Dean Moor
Solar Farm

Environmental Statement: Chapter 3 – Site and Proposed Development Description

on behalf of **FVS Dean Moor Limited**

March 2025
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DEAN MOOR SOLAR FARM

ENVIRONMENTAL STATEMENT

CHAPTER 3 – SITE AND PROPOSED DEVELOPMENT DESCRIPTION

PLANNING INSPECTORATE REFERENCE EN010155

PREPARED ON BEHALF OF FVS DEAN MOOR LIMITED

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009, Regulation 5(2)(a)

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3.1 Introduction

3.1.1 The purpose of this chapter of the ES is to provide an overview of the Site and surrounding area, and a description of the Proposed Development.

3.1.2 The Proposed Development comprises the construction, operation, and decommissioning of a solar photovoltaic ('PV') energy generating station located within approximately 276.5ha of land within the administrative boundary of Cumberland Council (a unitary authority) ('the Council').

3.1.3 The Proposed Development would export electricity via an on-Site connection to the local Electricity North West Limited ('ENW') (as Distribution Network Operator ('DNO')) grid network. The Proposed Development will have a total capacity exceeding 50MW and is anticipated to have the potential to export up to 150MW at any one time, based on the available export capacity identified by the DNO. The purpose of the Proposed Development is to generate clean renewable energy to contribute to the urgent need to decarbonise the UK's energy supply.

3.1.4 This chapter is supported by the following figures (full figures are provided separately) **[REF: 6.2]**:

- Figure 3.1: Solar Farm Area Plan;
- Figure 3.2: Topography of Site and Surroundings;
- Figure 3.3: Land Use Plan;
- Figure 3.4: Parameter Plan;
- Figure 3.5: Exclusion Areas;
- Figure 3.6: Illustrative Site Layout Plan [NOT USED];
- Figure 3.7: Indicative Solar PV Array Elevations (Standard);
- Figure 3.8: Indicative Solar PV Array Elevations (Ballasted);
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- Figure 3.10: Indicative PCS Unit: Central Inverter-Transformer;
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- Figure 3.13: Indicative Internal Access Tracks (Standard);
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- Figure 3.23: Indicative POC Mast;
- Figure 3.24: Indicative Security Fencing;
- Figure 3.25: Indicative Grid Connection Infrastructure Layout;
- Figure 3.26: Indicative Grid Connection Infrastructure Elevations (1 of 2); and
- Figure 3.27: Indicative Grid Connection Infrastructure Elevations (2 of 2).

3.1.5 Figures 3.6-3.27 are indicative only and provide a typical representation of what the Proposed Development could look like.

3.1.6 This chapter is supported by the following appendix:

- Appendix 3.1: Outline Operational Management Plan ('OOMP') **[REF: 6.3]**.

3.1.7 This chapter should be read alongside the following documents included within the ES and DCO application:

- Works Plans **[REF: 2.3]**;
- Design Parameters Document ('DPD') **[REF: 5.7]**;
- Design Approach Document ('DAD') **[REF: 5.8]**;
- ES Chapter 5: Construction and Decommissioning Methodology and Phasing **[REF: 6.1]**;
- Appendix 5.1: Outline Construction Environmental Management Plan ('OCEMP') **[REF: 6.3]**;
- Appendix 5.2: Outline Construction Traffic Management Plan ('OCTMP') **[REF: 6.3]**;
- Appendix 5.3: Outline Soil Management Plan ('OSMP') **[REF: 6.3]**; and

- The draft Dean Moor Solar Farm Development Consent Order ('dDCO') **[REF: 3.1]**.

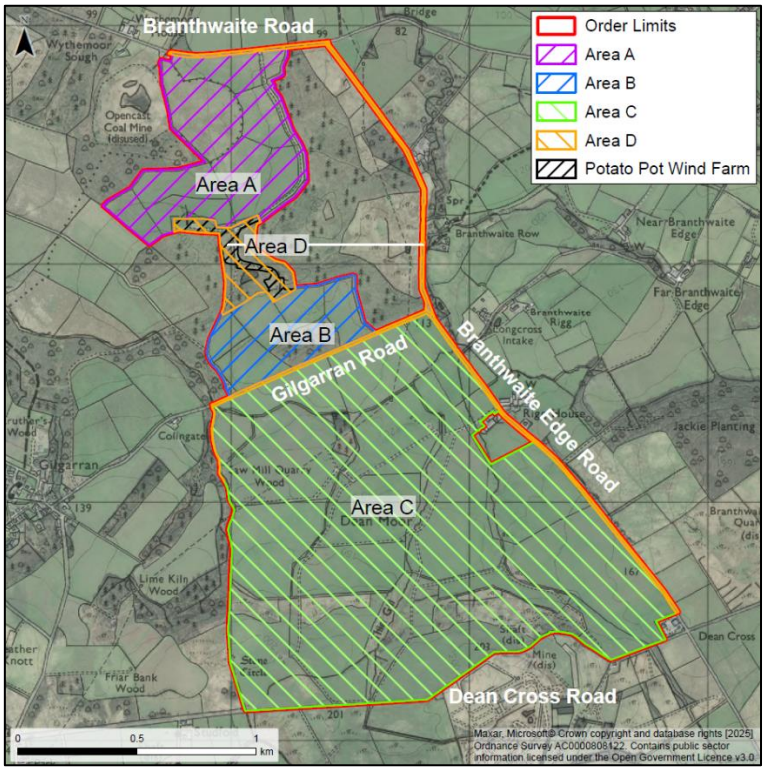
3.2 Site Description

3.2.1 The Site (Figure 1.1) **[REF: 6.2]** extends to approximately 276.5ha and is located approximately 1.1km east of the Lillyhall Industrial Estate, 600m east of the small village of Gilgarran, approximately 900m west of Branthwaite, and approximately 5km southeast of Workington town centre on the west Cumbrian coast. The hamlet of Branthwaite Edge is directly adjacent to the east of the Site.

3.2.2 For ease of reference the Site is divided primarily into four areas referred to as Areas 'A', 'B', 'C', and 'D' as shown on Figure 3.1.

- **Area A** – Land south of Branthwaite Road (approximately 40.2ha);
- **Area B** – Land south of Branthwaite Road and north of Gilgarran Road (approximately 19.9ha);
- **Area C** – Land south of Gilgarran Road and north of Dean Cross Road (approximately 203ha);
- **Area D** – Land connecting Areas A and B, including Potato Pot Wind Farm (the 'Wind Farm'), Gilgarran Road between Areas B and C, and Branthwaite Edge Road (approximately 13.4ha).

Figure 3.1: Solar Farm Area Plan



3.2.3 In describing the Site and its context, for ease of understanding, this ES will primarily refer to Areas A, B, and C as these three areas comprise most of the Site. As Area D comprises connective land including the Wind Farm, and highways land which forms much of the Site boundary; reference will only be made to Area D when discussing these matters.

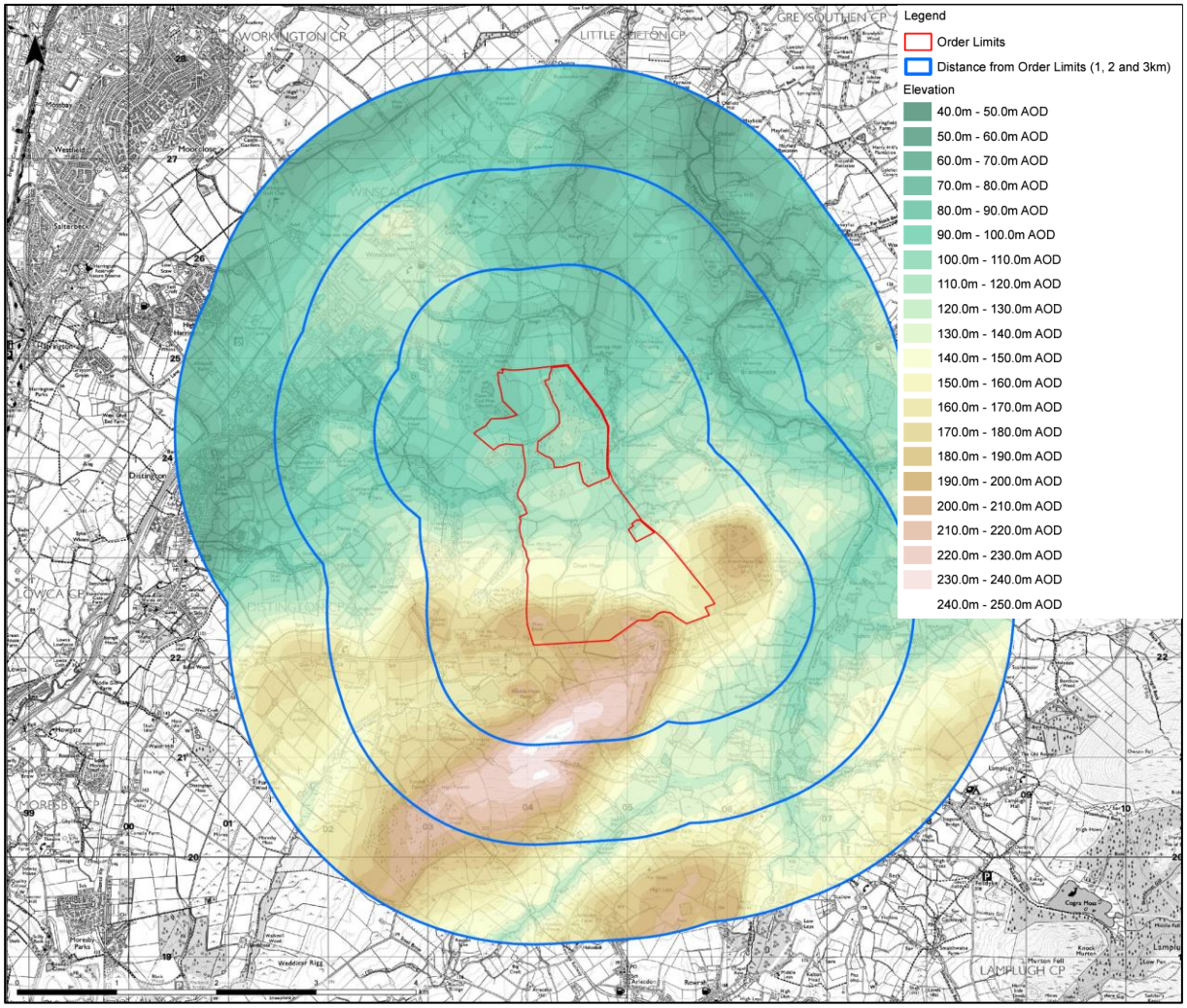
3.2.4 The northern part of Area A abuts an unclassified road, hereafter referred to as 'Branthwaite Road'. The southern boundary of Area C abuts Dean Cross Road. The unnamed north/south road between Branthwaite Road and Dean Cross Road, forming the eastern boundary of Area C, is hereafter referred to as 'Branthwaite Edge Road'. The Site is bisected between Areas B and C by an unclassified road between Gilgarran and Branthwaite Edge, hereafter referred to as the 'Gilgarran Road' (also locally known as Colingate Road).

Landscape and Topography

3.2.5 The Site is not located in any international or national landscape designations, nor does it lie within designations of regional or local landscape importance.

3.2.6 Land within the Site is typical of the surrounding area; comprising undulating predominantly pastoral land which at times curtails views from the wider area, providing a feeling of containment. Land within the Site tends to fall south to north, with a plateau of land along the Site's southern boundary lying at approximately 200m Above Ordnance Datum ('AOD'), falling relatively sharply initially by around 60m over a span of some 350m before taking on a more undulating form, falling to around 100m AOD at the northern boundary of Area A. The topography of the Site and the surrounding area is shown on Figure 3.2. More detailed information on topography is available from Chapter 7 – Landscape and Visual **[REF: 6.1]**.

Figure 3.2: Topography of Site and Surroundings



3.2.7 Notable landscape features within the Site include woodland blocks of varying maturity and minor watercourses within Area C (see below) which mainly run from the high plateau at its southern boundary to the northeast towards Branthwaite Edge. Aside from the woodland blocks, vegetation is broadly limited to field boundary hedgerows, often supported by legacy dry-stone walls or timber post and wire fencing.

Land Use

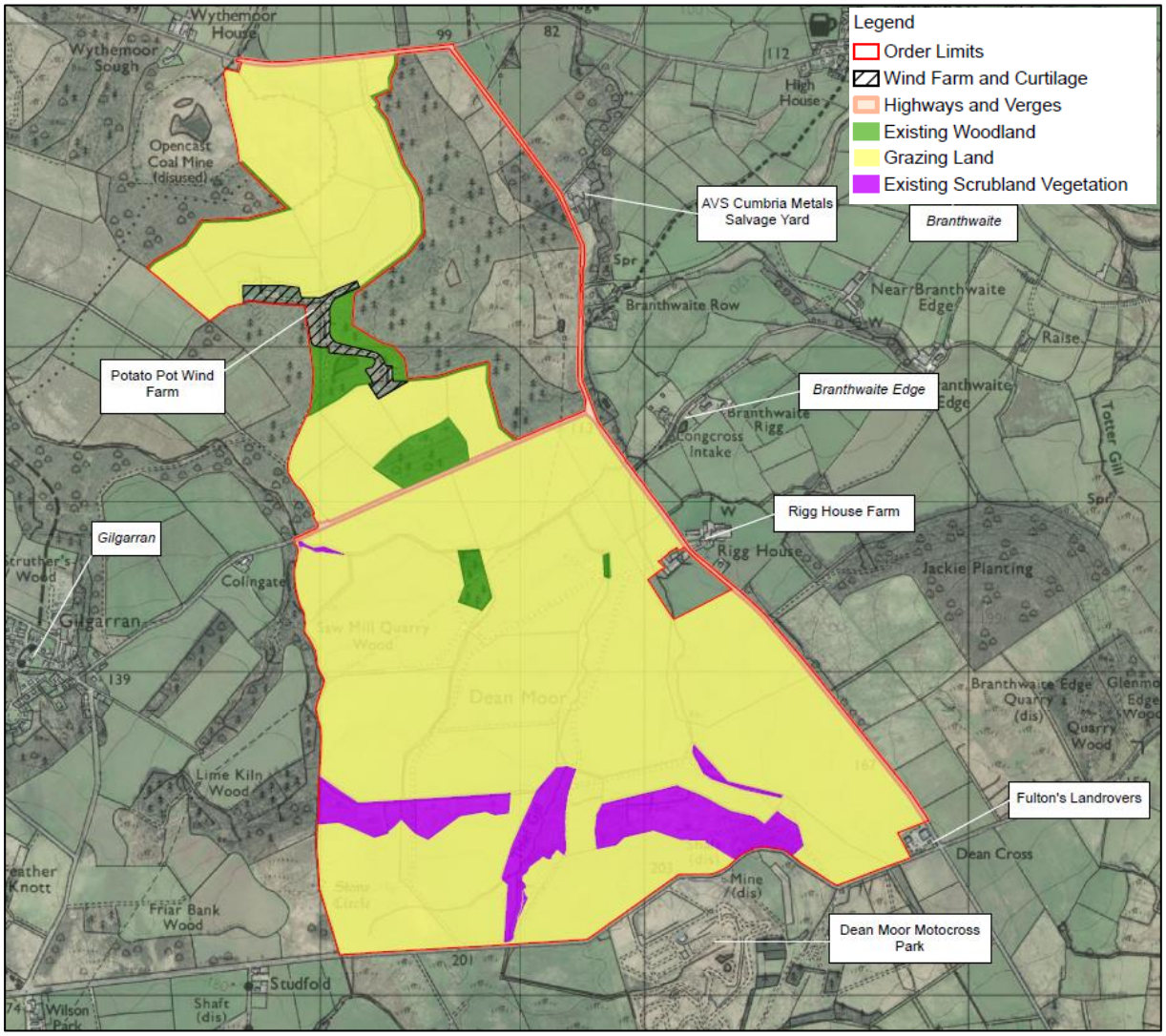
3.2.8 The existing land uses within the Site are mapped in Figure 3.3, and can be divided into the following land use types:

a. Grazing land – 236.54ha;
b. Woodland – 11.87ha;
c. Highways land and verges – 5.23ha;

d. Wind farm and curtilage – 3.44ha; and

e. Scrubland vegetation – 19.42ha.

Figure 3.3: Land Use Plan



Grazing Land

3.2.9 The Site is rural in character and is predominantly used for sheep grazing, although it is not an unspoilt rural landscape as the Site is affected by the presence of pylons, overhead lines ('OHL') and wind turbines. The northern portion of the Site (Areas A and B) is identified on Ordnance Survey ('OS') maps as Wythemoor and the southern part of the Site (Area C) as Dean Moor. The Site primarily consists of agricultural land, which is in intensive pastoral use. Area C benefits from a post-1988 ALC survey recorded by the Department for Environment, Food & Rural Affairs (Defra).

3.2.10 The land in Areas A and B and adjoining to the east were used by a colliery of opencast coal mining which was operational between 1986 and early 1994. These areas of former colliery land within the Site have since been restored to agricultural use.

3.2.11 Area C is predominantly in pastoral use but also has limited historic uses of quarrying and mining. The quarries recorded on the historical maps remain visible on contemporary aerial imagery and therefore are not considered to present an environmental hazard to the Site.

Existing Farm Buildings and Curtilage

3.2.12 The Site is in a sparsely populated location, and there are no dwellings within the Site. There are three isolated dwellings in proximity to Area C, including a bungalow and a farmhouse east of the Site at Rigg House Farm, and a dwelling at Fulton's Land Rover Garage adjacent to the southeast corner of Area C. To the north (east of Area A) is the AVS Cumbria Metals salvage yard and the Dean Moor Motocross Park is located immediately south of Area C.

Woodland and Scrubland

3.2.13 There are areas of recently planted woodland adjacent to Areas A and B, towards the east and northeast of the Site. There is also an area of replanted ancient woodland to the west of Area C, located outside the Site. Small areas of scrub are located across the Site.

Highways Land

3.2.14 The Site includes highways and verges which are within the estate of the Local Highways Authority (the Council). The Local Road Network ('LRN') adjacent to the Site consists of un-named rural single carriageway roads. These roads are referred to as Branthwaite Road, Branthwaite Edge Road, Gilgarran Road, and Dean Cross Road. This land has been included within the Order Limits to allow for any upgrades or repairs, visibility splays, and traffic management measures. Further information on the LRN and Strategic Road Network ('SRN') is available from Appendix 2.5 – Transport Statement **[REF: 6.3]**.

Existing Wind Farm

3.2.15 There is an existing operational wind farm, Potato Pot Wind Farm ('the Wind Farm') (planning ref. 2/2012/0594), which consists of three wind turbines and a control and services building located within Area D, between Areas A and B.

Existing Overhead Power Lines

3.2.16 The Proposed Development will include a new substation (as shown on Figure 3.4) to connect to the existing 132 kilovolt ('kV') OHL which runs across the north of Area C. There are various sections of 11kV OHL within the southern and northern parts of the Site, as shown on Figure 3.4.

Cultural Heritage

3.2.17 There is one designated heritage receptor located within the Site, namely the 'Large Irregular Stone Circle and a Round Cairn on Dean Moor' Scheduled Monument. The western boundary of the Site bisects the Scheduled Monument. The Site is not located within or adjacent to a Conservation Area.

3.2.18 Within the wider 3km Study Area around the Site, there are:

- Two Grade I Listed Buildings;
- One Grade II* Listed Buildings; and
- 25 Grade II Listed Buildings.

Biodiversity

3.2.19 No internationally, nationally, or local designated statutory sites are present within the Site. The closest statutory designated site is River Derwent and Bassenthwaite Lake Special Area of Conservation ('SAC') and Site of Special Scientific Interest ('SSSI'), located approximately 1.2km east.

3.2.20 Dean Moor County Wildlife Site ('CWS') is partially located within the Site and is shown on the Non-Statutory Sites and Notable Habitats figure. This CWS is designated for acidic moorland habitats.

3.2.21 The majority of the Site comprises grazed grassland and would be classified using the UKHab60 system as 'modified grassland' in poor condition.

Water Resources and Flood Risk

3.2.22 There is no historical record of flooding at the Site. The Site is at a low risk of flooding from all sources and is located in Flood Zone 1. The nearest areas of Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability' to the Site are associated with the Lostrigg Beck. These are located adjacent to the main river channel approximately 330m to the northeast of Area C.

3.2.23 An ordinary watercourse named the Thief Gill, as well as several other unnamed ordinary watercourses, flow through the Site from the south and west towards the northeast corner of Area C. Beyond the Site boundary, these watercourses combine to flow in an Environment Agency designated main-river named Lostrigg Beck, which continues in a north-east direction before joining the River Marron, approximately 6.5km to the northeast of the Site.

3.2.24 Section 2.1 of the OSMP (Appendix 5.3) sets out the soil resource assessment that has been undertaken and outlines that soil profiles assessed on the Site indicate that soils on-Site are slowly permeable and seasonally waterlogged for longer periods over winter months (October to March).

3.2.25 Of crucial relevance to soil management, the Site receives a high Average Annual Rainfall ('AAR') of 1390-1519mm compared with the AAR for central lowland England, which is between 625mm and 700mm.

3.2.26 The soil assessed on-Site soil is predicted to be at 'field capacity' (i.e., the amount of soil moisture or water content held in the soil after excess water has drained away) for between 287-303 Field Capacity Days ('FCD') per year. These values are high compared to the average FCD for central lowland England, which is between 125-175 FCD. Further information on soil management on-Site is available from the OSMP.

Ground Conditions

3.2.27 The land in the north of the Site (Areas A and B, shown on Figure 3.1) was historically part of an opencast coal mine that was operational between the late 1980s and early 1990s. Opencast mining ended in 1993, followed by backfilling and restoration.

3.2.28 Most of the land in Area C, at the southern extent of the Site has historically been used for agriculture, except for limited areas of quarrying and mining. Residual concentrations of agrichemical residues could be present in the soil.

3.2.29 The risk associated with unexploded ordnance is low based on a review of Zetica Ltd's risk map, further information is available from the Phase 1 Ground Condition Assessment (Appendix 10.1) **[REF: 6.3]**.

3.2.30 The bedrock geology is dominated by Carboniferous strata (the Whitehaven Sandstone Formation and Coal Measures Group (Middle and Lower)). Carboniferous strata are overlain by a variable but generally minor thickness of superficial deposits comprising Glacial Till, Alluvium, Peat, Landslide Deposits and Alluvial Fan Deposits. Artificial Ground (consisting of Infill Deposits and Made Ground) is mapped as present across the northern part of the Site.

3.2.31 The Environment Agency aquifer classifications are as follows:

- Alluvium and Alluvial Fan Deposits – Secondary A Aquifers;
- Glacial Till – Secondary Undifferentiated Aquifer;
- Peat – Unproductive; and
- Bedrock Geology (all of the bedrock strata) – Secondary A aquifers.

3.2.32 The Peat Survey Report (Appendix 10.3) outlines the presence of peat deposits identified on-Site following Site surveys. The results of the hand pit sampling indicated that peat was sampled and recorded in only two of the trial pits undertaken during the detailed peat probing exercise (see Appendix 10.3, Figure 1.4). Deeper areas of soft soil/peat are located in localised pockets within the areas identified as peat in the British

Geological Survey ('BGS') mapping, generally associated with topographical lows in proximity to watercourses.

3.2.33 Peat was not encountered outside of the area indicated as peat by the BGS. These results indicate that the majority of the Site area investigated by the survey comprised organic topsoil overlying soft to very soft clay soil with no peat present. Further information is available from the Peat Survey Report (Appendix 10.3) **[REF: 6.3]**.

3.3 Proposed Development Overview

3.3.1 The Parameter Plan (Figure 3.4) represents the parameters, such as the extent of the developable area of Solar PV infrastructure, which have been used to assess the likely significant effects of the Proposed Development for the purposes of this ES. The ES adopts a parameter-led assessment that considers the 'worst case', having regard to the Planning Inspectorate's *Advice Note Nine: Rochdale Envelope*[1] and paragraph 4.3.12 of EN-1.

3.3.2 The Parameter Plan replaces the Concept Layout which was assessed at PEIR, and aligns with the Work Numbers which are shown on the Works Plans, and the list of parameters in Table 3.2. The ES has been undertaken based on the maximum extents of each of the Work Numbers described in Schedule 1 of the DCO, as shown (and therefore secured) on the Work Plans. The Parameter Plan (Figure 3.4) provides a visual aid of all the Work Numbers in the context of the Site and its characteristics.

3.3.3 The Parameter Plan maps the Work Number which represents the maximum geographical parameters of where the infrastructure listed under each 'Work' could be sited, as well as features within the Site such as watercourses.

[1] HM Government (2018). Planning Inspectorate. Guidance Nationally Significant Infrastructure Projects - Advice Note Nine: Rochdale Envelope

Figure 3.4a: Parameter Plan (Areas A, B, and D)

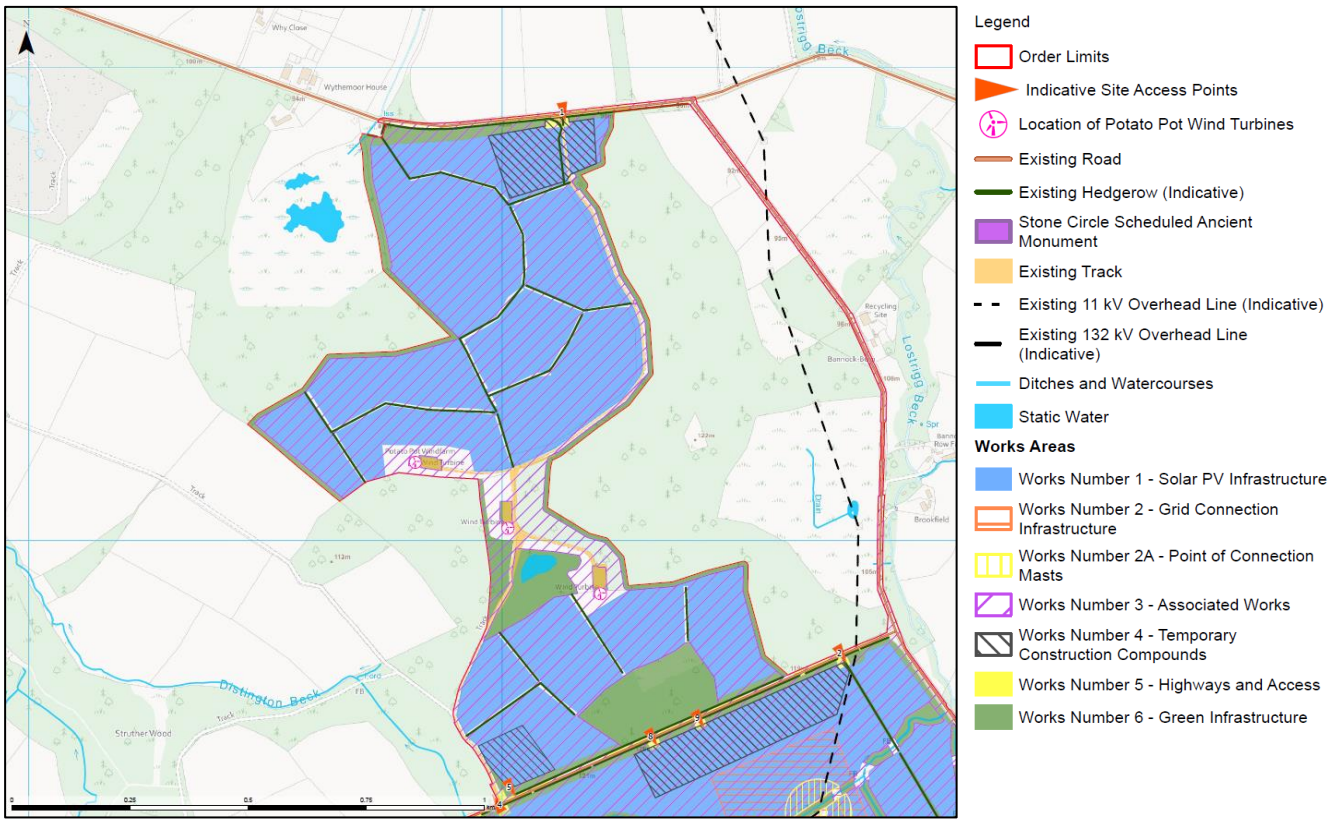
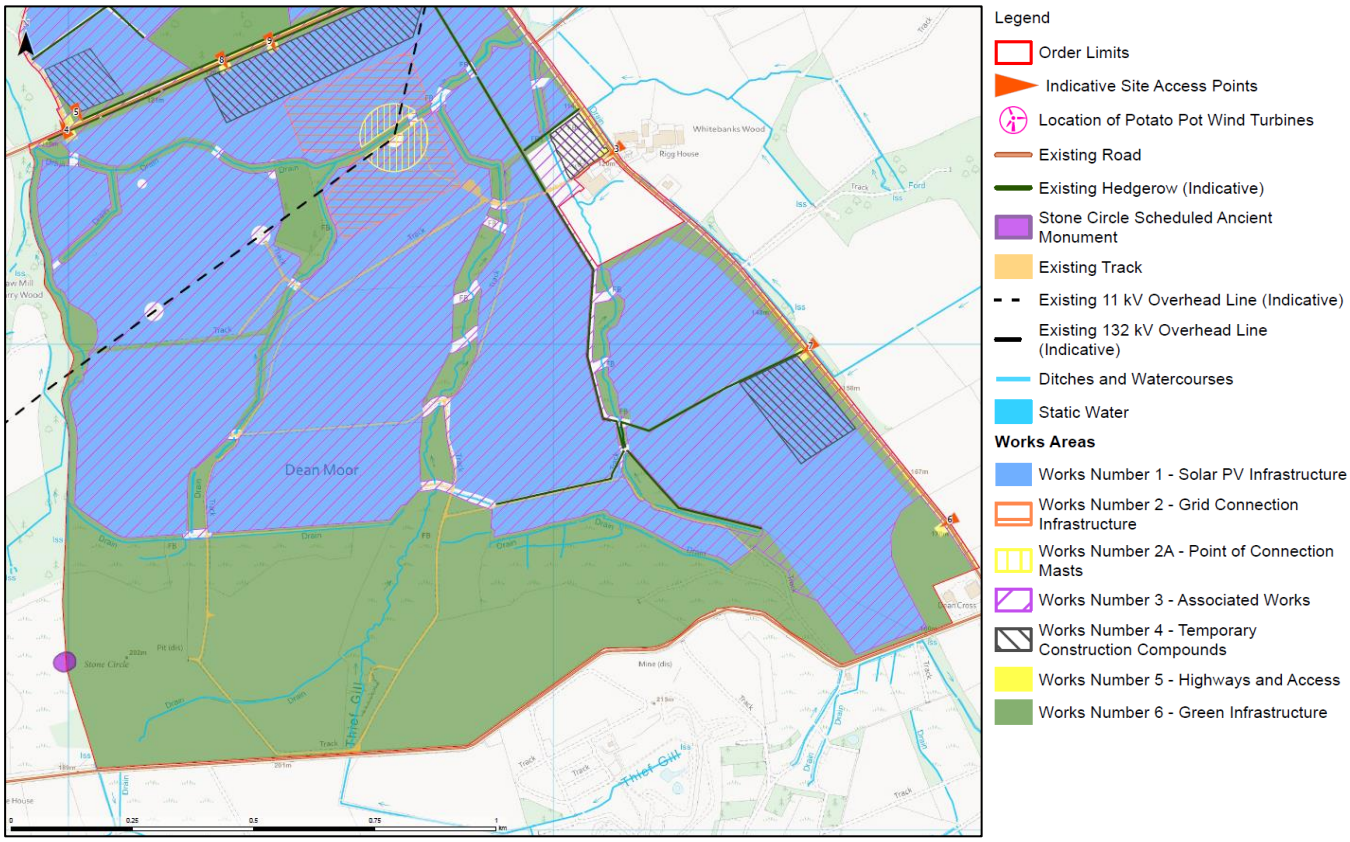


Figure 3.4b: Parameter Plan (Area C)



3.3.4 The design of the Proposed Development has evolved throughout the process, with infrastructure located to avoid significant effects on any specific designations or assets and, where appropriate, to respond to feedback from consultees.

3.3.5 Solar PV technology is rapidly evolving, and the quantity of panels to be installed will be based on the best available technology at the time of pre-construction procurement. In general, the efficiency of solar panels is improving such that the quantity of panels needed to generate a given amount of energy is decreasing. The DCO application provides the necessary flexibility for such changes, and to adapt other aspects of the design in association.

3.3.6 The Proposed Development will be carried out within the Order Limits (the Site) (shown on ES Figure 1.1). It is proposed that the principal components of the Proposed Development (shown on Figure 3.4 Parameter Plan) will comprise the infrastructure discussed in section 3.4 and listed in Table 3.2. The parameters listed in Table 3.2 are secured through the DPD **[REF: 5.7]**.

3.3.7 Further details of the temporary compounds that will be required during the construction phase are provided in Chapter 5 – Construction and Decommissioning Methodology and Phasing. The locations where construction compounds may be sited are also shown on the Parameter Plan. The identified potential accesses from the highway are also discussed further in Chapter 5. All access points have been included to be potentially utilised throughout the construction and operational phase.

3.3.8 The Proposed Development is divided into numbered ‘Works’ which identify the works required for the construction, operation, and decommissioning of the Proposed Development and which can take place inside each area shown on the Works Plans. These works are listed in Schedule 1 of the DCO and are summarised in Table 3.1 below.

Table 3.1: Work Numbers for the Proposed Development

Works	Component
Work No. 1 – Solar PV Infrastructure	Solar PV panels
	Mounting structures
	Power Conversion System ('PCS')
Work No. 2 – Grid Connection Infrastructure	Up to two substation buildings (a Customer Substation Building and a District Network Operator ('DNO') substation building)
	Control building (Customer Control Building)
	Point of Connection ('POC') Compound comprising external electrical equipment including transformers, relays, circuit breakers and harmonic filters, and ancillary infrastructure
	Communication mast
	Security fencing
	Electrical cables
Work No. 2A – Point of Connection ('POC') Masts	Up to two POC masts
Work No. 3 – Associated Works	Electrical cables including connecting equipment within Work No. 1 and within Work No. 2 and connecting Work Nos.1 and 2 to one another
	Fencing, gates, boundary treatment, and other means of enclosure
	Improvement, maintenance, and use of existing private tracks
	Laying down of internal access tracks, ramps, means of access, permissive paths, crossing of watercourses, culverts, and roads, including the laying and construction of drainage infrastructure, signage, and information boards
	Works for the provision of security and monitoring measures such as CCTV columns, lighting columns and lighting, cameras, communication infrastructure, and perimeter fencing
	Monitoring, communications, and control systems
	Electric vehicle charging points
	Operation and Maintenance ('O&M') units including storage, welfare, and site management
	Works, improvements, or extensions to the existing drainage and irrigation system and works to alter the position and extent of such irrigation system

Works	Component
	Landscaping and biodiversity mitigation and enhancement measures including planting
	Site drainage and waste management infrastructure including underground pipework, watercourse outfalls, sub-bases, filter drains, swales, and attenuation tanks.
	Working sites in connection with the construction, maintenance, and decommissioning of the authorised development, lay down areas and compounds, storage compounds and their restoration
	Noise attenuation works including acoustic barrier
Work No. 4 – Temporary Construction Compounds	Up to five temporary construction compounds
	Site entry security stations
	Areas of hardstanding
	Parking
	Areas for vehicle loading, unloading, and turning
	Site management offices, welfare facilities, canteens and workshops
	Safety and security infrastructure, including signage, cameras, fencing, gates, and lighting
	Areas to store materials, plant, machinery, equipment, and waste
Work No. 5 – Highways and Access	Enhancement of accesses to and from the public highway
	Visibility splays
	Works to widen and surface the public highway and private means of access
	Installation of temporary traffic management measures including traffic lights and signs
Work No. 6 – Green Infrastructure	Landscaping and biodiversity mitigation and enhancement measures including planting and improvement of existing features
	Habitat creation and management including earth works including embankments, landscaping, and drainage infrastructure
	Watercourse enhancements
	Maintenance of existing access routes and laying down of permissive paths, signage, and information boards
	Fencing, gates, boundary treatment, and other means of enclosure

3.4 Development Components

3.4.1 This section summarises the principal components of the Proposed Development once operational and identifies the design parameters which have informed the environmental assessment. A summary of the parameters is provided at Table 3.2, full information on the parameters listed is available from the DPD **[REF: 5.7]**. All heights are defined as above ground level ('AGL') and all depths referred to as below ground level ('BGL').

3.4.2 Indicative drawings providing typical representations of what the Proposed Development components could look like are provided in Figures 3.6-3.27.

Solar PV Panels and Array Mounting Structures

3.4.3 Solar PV arrays will be located within Work No. 1 – Solar PV Infrastructure **[REF: 2.3]** which covers Areas A, B, and C.

3.4.4 Solar PV arrays comprise solar panels placed on a mounting structure framework and arranged in rows (known as arrays), with a minimum range of 2m between each row depending on field topography. Aisle widths (the range of gaps between arrays) typically would be 2.5m-3.5m. Arrays will be fixed and oriented east-west across the Site, with the panel facades facing south, maximising the amount of solar radiation absorbed as the sun moves across the sky. The layout of the arrays would allow for landscaping, fencing and access tracks within the Site.

3.4.5 The minimum heights of the lower edge for the majority of the solar PV arrays from existing ground levels across the Site will be 800mm, although in limited areas this may be as little as 700mm to ensure panels are at the appropriate tilt in an undulating terrain. At their higher edge, solar panel arrays will be 3.3m as a maximum. Standard solar panel arrays will be at a height of 3m. The array tilt (slope from the horizontal) is assessed as ranging between 10 and 20 degrees, though it is expected that most arrays are likely to have a tilt of 10-15 degrees from horizontal. An indicative drawing of standard array mounting elevations is shown on Figure 3.7.

3.4.6 Array mounting structure frameworks would be a steel-aluminium alloy material and would either be dual post or single post. Foundations will typically be galvanised steel poles driven into the ground to a typical depth of around 2-2.5m and a maximum depth of 4m, depending on pre-construction geotechnical surveys. These will either be pile driven into the ground or via screw piled, where a screw would be driven into the ground and a pole attached. Alternatively, non-intrusive 'no-dig' mounting is available where required by ground conditions or below ground sensitivities.

3.4.7 The positioning of arrays will respond to existing physical features such as ditches and trees, with panels appropriately set back. No earth-moving or ground levelling is required.

Power Conversion System Units

3.4.8 Power Conversion System ('PCS') units refer to Solar Inverter-Transformers. Inverters convert direct current ('DC') generated by the solar PV panels into alternating current ('AC'). Transformers then convert low voltage output from the inverters to high voltage suitable for feeding into the local grid. PCS units are also located within Work No. 1 – Solar PV Infrastructure.

3.4.9 Two options for inverters and transformers are being considered for the Proposed Development and these are described below. For the purposes of the ES, the Proposed Development has been assessed as using central inverter-transformers because these are slightly larger units with greater potential noise impacts i.e., a worst-case scenario basis.

Central Inverter-Transformer Units

3.4.10 Central inverter-transformer units would be located throughout the Site (an indicative drawing is shown on Figure 3.10). Central inverters would be housed within prefabricated metal containers that are typically finished in a matte colour limited to white, grey, green, brown, or blue, or similar. The modular container solution means no permanent building is required which makes their removal at end of the Proposed Development's operational

life easier. The total number of central inverter-transformer units required would be determined through the iterative design process.

String Inverters and Standalone Transformer Units

3.4.11 Alternatively, the Proposed Development could use smaller string inverters which can be fixed to the rear of the array framework or positioned on a frame at the end of an array. If string inverters are utilised, then standalone transformer units would be required. A standalone transformer unit is typically smaller than combined central inverter-transformer units but otherwise have the same characteristics as a containerised solution. Indicative drawings of string inverters and standalone transformer units are shown on Figures 3.11 and 3.12.

Grid Connection Infrastructure

3.4.12 The Grid Connection Infrastructure (indicative figures are shown on Figures 3.25-3.27) comprises the infrastructure which supports the POC to the DNO grid, which is the existing pylon within Area C, and will be located within Work No. 2 – Grid Connection Infrastructure **[REF: 2.3]** (see Figure 3.4), and includes:

- The POC Compound comprising external electrical equipment and ancillary infrastructure within a security fence;
- The Customer Substation building and Control Building;
- DNO Substation Building;
- Communications mast; and
- Up to two POC masts (located within Work No. 2A – POC Masts) **[REF: 2.3]**.

3.4.13 The Customer Substation Building, DNO Substation Building, and Control Building (indicative drawings shown on Figures 3.20-3.22) would be contained within a partially or fully fenced grid connection infrastructure compound, as well as a further fully fenced ‘POC Compound’ for external electrical equipment which includes Medium Voltage > High Voltage (MV>HV) Transformers, relays, circuit breakers, and harmonic filters. A network of electricity cables, up to two POC Masts, and Communications Mast will also be included in Work No. 2.

3.4.14 The Customer Substation building includes the switchgear that receives electricity from the inverters-transformers before transferring it to the DNO Substation via underground electrical cables. This would most likely be a prefabricated glass-reinforced plastic ('GRP') kiosk up to 6.5m in height and is expected to be finished in colours limited to green brown, grey, white, or brick.

3.4.15 There will be one Control Building up to 3.6m in height situated adjacent to the Customer Substation. This includes monitoring equipment and metering for the Proposed Development. A weather station, featuring an anemometer, would be situated adjacent to, or if not possible, close to the Control Building. The weather station would primarily comprise a mast, and would be less than 1m wide, and approximately 4m tall. The weather station (an indicative drawing of which is on Figure 3.17) is listed under Work No. 3 – Associated Works **[REF: 2.3]**, which covers most of the Site, to allow sufficient flexibility to locate it where appropriate for monitoring meteorological conditions on-Site. The Control Building may be combined with the Customer Substation into one larger building (the footprint of which would not be larger than the two individual buildings). This will either be a GRP building with a lightly pitched roof or a modified shipping container and is expected to be finished in colours limited to green, brown, grey, or white.

3.4.16 A DNO Substation Building up to 6.5m height is required to facilitate the connection to the grid. The substation would be an ENW asset, most likely constructed in brick or of GRP, and finished in colours limited to green, brown, grey, white, or brick, depending on DNO specifications in the detailed design process which will occur in the pre-construction phase.

3.4.17 Adjoining the DNO and customer substation buildings will be a fenced area (known as the POC compound) (weld mesh security fencing up to 2.6m, an indicative drawing of which is shown on Figure 3.24) with external electrical equipment including DNO and Customer side High Voltage ('HV') and Low Voltage ('LV') transformers. Final electrical specifications will be determined by ENW requirements in advance of

construction in accordance with ENW standards in place at the time of construction. External electric equipment heights would be up to 9m, with equipment foundation heights a maximum of 600mm. The Grid Connection Infrastructure will connect into the existing 132kV OHL via the existing pylons that run east-west across the north of Area C (as shown on Figure 3.4). No new OHL or pylons are required for the grid connection and no off-Site cable route is required.

3.4.18 For the purposes of the ES the location has been identified in which the Grid Connection Infrastructure could be sited, as shown on the Parameter Plan (Figure 3.4) and Work No. 2 – Grid Connection Infrastructure. This area is located close to the existing OHL pylons. The indicative location is identified to enable siting which will be informed partly by a consideration of the suitable ground conditions.

3.4.19 Up to two POC masts up to 30m in height may be located in proximity to the existing ENW pylon within Work No. 2 – POC Masts, as shown on the Parameter Plan. The potential location for these POC masts is shown on Figure 3.4 and would be established through detailed design involving the DNO post consent. It is considered more likely that the substation would be connected to the existing pylons by buried cables. However, on the basis that the worst case is that the POC Masts are needed, the ES assesses them as part of the Proposed Development.

Network of Electrical Cables

3.4.20 A network of electrical cables is included under Work No. 3 – Associated Works. Typical trench depths are likely to be between 1m-1.5m, larger dimensions would likely only be necessary in circumstances where ground conditions require it, or where multiple cables are running adjacent within the same trench. Cabling in a no-dig area (established due to archaeological constraints, Root Protection Areas, or other constraints) would typically be within an on-ground trough. Suspended catenary wire solutions may also be available. An indicative drawing of cable trenching is shown on Figure 3.19.

Site Access

3.4.21 Details of Site access from the LRN and SRN are discussed in section 5.2 of Chapter 5 – Construction and Decommissioning Methodology and Phasing. Site access points are also shown on Figure 3.4.

3.4.22 Internal access tracks will be required to facilitate construction and the movement of operations and maintenance vehicles around the Site (indicative drawings are shown on Figures 3.13-3.14). Where possible, these will follow existing farm tracks within the Site and all tracks, whether only temporary for construction, or for the operational lifetime, will be of a fully permeable construction. Internal access tracks would either be in-ground with a permeable geotextile membrane and rolled ground that would typically compact up to 150mm topsoil, although 300mm has been assessed as a 'worst case'. Alternatively, tracks formed of geotextile membrane and permeable aggregate may be built up on-ground with no topsoil removal. Access tracks will be a maximum of 6m in width, however, typically would be 4m in width.

3.4.23 Site accesses are included within Work No. 3 – Associated Works, and Work No. 5 – Highways and Access **[REF: 2.3]**, and will be provided from Area D (which includes land within the Local Highways Authority ('LHA') estate) into Areas A, B, and C.

Fencing

3.4.24 The Proposed Development would be secured to prevent theft and criminal damage during both the construction and operational phases of the Proposed Development and to ensure health and safety (an indicative drawings is shown on Figure 3.15). Perimeter fencing (up to 2.4m high) would be installed around the boundaries of the solar farm within Areas A, B, and C of the Site and is included within Work No. 3 – Associated Works. It is proposed that 'deer fencing' with wooden fence poles and galvanised high tensile steel wire between would be used. No industrial metal palisade fencing, wire mesh, or barbed wire fencing is proposed other than for the security fencing around the perimeter of the POC

compound and within the wider grid connection infrastructure compound comprising the substation and control buildings internal to the Site for safety and additional security. There will be access wing gates at entrances to the Site.

3.4.25 The perimeter fencing will enclose the solar panels and allow sheep to graze securely amongst the arrays. Gates will be installed to allow for movement from the access points off into the Site for ongoing maintenance. Provision of mammal gaps at ground level in the fencing will allow continued access for foraging of wildlife across the Site. Exact positions of these gaps will be identified in the LEMP as secured by a DCO Requirement.

CCTV

3.4.26 The perimeter of the Site will be protected by a system of CCTV and/or infra-red cameras to provide full 24-hour surveillance around the internal perimeter. Cameras would be inward facing on poles of up to 3.3m high (an indicative drawing is shown on Figure 3.16), spaced at intervals along the fence line. Cameras would only monitor inside the Site and not record any public or private land outside the perimeter. An intelligent sensor management system would manage the cameras. CCTV is listed in Work No. 3 – Associated Works, which spans Areas A, B, C, and D.

Lighting

3.4.27 The Proposed Development will not be permanently lit during the operational phase, with lighting limited to motion activated, cowled, down lighting, affixed above or aside doors of buildings within the Site. Operational lighting will be installed for emergency purposes only. Temporary emergency lighting during the operational phase may be put in place for specific operational works which take place at night. This lighting would be isolated to the maintenance works being undertaken and would be directional.

Operation and Maintenance Units

3.4.28 Operation and Maintenance (O&M) units will be provided across Work No. 3 – Associated Works. The O&M units would be 3.6m in height with foundations and are likely to be finished in a standard pale grey or off-white colour. O&M Units are listed under Work No. 3 – Associated Works, which provides the flexibility to locate them across Areas A, B, C, and D of the Site. An indicative drawing of an O&M unit is shown on Figure 3.18.

Landscape and Ecological Enhancements

3.4.29 Planting is proposed across Areas A, B, C, and D of the Site for landscape, visual and biodiversity mitigation, and enhancement. Work No. 6 – Green Infrastructure **[REF: 2.3]** defines the area where green infrastructure enhancement works will be carried out, and where other development, particularly solar infrastructure and grid connection infrastructure will be avoided.

3.4.30 Work No. 3 – Associated Works also allows for landscaping and biodiversity mitigation and enhancement measures, including planting outside of the areas which are defined in Work No. 6. However, where Work Nos. 3 and 6 overlap with areas which are proposed to be within Work Nos. 1, 2, and 5, landscape, visual and biodiversity mitigation will not be specified until after consent. The proposed landscape and biodiversity enhancements across Work Nos. 3 and 6 are mapped in the Landscape Strategy Plan (Figure 7.6.1-7.6.5). The OLEMP (Appendix 7.7) **[REF: 6.3]** outlines the planting and landscape enhancements, with reference to the Landscape Strategy Plan (ES Figure 7.6.1-7.6.5), and sets out how those measures will be implemented and maintained.

3.4.31 Any new vegetation within 500m of the existing wind turbines within the Wind Farm will be selected to grow no higher than 5m to avoid any additional impacts on power generation. Boundary treatments will be limited to up to 2.4m in height.

3.4.32 Further details are provided in Chapter 7 – Landscape and Visual and Chapter 8 – Biodiversity.

3.5 Operational Phase

3.5.1 The Proposed Development is currently proposed to have an operational lifespan of up to 40 years for the purposes of the assessments in the ES.

3.5.2 During the operational phase, activities on-Site are expected to amount to maintenance activities, including servicing of plant and equipment and vegetation management. No permanent personnel will be required on-Site for operational activities.

3.5.3 It is expected that once operational the Proposed Development would require up to two technical maintenance visits per month in transit van or 4x4 type vehicles. Several visits a year will be required to clean the solar PV panels (using only distilled water). Regular visits will also be needed to undertake monitoring, and maintenance of landscape and habitat enhancements, to maintain any sustainable drainage ('SuDS') measures, and to secure any other mitigation to be delivered alongside the solar PV infrastructure area. Further information is available from the OOMP (Appendix 3.1).

3.5.4 Section 3 of the OOMP provides a high-level overview of the expected general activities that will lead to on-Site activity during the operational phase. As well as 'non-standard operational works' in section 3.9, where maintenance works are of a significant scale/nature or located in a part of the Site where controls were required by the CEMP, these will be carried forward and applied to the works in that part of the Site.

3.5.5 Where any repair or refurbishment works go beyond minor and/or standard O&M works, those activities will not take place unless the activities will not lead to materially new or materially different environmental effects to those identified in the assessment of the construction or operational phases within the ES. If works are of a scale where there is the potential for materially new or effects, a targeted management plan can be produced and provided to the Council for agreement. The OMP, which will be substantially in accordance with the

OOMP (Appendix 3.1) will be approved by the Council in advance of the commencement of the operational phase.

Noise and Vibration

3.5.6 An environmental sound survey has been undertaken to establish the existing environmental sound levels at positions considered representative of the nearest noise sensitive receptors. The results of the environmental sound survey have been used to establish background sound levels.

3.5.7 The Noise and Vibration Impact Assessment ('NIA') (Appendix 2.6) **[REF: 6.3]** presents the relevant results of the environmental sound surveys, details of the assessment methodology and assesses the Parameter Plan (Figure 3.4) to identify a suitable location for the Grid Connection Infrastructure.

3.5.8 The area (Work No. 2) which is identified on the Parameter Plan is primarily informed by preliminary noise modelling undertaken during the EIA scoping stage, in support of the PEIR (ES Appendix 2.1) **[REF: 6.3]**, which indicates that no significant effects would occur as the Grid Connection Infrastructure is sited in the area identified on the Parameter Plan.

3.5.9 Operational noise and vibration is therefore scoped out of the ES. Mitigation measures for operational noise from the Proposed Development are outlined in the OOMP (Appendix 3.1) **[REF: 6.3]** and will be secured through the implementation of the OMP and a DCO Requirement.

Operational Phase Control Documents

3.5.10 The OLEMP (Appendix 7.7) **[REF: 6.3]** will set out how the land will be managed and monitored throughout the Proposed Development's operational lifetime to deliver on biodiversity net gain ('BNG') and other environmental enhancement commitments.

3.5.11 It is anticipated that the existing agricultural use (sheep grazing) would continue, albeit at a reduced intensity, as part of the maintenance regime. An Outline Grazing Management Plan ('OGMP') which is included within

the OLEMP, outlines arrangements to provide for co-located grazing and associated pastoral activities.

3.5.12 The OOMP (Appendix 3.1) describes the typical arrangements for managing maintenance within the Site. This includes:

- A general description of what activities would be required for maintenance;
- Transport and access arrangements;
- Temporary lighting management;
- Likely working hours;
- Security arrangements;
- Maintenance facilities; and
- Vehicle maintenance to prevent oil spills.

3.5.13 The measures relating to landscaping and ecology are to be secured via the LEMP, which will substantially be in accordance with the OLEMP.

3.5.14 Upon cessation of the modelled operational 40-year lifespan, it is anticipated that the Proposed Development would be decommissioned, and the Site returned to its existing use. This is discussed further in Chapter 5 – Construction and Decommissioning Methodology and Phasing.

Table 3.2: Summary of Parameters for Assessment

Component	Parameters
Work No. 1 – Solar PV Infrastructure	
Location	The location of Work No. 1 will be within the corresponding numbered area shown on the Work Plan.
	There will be no Work No. 1 within 3m of the 11KV OHL and within 6m of the wooden poles (towers) of these OHL which cross the Site.
Mounting Structures	
Maximum depth of piles	The maximum depth of piles will be 4m.
Solar PV Arrays	
Maximum height of solar PV arrays	The maximum height will be 3.3m.

Component	Parameters
Minimum height of arrays	The lowest part of solar panels on the arrays will be no lower than 700mm.
Aisle Width (Range of gap between arrays)	The aisle width (range of gaps between arrays) will be a minimum of 2m.
Range of Array Tilt (slope from the horizontal)	The array tilt (slope from the horizontal) will be 10-20 degrees.
Azimuth Angle / Direction of Panel	Arrays will be fixed and oriented east-west across the Site with solar panel facades generally oriented South.
Power Conversion System – (Central Inverter and Standalone Transformer)	
Power Conversion System (PCS) Units maximum height	The maximum height of the PCS Unit containers will be 3.6m.
Work No. 2 – Grid Connection Infrastructure	
Location	The location of Work No. 2 will be within the corresponding numbered area shown on the Work Plans.
Area	The maximum area to be occupied by Work No. 2 will be 1.2ha.
Customer Substation Building	
Customer Substation Building – Maximum Height	The maximum height will be 6.5m.
Customer Substation Building – Maximum Area	The maximum footprint will be 184m^2.
Control Building	
Control Building – Maximum Height	The maximum height will be 3.6m.
Control Building – Maximum Area	The maximum footprint will be 31m^2.
DNO Substation Building	
DNO Substation Building – Maximum Height	The maximum height will be 6.5m.
DNO Substation Building – Maximum Area	The maximum footprint will be 140m^2.
Point of Connection ('POC') Compound	
Maximum equipment height of external electrical equipment	Electrical equipment and ancillary infrastructure within the POC Compound will be a maximum height of 9m.
Security Fencing	

Component	Parameters
Maximum security fence height (including posts between fence panels)	The maximum height will be 2.6m.
Communications Mast	
Maximum dimensions	The maximum dimensions will be 15m in height and 2m wide at the base.
Work No. 2A – POC Masts	
POC Masts	
POC Masts – Location	POC Masts will be located within Work No. 2A which is a limited part within Work No. 2 in proximity to the existing ENW pylon.
POC Masts – Maximum dimensions	Two POC Masts a maximum of 30m in height and with a maximum diameter of 5m at their widest point (base).
Work No. 3 – Associated Works	
Perimeter Fencing	
Maximum perimeter fence height (includes posts between fence panels)	The maximum height will be 2.4m.
Maximum perimeter fence post depth	The maximum fence post depth will be 1m.
Internal Access Tracks	
Internal Access Tracks – Material	The material will be permeable aggregate.
Internal Access Tracks – Design	Internal Access Tracks will be in-ground as standard, with a no-dig alternative provided where ground conditions dictate.
Internal Access Tracks – Maximum width	The maximum width will be 6m.
Internal Access Tracks – Maximum Depth	The maximum depth of topsoil removal / compaction to form in-ground tracks will be up to 300mm.
Site Security Measures	
Maximum CCTV Support Column Height	The maximum height of CCTV support columns will be 3.3m.
Network of Electrical Cables	
Trench dimension for distribution cables	Cabling in a no-dig area will either be within an on-ground trough and/or suspended solution.
Operation & Maintenance (O&M) units	

Component	Parameters
O&M units (storage & site management + H&S) Dimensions	The maximum dimensions of O&M Units will be 12.2m in length x 2.5m in width x 3.6m in height.
Green Infrastructure	
Green infrastructure	While the existing wind turbines are operational, any new vegetation within 500m of the turbines will be restricted to be no higher than 5m.
Work No. 4 – Temporary Construction Compounds	
Location	The location of Work No. 4 will be within the corresponding numbered area shown on the Works Plan.
Temporary Construction Compounds – Quantity	There will be a maximum of 5 Temporary Construction Compounds on the Site comprising Primary and Secondary Compounds.
Temporary Construction Compounds – Scale	Within Temporary Construction Compounds the maximum height of specific items (e.g. telescopic temporary CCTV) will be 7m. The maximum heights for buildings/structures in a fixed position (e.g. double stacked welfare cabins) will be 6.2m.
Temporary Construction Compounds – Scale	Temporary Construction Compounds will include temporary security fencing (heras fencing or similar) which will have a maximum height of 2.6m. No temporary fencing or gates, or other structural elements of Work No. 4 will be located within 5m of an access into the Site from the public highway.
Temporary Construction Compounds – Design	All construction compounds will be formed of a permeable aggregate base over geotextile membrane material.
Primary Construction Compounds	
Primary Construction Compounds – Scale	There will be a maximum of 2 Primary Construction Compounds.
Primary Construction Compounds – Maximum Total Area	The maximum area of any single Primary Construction Compound will be 6,400m^2 (0.64ha). This is the equivalent of 80 x 80m, or variations thereof, leading to a total footprint of no more than 0.64ha for any one Primary Construction Compound.
Secondary Construction Compounds	
Secondary Construction Compounds – Maximum area	The maximum area of any single Secondary Construction Compound will be 1,600m^2 (0.16ha). This is the equivalent of 40 x 40m, or variations thereof, leading to a total footprint of no more than

Component	Parameters
	0.16ha for any one Secondary Construction Compound.
Work No. 5 – Highways and Access	
Site Access	Bound surface materials (e.g. concrete, tarmac) will be utilised to form any access upgrades to the access apron (bell mouth). This bound surface may extend into the Site between 5-20m depending on civil engineering recommendations and LHA requirements.
Work No. 6 – Green Infrastructure	
Location	The location of Work No. 6 will be within the corresponding numbered area shown on the Works Plan.
General	While the existing wind turbines are operational, any new vegetation within 500m of the turbines will be restricted to be no higher than 5m.
Boundary Treatments	
Perimeter Fencing	Where Perimeter Fencing is utilised the specifications for this fencing are the same as those set out for Perimeter Fencing in Work No. 3.
Internal Access Tracks	
Internal Access Tracks	Where Internal Access Tracks are utilised, the specifications for these tracks are the same as those set out for Internal Access Tracks in Work No. 3.

3.5.15 The Parameter Plan (Figure 3.4) accounts for appropriate buffer distances and exclusion areas as informed by relevant technical guidance and statutory consultation responses. The exclusion areas that are set out in Table 3.3 and shown on Figure 3.5 have been embedded into the design of the Proposed Development and are secured through the Works Plans within the DCO, as well as the DPD.

Figure 3.5: Exclusion Areas

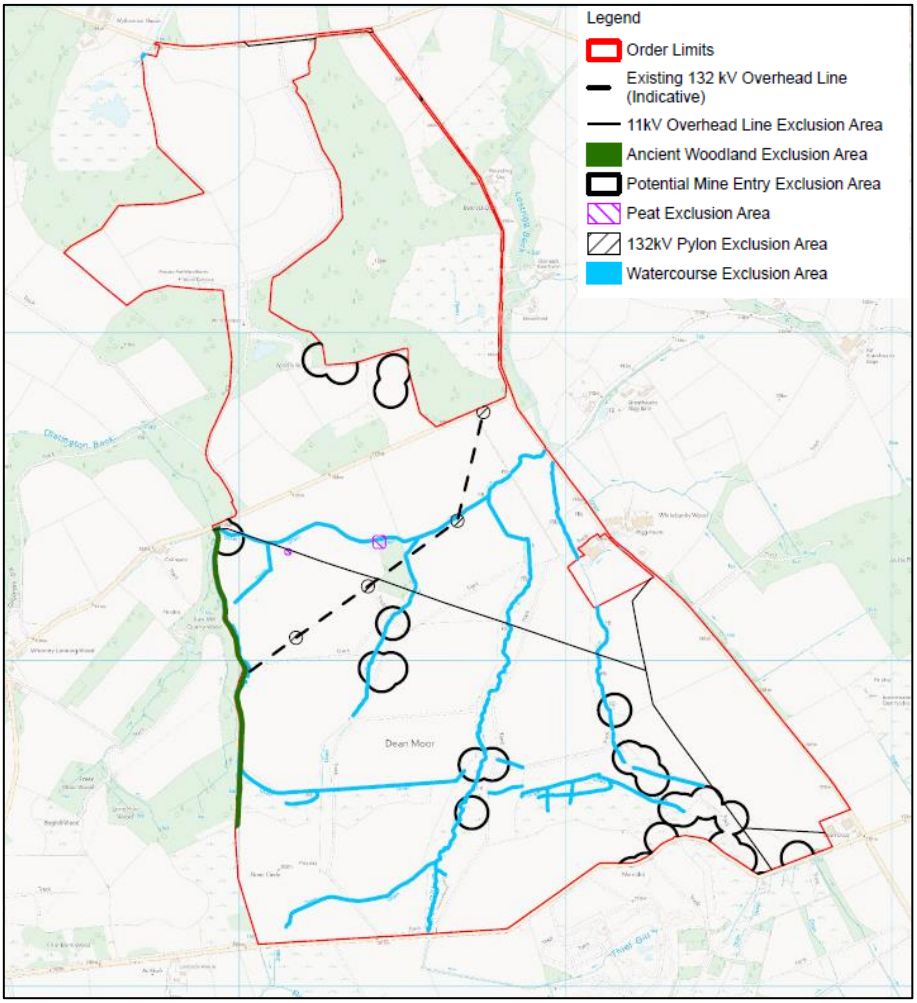


Table 3.3: Exclusion Areas

Parameter	Description of Exclusion Areas
Peat Exclusion Area	No Solar PV Infrastructure or buildings within Work No. 1 – Solar PV Infrastructure and Work No. 2 – Grid Connection Infrastructure is permitted 10m from the location where peat's presence has been confirmed in the Peat Survey Report (Appendix 10.3) **[REF: 6.3]**.
Watercourse and Waterbody Exclusion Area	No Solar PV Infrastructure or buildings within Work No. 1 – Solar PV Infrastructure and Work No. 2 – Grid Connection Infrastructure, and Work No. 5 – Highways and Access are permitted within 8m from the top of the bank of an Ordinary Watercourse or a Waterbody.
Mine Entries Exclusion Area	No permanent buildings within Work No. 1 – Solar PV Infrastructure, Work No. 1 – Grid Connection Infrastructure, or Work No. 3 – Associated Works is permitted within 50m of any former mine entries.

Parameter	Description of Exclusion Areas
	The possible locations of mine entries are recorded in the CMHA (Appendix 10.2) **[REF: 6.3]**. The ability for the Proposed Development to place other infrastructure in these areas is subject to further investigation, and if necessary, remediation prior to construction. Further information is available from Section 11 of the OCEMP (Appendix 5.1).
Ancient Woodland Exclusion Area	No infrastructure listed in Work No.1 – Solar PV Infrastructure, Work No. 2 – Grid Connection Infrastructure, Work No. 3 – Associated Works, and Work No. 5 – Highways and Access is permitted within 15m of ancient woodland.
132 kV OHL Exclusion Area	No infrastructure within Work No. 1 – Solar PV Infrastructure is permitted within 10m of the existing pylons.
11 kV OHL Exclusion Area	No infrastructure within Work No. 1 – Solar PV Infrastructure is permitted within 3m of the OHL and 6m of the wooden pole and stays of the final alignment of the 11kV OHL.

3.5.16 Detailed design aspects of the Proposed Development will be controlled pursuant to the DCO Requirements.