Chapter 4: Proposed Development Description

Kirknewton Solar & BESS EIA Report

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Acronyms and Abbreviations

AC	Alternating Current
AGL	Above Ground Level
AILV	Abnormal Indivisible Load Vehicle
ALC	Agricultural Land Capability
AOD	Above Ordnance Datum
AWI	Ancient Woodland Inventory
BESS	Battery Energy Storage System
BMS	Battery Management System
CA	Conservation Area
CCTV	Closed Circuit Television
CEMP	Construction Environmental Management Plan
DC	Direct Current
DNO	District Network Operator
ha	Hectares
HVAC	Heating, Ventilation and Air Conditioning
km	Kilometres
L	Litre
LEPO	Long Established Plantation Origin
LLA	Local Landscape Area
m	Metres
MW	Megawatt
NFCC	National Fire Chiefs Council
NSA	National Scenic Area
OBSMP	Outline Battery Safety Management Plan
OEMP	Operational Environmental Management Plan
PCS	Power Conversion System
PV	Photovoltaic
RDP	Restoration and Decommissioning Plan
SM	Scheduled Monument
SSSI	Site of Special Scientific Interest

4.0 Proposed Development Description

4.1 Introduction

4.1.1 This chapter provides a description of the Site and its geographical context. It then presents a description of the Proposed Development for which consent is being sought, for the purpose of informing the identification and assessment of likely significant environmental effects. This includes the anticipated construction and operation activities connected with the Proposed Development.

4.1.2 This chapter is supported by the following figures, which are presented in EIA Report, Volume II:

- **Figure 4.1** - Cumulative Developments
- **Figure 4.2** - Typical Solar Array Elevation
- **Figure 4.3** - Battery Containers Elevation
- **Figure 4.4** - PCS Elevations
- **Figure 4.5** - Typical AUX Transformer (Inverter) Elevation
- **Figure 4.6** - Transformer Elevation
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- **Figure 4.15** - CCTV Post Elevation
- **Figure 4.16** - Typical Access Track Cross Section

4.2 Site Status and Context

Site and Surroundings

4.2.1 The Proposed Development is located approximately 1.5 km south of the village of Kirknewton and is wholly within the West Lothian administrative area. The Site comprises two parcels of land, bisected by Leyden Road running north-west to south-east, with a total site area of 76 ha (refer to **Figure 1.1**).

4.2.2 The Site is rural and agricultural in nature and is currently used for arable purposes, though is designated as mainly Agricultural Land Capability (ALC) Class 4.2 with some Class 3.2 (i.e. not prime agricultural land). The immediate wider context includes agricultural buildings, tree plantations, a small pond and overhead pylons which transect the western land parcels. Surveys have determined that an area designated by NatureScot as ancient woodland, within the Site boundary, is in fact

Long Established of Plantation Origin (LEPO). There is also an Ancient Woodland Inventory (AWI) designation, 'Overton Woods', immediately to the north of the Site.

4.2.3 The Site will be accessed from Leyden Road and the A70 to the South. No Abnormal Indivisible Load Vehicles (AILVs) will be needed to deliver any components to the Proposed Development.

4.2.4 The Site's landform is gently sloping, with elevation varying from 230 m Above Ordnance Datum (AOD) in the south of the Site to a low of 200 m AOD along the northern Site boundary.

4.2.5 There are a small number of residential properties in the vicinity of the Site. Those closest comprise Newlands (to the south-east), Leyden Old House (to the West) and two small groups of cottages in and adjacent to the wooded area to the north of the western land parcel.

Environmental Designations and Heritage Assets

4.2.6 **Figure 3.1** shows the key environmental constraints within 5 km of the Proposed Development Site boundary. The Site is not located within or adjacent to a designated landscape, and there are no National Scenic Areas (NSAs) or National Parks within 5 km of the Site. There are six non statutory Local Landscape Areas (LLAs) within 5 km of the Site:

- Pentland Hills LLA (West Lothian) (S12000040) – 0.7 km south-east;
- Almond and Linhouse Valleys LLA (S12000040) - 1.9 km west;
- Pentlands LLA (Edinburgh) (LA S12000036) - 3 km south and west;
- Upper Almond LLA (S12000036) - 3 km north;
- Ratho Hills LLA (S12000036) - 3.2 km north-east; and
- Water of Leith West LLA (S12000036) - 3.3 km east.

4.2.7 There are no core paths that cross through the Site; the closest core path is 1.2 km to the north.

4.2.8 Almondell and Calderwood Country Park extends from 3.1 km to 4.2 km north of the Site. The Garden and Designated Landscape of Hutton House is located 3.2 km to the north-east.

4.2.9 There are three Conservation Areas (CAs) within 5 km of the Site:

- Kirknewton CA – 1 km north-north-east;
- Mid Calder CA – 3.2 km north-west; and
- Balerno CA – 4.9 km east-north-east.

4.2.10 There are three Sites of Special Scientific Interest (SSSIs) within 5 km of the site:

- Linhouse Valley – 2.6 km west-south-west;
- Calderwood – 3 km north-west; and
- Balerno Common – 4.8 km south-east.

4.2.11 The Linhouse Glen Scottish Wildlife Trust Reserve lies 2.7 km to the west of the Site.

4.2.12 There are 124 listed buildings within 5 km of the Site, with the closest being the Kirknewton House (category B) (0.9 km north-east). The closest A listed building is the Linhouse Water Railway Viaduct (2.6 km east).

4.2.13 There are nine Scheduled Monuments (SMs) within a 5 km radius of the Site:

- Corston Hill Cairn SM6194 – 1.6 km south-west;
- Kaimes Hill, fort, SM1172 – 2 km east-north-east;
- Dalmahoy Hill, fort, SM1213 – 2.5 km east-north-east;
- Almondell Footbridge SM4242 – 3.7 km north-west;
- Tormain Hill SM1161 – 4.3 km north-east;
- Cairns Castle SM1193 – 4.5 km south-south-west;
- Union Canal (Fountainbridge to River Almond) SM11097 – 4.8 km north;
- Dalmahoy, cross slab, St Mary's Church SM1184 – 4.8 km north-east; and
- Union Canal (River Almond to River Avon) SM8954 – 4.9 km north.

4.2.14 There is one undesignated heritage asset within the Site. Newlands Farmstead is found at the intersection of four fields and comprises one unroofed building, one partially roofed building and two enclosures. The farmstead is derelict and not in use, and in a poor state of preservation.

4.2.15 There are 68 areas of woodland on the AWI within 5 km of the Site, the closest being the aforementioned area within the Site on the east of Leyden Road. Overton Wood is immediately adjacent to the north, and there is an unnamed stand of trees immediately adjacent to the south, both on the AWI. An Arboriculture Impact Assessment is provided in **Technical Appendix 2.8**.

Land Use and Agriculture

4.2.16 The National Soil Map of Scotland indicates that the main soil type found on Site is mineral gleys. Reference to Land Capability for Agricultural mapping reveals that the Site comprises mostly Class 4.2 with some Class 3.2 land (Land capable of average production though high yields of barley, oats and grass can be obtained. Grass leys are common). A review of the Carbon and Peatland 2016 mapping published by Scottish Natural Heritage (now NatureScot) indicates that the area is Class 0, meaning a mineral soil where peatland habitats are not found.

4.2.17 The Site is currently used for agricultural purposes, with the fields in the west and south-east used for arable farming, and the fields in the north-east used for rough grazing for sheep.

4.2.18 The Proposed Development will result in a change to the dominant land use of agriculture to energy generation using solar PV infrastructure. The construction of the Proposed Development will result in some temporary loss of agricultural land. During project operation, sheep grazing will occur beneath the panels meaning ongoing agricultural practices will continue.

4.2.19 The extent of permanent infrastructure measures approximately 0.42 ha. This is mainly the BESS and substation compounds, and access tracks. The solar panels will have a much lower impact as it is only the steel piles that will be driven into the ground.

4.2.20 The eventual decommissioning of the solar site will allow the land to be restored to its original use. The soil will likely be returned in better condition than it is currently following the landscape and ecological enhancements proposed, including a break from any pesticides and fertilisers.

4.3 Description of the Development

4.3.1 The final Proposed Development layout is illustrated in **Figure 1.2**.

4.3.2 The Proposed Development will comprise a ground mounted solar photovoltaic (PV) array and associated infrastructure with an export capacity of up to 40 megawatts (MW). The array will comprise PV modules arranged in rows with a maximum of 2.7 m above ground level (AGL).

4.3.3 The Proposed Development also includes a BESS with an export capacity of 9 MW. The BESS will store excess energy generated by the solar PV array and release it during periods of high demand or low generation.

4.3.4 The infrastructure associated with the Proposed Development will include:

- PV module mounting frames;
- Battery units housed in containers;
- Substation;
- Inverter cabins to convert direct current (DC) electricity into usable alternating current (AC) power;
- Transformers;
- Underground cabling;
- Internal access tracks;
- Temporary construction compound;
- Private substation;
- Spares container;
- CCTV cameras mounted on posts;
- Perimeter fencing;
- Site drainage; and
- Biodiversity and landscaping enhancements.

Solar Photovoltaic Modules and Mounting Frames

4.3.5 The Solar PV modules will stand approximately 1 m AGL at their minimum point and will be angled up to 20° to the horizontal and arranged in rows. The maximum panel height will be up to 2.7 m AGL (refer to **Figure 4.2**).

4.3.6 Each PV module will be fixed and mounted upon a prefabricated alloy metal frame. The frames will be anchored to the ground via steel piles which will be driven approximately 1 to 2 m below ground.

BESS Containers

4.3.7 The BESS compound will consist of approximately 48 battery components measuring approximately 1.3 m x 1.3 m. There will be 8 rows x 6 rack containers, measuring a maximum of 8.3 m (length) x 3.1 m (width) x 2.6 m (height) (see **Figure 4.3**).

4.3.8 Four associated Power Conversion System (PCS) units will be located adjacent to the BESS containers, to allow the batteries to switch between inverter and charger modes. They measure approximately 9.2 m (length) x 5.3 m (width) x 2.3 m (height) (see **Figure 4.3**). The BESS and PCS units will be located in a compound within the eastern land parcel (see **Figure 1.2**).

Inverters and Transformers

4.3.9 The Proposed Development will include string inverters, typically mounted to the underside of the PV modules (approximately 28 modules per string) to convert the DC produced by the PV modules, into AC for export. One auxiliary transformer will be located in the BESS compound (**Figure 4.5**) to connect with the other auxiliary infrastructure. This will measure a maximum width and length of 3 m with a height of 2 m.

4.3.10 Approximately seven transformer stations will be installed in various locations across the Site, to ensure voltage compatibility for export to the local electricity distribution network (**Figure 4.6**). These will measure a maximum of 2.4 m wide x 6.1 m long x 2.9 m high.

Substations and Spares Containers

4.3.11 The Proposed Development will include a distribution network operator (DNO) substation compound, two customer (private) substation compounds, and two dedicated spares containers (one for BESS components and one for solar components).

4.3.12 The DNO substation will consist of electrical infrastructure required to facilitate the export of electricity from the Proposed Development to the distribution network. The building will measure approximately 8.1 m (length) x 2.6 m (width) x 2.7 m (height) (**Figure 4.7**).

4.3.13 The private substations (one for the solar PV array and one for the BESS) will each measure a maximum of 8.1 m (length) x 2.6 m (width) x 2.7 m (height) (**Figure 4.8**).

4.3.14 The solar PV spares container will provide space for store replacement modules, string inverters, connectors, fuses, combiner boxes, and monitoring equipment. This will measure a maximum of 12.2 m (length) x 2.4 m (width) x 2.9 m (height) (**Figure 4.9**).

4.3.15 There is also a BESS spares container that will provide space for storage of critical components such as battery modules, PCS parts, cooling fans, BMS units, fire suppression gear, HVAC filters and communication modules which will measure a maximum of 6.1 m (length) x 2.4 m (width) x 2.9 m (height) (**Figure 4.10**).

Temporary Construction Compound

4.3.16 A temporary construction compound will be located near the Site entrance, north of the proposed BESS area. The total compound is anticipated to be approximately 3,600 m^2 (0.36 ha) and the construction compound will incorporate a laydown area, welfare facilities, storage containers, on-site office and vehicle parking area.

4.3.17 On completion of construction works, all temporary structures will be removed, and the compound area restored.

On-site Cabling

4.3.18 Low voltage electrical cabling is required to connect the PV modules to the inverters. AC cabling from the inverters will connect to the transformers and the on-site substation via underground trenches. For a typical trench section refer to **Figure 4.11**.

Welfare Container

4.3.19 The Proposed Development will include two welfare containers measuring approximately 6.1 m (length) x 2.4 m (width) x 2.9 (height) (**Figure 4.12**).

Firewater Tanks

4.3.20 A water supply is required on site to support the BESS compound. Water will be used primarily for firefighting and safety purposes and stored in dedicated tanks within the BESS area. It also provides for routine welfare facilities. The water provision forms part of the Site's fire strategy and ensures that suitable resources are available in the unlikely event of a thermal incident within the battery units. The water tanks will each be 115,000L in volume with an indicative height of 3 m and diameter 7 m (**Figure 4.13**).

Security Fencing and CCTV

4.3.21 Security fencing will be constructed around the Site perimeter. The fencing will stand up to 2.4 m AGL and is proposed to comprise of security palisade fencing painted an appropriate shade of green (**Figure 4.14**).

4.3.22 Entrance to the eastern and western parts of the Site will be from Leyden Road via 5 m wide double lead access gates. These will be of a similar design to the security fencing, up to 2.4 m high, of galvanised steel construction and painted the same colour as the fencing. An elevation of the access gates is shown in **Figure 4.14**.

4.3.23 Closed Circuit Television (CCTV) will be deployed as a security measure. The cameras will be mounted on galvanised steel posts each measuring approximately 4.5 m in height (**Figure 4.15**). The cameras will be located just inside the proposed security fencing with the exact locations to be confirmed prior to construction. They will be installed at discreet locations and will be oriented away from external landowners and dwellings.

Site Access and On-site Tracks

4.3.24 Each of the land parcels will have an access point off Leyden Road.

4.3.25 The BESS area within the eastern land parcel will have two points of access, in line with relevant fire safety design guidance.

4.3.26 Internal access tracks within the solar PV areas will allow for ongoing access for maintenance vehicles. The tracks will have a typical 4 m running width, wider on bends and junctions and will be surfaced with local compacted aggregates. A cross section of the proposed internal access tracks is shown in **Figure 4.16**.

4.4 Export Connection to Grid

4.4.1 The Proposed Development will connect via underground cable to the upgraded Currie Substation located approximately 8 km to the east of the Site. The connection date of the Proposed Development is currently anticipated to be in 2030.

4.4.2 The cable route from the Site to Currie Substation will be subject to a separate consenting process in due course.

4.5 Construction

4.5.1 Construction of the Proposed Development is expected to be completed within approximately eight to twelve months.

4.5.2 A detailed construction programme will be developed once a construction contractor is appointed and would be provided to West Lothian Council as part of a Construction Environmental Management Plan (CEMP) prior to commencement of construction.

4.5.3 Normal construction hours are likely to be between 07:00 and 18:00 Monday to Friday and 08:00 and 13:00 on Saturdays. These times have been chosen to minimise disturbance to local residents. It must, however, be noted that out of necessity due to weather conditions or health and safety requirements, some generally quiet activities may occur outside of specified hours stated.

4.6 Environmental Management

Construction Environmental Management Plan

4.6.1 The Contractor responsible for undertaking the construction of the Proposed Development shall adhere to a CEMP. The Applicant expects that a CEMP will be produced in line with an appropriately worded planning condition. The CEMP will set out the appropriate measures to reduce and control the potential environmental impacts associated with the construction phase of the Proposed Development.

4.6.2 The CEMP shall be developed in accordance with good practice guidance. It shall describe how the Applicant will ensure suitable management of the following environmental issues during construction of the Proposed Development:

- Waste;
- Water quality;
- Dust and noise;
- Surface water drainage and groundwater;
- Ecology (including protection of habitats and species);

- Construction traffic;
- Pollution incidence response (for both land and water); and
- Site operations (including maintenance of the construction compounds, working hours and safety of the public).

BESS Emergency Response Plan

4.6.3 The Applicant will comply with the National Fire Chiefs Council (NFCC) guidance on the risk management process of >1 MW BESS facilities. An appropriate Risk Management Plan and Emergency Response Plan will be provided and agreed with West Lothian Council and the Scottish Fire and Rescue Service prior to commissioning. This will be included as part of the Operational Environmental Management Plan (OEMP) for the Proposed Development and will be subject to the final technology chosen. Monitoring equipment including fire detection and fire prevention systems will be installed within the containerised battery units and Site access is designed to ensure that fire appliances can safely access and egress the Site.

4.7 Operation and Maintenance

4.7.1 The operational life of the Proposed Development is expected to be approximately 40 years from the final commissioning to commencement of decommissioning.

4.7.2 Once the solar PV array and BESS are fully operational, they will require minimal maintenance. Maintenance is expected to consist mostly of monthly routine site inspection by technicians, as well as some unscheduled visits when required. Routine cleaning is occasional as rainwater will generally suffice.

4.7.3 An Outline Battery Safety Management Plan (OBSMP) has provided in support of the application and is provided as **Technical Appendix 2.2**.

4.8 Decommissioning and Restoration

4.8.1 At the end of the Proposed Development's operational lifetime of 40 years, the solar and BESS farm will be decommissioned. Decommissioning is a relatively straightforward process and similar to the construction process, with the majority of structures and equipment able to be disassembled and removed in a straightforward manner (with battery units, inverters etc. being containerised and simply able to be detached from the piles they are placed on, and the solar PV arrays disassembled, and piles pulled up).

4.8.2 The Applicant is committed to decommissioning and restoring the Site to its previous agricultural use at the end of the Proposed Development's lifespan. The limited physical infrastructure that is required on the ground area (around 5%) for a solar farm allows for a quick and easy restoration of land back to its existing agricultural land use.

4.8.3 In the event that a decision is made that the Site could be repowered/refitted, then a new consenting process, including an assessment of potential environmental effects, would be required.

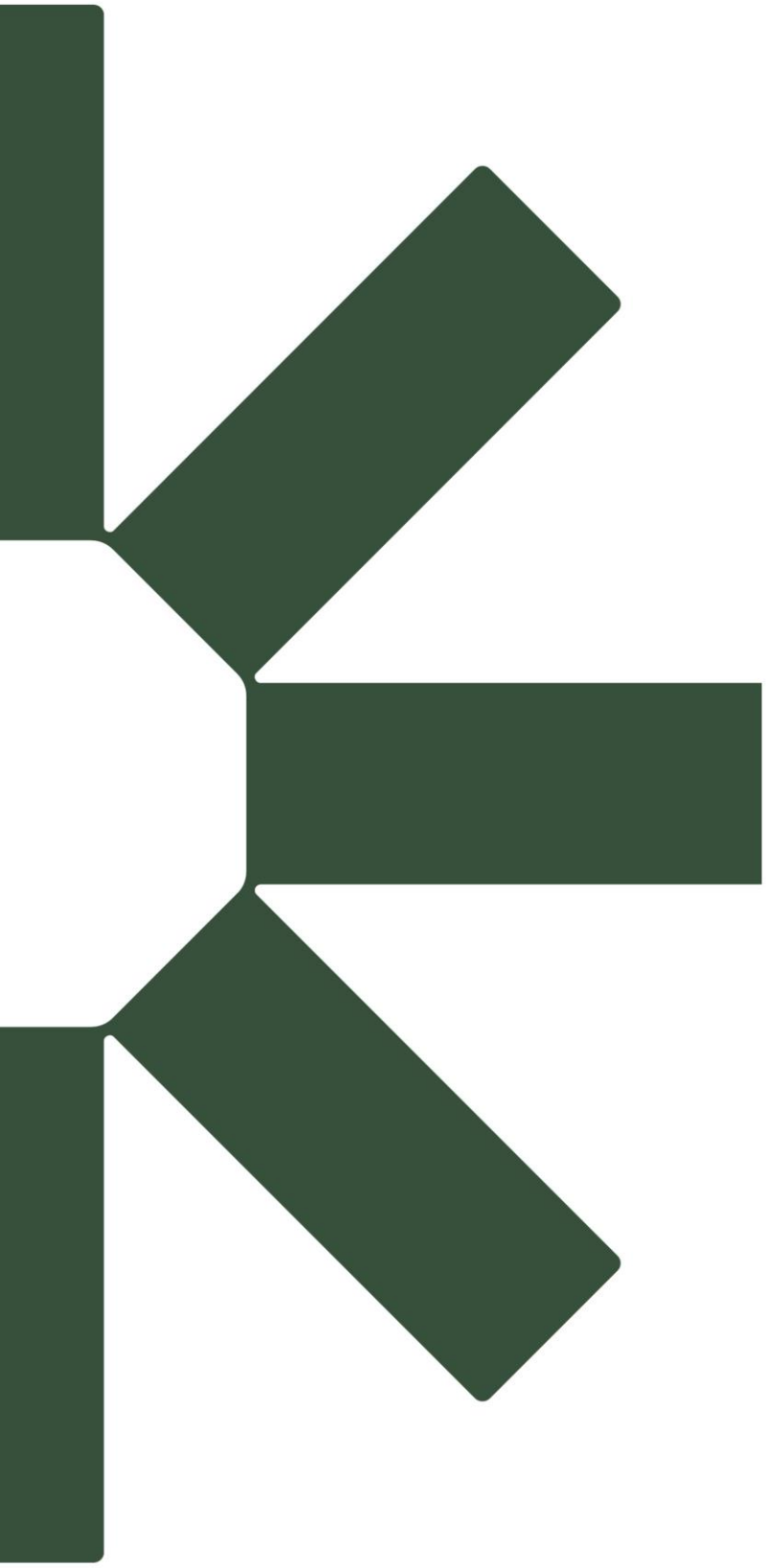
4.8.4 Prior to decommissioning, a Restoration and Decommissioning Plan (RDP) will be produced to reflect the current legislation and policy at that point in time and will be agreed with the relevant statutory authorities.

4.9 Cumulative Developments

4.9.1 A review of the area, including recent planning history and through consultation with West Lothian Council has identified two developments within 5 km of the Proposed Development, either in operation or in planning at the time of assessment (September 2025). The location of these developments in relation to the Proposed Development can be seen in **Figure 4.1** and are summarised in **Table 4.1** below.

Table 4.1 – Cumulative Developments

Site Name	Development Type	Reference and Status	Approximate Distance and Direction from Site
Selms Muir Solar and BESS Farm	18 MW solar PV installation and BESS and associated works	0442/FUL/22 Consented	1.4 km north
Drumshoreland Road BESS	Installation of 49.9MW BESS and associated works	0255/FUL/22 Operational	3.6 km north-west



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