highways

Required Invitees: [redacted] (TH) Stantec (STN)

[redacted] (RB) National Highways (NH)

Date of Meeting: 09 June 2023

Location: **Virtual meeting** (Microsoft Teams)

Job Number: 332511471

Item	Subject	Actions

1.	**Introduction:**
	The purpose of the meeting was to discuss with National Highways (NH), the transport scoping of the Dean Moor Solar Farm (DMSF) project. Topics discussed included:
	▪ Overview of the Project
	▪ Site Location & Order Limits
	▪ Baseline conditions
	▪ Construction, operation, decommissioning
	▪ Approach to the DCO & Transport Scoping
	  ▪ Environmental Statement
	  ▪ Transport Statement
	  ▪ Construction Traffic Management Plan
	
	TH provided a copy of the project information slides, which are appended to the minutes.
	
	RB commented that he would moving roles within NH in about a months time and a colleague would be taking over the Cumbria road network role. RB to provide details of the new contact in due course and provide handover information.	

2.	**Baseline Conditions:** TH presented the traffic count and speed data obtained from the National Highways WebTRIS database for the A595 north of Lillyhall roundabout and the A66 west of the Fitz roundabout. It was agreed that the flows and speeds were representative of the identified road network and did present any particular issues in terms of capacity etc. There are tidal flows on the A595 and the network peaks tend to occur in line with the shift working patterns at the Sellarfield nuclear plant further to the south. RB stated that the Lillyhall roundabout can get busy at peak times and requested that further analysis of the baseline conditions at the roundabout and the subsequent construction vehicle trips and site worker trips are appraised to understand any potential impact.	Stantec to undertaken appraisal work
3.	**Accident Data:**	

Meeting Minutes

Item	Subject	Actions
	Accident data on the A595 and A66 from Crash Map was reviewed during the discussions and no specific issues or areas of concern were raised by RB.	
4.	**Operational and Decommissioning Phase:** Based on the anticipated vehicle and staff numbers for the operational phase of DMSF, RB commented that NH would likely not have any issues or comments to make. Similarly, the decommissioning phase of DMSF does not pose any issues for NH, particularly with the timescales involved.	
5.	**Construction Phase:** TH outlined the anticipated construction programme and likely HGV and LGV movements associated with the construction phase. The likely number of construction workers on-site per day both peak and average was also considered as was the use of minibuses to transport workers to site. RB commented that the number of construction vehicles is not particularly high or concerning. However, further information on the likely use and capacity of the site worker minibuses would be needed to understand worker trips to site particularly in the AM peak. This should be confirmed as part of the Lillyhall roundabout appraisal work.	Stantec to confirm likely minibus numbers
6.	**Vehicle Routeing:** TH presented the anticipated designated construction vehicle routes at both a regional and local level. RB commented that the routes identified were as expected and using the A595 and A66 would not likely cause any material impacts although the road gets busy at peak times.	
7.	**Approach to the DCO & Transport Scoping:** TH commented that in terms of transport appraisal, he does not consider traffic modelling to be necessary in support of DMSF. The DCO application will focus on managing traffic during the construction and decommissioning phases. RB confirmed he was happy with the proposed approach. TH commented that the outline CTMP for DMSF will propose a series of measures including delivery scheduling, ensuring site compounds have sufficient space for vehicles to enter, turn and exit in forward gear, wheel wash facilities and traffic marshals with radios to coordinate and manage vehicle movements. TH confirmed that it was proposed to scope transport out of the Environmental Statement, as likely significant transport effects are not anticipated as a result of DMSF. RB suggested this could be possible given the lack of transport impacts.	RB to confirm he is happy for transport to be scoped out of the EIA.

Dean Moor
Solar Farm

Appendix 4.4 Sound Survey Results Summary of the EIA Scoping Report

on behalf of **FVS Dean Moor Limited**

August 2023

Prepared by: **Stantec UK Limited**
PINS Ref: **EN010155**
Document Reference: **EN010155/APP/4.03**
Revision: **0**

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Appendix 4.4 – Sound Survey Results Summary

ID	Date	Period	Period Average L_{Aeq} dB	Range $L_{A90,15minutes}$ dB	Mean $L_{A90,15minutes}$ dB	Median $L_{A90,15minutes}$ dB
LT1	Thursday 04/05/2023	Daytime (07:00 – 23:00 hours)	43	27-42	33	33
		Night-time (23:00 – 07:00 hours)	41	27-42	34	33
	Friday 05/05/2023	Daytime (07:00 – 23:00 hours)	44	17-40	31	31
		Night-time (23:00 – 07:00 hours)	35	16-36	21	18
	Saturday 06/05/2023	Daytime (07:00 – 23:00 hours)	39	20-31	27	27
		Night-time (23:00 – 07:00 hours)	36	16-34	22	19
	Sunday 07/05/2023	Daytime (07:00 – 23:00 hours)	41	26-40	31	31
		Night-time (23:00 – 07:00 hours)	41	29-39	35	35
	Monday 08/05/2023	Daytime (07:00 – 23:00 hours)	45	29-40	36	36
		Night-time (23:00 – 07:00 hours)	38	21-34	27	27
	Tuesday 09/05/2023	Daytime (07:00 – 23:00 hours)	42	21-39	30	30
		Night-time (23:00 – 07:00 hours)	36	22-35	27	25
	Wednesday 10/05/2023	Daytime (07:00 – 23:00 hours)	43	21-35	32	32
		Night-time (23:00 – 07:00 hours)	37	21-36	26	23
	Thursday 11/05/2023	Daytime (07:00 – 23:00 hours)	39	30-34	32	32
LT2	Saturday 25/03/2023	Daytime (07:00 – 23:00 hours)	47	22-34	28	28
		Night-time (23:00 – 07:00 hours)	38	20-34	25	24
	Sunday 26/03/2023	Daytime (07:00 – 23:00 hours)	43	19-38	28	28
		Night-time (23:00 – 07:00 hours)	42	18-29	21	19
	Monday 27/03/2023	Daytime (07:00 – 23:00 hours)	45	19-29	22	22
LT3	Thursday 04/05/2023	Daytime (07:00 – 23:00 hours)	55	34-51	41	41
		Night-time (23:00 – 07:00 hours)	49	39-49	40	41
	Friday 05/05/2023	Daytime (07:00 – 23:00 hours)	51	25-44	35	35
		Night-time (23:00 – 07:00 hours)	46	25-40	29	26
	Saturday 06/05/2023	Daytime (07:00 – 23:00 hours)	51	26-41	31	31
		Night-time (23:00 – 07:00 hours)	46	25-38	29	27

	Sunday 07/05/2023	Daytime (07:00 – 23:00 hours)	50	29-40	35	34
		Night-time (23:00 – 07:00 hours)	50	36-50	42	41
	Monday 08/05/2023	Daytime (07:00 – 23:00 hours)	52	37-50	42	41
		Night-time (23:00 – 07:00 hours)	45	33-40	35	35
	Tuesday 09/05/2023	Daytime (07:00 – 23:00 hours)	53	30-37	34	34
		Night-time (23:00 – 07:00 hours)	46	30-41	33	32
	Wednesday 10/05/2023	Daytime (07:00 – 23:00 hours)	52	30-38	35	35
		Night-time (23:00 – 07:00 hours)	46	28-39	32	30
	Thursday 11/05/2023	Daytime (07:00 – 23:00 hours)	54	31-37	34	34
LT4	Saturday 25/03/2023	Daytime (07:00 – 23:00 hours)	53	32-39	35	34
		Night-time (23:00 – 07:00 hours)	44	31-37	33	32
	Sunday 26/03/2023	Daytime (07:00 – 23:00 hours)	52	30-38	34	35
LT5	Thursday 04/05/2023	Daytime (07:00 – 23:00 hours)	51	33-43	37	36
		Night-time (23:00 – 07:00 hours)	42	27-40	32	32
	Friday 05/05/2023	Daytime (07:00 – 23:00 hours)	52	20-43	34	35
		Night-time (23:00 – 07:00 hours)	43	21-36	25	22
	Saturday 06/05/2023	Daytime (07:00 – 23:00 hours)	51	23-40	30	30
		Night-time (23:00 – 07:00 hours)	43	19-31	23	21
	Sunday 07/05/2023	Daytime (07:00 – 23:00 hours)	52	26-44	36	35
		Night-time (23:00 – 07:00 hours)	48	35-48	41	40
	Monday 08/05/2023	Daytime (07:00 – 23:00 hours)	56	38-48	43	43
		Night-time (23:00 – 07:00 hours)	48	31-40	34	33
	Tuesday 09/05/2023	Daytime (07:00 – 23:00 hours)	54	26-40	32	32
		Night-time (23:00 – 07:00 hours)	48	37-36	31	31
	Wednesday 10/05/2023	Daytime (07:00 – 23:00 hours)	54	27-43	35	35
		Night-time (23:00 – 07:00 hours)	49	26-39	30	29
	Thursday 11/05/2023	Daytime (07:00 – 23:00 hours)	58	30-41	34	33
LT6	Thursday 11/05/2023	Daytime (07:00 – 23:00 hours)	53	29-43	34	33
		Night-time (23:00 – 07:00 hours)	46	26-39	30	29
	Sunday 26/03/2023	Daytime (07:00 – 23:00 hours)	53	25-40	33	35
		Night-time (23:00 – 07:00 hours)	50	25-41	29	26
	Monday 27/03/2023	Daytime (07:00 – 23:00 hours)	54	28-41	32	31

Typical Background Sound Level

LT1 Daytime 28 dB $L_{A90,15minutes}$

LT1 Night-time 22 dB $L_{A90,15minutes}$

LT2 Daytime 28 dB $L_{A90,15minutes}$

LT2 Night-time 22 dB $L_{A90,15minutes}$

LT3 Daytime 31 dB $L_{A90,15minutes}$

LT3 Night-time 30 dB $L_{A90,15minutes}$

LT4 Daytime 35 dB $L_{A90,15minutes}$

LT4 Night-time 32 dB $L_{A90,15minutes}$

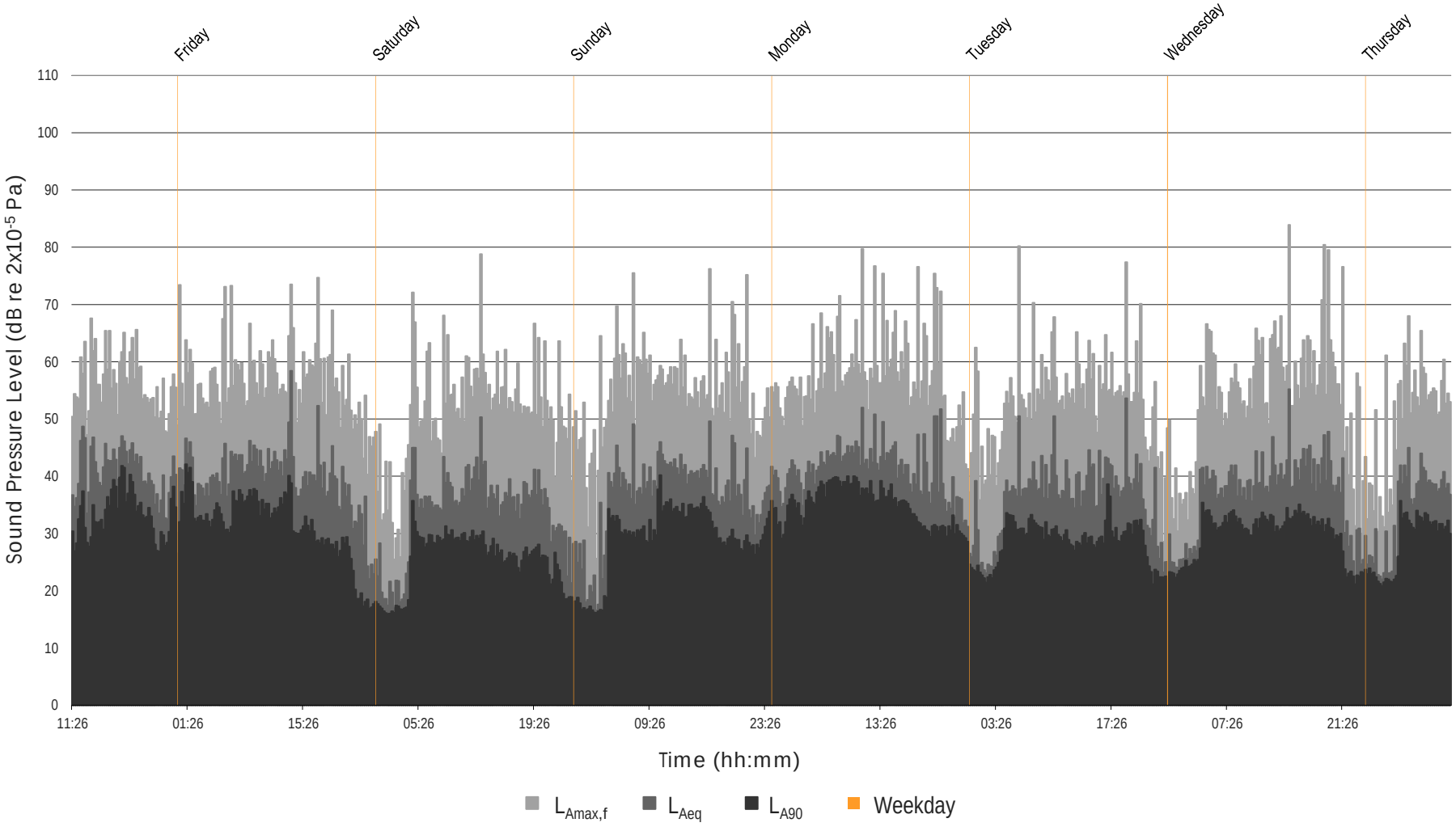
LT5 Daytime 31 dB $L_{A90,15minutes}$

LT5 Night-time 27 dB $L_{A90,15minutes}$

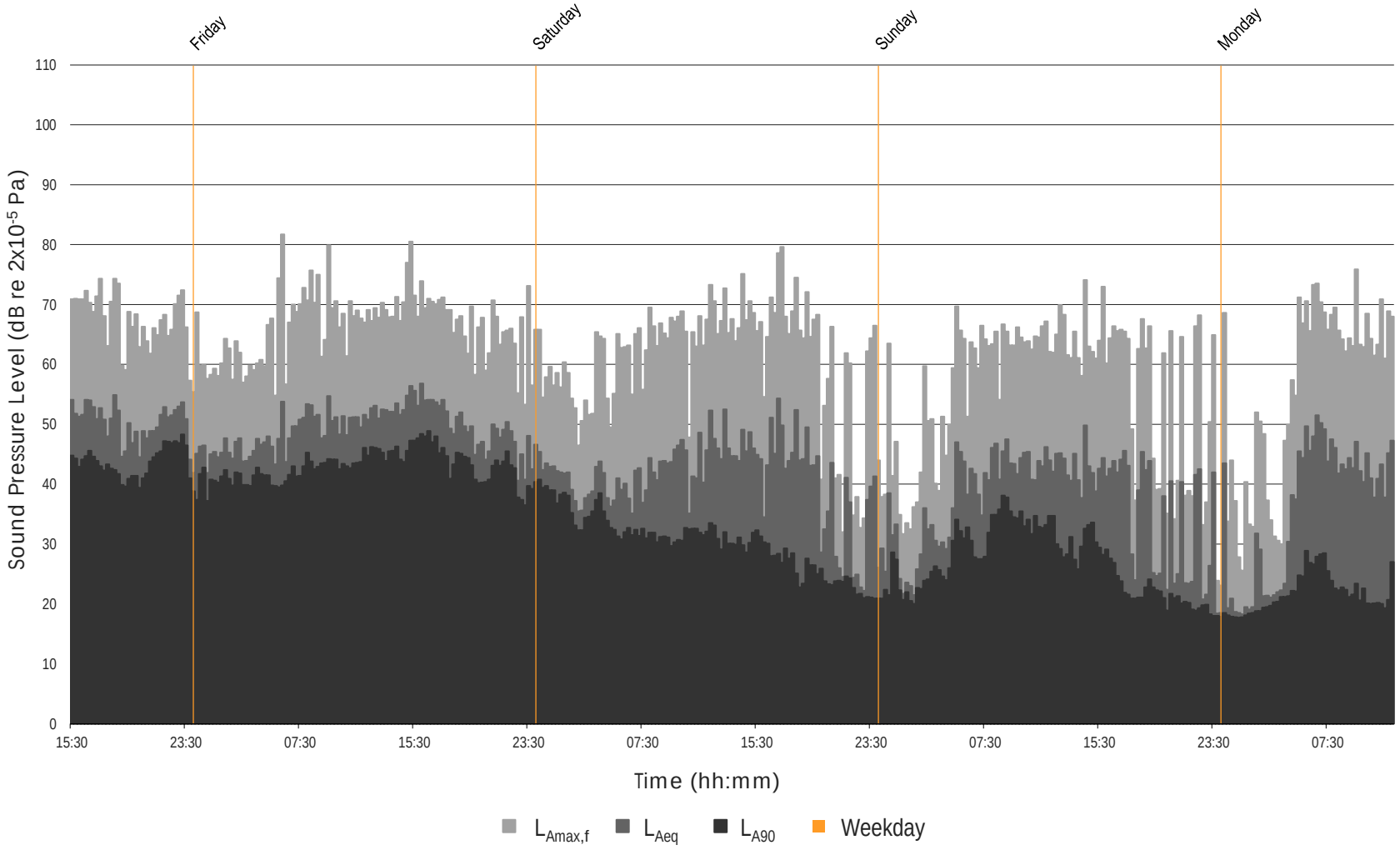
LT6 Daytime 31 dB $L_{A90,15minutes}$

LT6 Night-time 27 dB $L_{A90,15minutes}$

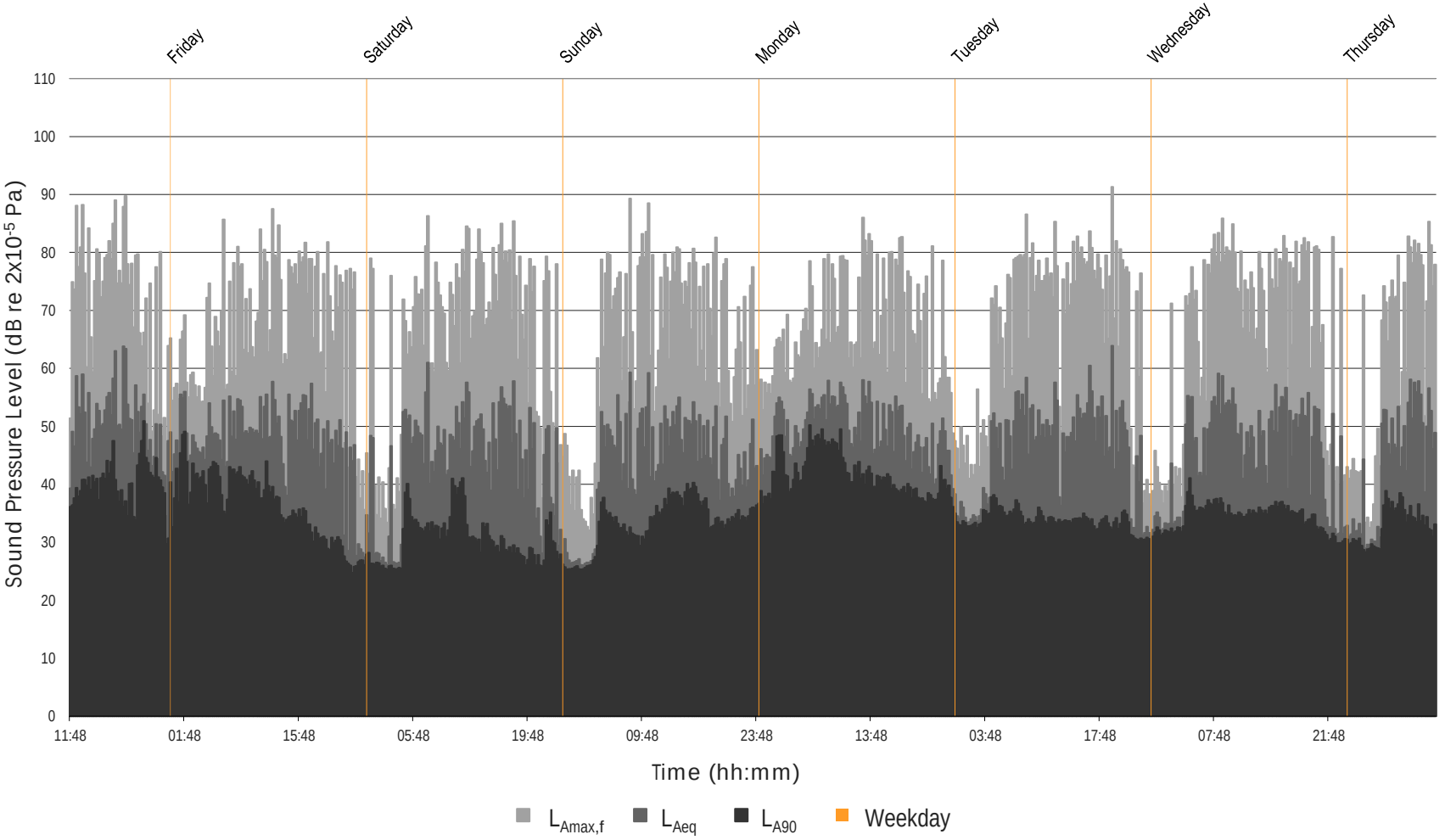
Dean Moor Solar Farm
L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History
LT1 - Thursday 4 May to Thursday 11 May 2023



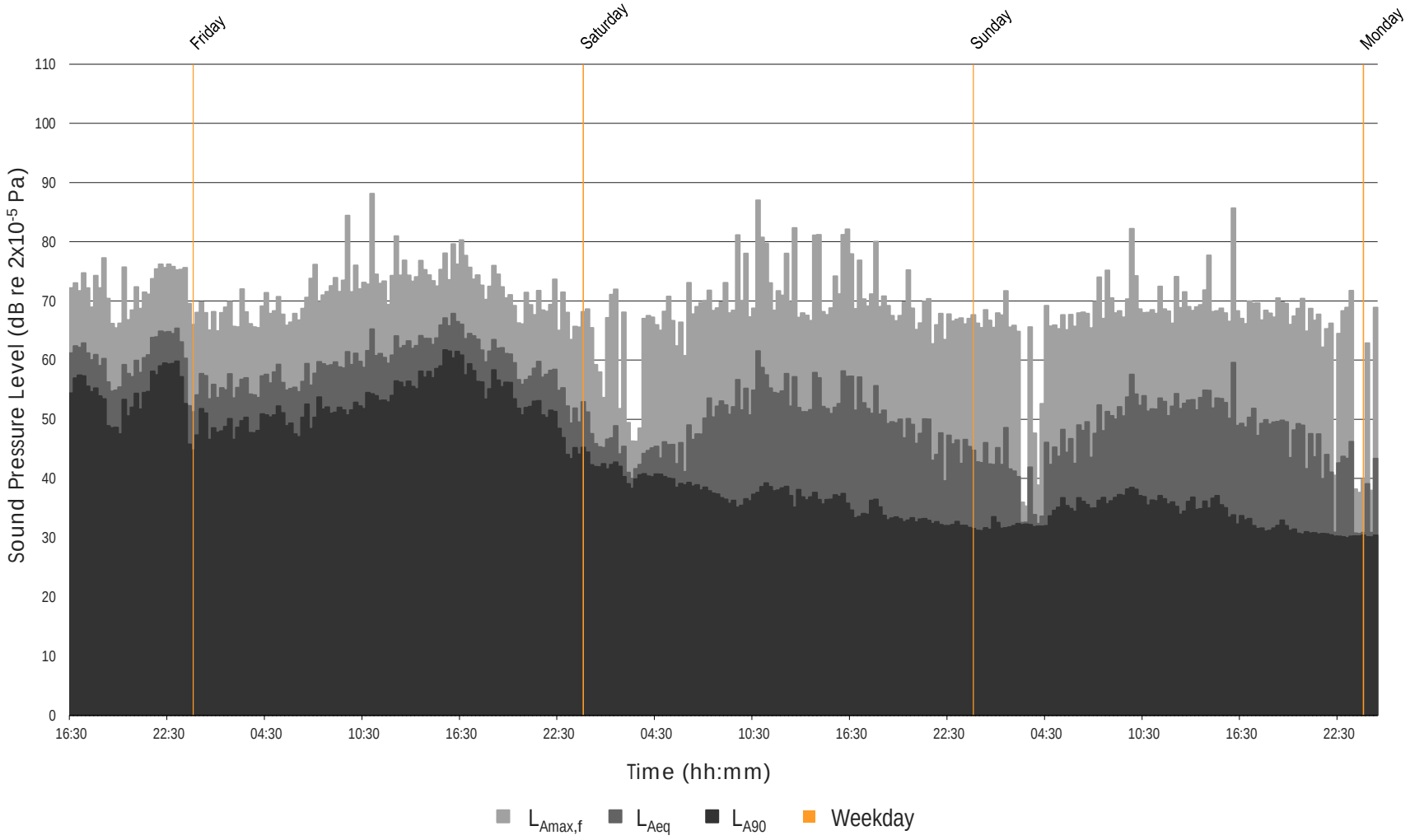
Dean Moor Solar Farm
L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History
LT2 - Thursday 23 March to Monday 27 March 2023



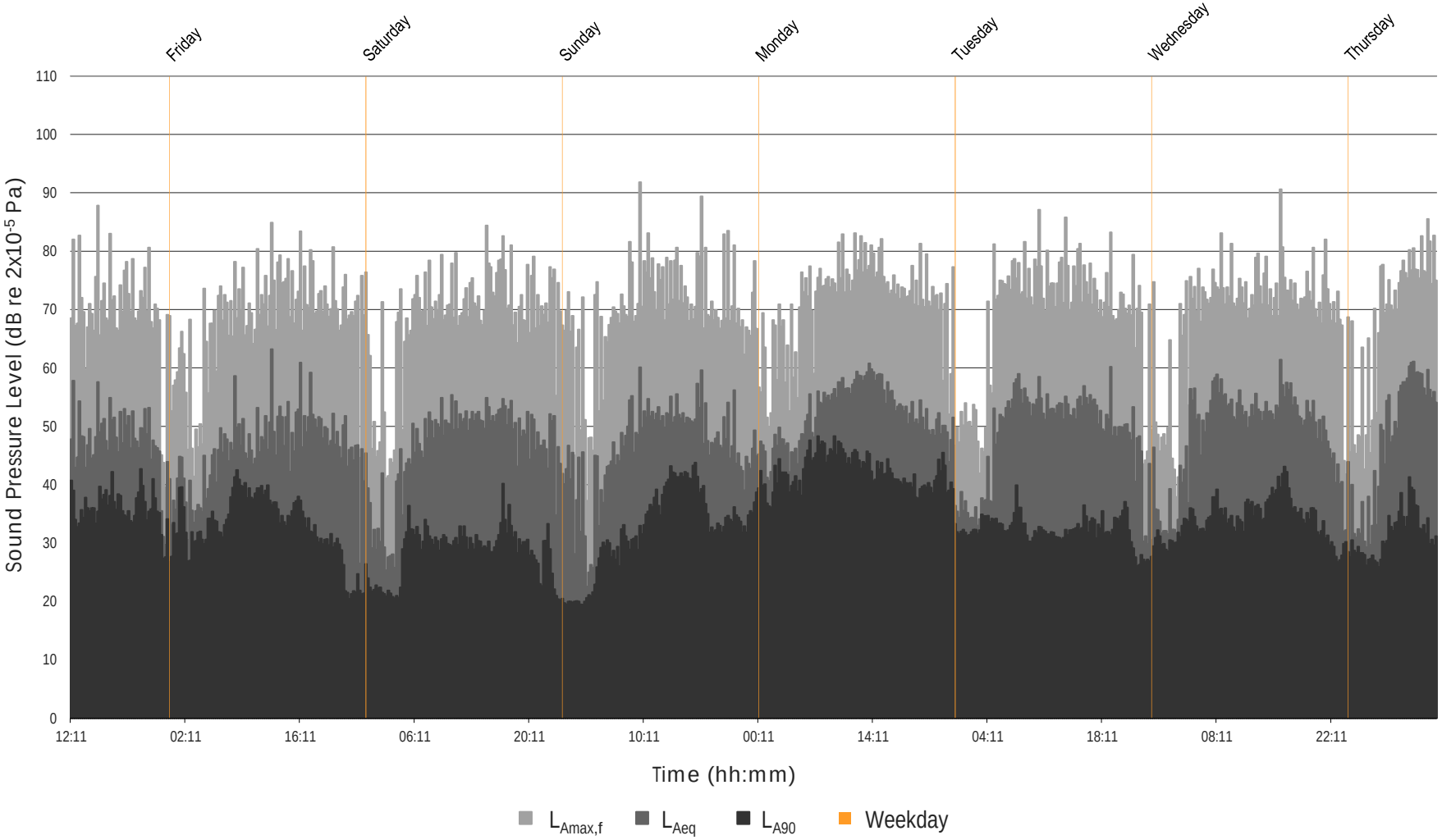
Dean Moor Solar Farm
L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History
LT3 - Thursday 4 May to Thursday 11 May 2023



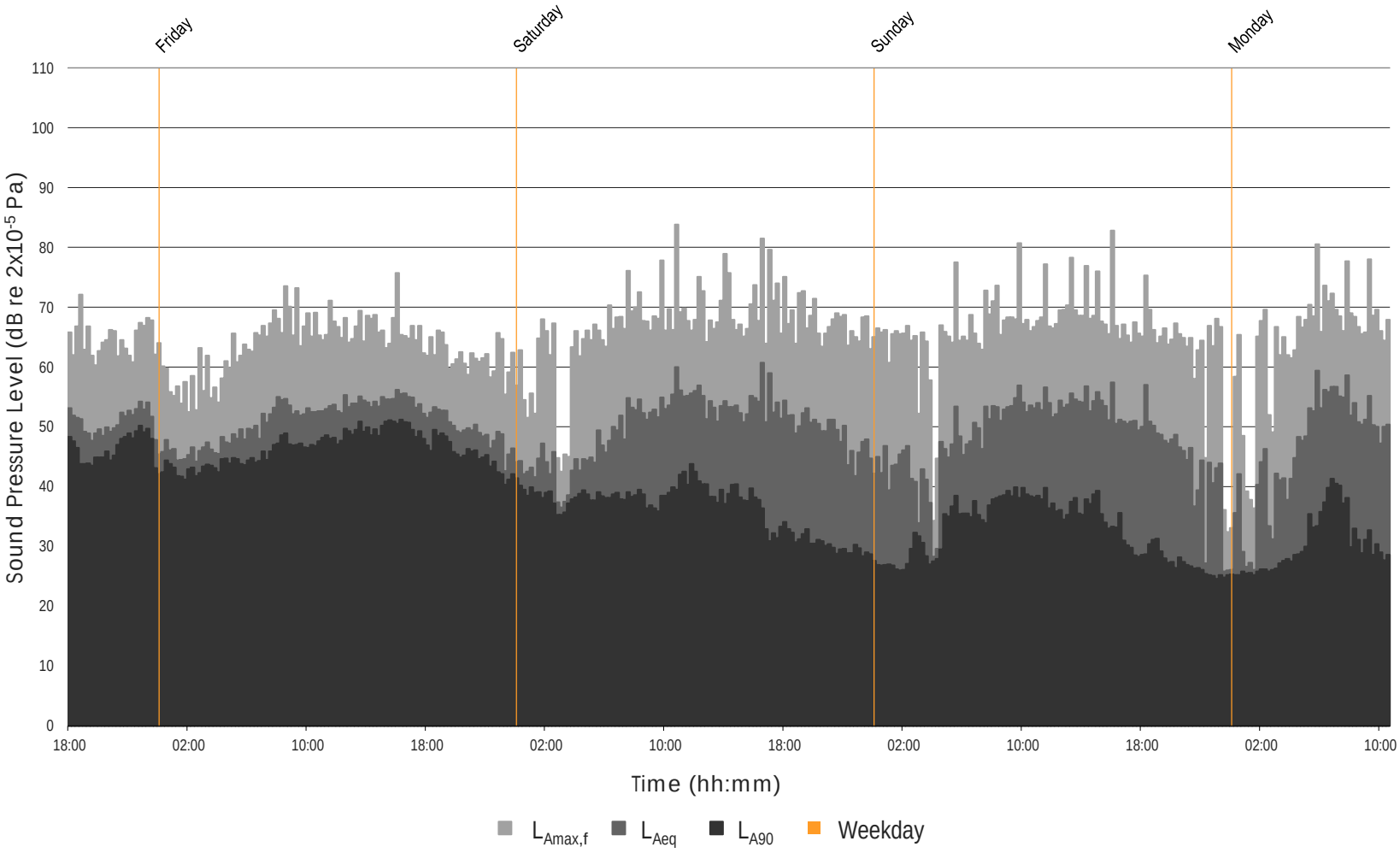
Dean Moor Solar Farm
L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History
LT4 - Thursday 23 March to Monday 27 March 2023



Dean Moor Solar Farm
L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History
LT5 - Thursday 4 May to Thursday 11 May 2023



Dean Moor Solar Farm
L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History
LT6 - Thursday 23 March to Monday 27 March 2023



Dean Moor
Solar Farm

Appendix 4.6 Desk-Based Coal Mining Hazard Assessment of the EIA Scoping Report

on behalf of **FVS Dean Moor Limited**

August 2023

Prepared by: **Stantec UK Limited**
PINS Ref: **EN010155**
Document Reference: **EN010155/APP/4.03**
Revision: **0**

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APPENDICES

1. Introduction

1.1. Preamble

1.1.1. Stantec UK Ltd (Stantec) has been instructed by FVS Dean Moor Limited (the Applicant) to provide an assessment of the possible hazards associated with historical coal mining and the potential to affect the Proposed Development on land referred to as Dean Moor.

1.1.2. The Proposed Development comprises the proposed construction, operation and maintenance, and decommissioning of a renewable energy generating project on 279.62 hectares ('ha') of land located between the village of Gilgarran and Branthwaite in West Cumbria (the 'Site'), which is situated within the administrative area of Cumberland Council ('CC').The location plan showing the Site boundary is included as **Figure 1**.

1.1.3. This report presents a Coal Mining Hazard Assessment for the Proposed Development, to provide the Planning Inspectorate and Cumberland Council and relevant stakeholders with information pertaining to the mining legacy in the area, and an assessment of the potential impact to land stability for the Proposed Development.

1.1.4. It should be noted that a Phase 1 Ground Conditions Assessment has been carried out for the Site by Stantec (Stantec, 2023) which assesses whether there are general land instability or contamination risks associated with the ground conditions that require management / mitigation as part of the Proposed Development.

1.2. Proposed Development

1.2.1. The Proposed Development comprises a renewable energy generating project comprising ground-mounted solar photovoltaic ('PV') arrays, together with on-Site energy storage facilities, associated infrastructure, and grid connection.

1.3. Regulatory Framework

1.3.1. The Coal Authority (CA) interactive mapping shows that the Site is situated within a CA reporting area and a Development High Risk Area. Guidance from the CA indicates that most development within a Development High Risk Area requires a site-specific coal mine risk assessment to be undertaken to comply with statutory obligations. Solar arrays are, however, often considered to be exempt from these requirements as the building/groundworks are typically of limited extent. In this case it was considered prudent to assess coal mining hazards due to the scale of the Proposed Development, which will include a number of buildings and access roads, together with the sensitive coal mining history of the Site and region.

1.3.2. This document has been prepared following the guidance presented within CIRIA C758D, Abandoned Mine Workings Manual, 2019, and CL:AIRE, Good Practice for Risk Assessment for Coal Mine Gas Emissions, October 2021.

1.3.3. The CA requires that coal mining hazard should be assessed by a Competent Person(s). Accordingly, this assessment was prepared by Mr Andrew Wyllie (9 years' experience, BSc (hons), CGeol, EurGeol, MIMMM, FGS), reviewed by Ms Victoria Acres (17 years' experience, BSc(hons) MSc CGeol EurGeol RoGEP Specialist) and approved by Dr Clive Edmonds (45 years' experience, PhD, MSc, BSc (Hons), DIC, EurGeol, CGeol, CSci, FGS).

1.4. Objectives and Scope

1.4.1. The objectives of this study are to identify mining hazards that might affect the Proposed Development at the Site. Key objectives include:

a. Present a desk-based review of information relating to mining relevant to the Site;
b. Use this information to update and assess the risks to the Proposed Development from the mining legacy, including the cumulative impact of issues;
c. Set out appropriate mitigation measures where necessary to address the mining legacy issues affecting the Site, including identification of

constraints to the development layout and/or recommendation of any investigation / remediation works necessary in order to facilitate the Proposed Development; and,

d. Demonstrate to the Local Planning Authority and the Coal Authority that the Site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on potentially unstable land.

1.5. Limitations

1.5.1. Guidance on the context of this report and any general limitations or constraints on its content and usage are given in a separate guidance note included after the text of the report.

1.6. Sources of Information

1.6.1. This assessment has been carried out using data obtained from the following sources:

a. A walkover of the Site was undertaken by Mr Andrew Wyllie on 28th and 29th April 2023.

b. The Coal Authority's Mine Abandonment Plans, Catalogue No. 7837 (1 of 3) No.1 Seam, 7837 (2 of 3) No.2 Seam, and 16661 (1 of 7 to 7 of 7) Potatopot Opencast mine.

c. Consultants Coal Mining Report for Gilgarran, Cumbria, CA14 4RF order ref. 51003348836001. Coal Authority. Nottinghamshire.[1]

d. BGS, 2004: Whitehaven. England and Wales Sheet 28 Solid and Superficial Geology 1:50,000 scale. (Keyworth, Nottingham: British Geological Survey).

e. BGS, 1991: Lamplugh. England and Wales Sheet NY02SE Solid Geology 1:10,000 scale. (Keyworth, Nottingham: British Geological Survey.

[1] Note: Coal Authority Report obtained refers to previous red line boundary and does not include the north eastern roads area which was added as an extension. However, due to development proposals indicating that these areas are to remain unchanged, it was not considered necessary to reorder the report.

f. BGS, 1998: Pica. England and Wales Sheet NY02SW Solid Geology 1:10,000 scale. (Keyworth, Nottingham: British Geological Survey.

g. The BGS / National Geosciences Data Centre historical borehole information[2].

h. BGS non-coal mining search[3]

i. Stantec non-coal Cavities Database

1.6.2. Stantec have not been provided with reports of any previous investigations on the Site.

[2] BGS online borehole records database viewer, available at: GeoIndex - British Geological Survey (bgs.ac.uk), accessed 14 April 2023

[3] BGS online non-coal mining database, available at: GeoIndex - British Geological Survey (bgs.ac.uk), accessed 14 April 2023

2. Land Use Information

2.1. Introduction

2.1.1. This section presents a summary of current and historical land uses on and adjacent to the Site. Land use is used to inform the potential hazard identification element of the risk assessment.

2.2. Site Location and General Description

2.2.1. The Site is centred on National Grid Reference NY 045 236, located between the villages of Gilgarran and Branthwaite in West Cumbria (the 'Site'), as shown on the Site Location Plan presented as **Figure 1**.

2.2.2. The Site is located approximately 1.1km east of the Lillyhall Industrial Estate, 6.5km east of the small village of Gilgarran, 1.3km west of Branthwaite, and 6km southeast of Workington town centre on the West Cumbrian coast. The hamlet of Branthwaite Edge is directly adjacent to the east of the Site.

2.2.3. The northern part of the Site boundary adjoins an unclassified road, hereafter referred to as "Branthwaite Road". The southern part of the Site boundary abuts Dean Cross Road. The north/south road between Branthwaite Road and Dean Cross Road, forming the eastern boundary of much of the Site, is Branthwaite Edge Road. The Site is bisected by an unclassified road between Gilgarran and Branthwaite Edge, hereafter referred to as the 'Gilgarran Road', as shown on the Site Layout Plan presented as **Figure 2**.

On-Site

2.2.4. The land gradually rises in elevation towards the south, with the topography becoming steep towards the Sites southern boundary. The lowest elevation is recorded in the northwest at approximately 84m Above Ordnance Datum (AOD), and the highest elevation of approximately 200m AOD is recorded in the southwest.

2.2.5. The land use is generally dominated by sheep pasture and heathland, with some localised areas of woodland.

2.2.6. Electric High Voltage (EHV) cables are noted to traverse the Site, oriented approximately east-west land within the Site to the south of the 'Gilgarran Road', and approximately southwest-northeast in the land within the Site to the north of the 'Gilgarran Road'.

The Northern Part of the Site

2.2.7. The land within the Site to the north of the 'Gilgarran Road' has been partially developed as a wind farm with three wind turbines and their associated infrastructure including cabling, gravel tracks, and outbuildings present within the central part.

2.2.8. Within the low-lying north-western part there is a large area of ponded surface water and saturated marshy land.

2.2.9. In June 2023, the boundary was extended to include the footprint for the two B-class roads between Wythemoor Sough to the north and the junction north of Branthwaite Edge to the east.

The Southern Part of the Site

2.2.10. In the land within the Site to the north of the 'Gilgarran Road' an ordinary watercourse[4] named the Thief Gill, as well as several other unnamed ordinary watercourses, flow through the Site from the south and west towards the north-east corner. Beyond the Site boundary, these watercourses combine to flow in an EA-designated main river named Lostrigg Beck, which continues in a north-east direction before joining the River Marron, approximately 6.5km to the north east of the Site. Thief Gill flows northeast until it exists the Site via a bridge on the eastern boundary. Near the southern boundary of the Site, Thief Gill runs through a steep gorge.

[4] An ordinary watercourse is any channel that water flows through, which is not part of the main river network. It could be a river, stream, ditch, drain or brook

2.2.11. A small fenced off area on the southwest boundary represents a protected area associated with ancient standing stones.

Off-Site

2.2.12. Land use in the area surrounding the Site is generally similar to the land use on-Site, comprising largely pastural agricultural land with moorland and sporadic areas of woodland.

2.2.13. There are scattered residential properties in the surrounding area, mostly comprising farmyards and farmhouses.

2.3. Historical Land Use/ Mining Setting

2.3.1. The historical land use relevant to the CMRA has been assessed using the historical mapping included as part of the Groundsure report included the Ground Conditions Assessment (Stantec, 2023).

On-Site

The Northern Part of the Site

2.3.2. The earliest available map from 1864 shows the land within the Site to the north of the 'Gilgarran Road' to comprise woodland and open fields as part of Wythe Moor. On-Site roads in the extension area to the northeast are noted to be present from these earliest map editions.

2.3.3. By 1898, a railway line on an embankment has been constructed across the centre of this area oriented approximately east-west, which remained on Site until the 1947 map edition where it was labelled as an "old wagon way", before being recorded as "dismantled" on the 1967 map.

2.3.4. Large scale opencast mining (Potatopot mine) is first shown on the 1989 map. Historical aerial imagery shows this to have been backfilled and the Site restored to pasture by 2003.

2.3.5. The 1991 map shows the overhead electricity cables and pylons within the eastern part of the land to the north of the 'Gilgarran Road'.

2.3.6. By 2016, the wind farm and associated infrastructure were constructed, followed by an access road along the northeastern boundary by 2018.

2.3.7. No other significant changes are shown to the most recent mapping (2023).

The Southern Part of the Site

2.3.8. The 1864 mapping shows the land within the Site to the south of the 'Gilgarran Road' to comprise rough pasture, labelled Dean Moor, with a quarry noted at the southern end of Thief Gill and an "old coal pit" on the southeast boundary.

2.3.9. The 1898 map shows an additional old quarry in the southwest. An "old shaft" is shown on the 1923 map.

2.3.10. Overhead and electricity cables and associated pylons are shown on the 1991 mapping.

2.3.11. No other significant changes are shown to the most recent mapping (2023).

Off-Site

2.3.12. Generally, the region is noted to have an extensive mining history, with coal pits, collieries, and shafts frequently highlighted on historical maps.

2.3.13. On the earliest available map dated 1864, the following relevant features are shown in the vicinity of the Site:

a. Two coal pits immediately south;
b. Colingate Quarry approximately 145m west;
c. Branthwaite Edge Quarry approximately 280m east;
d. Limekiln in Gilgarran Wood approximately 500m southwest;
e. Two coal shafts approximately 400m southwest; and
f. Tile works approximately 950m east, which may have associated clay pits.

2.3.14. The 1898 map shows many pits and shafts to be "old". Three collieries are shown within 1km of the Site:

a. Wythemoor Colliery approximately 100m to the northwest with associated wagonway and mine entries;
b. Deanmoor Colliery approximately 200m to the south with associated tramway and mine accesses; and
c. Moorside Colliery approximately 750m to the south with associated level and tramway.

2.3.15. By the 1923 map edition, Deanmoor Colliery, Colingate Quarry, and Brandthwaite Edge Quarry are recorded to be disused. Moorside Colliery and Wythemoor Colliery have been redeveloped and expanded.

2.3.16. The 1947 no longer shows Wythemoor Colliery (although its associated mine entries are still indicated).

2.3.17. The 1951 map notes Moorside Colliery to be disused.

2.3.18. In 1989 with the commencement of opencast mining at the Potatopot mine, it is noted that the opencast mining area extends off-Site to the southwest and northwest by up to 1km, and consequently a large amount of disturbance is noted regionally.

2.4. Published Geology

2.4.1. The 1:50,000 scale geological map of Whitehaven, Sheet 28 (BGS, 2004[5]) and the 1:10,000 scale geological maps of NY02SW (BGS, 1998) and NY02SE (BGS, 1991) were reviewed alongside online data provided by the BGS to provide a summary of the anticipated geological regime of the Site. The deposits, lithologies and structural geology are described below. The superficial geology for the Site is presented as **Figure 3,** with the bedrock geology shown on **Figure 4**.

[5] BGS 1:50,000 scale Bedrock and Superficial map, Sheet Number 28 (2004), available at: British Geological Survey (BGS), last accessed 14 April 2023

Artificial Ground

2.4.2. The land within the Site to the north of the 'Gilgarran Road' is recorded to be almost entirely underlain by anthropogenic deposits, pertaining largely to the presence of the Potatopot Opencast coal mining activities. Of this, the majority of the land within the Site to the north of the 'Gilgarran Road' is recorded as Infilled Ground, with the rest shown to be general Made Ground.

2.4.3. No Made Ground is recorded underlying the land within the Site to the south of the 'Gilgarran Road', with the exception of a small area at the end of Thief's Gill at the location of a former quarry.

Superficial Geology

2.4.4. The majority of the Site is shown to be underlain by Devensian-aged Glacial Till noted to comprise sandy clay deposits, with silt and sand pockets.

2.4.5. Alluvium is shown in the vicinity of Thief Gill and its tributaries, and the tributary to Lostrigg Beck, generally comprising unconsolidated clay, silt, sand and gravel.

2.4.6. Alluvial Fan Deposits are shown at the mouth of tributary valleys, generally comprising loose rock material.

2.4.7. Peat is shown near the eastern flowing tributary of Thief Gill as well as an area near the southwestern corner of the Site.

2.4.8. Three areas of the Site are indicated to contain landslide deposits (the debris of former landslides and likely comprising the same constituent material as the upslope areas):

a. The largest crosses the southern boundary near the southeastern corner of the Site and extends to the west across the southern parts of the Site;
b. A relatively small area located in the southwestern quarter of the land within the Site to the south of the 'Gilgarran Road'; and

c. A relatively small area located across the western boundary of the land within the Site to the south of the 'Gilgarran Road'.

Bedrock Geology

2.4.9. The Site is predominantly underlain by sedimentary strata comprising cyclical strata of sandstone, siltstone, and mudstone with economically viable seams of coal throughout. It is highlighted that in the land within the Site to the north of the 'Gilgarran Road, the historical opencast mining activity would have largely removed the shallow bedrock.

2.4.10. The **Whitehaven Sandstone Formation** forms the uppermost unit of the Carboniferous strata and outcrops in the land within the Site to the south of 'Gilgarran Road'. It comprises a succession of red to purplish brown cross bedded sandstones, mudstones, siltstones and thin coals and limestones. It is recorded by the BGS as being in excess of 300m thickness.

2.4.11. The Pennine Middle and Lower Coal Measure Formations underlie the Whitehaven Sandstone Formation.

2.4.12. The **Pennine Middle Coal Measures Formation** (PMCMF) comprises mudstone, siltstone and sandstone with numerous coal seams, including the Black Metal Coal, Fireclay Coal, Tenquarters Coal, Bannock Band Coal, Main Band Coal and Yard Coal. This stratum outcrops north of the centre and in the eastern part of the Site and are indicated by the BGS to be up to 200m thick.

2.4.13. The **Pennine Lower Coal Measures Formation** (PLCMF) comprises mudstone, siltstone and sandstone with coal seams, including the Little Main Coal, Lickbank Coal, Sixquarters Coal, Upper Threequarters Coal, Lower Threequarters Coal and the Albrighton Coals. This stratum outcrops north of the centre and in the eastern part of the Site and are indicated by the BGS to be up to 200m thick.

2.4.14. A summary of the coal seams identified through the various information sources is presented in **Table 1** below. Due to the past nature of underground coal mining by independent small-scale mining enterprises, it is often the case

that coal seams have differing local/regional names. In this instance, both the BGS and CA have utilised differing regional names for the same seam. Given this discrepancy, Stantec have attempted to reconcile the names used and in **Table 1** below, listed seams are named together with their alternative name shown in brackets. The location and depth of these seams in the context of the Site is discussed further in Section 3.

Table 1:Summary of Recorded Coal Seams

Formation Name	Lithology	Coal Seam Name
Pennine Middle Coal Measures Formation (PMCM)	Interbedded grey mudstone, siltstone, pale grey sandstone, and coal seams commonly	Unnamed Coal J
		Unnamed Coal I
		Unnamed Coal H (Unnamed 8 Coal)
		Unnamed Coal G
		Unnamed Coal F (Unnamed 6 Coal)
		Unnamed Coal E
		Brassy Coal
		Black Metal Coal
		Fireclay Coal
		White Metal Coal
		Slaty Coal
		Tenquarters (Upper Tenquarters) Coal
		Rattler Coal
		Bannock Band Coal
		Main Band Coal

Formation Name	Lithology	Coal Seam Name
		Yard Coal
Pennine Lower Coal Measures Formation (PLCM)	Interbedded grey mudstone, siltstone, and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.	Half Yard Coal
		Little Main Coal
		Eighteen Inch Coal
		Lickbank Coal
		Sixquarters Coal
		Upper Threequarters Coal
		Lower Threequarters Coal
		Albrighton Coals
		Harrington Four Foot Coal

Structural Geology

2.4.15. Geological records indicate the Site to be located on the southern limb of a gently dipping anticlinal structure, plunging towards the east. Strata are recorded to dip generally towards the south at an angle of approximately 4° to 6°.

2.4.16. Significant faulting is noted within the Site, with a series of normal faults present and oriented approximately north-south, particularly within the land within the Site to the south of the 'Gilgarran Road'. A large fault running through the land within the Site to the north of the 'Gilgarran Road' from approximately its north western extremity to its south eastern corner. It is anticipated that more unrecorded minor faults may be present.

3. Historical Coal Mining Data Review

3.1. Coal Authority Data

Coal Authority Interactive Map Viewer

3.1.1. The CA Interactive Mapping[6] tool indicates that the Site lies within a Coal Mining Reporting Area. Table 2 below presents a summary of the information presented on the website regarding the Site area:

Table 2 Review of Coal Authority Information

Item	Yes	No	Remarks
Inside a coal mining reporting area	✓		
Coal Outcrops	✓		Yes – five outcrops are shown.
Development High Risk Area	✓		Yes – the entirety of the land within the Site to the north of the 'Gilgarran Road', and localised areas within the land to the south of the 'Gilgarran Road' (typically restricted to coal outcrops, mine entry positions, and the area of the land within the Site to the south of 'Gilgarran Road' highlighted as having "probable shallow coal workings")
Mine Entry	✓		Yes – 7 noted in the land within the Site to the north of the 'Gilgarran Road'. 21 noted in the land within the Site to the south of the 'Gilgarran Road.

[6] CA Interactive Mapping tool, available at: Interactive Map Viewer | Coal Authority (bgs.ac.uk), last accessed 17 April 2023

Item	Yes	No	Remarks
Mine Entry Potential Zone of Influence	✓		Yes – 7 noted in the land within the Site to the north of the 'Gilgarran Road'. 21 noted in the land to the south of the 'Gilgarran Road'.
Probable shallow coal mine workings	✓		Yes – an area of the land within the Site to the south of the 'Gilgarran Road' is noted to be affected by probable shallow coal mine workings. This may be an error or may not define extents suitably as the area is perfectly square and isolated.
Past shallow coal mine workings	✓		Yes – these are shown to be present in the extreme southeast of the land within the Site to the south of the 'Gilgarran Road and the extreme northwest of the land within the Site to the north of the 'Gilgarran Road.'
Surface Mining (Past and Current)	✓		Yes – The entirety of the land within the Site to the north of the 'Gilgarran Road is noted to be affected by past surface mining.
Surface Coal Resource Area	✓		Yes – the entire Site
Abandoned Mines Catalogue	✓		Yes – 14 plans are listed as representing mines within the Site.

3.1.2. The CA interactive map viewer records seven seams of coal which subcrop within the Site: Unnamed 1, Unnamed 2, Unnamed 3, Unnamed 4, Unnamed 5, Upper Ten Quarters, and the Yard Coals.

Coal Authority Consultants Coal Mining Report

3.1.3. The Coal Authority's Consultant Coal Mining Report (Ref: 51003348836001) contains five records of past underground mining at the Site (CA, 2022) at the level of the Unnamed 6, Two Foot, Upper Ten Quarters, Yard, and Unnamed 8 Coal seams. The depths of these records range from 17m to 100m bgl. Of these, two records are considered to represent shallow past underground mining beneath the Site. The two shallow records are noted to comprise workings at the level of the Unnamed 6 Coal at 17m bgl (recorded abstraction of 0.56m thickness), and at the level of the Two Foot Coal at 22m to 34m bgl. It should be highlighted however that these measurements recorded in Coal Authority reports are typically taken from various positions across the Site where information allows, and therefore the depths can be inaccurate / unrepresentative in places.

3.1.4. The CA report also records possible unrecorded shallow workings at the Site and indicates detailed extents of workings at the extreme south of the Site as "Parent Phase" workings, which indicate past or current mining. These worked areas in the extreme south of the Site are conjectured to represent the workings detailed in the Coal Authority Consultant's Report as at the level of the Yard Coal (63-71m depth) and the Unnamed 8 Coal (110m depth). Plans have not been provided for these workings due to their depth beneath the Site being outwith anticipated influencing distance.

3.2. Review of Coal Authority's Mine Abandonment Plans

3.2.1. Searches of the mine abandonment plans based on the Site boundary area revealed two available shallow mine abandonment plans depicting former underground mine workings. The plans show workings within two seams of coal; the No. 1 (Unnamed 6), and the No. 2 (Two Foot) Coals, underlying the north-western extremity of the Site. Their searches also revealed seven abandonment plans pertaining to the former opencast mining within the land within the Site to the north of 'Gilgarran Road'. One of these plans details the entire opencast site and another six show detail of the seams encountered. The plans are reproduced in **Appendix B**.

3.2.2. Mine abandonment plans provided for the No.1 seam and the No.2 seam indicate a dip of approximately 1 in 6 to the east north east. Fault lines generally corresponding with those depicted on the BGS published geological map are noted to bound these workings to the south and northeast.

Mine Abandonment Plan Catalogue No. 7837 (1 of 3)

3.2.3. This available mine abandonment plan is entitled *"Wythemoor Colliery, Workington – No. 1 Seam Plan"*. The plan's title implies that the red coloured shading is the No. 1 (Unnamed 6) Coal which has been mined from the former Wythemoor Colliery. These workings are recorded to extend to within the boundaries of the Site and the immediately surrounding area, in particular at the north western extremity of the Site. It is noted that workings within this area are largely accessed by the "New Shaft" near to Wythemoor Sough, which is understood to represent the shaft referenced 303524-004 on the Coal Authority Report and interactive map viewer. An extract of this plan is contained within **Plate 1** below.

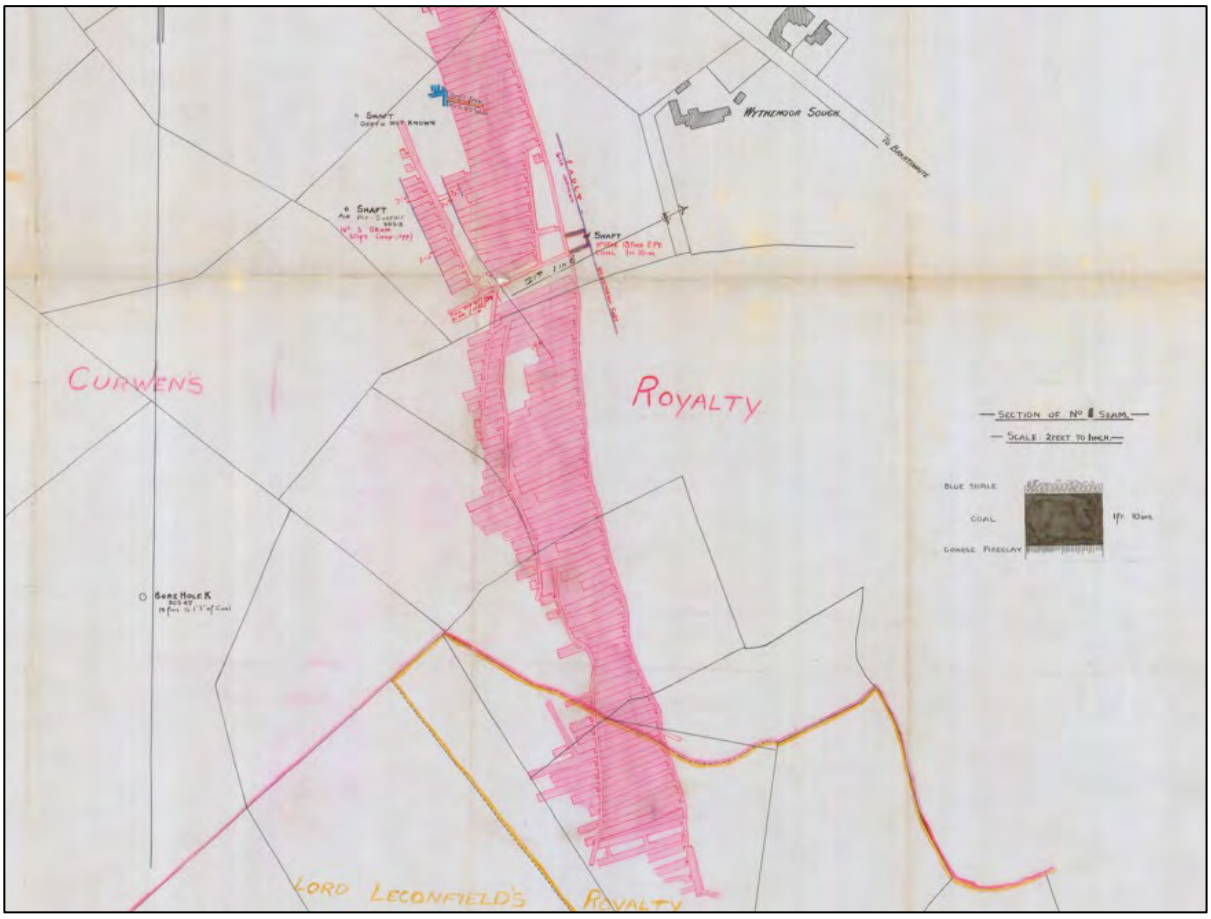


Plate 1: - *Extract of mineplan showing extents of workings at the level of the No.1 Coal. Source: Coal Authority Mine Abandonment Plan 7837 (1 of 3). North arrow shown in top left corner, and cross section of worked seam included. Red line Boundary overlain.*

3.2.4. The mine plan does not provide dates for the workings, however a closure statement is included dated 16th October 1923, stating that the plan shows workings as completed up to 29th September 1921. Taking cognisance of these dates, it is likely that these workings will exhibit longwall style extraction methods, where the entire mineral vein is removed and allowed to collapse behind the working face. It is noted however that the southernmost area of mining shown on the plan is conjectured to represent stoop-and-room style workings (also known as pillar-and-stall workings), where corridors ("rooms") of coal are extracted, leaving "stoops" of intact coal, which are used to support the ceiling of the workings.

3.2.5. The mine plan also provides a sketch representing the cross-section of the No.1 seam and its typical extraction thickness. This cross section gives an extraction thickness of approximately 1ft 10in (0.55m). The seam is noted to

be overlain by Blue Shale and the pavement comprises Coarse Fireclay. A depth of the seam beneath ground level is only provided at one location, approximately 200m west of the Site at the Wythemoor Sough shaft, which notes the seam to be present at 13fms (approx. 24m) below ground level.

3.2.6. The mine abandonment plan shows that workings to the north of the Site, adjacent to Wythemoor Sough, are truncated at the east against a fault which generally correlates with BGS 1:50,000 geological map and BGS GeoIndex online viewer. A note regarding this feature on the mineplan is given as "*downthrown east*" although a magnitude of offset is not given. The plan also gives a dip value of 1 in 6 (approximately 9.5°) to the east north east. No larger-scale geological structures are evident within the plan.

Mine Abandonment Plan Catalogue No. 7837 (2 of 3)

3.2.7. This available mine abandonment plan is entitled "*Wythemoor Colliery, Workington, 1904 – No.2 Seam Plan*". The plan's title implies that the blue coloured shading is the No.2 (Two Foot) Coal which has been mined from the former Wythemoor Colliery. These workings are recorded to extend to within the boundaries of the Site at the northern extremity and the immediately surrounding area. An extract of this mine plan is provided in **Plate 2** below.

Plate 2: - *Extents of workings at the level of the No.2 seam. Source: Coal Authority Mine Abandonment Plan 7837 (2 of 3). Red line boundary overlain.*

3.2.8. The mine plan does not provide dates for the workings, however a closure statement is included dated 16th October 1923, stating that the plan shows workings as completed up to 30th June 1922. As above, it is likely that these workings will exhibit longwall style extraction methods, where the entire mineral vein is removed and allowed to collapse behind the working face. As before, however, it is conjectured that an area along the northeast of the workings represent stoop-and-room style workings (also known as pillar-and-stall workings), where corridors ("rooms") of coal are extracted, leaving "stoops" of intact coal, which are used to support the ceiling of the workings.

3.2.9. A small cross section showing the extraction thicknesses of the worked seam is given in this plan. It would appear that coal thickness here is approximately 2ft (0.61m). This cross section shows that the ceiling of the working comprises Blue Shale, and the pavement comprises Coarse Fireclay. A depth of the seam beneath ground level is only provided at two locations location, approximately 200m west of the Site at the Wythemoor Sough shaft and approximately 600m west of the Site, which notes the seam to be present at 167 feet (approx. 51m) and 11 fms (approx. 20m) below ground level, respectively.

3.2.10. As with the previous plan, this document does not provide any great deal of information pertaining to the geological structure of the region. However, the workings are noted to be bound to the south and the northeast by two faults, which generally correlate with faults recorded on the BGS geological map of the region. The large fault which bounds the working to the south is unknown in scale with regards to downthrow. A smaller fault, which does not appear to be represented on the BGS maps, is shown off-Site approximately 125m to the northwest, showing an upthrow to the northeast of 6 inches. This feature seems to separate two different phases of extraction.

Mine Abandonment Plan Catalogue No. 16661 (1 of 7 – 7 of 7)

3.2.11. Completion plans pertaining to the Potatopot Opencast Mine were provided by the Coal Authority and comprised a total of 7 plans (Nos. 16661 1, 2, 3, 4, 5, 6, and 7 of 7) recording workings within the boundaries of the Site at the level of the Tenquarters, Rattler, Bannock Top Level, Bannock Bottom Level, Yard, Lower Yard, Half-yard, Little Main, Lickbank, Sixquarters, Upper Threequarters, Lower Threequarters coal seams. The plans provided include a summary plan which depicts all the workings and their extents (reference 16661 1 of 7, Appendix B) discussed further below.

3.2.12. Plan 16661 “Potatopot Completion Plan” indicate the opencast operation was authorised on 16th October 1985 and “Coaling” or mining commenced on 1st July 1986. Mining was indicated as complete by 14th July 1993. The plans indicate bituminous coal was worked in a total of 12 Coal seams to a

maximum depth of approximately 76m below ground level (119.7m AOD). Within the Site boundaries, all 12 seams have been targeted by the opencast mining operations, although they seem to have been extracted in localised areas. No specific details of backfill are included on the plan apart from reference to “Uncompacted” which would indicate that the materials were not placed in an engineered fashion. The thickness of the backfill deposits is noted to be in the region of up to 75m.

3.2.13. Taking cognisance of the depth of the seams to the top of batter recorded on the plans, side slopes can be expected to have been cut at angles of potentially up to 63°. Is should be noted that these figures are indicative only, as variations in the location of the highwall or the seam pavements may not be recorded on the plan. Similarly, changes of gradient across the headwall cannot be accounted for.

3.2.14. No mine entries are noted to be present within the opencast area recorded on the opencast completion plan. However, it is known from the Coal Authority report and the underground mine abandonment plans that shafts are present in the vicinity of the Site. It is possible, however, that the opencasting activity at Potatopot mine has either truncated these shafts or removed them in their entirety.

3.2.15. No stratigraphic column is included within this completion plan, although the mined seams listed in the legend is noted to have the seams presented in their correct stratigraphic order, from shallowest to deepest. An extract of this completion plan is included within **Appendix B**.

Mine Abandonment Plan Catalogue No. NCB62NW (Shaft Plan)

3.2.16. During consultation with the Coal Authority in regard to mine plan availability within this region, it was highlighted that the CA were in possession of a Shaft File for this Site, which is one of a series of documents inherited from British Coal which shows mine entry locations. An extract of the plan is shown in **Plate 3** below, and this is what the CA used for the positioning of shafts onto their interactive map viewer. Further description of shafts and other mine

entries is provided in Section 4 below. The location of these shafts is shown on **Figure 5**.

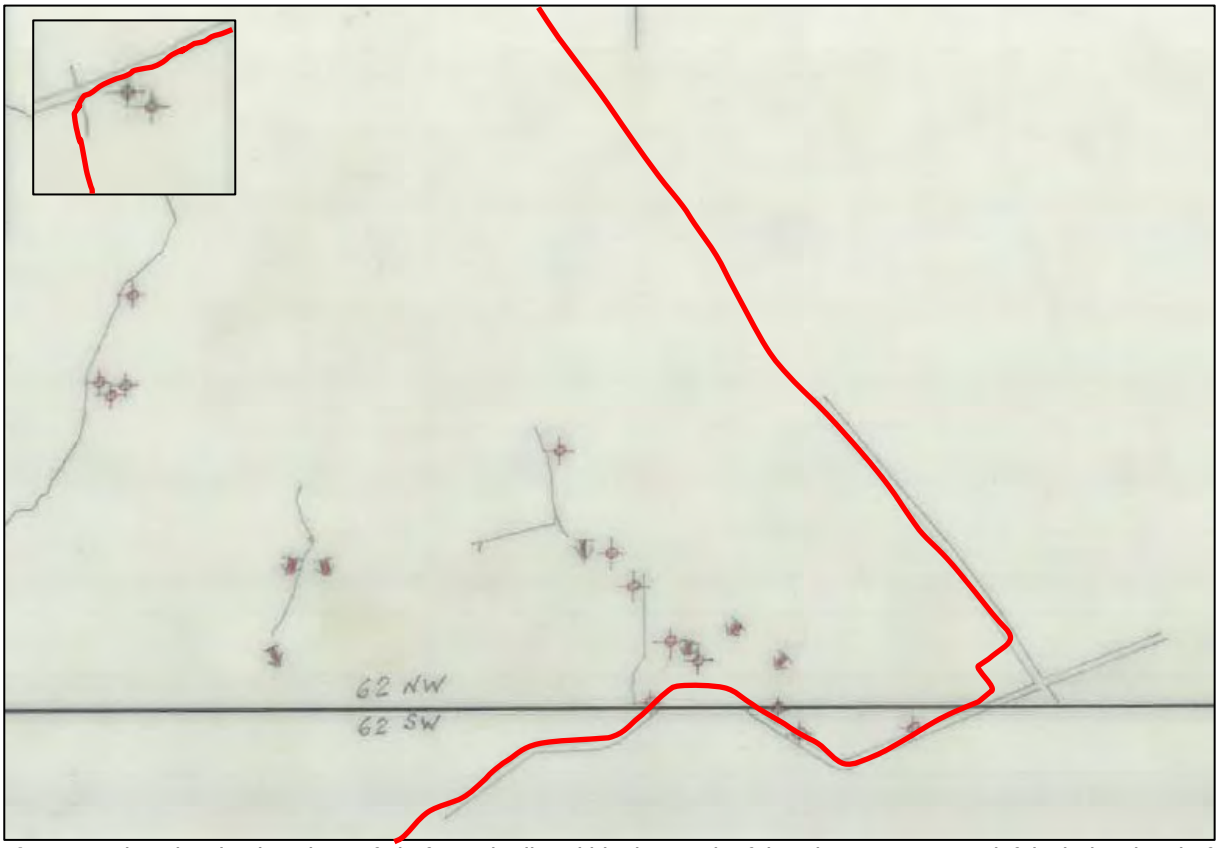


Plate 3: - *Plan showing locations of shafts and adits within the south of the Site. Insert at top left includes the shafts at northwestern extremity of the land within the Site to the south of 'Gilgarran Road'. Source: Coal Authority Mine Abandonment Plan NCB62NW. North arrow shown in top right corner. Red line boundary overlain.*

3.3. Natural Cavities and Non-Coal Mining

Non-Coal Mining Data

3.3.1. A search of the Stantec Mining Cavities Database indicated that the nearest mining cavity location lies approximately 4.52 km to the east. The database does not provide any information on the feature other than its position, which is understood to be close to Sosgill farm, near Mockerkin.

3.3.2. A search of the BGS Mine Plans Portal[7] and via the BGS the non-coal mining plans database[8] was undertaken by Stantec. This search revealed a series of

[7] BGS Non-coal mining plans, available at: GeoIndex - British Geological Survey (bgs.ac.uk), accessed 20 April 2023
[8] BGS Non-coal mining plans database, available at: Search | Mining plans | Opengeoscience scans and photos | Our data | British Geological Survey (BGS), accessed 20 April 2023

343 mine plans within the Site, however consultation with the BGS indicates these to be wrongly attributed. There are no further records within the vicinity of the Site.

3.3.3. The potential for non-coal mining related activities to affect the Proposed Development is considered to be negligible.

Natural Cavities

3.3.4. A search of the Stantec Natural Cavities Database indicated that there is one natural cavity recorded approximately 2.75km to the west of the Site in Distington. This feature is noted to pertain to a swallow hole type feature formed in a unit of Carboniferous Limestone.

3.3.5. The potential for naturally occurring cavities to affect the Proposed Development is considered to be negligible.

3.4. Quarries

3.4.1. A review of the historical maps has revealed that there are some small-scale surface quarrying operations which have been undertaken locally within the land to the south of 'Gilgarran Road', conjectured to pertain to the extraction of sandstone towards the southern boundary, where bedrock is close to the surface. Findings from the walkover and historical map review note a large quarry to the east of the Thief Gill near the southern boundary of the land within the Site to the south of the 'Gilgarran Road', and a small pit excavation in the land within the Site to the southwest of the 'Gilgarran Road'.

3.4.2. No further non-coal quarries are noted to be present on-Site.

4. Hazard Assessment

4.1. Mining Hazards

4.1.1. **Figure 5** illustrates the location and extent of the various mining related features and potential hazards. A summary of these features is provided in the following section.

4.2. Mine Entries

4.2.1. The CA Mine Abandonment Plans and CA Consultants Report reviewed by Stantec reveal twenty-seven recorded mine entries on the Site and five further neighbouring the study area close to the north western, western, and southern boundary line. These recorded mine entries are summarised in **Table 3**.

4.2.2. There are numerous off-Site mine entries surrounding the Site to the north, east and south, labelled as coal pits in historical maps, however these are conjectured to lie at sufficient distances from the Site that they are unlikely to pose a hazard within the Site and are omitted from below.

Table 3 Summary of Mine Entries

CA Shaft Reference	Approximate Easting	Approximate Northing	Remarks
303522-001	303957	522609	Adit style entry.
303523-004	303937	523392	Shaft style entry.
303523-005	303965	523372	Shaft style entry.
303524-004	303488	524781	Shaft style entry. Shaft noted to have been filled with colliery debris before 1957. May have been partially or wholly removed by opencasting.

CA Shaft Reference	Approximate Easting	Approximate Northing	Remarks
304522-001	304466	522973	Shaft style entry.
304522-002	304419	522974	Shaft style entry.
304522-003	304438	522952	Shaft style entry.
304522-004	304725	522679	Adit style entry.
304522-005	304777	522680	Adit style entry.
304522-006	304714	522532	Adit style entry.
304523-001	304414	523994	Adit style entry. May have been partially or wholly removed by opencasting.
304523-002	304247	523919	Shaft style entry. Shaft noted to have been filled to an unknown specification prior to 1957. May have been partially or wholly removed by opencasting.
304523-003	304314	523896	Shaft style entry. Shaft noted to have been filled to an unknown specification prior to 1957. May have been partially or wholly removed by opencasting.
304523-004	304476	523885	Shaft style entry. May have been partially or wholly removed by opencasting.
304523-005	304466	523823	Shaft style entry. May have been partially or wholly removed by opencasting.

CA Shaft Reference	Approximate Easting	Approximate Northing	Remarks
304523-006	304472	523112	Shaft style entry.
304524-001	304400	524429	Shaft style entry. May have been partially or wholly removed by opencasting.
305522-001	305152	522846	Shaft style entry.
305522-002	305197	522701	Adit style entry.
305522-003	305239	522686	Shaft style feature.
305522-004	305267	522635	Shaft style feature.
305522-005	305337	522543	Shaft style feature.
305522-006	305362	522540	Adit style entry.
305522-007	305432	522562	Adit style entry.
305522-008	305510	522516	Adit style entry.
305522-009	305295	522451	Shaft style entry.
305522-010	305488	522424	Shaft style entry.
305522-011	305536	522387	Shaft style entry. Filled to an unknown specification prior to 1957.
305522-012	305712	522394	Shaft style entry.

CA Shaft Reference	Approximate Easting	Approximate Northing	Remarks
305522-013	305248	522359	Shaft style entry.
305522-014	305206	522345	Shaft style entry.
305522-015	305605	522298	Shaft style entry.

4.2.3. The presence and surface expression of the above features was considered during the walkover. Shaft reference 305522-009 was readily identifiable at the surface as a topographic depression with ponded water present at the time of the walk over. Smaller topographic depressions were also noted in the location of shafts 305522-010 and 305522-011. Hummocky ground was noted in the vicinity of shafts referenced 304522-001 and the cluster of shafts referenced 304522-001, 304522-002, and 304522-003, which may pertain to settlement of these features, or even the stockpiling of materials during coaling operations. The areas of hummocky ground and surface disturbance observed as part of the walk over is illustrated on **Figure 2**.

4.2.4. Given the mining setting, known mine entries on-Site and the anticipated ground conditions, Stantec believe the possibility exists of unrecorded mine entries, day holes, and/or shallower bell pits to be present across the Site.

4.2.5. The precise location and status of the recorded shafts and adits are unconfirmed and the potential for ground movement to occur as a result of these features remains present. Furthermore, there remains potential for other, unrecorded, mine entry features to be present across the Site.

4.3. Shallow Mine Workings

4.3.1. Historical records indicate that coal workings extend beneath the Site, but recorded workings appear to be limited to deeper horizons. Stantec also

consider it likely that unrecorded workings are also present and that such workings could be within the near surface horizons.

4.3.2. In any area of shallow recorded or unrecorded stoop-and-room mining the maximum height of void migration is typically directly proportional to the thickness of seam mined and inversely proportional to the change in volume associated with any collapsed material. The height of collapse in pillared workings may be frequently proportional to the width of the excavation and the larger the span, the more likely collapse is to occur. The maximum height of void migration might extend to 10 times the height of the original room dimension. However, it is generally more likely to be 3 to 5 times the room height where more competent strata overlie the workings. The presence of surface water features and saturated overburden can accelerate / increase void migration, extending to 18 times the seam/strata thickness in exceptional cases.

4.3.3. In the land with the Site to the north of 'Gilgarran Road', where opencast has been undertaken, shallow mining will have been removed. However, in those parts of the Site that boarder the opencast, there will remain potential for shallow workings to be present.

4.3.4. In the land within the Site to the south of 'Gilgarran Road', evidence of mine workings at shallow levels is present in the form of mine shafts/adits. No mine plans are available pertaining to coal mining in this area, however it is possible that unrecorded mine workings extend from these features. From BGS and CA information, it is assumed that workings may be present at the level of the Tenquarters, Rattler, Bannock Top Level, Bannock Bottom Level, Yard, Lower Yard, Half Yard, Little Main, Lickbank, Sixquarters, Upper Threequarters, and Lower Threequarters Coal seams, which are noted to outcrop within the land to the south of 'Gilgarran Road'. Figure 5 illustrates the areas where these seams are mapped at outcrop / subcrop together with an estimate of the extent of where seams might be present within the 10 x seam thickness horizon.

4.3.5. Whilst there is no direct evidence of recorded workings being present in these areas, the potential for ground subsidence / collapse to occur in these areas as a result of unrecorded workings will require consideration as part of future masterplanning / development at the Site.

4.4. Opencast Infill and Made Ground

4.4.1. Most of the land within the Site to the north of 'Gilgarran Road' has been subject to previous opencast mining and subsequent backfill. In addition, in the adjoining surrounding area BGS mapping shows Made Ground to be present (of unknown thickness and composition). In these areas there is potential for ground settlement to occur as a result of ongoing consolidation of historical backfill / Made Ground, and as a result of any new structure loads induced by new development. In the context of the proposed solar arrays and infrastructure, such settlements are unlikely to be a significant hazards. However, in the context of any proposed buildings, settlement will require consideration as part of design to ensure appropriate foundation solutions are defined. In particular, the potential for differential settlement to occur at the location of the buried opencast pit highwall may require specific consideration.

4.5. Mine Water Rebound and/or Breakout

4.5.1. Flooding of the shallow abandoned mine workings underlying the Site is considered feasible, given possible shallow groundwater and the likely cessation of any mine dewatering program. It is likely that there is connectivity between the known mine entries and the abandoned mines underlying the Site, thus creating a preferential pathway for possible groundwater/mine water breakouts.

4.5.2. The probability of occurrence and hazards associated with mine water rebound and/or breakout impacting the Proposed Development is limited considering the geomorphology of the Site, the current groundwater regime and the nature of the Proposed Development.

4.6. Mine Gas

4.6.1. As an intrinsic hazard associated with former subsurface mineworkings, the generation and migration of mine gas should be assessed as part of a proposed new development. CL:AIRE document "*Good Practice for Risk Assessment for Coal Mine Gas Emissions"* released in 2021 provides guidance on the assessment of coal mine gas risk at development sites. This document highlights that mine gas generation and migration is site-specific and requires attention into the development of a Conceptual Model with site-specific parameters, able to test any source-pathway-receptor linkages.

4.6.2. Consequently, Stantec have taken cognisance of the desktop research undertaken at the Site and the likely ground conditions, and presented possible sources, pathways, and receptors which could be foreseeable at the Proposed Development and the likelihood of any linkages that could arise.

Sources

4.6.3. The probability and hazard of methane generation within the underlying seams is considered to be limited, given that coal mining is noted by the Coal Authority to have ceased by 1922. This would indicate that the walls of the mineworking have had significant time to desorb the associated methane gas and that any further desorption is anticipated to be minor. Although it is possible that unrecorded mineworkings are present at the Site, it is assumed that these are unrecorded as their working predates the requirement to keep mining records and it is therefore anticipated that any unrecorded mineworkings would also have had a significant amount of time to desorb any near-surface methane.

4.6.4. With regards to carbon dioxide gas generation, it is noted that there is a potential for carbon dioxide generation given the assumed interconnectedness of the various coal seams, their proximity to the surface, and a number of mine entries recorded within proximity to the Site which could provide a constant recharge of the oxygen required to oxidise the carbon within the seam walls. This recharge of oxygen gas could theoretically sustain the generation of carbon dioxide in the seams for a long period of time.

4.6.5. Information pertaining to the existing groundwater table at the Site is limited. Consequently, as a conservative approach to the consideration of mine gases, it is assumed that shallow mineworkings and mine entries are not entirely flooded and this cannot at present be suggested to form a barrier to mine gas migration or generation.

4.6.6. The Coal Authority note that all coal seams within the Cumberland Coal Field have the potential for spontaneous combustion where “roof coal” is left by incomplete removal of the coal. The condition of worked seams at the Site is unconfirmed, but it is considered reasonable to assume that significant quantities of residual roof coal is unlikely given the limited thickness of the target coal seams themselves.

Receptors

4.6.7. The development proposals for the Site have identified human health as the main on-Site receptor. The risk to human health from mine gas is only expected to become an issue when indoors and the internal landuses associated with the proposed solar farm are limited to only the sub-station / battery storage buildings. In the event that underground utilities / chambers are also proposed then such features may be a significant receptor, given that there is a potential for such chambers to accumulate potentially explosive or asphyxiant gases.

Pathways and Barriers

4.6.8. Taking cognisance of the above sources and receptors, the development of a reasonably foreseeable pathway between the two needs to be in place for there to be an associated risk. The major pathways for mine gas transport would be considered to be the open, interconnected mineworkings and the associated mine entries. It is therefore considered that any mine gas generation would have a preferential pathway up seam and through these entry shafts or mining induced fissures, faults or ground collapse to the surface. Similarly, any coal outcrops could present an escape pathway. Any gas release at the surface would therefore be considered to be concentrated around these features.

4.6.9. The presence of the backfilled opencast coal pit in the land within the Site to the north of the 'Gilgarran Road' is potentially facilitative to mine gas migration to the surface also.

4.6.10. The potential for migration of mine gas to the surface through the glacial till superficial strata, where present, is reduced given that these comprise weakly permeable strata which would be largely restrictive to gas migration. However, mine induced fissures, ground collapse and mine entries are anticipated to cross cut these deposits and may still present a pathway despite their low permeability.

4.6.11. Shallow seams at the Site may be exposed to surface air flow through break lines and fissures in the shallow superficial and solid strata, or through weathering processes at rockhead. It is considered however that generation of methane in this way would have been ongoing for a long time and consequently any desorption of methane will be negligible.

Summary

4.6.12. Whilst the Site may have potential to generate mine gases, and for such gases to be transmitted along possible pathways, the potential for significant ground gas volumes / concentrations to be generated is considered to be limited. Furthermore, where solar arrays and associated infrastructure are proposed there are no enclosed spaces and therefore no potential for gas accumulation to occur. Where any buildings and / or buried chambers are proposed, then assessment of gas risk will be necessary as part of the design process.

5. Mitigation of Mining Hazards

5.1.1. Whilst mining related hazards are present at the Site, the Proposed Development is of a relatively low sensitivity and mitigation measures necessary to facilitate the development can be considered accordingly. Further description of the approaches considered applicable is provided in the following section.

5.1.2. The following mitigation options may be considered.

5.1.3. **The 'Do nothing' or reactionary approach:** Planning guidance identifies solar arrays as a landuse that does not specifically require assessment of coal mining risks given the relatively low sensitivity of the landuse. However, assessment is identified as a requirement for the associated access roads and any buildings given the more sensitive use / value of these features. Furthermore, given the nature of the Site with numerous mine entries recorded on the Site and the potential for unrecorded entries and shallow works considered to be high, consideration of stability hazards and definition of development constraints and / or mitigation is considered appropriate for the proposal in general.

5.1.4. **Avoidance of hazards:** Where possible the development masterplanning should seek avoid areas of highest hazard. With regards to recorded mine entry features, solar arrays, roads and buildings should avoid these locations. With regards to areas where shallow mining hazard has been identified development should, ideally, seek to avoid these areas where possible – where this is not possible then then further investigation / assessment of hazard will be necessary.

5.1.5. **Mine entries**: Any mine entries (shaft and adits) recorded or suspected to exist within at least 20m of the development infrastructure footprint, will require investigation. Features should be located by a combination of geophysical surveys, strip trenching and probing, with the associated hazards, risks of collapse and subsidence potential, assessed. Where required, shafts /

adits should be treated to provide long term stability appropriate to support the land use propose. It is likely that treatment would comprise a combination of reinforced concrete capping and grouting.

5.1.6. **Shallow mine workings**: Development in areas where potential for shallow mine related hazards has been identified will required ground investigation to confirm the conditions present. A combination of geophysical and intrusive investigation will be required to confirm presence / absence of mine workings. In the event that shallow mine workings are encountered beneath Proposed Development then stabilisation measures may be necessary to support the proposed construction / operation of the development. If necessary, such measures would be designed to backfill any voids and consolidate any disturbed ground using grouts / slurries.

5.1.7. **Former Opencast Area**: Where development is proposed in the area of the former opencast mine in the land within the Site to the north of 'Gilgarran Road', there will remain potential for ground settlement to occur, and in particular for differential settlement to occur around the buried quarry highwall. In the context of a proposed solar farm, it is considered unlikely that such conditions would present a constraint to the development. However, if buildings or infrastructure is proposed that is sensitive to ground settlement / differential settlement then investigation of these areas will be necessary to confirm ground conditions and to inform appropriate ground improvement / design.

5.1.8. **Construction**: Given the Site lies within a former mining setting, it is considered likely that unrecorded mine entries and / or unrecorded mine workings will be present on the Site. Caution should be maintained throughout the construction work for any signs of such features such that appropriate measures can be put in place in the event that stability risks are identified.

6. Essential Guidance for Report Readers

6.1.1. This report has been prepared within an agreed timeframe and to an agreed budget that will necessarily apply some constraints on its content and usage. The remarks below are presented to assist the reader in understanding the context of this report and any general limitations or constraints. If there are any specific limitations and constraints, they are described in the report text.

6.1.2. The opinions and recommendations expressed in this report are based on statute, guidance, and best practice current at the time of its publication. Stantec UK Limited does not accept any liability whatsoever for the consequences of any future legislative changes or the release of subsequent guidance documentation, etc. Such changes may render some of the opinions and advice in this report inappropriate or incorrect and the report should be returned to us and reassessed if required for re-use after one year from date of publication. Following delivery of the report, Stantec has no obligation to advise the Client or any other party of such changes or their repercussions.

6.1.3. Some of the conclusions in this report may be based on third party data. No guarantee can be given for the accuracy or completeness of any of the third-party data used. Historical maps and aerial photographs provide a “snap-shot” in time about conditions or activities at the Site and cannot be relied upon as indicators of any events or activities that may have taken place at other times.

6.1.4. The conclusions and recommendations made in this report and the opinions expressed are based on the information reviewed and/or the ground conditions encountered in exploratory holes and the results of any field or laboratory testing undertaken. There may be ground conditions at the Site that have not been disclosed by the information reviewed or by the investigative work undertaken. Such undisclosed conditions cannot be considered in any analysis and reporting.

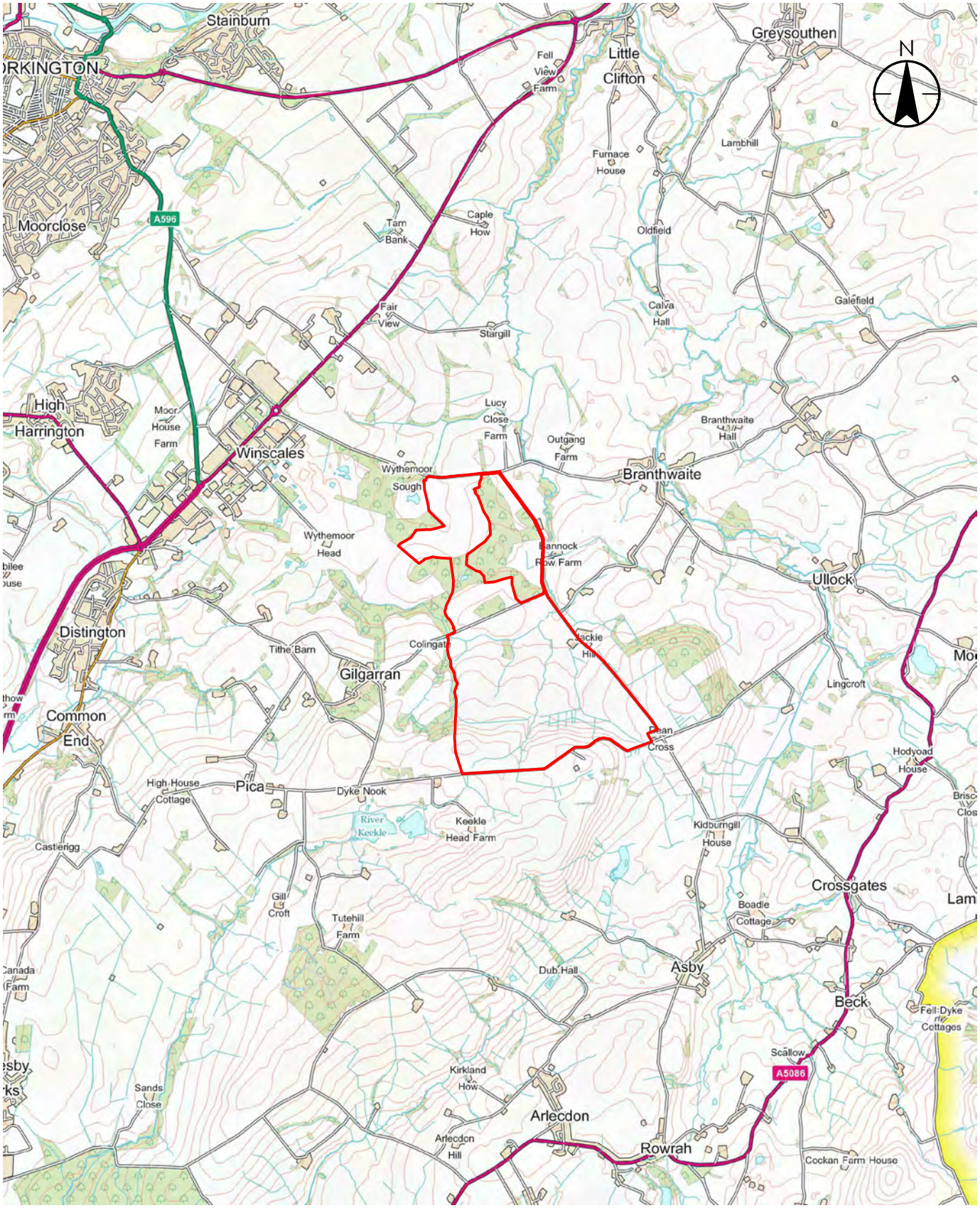
6.1.5. It should be noted that this report is a land condition assessment and does not purport to be an ecological, flood risk or archaeological survey and additional specific surveys may be required.

6.1.6. This report has been written for the sole use of the Client stated at the front of the report in relation to a specific development or scheme. The conclusions and recommendations presented herein are only relevant to the scheme or the phase of project under consideration. This report shall not be relied upon or transferred to any other party without the expressed written authorisation of Stantec. Any such party relies upon the report at its own risk.

6.1.7. The interpretation carried out in this report is based on scientific and engineering appraisal carried out by suitably experienced and qualified technical consultants based on the scope of our engagement. We have not considered the perceptions of, for example, banks, insurers, other funders, lay people, etc., unless the report has been prepared specifically for that purpose. Advice from other specialists may be required such as the legal, planning and architecture professions, whether specifically recommended in our report or not.

6.1.8. Public or legal consultations or enquiries, or consultation with any Regulatory Bodies (such as the Environment Agency, Natural England or Local Authority) have taken place only as part of this work where specifically stated.

FIGURES



Approximate Site Boundary

Grid Reference: NY 04486 23476

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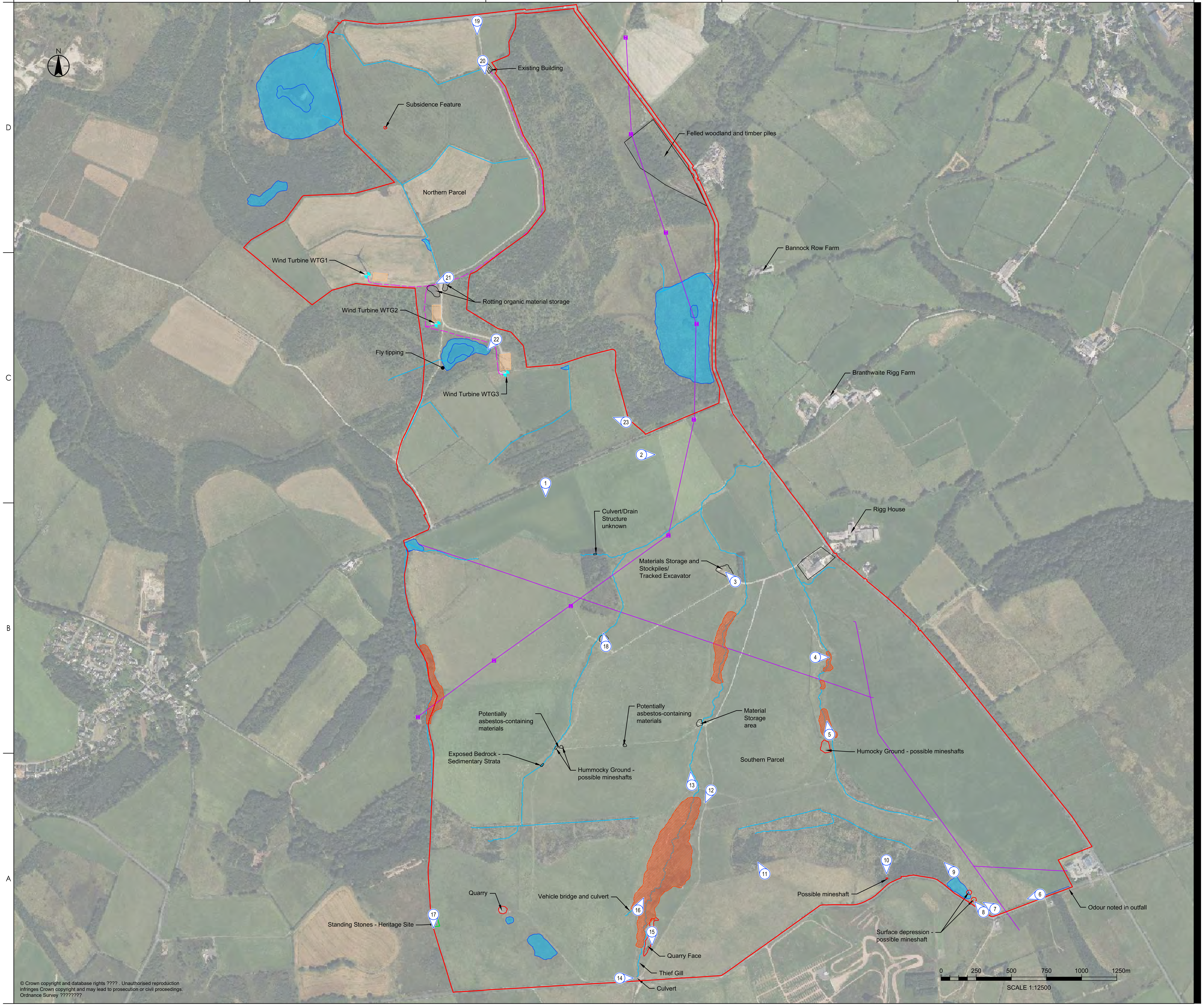
READING
Caversham Bridge House, Waterman Place, Reading,
Berkshire RG1 8DN
Tel: +44 1189 500 761
www.stantec.com/uk

Client/Project:
FVS Dean Moor Ltd.

Dean Moor Solar Farm

Title
Site Location Plan

Prepared:	Checked:	Date:	Revision:	Figure
davco	AM	2023.05.11	0	1



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Notes

UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

Key

- Approximate Site Boundary
- Drainage Ditch
- Pond/Surface Water
- Overhead Power Cable
- Pylons
- Assumed Underground Power Cables
- Wind Turbine
- Steep Banking and visual evidence of Slope Failure
- Platformed/Filled land - gravel set-down area
- Photo location

davco	-	AM	2023.06.13
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Issue Status

Report Figure

This document is suitable only for the purpose noted above.
Use of this document for any other purpose is not permitted.

Client/Project Logo

Client/Project

FVS Dean Moor Ltd.

Dean Moor Solar Farm

Title

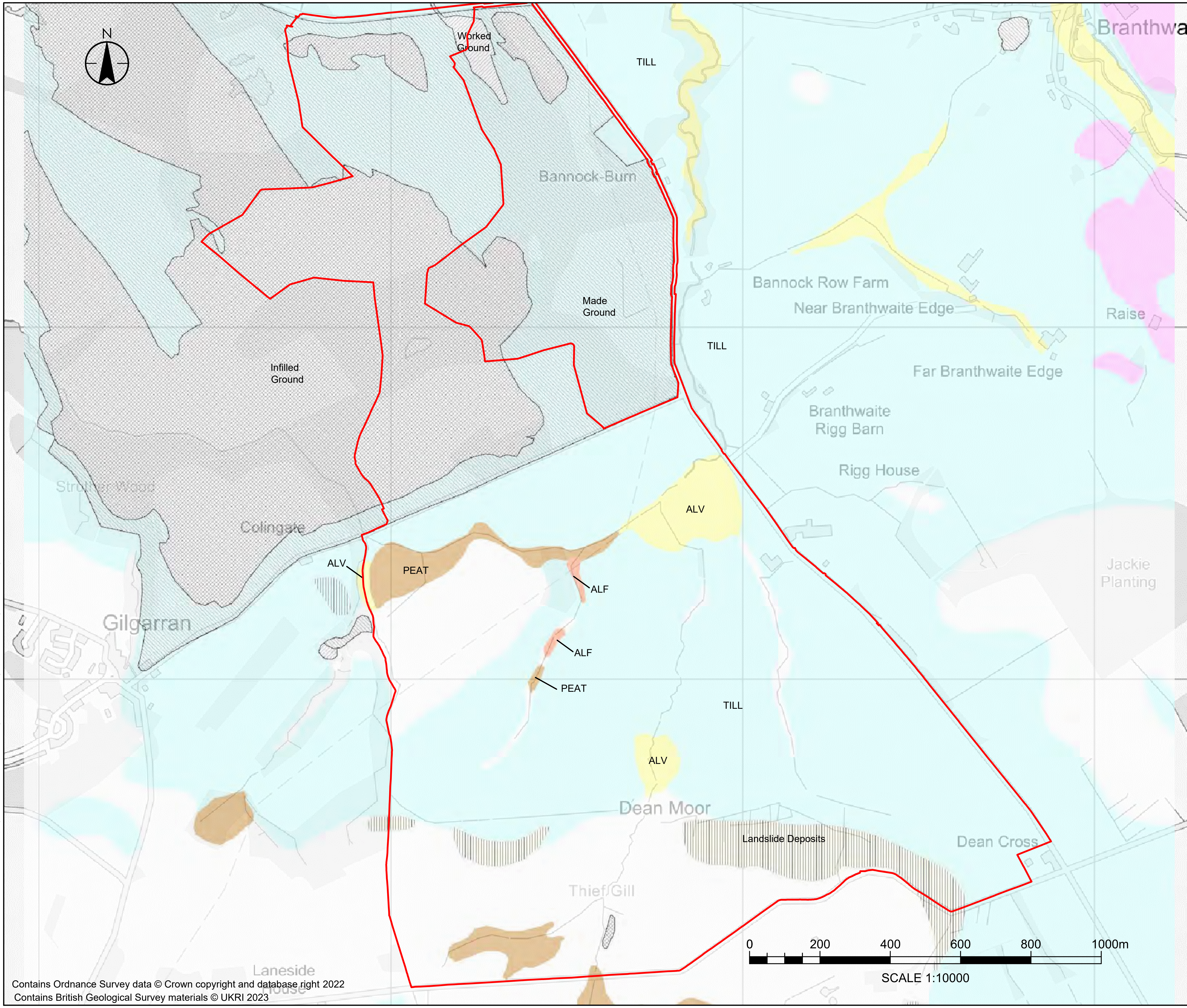
Site Layout Plan and Site Renaissance Observations

Project No. 332511471

Scale 1: 5000

Revision 0

Figure No. 2



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Key

- Approximate Site Boundary
- Made Ground
- Infilled Ground
- Worked Ground
- Landslide Deposits
- ALV Alluvium
- TILL Till
- PEAT Peat
- ALF Alluvial Fan Deposits

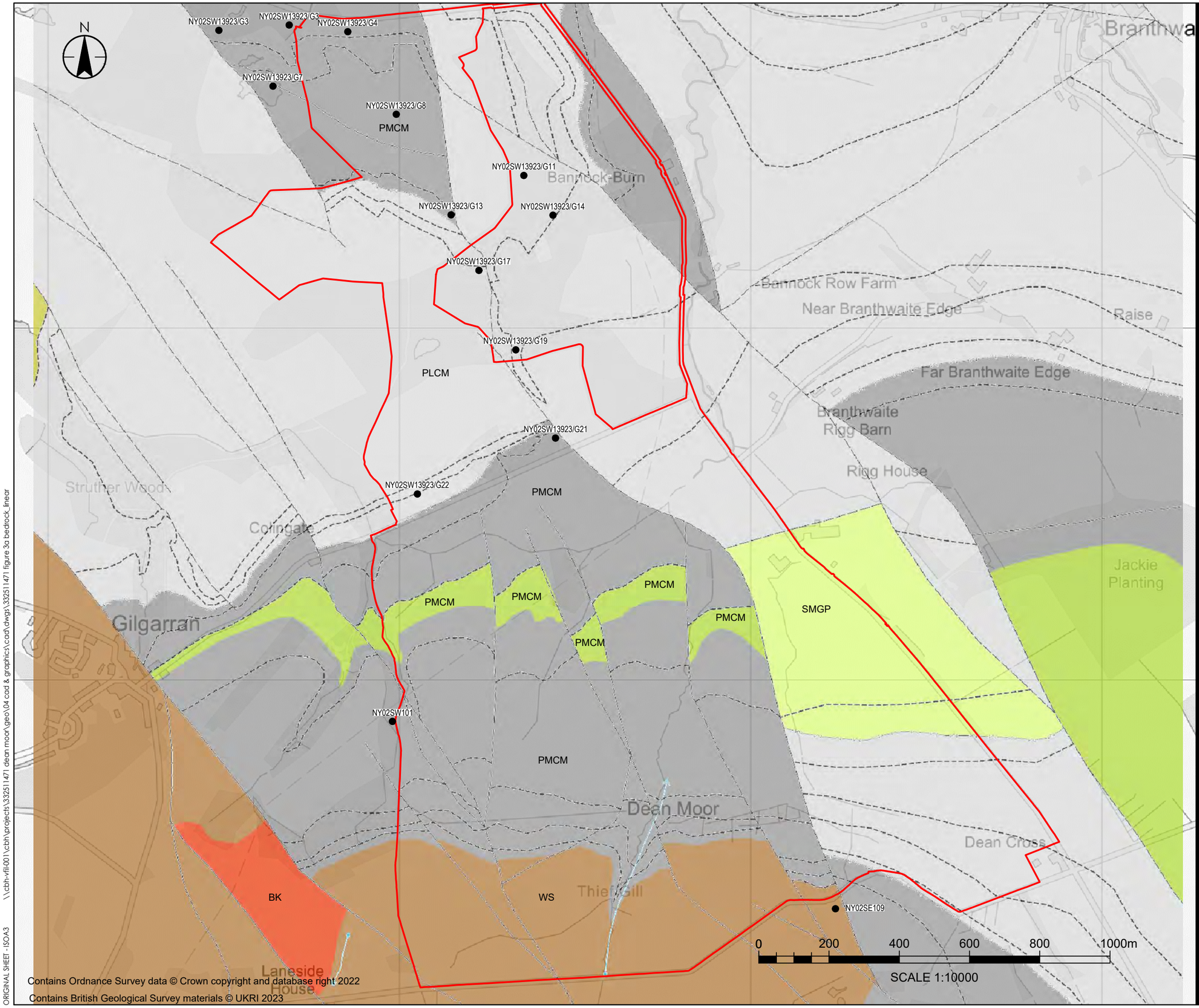
Client/Project:
FVS Dean Moor Ltd.

Dean Moor Solar Farm

Prepared:	Checked:	Date:
davco	AM	2023.05.23

Title
Superficial Geology

Revision:	Figure
0	3



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Berkshire RG1 8DN
Tel: +44 1189 500 761
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Key

- Approximate Site Boundary
- WS — Whitehaven Sandstone Formation
- PMCM — Pennine Middle Coal Measures Formation - Mudstone Siltstone and Sandstone
- PMCM — Pennine Middle Coal Measures Formation - Sandstone
- SMGP — Stainmore Formation
- PLCM — Pennine Lower Coal Measures Formation
- BK — Brockram - Breccia
- Coal Seam (inferred)
- Fault
- Glacial Meltwater Channel
- Fossil Horizon (marine band)
- BGS Borehole Location

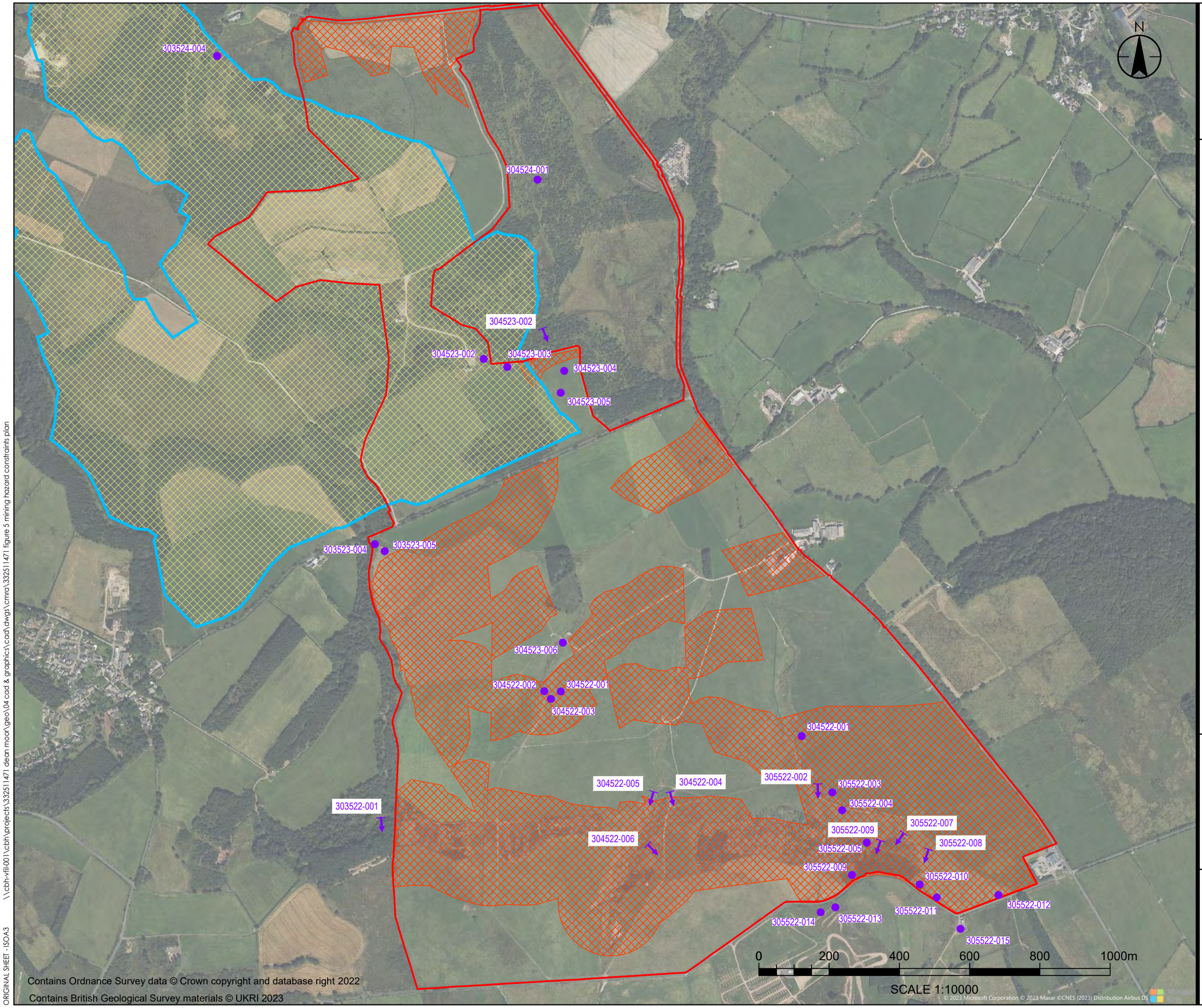
Client/Project:
FVS Dean Moor Ltd.

Dean Moor Solar Farm

Prepared:	Checked:	Date:
davco	AM	2023.06.02

Title
Bedrock Geology

Revision:	Figure
0	4



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Berkshire RG1 8DN
Tel: +44 1189 500 761
www.stantec.com/uk

Key

- Approximate Site Boundary
- Area where coal seams are mapped close to ground level and potential for unrecorded shallow coal mining presents a possible stability hazard
- Location of recorded mineshafts
- Location of recorded mine adit
- Worked Ground associated with former opencast mine and associated backfill
- Anticipated location of buried opencast boundary / high wall

Client/Project:
FVS Dean Moor Ltd.

Dean Moor Solar Farm

Prepared:	Checked:	Date:
davco	AW	2023.06.02

Title
Mining Hazard Plan

Revision:	Figure
0	5

Plotted: 27.06.2023 2023.06.27 9:59:05 AM By: Cotton, David
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APPENDIX A Mine Abandonment Plans

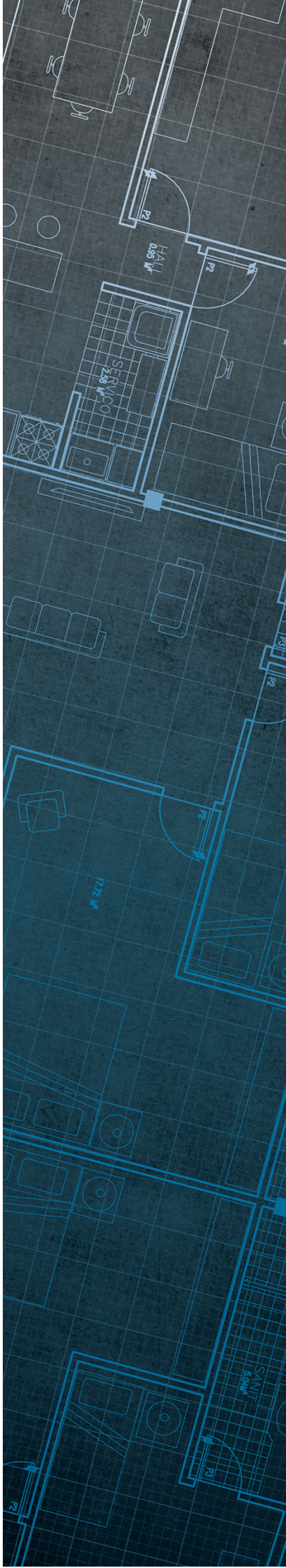
The Coal Authority

Consultants

Coal Mining Report

Gilgarran
Gilgarran
Cumbria
CA14 4RF

Date of enquiry:	**11 April 2023**
Date enquiry received:	**11 April 2023**
Issue date:	**11 April 2023**
Our reference:	**51003348836001**
Your reference:	**332511471**



Consultants

Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

Stantec

Enquiry address

Gilgarran
Gilgarran
Cumbria
CA14 4RF

Approximate position of property

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

@coalauthority
/company/the-coal-authority
/thecoalauthority
/thecoalauthority

Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	UNNAMED 6	Coal	0001	17	Beneath Property	4.8	North-East	56	1921
unnamed	UNNAMED 6	Coal	0058	17	Beneath Property	4.8	North-East	56	1921
unamed6	TWO FOOT	Coal	0002	22	Beneath Property	4.8	North-East	60	1922
unamed6	TWO FOOT	Coal	0003	29	Beneath Property	4.8	North-East	60	1922
unamed6	TWO FOOT	Coal	0059	34	Beneath Property	4.8	North-East	60	1922
unnamed7	UPPER TEN QUARTERS	Coal	A04F	37	Beneath Property			120	1900
unnamed	YARD	Coal	005E	63	Beneath Property	7.9	South-West	91	1908
UNAMED	YARD	Coal	005F	71	South	7.9	South-West	91	1908
unnamed	UNNAMED 8	Coal	0005	100	Beneath Property	4.8	North-East	117	1918

Probable unrecorded shallow workings

Yes.

Spine roadways at shallow depth

Distance to spine roadway (m)	Direction to spine roadway
Within	N/A

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Adit	303522-001	303957 522609		Coal	
Shaft	303523-004	303937 523392		Coal	
Shaft	303523-005	303965 523372		Coal	
Shaft	303524-004	303488 524781	Shaft filled with colliery debris prior to 1957. This shaft is located in an area that has been worked by opencast mining operations. There are no details of any further treatment but it is likely that the shaft has been partially or totally removed.	Coal	
Shaft	304522-001	304466 522973		Coal	
Shaft	304522-002	304419 522974		Coal	
Shaft	304522-003	304438 522952		Coal	
Adit	304522-004	304725 522679		Coal	
Adit	304522-005	304777 522680		Coal	
Adit	304522-006	304714 522532		Coal	
Adit	304523-001	304414 523994	This adit is located in an area that has been worked by opencast mining operations. There are no details of any treatment but it is likely that the adit has been partially or totally removed.	Coal	
Shaft	304523-002	304247 523919	The shaft was filled to an unknown specification prior to 1957. This shaft is located in an area that has been worked by opencast mining operations. There are no details of any treatment but it is likely that the shaft has been partially or totally removed.	Coal	
Shaft	304523-003	304314 523896	The shaft was filled to an unknown specification prior to 1957. This shaft is located in an area that has been worked by opencast mining operations. There are no details of any treatment but it is likely that the shaft has been partially or totally removed.	Coal	
Shaft	304523-004	304476 523885	This shaft is located in an area that has been worked by opencast mining operations. There are no details of any treatment but it is likely that the shaft has been partially or totally removed.	Coal	
Shaft	304523-005	304466 523823	This shaft is located in an area that has been worked by opencast mining operations. There are no details of any treatment but it is likely that the shaft has been partially or totally removed.	Coal	

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	304523-006	304472 523112		Coal	
Shaft	304524-001	304400 524429	This shaft is in an area worked by opencast mining and may have been fully/partially removed by this method	Coal	
Shaft	305522-001	305152 522846		Coal	
Adit	305522-002	305197 522701		Coal	
Shaft	305522-003	305239 522686		Coal	
Shaft	305522-004	305267 522635		Coal	
Shaft	305522-005	305337 522543		Coal	
Adit	305522-006	305362 522540		Coal	
Adit	305522-007	305432 522562		Coal	
Adit	305522-008	305510 522516		Coal	
Shaft	305522-009	305295 522451		Coal	
Shaft	305522-010	305488 522424		Coal	
Shaft	305522-011	305536 522387	Shaft filled to an unknown specification prior to 1957.	Coal	
Shaft	305522-012	305712 522394		Coal	
Shaft	305522-013	305248 522359		Coal	
Shaft	305522-014	305206 522345		Coal	
Shaft	305522-015	305604 522298	Shaft filled to an unknown specification prior to 1957.	Coal	

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

16661	17391	NW1326
OM0	NC289	17367
0	10765	4070

Our records show we have more plans than those shown above which could affect the enquiry boundary.

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
UNNAMED 1	Coal	Yes	Within	N/A	161
UNNAMED 1	Coal	Yes	Within	N/A	169
UNNAMED 2	Coal	Yes	Within	N/A	99
UNNAMED 3	Coal	Yes	Within	N/A	84
UNNAMED 3	Coal	Yes	Within	N/A	90
UNNAMED 4	Coal	Yes	Within	N/A	154
UNNAMED25	Coal	Yes	Within	N/A	291
UPPER TEN QUARTERS	Coal	Yes	Within	N/A	79
UPPER TEN QUARTERS	Coal	Yes	Within	N/A	284
UPPER TEN QUARTERS	Coal	Yes	Within	N/A	327
YARD	Coal	Yes	Within	N/A	146

Geological faults, fissures and breaklines

Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Faults under or close to the property recorded.

Opencast mines

Please refer to the “Summary of findings” map (on separate sheet) for details of any opencast areas within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations
None recorded within 50 metres of the enquiry boundary.

Remediated sites
None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence
The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas
None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes
None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining
None recorded.

Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

Court orders
None recorded.

Section 46 notices
No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices
The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Future development

If development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply specialist engineering practice required for former mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or coal mines without first obtaining the permission of the Coal Authority.

MINE GAS: Please note, if there are no recorded instances of mine gas within 500m of the enquiry boundary, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded. Developers should be aware that the investigation of coal seams, mine workings or mine entries may have the potential to generate and/or displace underground gases. Associated risks both to the development site and any neighbouring land or properties should be fully considered when undertaking any ground works. The need for effective measures to prevent gases migrating onto any land or into any properties, either during investigation or remediation work, or after development must also be assessed and properly addressed. In these instances, the Coal Authority recommends that a more detailed Gas Risk Assessment is undertaken by a competent assessor.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk.**

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines
Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips
Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations
Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites
Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence
Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas
Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission. Please note, if there are no recorded instances of mine gas reported, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded.

Mine water treatment schemes
Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining
Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing
Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders
Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices
Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices
Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

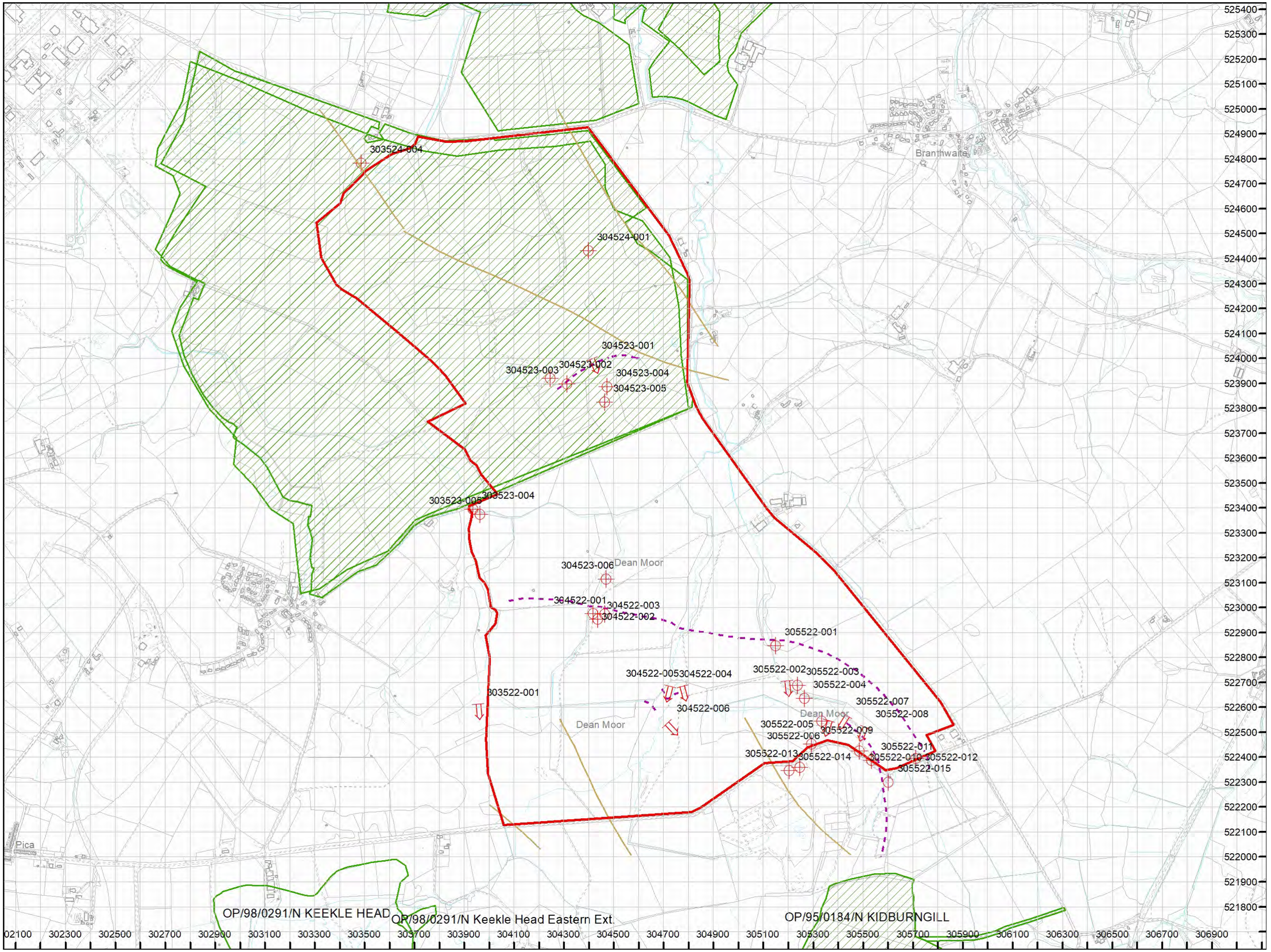
The Coal Authority

Summary of findings

The map highlights any specific surface or subsurface features within or near to the boundary of the site.

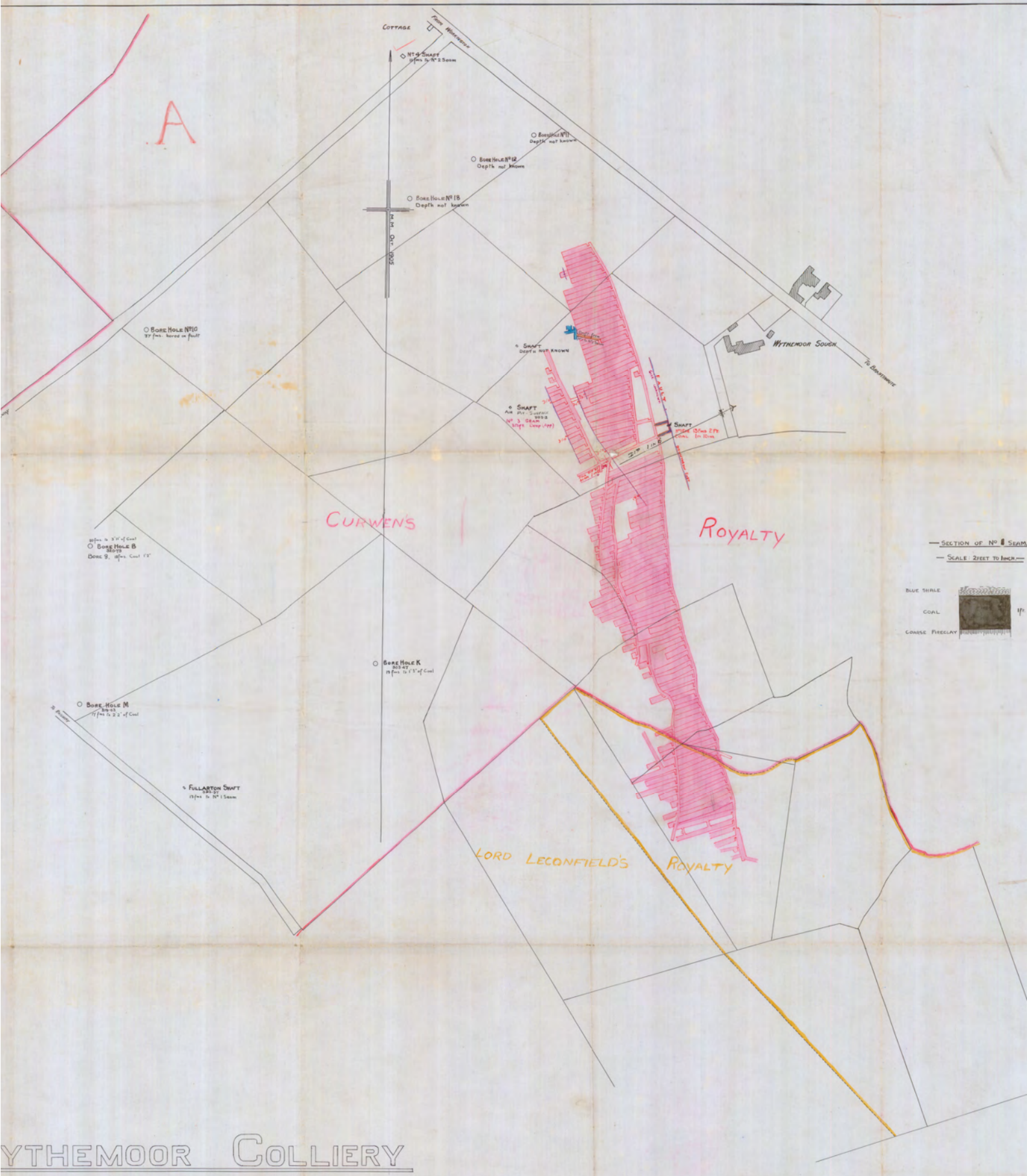
Key

- Approximate position of the enquiry boundary shown
- Disused mine shaft
- Disused adit
- Outcrop (Conjectured)
- Geological faults
- Opencast mine licence area
- Unlicensed opencast site



How to contact us
0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com

APPENDIX B Consultants Coal Mining Report



YTHEMOOR COLLIERY

WORKINGTON

No. 1 SEAM PLAN 7837

SCALE :- 2 CHAINS = 1 INCH.

THIS PLAN IS A TRUE
WORKING PLAN OF THE
UP TO 29TH SEPTEMBER
THOROUGH EXAMINATION
THE BEST OF MY KNOWL
ACCURATE PLAN OF T

7837/1

-WYTHEMOOR COLLIERY-

-WORKINGTON-

-1904-

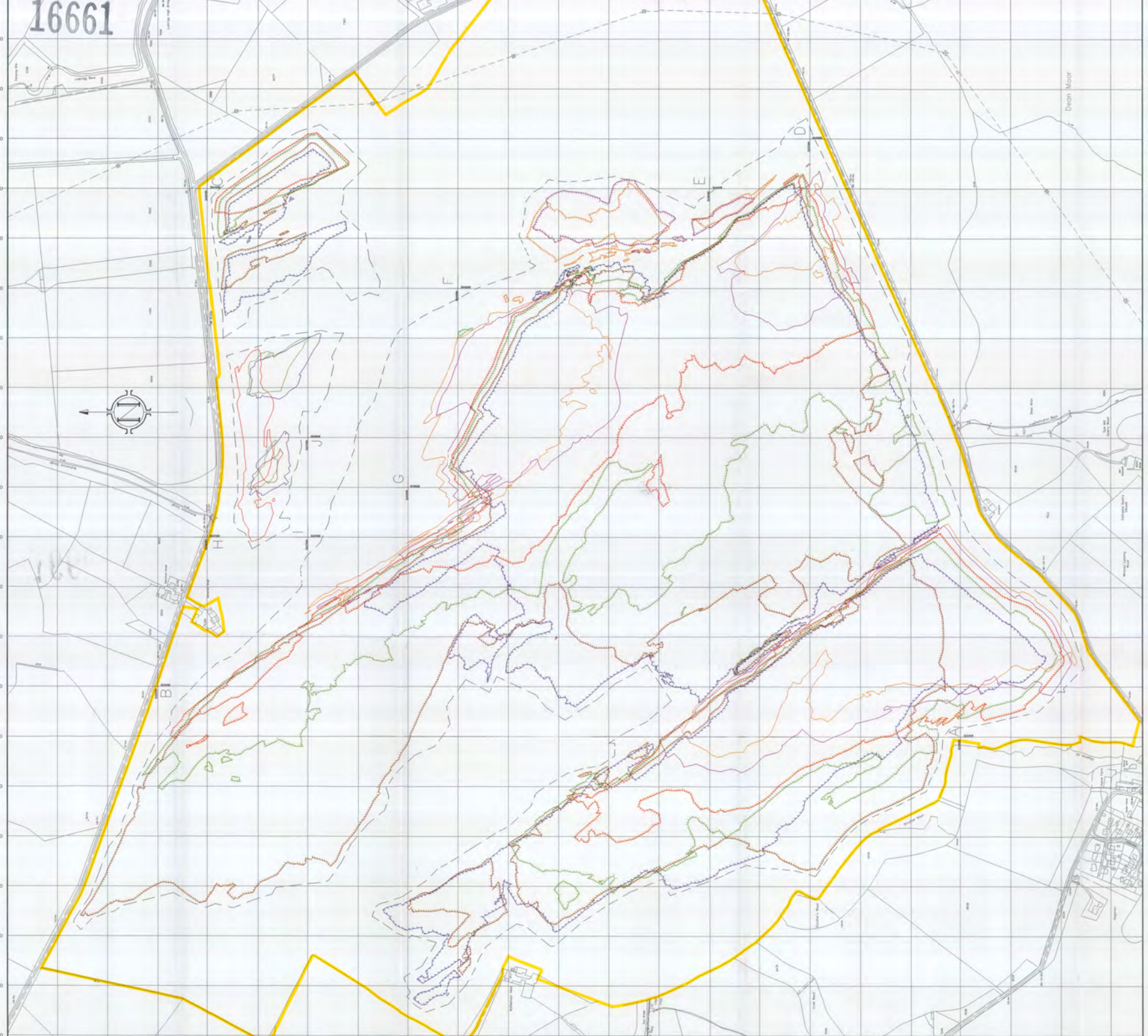
7837

Nº 2 SEAM PLAN.

SCALE :- 2 CHAINS = 1 INCH

THIS PLAN, IS A TRUE C
WORKING PLAN OF TH
CONFLETED UP TO
AND I CERTIFY, AFTER
AND INQUIRY, THAT TO
KNOWLEDGE AND BELIEF
PLAN OF THE MINE.

7837



Legend

- SITE BOUNDARY (Centre of symbol to be taken as boundary of site)
- PERIMETER OF BATTER
- POSITION OF KNOWN OR SUSPECTED SHAFT
- OLD WORKINGS (Seam Colour)

AREA OF SEAM WORKED (with seam code) IN GEOLOGICAL DESCENDING ORDER

- TENQUARTERS
- RATTLER
- BANNOCK-TL
- BANNOCK-BL
- YARD
- LOWER-YARD
- HALF-YARD
- LITTLE-MAIN
- LICKBANK
- SIXQUARTERS
- UPPER-THREEQUARTERS
- LOWER-THREEQUARTERS

NOTES

Shafts (S1 etc.) Refer to Shaft Register

Site Bench Mark	E	N	L
WYTHEMOOR SOUGH	303740	524893	84.741M

LAND TYPE AND USAGE

BEFORE OPERATIONS **LOW-QUALITY AGRICULTURE + WOODLAND**

AFTER RESTORATION **AGRICULTURE,AMENITY + WOODLAND**

DETAILS OF OVERBURDEN **GLACIAL-DRIFT,MUDSTONE + SANDSTONE**

DETAILS OF BACKFILL **UNCOMPACTED**

NATURE OF COAL **BITUMINOUS**

OPERATIONAL DATES

AUTHORISED **9th OCTOBER 1985**

COALING COMMENCED **1st JULY 1986**

COALING COMPLETED **14th JULY 1990**

PLANS ISSUED

BRITISH COAL OPENCAST

16661

BRITISH COAL OPENCAST
Headquarters, 200 Lichfield Lane,
Mansfield, Notts. NG18 4RG

SITE NAME

POTATOPOT

TITLE

COMPLETION-PLAN

COUNTY	DISTRICT	CIVIL PARISHES
CUMBRIA	ALLERDALE COPELAND	DEAN WINDSCALES & DISTINGTON

LOCATION
6 Kilometers South East of Workington

O.S. SHEETS USED Prefix NY

NY	0225	0325	0425
NY	0224	0324	0424
NY	0223	0323	0423

Based upon Ordnance Survey maps with the sanction of the controller of H.M. Stationary Office. Crown Copyright Reserved. Licence No. NA 27082

Drawn by D.MCSSENGER Date JUN1994

Checked by S.EDWARDS Date 14/07/94

BRITISH COAL OPENCAST
Headquarters, 200 Lichfield Lane,
Mansfield, Notts. NG18 4RG

SITE NAME

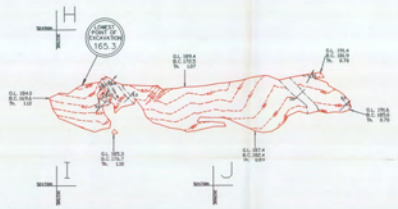
POTATOPOT

TITLE

COMPLETION PLAN

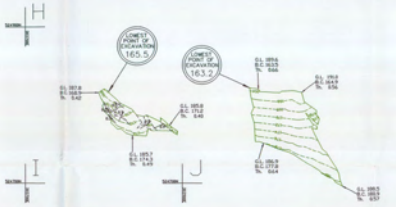
SITE REFERENCE NUMBER	OPERATIONAL CONTRACT NUMBER
032060	OE/CON/6090
Drawn by: D.Messenger Date: 14-04-94	Checked by: S. Edwards Date: MAY 1994
Scale: 1:2500	Sheet: 2 of 7
Drawing No.: CP2720b	

16661



TENQUARTERS

THIS SEAM SHOWN ON COMPOSITE PLAN (SHEET No. 1) THUS

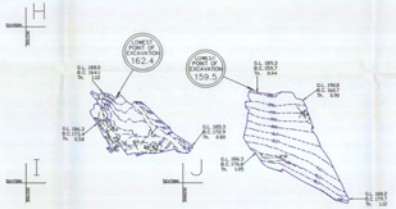


RATTLER

THIS SEAM SHOWN ON COMPOSITE PLAN (SHEET No. 1) THUS

BANNOCK TL

THIS SEAM SHOWN ON COMPOSITE PLAN (SHEET No. 1) THUS



BANNOCK BL

THIS SEAM SHOWN ON COMPOSITE PLAN (SHEET No. 1) THUS

16661

BRITISH COAL OPENCAST
Headquarters, 200 Lichfield Lane,
Mansfield, Notts. NG18 4RG

SITE NAME

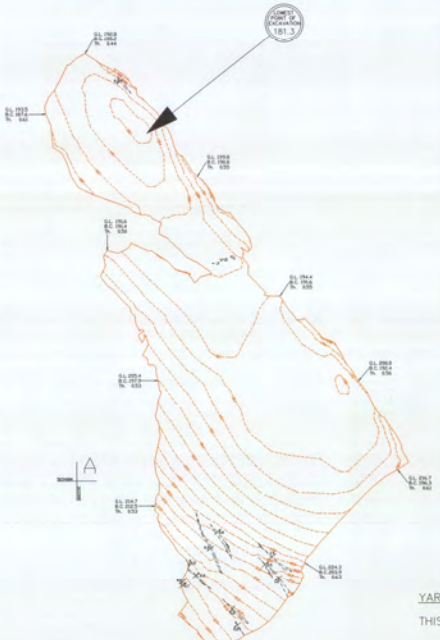
POTATOPOT

TITLE

COMPLETION PLAN

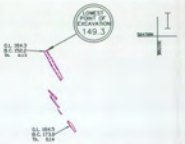
SITE REFERENCE NUMBER	OPERATIONAL CONTRACT NUMBER
032060	OE/CON/6090
Drawn by Date: D.Messenger 15-04-94	Checked by Date: S. Edwards MAY 1994
Scale: 1:2500	Sheet 3 of 7
Drawing No: CP2720c	

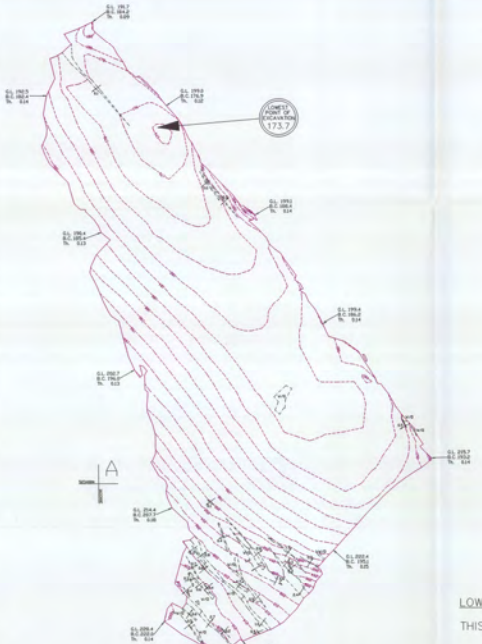
16661

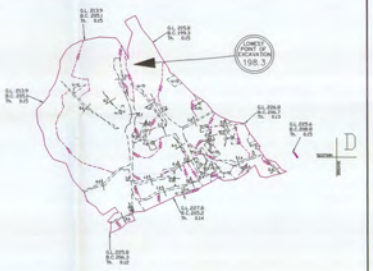


YARD BOTTOM-LEAF

THIS SEAM SHOWN ON COMPOSITE PLAN (SHEET No. 1) THUS







16661

LOWER YARD

THIS SEAM SHOWN ON COMPOSITE PLAN (SHEET No. 1) THUS

BRITISH COAL OPENCAST
Headquarters, 200 Lichfield Lane,
Mansfield, Notts. NG18 4RG

SITE NAME

POTATOPOT

TITLE

COMPLETION PLAN

SITE REFERENCE NUMBER	OPERATIONAL CONTRACT NUMBER
032060	OE/CON/6090
Drawn by: D.Messenger Date: 22-04-94	Checked by: S. Edwards Date: MAY 1994
Scale: 1:2500	Sheet 4 of 7
Drawing No. CP2720d	

16661

HALF-YARD

16661

BRITISH COAL OPENCAST
Headquarters, 200 Lichfield Lane,
Mansfield, Notts. NG18 4RG

SITE NAME

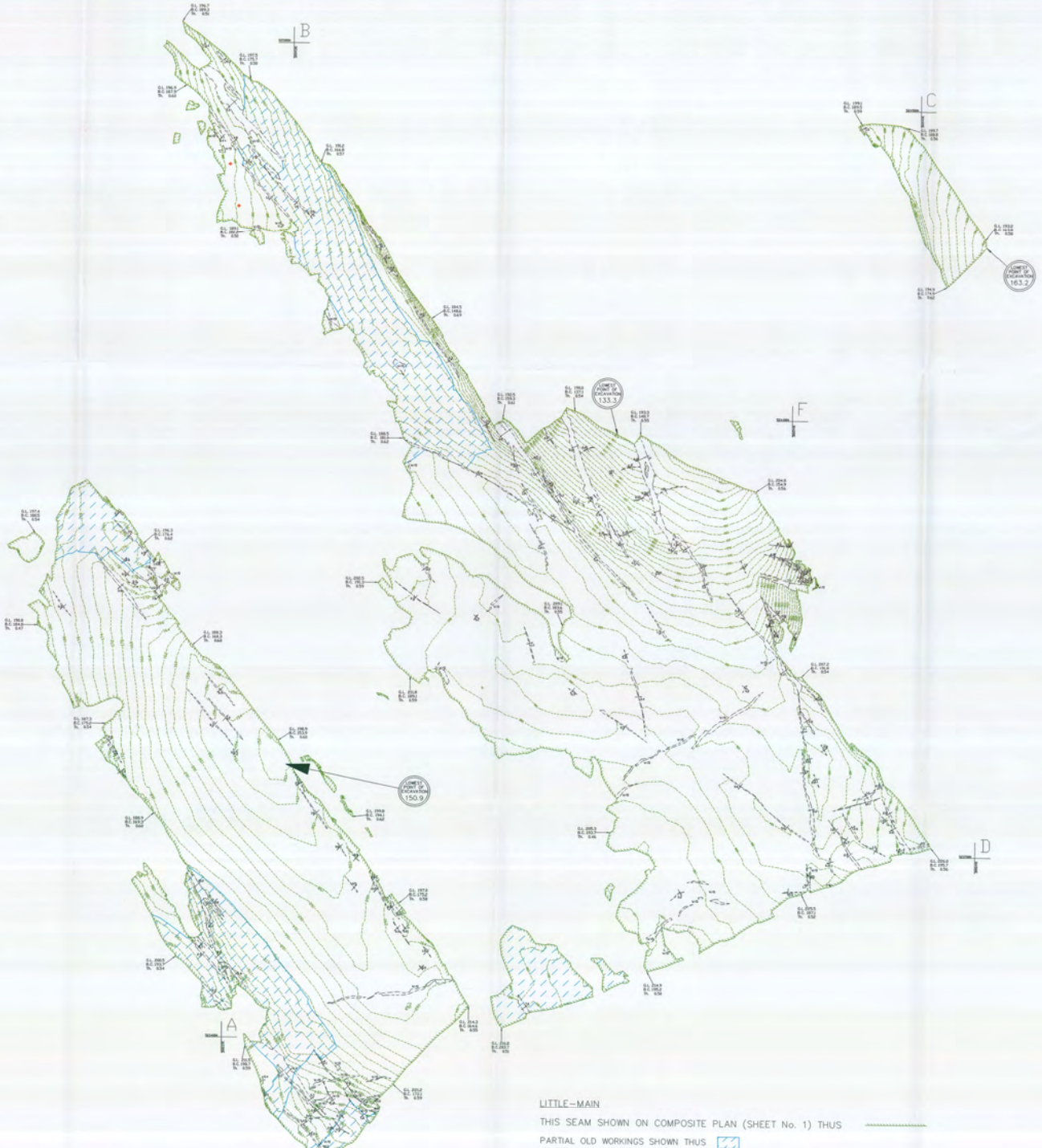
POTATOPOT

TITLE

COMPLETION PLAN

SITE REFERENCE NUMBER	OPERATIONAL CONTRACT NUMBER
032060	OE/CON/6090
Drawn by: D.Messenger Date: 25-04-94	Checked by: S. Edwards Date: MAY 1994
Scale: 1:2500	Sheet 5 of 7
Drawing No. CP2720e	

16661



LITTLE-MAIN

THIS SEAM SHOWN ON COMPOSITE PLAN (SHEET No. 1) THUS

PARTIAL OLD WORKINGS SHOWN THUS

16661

BRITISH COAL OPENCAST
Headquarters, 200 Lichfield Lane,
Mansfield, Notts. NG18 4RG

SITE NAME

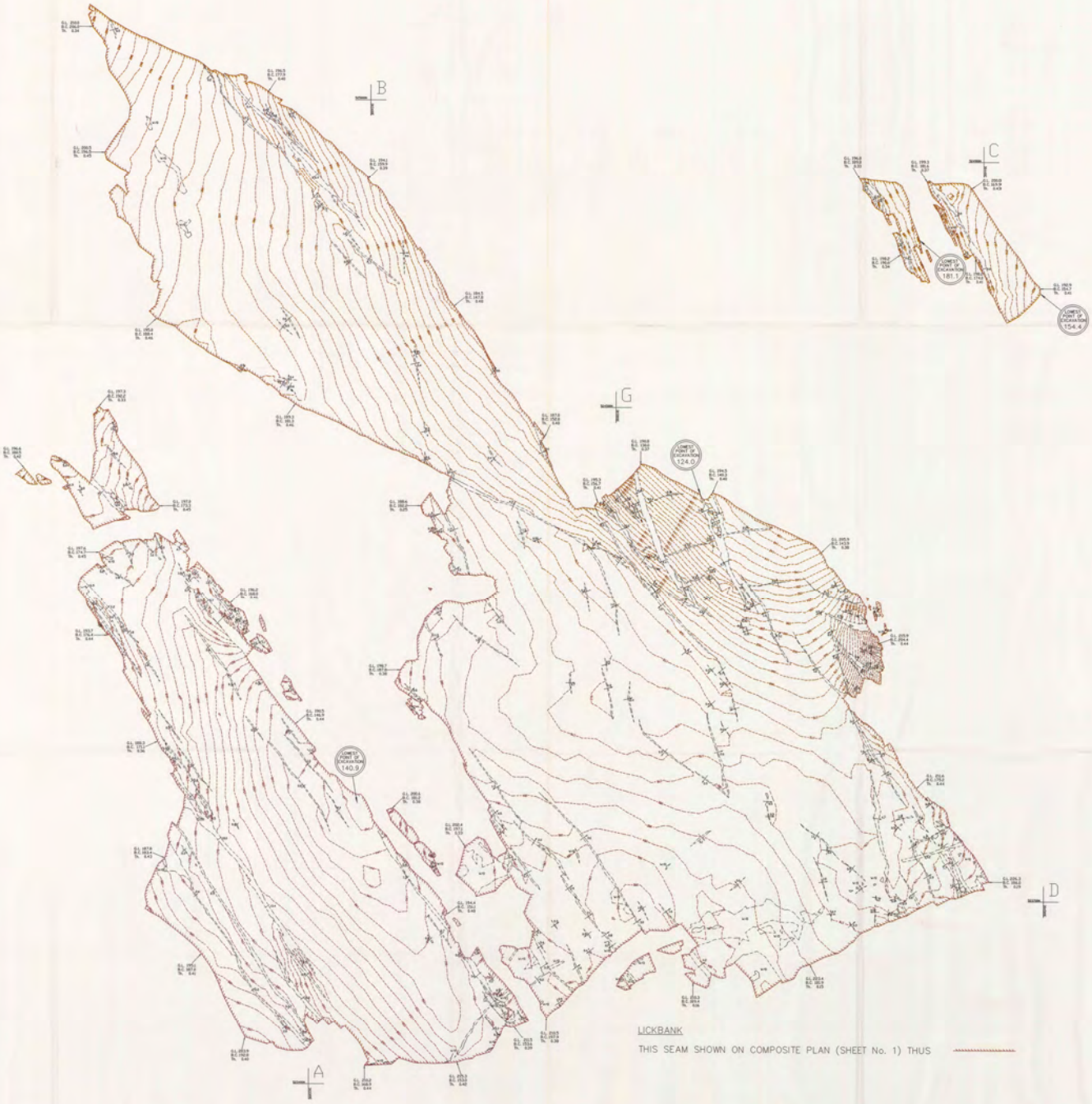
POTATOPOT

TITLE

COMPLETION PLAN

SITE REFERENCE NUMBER	OPERATIONAL CONTRACT NUMBER
032060	OE/CON/6090
Drawn by Date: D.Messenger 06-05-94	Checked by Date: S. Edwards MAY 1994
Scale: 1:2500	Sheet 6 of 7
Drawing No. CP2720f	

16661



LICKBANK

THIS SEAM SHOWN ON COMPOSITE PLAN (SHEET No. 1) THUS

16661

BRITISH COAL OPENCAST
Headquarters, 200 Lichfield Lane,
Mansfield, Notts. NG18 4RG

SITE NAME

POTATOPOT

TITLE

COMPLETION PLAN

SITE REFERENCE NUMBER	OPERATIONAL CONTRACT NUMBER
032060	OE/CON/6090
Drawn by D.Messenger Date 14-04-94	Checked by S. Edwards Date MAY 1994
Scale 1:2500	Sheet 7 of 7
Drawing No. CP2720g	

16661

SIXQUARTERS

THIS SEAM SHOWN ON COMPOSITE PLAN (SHEET No. 1) THUS

PARTIAL OLD WORKINGS SHOWN THUS

UPPER–THREEQUARTERS

THIS SEAM SHOWN ON COMPOSITE PLAN (SHEET No. 1) THUS

LOWER–THREEQUARTERS

THIS SEAM SHOWN ON COMPOSITE PLAN (SHEET No. 1) THUS

PARTIAL OLD WORKINGS SHOWN THUS

16661

Dean Moor
Solar Farm

Appendix 6.1 Consultation Correspondence on Archaeology of the EIA Scoping Report

on behalf of **FVS Dean Moor Limited**

August 2023

Prepared by: **Stantec UK Limited**
PINS Ref: **EN010155**
Document Reference: **EN010155/APP/4.03**
Revision: **0**

Firma Energy

ib vogt

From: [redacted]@WestmorlandandFurness.gov.uk>
Sent: Tuesday, July 25, 2023 1:26 PM
To: [redacted]@stantec.com>
Cc: [redacted]@WestmorlandandFurness.gov.uk>
Subject: RE: Site at Dean Moor - Confidential

Hello [redacted]

Thanks for sending the wsi for a geophysical survey at Dean Moor. I confirm that I'm content for the survey to proceed on that basis.

Regards

[redacted]

[redacted]
Historic Environment Officer | Heritage and Historic Environment
Thriving Communities
Westmorland and Furness Council | County Offices | Kendal | LA9 4RQ
t: [redacted]

From [redacted]@stantec.com>
Sent: 25 July 2023 13:01
To: [redacted]@cumbria.gov.uk>
Cc: [redacted]@cumbria.gov.uk>
Subject: RE: Site at Dean Moor - Confidential

Thanks [redacted] – please find attached the WSI for this one.

Should be undertaken this within the next few weeks.

Thanks,
[redacted]

From: [redacted]@WestmorlandandFurness.gov.uk>
Sent: Wednesday, July 12, 2023 4:04 PM
To: [redacted] <[redacted]@stantec.com>
Cc: [redacted] <[redacted]@WestmorlandandFurness.gov.uk>
Subject: RE: Site at Dean Moor - Confidential

Hello [redacted]

The area of the proposed survey looks OK to me.

Regards

[redacted]

[redacted]
Historic Environment Officer | Heritage and Historic Environment
Thriving Communities
Westmorland and Furness Council | County Offices | Kendal | LA9 4RQ
t: [redacted]

From: [redacted] <[redacted]@stantec.com>
Sent: 12 July 2023 14:08
To: [redacted] <[redacted]@cumbria.gov.uk>
Cc: [redacted] <[redacted]@cumbria.gov.uk>
Subject: RE: Site at Dean Moor - Confidential

Good afternoon [redacted]

We're currently looking to commission a geophysical contractor. Due to the opencast mining to the north of the site (see attached) we shall be focusing on the southern area of the Site. I expect that due to topography and previous mining a few areas will not be accessible to survey (as shown on the attached).

If you're happy with this approach, we can commission our geophysical contractor to produce the WSI.

Any questions do let me know.

Thanks,
[redacted]

From: [redacted]
Sent: Wednesday, June 21, 2023 12:25 PM
To: [redacted] <[redacted]@WestmorlandandFurness.gov.uk>
Cc: [redacted] <[redacted]@WestmorlandandFurness.gov.uk>
Subject: RE: Site at Dean Moor - Confidential

Thanks [redacted] that's really useful and confirms my initial thoughts for the Site and scheme. We're currently producing a desk-based assessment and will share the findings with you.

Once we have a final development plan (and geophysical contactor onboard) I'll be in touch with a plan of the proposed areas for magnetometer survey.

I'll be consulting with Historic England in regards to the scheduled monument and I'll keep you abreast of those discussions.

Thanks,

[redacted]

From: [redacted] <[redacted]@WestmorlandandFurness.gov.uk>
Sent: Tuesday, June 20, 2023 4:56 PM
To: [redacted] <[redacted]@stantec.com>
Cc: [redacted] <[redacted]@WestmorlandandFurness.gov.uk>
Subject: RE: Site at Dean Moor - Confidential

Hello [redacted]

Thanks for sending the plan of the scheme and for the photo showing the opencast mining.

To determine the archaeological impact of the scheme, I advise that the site is subject to an archaeological desk-based assessment and walkover survey. The assessment would need to consider the palaeo-environmental potential of the site and it may be appropriate to include the results of any GI work that has been carried to aid this assessment. It would also be helpful if the dba highlights the extent of the former opencast mining. The area of mining can therefore be discounted from any further archaeological work.

The area of the proposed solar farm, any infrastructure, landscaping, and new woodland planting (discounting the area of former mining) should then be subject to a magnetometer survey to provide information on the below-ground archaeological potential of the area. The need for, and scope of, any trial trenching would then be based upon the results of this work.

This programme of work will provide information that is proportionate to both the significance of the archaeological assets and to the scale of impact of the proposed development. An informed judgement can then be made as to whether, in the event planning consent is granted, it is necessary to include provisions for the preservation of significant archaeological assets or the recording of assets of lesser interest affected by the proposal.

You will be aware that a scheduled monument protecting Dean Moor stone circle lies on the edge of the development boundary and so you will need to liaise with Historic England regarding the impact of the scheme on the setting of this and any other designated heritage assets in the vicinity.

I hope you find these comments helpful. Please do not hesitate to contact me if you wish to discuss further.

Regards

[redacted]
Historic Environment Officer | Heritage and Historic Environment
Thriving Communities
Westmorland and Furness Council | County Offices | Kendal | LA9 4RQ
t: [redacted]

From: [redacted] <[redacted]@stantec.com>
Sent: 20 June 2023 11:09
To: [redacted] <[redacted]@cumbria.gov.uk>
Cc: [redacted] <[redacted]@cumbria.gov.uk>
Subject: RE: Site at Dean Moor - Confidential

Morning [redacted]

Please see the attached plan, includes Solar Development Area, and Electrical Infrastructure (Substation and BESS) general area.

Please note that this is indicative only and will almost certainly change. We're also currently reviewing the site regarding previous below ground impacts. Evidently the northern area of the Site has been previously impacted. This has been subject to archaeological desk-based assessment as part of a planning application for a windfarm (2/2012/0594). It concluded that the entire area had been subject to disturbance as part of opencast mining in the 1990s (see photograph below).

Any questions do let me know – it would be useful to get a meeting in the calendar to discuss.

Again, please keep this information confidential.

Thanks,
[redacted]

1992 Aerial photograph (NMR ref: OS/92206)

[redacted]
Associate (Built Heritage and Archaeology)

Direct: [redacted]
[redacted]@stantec.com

From: [redacted]
Sent: Wednesday, June 14, 2023 3:16 PM
To: [redacted] <[redacted]@WestmorlandandFurness.gov.uk>
Cc: [redacted] <[redacted]@WestmorlandandFurness.gov.uk>
Subject: RE: Site at Dean Moor - Confidential

Thanks [redacted]!

The proposed development areas keep changing, leave it with me and I'll get you over the latest plan.

Thanks,
[redacted]

From: [redacted] <[redacted]@WestmorlandandFurness.gov.uk>
Sent: Wednesday, June 14, 2023 3:11 PM
To: [redacted] <[redacted]@stantec.com>
Cc: [redacted] <[redacted]@WestmorlandandFurness.gov.uk>
Subject: RE: Site at Dean Moor - Confidential

Hello [redacted]

Thanks for the email. I'm happy to let you know my thoughts on the scope of archaeological work at your site and so I'd be grateful if you could please share with me a plan of the proposed development so that I can respond to you accordingly. If you feel that you need a Teams meeting after this, then of course that would be fine.

Regards

[redacted]
Historic Environment Officer | Heritage and Historic Environment
Thriving Communities
Westmorland and Furness Council | County Offices | Kendal | LA9 4RQ
t: [redacted]

From [redacted] <[redacted]@stantec.com>
Sent: 14 June 2023 14:45
To: [redacted] <[redacted]@cumbria.gov.uk>
Cc: [redacted] <[redacted]@cumbria.gov.uk>
Subject: Site at Dean Moor - Confidential

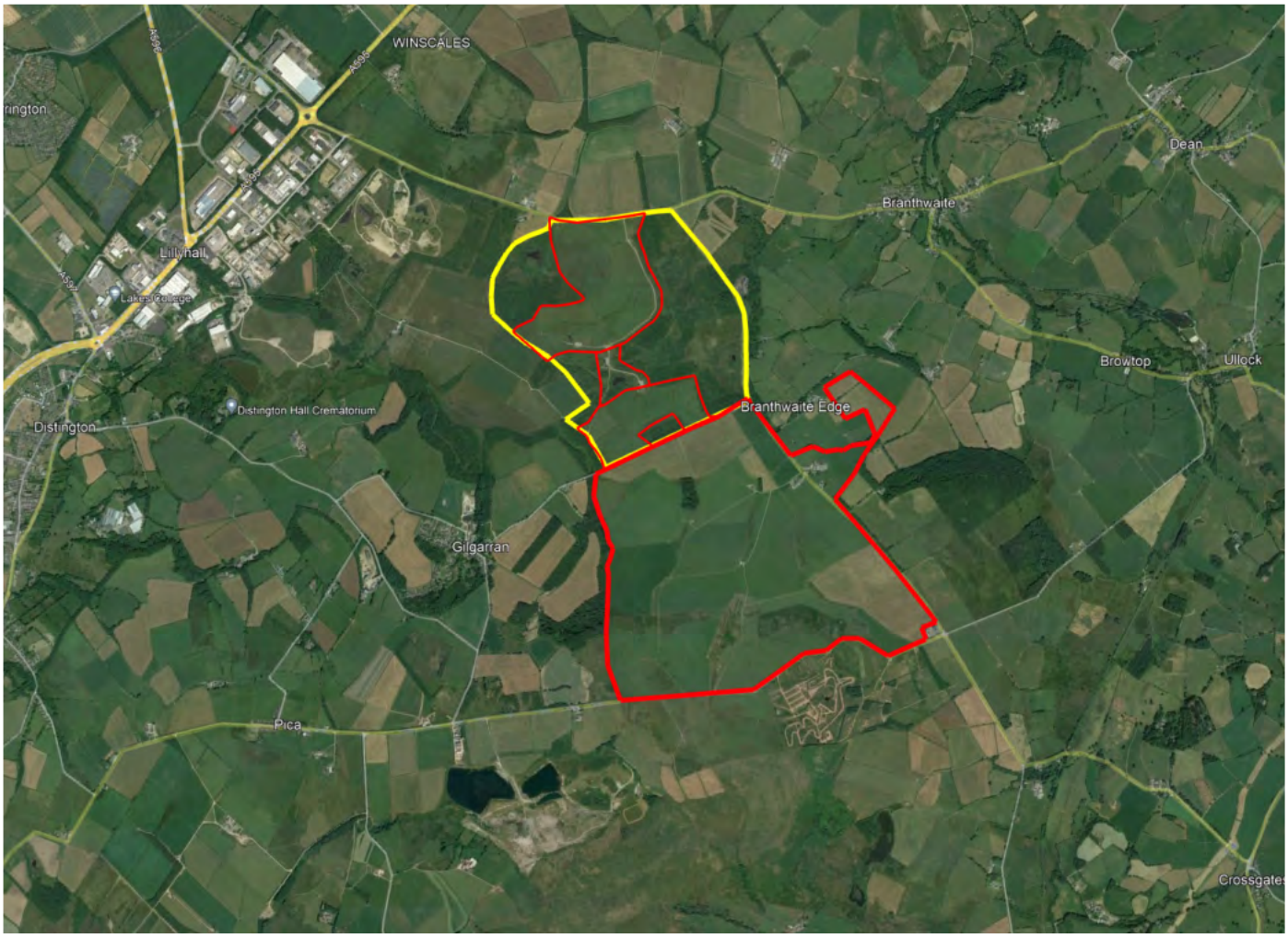
Good afternoon, [redacted] I've been passed your details [redacted] in regard to archaeological requirements for this site.

If you could please keep this information confidential and I've been asked by my client to keep it between us and not to share it with anyone else.

Please see below for the proposed redline boundary for this site (this may be subject to change). We have the HER data (along with the HE data) and have a good understanding of the archaeological potential for the Site. It would be good to get a meeting in the diary to discuss any archaeological matters as soon as possible.

Any questions as always do let me know.

Thanks,
[redacted]



[redacted]
Associate (Built Heritage and Archaeology)

Direct: [redacted]
[redacted]@stantec.com

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Appendix 6.2 Cultural Heritage of the EIA Scoping Report

on behalf of **FVS Dean Moor Limited**

August 2023

Prepared by: **Stantec UK Limited**
PINS Ref: **EN010155**
Document Reference: **EN010155/APP/4.03**
Revision: **0**

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Appendix 6.2 - Cultural Heritage

National Policy for Energy Infrastructure

6.1.1 The National Policy Statement ('NPS') EN-1 and NPS EN-3 published in July 2011 are the primary basis for decisions made by the Secretary of State in relation to solar PV generation. Revised Drafts of NPSs EN-1 and EN-3 were published for public consultation in March 2023. The relevant paragraphs that set out the considerations that the Secretary of State should have in the decision-making process are provided below.

6.1.2 Paragraph 5.8.15 of the NPS EN-1 (July 2011) states:

> *'Any harmful impact on the significance of a designated heritage assets should be weighed against the public benefit of development, recognising that the greater the harm to the significance of the heritage asset the greater the justification will be needed for any loss.'*

6.1.3 The Revised (Draft) NPS EN-1 at paragraph 5.9.30 states the following in relation to designated heritage assets:

> *'Where the proposed development will lead to less than substantial harm to the significance of the designated heritage asset, this harm should be weighed against the public benefits of the proposal, including, where appropriate securing its optimum viable use.'*

6.1.4 In relation to non-designated heritage assets, the Revised (Draft) NPS EN-1 at paragraph 5.9.31 states the following:

> *'In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.'*

6.1.5 In relation to the effects of a proposed development on the setting of a designated heritage asset, paragraph 5.8.18 of the NPS EN-1 states:

'When considering applications for development affecting the setting of a designated heritage asset, the IPC should treat favourably applications that preserve those elements of the setting that make a positive contribution to, or better reveal the significance of, the asset. When considering applications that do not do this, the IPC should weigh any negative effects against the wider benefits of the application. The greater the negative impact on the significance of the designated heritage asset, the greater the benefits that will be needed to justify approval.'

6.1.6 Within the Revised (draft) NPS EN-1, at paragraph 5.9.34, this is re-stated with slight amendments, such that the Secretary of State should also *'... give appropriate weight to the desirability of preserving the setting of such assets and treat favourably applications that make a positive contribution to, or better reveal the significance of. the asset.'* Furthermore, the Secretary of State *'...should give great weight to any negative effects, when weighing them against the wider benefits of the application.'*

6.1.7 The Revised (Draft) NPS EN-3[1] includes guidance on the consideration of project lifetimes for solar generation schemes over 50MW in generating capacity. The Revised (Draft) NPS EN-3 states at paragraph 3.10.138:

'Where the consent for a solar farm is to be time-limited, the DCO should impose a requirement setting that time-limit from the date the solar farm starts to generate electricity.'

6.1.8 At paragraph 3.10.141, NPS EN-3 states that the time limited nature of the solar farm is likely to be an important consideration for the Secretary of State, where a time limit is sought as a condition of consent. The temporary nature of solar generation schemes and the imminent return of the development site to its original state through decommissioning are clearly important considerations for the decision maker, when assessing the potential effects on heritage

[1] Department of Energy Security and Net Zero (2023), Draft National Policy Statement for Renewable Energy Infrastructure EN-3

receptors. The is outlined as one of the technical considerations for the Secretary of State in paragraph 3.10.142:

> *'The Secretary of State should consider the period of time the applicant is seeking to operate the generating station as well as the extent to which the site will return to its original state when assessing impacts such as landscape and visual effects and potential effects on the settings of heritage assets and nationally designated landscapes.'*

Methodology

6.1.9 No standard methodologies exist for assessing the likely significant effects of a proposed development on the environment with respect to archaeology and built heritage through the EIA process. However, the assessment methodology will be guided by the following best practice documents:

i. The Institute of Environmental Management and Assessment's ('IEMA') *Principles of Cultural Heritage Impact Assessment* (2021)[2] which sets out an authoritative set of principles that promotes good practice in cultural heritage impact assessment;
ii. The *Design Manual for Roads and Bridges* ('DMRB')[3] which provides general guidance for environmental assessment and monitoring for impacts arising from highway schemes (LA 104 [2019]). LA 106 Revision 1 (2020) provides guidance specifically on assessing cultural heritage;
iii. The ICOMOS issued guidance on *Heritage Impact Assessments for Cultural World Heritage Properties* (2022).[4] Though specifically addressing World Heritage Sites and development impacts on their Outstanding Universal Value, the guidance document provides a useful approach to the assessment and evaluation of impact.
iv. Chartered Institute for Archaeologists ('CIFA') guidance for historic environment desk-based assessment.[5]

[2] IEMA, Principles of Cultural Heritage Impact Assessments (2021)
[3] Design Manual for Roads and Bridges LA 104 (2019) and LA 106 Rev.1 (2020)
[4] ICOMOS Heritage Impact Assessments for Cultural World Heritage Properties (2022)
[5] Chartered Institute for Archaeologists (CIFA) Standards and Guidance for Historic Environment Desk Based Assessment (2017)

v. Historic England guidance on *Planning and Archaeology* (2022) [6], setting[7], significance[8] and decision making[9].

6.1.10 In addition, the assessment will be informed by the National Planning Policy Framework ('NPPF') and Planning Practice Guidance ('PPG'), local planning policy, and consultation with other statutory and non-statutory bodies, where applicable.

6.1.11 Baseline data will be gathered to inform the baseline that will identify the heritage resource within the study area. The exercise will examine the following sources:

i. Relevant guidance found in the NPS EN-1 and NPS EN-3;
ii. British Geological Survey ('BGS') - solid and drift geology digital mapping; online BGS geological borehole record data;
iii. Existing topographic survey data; architectural and engineering plans and sections of existing buildings and of the Proposed Development, information on massing, height, materials and elevations, and existing geotechnical data.
iv. A search of the Cumberland Council ('the Council') HER data centred on the Site and extending 3km from the boundary of the Site (the study area);
v. Archaeological and historical background (including published and unpublished sources), drawn from a variety of sources including the Council;
vi. A Site walkover survey from publicly accessible areas;
vii. National heritage datasets including The National Heritage List for England ('NHLE'), Historic England Archive ('HEA'), Images of England, Historic England Research Records, NMR Excavation Index, Portable Antiquities Scheme ('PAS'), Multi-Agency Geographic Information for the Countryside ('MAGIC'), www.britainfromabove.org.uk, and Google Earth;

[6] Historic England, Planning and Archaeology (2022)
[7] Historic England, The setting of heritage assets. Historic Environment Good Practice Advice in Planning Note 3 (2017)
[8] Historic England Advice Note 12: Statements of significance, Swindon (2019)
[9] Historic England, Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision Taking in the Historic Environment (2015)

viii. Relevant grey literature reports[10]; and

ix. Historic manuscripts and maps available online.

6.1.12 The preliminary ZTV analysis will be used as a tool to identify the receptors for consideration within the assessment. As the ZTV is updated and the design of the Proposed Development further developed, other receptors may be identified as being located within an area of zero visibility. Should it be established that there are no historic associations between the receptor and the Site, these receptors would be excluded from assessment.

6.1.13 The assessment of the likely significant environmental effects on potential archaeological buried heritage receptors and above ground heritage receptors will entail:

i. The determination of the significance of a heritage receptor based on statutory designation and/or professional judgement against the identified in Historic England's Conservation Principles[11]: Historic Interest, Archaeological Interest and Architectural and Artistic Interest. These values encompass the criteria that Historic England are obliged to consider when statutorily designating heritage receptor. Each receptor will be evaluated against the range of criteria listed above on a case-by-case basis.

ii. 'Significance's is defined in the NPS EN-1 as the sum of the heritage interests that a heritage receptor holds. The draft NPS EN-1 provides the same definition but also notes that significance derives not only from a heritage receptor's physical presence, but also from its setting.

iii. The significance translates into the 'sensitivity to change' for the receptor. The term 'significance' will be interchangeable with the term 'importance' and the 'sensitivity to change' of the receptor. The PEIR and ES Chapter will utilise the term 'importance' in relation to the significance of the

[10] Through the assessment process there may be relevant as-yet-unknown unpublished archaeological reports which would be useful in the heritage impacts assessments.

[11] English Heritage (as was), Conservation Principles, Policies and Guidance (2008); updated version consulted upon 2017-18

receptor, while “significance”, will be associated with the ‘significance of the effect’.

iv. Evaluating the contribution that setting makes to the overall importance of above ground heritage receptors selected for assessment;

v. Predicting the ‘magnitude of change’ upon the known or potential significance of heritage receptors, including impacts to significance through change in setting and the likelihood and resulting scale of environmental effect;

vi. Assessing any likely significant cumulative effects upon the heritage resource resulting from the Proposed Development in combination with other schemes, as appropriate;

vii. Considering the mitigation measures that have been included within the design of the Proposed Development and any additional mitigation that might be required in order to avoid, reduce or off-set any significant adverse effects; and

viii. Quantifying any residual effects (those that might remain after mitigation).

6.1.14 The decision-making process for EIA and DCO development is underpinned by different requirements in terms of impact assessment. There are differences in terminology relating to the degree of impact and in the thresholds that inform the decision-making process. The ES Chapter will assess the impact on significance arising from the Proposed Development in accordance with the requirements of the EIA Regulations. However, the NPS EN-1 (and the Revised (Draft) EN-1) considers impacts arising from the Proposed Development in terms of the level of harm (no harm, less than substantial harm or substantial harm) to the significance of a receptor.

6.1.15 Under the EIA assessment process, the sensitivity of the receptor needs to be considered in addition to the magnitude of change. A receptor could therefore be subject to ‘less than substantial harm’ under the NPS EN-1 and fall within ‘significant effect’ by the EIA Assessment matrix. For example, a receptor that falls within ‘less than substantial harm’ under the NPS EN-1 and is of medium

or low sensitivity could fall within significant effects if the magnitude of impact is moderate or major.

6.1.16 There is no published methodology or prescriptive criteria that enables a pre-judgement to be made as to how the level of harm to a heritage receptor translates to 'significance of effect'. The application of the EIA methodology relies on professional judgement to establish the sensitivity of a receptor and the magnitude of the impact. A matrix-based system will be employed to simultaneously consider the sensitivity of the receptor and the magnitude of impact to ensure that a robust assessment of the level of effect to the significance (in EIA terms) of the heritage receptor is applied. The principles and criteria for EIA Assessment based on the ICOMOS guidance for Heritage Impact Assessment (2011)[12] and the updated 2023 guidance on impact assessments[13].

6.1.17 Additionally, the level of harm on the significance of the receptors will be assessed against the NPS policies and tests set out in the NPS EN-1 (and Revised (Draft) NPS EN-1). This assessment will form part of the conclusion within the PEIR and ES Chapter.

Evaluating the Contribution of Setting

6.1.18 In terms of the consideration of effects related to changes in setting, the Historic England stepped approach will be followed. This comprises:

i. Step 1 - Identifying the designated receptors likely to experience a change with respect to their setting;
ii. Step 2 - Assessing the contribution that setting makes to the importance of the receptor;

[12] Available at: https://www.iccrom.org/sites/default/files/2018-07/icomos_guidance_on_heritage_impact_assessments_for_cultural_world_heritage_properties.pdf Accessed July 2023

[13] Court, Sarah, Jo, Eugene, Mackay, Richard, Murai, Mizuki and Therivel, Riki (2022) Guidance and toolkit for impact assessments in a World Heritage Context. Manual. UNESCO, ICCROM, ICOMOS and IUCN, Paris, France; Rome, Italy; Charenton-le-Pont, France; Gland, Switzerland, 87p. ISBN 978-92-3-100535-0.

iii. Step 3 - Assessing the effect of the Proposed Development on the importance of the receptor;
iv. Step 4 - Maximising enhancement and minimising harm (mitigation); and
v. Step 5 - Reporting the outcome of the assessment.

6.1.19 The Historic England (2017)[14] advice note sets out a recommended approach (reformulated here in context of the EIA) which will be referred to in the Cultural Heritage ES chapter and includes:

i. Setting is the surroundings in which a receptor is experienced and may therefore be more than its curtilage; that it may be affected by a range of factors beyond visual, including historical relationships between receptors; it may extend beyond public rights of way;
ii. The extent of setting is not fixed and may change as the receptor and its surroundings evolve; heritage receptors within extensive landscapes may have nested or overlapping settings;
iii. Where the setting of a heritage receptor has been compromised, consideration needs to be given to whether additional change will further detract from, or can enhance the importance of the receptor;
iv. Importance of setting in relation to designed landscapes can extend beyond the designated area and may not necessarily be confined to land visible from the Site, but may have historic or other associations with the receptor; and
v. The contribution of views to setting can be assessed in relation to static, dynamic, long, short or laterally spreading views.

EIA "Significant Effects" versus NPS EN-1 "Harm"

6.1.20 The NPS EN-1 refers to substantial harm as a category of impact on the significance of a heritage receptor. The Revised (Draft) NPS EN-1 refers to the degree of impact on a heritage receptor as falling into three categories: substantial harm, less than substantial harm, and no harm.

[14] Historic England, The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3 (Second Edition) (2017)

6.1.21 There are more categories of impact used in the EIA assessment methodology than that used for the NPS EN-1. In this sense, the EIA is more nuanced and would result in a larger range of outcomes in terms of the degree of impact.

6.1.22 The EIA assessment grades impact as neutral, negligible, minor adverse/beneficial, moderate adverse/beneficial and major adverse/beneficial. For the purposes of this note, impact that is assessed as beneficial is disregarded, as a positive effect would not be considered harmful.

6.1.23 When translating the degree of impact under the EIA methodology to the NPPF assessment, EIA best practice considers that a 'significant adverse effect' equates to 'substantial harm' under the NPS EN-1. 'Substantial harm' is a high test as set out in the PPG paragraph 18. This would therefore only apply to the heritage receptors that fall within the grades shown in grey in Table 9.6 of the EIA Scoping Report.

6.1.24 The 'less than substantial harm' test under the NPS EN-1 applies to a much broader range of impact, that could be at the lower or upper ends of 'less than substantial harm'. A much larger of pool of receptors are likely to fall within this category of impact.

6.1.25 Under the EIA assessment process, the sensitivity of the receptor needs to be considered in addition to the magnitude of change. A receptor could therefore be subject to 'less than substantial harm' under the NPS EN-1 and fall within 'significant effect' by the EIA Assessment matrix. For example, a receptor that falls within 'less than substantial harm' under the NPS EN-1 and is of medium or low sensitivity could fall within significant effects if the magnitude of impact is moderate or major.

6.1.26 As outlined above, there is no published methodology or prescriptive criteria that enables a pre-judgement to be made as to whether a heritage receptor that is subject to 'less than substantial harm' would also fall within the category of 'significant effect'. The application of the EIA methodology relies on professional judgement to establish the sensitivity of a receptor and the magnitude of the impact. Professional judgement is also required to

understand whether development that causes less than substantial harm to a heritage receptor would also result in significant effects on the heritage receptor. An assessment of ‘less than substantial harm’ therefore does not therefore always equate to no ‘significant effect.’ There is the potential for the pool of receptors that experiences ‘less than substantial harm’ to overlap with those that fall within the EIA category of ‘significant effects.’

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Appendix 7.1 Landscape and Visual Methodology of the EIA Scoping Report

on behalf of **FVS Dean Moor Limited**

August 2023

Prepared by: **Stantec UK Limited**
PINS Ref: **EN010155**
Document Reference: **EN010155/APP/4.03**
Revision: **0**

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1. Landscape & Visual Methodology

1.1. Introduction

1.1.1. The proposed methodology for the landscape and visual impact assessment has been devised to assess the likely significant effects resulting from the Proposed Development. The methodology draws upon the following established best practice guidance:

i. Guidelines for Landscape and Visual Assessment, Third Edition (2013)[1] , ('GLVIA3');

ii. GLVIA3 Statement of Clarification 1/13[2];

iii. Natural England's An Approach to Landscape Character Assessment (2014)[3];

iv. Landscape Institute Technical Guidance Note 02/21: Assessing Landscape Value Outside National Designations (2021)[4]; and

v. Landscape Institute Technical Guidance Note 06/19: Visual Representation of Development Proposals (2019)[5].

1.1.2. The assessment will consider the likely significant effects on landscape (including landscape character and landscape components) and on people's views (visual amenity); these will be presented as separate elements of the assessment. The assessment will be undertaken with an emphasis on the identification of likely significant landscape and visual effects as a result of the Proposed Development, using an approach which is in proportion to the project and nature of likely effects.

1.1.3. The planning context with respect to landscape and visual amenity will also

[1] Landscape Institute and the Institute of Environmental Management and Assessment, 2013. Guidelines for Landscape and Visual Assessment, Third Edition.
[2] Landscape Institute, 2013. GLVIA3 Statement of Clarification [online] Accessed 05/06/2023
[3] Natural England (2014). An Approach to Landscape Character Assessment [online] Accessed 05/06/2023
[4] Landscape Institute, 2021. Assessing Landscape Value Outside National Designations [online] Accessed 05/06/2023
[5] Landscape Institute, 2019. Technical Guidance Note 06/19: Visual Representation of Development Proposals [online] Accessed 05/06/2023

be considered, considering relevant national, regional, and local planning policies. The baseline study will inform the basis of the assessment of the likely significant landscape and visual effects of the Proposed Development.

1.1.4. View locations have been identified using Preliminary ZTV analysis (see Figure 7.1 of the Scoping Report). The selection of view locations has been made on the following types of publicly accessible views (no private views will be assessed in the ES):

vi. Representative views (for example, representing views of a particular footpath);

vii. Specific views (for example, a key view from a specific visitor attraction);

viii. Illustrative views (chosen to demonstrate a particular effect/ specific issue); and

ix. Any important sequential views (for example, along key transport routes).

1.1.5. ZTVs will be prepared for the Proposed Development, which will utilise information received on finished heights of the ground-mounted solar photovoltaic ('PV') arrays and ancillary structures, such as the substation. ZTVs will be generated which illustrate the potential visibility of the solar PV arrays and finished heights of ancillary structures separately, using a bare ground Digital Terrain Model ('DTM') and Digital Surface Model ('DSM').

1.2. Assessment Stages

1.2.1. A three-stage assessment process will be adopted for the ES, in accordance with the GLVIA3. Firstly, the nature of receptors (sensitivity) will be identified and assessed by combining judgements of value and susceptibility.

1.2.2. The assessment of landscape and visual effects would make comparison with the baseline year and will include assessment during the construction period and on completion of the Proposed Development (i.e., operation). The assessment would also include a period of 15 years after completion of the Proposed Development, when new planting is assumed to have successfully established and

grown to provide effective mitigation.

1.2.3. Reference to the findings within the Glint and Glare Study prepared by Pager Power would be made where appropriate to views and visual amenity within the assessment. Where relevant to landscape, any mitigation recommendations identified within the Glint and Glare assessment would be indicated as part of the landscape mitigation strategy.

1.2.4. Table 10.1 identifies the scales to be used for judgements on sensitivity within the ES.

Table 10.1: Landscape and Visual Sensitivity

Sensitivity	Landscape	Visual
Very High	An area which is designated internationally for its attributes, i.e. a UNESCO World Heritage Site.	Typically views of very high scenic value within landscapes of international importance, for instance from UNESCO World Heritage Sites.
High	An area possessing a particularly distinctive sense of place and character, and / or attributes which make a particular contribution to the landscape or landscape character and little ability to accommodate the proposed development and / or irreplaceable features of character.	Typically views of a high scenic value within landscapes of national importance, and/or from receptors whose attention is likely to be focused on the visual experience of the landscape.
Medium	An area with a clearly defined sense of place and character, and / or attributes which contribute to the landscape or landscape character, and with partial tolerance to change of the type proposed.	Typically views of moderate scenic value within landscapes of regional/district importance and/or experienced by receptors with moderate interest in their visual environment.

Sensitivity	Landscape	Visual
Very High	An area which is designated internationally for its attributes, i.e. a UNESCO World Heritage Site.	Typically views of very high scenic value within landscapes of international importance, for instance from UNESCO World Heritage Sites.
Low	An area with a weak sense of place or poorly defined character, and / or attributes which contribute to the landscape or landscape character, and with the ability to tolerant substantial change of the type proposed.	Typically views of unremarkable scenic value with partly degraded visual quality and detractors, and/or experienced by receptors with limited appreciation of, or focus upon views.

1.2.5. Secondly, the nature of effects (magnitude) likely to result from the Proposed Development will be assessed by combining judgements on the size/scale of change, the geographical extent of the change, and duration and reversibility of the effect. Factors to be used within the judgement of magnitude for landscape and visual concerns are outlined below in Table 10.2.

Table 10.2: Magnitude of Effect

Magnitude	Landscape	Visual
Major	Fundamental and very obvious change in the makeup and balance of landscape characteristics over an extensive area. Permanent removal of, or a substantial change to the characteristics of the landscape feature in question that cannot be replaced, reinstated or otherwise mitigated against.	Fundamental or very obvious change in the character, makeup and balance of the view. The Proposed Development would be dominant; a controlling feature within the view.

Magnitude	Landscape	Visual
Moderate	Changes in an extensive area which whilst notable do not alter the balance of landscape characteristics. Partial removal or moderate changes to the characteristics of the landscape feature in question. Also applies to complete removal that can be mitigated against.	Moderate changes in the character, makeup and balance of the view, with the proposals noticeably distinct. This may lead to an overall change in the nature of the view depending on the type and nature of change.
Slight	Limited change in any components of the wider landscape with modest and unremarkable changes in the localised area. Small scale changes to a landscape feature.	The Proposed Development would be visible as a new feature. Change would be limited and would be unlikely to affect the nature of the existing view as a whole.
Negligible	Change, which whilst occurring would be virtually imperceptible within the wider landscape. Changes to a landscape that would have no impact on its integrity as a whole.	Barely perceptible change to the view.
Neutral	Change would occur, but would be neither detrimental nor beneficial to the receiving landscape overall.	Change within the view would be neither detrimental nor beneficial overall.
No Change	No change to current baseline conditions.	No change to current views.

1.2.6. Lastly, the significance of the identified landscape and visual effects on receptors will be assessed and described by combining the previous judgements on sensitivity and magnitude. The levels of significance determined by the combination of sensitivity and magnitude are set out in Table 10.3 below. Effects can be beneficial, adverse, neutral or result in no change.

Table 10.3: Levels of Significance of Landscape and Visual Effects

Magnitude of Effect							
Sensitivity		**Major**	**Moderate**	**Slight**	**Negligible**	**Neutral**	**No Change**
	Very High	Substantial	Major to Substantial	Major	Moderate	Minor	No Change
	High	Major to Substantial	Major	Moderate	Minor	Negligible	No Change
	Medium	Major	Moderate	Minor	Negligible	Negligible	No Change
	Low	Moderate	Minor	Minor	Negligible	Negligible	No Change

1.2.7. Where the assessment indicates the need for mitigation as a result of significant effects on landscape character or visual amenity, where relevant the mitigation hierarchy of avoid, prevent, reduce and offset will be employed.

1.2.8. A full methodology will be set out in an appendix within the ES.

Dean Moor
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Appendix 8.1 Preliminary Ecological Appraisal of the EIA Scoping Report

on behalf of **FVS Dean Moor Limited**

August 2023

Prepared by: **Stantec UK Limited**
PINS Ref: **EN010155**
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Revision: **0**

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Document Control Sheet

Project Name: Dean Moor Solar Farm

Project Ref: 332511471

Report Title: Preliminary Ecological Appraisal and Great Crested Newt Report

Date: July 2023

	Name	Position	Signature	Date
Prepared by:	Hannah Breadin	Senior Ecologist	HB	05 June 2023
Checked by:	Jim Gillespie	Director	JG	08 June 2023
Reviewed by:	Iain Adderton / Duncan McLaughlin	Senior Associate Ecologist	IA / DM	13 July 2023
Approved by:	Lucy Wood	Director	LW	19 June 2023
For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved

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Tables

Appendices

1 Executive Summary

1.1.1 Stantec UK Ltd was commissioned by FVS Dean Moor Limited to undertake a Preliminary Ecological Appraisal ('PEA') in connection with the Dean Moor Solar Farm (the 'Proposed Development'). In parallel to the PEA, the following surveys were also conducted, and the results presented in this report: great crested newt surveys, preliminary bat roost assessment, and winter bird characterisation survey.

1.1.2 The purpose of the PEA is to provide preliminary baseline information about the likely / potential ecological interest of the Site, further survey recommendations, and early comment on potential constraints and opportunities associated with the potential ecological interest of the Site. The PEA was carried out with reference to the Chartered Institute for Ecology and Environmental Management ('CIEEM') guidelines for preliminary ecological appraisal (CIEEM 2017), and included a desk study, and extended habitat survey.

1.1.3 The Site is predominantly pasture that is grazed by cattle and sheep. It is generally drained by a series of unnamed minor watercourses which run broadly south to north and west to east in the southern part of the Site.

1.1.4 A number of statutory designated sites are present near to the Site, including the River Derwent and Bassenthwaite Lake Special Area of Conservation ('SAC') / Site of Special Scientific Interest ('SSSI') and Solway Firth Special Protection Area ('SPA'). Further surveys and assessment (including a Habitats Regulations Assessment ('HRA')) are recommended to fully understand potential effects to these receptors.

1.1.5 Dean Moor County Wildlife Site ('CWS') is partially located within the Site. The layout of the Proposed Development should avoid direct impacts to Dean Moor CWS, where possible. It is recommended that further botanical survey information is secured in respect of Dean Moor CWS, to fully assess the potential for effects on the interest features. The potential for the enhancement of the CWS through the implementation of appropriate management should be considered, and subject to agreement with stakeholders.

1.1.6 There is potential for direct impacts to notable habitats such as ancient woodland and hedgerows, and other habitats of ecological value such as plantation woodland, and ponds although these can be avoided by designing appropriate stand-off distances from development activities.

1.1.7 Presence of or potential for a number of notable species has been identified. Further surveys are recommended for:

- Otter and water vole;
- Breeding and wintering birds;
- Habitats; and
- Roosting bats (if required).

1.1.8 A range of measures to mitigate impacts and provide ecological enhancements are recommended.

Disclaimer

This Executive Summary contains an overview of the key findings and conclusions. However, no reliance should be placed on any part of the executive summary until the whole of the report has been read.

2 Introduction

2.1 Overview

2.1.1 Stantec UK Ltd was commissioned by FVS Dean Moor Limited to undertake a PEA and great crested newt survey for the Dean Moor Solar Farm (the 'Proposed Development') project. The PEA was undertaken by Stantec approved supplier BSG Ecology. The Proposed Development is located on land located between the villages of Gilgarran and Branthwaite in West Cumbria (central Ordnance Survey ('OS') grid reference NY 04760 22926), from here on referred to as 'the Site'. The survey area for the PEA included land with the Site and surrounding area, where access was available.

2.1.2 The purpose of the PEA is to provide preliminary baseline information about the likely / potential ecological interest of the Site, further survey recommendations, and early comment on potential constraints and opportunities associated with the potential ecological interest of the Site. This can be used to inform the scoping of future survey work and the ecological impact assessment, as well as the design of the Proposed Development, which has not yet been confirmed.

2.1.3 The advice set out with this PEA report is advisory and should not be used to inform planning.

2.2 Site Location and Description

2.2.1 The Site is 279.5 hectares ('ha') in area and is located between the villages of Gilgarran and Branthwaite in West Cumbria. The Site is bisected by a minor road that runs between Gilgarran and Branthwaite Edge. The Site lies entirely within the administrative area of Cumberland Council.

2.2.2 The Site can be viewed on the figures in **Section 7**.

2.2.3 The Site is predominantly pasture that is grazed by cattle and sheep. It is generally drained by a series of unnamed minor watercourses which run broadly south to north and west to east in the southern part of the Site. The watercourses coalesce near Branthwaite Rigg and flow north to ultimately join the River Derwent.

2.2.4 The land within the Site has a varied topography with steep-sided hills associated with Thief Gill in the southern-central section part of the Site; and flat land to the north, east and west. Small sections of plantation woodland are present in the northern part of the Site.

2.2.5 Land surrounding the Site is dominated by grazing pasture and arable farmland, with large areas of plantation woodland also located north, east and west of the Site.

2.3 Proposed Development

2.3.1 The Proposed Development comprises the proposed construction, operation and maintenance, and decommissioning of a renewable energy generating project on 279.5 ha of land between the villages of Gilgarran and Branthwaite in West Cumbria.

2.3.2 The Proposed Development has an expected energy generating capacity in excess of the 50MW threshold for onshore generating stations in England and therefore constitutes a 'nationality significant infrastructure project' ('NSIP'). The Applicant intends to make an application for a Development Consent Order ('DCO') to authorise the Proposed Development.

2.3.3 Detailed development plans for the Proposed Development are unavailable at the time of writing this report.

2.4 Report Objectives

2.4.1 The objectives of this report are to:

i. outline survey methodologies and relevant survey guidance;

ii. detail the results of the survey;

iii. discuss the results in relation to relevant legislation and planning policy (impacts); and

iv. outline recommendations (further surveys, avoidance/ mitigation/ compensation/ enhancements) as required.

3 Methods

3.1 Overview

3.1.1 The section below sets out the methodology used to inform the PEA. This included a desk study, and extended habitat survey. Details of survey limitations and survey personnel are also included.

3.2 Survey Area

3.2.1 The survey area encompassed the Site and surrounding land, where access was available. The survey area can be viewed on the **Habitat Survey Plans** in **Section 8.**

3.3 Desk Study

3.3.1 The desk study was carried out with reference to the CIEEM guidelines for preliminary ecological appraisal (CIEEM 2017). Data relating to the presence of statutory and non-statutory designated sites, species records, and information relating to the Site itself were gathered from public and private sources. Data from Cumbria Biodiversity Centre was obtained in May 2023.

3.3.2 For the desk study, the proposed search areas consist of the following search radii from the Site boundary:

- 10km radius from the Site boundary for internationally designated sites, to be extended beyond this radius where any hydrological pathways from the Site to the designated site are known to occur;
- 2km radius from the Site boundary for all other statutory and non-statutory locally designated sites;
- 2km radius from the Site boundary for notable habitats, including ancient woodland and Habitats of Principal Importance; and
- 2km radius from the Site boundary for protected species records.

3.3.3 In addition, an ecology and ornithology impact assessment produced in support of the wind turbine development within the Site was reviewed, particularly in relation to bird and bat surveys conducted in 2011 and 2012 (Airvolution Energy, Potato Pot Wind Farm ES, Chapter 6, Ecology and Ornithology, chapter undated).

3.4 Extended Habitat Survey

3.4.1 Habitats within the survey area were mapped in accordance with UK Habitat Classification System ('UKHab') (Butcher et al., 2020)). he survey was then "extended" to include an appraisal of the habitats' suitability for protected species. This included a search for signs of protected species or the species themselves. Such signs, and habitat features suitable for protected species were where, necessary, target noted. The survey was undertaken with reference to the CIEEM PEA guidelines (CIEEM 2017).

Table 3.1: Survey details.

Date	Cloud cover (oktas)	Temperature	Wind speed	Precipitation
26.04.23	3	10ºC	2F	None

3.4.2 During subsequent visits to undertake other species-specific surveys, elements of the PEA were updated.

3.5 Bat roost potential

3.5.1 Trees within the survey area were inspected from the ground to assess their potential for supporting roosting bats. Features suitable for roosting bats including flaking bark, rot holes, cracks and splits in major limbs, and woodpecker holes were all noted (Collins, 2016; BTHK, 2018). The survey excluded areas of plantation woodland which would not be affected by the Proposed Development.

3.5.2 Farm buildings were externally inspected from the ground and a preliminary assessment made with reference to Bat Conservation Trust ('BCT') guidance (Collins, 2016; in particular Chapter 5). A detailed assessment was not completed as it is understood these buildings are to be retained.

3.6 Bat habitat assessment

3.6.1 The potential suitability of the survey area for bats was considered in relation to commuting or foraging, with reference to Bat Conservation Trust guidance (Collins, 2016; in particular **Table 4.1** in Chapter 4).

3.7 Wintering bird characterisation survey

3.7.1 Two wintering bird characterisation surveys have been undertaken using a walkover methodology (Bird Survey & Assessment Steering Group website). During each survey each point within the survey area was approached to within 50m. Where multiple species were observed at once, the surveyor made short stops to ensure the full range of species and behaviour were recorded. Birds and their behaviours were recorded using standard British Trust for Ornithology ('BTO') notation.

A summary of the survey conditions is presented below in **Table 3.2.**

Table 3.2: Wintering bird survey details.

Date	Timin-g	Sunrise	Temperature	Wind speed (Beaufort Force)	Cloud Cover (Oktas)	Precipitation	Visibility
22/02/2023	09:00 – 14:00	07:20	6°c	1	1	Light drizzle	<2 km
23/03/2023	07:30 -12:00	06:09	9°c	4	2	Dry	>2 km

3.8 Great Crested Newt

3.8.1 The survey area and a buffer 250m around it were initially assessed using aerial photographs and OS maps for the presence of small, non-flowing waterbodies that were considered to have potential suitability to support breeding great crested newt ('GCN'). Six ponds were identified either within the survey area or the surrounding 250m area.

3.8.2 Four ponds (Pond 1 - 4) were taken forward for further survey. Two ponds to the east of the Site were not surveyed due to access constraints.

3.8.3 The location of the Ponds 1 - 4 is described in **Table 3.3** below and shown on the Habitat Survey Plans, Section 8.

3.8.4 The Ponds were assessed for their potential to support great crested newt using the Habitat Suitability Index ('HIS') scoring method (Oldham et al., 2000) on 5 May 2022. HSI assessment is a quantitative means of evaluating habitat quality for great crested newt and is measured using ten indices. An overall score is obtained for a pond between 0 and 1 with a score of 1 representing optimal conditions for breeding GCN.

2.19 Water samples were then collected from Ponds 2, 3 and 4 on 26 April 2023, and from Pond 1 on 24 May 2023. The water samples were subject to environmental DNA ("eDNA") sampling and analysis for great crested newt. This was undertaken within the recommended survey period (mid-April to the end of June). A total of 20 samples were taken from each pond using a sampling kit provided by Sure-screen and using the standard sampling method (Biggs et al., 2014), which were labelled and sent for analysis.

Table 3.3: Location of Ponds.

Pond reference	Ordnance Survey grid reference
Pond 1	NY 03626 24695
Pond 2	NY 04070 23951
Pond 3	NY 0474224071
Pond 4	NY 04220 22338

2.21 Concurrently with the eDNA survey, a single GCN survey visit was undertaken in accordance with published guidelines (Langton et al., 2001). Three survey methods (egg searches, torch surveys and bottle trapping) were used to survey Ponds 2 - 4 (safe access was not possible to Pond 1). Survey details are shown in **Table 3.4** below:

Table 3.4 GCN survey timings and conditions

Pond Surveyed	Date	Survey Methods Used	Weather
Ponds 2 & 3	26/04/2023	Egg searching, bottle trapping, torching and eDNA	5°C, Dry, F2
Pond 4	28/04/2023	Egg searching, bottle trapping, torching and eDNA	16°, Dry, F2
Pond 1	24/05/2023	eDNA	16°, Dry, F2

3.9 Survey Personnel

3.9.1 Surveys were led by Senior Ecologist Josh Havlin ACIEEM of BSG Ecology. Josh has worked in the ecology sector since 2016 and has completed preliminary ecological appraisals on a wide range of sites in the UK.

3.9.2 This report was drafted by Hannah Breadin ACIEEM, Senior Ecologist at BSG who has worked in the ecological sector for more than 9 years, with input from Josh Havlin.

3.10 Limitations

3.10.1 It was not possible to access the open water of Pond 1 during the newt survey due to dense reeds forming a floating vegetative mat between the banks and open water. As a result the water that was sampled is the relatively shallow water from within the reed bed, with only around 25% of the perimeter of the open water being accessible. This is a limitation on the eDNA sampling, although it did not affect the results of the desk study or the HSI assessment of this pond.

3.10.2 Two ponds to the east of the Site were not surveyed for great crested newts due to access constraints. However 4 ponds with and immediately adjacent to the site were surveyed meaning a reasonable assessment of the likelihood of great crested newts being present within the Site could be made.

3.10.3 Wintering bird surveys cover February and March 2023. The aim of these surveys was not to complete a comprehensive assessment of the survey area by non-breeding wintering bird populations but to provide information to inform the scoping of more formal surveys that might be completed at a later stage and to support consultations with Natural England and other stakeholders in agreeing the level of survey work ultimately required. As such no limitation is identified.

3.10.4 The habitat survey was completed in April 2023 when botanical species may be dormant and undetectable. Most habitats within the survey area were agriculturally improved and of minimal botanical interest. However, some discrete areas of grassland which have the potential to be botanically diverse were present. This is not a significant constraint given the purpose of the report (a preliminary ecological appraisal) but further survey of these discrete areas is recommended within the core botanical growing period to confirm the interest of these habitats.

3.11 Report Qualification

3.11.1 The survey described here was undertaken in accordance with the best practice methodologies current at the time of commissioning. Site circumstances, scientific knowledge or methodological requirements can change during the course of a project, and these external factors may impact on the scope of subsequent work requirements.

3.11.2 All survey work and reporting was undertaken by experienced and qualified ecologists, in accordance with the Code of Professional Conduct of the CIEEM.

3.11.3 All ecological surveys have an expected validity period owing to the tendency of the natural environment to change over time. This validity period varies from receptor to receptor, and is also dependent on the degree of change in a site's management and overall landscape ecology. Where the potential for change is considered to be relevant to the site, this is highlighted in the appropriate section.

3.11.4 This report does not purport to provide detailed, specialist legal advice. Where legislation is referenced, the reader should consult the original legal text, and/or the advice of a qualified environmental lawyer.

4 Results and Interpretation

4.1 Overview

4.1.1 Information on designated sites, habitats and species are described below. The photographs referred to in the text below are presented in **Appendix B**.

4.1.2 Designated sites are shown on **Figure 1** and **Figure 2**, Habitats are show on **Figure 3**.

Statutory Designated Sites

Results and Evaluation

4.1.3 Internationally designated sites present within 10km of the Site are described in **Table 4.1** below.

Table 4.1: Internationally Designated Sites present within 10km of the Site

Site Name	Approximate Distance and Direction from Site	Reason for Designation
River Derwent & Bassenthwaite Lake SAC	1.2km to the east (and hydrologically connected to the Site via watercourses)	Designated for aquatic habitats and species which the River Derwent and Bassenthwaite Lake support, including lamprey species, Atlantic salmon, otter, marsh fritillary butterfly, and floating water plantain.
River Ehen SAC	6.1km to the south	Designated for the presence of freshwater pearl mussel and Atlantic salmon.
Solway Firth SPA	5km to the west	Designated due to its importance during winter for non-breeding waterfowl and non-breeding gulls.
Lake District High Fells SAC	8km to the southeast	Designated for a range of upland habitats including heathland, tarns (waterbodies), grassland, bogs, scree, woodland, and tall herb communities.
North Pennine and Dales Meadows SAC	8.9km to the east	Designated due to the presence of mountain hay meadows and *Molinia* meadows.

12.1.1. Nationally and locally designated statutory sites present within 2km of the Site boundary are described in **Table 4.2** below.

Table 4.2: Nationally Designated Statutory Sites present within 2km of the Site

Designated Site Name	Approximate Distance and Direction from the Site Boundary	Reason for Designation
River Derwent and Tributaries SSSI	1.2km to the east (and hydrologically connected to the Site via watercourses)	Designated for aquatic habitats and species which the River Derwent and its tributaries support.

4.1.4 The Survey area falls within the Natural England Impact Risk Zone ('IRZ') for the designated sites listed in Table 7a, above. The IRZ indicates that planning applications for solar schemes with a footprint greater than 0.5ha could potentially have an adverse impact on the designated sites. It is assumed that these are also relevant for DCO applications.

4.1.5 The accompanying IRZ guidance (Natural England, 2021) states that local planning authorities ('LPAs') have a duty to consult Natural England before granting planning permission on any development that is in or likely to affect a SSSI. The SSSI IRZs can be used by LPAs to consider whether a proposed development is likely to affect a SSSI and determine whether they will need to consult Natural England to seek advice on the nature of any potential SSSI impacts and how they might be avoided or mitigated.'

Potential impacts and recommendations

4.1.6 River Derwent and Bassenthwaite Lake SAC and River Derwent and Bassenthwaite Lake SSSI (same footprint as the SAC). Given the distance (1.2 km) and the buffering that intervening habitats will provide, direct impacts on either the SAC or SSSI are not anticipated to arise from a solar photovoltaic ('PV') development.

4.1.7 Indirect impacts (the potential for airborne dust or other emissions to the air or water during construction to give rise to an adverse impact on designated sites) is possible and the potential requirement for a HRA in respect of the interest of the SAC should be considered / discussed with the planning authority and Natural England.

4.1.8 Likewise, the presence of otter (an interest feature of the SAC) on the survey area should be considered further in respect of the potential requirement for HRA. As discussed below in this report, otter has been recorded on and close to the survey area which is in the catchment of the River Derwent.

4.1.9 The North Pennine Dales Meadows SAC, Borrowdale Woodland Complex SAC, Lake District High Fells SAC and the River Ehen SAC are all located over 6km from the Survey area and as such direct impacts are considered unlikely. Indirect impacts may need to be considered further once detailed plans for the Proposed Development are available.

4.1.10 There is potential for impacts to the Solway Firth SPA through loss of habitat used by SPA birds, in particular those species which will utilise agricultural habitats such as lapwing and curlew, if they use the Site for foraging or roosting.

4.1.11 It is likely that a HRA will need to be undertaken to assess any likely significant effects to internationally designated sites. Natural England should be consulted with respect to the findings of the HRA at the earliest opportunity.

Non-Statutory Designated Sites

Results and Evaluation

4.1.12 Dean Moor CWS is partially located within the Site and is shown on **Figure 2**. This CWS is designated for acidic moorland habitats.

4.1.13 There are a further 13 CWSs and three Special Roadside Verges within 2km of the Site.

Potential impacts and recommendations

4.1.14 The layout of the Proposed Development should avoid direct impacts to Dean Moor CWS, where possible. It is recommended that further botanical survey information is secured in respect of Dean Moor CWS, to fully assess the potential for effects on the interest features. The potential for the enhancement of the CWS through the implementation of appropriate management should be considered, and subject to agreement with stakeholders.

4.1.15 Effects on the interest of other non-statutory designated sites are unlikely to be significant if they are not directly impacted (i.e. if they are excluded from the development footprint). The potential impact of emissions to the air and water during the construction and decommissioning phases of the Proposed Development should be considered further.

4.2 Habitats

4.2.1 Notable habitats identified through the desk study are shown on **Figure 2** Non-Statutory Sites and Notable Habitats. All habitat identified during the site visit are shown on **Figures 3a** and **3b** with Target Notes identifying features of interest (further detail on Target Notes is present within **Appendix A**).

Notable Habitats

Lowland dry acid grassland

4.2.2 Slopes of the gorge containing Thiefs Gill on the southern boundary of the survey area feature grazed semi-improved acid grassland. The habitat is comprised of soft rush Juncus effusus, crested dog's tail Cynosurus cristatus, mat-grass Nardus stricta, common sorrel, lady's bedstraw Galium verum, tormentil Potentilla erecta, bilberry Vaccinium myrtillus, and sheep fescue.

Hedgerow

4.2.3 Several hedgerows are present, dominated by hawthorn and blackthorn. Common tree species include ash, goat willow, English oak, alder and beech. One hedgerow on the southern part of the survey area (H7) is dominated by gorse Ulex europaeus. Common ground flora species include broad-leaved dock, dandelion, creeping buttercup, hairy bittercress, common nettle, rosebay willowherb, foxglove, bramble, gorse and honeysuckle. Dog-violet, creeping thistle, dog rose, lesser stitchwort Stellaria graminea, hard fern, cleavers, spear thistle Cirsium vulgare and holly are also present.

Ancient woodland

4.2.4 Seven parcels of ancient woodland are present within 2km of the Site, the closest being located adjacent to the western part of the Site boundary in Area C. No ancient woodland is present within the Site.

Lowland heathland

4.2.5 An area of the lowland heathland is also mapped immediately adjacent to the west of the Site. No lowland heathland is present within the Site.

Other habitats

Modified grassland

4.2.6 Most fields on the southern half of the survey area are heavily grazed and are dominated by perennial rye grass Lolium perenne. Soft rush Juncus effusus is present in damper areas, such as the shallow valley adjacent to the larger coniferous plantation woodland block and along watercourses. Other species present include common bent Agrostis capillaris, creeping bent Agrostis stolonifera, red fescue Festuca rubra, sheeps fescue Festuca ovina, rough meadow grass Poa trivialis, Timothy Phleum pratense, sweet vernal grass Anthoxanthum odoratum, hard rush Juncus inflexus, white clover Trifolium repens, creeping buttercup Ranunculus repens, common nettle Urtica dioica, broad-leaved dock Rumex obtusifolius, yarrow Achillea millefolium, cuckoo flower Cardamine pratensis, and hairy bittercress Cardamine hirsuta.

4.2.7 Whilst a range of species were found to be present, including several grass species, perennial rye grass was dominant across all fields with other grass species at much lower densities or being highly localised. Forb species were also sparse within the sward, which was found to be uniformly below 7cm in height across these fields. In addition, areas of bare ground were present indicative of poaching during wet weather.

4.2.8 Several of the fields on the northern half of the survey area contain a similar species composition to those in the southern half, though some also exhibit some key differences. Large swathes of these fields are dominated by soft rush and hard rush that appear to be regularly topped. Outside of the areas dominated by rushes, the habitat is dominated by perennial rye grass with occasional common bent, red fescue, Timothy, annual meadow grass Poa annua, and rarely white clover, broad-leaved dock, cuckoo flower, common nettle, and hairy bittercress.

4.2.9 These fields are also heavily grazed, with areas of poached bare ground within the sward. The sward is, notwithstanding areas dominated by rushes, uniformly less than 7cm in height.

4.2.10 During a breeding bird survey in May 2023 (after the initial habitat survey in April 2023), some of the northern fields were found to contain several species of sedge that were not previously in evidence. These species include common sedge Carex nigra, false fox sedge Carex otrubae, and common spike-rush Eleocharis palustris. The presence of these species indicates a higher level of diversity than was originally recorded, though a low diversity of forb species means that the grassland is not currently considered sufficiently distinctive to be recorded as a other neutral grassland.

Other neutral grassland

4.2.11 Other neutral grassland is dominated by soft rush, perennial rye grass, tufted hair grass Deschampsia cespitosa and broad-leaved dock. Other commonly occurring species include creeping thistle Cirsium arvense, common nettle, cocksfoot Dactylis glomerata, creeping buttercup, Yorkshire fog Holcus lanatus, common bird's-foot-trefoil Lotus corniculatus and angelica Angelica sylvestris. Less common species present include curled dock Rumex crispus, soft rush, hard rush, foxglove Digitalis purpurea, common sorrel Rumex acetosa, rosebay willowherb Epilobium angustifolium, white clover, marsh thistle Cirsium palustre, dandelion Taraxacum officinalis, silverweed Potentilla anserina, common bent grass, white dead nettle Lamium album, common spotted orchid Dactylorhiza fuchsii, alder saplings Alnus glutinosa, horsetail Equisetum arvense, lesser celandine Ranunculus ficaria, colt's foot Tussilago farfara, gorse Ulex europaeus, common ragwort Senecio jacobaea, goat willow Salix caprea, reed canary grass Phalaris arundinacea and bramble Rubus fruticosus.

4.2.12 The grassland around Pond 1 is rank but found to be dominated by soft rush and Yorkshire fog with locally dominate areas of tufted hair grass. Less abundant species include common sorrel, Alexanders Smyrnium olusatrum, common hogweed Heracleum sphondylium, bramble, bracken Pteridium aquilinum and common ragwort.

4.2.13 An area of damp grassland was present in the southwest of the survey area, dominated by hard rush and other common species include meadow buttercup, soft rush Juncus effusus, compact rush Juncus conglomeratus, sharp flowered rush Juncus acutiflorus, cuckoo flower, marsh thistle, dandelion, common sedge Carex nigra, star sedge Carex echinata, marsh bedstraw Galium tinctorium, water forget-me-not Myosotis scorpoides, hairy willowherb Epilobium hirsutum, and broad-leaved willowherb Epilobium montanum.

Other woodland; broadleaved

4.2.14 Much of the northern part of the survey area is dominated by broadleaved plantation woodland. Canopy species consist of alder, goat willow Salix caprea, silver birch Betula pendula, English oak Quercus robur and ash Fraxinus excelsior. Understory species include common cherry Prunus avium, holly Ilex aquifolium and hawthorn Crataegus monogyna. Ground layer species include common sorrel, soft rush, hard rush, curled dock, broad-leaved dock, marsh thistle, wild carrot Daucus carota, Yorkshire fog, hairy willowherb Epilobium parviflorum, creeping buttercup, meadow buttercup Ranunculus acris, floating sweet-grass Glyceria fluitans, bramble, cuckoo flower, horsetail, angelica, common bent grass, common bird's-foot-trefoil, common nettle, gorse, cleavers Galium aparine, common spotted orchid, bracken, honeysuckle Lonicera periclymenum, deer grass Trichophorum germanicum and Pendulous sedge Carex pendula. A few conifers are present in the broadleaved woodland which include Scots pine Pinus sylvestris, larch Larix decidua and sitka spruce Picea sitchensis. Additionally, two area are damper: one has localized areas of wetness and the other has a damp ground layer with a high proportion of bryophytes and evidence of deer grazing. In the more extensive areas of this woodland, grassy rides are present. These were mapped as the appropriate grassland habitats.

4.2.15 The ground layer of broadleaved woodland on the slope is similar in composition to the semi-improved neutral grassland present elsewhere on the survey area.

Other woodland; mixed

4.2.16 A small mixed planation is present in the east of the survey area. Canopy species consist of Sitka spruce, alder, silver birch, Scots pine, common cherry, hawthorn (left to grow tall), hazel Corylus avellana, sycamore Acer pseudoplatanus, field maple Acer campestre, grey willow and English oak. Understory species are holly, bramble and blackthorn Prunus spinosa. Ground species present are tufted hair grass, soft rush, marsh thistle, common sorrel, common nettle, Yorkshire fog, broad-leaved dock, creeping thistle, rosebay willowherb, lesser celandine, fox glove, common hogweed, common nettle and dandelion. Rhododendron Rhododendron ponticum is present in low concentration.

Felled woodland

4.2.17 A small section of woodland directly south of the mixed planation woodland has been recently felled.

Other woodland; coniferous

4.2.18 Two conifer plantations are present in the south of the survey area and are dominated by Sitka spruce. A sparse ground layer at the fringes of the conifer blocks contains broad-leaved dock, tufted hair grass, soft rush, red fescue, bracken, and gorse. No ground layer is present in the centre of the blocks due to lack of light. Two younger areas of recently planted coniferous plantation woodland are present on the southern slope.

Line of trees (UKHab equivalent: line of trees)

4.2.19 There is one line of trees present on the survey area and it is associated with a bank. Species include beech Fagus sylvatica, alder, silver birch, elder Sambucus nigra, hawthorn, bramble, ground elder Aegopodium Podagraria, lesser celandine, herb Robert Geranium robertianum, common heather Calluna vulgaris, common nettle, meadowsweet Filipendula ulmaria, cow parsley Anthriscus sylvestris, angelica, soft rush, broadleaved willow herb Epilobium montanum, hairy bittercress, hard fern Blechnum spicant, Spanish bluebell Hyacinthoides hispanica, dog rose Rosa canina, dog-violet Viola riviniana, daffodil Narcissus sp., white dead nettle, cleavers, gorse, fox glove, honeysuckle and crab apple Malus Sylvestris.

Mixed scrub

4.2.20 Several areas of dense scrub are present, including on damper ground. Most areas are dominated by grey willow with occasional alder. Hawthorn scrub and gorse scrub are also present. Ground layer species are tufted hair grass, soft rush, common bent grass, silverweed, dandelion, angelica, broad-leaved dock, daisy Bellis perennis, ribwort plantain Plantago lanceolata, common hogweed, honeysuckle, marsh thistle, broad-leaved willowherb, marsh marigold Caltha palustris and hemlock water dropwort Oenanthe crocata.

Flush

4.2.21 Two flushes are present in the gorge in the south of the survey area. These flushes were dominated by sun spurge Euphorbia helioscopia, with soft rush, compact rush, and common nettle. The water table was near the surface at the time of survey.

Ponds

4.2.22 There are 4 ponds within the survey area. Pond 1 was partly inaccessible to surveyors as it is surrounded by 20 m of swamp dominated by floating bulrush. Ponds 3 and 4 are surrounded by marshy grassland vegetation. Pond 3 also has an island in the middle of the pond with goat willow scrub.

Swamp

4.2.23 Swamp is present at the margins of Ponds 1 and 2, with a species composition of alexanders Smyrnium olusatrum, water mint, floating sweet-grass, greater pond sedge Carex riparia, marsh thistle, bulrush Typha latifolia, meadowsweet, a horsetail and marsh bedstraw. Alder is scattered throughout the habitat. The water table is above ground.

Streams

4.2.24 The southern part of the survey area contains a series of watercourses. The main watercourse, Thief Gill, flows northwards from the southern boundary, through a steep-sided gorge, before discharging offsite via a culvert under the road on the eastern boundary. The watercourse is joined by two smaller watercourses.

4.2.25 A smaller watercourse flows down the western boundary of the southern part of the Site where it is joined by another watercourse flowing west from one of the coniferous plantation woodland blocks.

4.2.26 The watercourses appear (visually) to have poor water quality. The bed material is primarily cobbles, gravel, and silt, with the cobbles being well-impacted into the substrate.

Buildings

4.2.27 Two buildings are present within the survey area. The potential of these structures to support bats and breeding birds is discussed in the ‘protected species’ section of this report.

Potential impacts and recommendations

4.2.28 There is potential for direct impacts to notable habitats such as ancient woodland and hedgerows, and other habitats of ecological value such as plantation woodland, and ponds although these could be avoided by designing appropriate stand-off distances from development activities.

4.2.29 Grassland habitat will be lost although the extent of loss will be limited given the nature of the proposed development. It is assumed at this stage that the grassland beneath the solar arrays will be retained, although there is scope to manage the retained grassland less intensively. Grassland in the stand-off buffers along hedge lines has potential to be diversified and managed to benefit invertebrates, farmland birds and commuting / feeding bats.

4.2.30 The Proposed Development has the potential to adversely impact the watercourses a as a result of run-off, dust or any pollution events that could arise. These potential impacts would need to be assessed further once detailed proposals for the Proposed Development are available. However, it is likely that the implementation of best practice for works near watercourses would provide appropriate mitigation.

4.2.31 It is assumed that swamp, ponds and other habitats will be unaffected by the Proposed Deevlopment. Opportunities for further habitat creation (such as the creation of new wetland habitat) should be considered as the scheme evolves.

4.2.32 Removal of woodland, trees, hedges should be avoided, other than limited clearance to enable access, where required. The removal of habitats should be done sympathetically. For example, through the implementation of phased clearance of habitats to minimise impacts to species.

4.2.33 The Proposed Development's design should incorporate appropriate buffers between infrastructure development and sensitive habitats, such as watercourses and woodland. The enhancement of watercourses within the Site through the exclusion of livestock and the implementation of supplementary planting to reduce the erosion of banks and sediment input.

4.2.34 During the operational phase of the Proposed Development, the intensity of sheep grazing within the Site is likely to be reduced which will allow an improvement of habitat quality and diversity relative to the existing baseline conditions. In addition, this is likely to provide further enhancement to watercourses within the Site, and downstream, through a reduction in nutrients generated through agricultural activity entering these watercourses.

4.3 Species

4.3.1 Results of the desk study and field survey are presented below to determine the likelihood of protected or notable species to be present on-Site.

4.4 Bats

Results and Evaluation

Bats - potential roosting assessment- buildings

4.4.1 Two agricultural barns are present on the southern half of the survey area. Building 1 is located at OS grid reference NY 05062 23343 and Building 2 is located at NY 05090 23334.

4.4.2 Both buildings feature pitched roofs of corrugated asbestos concrete sheeting and appear to be steel-framed. A breezeblock wall is built up to approximately 1.5m from the ground with the remaining walls of each side of the structure being constructed of wooden slats, with gaps between each piece of wood. The interior of the buildings is therefore open to the elements, reducing the suitability of the interior for roosting bats.

4.4.3 Whilst some potential roost features ('PRFs') may be present between the steel frame of the buildings and the wooden panelling / the roof sheeting, it is considered that these PRFs are unsuitable for bats due to the internal temperature and humidity conditions created by the overall nature of the buildings' construction. Building 1 and Building 2 are therefore assessed as being of negligible suitability for roosting bats.

4.4.4 A third building is located on the northern part of the survey area and is associated with the Potato Pot Windfarm (OS grid reference NY 04164 24756). This is a single-storey building of brick and mortar construction with a simple, slate-covered, pitched roof. The building has plastic fascias and soffits, which appear to be well sealed. No potential roost features were identified on the building and it is considered to be of negligible suitability for roosting bats.

Bats - potential roosting assessment- trees

4.4.5 The woodland areas of the survey area are predominantly young or early mature. The tree specimens within these habitats are typically uniform in age with narrow trunk diameters and lacking splits, cavities and aerial dead wood with the potential to support roosting bats. However, tree age does not definitively rule out the presence of roosting bats (BTHK, 2018), and further survey would be needed should any of the early mature woodland areas be impacted by the Proposed Development.

4.4.6 A number of more mature trees were recorded along the road that divides the northern and southern parts of the survey area however, and these were noted to contain potential roost features.

4.4.7 Mature woodland is located outside the survey area to the west and this habitat is likely to contain potential roosting opportunities to bats.

Bats – general habitat assessment

4.4.8 The grazed grassland areas of the survey area are likely to provide lower suitability foraging habitat for bats (see, for instance, Brandt et al, 2007). However, the watercourses, ponds and areas of woodland have the potential to provide better foraging habitat. The habitat in the surrounding area is dominated by arable, pasture and upland heath, all of which is likely to be of lower foraging value. Overall, the survey area is likely to be of low to moderate potential for commuting and foraging bats.

4.4.9 The data search returned a limited range of bats from 17 individual records: "bat species", whiskered / Brandt's bat Myotis mystacinus / brandtii, Daubenton's bat Myotis daubentonii, noctule bat Nyctalus noctula, pipistrelle bat species, common pipistrelle Pipistrellus pipistrellus, soprano pipistrelle Pipistrellus pygmaeus, and brown long-eared bat Plecotus auratus. Of the records supplied, approximately half appear to be records of roosting bats, with the largest being a 130-count "bat" roost near Gilgarron from 1991. The latest likely roost records are for a 50-count event in 2017 near Asby, to the south (pipistrelle species).

4.4.10 Surveys in 2012 to inform the wind farm development used Static bat detectors at three locations and these recorded low levels of bat activity at a maximum of 11.72 bat passes per hour at one of the detectors. Common pipistrelle was the most commonly recorded species and other species included pipistrelle species, soprano pipistrelle, Myotis sp., Daubenton's bat, Brandt's bat Myotis brandtii, whiskered / Brandt's bat and noctule bat. This is consistent with the desk study returns and indicates a relatively low level of bat interest at the survey area.

Potential impacts and recommendations

4.4.11 In line with most solar PV developments, impacts from the Proposed Development are very likely to be minimal on the principal bat foraging and commuting habitats (hedges, watercourses, wetlands, scrub and woodland). Grassland where solar development will be focused mostly have less interest for bats and will in any case be retained in large part. In addition, there is a likelihood of grassland diversification along retained buffer as the design of the scheme emerges. As such, no detailed bat activity surveys are recommended at this stage. However, it is recommended that consultation with Natural England and the local planning authority is undertaken to agree this approach.

4.4.12 If any trees with bat roosting potential are likely to be affected by the Proposed Development then these would be surveyed to determine whether bats are roosting and likely to be affected. On the basis of no likely impact on buildings, no further survey for bat roosting in buildings is recommended.

4.5 Badgers

Results and Evaluation

4.5.1 The data search returned no records of badger Meles meles within the survey area. Five records were returned, the closest of which is from approximately 350m west.

4.5.2 No evidence of badger presence was recorded during the survey. Woodland habitats will provide both good potential sett creation opportunities (although no setts were recorded) and good foraging habitat.

Potential impacts and recommendations

4.5.3 Badgers are highly mobile and can change their use of an area (and their territories) in response to external pressures (such as territorial disputes or anthropogenic activities). Given the potential for parts of the survey area to become colonised by badger, checks for signs of badger activity on the survey area over the course of forthcoming survey visits is recommended.

4.6 Birds

Results and Evaluation

Breeding birds

4.6.1 Records of rook Corvus frugilegus, wheatear Oenanthe oenanthe and "sensitive species" were returned for the Survey area itself from the desk study. There are numerous records of birds in the area, including many for species potentially sensitive to solar farm development at the Survey area, such as mute swan Cygnus olor, lapwing Vanellus vanellus, curlew Numenius arquata, skylark Alauda arvensis, and dipper Cinclus cinclus.

4.6.2 The scrub and young woodland located within the survey area is suitable for breeding passerines. The grassland habitats are suitable for ground nesting species, although

opportunities are likely confined to locally dominant soft rush tussocks as the grass itself is heavily grazed by sheep.

4.6.3 The wetland habitats around the ponds offer suitable nesting opportunities for wildfowl and certain passerine species such as reed bunting Emberiza schoeniculus and grasshopper warbler Locustella nivalis.

Wintering bird

4.6.4 The Solway Firth SPA is designated for a range of passage and wintering birds, some of which could make use of the survey area. It is therefore possible that the survey area is "functionally linked" to the SPA (meaning, broadly, that it provides supporting habitat that could be used by SPA-interest birds).

4.6.5 There are numerous records of birds in the area, including many for species potentially sensitive to solar farm development, such as greylag goose Answer anser, pink-footed goose Answer brachyrhyncus, mute swan Cygnus olor, oystercatcher Haematopus ostralegus, lapwing Vanellus vanellus, herring gull Larus argentatus, and curlew Numenius arquata.

4.6.6 Very few birds were recorded within the survey area during the wintering bird characterisation survey. Observations of note include a group of lapwings on the periphery, an overflying buzzard Buteo buteo, raven Corvus corax, pink-footed geese Anser brachyrhynchus, and kestrel Falco tinnunculus. Some small pockets of potential ornithological interest are present associated with hedgerow or woodland edges. However, the majority of the survey area is heavily sheep-grazed with a resulting close sward lacking habitat likely to be of high value to wintering birds.

4.6.7 Breeding and wintering bird surveys in 2011/12 commissioned by Airvolution Energy identified a range of breeding and wintering birds across their study area that was consistent with the recent wider desk study for the survey area. It was also noted in the Potato Pot ES Chapter 6 that the wind turbine Survey area is within a hen harrier sensitive location.

Potential impacts and recommendations

4.6.8 A requirement for a HRA in respect of the interest of the SPA is possible and further survey would be required to confirm the ornithological value of the survey area.

4.6.9 In addition, the scheme will give rise to more localised landscape changes and may alter its use by breeding birds (in particular, ground-nesting species) over a relatively large area.

4.6.10 Further survey for birds should include breeding bird surveys between March and July 2023 (underway at the time of writing). In addition, to inform the requirement for HRA wintering bird surveys during winter 2023/2024, with the scope agreed with Natural England.

4.6.11 It is recommended that up-to-date information on the location of hen harrier sensitive locations is secured and that consultation with RSPB and the local planning authority, as well as Natural England, is undertaken in respect of the scope of further bird survey.

4.6.12 Nearby barns (see below, potential roost assessment for bats) have potential to support nesting barn owl, but these are to be retained and the potential for significant adverse impacts on barn owl are limited to disturbance of potential nest sites depending on proximity to barns, timing of work and presence of nesting barn owl. Heavily grazed grasslands on the southern part of the Survey area have low potential to support barn owl prey species (land to on the northern part has higher potential). If unavoidable significant disturbance of barns is likely, then a check for evidence of nesting barn owl in nearby barns would be recommended.

4.7 Otter and water vole

4.7.1 Several minor watercourses flow through the southern half of the survey area and two otter spraints were recorded: one along Thief Gill and the other on the watercourse to the west of Thief Gill in the southern part of the survey area (see Target Note 4). The stream habitats provide potential foraging and commuting habitat for otter, although holt creation opportunities are limited given the open nature of the banks (tree and scrub cover is generally absent from the banks) and the degree to which livestock poaching has occurred along the banksides. Nonetheless, the potential for laying up areas cannot be ruled out.

4.7.2 There are two records of otter close to the survey area; one at the southern end of the survey area, close to the southern extent of the main watercourse (Thief Gill) and the other on the eastern boundary where the watercourse leaves the survey area. This and the spraints suggest that otters are commuting along at least one of the watercourses. 21 records of otter were returned in total from the desk study, the most recent of which is from 2008.

4.7.3 There were two records of water vole Arvicola amphibius from the desk study (both from a similar location, approximately 1.5km south-west of the Survey area. No signs of water vole were recorded during the survey but the watercourses have potential to support the species.

Potential impacts and recommendations

4.7.4 Development of the survey area has the potential to impact habitat used by commuting and foraging otter, and with the potential to support otter resting places. Potential impacts include damage or destruction to resting places that may be present, harm to otter, and disturbance resulting from increased noise and light.

4.7.5 The River Derwent and Bassenthwaite Lake SAC is designated in part for the presence of otter, with animals from the SAC making use of the survey area. It is therefore possible that the survey area is “functionally linked” to the SAC (meaning, broadly, that it provides supporting habitat that is used by SAC-interest species). A requirement for HRA in respect of otters and the interest of the SAC is therefore likely.

4.7.6 Further survey is recommended to assess the value / use of watercourse habitats to otter and confirm the presence / absence of resting places. This will inform the assessment of likelihood of an impact arising and the need for particular mitigation or design measures.

4.7.7 Water vole surveys of any affected watercourses or water bodies are also recommended to be completed alongside the otter surveys.

4.8 Reptiles

4.8.1 The desk study identified eight records of common lizard Zootoca vivipara (closest: 700m west and 700m south of the survey area); and seven of adder Vipera berus (one location, 1.7km south-west of the survey area).

4.8.2 The heavily grazed grassland habitats on the survey area have low suitability for reptiles, lacking the structural diversity to provide basking and foraging opportunities. The coarser areas of grassland such as the areas around the existing turbines and woodland edges are suitable for common reptiles species such as common lizard and slow worm Anguis fragilis. Habitat in the surrounding area contains upland heath, further woodland habitat and a number of quarries, all of which will provide potential habitat for reptiles.

4.8.3 A single common lizard was recorded during survey in the north-east corner of the survey area. Common species of reptiles, such as slow worms and common lizards are likely to be present on Site, albeit in low numbers.

Potential impacts and recommendations

4.8.4 Loss of habitat that is suitable for reptiles is unlikely, and the risk of killing / injury of reptiles is very limited given the very open and short-sward nature of the grassland that is likely to form the development footprint. Further survey for reptiles is therefore not currently recommended, unless the design of the Proposed Development includes locations or activities that would be likely to affect potential reptile cover. Depending on the layout of the scheme it is likely that implementation of a precautionary reptile method statement to ensure no killing of injury of reptiles would be adequate.

4.9 Great crested newts

4.9.1 The desk study identified a single record of great crested newt Triturus cristatus from 1.15km north-west of the Survey area, and over 1.2km from Pond 1, from a pond in Lillyhall. Assuming the development footprint is limited to open grassland, the record would be 1.5km from developed land. No records of previous EPS (European Protected Species) licences or licence returns, or positive GCN pond survey results have been identified on the MAGIC website.

4.9.2 HSI scores for the ponds are presented in **Table 4.3** below. An HSI score of 0.79 was assigned to Pond 1 and 2 indicating they are of 'good' suitability for supporting GCN while Ponds 3 and 4 were assigned scores of 0.84 and 0.65 indicating they are of 'excellent' and 'average' suitability respectively.

Table 4.3: Results of HSI Survey

Habitat Index	Pond 1		Pond 2		Pond 3		Pond 4	
Map location	A	1.00	A	1.00	A	1.00	A	1.00
area (m^2) =	*5830*	0.80	*2100*	0.80	*545*	1.00	*150*	0.25
Dessication rate	never	0.90	never	0.90	never	0.90	sometimes	0.50
Water quality	good	1.00	good	1.00	good	1.00	moderate	0.67
Shade (% of margin shaded 1m from bank)	0	1.00	0	1.00	0	1.00	0	1.00
Waterfowl	minor	0.67	minor	0.67	minor	0.67	absent	1.00
Fish population	possible	0.67	possible	0.67	possible	0.67	absent	1.00
Number of ponds within 1km	5	0.75	2	0.60	1	0.45	2	0.60
Terrestrial habitat	good	1.00	good	1.00	good	1.00	moderate	0.67
Macrophyte cover (%)	10	0.41	20	0.51	80	1.00	10	0.41
HSI score =	**0.79**		**0.79**		**0.84**		**0.65**	
Pond suitability =	**good**		**good**		**excellent**		**average**	

4.9.3 Environmental DNA surveys, and a survey using traditional techniques (bottle trapping, torching and egg searching) identified no evidence of GCN. eDNA results for all ponds were negative.

4.9.4 Although the eDNA survey of Pond 1 was constrained, there is a lack of nearby records and the low sward grassland that is likely to make up the footprint of the Proposed Development has low potential for great crested newts. The results of the surveys completed suggest that it is unlikely that GCN are present within the Site.

4.10 Dormice

4.10.1 Whilst hedgerows and woodland within, and adjacent to, the Site are suitable for dormice, the Site is on the edge of the natural range of this species in the UK and their presence is unlikely.

Potential impacts and recommendations

4.10.2 If dormice are present on the Site, the design of the Proposed Development will retain all suitable dormice habitat (woodland, scrub, and hedgerows), and the design is likely to provide additional habitats for this species in the unlikely event that they are present. Operational phase management of the habitats within the Site will also improve existing suitable habitats.

4.10.3 Therefore, likely significant effects from the Proposed Development on dormice are not anticipated and no further surveys are considered necessary at this time.

4.11 Brown hare

4.11.1 A single record was returned for the survey area, and eight records in total, mostly within 1.5km of the survey area.

Potential impacts and recommendations

4.11.2 The bulk of the survey area has limited cover for brown hare Lepus europaeus and the species is unlikely to be significantly affected by the proposed development. Depending on the layout of the Proposed Development, consideration should be given to a construction phase method statement to ensure no harm to the species if vegetation that could provide cover for the species is impacted.

4.11.3 Structural diversification of field margins (for instance by sowing with tussocky grasses) could provide more cover for brown hare.

4.12 Red squirrel

4.12.1 One record of red squirrel Sciurus vulgaris was returned from within the survey area, and there are several close by in wooded areas. The bulk of the records appear to be from around the local settlements (where they are more likely to be recorded).

Potential impacts and recommendations

4.12.2 There is limited woodland cover for the species within the Site, and woodland will be retained during construction. Consideration should be given to a construction phase method statement to ensure no harm to the species if woodland is impacted.

4.13 Water shrew

4.13.1 Two records of water shrew Neomys fodiens were returned from approximately 900m west of the survey area and approximately 2km south.

Potential impacts and recommendations

4.13.2 It is possible that the species is present on the survey area, but unless the watercourses / water bodies are impacted, the species is unlikely to be significantly affected.

4.14 Polecat

4.14.1 Two records of polecat Mustela putorius were returned, from similar locations approximately 1.8 km to the north of the survey area.

Potential impacts and recommendations

4.14.2 Presence of polecat cannot be discounted, but unless suitable habitats such as watercourses, ponds, hedges, or woodland are impacted, the species is unlikely to be significantly affected. Consideration should be given to a construction phase method statement to ensure no harm to the species if structural vegetation or watercourses are impacted.

4.15 Hedgehog

4.15.1 No records of hedgehog Erinaceus europaeus were returned from the survey area. The closest record is from 950m west, at Gilgarran.

Potential impacts and recommendations

4.15.2 If hedgehog are on the survey area they would likely be restricted to scrub, hedgerows and woodland cover. If there is no significant impact on these habitats then no significant effect on the species would be expected. Depending on the layout of the Proposed Development, consideration should be given to a construction phase method statement to ensure no harm to the species if structural vegetation is impacted.

5 Conclusion

5.1.1 Stantec UK Ltd was commissioned by FVS Dean Moor Limited to undertake a PEA at the Site for the Proposed Development. The purpose of the PEA is to provide preliminary baseline information about the likely / potential ecological interest of the Site, further survey recommendations, and early comment on potential constraints and opportunities associated with the potential ecological interest of the Site.

5.1.2 The Site is predominantly pasture that is grazed by cattle and sheep. It is generally drained by a series of unnamed minor watercourses which run broadly south to north and west to east in the southern part of the Site

5.1.3 A number of statutory designated sites are present near to the Site, including the River Derwent and Bassenthwaite Lake SAC/SSSI and Solway Firth SPA. Further surveys and assessment (including HRA) are recommended to fully understand potential effects to these receptors.

5.1.4 Dean Moor CWS is partially located within the Site. The layout of the Proposed Development should avoid direct impacts to Dean Moor CWS where possible. It is recommended that further botanical survey information is secured in respect of Dean Moor CWS, to fully assess the potential for effects on the interest features. The potential for the enhancement of the CWS through the implementation of appropriate management should be considered, and subject to agreement with stakeholders.

5.1.5 There is potential for direct impacts to notable habitats such as ancient woodland and hedgerows, and other habitats of ecological value such as plantation woodland, and ponds although these can be avoided by designing appropriate stand-off distances from development activities.

5.1.6 Presence of or potential for a number of notable species has been identified. Further surveys are recommended for:

- Otter and water vole;
- Breeding and wintering birds;
- Habitats; and
- Roosting bats (if required).

5.1.7 A range of measures to mitigate impacts and provide ecological enhancements are recommended.

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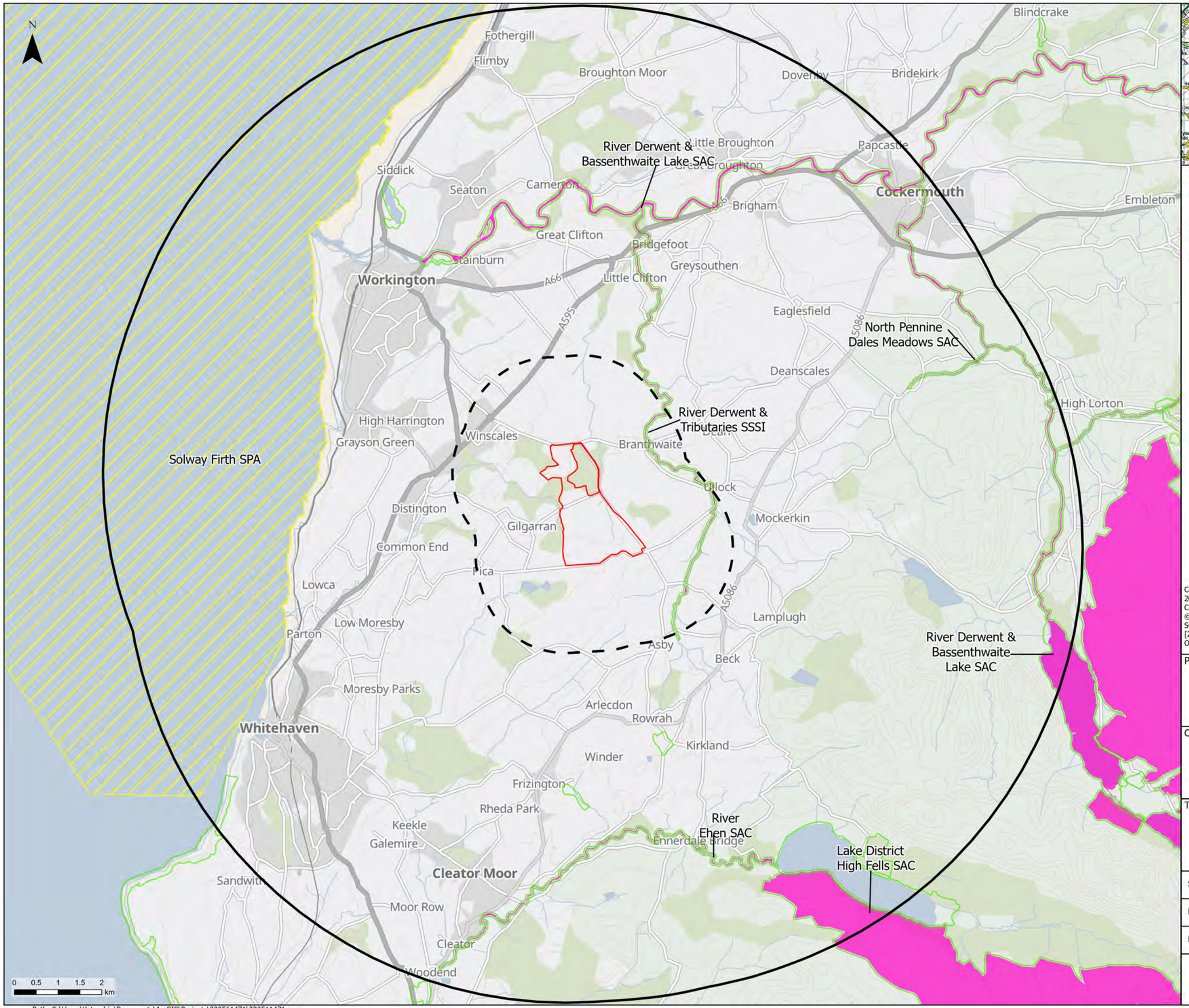
7 Figures



Legend

- Draft Order Limits
- 2km Buffer from Draft Order Limits
- 10km Buffer from Draft Order Limits
- Sites of Special Scientific Interest (SSSI)
- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)

Project Title

Dean Moor Solar Farm

Client

FVS Dean Moor Limited

Title

DEAN MOOR SOLAR FARM
DEVELOPMENT CONSENT ORDER
Statutory Designated Sites

Scale: 1:80,000 @ A3	Date: 08/06/2023
Drawn: TL	Checked: HC
Figure: 1	Rev: A

Stantec

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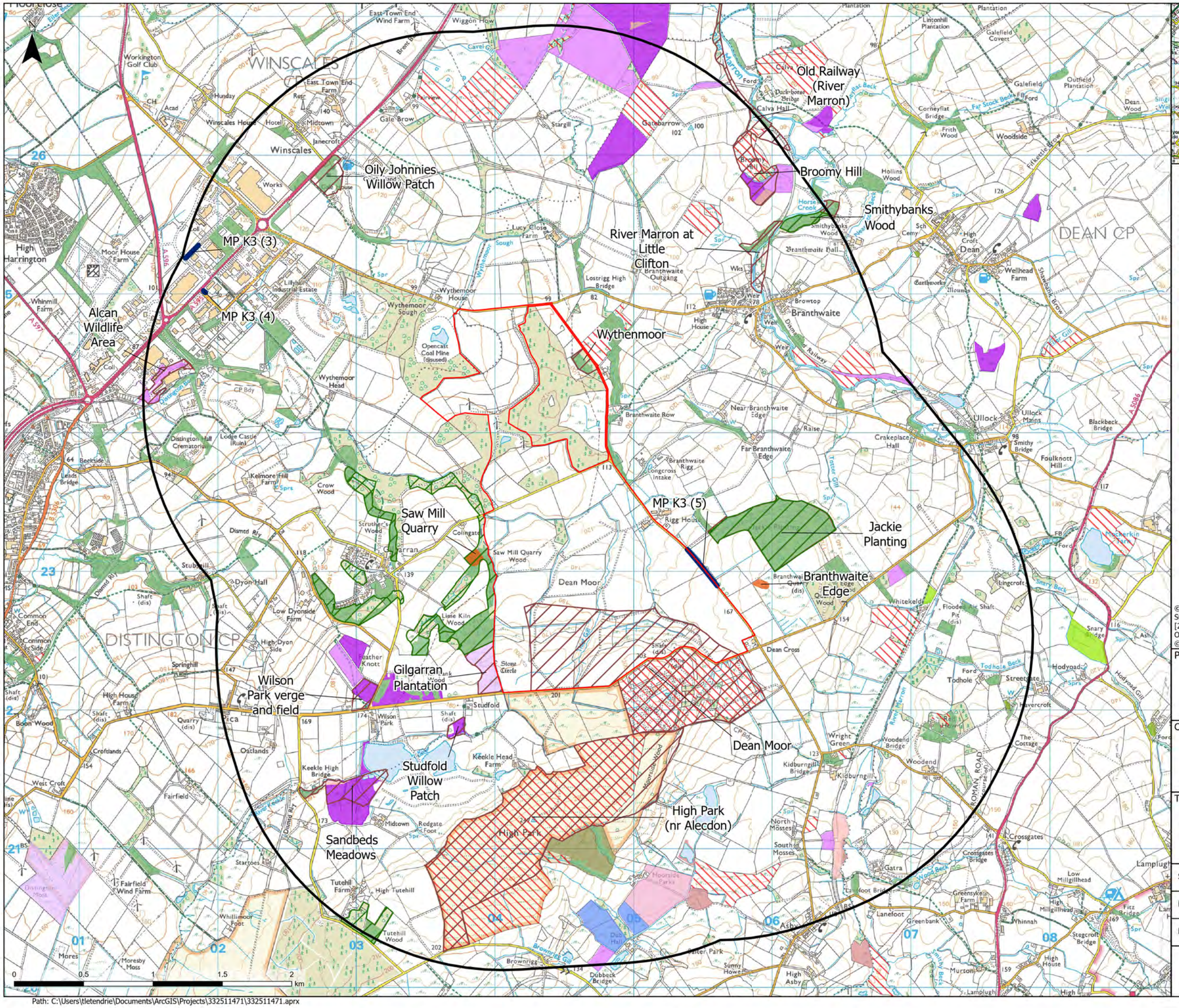

Legend

- Draft Order Limits
- 2km Buffer from Draft Order Limits
- Ancient Woodland
- County Wildlife Site
- Local Geological Site
- Special Roadside Verge

Priority Habitat

- Coastal and floodplain grazing marsh
- Deciduous woodland
- Good quality semi-improved grassland
- Lowland calcareous grassland
- Lowland dry acid grassland
- Lowland fens
- Lowland heathland
- Lowland meadows
- No main habitat but additional habitats present
- Purple moor grass and rush pastures
- Traditional orchard
- Upland hay meadow

Project Title

Dean Moor Solar Farm

Client

FVS Dean Moor Limited

Title

DEAN MOOR SOLAR FARM
DEVELOPMENT CONSENT ORDER
Non-Statutory Sites and Notable Habitats

Scale: 1:25,000 @ A3	Date: 08/06/2023
Drawn: TL	Checked: HC
Figure: 2	Rev: A

Stantec

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Wythemoor House

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Pond 1

Pond 2

Pond 3

Bannock Row Fa

truther Wood

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Legend

- Draft Order Limits
- Target Note

UK Habitat

- Tree
- Scattered scrub
- Fence
- Hedgerow
- Rivers and streams
- Swamp
- Natural lake or pond
- Other neutral grassland
- Modified grassland
- Mixed scrub
- Other woodland; broadleaved
- Other woodland; mixed
- Built up areas and gardens
- Buildings

Project Title

Dean Moor Solar Farm

Client

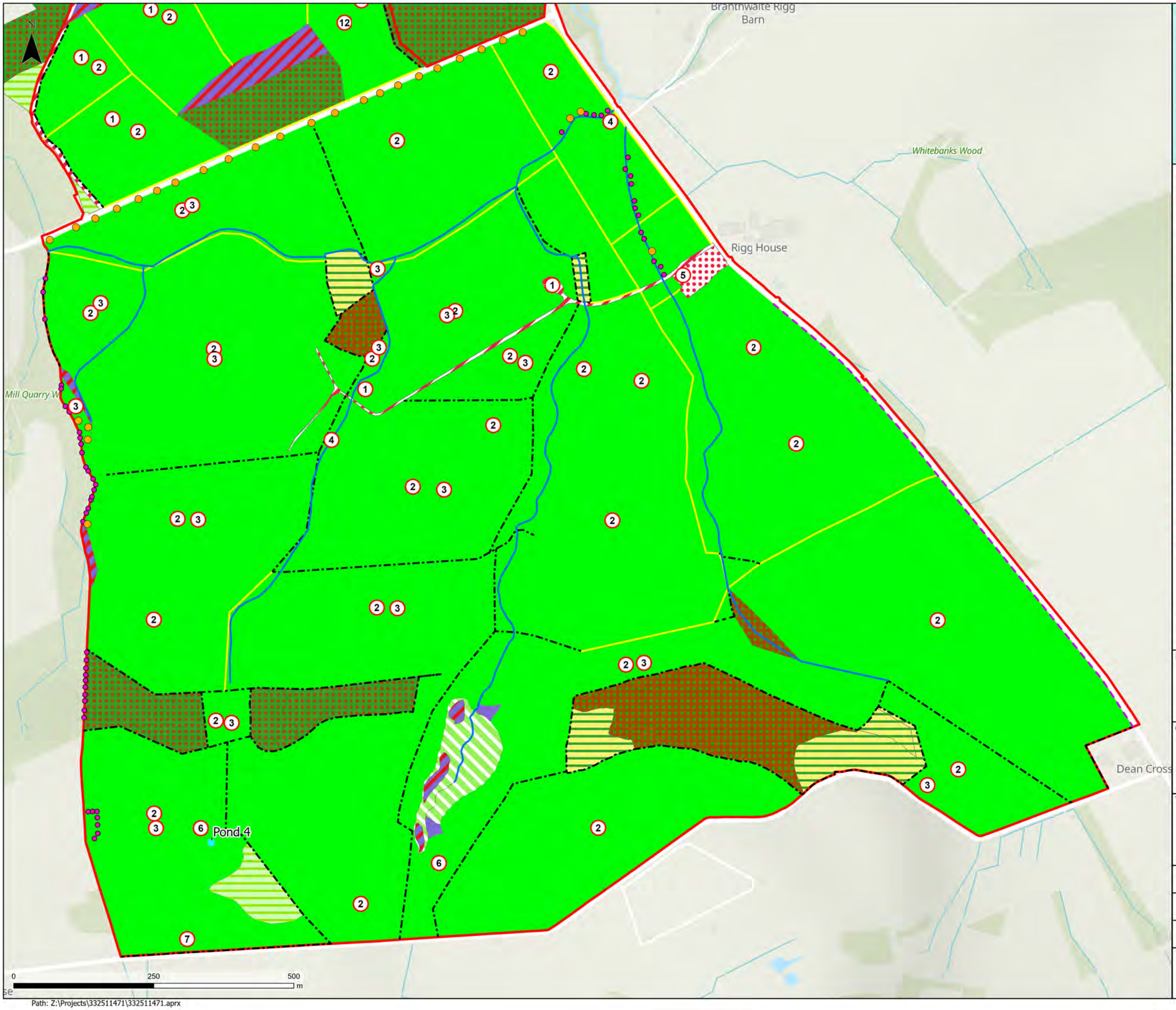
FVS Dean Moor Limited

Title

DEAN MOOR SOLAR FARM
DEVELOPMENT CONSENT ORDER
UK Habitat Plan

Scale: 1:5,500 @ A3	Date: 19/07/2023
Drawn: LW	Checked: DM
Figure: 003a	Rev: A

Stantec



Legend

- Draft Order Limits
- Target Note

UK Habitat

- Tree
- Scattered scrub
- Built linear features
- Fence
- Hedgerow
- Rivers and streams
- Natural lake or pond
- Lowland dry acid grassland
- Other neutral grassland
- Other coniferous woodland
- Modified grassland
- Flush
- Mixed scrub
- Other woodland; broadleaved
- Other woodland; mixed
- Built up areas and gardens
- Buildings

Project Title

Dean Moor Solar Farm

Client

FVS Dean Moor Limited

Title

DEAN MOOR SOLAR FARM
DEVELOPMENT CONSENT ORDER
UK Habitat Plan

Scale: 1:6,200 @ A3	Date: 19/07/2023
Drawn: LW	Checked: DM
Figure: 003b	Rev: A

Stantec

Appendix A Target Notes

Target Note Number – Figure 3a	Description
1	Locally dominant soft rush in field (indicative position only)
2	Field in poor condition – fewer than 6 species per square metre (indicative position only)
3	Dominant soft rush (indicative position only)
4	High proportion of scattered scrub over semi-improved neutral grassland (hawthorn, willow sp.)
5	Locally dominant common nettle in ground layer of woodland, indicative of nutrient enrichment
6	High proportion of bare ground present in grassland
7	Target for more detailed botanical survey if necessary
8	Target for more detailed botanical survey if necessary
9	Rhododendron – Schedule 9 invasive species in woodland
10	Common lizard sighting in area of recently felled woodland dominated by brash. Wet underfoot
11	Barn owl (Schedule 1 bird) sighting – roosting in tree within woodland
12	Planted trees present in field, no older than saplings. Most have failed
Target Note Number – Figure 3b	**Description**
1	Spoil heap – potential to shelter reptiles and/or small mammals
2	Field in poor condition – fewer than 6 species per square metre therefore automatic poor condition for BNG purposes (indicative position only)
3	Locally dominant soft rush (indicative position only)
4	2 x otter spraints on prominent rocks within watercourse channels
5	Agricultural buildings – negligible bat roost potential but good suitability for barn owl
6	Disused quarry with exposed rock
7	Curlew sighting, not thought to be nesting but was not recorded on previous breeding bird surveys

Appendix B Photographs

Photograph 1: heavily grazed and poached grassland typical in northern part of Surveyed Area

Photograph 2: heavily grazed and poached grassland typical in southern part of the Surveyed Area

Photograph 3: woodland located around pond 1

Photograph 4: pond 1

Photograph 5: pond 2

Photograph 6: pond 3