Light Valley Solar

Design Parameters and Commitments

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Light Valley Solar

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Light Valley Solar

DCO Submission

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1 Introduction

1.1 Overview of the Proposed Development

1.1.1 The Proposed Development, subject of the Development Consent Order (DCO) application, comprises a solar photovoltaic (PV) electricity generating station connecting over 100 megawatts (MW) to the Monk Fryston Substation, including associated development comprising Battery Energy Storage System (BESS), substations, grid connection infrastructure and other infrastructure integral to the construction, operation and maintenance, and decommissioning phases.

1.1.2 The Point of Connection (PoC) for the Proposed Development will be at the Monk Fryston 275 kV National Grid Substation (Monk Fryston Substation).

1.1.3 The Proposed Development comprises four broad areas:

1) Solar Development Sites;
2) Cable Route Corridor;
3) Highway Improvements Areas (HIA); and
4) Solar Development Site 8 Access.

1.1.4 A full description of the Proposed Development is included in ES Volume 1, Chapter 2: The Proposed Development [**EN0110012/APP/LVS/06.01.02**] and one illustrative way in which those elements could be built out is shown in ES Volume 2, Illustrative Site Layout Plans [**EN0110012/APP/LVS/06.02.02.01**] and in the Outline Environmental Masterplan [**EN0110012/APP/LVS/02.12**]. The location of the Proposed Development and the Order Limits are shown in ES, Volume 2, Figure 1.1 Site Location Plan and Order Limits [**EN0110012/APP/LVS/06.02.01.01**].

1.2 Purpose of this Document

1.2.1 This document sets out the design parameters and commitments by which the Proposed Development will be designed. Alongside the limits of deviation shown on the Works Plans [**EN0110012/APP/LVS/02.03**], it sets out the assessment envelope (also known as the 'Rochdale Envelope') within which the Environmental Impact Assessment has been undertaken. Compliance with the parameters and commitments contained within this document are secured by a Requirement in the Draft Development Consent Order (DCO) [**EN0110012/APP/LVS/03.01**] and will apply to the detailed design of the Scheme, to be secured post consent.

1.2.2 This document should be read alongside the Design Approach Document [**EN0110012/APP/LVS/05.05**] and ES Volume 1, Chapter 2: The Proposed Development [**EN00110012/APP/LVS/06.01.02**]. As set out in ES Volume 1, Chapter 2: The Proposed Development [**EN0110012/APP/LVS/06.01.02**], some flexibility is built into the design of the Proposed Development for the DCO

application, so that detailed design can be informed by technical considerations, post-consent work and take advantage of innovation in technology. This is of particular importance due to the rapid pace of change in solar PV and battery storage technology, whilst maintaining a robust and comprehensive assessment of potential effects. As such, the maximum, and where relevant, minimum parameters for flexibility set out in this document have formed the basis of assessment under the Rochdale Envelope approach. The approach has been applied by the technical authors as part of the EIA, ensuring that the worst-case scenario has been assessed for the Proposed Development.

1.2.3 When the detailed design for the Scheme is submitted for approval to North Yorkshire Council, those details must accord with the relevant parameters and commitments set out in this document.

1.3 Key Design Terminology

1.3.1 A description of the key design terminology for each component of the Proposed Development is set out in the document is as follows:

- Location – The location of the specific Scheme component or Works Number as it is assessed in the ES [**EN00110012/APP/LVS/06.01**] and shown on the Works Plans [**EN0110012/APP/LVS/02.03**].
- Parameters – The parameters define the envelope within which the Scheme will be developed. This includes the maximum (and where relevant, minimum) parameters for the elements where flexibility needs to be retained.
- Commitments – Specific design commitments that the detailed design will need to accord with relating to design matters such as appearance, materials, colour, alignment, buffers and set-backs, orientation, finished floor levels, methods of construction and the delivery of specific mitigation measures. For example, a noise barrier and flood risk reduction measures.

1.3.2 All heights defined in this document are Above Ground Level (AGL), unless otherwise specified.

1.4 Design Vision

1.4.1 The Applicant developed a design vision and design principles for the Proposed Development, which were adopted at the outset and have influenced design-based decisions throughout the pre-application process. The design vision for the Proposed Development is:

"Light Valley Solar will provide a substantial contribution towards the UK's net zero carbon ambitions and energy security.

Rooted in the landscape of North Yorkshire, the project will deliver lasting environmental and community benefits by enhancing green corridors, promoting biodiversity, and connecting people with nature. It aims to leave a positive, enduring legacy for local communities through thoughtful, environmentally-led design and sustainable development."

1.4.2 The Design Approach Document [**EN0110012/APP/LVS/05.05**] provides further information on the design vision.

2 Design Parameters and Commitments

2.1 Introduction

2.1.1 This following section sets out the design parameters and commitments for the Proposed Development, with individual tables provided for each work number. The tables below should be read in conjunction with the following:

- Draft DCO [**EN0110012/APP/LVS/03.01**];
- ES Volume 1, Chapter 2: The Proposed Development [**EN0110012/APP/LVS/06.01.02**];
- ES Volume 1, Chapter 6: Biodiversity [**EN0110012/APP/LVS/06.01.06**];
- Outline Construction Environmental Management Plan [**EN0110012/APP/LVS/07.02**];
- Outline Landscape and Ecological Management Plan [**EN0110012/APP/LVS/07.05**];
- Outline Environmental Masterplan [**EN0110012/APP/LVS/02.12**];
- Outline Bird Mitigation Area Management Plan [**EN0110012/APP/LVS/07.19**];
- Outline Battery Safety Management Plan [**EN0110012/APP/LVS/02.12**]; and
- Works Plans [**EN0110012/APP/LVS/02.03**].

2.2 Work No. 1 Design Parameters and Commitments

2.2.1 **Work No. 1** – a ground mounted solar photovoltaic generating station with a gross electrical output capacity of over 100 megawatts including:

a) solar modules fitted to mounting structures;
b) DC electrical cabling and combiner DC boxes;
c) 33 kV switch rooms, conversion units including inverters, transformers, switchgear, and monitoring and control systems; and
d) electrical and communications cabling connecting Work No. 1(c) to Work No. 3.

Table 2-1 Work No. 1 Design Parameters and Commitments

Proposed Development Component	Parameter / Commitment	Design Detail
Ground Mounted Solar Photovoltaic Generating Station (Work No.1)	Design Parameter	The following minimum offsets from the Proposed Development will be incorporated into Work No.1 (with the exception of Work No.1 (d)): ▪ Residential properties – 30 m from curtilage ▪ Ancient woodland – 15 m buffer or Root Protection Area (whichever is larger), except for adjacent to Common Wood SINC.

Proposed Development Component	Parameter / Commitment	Design Detail
		▪ A buffer of 15 times the stem diameter as measured at 1.5 m, will be put in place around ancient/ veteran trees. ▪ Non-ancient woodland – 10 m or Root Protection Area (whichever is larger); ▪ Non-ancient/ non-veteran trees – 5 m or Root Protection Area (whichever is larger) ▪ Hedgerows – 8 m ▪ Bank top of all watercourses and riparian boundaries, except where watercourse crossings are required – 10 m (50 m for Canal and River Trust watercourses) ▪ PRoW – 15 m ▪ Groundwater and surface water abstractions, both licensed and private water supplies – 50 m
Solar Modules and Mounting Structures (Work No.1(a))	Design Parameter	Solar PV Panels would be secured via metal posts driven into ground to an approximate depth of 1.5 m to 4 m (dependant on ground conditions). In areas where archaeological protection is required, non-ground penetrative techniques would be used. The Applicant has committed to these techniques being used, as a minimum at the locations on Figure 2.6 Concrete Feet Locations or Other Non-Ground Penetrative Techniques [**EN0110012/APP/LVS/06.02.02.06**]. The exact locations of where archaeological protection is required will be confirmed in the final Construction Environment Management Plan (CEMP) to be produced at detailed design stage (as outlined within the Outline CEMP (oCEMP) [**EN0110012/APP/LVS/07.02**].
	Solar PV Panel and Mounting Structure Commitment	Solar PV Panels will be bifacial monocrystalline panels, comprising smooth glass with an anti-reflective coating. The solar modules will be either black or dark blue. The Solar PV Mounting Structures will comprise a metal frame which are compatible with being placed in the floodplain, holding the solar panels in rows.

Proposed Development Component	Parameter / Commitment	Design Detail
Tracking Solar PV Tables (Option A) (Work No.1(a))	Option A Parameter	Solar PV Panels would have a minimum clearance of 0.4 m AGL at maximum tilt (+/- 60 degrees). Solar PV Panels would have a maximum height of 4.5 m AGL at maximum tilt (+/- 60 degrees). The maximum height when Solar PV Panels are horizontal would be 2.5 m AGL. Separation distance between rows will be a minimum of 2.5 m at the closest point.
	Option A Commitment	Solar PV Panels will be aligned in north-south rows. The panels will rotate east to west and tilt up to a variable of +/- 60 degrees. During times of flooding, tracked solar panels may be stowed by the tracking system algorithm onto a horizontal plane, to a maximum height of 2.5 m above ground level.
Fixed Solar PV Tables (Option B) (Work No. 1 (a))	Option B Parameter	Solar PV Panels would have a minimum clearance of 0.4 m AGL and a maximum height of 3.5 m AGL. Separation distance between rows will be a minimum of 2.5 m at the closest point.
	Option B Commitment	Solar PV Panels will be aligned in east-west rows of Solar PV Tables. The Solar PV Panels would be secured to fixed south facing Solar PV Tables with a fixed tilt angle of between +10 degrees to 35 degrees from horizontal.
33 kV Switch Room (Work No. 1(c))	33 kV Switch Room Parameter	The maximum dimensions of the 33 kV Switch room will be 15 m by 5 m with a maximum height of 3.5 m. Palisade fencing at a height of 3 m will be positioned around the Switch room. A concrete foundation slab, strips or footings up to 16 m by 6 m and a levelling layer of aggregate with a maximum depth of 0.8 m, or a concrete plinth set onto the topsoil where non-ground penetrative works are required. Piling may be required due to ground conditions.

Proposed Development Component	Parameter / Commitment	Design Detail
	33 kV Switch Room Commitment	The 33 kV Switch room will be housed and externally finished to be in keeping with the prevailing surrounding environment. The minimum Finished Floor Level (FFL) would be set to the design event flood level plus 0.3 m freeboard or the credible maximum scenario flood level, whichever is greater. In the event voided structures are used, freeboard will be a minimum of 600 mm.
Integrated Conversion Units	Location	Integrated Conversion Units will be located as far as reasonably practicable from noise sensitive receptors.
	Integrated Conversion Units Parameter	The maximum dimensions of the Integrated Conversion Units will be 15 m by 5 m with a maximum height of 3.5 m. A concrete foundation slab, strips or footings up to 16 m by 6 m and a levelling layer of aggregate with a maximum depth of 0.8 m, or a concrete plinth set onto the topsoil where non-ground penetrative works are required.
	Integrated Conversion Units Commitment	The Integrated Conversion Units will be housed in a metal container, externally finished in keeping with the prevailing surrounding environment. The minimum Finished Floor Level (FFL) would be set to the design event flood level plus 0.3 m freeboard or the credible maximum scenario flood level, whichever is greater. In the event voided structures are used, freeboard will be a minimum of 600 mm.
Disaggregated Conversion Units	Location	Disaggregated Conversion Units will be located as far as reasonably practicable from noise sensitive receptors.
	Disaggregated Conversion Units Parameter	A concrete foundation slab, strips or footings up to a metre greater than the maximum dimension of the relevant piece of equipment and a levelling layer of aggregate with a maximum depth of 0.8 m, or a concrete plinth set onto the topsoil where non-ground penetrative works are required.

Proposed Development Component	Parameter / Commitment	Design Detail
	Disaggregated Conversion Units Commitment	The Disaggregated Conversion Units will be finished to be in keeping with the prevailing surrounding environment. The minimum FFL would be set to the design event flood level plus 0.3 m freeboard or the credible maximum scenario flood level, whichever is greater. In the event voided structures are used, freeboard will be a minimum of 600 mm.
	Inverters Parameter	The maximum dimensions of the inverters will be 9 m by 6.5 m and a maximum height of 3.5 m
	Transformers Parameter	The maximum dimensions of the transformers will be 6.5 m by 5.5 m and a maximum height of 3.5 m.
	Switchgear Parameter	The maximum dimensions of the switchgear will be 6.5 m by 2.5 m and a maximum height of 3.5 m.
Temporary Launch Area/ Pits if Trenchless Techniques used for Work No. 1	Launch Area/ Pits Parameter	Launch / receptor pit working areas, where trenchless solutions are used, will be approximately 25 m x 25 m.
	Launch Area/ Pits Commitment	Launch and exit pits will be backfilled with spoil.

2.3 Work No. 2 Design Parameters and Commitments

2.3.1 **Work No. 2** – an energy storage facility comprising:

a) battery energy storage system units each containing fire protection systems and components;
b) a structure protecting the battery energy storage cells comprised in Work No. 2(a) and ancillary equipment, being either one container or multiple containers joined to each other, mounted on a reinforced concrete foundation slab or concrete piling;
c) interconnection units including heating, ventilation and air conditioning or liquid cooling systems and temperature management either housed within the containers comprised in Work No. 2(b), attached to the side or top of each of the containers, or located separate from but near to each of the containers;

d) integrated conversion units including inverters, transformers, switchgear and energy management systems;
e) inverters, transformers, switchgear and energy management systems;
f) monitoring and control systems housed within a container with Work No. 2(c) or located separately in its own container or control room;
g) electrical and communications cabling including electrical cables connecting Work No. 2 to Work No. 3;
h) bunded impermeable surface or other form of containment system to manage surface water drainage;
i) water storage facility for the purposes of firefighting water supply;
j) bunded impermeable surface or other form of containment system and associated infrastructure to contain used firewater; and
k) a noise barrier.

Table 2-2 Work No. 2 Design Parameters and Commitments

Proposed Development Component	Parameter / Commitment	Design Detail
BESS Compound (Work No. 2)	Location	The sequential location of the BESS Compound, in areas of lowest flood risk, in the location shown on the Works Plans [**EN0110012/APP/LVS/02.03**]. This includes locating the BESS Compound within Flood Zone 1, thereby avoiding Flood Zone 2 and 3, minimising potential flood risk and avoiding loss of functional floodplain.
	Area	The maximum area for the BESS Compound will be 10.5 ha.
	Design Parameter	The maximum height of the palisade fencing around the BESS Compound will be 3 m high with CCTV cameras installed.
		The following minimum offsets from the Proposed Development will be applied to Work No 2: ▪ Ancient woodland – 15 m buffer or Root Protection Area (whichever is larger), except for adjacent to Common Wood SINC. ▪ A buffer of 15 times the stem diameter as measured at 1.5 m, will be put in place around ancient/ veteran trees. ▪ Non-ancient woodland – 10 m or Root Protection Area (whichever is larger); ▪ Non-ancient/ non-veteran trees – 5 m or Root Protection Area (whichever is larger)

Proposed Development Component	Parameter / Commitment	Design Detail
		▪ Bank top of all watercourses and riparian boundaries, except where watercourse crossings are required – 10 m (50 m for Canal and River Trust watercourses) ▪ PRoW – 15 m ▪ Groundwater and surface water abstractions, both licensed and private water supplies – 50 m
		The use of site-specific flood modelling to inform the spatial distribution of infrastructure, ensuring that the BESS Compound is located outside the flood envelope associated with the 1 in 100-year plus climate change design flood event.
	Design Commitment	Refer to the Outline Battery Safety Management Plan [**EN0110012/APP/LVS/7.06**] for design commitments.
Fire Suppression System (Work No. 2(a))	Fire Suppression System Commitment	Refer to the Outline Battery Safety Management Plan [**EN0110012/APP/LVS/7.06**] for details.
A structure protecting the battery energy storage cells comprised in Work No. 2(a) and ancillary equipment, being either one container or multiple containers joined to each other, mounted on a reinforced concrete foundation slab or concrete piling (Work No. 2(b))	BESS Enclosure Parameter	Maximum dimensions of 16 m by 3 m with a maximum height of 3.5 m AGL per enclosure.
	BESS Enclosure Commitment	The BESS design will include integrated fire and explosion prevention and protection systems following National Fire Chiefs Council (NFCC) guidance and key industry standards, such as the National fire Protection Association requirements. The BESS Enclosures will be externally finished to be in keeping with the prevailing surrounding environment. The exact colour will be subject to manufacturer specifications and agreed with the relevant planning authority prior to construction but will be carefully selected in subdued, non-reflective tones to sit as discreetly as possible within the landscape. The BESS Enclosures will be mounted on concrete foundations (likely concrete base or monolith plinth up to 2 m deep 'raft' foundation and up to 15 m depth for piles foundation. The minimum FFL would be set to the design event flood level plus 0.3 m freeboard or the credible maximum scenario flood level, whichever is

Proposed Development Component	Parameter / Commitment	Design Detail
		greater. In the event voided structures are used, freeboard will be a minimum of 600 mm. Refer to the Outline Battery Safety Management Plan [**EN0110012/APP/LVS/7.06**] for more detail.
Integrated Conversion Units (Work No. 2(d))	Location	Integrated Conversion Units will be located as far as reasonably practicable from noise sensitive receptors.
	Integrated Conversion Units Parameter	The maximum dimensions of the Integrated Conversion Units will be 15 m by 5 m with a maximum height of 3.5 m. A concrete foundation slab, strips or footings up to 16 m by 6 m and a levelling layer of aggregate with a maximum depth of 0.8 m, or a concrete plinth set onto the topsoil where non-ground penetrative works are required.
	Integrated Conversion Units Commitment	The Integrated Conversion Units will be housed in a metal container, externally finished in keeping with the prevailing surrounding environment.
Disaggregated Conversion Units	Location	Disaggregated Conversion Units will be located as far as reasonably practicable from noise sensitive receptors.
	Disaggregated Conversion Units Parameter	A concrete foundation slab, strips or footings up to a metre greater than the maximum dimension of the relevant piece of equipment and a levelling layer of aggregate with a maximum depth of 0.8 m, or a concrete plinth set onto the topsoil where non-ground penetrative works are required.
	Disaggregated Conversion Units Commitment	The Disaggregated Conversion Units will be finished to be in keeping with the prevailing surrounding environment. The minimum Finished Floor Level (FFL) would be set to the design event flood level plus 0.3 m freeboard or the credible maximum scenario flood level, whichever is greater. In the event voided structures are used, freeboard will be a minimum of 600 mm.

Proposed Development Component	Parameter / Commitment	Design Detail
	Inverters Parameter	The maximum dimensions of the inverters will be 9 m by 6.5 m and a maximum height of 3.5 m
	Transformers Parameter	The maximum dimensions of the transformers will be 6.5 m by 5.5 m and a maximum height of 3.5 m.
	Switchgear Parameter	The maximum dimensions of the switchgear will be 6.5 m by 2.5 m and a maximum height of 3.5 m.
Monitoring and Control Systems housed within a Container with Work No. 2(c) or Located Separately in its own Container or Control Room (Work No. 2(f))	Monitoring and Control System Commitment	The monitoring and control systems will consist of manual controls at the Conversion Units, and automatic and centralised monitoring and control features at the control rooms on the onsite substations.
Electrical and Communications Cabling Connecting Work No. 2 to Work No. 3	Cabling Parameter	The cable trench is up to approximately 7 m wide. The maximum depth of the cable trench will be 2 m subject to design and ground conditions.
	Cabling Commitment	Cabling between the conversion units and sub-stations and between sites would connect at 33 kV depending on the electrical design. Avoidance Areas have been identified where non-intrusive (trenchless) installation methods will be used to avoid impact to sensitive features such as watercourses, hedgerows and mature vegetation. Trenchless solutions, for example horizontal directional drilling (HDD) is proposed for the crossing of main rivers including the River Ouse, IDB watercourses, and WER water body line watercourses. Trenchless solutions will be utilised when/ if crossing ditches that lead to the following designated sites: Common Wood SINC, Nightingale Wood SINC, Burr Closes SSSI, and Barber Rain SINC. Trenchless solutions will also be employed to pass beneath Ouse Bank-Westfield-Riccall Ings SINC that flanks the River Ouse, which will avoid direct impacts to the designated site. Trenchless solutions would be used for railway crossings. Road crossings will

Proposed Development Component	Parameter / Commitment	Design Detail
		be a combination of trenchless and open cut crossings. Where trenchless solutions have been used, the cable may be placed at greater depths. The Crossing Schedule [**EN110012/APP/LVS/07.01**] illustrates the areas where trenches crossings have been committed to. Underground cables will be located in existing gaps in hedgerows wherever feasible, and the final design will seek to retain trees and hedgerows, as far as practicable, to retain existing Historic Landscape Character. Any trees or hedges lost to cable installation will be replanted where appropriate in the Cable Route Corridor. Existing watercourse crossings will be used wherever practicable. Where watercourses cannot be avoided, a range of solutions will be considered including temporary culverts, with the type of crossing selected being determined based on on-site specific factors. Watercourse crossings will be designed and implemented so that they do not increase flood risk within the Order limits of on adjacent third-party land. The design will also maintain a natural watercourse bed where reasonably practicable.
Launch Area/ Pits if Trenchless Techniques used for Work No. 2	Launch Area/ Pits Parameter	Launch / receptor pit working areas, where trenchless solutions are used will be approximately 25 m x 25 m.
	Launch Area/ Pits Commitment	Launch and exit pits will be backfilled with spoil.
Water Storage Facility (Work No. 2(i))	Water Storage Facility Commitment	Refer to the Outline Battery Safety Management Plan [**EN0110012/APP/LVS/7.06**] for details.
Used Firewater Containment Structure and Infrastructure (Work No. 2(j))	Firewater Containment Structure Commitment	Refer to the Outline Battery Safety Management Plan [**EN0110012/APP/LVS/7.06**] for details.
Parking	Location	Parking bays will be provided at the BESS Area.

Proposed Development Component	Parameter / Commitment	Design Detail
Noise Generating Plant e.g. Conversion Units, BESS, Substation.	Plant Orientation Commitment	Plant orientation to use buildings and structures as noise barriers and positioning noise emitting items such as BESS fans and air inlets to be directed away from sensitive receptors. This includes positioning units so that their noise emitting side is screening by noise barriers.
Noise Barrier	Noise Barrier Commitment	Implementation of up to 5 m noise barriers around and within the BESS site. This includes optimising the location of such barriers to maximise efficient acoustic screening e.g. internal barriers closer to BESS units. The exact colour will be subject to manufacturer specifications but will be carefully selected in subdued, non-reflective tones to sit as discreetly as possible within the landscape.

2.4 Work No. 3 Design Parameters and Commitments

2.4.1 **Work No. 3** – works in connection with onsite substations with works comprising:

a) an up to 275 kV substation, with associated transformer bays, feeder bays, transformers, switchgear buildings and ancillary equipment power quality and reactive power devices;
b) control building or container relay rooms with associated offices, storage and welfare facilities;
c) monitoring and control systems for Work Nos. 1, 2 and 3;
d) electrical and communications cabling including electrical cables connecting Work No. 1, 2 to Work No. 3;
e) maintenance compound including car parking;
f) electrical cabling; and
g) earthworks, including soil stripping and site levelling.

Table 2-3 Work No. 3 Design Parameters and Commitments

Proposed Development Component	Parameter / Commitment	Design Detail
Onsite Substations (Work No.3)	Design Parameter	Maximum height of 13 m to the top of the busbars. Maximum depth of 2.5 m for a 'raft' foundation and 15 m for piles foundation.

Proposed Development Component	Parameter / Commitment	Design Detail
	Design Commitment	The sequential location of the substations, in areas of lowest flood risk, in the locations shown on the Works Plans [**EN0110012/APP/LVS/02.03**]. This includes locating the substations within Flood Zone 1 and 2 only, thereby avoiding Flood Zone 3, minimising potential flood risk and avoiding loss of functional floodplain. The use of site-specific flood modelling to inform the spatial distribution of infrastructure, ensuring that the substations are located outside the flood envelope associated with the 1 in 100-year plus climate change design flood event. The minimum FFL of all equipment including transformers and switchgear would be set to the design event flood level plus 0.3 m freeboard or the credible maximum scenario flood level, whichever is greater. In the event voided structures are used, freeboard will be a minimum of 600 mm.
	Location	Located in Solar Development Sites 1, 2 and 4.
	Control Building Parameter	Maximum dimension of 15 m by 32.5 m with a maximum height of 4 m AGL.
	Spare Parts Building Parameter	Maximum dimension of 15 m by 5 m with a maximum height of 3.5 m AGL.
	33 kV Switchgear Building Parameter	Maximum dimensions of 7 m by 19 m with a maximum height of 4.2 m.
	Design Commitment	The buildings will be finished in neutral colours to be in keeping with the prevailing surrounding environment.
Parking	Location	Parking bays will be provided at the substations.

2.5 Work No. 4 Design Parameters and Commitments

2.5.1 **Work No. 4** – works to the National Grid substation to facilitate connection of the authorised development to the National Grid including population of the substation bay:

a) a 275 kV 3-phase 4000 A circuit breaker for control and protection of the outgoing circuit serving the authorised development;
b) a 3-phase set of current transformers for protection of the new outgoing 275 kV feeder circuit and the overlap with the National Grid system;
c) a 3-phase high accuracy metering current and voltage transformer assembly for commercial metering of the connection;
d) a 3-phase 275 kV line disconnector/earth switch for isolation and earthing of the outgoing 275 kV feeder circuit;
e) a 3-phase set of 275 kV high voltage cable sealing ends and cables connecting the National Grid substation with Work No. 5;
f) a 3-phase power quality ready capacitor voltage transformer; and
g) provision of a stand-alone building to house duplicate feeder protection systems, commercial metering systems, protection and control equipment and user remote control and data acquisition apparatus.

2.5.2 As Work No. 4 consists entirely of works to be undertaken by the National Grid within their substation, no specific design parameters or commitments can be determined at this stage.

2.6 Work No. 5 Design Parameters and Commitments

2.6.1 **Work No. 5** – works in connection with electrical and communication cabling comprising works to lay electrical cables up to 275 kV including:

a) laying electrical and communication cables connecting Work Nos. 2, 3 and 1(c) to Work No. 4;
b) laying down of access tracks, ramps, footpaths, roads, including the laying and construction of drainage infrastructure, signage and information boards;
c) joint bays, link boxes, cable ducts, cable protection, joint protection, manholes, marker posts, underground cable marker, tiles and tape, communications chambers, fibre optic cables and lighting and other works associated with cable laying;
d) tunnelling, boring and drilling works; and
e) temporary construction and decommissioning laydown areas comprising:
    (i) areas of hardstanding, compacted ground or track matting;
    (ii) car parking;
    (iii) area to store materials and equipment;
    (iv) site and welfare offices and workshops;
    (v) security infrastructure, including cameras, perimeter fencing and lighting;
    (vi) safety infrastructure to manage traffic when crossing roads or other obstacles;
    (vii) site drainage and waste management infrastructure (including sewerage); and
    (viii) electricity, water, waste water and telecommunications connections.

Table 2-4 Work No. 5 Design Parameters and Commitments

Proposed Development Component	Parameter / Commitment	Design Detail
Works to lay Electrical Cables up to 275 kV (Work No. 5(a))	275 kV Cables Parameter	The cable trench will be a maximum width of 7 m and installed in a trench up to 2 m deep, subject to ground conditions. The cable trench from Solar Development Site 4 to the point of connection at the Existing National Grid Monk Fryston Substation, will be a maximum width of 2 m.
	275 kV Cables Commitment	The maximum width of the temporary haul road will be up to 7 m with the majority of the haul road typically constructed using granular/ hard core depending on ground conditions. Where ground is identified as requiring additional protection, such as the launch and receptor pits, aluminium trackway may be used as an alternative to minimise ground disturbance. The haul road may require a wearing course to be applied in specific locations to minimise degradation. Where passing places are incorporated into the temporary haul road, these will be 12 m wide. Avoidance Areas have been identified where non-intrusive (trenchless) installation methods will be used to avoid impact to sensitive features such as watercourses, hedgerows and mature vegetation. Trenchless techniques will be used for the crossing of the main rivers including the River Ouse, IDB watercourses, and WER water body line watercourses. Trenchless solutions will be utilised when/ if crossing ditches that lead to the following designated sites: Common Wood SINC, Nightingale Wood SINC, Burr Closes SSSI, and Barber Rain SINC. Trenchless solutions will also be employed to pass beneath Ouse Bank-Westfield-Riccall Ings SINC that flanks the River Ouse, which will avoid direct impacts to the designated site. Trenchless solutions would be used for railway crossings. Road crossings will be a combination of trenchless and open cut crossings. In these locations the cable may be placed at greater depths. Underground cables will be located in existing gaps in hedgerows wherever feasible, and the

Proposed Development Component	Parameter / Commitment	Design Detail
		final design will seek to retain trees and hedgerows, as far as possible, to retain existing Historic Landscape Character. Any trees or hedges lost to cable installation will be replanted where appropriate in the Cable Route Corridor. Existing watercourse crossings will be used wherever practicable. Where watercourses cannot be avoided, a range of solutions will be considered including temporary culverts, with the type of crossing selected being determined based on on-site specific factors. Watercourse crossings will be designed and implemented so that they do not increase flood risk within the Order limits of on adjacent third-party land. The design will also maintain a natural watercourse bed where reasonably practicable. Micro siting will be undertaken within the Cable Route Corridor to best avoid impacts on important ecological features and fauna as identified during the UK Habitat surveys and species surveys, as far as practicable.
Temporary Culverts	Temporary Culverts Commitment	All culverts will be designed in accordance with CIRIA Report C786, with initial sizing based on upstream catchment assessments and anticipated flows.
Launch Area/ Pits if Trenchless Techniques used for Work No. 5	Launch Area/ Pits Parameter	Launch / receptor pit working area, where trenchless solutions are used, will be approximately 25 m x 25 m.
	Launch Area/ Pits Commitment	Launch and exit pits will be backfilled with spoil.
Joint Bays including Link Boxes (Work No. 5 (c))	Joint Bay (including Link Boxes) Parameter	Joint bays will be a minimum of 250 m to a maximum of 2 km apart. The dimensions of these will be determined by how many electrical circuits will be in the jointing bay. Link boxes, where required, will be to a minimum depth of 1.2m below ground level. Where manhole covers are required, these will be up to 0.2 m above ground.

Proposed Development Component	Parameter / Commitment	Design Detail
		Access, if required, would be via a manhole cover at ground level, which would measure up to 2 m by 2 m.
	Joint Bay (including Link Boxes) Commitment	The base of the joint bay will be level and a concrete pad installed (approximately 150 mm thick with light reinforcement) as a dry working surface.
Fibre Communication Chambers (Work No. 5(c))	Fibre Communication Chamber Parameter	The excavation for fibre communications chambers will be approximately 1.5 m in length, 1 m wide and 1.5 m deep. The fibre communications chambers will sit flush to ordinary ground level (OGL).
	Fibre Communication Chamber Commitment	Fibre communications chambers will be located in hard surface or at edges of fields with the final location to be determined during detailed design.
Manholes	Manholes Commitment	Where manhole covers are required, every effort will be made to place them within field margins where reasonably practicable to do so or in other technically suitable locations in consultation with the landowner. If it is not practicable to place the manhole covers in field margins, the area would be clearly fenced or otherwise demarcated to ensure farmers can avoid the manhole covers during normal agricultural operations.

2.7 Work No. 6 Design Parameters and Commitments

2.7.1 **Work No. 6** – works including:

a) fencing, gates, boundary treatment and other means of enclosure;
b) works for the provision of security and monitoring measures including CCTV columns, lighting columns and lighting cameras, weather stations, communication infrastructure, and perimeter fencing;
c) landscaping and biodiversity mitigation and enhancement measures including planting;
d) improvement, maintenance and use of existing private tracks;
e) laying down of internal access tracks, ramps, bridges, means of access and footpaths;
f) temporary footpath diversions, signage and information boards;
g) earthworks;

h) sustainable drainage system features, ponds, outfalls, general drainage and irrigation infrastructure and improvements or extensions to existing drainage and irrigation systems;
i) acoustic barriers;
j) electricity and telecommunications connections; and
k) secondary temporary construction and decommissioning laydown areas:

Table 2-5 Work No. 6 Design Parameters and Commitments

Proposed Development Component	Parameter / Commitment	Design Detail
Solar PV Sites Perimeter Fencing	Perimeter Fencing Parameter	The maximum height of the perimeter fencing around the Solar PV Sites will be 2.5 m.
	Perimeter Fencing Commitment	Fencing will comprise deer wire mesh and wooden post security fence with wooden posts. It will be directly driven into the ground using a standard post driver. There will be no excavation of foundations. 'Concreting in' of posts would only be used in limited circumstances such as corner or tenson posts.
Onsite Substations	Onsite Substations Fencing Parameter	Maximum height of the palisade fencing around the substation compound is 3 m. Maximum height of deer type wire mesh and wooden post fencing outside of the palisade fencing is 2.5 m.
Cabling Fencing	Cabling Fencing Commitment	During construction the working width for the cables would be demarcated by temporary fencing where required.
Security System	Security System Parameter	The maximum height of CCTV poles will be 3 m.
	Security System Commitment	The poles will be galvanized steel and painted in keeping with the prevailing surrounding environment. The CCTV cameras would point directly within the Site boundary and away from land outside.
Internal Access Tracks	Solar PV Access Parameter	Maximum of 3.5 m wide (6 m at passing places).
	Solar PV Access Commitment	Constructed of granular material and will therefore be permeable. The access points from the public highway may comprise reinforced concrete or asphalt.

Proposed Development Component	Parameter / Commitment	Design Detail
	BESS Compound and Substation Access (for Solar Development Sites 1, 2 and 4) Parameter	Maximum 6 m wide road (8 m at passing places).
	BESS Compound and Substation Access (for Solar Development Sites 1, 2 and 4) Commitment	May be constructed of asphalt over a levelling layer of substrate. The access points from the public highway and bends in the track would be wider to accommodate abnormal indivisible load turning space.
Groundwater and Surface Water Abstractions	Groundwater and Surface Water Abstractions Parameter	50 m stand off from all groundwater and surface water abstractions, both licensed and private water supplies.
Drainage	Drainage Commitment	The drainage design will manage surface water runoff in accordance with the design standards set out in the outline Drainage Strategy, including incorporating the recommended climate change allowances for peak rainfall intensities. Refer to the outline Drainage Strategy [**EN0110012/APP/LVS/06.03.15.04**] for details. Wherever possible, the design will maintain existing catchments, prioritise the use of SuDS where feasible, and surface water will be managed such that existing greenfield runoff rates are maintained.
		All culverts will be designed in accordance with CIRIA Report C786, with initial sizing based on upstream catchment assessments and anticipated flows.

2.8 Work No. 7 Design Parameters and Commitments

2.8.1 **Work No. 7** – temporary construction and decommissioning laydown areas comprising:

a) areas of hardstanding;
b) car parking;
c) site and welfare offices and workshops;
d) security infrastructure, including cameras, perimeter fencing and lighting;

e) area to store materials and equipment;
f) site drainage and waste management infrastructure (including sewerage); and
g) electricity, water, waste water and telecommunications connections.

Table 2-6 Work No. 7 Design Parameters and Commitments

Proposed Development Component	Parameter / Commitment	Design Detail
Temporary Construction Compounds	Temporary Construction Compounds Commitment	Temporary construction compounds will be located on low ecological importance habitat where practicable and will be located as far as practicable from sensitive receptors. Temporary construction compounds will include areas of hardstanding which would be made out of granular material. In locations identified as being at greater risk from contamination releases, a non-permeable 'Durabase Mat System' or a similar non-ground penetrating mat system would be installed to protect groundwaters during construction.
Temporary Portacabins	Temporary Portacabins Parameter	The dimensions of the portacabins will vary. However, the maximum dimensions for individual units is expected to be 12 m by 3 m with a typical maximum height of 3 m.
Temporary Perimeter Fencing	Temporary Perimeter Fencing Parmeter	The maximum height of the perimeter fencing will be 3 m.
Security System	Security System Parameter	The maximum height of CCTV poles will be 3 m.
	Security System Commitment	The poles will be galvanized steel and painted in keeping with the prevailing surrounding environment.
Temporary Access	Temporary Access Commitment	Each access point will have an appropriate length of hardstanding from the proposed junction access point / wheel washing facility to avoid mud being spread on the highway network from construction vehicle movements.
Drainage	Drainage Commitment	The drainage design will manage surface water runoff in accordance with the design standards set out in the outline Drainage Strategy, including incorporating the recommended climate change allowances for peak rainfall intensities. Refer to the outline Drainage

Proposed Development Component	Parameter / Commitment	Design Detail
		Strategy [**EN0110012/APP/LVS/06.03.15.04**] for details. Wherever possible, the design will maintain existing catchments, prioritise the use of SuDS where feasible, and surface water will be managed such that existing greenfield runoff rates are maintained.
		All culverts will be designed in accordance with CIRIA Report C786, with initial sizing based on upstream catchment assessments and anticipated flows.

2.9 Work No. 8 Design Parameters and Commitments

2.9.1 **Work No. 8** – works to facilitate access to Work Nos. 1 to 7 and 9 to 10 including:

a) **Work No. 8A** – works to facilitate temporary construction, maintenance and decommissioning access to Work Nos. 1 to 7 and 9 to 10 including:
   (i) creation of accesses from the public highway;
   (ii) creation of visibility splays and passing places;
   (iii) works to alter the layout of any street or highway temporarily; and
   (iv) offsite works adjacent to highways land including those to structures, boundary features, drainage features on private land, in connection with the movement of abnormal indivisible loads.

b) **Work No. 8B** – works to facilitate permanent access to Work Nos. 1 to 6 and 9 to 10 including:
   (i) creation of accesses from the public highway;
   (ii) creation of visibility splays and passing places;
   (iii) works to alter the layout of any street or highway permanently; and
   (iv) offsite works on and adjacent to highways land including those to structures, boundary features, drainage features on private land, in connection with the movement of abnormal indivisible loads.

Table 2-7 Work No. 8 Design Parameters and Commitments

Proposed Development Component	Parameter / Commitment	Design Detail
Solar Development Sites Access	Solar PV Access Parameter	Maximum width of 3.5 m and 6 m in passing places.

Proposed Development Component	Parameter / Commitment	Design Detail
	Solar PV Access Commitment	Constructed of a granular material and will therefore be permeable. The access points from the public highway and bends in the track may comprise reinforced concrete or asphalt. Site access and access routes around the Solar Development Sites, including watercourse crossings, will aim to use existing access points/ crossings and field openings where practicable to reduce impacts.
BESS Compound and Substation Access	BESS Area and Substation Access (for Solar Development Sites 1, 2 and 4) Parameter	Maximum width of BESS Compound and Substation access tracks will be 6 m. Maximum width of BESS Compound and Substation access tracks at passing places will be 8 m.
	BESS Compound and Substation Access (for Solar Development Sites 1, 2 and 4) Commitment	May be constructed of asphalt over a levelling layer of substrate. The access points from the public highway and bends in the track would be wide enough to accommodate abnormal indivisible load turning requirements.
Cable Route Corridor Access	Cable Route Corridor Access Commitment	A temporary haul road throughout the Cable Route Corridor will be constructed. Where ground is identified as requiring additional protection, for example, launch and receptor pits, aluminium trackway or alterative protection may be used as an alternative to minimise ground disturbance. The haul road will be removed following installation of the Grid Connection Cables and Interconnecting Cables and the land used for the haul road fully reinstated back to its original use.

Proposed Development Component	Parameter / Commitment	Design Detail
Drainage	Drainage Commitment	The drainage design will manage surface water runoff in accordance with the design standards set out in the outline Drainage Strategy, including incorporating the recommended climate change allowances for peak rainfall intensities. Refer to the outline Drainage Strategy [**EN0110012/APP/LVS/06.03.15.04**] for details. Wherever possible, the design will maintain existing catchments, prioritise the use of SuDS where feasible, and surface water will be managed such that existing greenfield runoff rates are maintained.
		All culverts will be designed in accordance with CIRIA Report C786, with initial sizing based on upstream catchment assessments and anticipated flows.

2.10 Work No. 9 Design Parameters and Commitments

2.10.1 **Work No. 9** – works to create and maintain green infrastructure, comprising:

a) **Work 9A** – green infrastructure works including:
   (i) fencing, gates, boundary treatment and other means of enclosure;
   (ii) signs, interpretation boards or any other information display board;
   (iii) earth works including bunds, embankments, trenching and sustainable drainage systems features including ponds and swales;
   (iv) landscaping and biodiversity mitigation and enhancement measures including planting;
   (v) means of access; and
   (vi) drainage.

b) **Work 9B** – works to create and maintain a Bird Mitigation Area including:
   (i) scrapes, shallow wet features and backwaters;
   (ii) earthworks;
   (iii) formation of islands;
   (iv) topsoil stripping;
   (v) water retention measures;
   (vi) connections to and enhancement of existing ditches;
   (vii) removal or modification of hedges and vegetation; and
   (viii) stock fencing.

Table 2-8 Work No. 9 Design Parameters and Commitments

Proposed Development Component	Parameter / Commitment	Design Detail
Fencing	Fencing Parameter	Maximum height of fencing will be 2.5 m.
	Fencing Commitment	Fencing will comprise deer wire mesh and wooden post security fence with wooden posts. Fencing of the Solar Development Areas within the Solar Development Sites will be designed to let small mammals pass through where practicable.
Internal Access Tracks	Internal Access Tracks Parameter	Maximum width of Solar PV access tracks will be 3.5 m wide. Maximum width of Solar PV access tracks at passing places will be 6 m.
	Internal Access Tracks Commitment	Constructed of a granular material and will therefore be permeable.
Bird Mitigation Area	Bird Mitigation Area Commitment	Refer to the Outline Bird Mitigation Area Management Plan [**EN0110012/APP/LVS/07.19**] for details.
Drainage	Drainage Commitment	The drainage design will manage surface water runoff in accordance with the design standards set out in the outline Drainage Strategy, including incorporating the recommended climate change allowances for peak rainfall intensities. Refer to the outline Drainage Strategy [**EN0110012/APP/LVS/06.03.15.04**] for details. Wherever possible, the design will maintain existing catchments, prioritise the use of SuDS where feasible, and surface water will be managed such that existing greenfield runoff rates are maintained.
		All culverts will be designed in accordance with CIRIA Report C786, with initial sizing based on upstream catchment assessments and anticipated flows.

2.11 Work No. 10 Design Parameters and Commitments

2.11.1 **Work No. 10** – creation of permissive paths including:

a) **Work No. 10A** – creation of permissive paths for the exclusive use of pedestrian users comprising:
   (i) ramps, bridges and other means of access;
   (ii) fencing, gates, boundary treatment and other means of enclosure;
   (iii) signs, interpretation boards or any other information display board;
   (iv) facilities supporting use and enjoyment including bird hides; and
   (v) landscaping and biodiversity mitigation and enhancement measures including planting.

b) **Work No. 10B** – creation of permissive paths for the exclusive use of pedestrian and cycle users comprising:
   (i) ramps, bridges and other means of access;
   (ii) fencing, gates, boundary treatment and other means of enclosure;
   (iii) signs, interpretation boards or any other information display board;
   (iv) facilities supporting use and enjoyment including bird hides; and
   (v) landscaping and biodiversity mitigation and enhancement measures including planting.

c) **Work No. 10C** – creation of permissive paths for the exclusive use of pedestrian, cycle and equestrian users comprising:
   (i) ramps, bridges and other means of access;
   (ii) fencing, gates, boundary treatment and other means of enclosure;
   (iii) signs, interpretation boards or any other information display board;
   (iv) facilities supporting use and enjoyment including bird hides; and
   (v) landscaping and biodiversity mitigation and enhancement measures including planting.

Table 2-9 Work No. 10 Design Parameters and Commitments

Proposed Development Component	Parameter / Commitment	Design Detail
PRoW Diversions	PRoW Diversions Parameter	Where the PRoW is diverted in Solar Development Site 1, agricultural wire stock proof fencing at a maximum height of 1.15 m will be provided to prevent dog encroachment into the BMA and to retain any grazing stock.
Permissive Path	Location	Permissive paths will be located in: ▪ Solar Development Site 1 ▪ Solar Development Site 4 ▪ Solar Development Site 6 ▪ Solar Development Site 7
	Permissive Path Commitment	Details of the permissive path network provided within the Proposed Development will be agreed with North Yorkshire Council post consent.

Proposed Development Component	Parameter / Commitment	Design Detail
Fencing	Fencing Parameter	Maximum height of fencing will be 2.5m.
	Fencing Commitment	Fencing will comprise deer wire mesh and wooden post security fence with wooden posts.

Light Valley
Solar

W: Lightvalleysolar.co.uk
E: info@lightvalleysolar.co.uk