04.
Project Description

4 Project Description

4.1 Introduction

4.1.1 This chapter of the EIA Report provides a description of the Project and describes the associated construction and operation activities. The components of the Project detailed in this chapter are listed below:

- New Build Overhead Line:
  - The construction of approximately 19km of a new 275 / 400kV overhead line (known as the 'WB Route') between Bonnybridge Substation and an existing overhead line (known as the 'XX Route') north of Glenmavis, with a connection to Cumbernauld Substation.
- Uprating of Existing Overhead Lines:
  - The uprating of approximately 4km of an existing overhead line between Denny North Substation and Bonnybridge Substation from 275 to 400kV, known as the 'ZG Route' and ancillary overhead line span between existing towers (ZG001A and ZCS062A);
  - ZD Route - installation of two new towers with two new overhead line spans as part of reconfiguration of connections to Denny North Substation;
  - The uprating of approximately 15km of an existing overhead line between Easterhouse and Newarthill Substations from 275 to 400kV, known as the 'XX Route' and the installation of one new tower (XX048A); and
- The uprating of approximately 16km of an existing overhead line between Newarthill and Wishaw Substations from 275 to 400kV, known as the 'XR route' and the installation of two new towers (XR001A and XR001T). Tower XR001T will be temporary bypass tower, to allow the circuit to remain in operation while the new tower (XR001A) is constructed.
- Ancillary Works:
  - The CB Route Removal - The removal of approximately 11km of an existing 132kV overhead line between Bonnybridge and Cumbernauld Substation, known as the 'CB Route'.
  - The AA Route Undergrounding - The undergrounding of two sections of the existing 132kV overhead line (known as 'AA route') between Bonnybridge and Bathgate, where it is crossed by the proposed new overhead line, known as the 'AA Route'.
- Extensions to four existing substations are required as part of the Project. These substations are:
  - Denny North (the 'Denny North Substation Works');
  - Bonnybridge (the 'Bonnybridge Substation Extension');
  - Cumbernauld (the 'Cumbernauld Substation Extension');

- Easterhouse substation internal works - Previously a small extension of the site was required to facilitate the installation of the new line Circuit Breaker. This requirement was removed during the detailed design process and will not be progressed. The works will be limited to internal works within the existing substation boundary. It has therefore been scoped out of the EIA; and
    - Wishaw (the 'Wishaw Substation Extension').
- Distribution Line Diversion Works (the 'SPD Works)- Diversions to other SPD infrastructure is required as part of the Project. Volume 1, Chapter 1 Introduction sets out which chapters have included the SPD Works as part of the scope of their assessment.

4.1.2 The following design parameters are used in each component of the Project and are provided in Table 4-1.

Table 4-1 Design Parameter Assumptions

Parameter	Assumption for EIA
Tower Height	The Vertical Limit of Deviation (LoD) is up to 20% variation of the tower heights provided in the tower schedule in Volume 3, Appendix 4.1.
Span Lengths	Approximately 300m apart on average.
Tower Construction Compounds	Approximately 50m x 50m.
Tower foundation	4m x 4m x 0.5m (average).
Temporary Access Tracks	Stone for the New Build Overhead Line. Trackway within the Antonine Wall Scheduled Monument designation and for the Uprated Overhead Lines and Substations.
Temporary access track dimensions	4m wide, increasing to 6m at bends.
Proposed Access Limit of Deviation	40m (20m each side).
New Build Overhead Line (the WB Route) Limit of Deviation	80m (40m each side).
New build tower micro-siting	LoD for the siting of towers to be adjusted within a 40m radius of indicative tower locations. Micro-siting of towers will only apply to new build towers as follows:

Towers requiring reduced LoD in relation to Scheduled Monuments (WB Route)	**WB Route** - All Towers **ZD Route** - ZD096A, ZD96B AA Route - AA001T, AA001CSE, AA006T, AA006CSE, AA009CSE **XX Route -** XX019A, XX019B, XX020A, XX21A, XX0048 **XR Route -** XR001A, XR001T WB055, WB054, WB052, WB051
Temporary Access Tracks micro-siting	LoD for the temporary access tracks to be adjusted within a 40m tolerance (20m each side). m tolerance either side.

Limit of Deviation

4.1.3 The EIA process has been used in combination with technical design work to develop the detailed development footprint upon which the assessments are based. However, it is anticipated that, post consent, it may be necessary and desirable to refine the final vertical and horizontal profile of conductors and tower positions and heights, as well as the lines of access tracks, to reflect the following:

- pre-construction confirmation of dynamic environmental conditions, e.g. the location of protected species;
- more detailed technical survey information, particularly for unconfirmed ground conditions;
- to provide further scope for the effective mitigation of any likely environmental effects; and
- minor alterations requested by landowners.

4.1.4 To ensure that the final positions of the overhead lines and associated works are not varied to such a degree as to result in new or different likely significant environmental effects reported in this EIA Report, a Limit of Deviation (LoD) is proposed. This would permit the siting of a tower to be adjusted within a 40m radius of the indicative tower locations and a 40m tolerance either side of the indicative access track locations. Potential variances to the vertical profile of individual towers will also be managed via the LoD process as described below. Table 4-1 lists towers where micro-sitting is required.

4.1.5 Implementation of the LoD would be controlled through the proposed detailed Construction and Environmental Management Plan (CEMP). Should a request to vary a tower location or height or access track position within the LoD be raised, the relevant environmental baseline information would be reviewed, as will be defined in the CEMP.

Construction Compounds and Access

4.1.6 Due to the relative proximity of the various project components, temporary works such as construction compounds and access tracks will be shared where feasible to help minimise environmental effects.

Conductor Type

4.1.7 In order to maximise the amount of power that can be sent through the new and uprated overhead line routes High Temperature Low Sag (HTLS) conductors will be installed. Where there are no close receptors a Twin Matthew GAP HTLS conductor will be used, this will utilise two conductors per phase or six conductors in total on each circuit. In areas where the overhead line route is located closer to receptors, a Triple Angus GAP HTLS conductor will be used, this will utilise three conductors per phase or nine conductors in total per circuit. The existing ZG and new WB OHL routes will utilise Twin Matthew GAP and the existing XX and XR OHL routes will employ the Triple Angus GAP HTLS conductor.

4.1.8 The EMF Report that accompanies the application identifies that the use of the Triple Angus GAP HTLS conductor will result in noncompliance with EMF exposure limits. To ensure compliance, the Triple Bundle Angus conductor will require an additional 20cm of clearance to ensure that this limit is not breached, therefore the clearance distance from the conductors will require to be increased to 7.7m. This will be addressed in the construction phase with the minimum clearance of the triple bundle conductor being set at 7.7m.

4.2 The New Build Overhead Line (WB Route)

Introduction

4.2.1 The New Build Overhead Line (the WB Route) will consist of approximately 19km of new double circuit overhead line running from Glenmavis to Bonnybridge Substation, with a connection to Cumbernauld Substation. This new overhead line will have an operational capacity of 400kV, with the option for the circuits to operate at 400kV and 275kV. One circuit will run at 400kV, and the other circuit will run at 275kV.

Overhead Line Tower Design

4.2.2 Overhead lines transmit electricity by conductors (often referred to as ‘wires’) which are suspended at a specified height above ground and carried by wood poles or steel lattice towers (referred to as pylons) which are located at regularly spaced intervals. The conductors can be made of aluminium or steel strands. Most overhead lines operating at 132kV and above carry two 3-phase circuits, with one circuit strung on each side of a steel tower as shown in Image 1 below. The conductors are strung from insulators which are attached to the cross arms of the towers and prevent the electric current from crossing to the tower. Insulators are made of material with a high resistance to electricity flow, for example glass or porcelain. An earth wire will also be required to provide protection from lightning strikes.

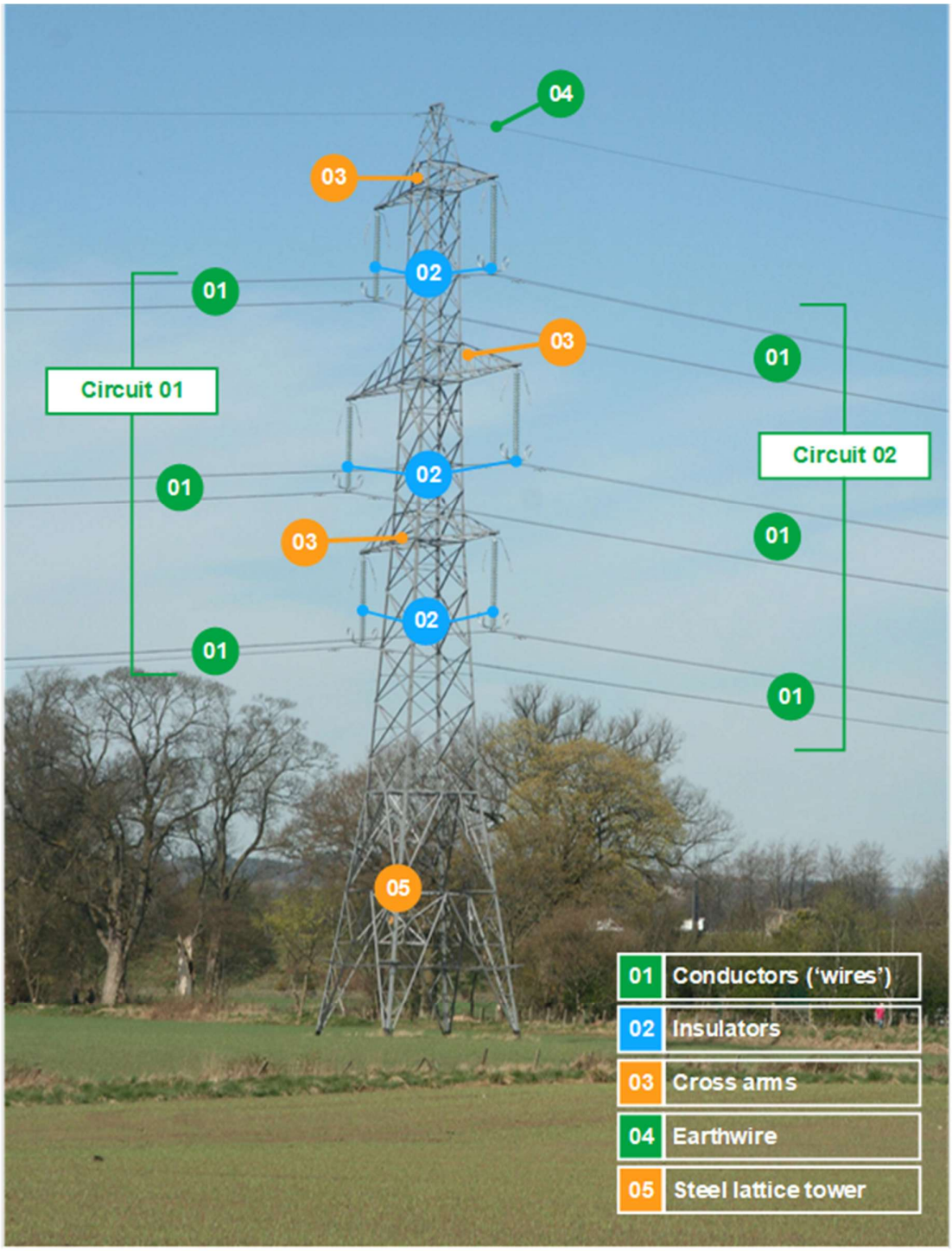

Image 1: Typical Operational 400kV Double Circuit overhead line

4.2.3 The New-Build Overhead Line will be carried on steel lattice towers, with the specific tower types detailed in Volume 3, Appendix 4.1. The height of the steel lattice towers varies according to the operating voltage of the conductors and relevant electrical safety clearances to the ground. Tower heights range from 42m to 57m, however, this may increase subject to

the route design. The EIA has been undertaken on a reasonable worst-case scenario applying a 20% limit of deviation (LoD) to tower height as detailed in Table 4-1, with a maximum assessed tower height of 68.88m. The distance between adjacent towers is approximately 300m. This can be increased where there is a requirement to span obstacles or decreased where a route traverses higher altitudes. There would typically be three to four steel towers per km. Steel towers are constructed from galvanised steel and typically grey in colour, which becomes duller over time (approximately 18 months).

4.2.4 There are broadly three types of towers which may be required at various points along the new overhead line route subject to detailed design:

- Suspension or (straight) Line Tower (image 2) - these typically form most of an overhead line route and are used where the tower is part of a straight-line section of the route;
- Terminal Tower (image 3) - used when an overhead line terminates at a substation or on to an underground cable section via a separate cable sealing end compound or platform; and
- Tension or Angle Tower (image 4) - mainly used where an overhead line route changes direction where there is a horizontal or vertical deviation; and

4.2.5 Images 2-4 shows the different types of towers.

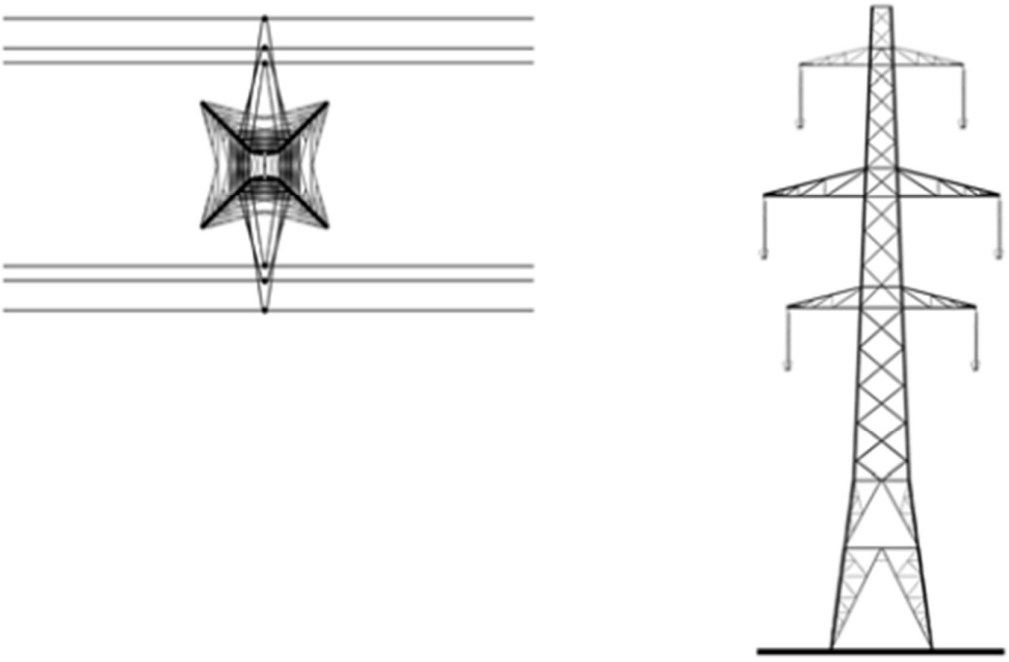

Image 2: Suspension or (Straight) Line Tower

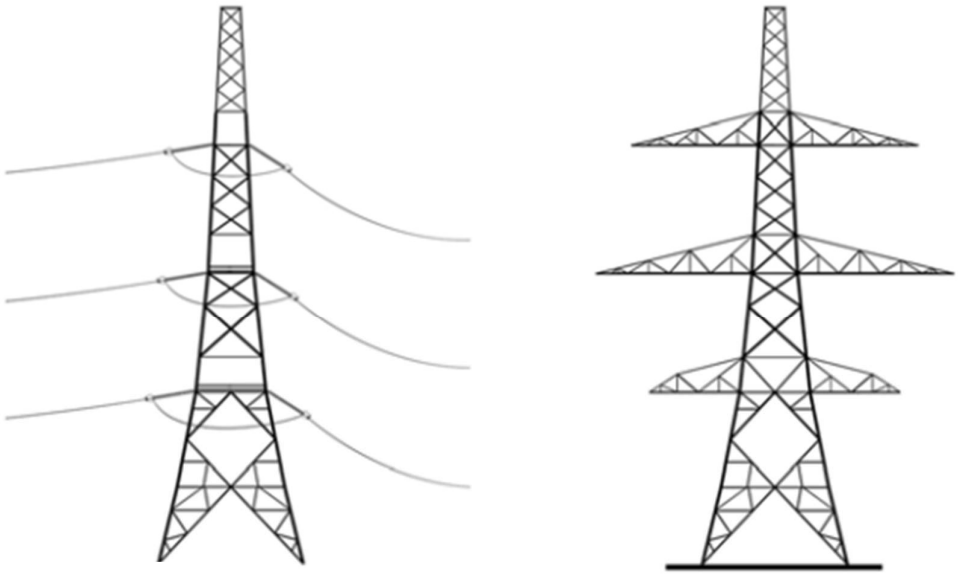

Image 3: Terminal Tower

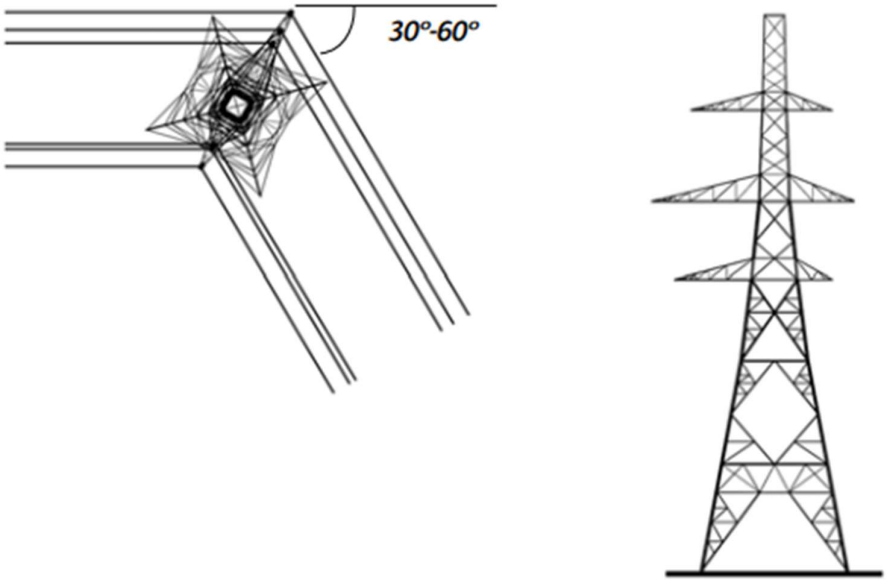

Image 4: Tension or Angle Tower (60 degree provided as an example, these can be between 30 degrees and 90 degrees)

Route Description

4.2.6 This section describes the route of the New Build Overhead Line with reference to the existing baseline to provide a geographic description of the alignment. Where infrastructure is proposed to be removed prior to construction this is addressed within the relevant section.

4.2.7 The New Build Overhead Line route is illustrated on Volume 2, Figure 1.1 Overview of Denny to Wishaw Network Upgrade. The location of the New Build Overhead Line is shown on

Volume 2, Figure 4.1 Project Components Location Plan. The works associated with the New Build Overhead Line are shown on Volume 2, Figure 4.2 Project Works Plan. All towers involved in the New Build Overhead Line works are listed in Volume 3, Appendix 4.1.

4.2.8 The New Build Overhead Line starts on the western side of Bonnybridge Substation within Falkirk Council's administrative area. It is routed to the south of the substation crossing two existing 132kV overhead lines routes, referred to as the CB Route and the AA Route (for CB route removal see 4.4.1 and for AA Route undergrounding see 4.4.12), then heads southeast towards the Forth and Clyde Canal. This section of the New Build Overhead Line is located within the Antonine Wall World Heritage Site (WHS) Buffer Zone.

4.2.9 From here the New Build Overhead Line crosses the Canal, Antonine Wall and Glasgow (Queen St.) – Edinburgh Railway Line in a southern direction to Howie Rig. It then heads southwest largely following the existing CB Route to the north / northwest of the Slamannan Plateau Special Protection Area (SPA). The New Build Overhead Line crosses into North Lanarkshire to the north of Fannyside Muir continuing towards Palacerigg Country Park.

4.2.10 The New Build Overhead Line includes an approximate 750m spur which connects it to the existing Cumbernauld Substation and which will allow the existing CB Route between Bonnybridge and Cumbernauld to be removed in its entirety. From Cumbernauld Substation the New Build Overhead Line is routed through part of Palacerigg Country Park heading south towards Greengairs. It is routed southwest from here crossing the A73 to the north of Riggend.

4.2.11 From here the route heads south to the east of Glenmavis / west of Stand where it meets the reconfigured XX Route.

Construction

4.2.12 The construction of 62 new towers from Glenmavis to Bonnybridge Substation via Cumbernauld Substation is required as part of the New Build Overhead Line.

4.2.13 The construction process for the New Build Overhead Line will comprise the following key stages:

- Establishment of temporary construction compounds;
- Access track construction including bellmouths and other road improvements;
- Installation of tower foundations;
- Construction of towers;
- Conductor stringing including construction of any temporary scaffolding;
- Overhead line commissioning;
- Removal of existing redundant CB Route equipment, conductors and towers ; and
- Removal and reinstatement of temporary construction work areas.

Enabling Works

4.2.14 In order for the New Build Overhead Line to be constructed, enabling works are required such as, the establishment of temporary construction compounds, bellmouths, access tracks and drainage works. Construction would commence with site establishment involving

demarcation of working areas, stripping of topsoil and erection of temporary facilities such as compounds and laydown areas. Due to the linear nature of the Project, multiple compounds will be established at key locations along the length of the New Build Overhead Line. Bellmouths and access tracks would also be constructed at this stage to ensure access from the adopted road network for construction traffic.

4.2.15 In advance of any construction works taking place, Ground Investigation (GI) works will be required at each new tower position along the New Build Overhead Line route. This confirms the ground conditions at each tower location which in turn informs the foundation type.

Temporary Construction Compounds

4.2.16 A main works construction compound for the New Build Overhead Line is proposed on land adjacent to tower XR003. This is presented on Volume 2, Figure 4.2 Projects Works Plan. This compound will be used to provide office accommodation and welfare facilities for construction staff. This construction compound will provide a safe area for parking away from public highways and the temporary storage of materials, plant and equipment. An additional main works compound will be located at Dunnswood Road, Wardpark South, Cumbernauld, Glasgow G67 3EN. This, however, will not form part of the EIA assessment as it is an existing work yard and does not require any additional land take. The compound will service works on the ZG route and the New Build Overhead Line. A smaller satellite construction compound located to the north of tower WB37 will be used for temporary storage and parking.

4.2.17 In addition, at each proposed tower location for the New Build Overhead Line a tower working area is proposed. Each of these compounds will be approximately 50m x 50m in area and will comprise a construction laydown area, turning head and segregated bunding area. These proposed construction compounds will provide welfare facilities for construction staff, storage of plant, storage of materials and equipment to carry out the works safely, and bunding areas for storage and final reinstatement of excavated materials. Following construction and reinstatement of the foundations, a crane pad shall be established in preparation of tower erection.

4.2.18 The locations of the proposed construction compounds for the New Build Overhead Line are illustrated on Volume 2, Figure 4.2 Project Works Plan.

Access

4.2.19 Access tracks are proposed to provide access to the New Build Overhead Line route during construction. The majority of existing and new temporary access tracks will be stone tracks. These will be 4m wide (including construction areas) and will extend to 6m wide at bends. Temporary trackway will be used within the Antonine Wall designation where the upgrade of existing tracks is required.

4.2.20 Where possible, it is proposed that existing non-public roads and tracks are utilised. Upgrade works to these existing tracks will be undertaken to ensure they are suitable. Where there are no existing access tracks, new tracks will be constructed in accordance with good practice working methods. For example, water crossings will be designed and installed to comply with all relevant legislation and Scottish Environment Protection Agency (SEPA) River Crossings

guidance[1]. Any modifications to existing access tracks and new access tracks are temporary and will be reinstated to previous condition following the completion of construction works.

4.2.21 Stone tracks are preferred as they are designed to accommodate heavy plant loads required for the construction works and are suitable in a variety of ground conditions. On completion of the construction works the stone is removed and the original ground material is reinstated.

4.2.22 The proposed access points (described north to south) for the New Build Overhead Line, along with the roads they are routed from and the tower(s) they provide access to, are described in Volume 3, Appendix 4.1. All proposed access points are also shown on Volume 2, Figure 4.2 Project Works Plan.

4.2.23 OHL construction works require road legal, standard articulated lorries only. There will be no abnormal loads in terms of size (i.e. length or width) of load, however, there would be abnormal loads in terms of weight. Abnormal loads with regards to vehicle weight (over 44 tonnes) are required. These will be road legal standard articulated lorries or low loaders importing construction equipment such as plant and cranes.

Access Track Water Crossings

4.2.24 The New Build Overhead Line works requires 54 water crossings associated with the proposed accesses. All crossing works will be undertaken in compliance with all relevant legislation and in accordance with good practice. Water crossing locations are shown in Volume 2, Figure 4.2 Project Works Plan.

Foundations

4.2.25 The foundation design for the towers forming the New Build Overhead Line are subject to the GI works. Pad and column, micro-pile and rock anchor are all potential construction methods to install tower foundations. The construction process involved with each of these options are described further below.

Pad and Column

4.2.26 Prior to construction, a 50m x 50m compound will be established, complete with stone access and laydown area for welfare, plant and materials. Each foundation will be excavated to a typical depth of 4m with temporary shoring installed to allow for safe working. On average, dimensions for each foundation are 4m x 4m x 0.5m. Due to restricted working room, no more than two excavations will be open at any time. The concrete pours are typically 16m^3.

4.2.27 Major items of plant required to construct the foundations include a 20t excavator to excavate to formation and place the shoring system. Concrete is supplied via concrete wagon and placed by concrete skip with the excavator.

Micro-pile

4.2.28 Prior to construction, a stone piling pad will be required, typically 625m^2, providing a stable working platform for the piling rig. Major items of plant required to install the piles include a 20t excavator and vibrating roller for the piling pad and a 14t piling rig with a supply of cement

[1] Scottish Environment Protection Agency, 2010. River Crossings. Engineering in the Water Environment: Good Practice Guide. [online] Available at: https://beta.sepa.scot/regulation/authorisations-and-compliance/easr-authorisations/water-activities/engineering/crossings/ . https://www.sepa.org.uk/media/151036/wat-sg-25.pdf Accessed 20 November 2025

and potable water to form the piles. A 20t excavator will then be required to excavate to formation for the construction of the pile cap. Concrete is supplied via concrete wagon and placed by concrete skip with the excavator.

Rock Anchor

4.2.29 Anchors will be considered if suitable hard rock is encountered up to a depth of 2.5m. Beyond this depth, pad and column foundations are utilised. A similar working area would be required to that of micro piling, however in this instance the area is excavated down to rockhead and access ramp formed with a nominal layer of stone placed to create a level working platform. The same major plant required for micro-pile are also required for rock anchor.

Tower Construction

4.2.30 Prior to the erection of each tower, a stone crane pad and laydown area shall be created within the tower working area compounds to provide a stable working platform for lifting operations. Tower steelwork is transported to site by a flatbed wagon, and placed within the laydown area ready for assembly. Sections are then assembled on the ground before being lifted into position with a telehandler or an all-terrain mobile crane.

4.2.31 To allow for the tie-in between XX Route and WB Route at Glenmavis, selected existing 275kV overhead line towers will be decommissioned, dismantled and removed, before new towers will be constructed. These works are part of the Uprated Overhead Line works.

Temporary Scaffolding

4.2.32 Temporary scaffolding will be erected at each end of the necessary section of cable to provide access to the tower or other terminating structure. Temporary scaffolding will also be used to allow the cable to cross features such as roads during construction. These temporary scaffolding locations are shown in Volume 2, Figure 4.2 Project Works Plan.

Pulling Positions

4.2.33 Prior to the wiring operations, pulling positions will be identified and levelled by an excavator. Trackway panels will be installed using flatbed wagons and fixed into position. Winches and cable drums will then be deployed in readiness for pulling operation. Light pilot bond shall be pulled out along the section of line in preparation of wiring operations utilising a tracked machine. A puller / tensioner with ancillary equipment will then be used for pulling operations and a telehandler for mounting conductor drums. These pulling positions are shown on Volume 2, Figure 4.2 Project Works Plan.

Construction Phasing

4.2.34 The construction phase would last approximately 31 months, however Table 4.2 shows how the construction works will be phased (i.e. there will not be continual works at any one location for the whole construction period). The construction phase would comprise the following key stages:

- Land access arranged;
- Scottish Power Distribution (SPD) resources arranged;
- SPD outage arranged;

- SPD overhead line diversion works;
- Access works for New Build Overhead Line; and
- Construction of New Build Overhead Line.

Operation and Maintenance

4.2.35 The New Build Overhead Line will require minimal maintenance. The condition of tower steelwork and foundations will be monitored regularly. Towers which have deteriorated significantly may be dismantled carefully and replaced. Any vegetation within proximity to the New Build Overhead Line will also be monitored to ensure it does not impact on safety clearances.

Decommissioning

4.2.36 It is not envisaged that the New Build Overhead Line would be decommissioned and therefore does not have a fixed operational life, as it is proposed as permanent development. The lifespan of conductors is approximately 40 years and lifespan of towers is approximately 80 years, however, it is expected that this would be extended through replacement or refurbishment.

4.2.37 In the event that the New Build Overhead Line was no longer required and could be decommissioned then a Decommissioning Plan would be prepared and planning permission would be obtained, if required, in accordance with the relevant legislation in place at the time. The towers, equipment and materials would be removed and recycled where possible. It is expected that the platform, access roads and foundations would be removed (the latter to approximately 1.5m deep) and land reinstated. The process of decommissioning would be similar to construction meaning the likely significant environmental effects would be comparable. As a result, decommissioning has not been assessed in the EIA Report.

4.3 The Uprated Overhead Lines

Overview

4.3.1 The Uprated Overhead Lines works consist of the ZG, XX and XR Routes being uprated from 275kV to 400kV. The existing towers carry conductors and an earth wire. Each conductor is joined to the tower cross arm via an insulator string. The conductors, earth wire and insulators will be replaced as part of the Uprated Overhead Lines works. In addition, the existing towers along each route are to be reviewed and tower steel strengthening and foundation upgrades are to be completed as required, to facilitate conductor upgrades. All towers involved in the Uprated Overhead Lines works are listed in Volume 3, Appendix 4.1.

Route Descriptions

ZG Route

4.3.2 The ZG route is illustrated on Volume 2, Figure 4.1 Project Components Location Plan. It is approximately 4km long extending from Denny North Substation to Bonnybridge Substation and comprises 13 double circuit towers. It exits the substation in a southern direction through a wayleave within Tor Wood which is identified on the Ancient Woodland Inventory (AWI). It continues in a southeastern direction, crossing the M876 before heading south crossing the River Carron and A883, terminating at Bonnybridge Substation.

XX Route

4.3.3 The XX route is illustrated on Volume 2, Figure 4.1 Project Components Location Plan. It is approximately 15km long extending from Easterhouse Substation to Newarthill Substation and comprises 49 double circuit towers. It is routed in an eastern direction from Easterhouse towards Glenmavis. It is currently routed east / southeast around Glenmavis but as part of the Project will be diverted to tee into the New Build Overhead Line. It continues south to the west of the Albert Bartlett Factory and is then routed to the northeast and east Airdrie, on the margins of the settlement. It is routed through Chapelhall crossing the M8 to the west of Newhouse before terminating at Newarthill Substation.

XR Route

4.3.4 The XR route is illustrated on Volume 2, Figure 4.1 Project Components Location Plan. It is approximately 16km extending from Newarthill Substation to Wishaw Substation and comprises 50 double circuit towers. It is routed in a broadly eastern direction from Newarthill Substation towards Shotts then heads south between Newmains and Allanton. From here it is routed in a western / southwestern direction to the south of Wishaw before terminating at Wishaw Substation.

Construction

4.3.5 The following construction activities are required as part of the Uprated Overhead Lines:

- ZG Route:
  - Replacement of existing conductors, fittings, tension and suspension insulators and tension and suspension conductor end fittings;
  - Existing towers to be reviewed and tower strengthening and foundation upgrade design to be completed if required, to facilitate conductor upgrades;
  - Overhead line reconfiguration works at Bonnybridge Substation, including the removal and installation of phase conductors and installation of slack span.
- ZD Route overhead line reconfiguration works at Denny North Substation, including the installation of 2no. new L6 terminal towers, stringing of converters and potential existing tower strengthening.
- XX Route:
  - Replacement of existing conductors, fittings, tensions and suspension insulators and tension and suspension conductor end fittings;
  - Existing towers to be reviewed and tower strengthening and foundation upgrade design to be completed if required, to facilitate conductor upgrades;
- Installation of 4no. new L8c towers including foundations between existing towers XX019 and XX022. These 4 new towers are required to facilitate the tee in at Glenmavis;
- Dismantling existing towers XX019, XX020 and XX021;
- Overhead line reconfiguration works at Newarthill Substation, including the installation of 1no. new L8c terminal tower (XX048A) and potential tower strengthening; and

- Overhead line reconfiguration works at Easterhouse Substation, including the installation of new downleads from existing tower XX001A and potential tower strengthening.
- XR Route:
  - Replacement of existing conductors, fittings, tensions and suspension insulators and tension and suspension conductor end fittings;
  - Existing towers to be reviewed and tower strengthening and foundation upgrade design to be completed if required, to facilitate conductor upgrades;
  - Overhead line reconfiguration works at Newarthill Substation, including the installation of a temporary diversion of the Newarthill – Wishaw circuit, installation of 1no. New permanent L8c terminal tower (XR001A), 1no. temporary tower (XR001T) and potential tower strengthening; and
- Overhead line reconfiguration works at Wishaw Substation, including the installation of new downleads from existing tower XR050 and potential tower strengthening.

4.3.6 The construction process for the Uprated Overhead Lines will last approximately 14 months, however, as shown in Table 4.2, these works will be phased and comprise the following key stages:

- Delivery of conductors and stringing equipment;
- Steel strengthening works to towers as required;
- Upgrade of foundations to towers as required;
- Insulator and conductor fitting and tensioning; and
- Clearance and reinstatement.

4.3.7 For uprating works listed above, no Limit of Deviation is proposed for these tower works, as tower positions will remain in their current location.

4.3.8 Prior to uprating the overhead line, temporary accesses will be constructed as necessary, and laydown / storage areas established.

4.3.9 Linesmen will climb each tower and attach a pul-lift from tower crossarm to conductors. This allows the existing insulator to be unbolted before being lowered to the ground using a tractor and winch. The tractor and winch are then used to lift the new insulator on to the tower cross arm before being attached to the cross arm and conductors. Once the new insulator is in place, the pul-lift is removed. This process is then repeated for the remaining insulators on the tower.

4.3.10 Following commissioning of the uprated overhead line, all equipment and temporary access of construction areas will be removed with the land being reinstated to its former use / condition.

Temporary Construction Compounds

4.3.11 As per the New Build Overhead Line, at each proposed tower location for the Uprated Overhead Line, a tower working area is proposed. Each of these compounds will be approximately 50m x 50m in area and will comprise a construction laydown area, turning

head and segregated bunding area. These will be used for the same purposes as described for the New Build Overhead Line.

4.3.12 The locations of the proposed construction compounds for the Uprated Overhead Line are illustrated on Volume 2, Figure 4.2 Project Works Plan.

Access

Access tracks are proposed to provide access to the Uprated Overhead Lines during construction. All existing and new temporary access tracks for the Uprated Overhead Lines will be trackway. These will utilise a plastic trackway laid on the existing ground with no soil stripping required. These access tracks will be approximately 4m wide (including construction areas).

Operation and Maintenance

4.3.13 Operational and maintenance requirements for the Uprated Overhead Lines are the same as those described for the New Build Overhead Line.

Decommissioning

4.3.14 Decommissioning has been scoped out of the EIA Report as it is not envisaged that the line will be decommissioned.

4.4 Ancillary Works

CB Route Removal

Description of the CB Route Removal Works

4.4.1 The location of the CB Route Removal is shown on Volume 2, Figure 4.1 Project Components Location Plan. The works involved in the CB Route Removal are shown in Volume 2, Figure 4.2 Project Works Plan. The towers involved in the CB Route Removal are all listed in Volume 3, Appendix 4.1.

4.4.2 The removal of CB route would be undertaken in advance of construction of the New Build Overhead Line, parts of which would be constructed on the same or a similar alignment to the existing route. Steel towers will be removed with components re-used where possible. Foundations would be removed to a minimum depth of approximately 1.5m below ground level with the area around the base of the tower cleared and the ground reinstated.

4.4.3 Tower CB035 is located within the Antonine Wall Scheduled Monument at Rough Castle Fort. Works will be limited to the area required and Scheduled Monument Consent (SMC) will be required as agreed with Historic Environment Scotland (HES).

4.4.4 The proposed removal of the CB Route will last approximately 4 months and involve the dismantling of the existing 132kV CB Route, including:

- Removal of conductors;
- Removal of earthwire and associated fittings;
- Dismantling of existing towers; and
- Removal of foundations to a depth of 1.5m.

Proposed Construction Methods

4.4.5 To provide a clear corridor for the New Build Overhead Line, the existing 132kV overhead line CB Route must be decommissioned, dismantled and removed from site. This involves removing all hardware including conductors and fittings, dismantling of towers and removal of foundations to a depth of 1.5m.

4.4.6 Existing SPT wayleaves and shared New Build Overhead Line access routes will primarily be used to provide access to a point at each tower location along the CB Route. Where these tracks become unsuitable for heavy construction plant, low ground bearing plant including a tracked excavator, tracked dumper and associated cutting equipment will be offloaded and taken to the tower location individually. Where possible, these wayleaves will also support access for dismantling works at CB Towers. Existing access tracks already in place for WB Towers for the New Build Overhead Line present a viable solution, and further investigation will determine the most appropriate track type for reaching the CB Towers. In areas where tracks serve only CB Towers, proprietary trackway systems are likely to be sufficient. A worst-case scenario has been assessed which considered stone tracks being used throughout the New Build Overhead Line, which is where some of the CB towers are located.

4.4.7 The conductors and all fixtures and fittings are removed from the overhead line leaving only the tower remaining. Two legs are cut and a tracked excavator used to pull the tower over into a segregated landing zone within the span of the line. When the tower is down, it can be cut into smaller sections and removed from site by tracked dumper. The tower foundations are excavated and removed to a depth of 1.5m below ground level.

Temporary Construction Compounds

4.4.8 As per the New-Build Overhead Line, at each proposed tower location for the CB Route Removal, a tower working area is proposed. Each of these compounds will be approximately 50m x 50m in area and will comprise a construction laydown area, turning head and segregated bunding area. These will be used for the same purposes as described for the New Build Overhead Line.

4.4.9 The locations of the proposed construction compounds for the CB Route Removal are illustrated on Volume 2, Figure 4.2 Project Works Plan.

Access

4.4.10 Access tracks are proposed to provide access to the CB Route Removal during construction. All existing and new temporary access tracks for the CB Route Removal will be stone and approximately 4m wide, increasing to 6m at bends (including construction areas).

4.4.11 No Abnormal Indivisible Loads (AILs) with regards to length and width will be required and the largest construction vehicles required will be road legal, standard articulated lorries. Abnormal loads with regards to vehicle weight (over 44 tonnes) are required. These will be road legal standard articulated lorries or low loaders importing construction equipment such as plant and cranes.

AA Route Undergrounding

Description of the AA Route Undergrounding Works

4.4.12 The location of the AA Route Undergrounding is shown on Volume 2, Figure 4.1 Project Components Location Plan. The works involved in the AA Route Undergrounding are shown in Volume 2, Figure 4.2 Project Works Plan. The towers involved in the AA Route Undergrounding are all listed in Volume 3, Appendix 4.1.

4.4.13 The AA Route will be undergrounded in two sections where it would be crossed by the New Build Overhead Line. The AA Route Undergrounding works will take place between Bonnybridge Substation and existing AA towers of AA001 and in between existing towers AA006 and AA009. The undergrounding will require 3 new CSE towers to be constructed (AA001CSE, AA006CSE and AA009CSE). Further details are set out in paragraphs 4.4.15 to 4.4.16.

4.4.14 The undergrounding of the AA Route will last approximately 18 months and involve the following activities:

- Temporary diversion of one circuit;
- Dismantling of existing sections;
- Reconductoring of existing towers;
- Installation of new terminal towers; and
- Installation of underground cable.

Proposed Construction Methods

4.4.15 The construction process for the partial undergrounding of the existing 132kV AA Route comprises the following key stages:

- Due to the proximity of the AA and WB works, temporary construction requirements such as access and compounds will be shared;
- Installation of temporary masts allowing one circuit to remain live during works;
- Removal of redundant equipment associated with the existing AA overhead line Route;
- Installation of cable sealing end tower arrangements at each end of the underground cable route;
- Excavation of trenches, installation of cable ducts and reinstatement of ground;
- Cable installation, including erection of temporary scaffolding at each end;
- Jointing / termination works; and
- Underground cable commissioning.

4.4.16 Access will be provided to each tower position where the redundant overhead line equipment is dismantled and removed from site. This includes conductors, fittings and foundations to a depth of 1.5m. At both the new Cable Sealing End towers, AA006CSE and AA009CSE, terminal tower arrangements are installed at either end of the underground cable route. Access will be provided to each tower position to be dismantled and removed from site. Access will also be provided to both AA006CSE and AA009CSE.

4.4.17 Selected towers to be dismantled in relation to AA undergrounding are towers AA001A, AA001B, AA006, AA007, AA008 and AA009.

4.4.18 For the cable installation, trenches of approximately 1.5m in width will be excavated to a typical depth of 1.3m. With AA Route being an existing double circuit overhead line, two trenches will be required, running approximately parallel at a typical spacing of 5m, centre to centre. Lengths of cable duct for cable to be pulled through would then be installed and an insulating material (usually concrete, sand or cement bound sand) is placed to cover the ducts. Sections at a time are then backfilled with the excavated material, and the ground reinstated with minimal scarring.

4.4.19 Prior to installing the cable, scaffolding would be erected at each end of the cable route to provide access to the terminating structure. An access road would be required to each end of the installation to allow for winch pulling position at one end, and cable drums at the other. Using a winch and hoist mechanism, the cable would be pulled carefully off the drum, through the ducts and up to the terminating structure at each end. From there, the cables would be terminated to the desired basket or cable sealing end arrangement. Following successful HV testing, the underground cable installation would be commissioned.

Temporary Construction Compounds

4.4.20 As per the New Build Overhead Line, at each proposed tower location for the AA Route Undergrounding, a tower working area is proposed. Each of these compounds will be approximately 50m x 50m in area and will comprise a construction laydown area, turning head and segregated bunding area. These will be used for the same purposes as described for the New Build Overhead Line.

4.4.21 The locations of the proposed construction compounds for the AA Route Undergrounding are illustrated on Volume 2, Figure 4.2 Project Works Plan.

Access

4.4.22 Access tracks are proposed to provide access to the AA Route Undergrounding during construction. All existing and new temporary access tracks for the AA Route Undergrounding will be stone and approximately 4 m wide (including construction areas). These access points are illustrated on Volume 2, Figure 4.2 Project Works Plan.

4.4.23 No AILs with regards to length and width will be required and the largest construction vehicles required will be road legal, standard articulated lorries. Abnormal loads with regards to vehicle weight (over 44 tonnes) are required. These will be road legal standard articulated lorries or low loaders importing construction equipment such as plant and cranes.

Denny North Substation Works

4.4.24 Denny North Substation is located approximately 1.7km north of Denny, as shown in Volume 2, Figure 4.1 Project Components Location Plan.

4.4.25 Works at Denny North Substation are required due to the uprating of the existing ZG Route. These comprise works at the northern side of the existing substation including the installation of a new overhead line gantry and associated busbar connection to a 400kV air insulated switchgear bay within the substation. As part of the works the existing security fence would be extended. Towers ZD096A and ZD096B will also be constructed as part of the Denny North

Substation Works, these are shown on Volume 2, Figure 4.2 Project Works Plan. These two towers are also listed in Volume 3, Appendix 4.1.

Construction

4.4.26 The following construction activities are required as part of the Denny North Substation Works:

- Establishment of temporary construction compound;
- Site clearance and de-vegetation;
- Bulk earthworks and drainage works;
- Installation of primary utility services;
- Construction of equipment foundations;
- Erection of equipment structures and line landing gantry;
- Modifications to existing Denny North substation and adjacent sealing compounds;
- Construction of towers ZD096A and ZD096B, new terminal tower and overhead line gantry construction;
- Dismantle and removal of redundant equipment;
- Installation of HV plant, cable and associated equipment;
- Testing and commissioning of newly installed equipment;
- Dismantle and removal of redundant equipment; and
- Site clearance and demobilisation.

ZD Tower Construction

4.4.27 The addition of the proposed 2 new towers at Denny North substation has been included into the EIA Report post the EIA scoping report and opinion. The two new ZD towers are required to facilitate the reconfiguration of existing circuits as they connect into the substation. The ZD towers will be captured within the works proposed at Denny North substation and be included within the Section 37 application to uprate ZG route.

4.4.28 The construction of towers ZD096A and ZD096B will follow the same process as the New Build Overhead Line. A tower working area will be established at each tower. This is typically 50m x 50m in area and comprises a laydown area, turning head and segregated bunding area. The compounds will be used to provide welfare facilities for operatives, storage and final reinstatement of excavated materials. Following construction and reinstatement of foundations, the crane pad shall be established in preparation of tower erection.

4.4.29 The foundations are subject to GI works, with three potential options as described above:

- Pad and Column;
- Micro-pile; and
- Rock Anchor.

4.4.30 Prior to the erection of each tower, a stone crane pad and laydown area shall be created within the tower working area to provide a stable working platform for lifting operations. Tower

steelwork is transported to site by a flatbed wagon, and placed within the laydown area ready for assembly. Sections are then assembled on the ground before being lifted into position with a telehandler or an all-terrain mobile crane.

4.4.31 The towers will be access via the existing tracks through Denny North Substation.

Construction Compound

4.4.32 All temporary construction compound and laydown area will be located within the existing Denny North Substation site and land owned by SPT. These areas will be used to provide office accommodation, welfare facilities for staff and provide a safe area for parking and temporary storage of materials, plant and equipment.

4.4.33 The Denny North Substation Works are shown on Volume 2, Figure 4.2 Project Works Plan.

Access

4.4.34 The proposed access route for the Denny North Substation Works will be via existing tracks from an unnamed road to the east of the A872. The existing access point to the northwest of Denny North Substation will continue to be used.

4.4.35 Construction works require road legal, standard articulated lorries only. There will be no abnormal loads in terms of size (i.e. length or width) of load, however, there would be abnormal loads in terms of weight. Abnormal loads with regards to vehicle weight (over 44 tonnes) are required. These will be road legal standard articulated lorries or low loaders importing construction equipment such as plant and cranes.

Drainage

4.4.36 The proposed works constitute an extension of the existing substation platform in its north-east corner. A 3m wide peripheral access road is proposed to tie in with the existing access roads. This additional hardstanding will be drained through a filter drain, which will outlet to the existing swale. To accommodate the platform extension, it is proposed that flow through the existing swale within the footprint of the proposed extension be redirected through the new filter drain. This scheme follows local and national guidance by following Sustainable Drainage Systems (SuDS) best practice, and retrofitting existing drainage features where possible[2].

Construction Programme and Phasing

4.4.37 The construction phase would last approximately 9 months, and would comprise the following key stages:

- Site mobilisation;
- Removal of busbars;
- Civil works;
- Installation of new 400kV plant;
- Protection and control works;

[2] Planning Application Advice on Flood Risk and Surface Water Drainage (2020). Falkirk Council https://www.falkirk.gov.uk/development-management/flood-risk-and-surface-water-drainage-advice

- Busbar installation;
- Construction of towers ZD096A and ZD096B, new terminal tower and overhead line gantry construction;
- Turn in of Denny to Clydesmill section of Longannet to Clydesmill circuit;
- Pre-commissioning testing; and
- Final demobilisation.

Operation

4.4.38 While Denny North Substation would continue to be an integral part of the electricity network and operate all year round, it would generally be operated remotely. Access would be required for inspections, servicing or repairs, should they be required. However, once operational the substation would not generate significant on-site activity.

4.4.39 Full operational lighting for maintenance/emergencies will be temporary and sporadic. Lighting will be lower-level and be contained to security/perimeter lighting which is assumed to operate throughout the hours of darkness. Lights will be directional, downward-facing and shielded to minimise upward spill and horizontal glare.

Bonnybridge Substation Extension

4.4.40 Bonnybridge Substation is located between Bonnybridge and Camelon, as shown in Volume 2, Figure 4.1 Project Components Location Plan.

4.4.41 Works at Bonnybridge Substation are required due to the uprating of the existing ZG Route as well as the New Build Overhead Line. These comprise the installation of 400kV equipment on five of the substation bays, installation of 33kV equipment on two of the substation bays, installation of 132kV underground cable and equipment, removal of existing electrical equipment including busbars, circuit breakers and inter-bus transformers, and the construction of a new 400kV control building. Existing shunt-reactors will be retained.

Construction

4.4.42 The following construction activities are required as part of the Bonnybridge Substation Extension:

- Establishment of temporary construction compound;
- Site clearance and de-vegetation;
- Utility diversions;
- Bulk earthworks and drainage work;
- Installation of primary utility services;
- Construction of new transformer bund and plinths;
- Control building foundations, steelwork erection and cladding;
- Terminal tower foundation and erection;
- Construction of new Supergrid transformer bunds and plinths;
- Construction of equipment foundations;

- Erection of equipment structures and line landing gantry;
- Installation of HV plant, cable and associated equipment;
- Dismantle and removal of redundant equipment; and
- Site clearance and demobilisation.

Construction Compound

4.4.43 A temporary construction site compound will be used to provide office accommodation and welfare facilities for staff and provide a safe area for parking and temporary storage of materials, plant and equipment.

4.4.44 This compound will be located within SPT owned land around the substation. Access to the compound will be from the existing access to Bonnybridge Substation via A803. The indicative location of this construction site compound area is currently directly north of Bonnybridge Substation, as shown in Volume 2, Figure 4.2 Project Works Plan.

Access

4.4.45 The proposed access route for the Bonnybridge Substation Extension will be via the A803 Falkirk Road. The existing access point to the south of Bonnybridge Substation will continue to be used.

4.4.46 Construction works require road legal, standard articulated lorries only. There will be no abnormal loads in terms of size (i.e. length or width) of load, however, there would be abnormal loads in terms of weight. Abnormal loads with regards to vehicle weight (over 44 tonnes) are required. These will be road legal standard articulated lorries or low loaders importing construction equipment such as plant and associated equipment. There will be a requirement for the movement of abnormal loads (associated with the movement of transformer and control building components) during the construction phase. Details regarding the transportation of any abnormal loads to Site will be confirmed once a contractor is in place.

Drainage

Bonnybridge Substation Extension is to be drained by a series of perforated underdrain pipes which would convey flow to a perimeter filter drain network. This would outfall to a new SuDS basin which would temporarily store surface water, before discharging at a controlled rate through a Hydrobrake chamber to the Bonny Water.

Construction Phasing

4.4.47 The construction phase would last approximately 26 months and unless otherwise stated are anticipated to be carried out on a continuous basis. It would comprise the following key stages which are presented in the order they will be undertaken:

- Site mobilisation;
- Denny North – Bonnybridge 2 Circuit (Pre Super Grid Transformer 2 (SGT2) Replacement Works);
- Denny North – Bonnybridge 1 Circuit (Pre Super Grid Transformer 1 (SGT1) Replacement Works);

- Denny North – Bonnybridge 2 Circuit becomes Longannet – Bonnybridge;
- Denny North – Bonnybridge 1 Circuit becomes Longannet – Bonnybridge 1;
- Substation Extension Works;
- Longannet – Bonnybridge 2 Circuit becomes Kincardine– Bonnybridge 2;
- Denny North – Bonnybridge 1 Circuit becomes Kincardine 2 – Bonnybridge 1;
- SGT2 Replacement;
- SGT1 Replacement;
- Commissioning SGT2; and
- Commissioning SGT1.

Operation

4.4.48 While Bonnybridge Substation would continue to be an integral part of the electricity network and operate all year round, it would generally be operated remotely. Access would be required for inspections, servicing or repairs should they be required. However, once operational the substation would not generate significant on-site activity.

4.4.49 Full operational lighting for maintenance/emergencies will be temporary and sporadic. Lighting will be lower-level and be contained to security/perimeter lighting which is assumed to operate throughout the hours of darkness. Lights will be directional, downward-facing and shielded to minimise upward skill and horizontal glare.

Landscaping

4.4.50 An Outline Landscape Plan for Bonnybridge Substation Extension has been produced as part of this EIA Report (See Figure 6-9).

Cumbernauld Substation Works

Site Description

4.4.51 The existing Cumbernauld Substation is located to the east of the town of Cumbernauld, and south of the Abronhill area. The application site for the Cumbernauld Substation Extension (hereafter referred to as the Cumbernauld Substation Extension Site) includes the area within the red line boundary shown on Figure 4-3. The Cumbernauld Substation Extension Site is situated within woodland to the south-east of Forest Road, on the south-eastern periphery of the town of Cumbernauld.

4.4.52 The Cumbernauld Substation Extension Site is located at around 120 m Above Ordnance Datum (mAOD). Land within Cumbernauld Substation Extension Site slopes down toward the north-west, towards Forest Road and the Red Burn watercourse. Red Burn runs around of the southern, western and north-western Site boundaries.

4.4.53 North-east of the Cumbernauld Substation Extension Site, land use is characterised by open fields interspersed with woodland. To the north-east, a new residential development is under construction. To the north-west of the Cumbernauld Substation Extension Site land use is urban and primarily residential. The Cumbernauld Substation Extension Site is separated from the town of Cumbernauld by Forest Road, the railway line, and bands of forestry listed

on the Ancient Woodland Inventory. Cumbernauld Academy lies approximately 400m to the north-west.

4.4.54 The Slamannan Plateau Special Protection Area (SPA) designated for Taiga Bean Goose lies approximately 1.5km east. West Fannyside Moss Special Area of Conservation (SAC) overlaps for a portion of the Slamannan Plateau and features blanket bog habitat. Palacerigg Country Park boundary wraps around the Cumbernauld Substation Extension Site from the south and to the south-west.

Cumbernauld 275kV/33kV Substation Extension

4.4.55 The construction of a new Cumbernauld 275/33kV Substation Extension will involve the demolition of the existing 132/33kV Cumbernauld outdoor substation equipment and control building. The area of temporary and permanent works associated with the Cumbernauld Substation Extension would be approximately 5.8Ha, and new infrastructure would be a maximum height of 15.5m above the finished platform level.

The permanent works would include:

- New substation equipment including:
  - 275kV Air Insulated Switchgear (AIS);
  - Two Super Grid (275/33kV) Transformers with gas-insulated circuit breakers;
  - Two Connection bays with Marshalling Kiosks;
  - 275kV bus section breaker;
  - 2no. new gantries;
- New access road (5.5m width), from Forest Road main road;
- One single storey new control building (including toilet, mess room, storage, office, battery room, and other electrical equipment);
- New platform to accommodate new electrical equipment (no more than 1.8Ha);
- Diesel generator;
- Car parking for up to 6 vehicles;
- 3m high palisade perimeter fencing;
- Internal footpath (2m wide);
- Internal vehicular access road (3.5m wide);
- Realignment of existing 33kV cables and overhead line;
- The temporary storage of up to 90,000 litres of insulating oil until utilised in transformers; and
- Operational lighting (only during maintenance in hours of darkness).

The temporary works associated with construction would include:

- Earthworks;
- Decommissioning and removal of two existing 132kV grid transformers;

- Construction phase lighting (only during hours of darkness);
- Dismantling and removal of one existing CB tower to make space for new substation infrastructure;
- Two temporary compounds to provide office accommodation and welfare facilities during construction;
- Upgrade to telecommunications;
- Dismantling and removal of existing control building;
- Removal of existing septic tank and associated drainage; and
- Diversion of water mains associated with Forest Road.

Insulation Technology

4.4.56 The proposed substation extension would utilise air-insulation technology with oil-insulated technology only used in the transformers. SF_6 (Sulfur Hexafluoride) free equipment will be used where possible.

Site Access

4.4.57 The existing substation access road would be re-aligned to accommodate the arrangement of the Cumbernauld Substation Extension. This existing access road would be maintained as the primary vehicular access point to the existing and extended substation areas, during operation of the Cumbernauld Substation Extension

4.4.58 A separate entirely new 5.5m wide secondary access road would be constructed to facilitate delivery of the two new transformers, as well as facilitate their future maintenance or replacement. This secondary access road would be retained during operation, and would enter the Cumbernauld Substation Extension from Forest Road via a new bellmouth, entering the extension area from the west. Internal access roads would be designed to accommodate delivery of the new transformer.

Drainage

4.4.59 Surface water flow generated within the Cumbernauld Substation Extension Site will be dealt with by a dedicated permanent drainage system, designed to appropriate standards and incorporating SuDS.

4.4.60 The permanent drainage design would employ a new oil containment and separation system scheme utilising an above ground full retention oil/water separator. This system would be alarmed and fitted with an automatic shut off valve which would operate when the concentration of oil exceeds an appropriate regulatory threshold level.

4.4.61 New filter drains, cut-off ditches and pipes would direct run off towards two SuDS ponds. Both SuDS ponds would outfall to the Glencayan burn via hydrobrake (flow control) chambers. Existing drainage infrastructure would be inspected and utilised where possible, with cover and invert levels being amended to tie in with the wider design.

4.4.62 A new British Water-certified (BS EN 12566 – Part 3) packaged or site-assembled domestic wastewater treatment plant will be utilised to treat foul water discharge from the substation platform prior to it being released into the SuDS network and before releasing at restricted

rate into the existing drainage system. The existing septic tank and associated drainage will be removed and replaced with the system described above.

Landscaping

4.4.63 An Outline Landscape Plan for Cumbernauld Substation Extension has been produced as part of this EIA Report (See Figure 6-10).

Construction of Cumbernauld Substation Extension.

Overview

4.4.64 Site access during construction would be from the main access point from Forest Road. The construction site access route would be via existing the existing highway network to the main access point.

4.4.65 Construction would include the removal of the two existing 132kV/33kV transformers. These would be replaced with two new 275kV/33kV Super Grid Transformers.

4.4.66 The construction phase would last approximately 28 months, and would comprise the following key stages:

- Site Mobilisation
- Construction Stage 1including:
  - Groundworks and platform construction;
  - Civil works;
  - Control building construction;
  - Super Grid Transformer No 1 installation;
  - Telecommunications works;
  - Pre-commissioning of equipment; and
  - Decommissioning of existing equipment (including removal of once CB route tower);
- Construction Stage 2 including:
  - Demolition works;
  - Decommissioning of existing equipment;
  - Protection and control works;
  - Super Grid Transformer No 2 installation;
  - Civil works;
  - Commissioning of Super Grid transformer No 2; and
  - Final demobilisation.

Construction activities

4.4.67 Construction works would include decommissioning of the existing 132/33kV 90MVA GT's (Grid Transformers) GT1 and GT2, and disposal of the associated bays and equipment. This

would be followed by installation of the new Cumbernauld 275/33kV Substation within and adjacent to the existing Cumbernauld 132/33kV Substation compound.

Construction methodologies

4.4.68 Earthworks fill material would be sourced from offsite, however material won on-site would be utilised if it is determined to be acceptable and suitable for re-use.

4.4.69 New ducts would be laid for new cabling. The use of precast concrete cable trenches would be kept to a minimum and wherever practicable a system of multicore ducts and duct boxes would be used to route cables into proposed new control building. Cable trenches would be used where appropriate. Cable trenches would be self-draining pre-cast concrete systems. All cable ducts would be PVC.

Operation of the Project

4.4.70 While Cumbernauld Substation Extension would form an integral part of the electricity network and operate all year round it would generally be operated remotely. Access would be required for inspections, servicing or repairs should they be required. However, once operational the Cumbernauld Substation Extension would not generate significant on-site activity or travel to or from the Site.

Wishaw Substation Extension

4.4.71 Wishaw Substation is located to the south of Wishaw between the B574 and a railway line, as shown on Volume 2, Figure 4.1 Project Components Location Plan.

4.4.72 Works at Wishaw Substation are required due to the uprating of the existing XR route. These include an extension of the existing substation platform and associated security fencing, gantries, outdoor air insulated switch gear and gas insulated busbars.

Construction

4.4.73 The following construction activities are required as part of the Wishaw Substation Extension:

- Establishment of temporary construction compound;
- Site clearance and de-vegetation;
- Bulk earthworks and drainage works;
- Extension of existing gas insulated busbar in switchyard;
- Installation of primary utility services including relocation of existing diesel generator;
- Construction of equipment foundations;
- Erection of equipment structures and line landing gantry;
- Installation of HV plant and associated equipment;
- Testing and commissioning of newly installed equipment; and
- Site clearance and demobilisation.

Construction Compound

4.4.74 A temporary construction site compound will be used to provide office accommodation and welfare facilities for staff and provide a safe area for parking and temporary storage of materials, plant and equipment.

4.4.75 This compound will be located outside of SPT owned land and the location of the compound will be subject to further landowner discussions. Access to the compound will be via an existing track from Allershaw Road and Birkshaw Brae. The location of this construction site compound area is currently southeast of the Wishaw Substation, as shown on Volume 2, Figure 4.2 Project Works Plan.

Access

4.4.76 The proposed access route for the Wishaw Substation Extension will be via existing tracks from Castlehill Road. The existing access point to the northwest of Wishaw Substation will continue to be used, with an existing access point to the construction compound being used from Birkshaw Brae.

4.4.77 Construction works require road legal, standard articulated lorries only. There will be no abnormal loads in terms of size (i.e. length or width) of load, however, there would be abnormal loads in terms of weight. Abnormal loads with regards to vehicle weight (over 44 tonnes) are required. These will be road legal standard articulated lorries or low loaders importing construction equipment such as plant and associated equipment.

Drainage

4.4.78 The proposed works include a filter drain and swale network to service the platform extension, which would feed into the existing drainage network at a controlled rate, eventually feeding to the Gowkthrapple Burn. The proposed drainage scheme may be subject to change in the detailed design phase

Construction Phasing

4.4.79 The construction phase would last approximately 32 months, and would comprise the following:

- Bonnybridge Gas Insulated Busduct (GIB) works, including retrofill works.
- Wishaw 275kV protection and control works;
- Wishaw 400kV protection and control works, and connection of new 400kV circuit; and
- Commissioning.

Operation

4.4.80 While Wishaw Substation would continue to be an integral part of the electricity network and operate all year round it would generally be operated remotely. Access would be required for inspections, servicing or repairs should they be required. However, once operational the substation would not generate significant on-site activity.

4.4.81 Full operational lighting for maintenance/emergencies will be temporary and sporadic. Lighting will be lower-level and be contained to security/perimeter lighting which is assumed to operate throughout the hours of darkness. Lights will be directional, downward-facing and shielded to minimise upward skill and horizontal glare.

Works required to reconfigure XX Route and XR Route at Newarthill Substation

4.4.82 Newarthill Substation is located approximately 750m north of Newarthill, as shown on Volume 2, Figure 4.1 Project Components Location Plan.

4.4.83 Works are required due to the uprating of the existing XX Route and XR Route. These comprise works to replace the 275kV equipment including air insulated switchgear.

4.4.84 While works required to facilitate internal modifications within Newarthill Substation have been scoped out of the assessment as these are needed to deliver other connections, the works to reconfigure XX and XR remain part of the Project.

Construction

4.4.85 The following construction activities are required as part of the reconfiguration of XX and XR:

- Establishment of temporary construction compound;
- Site clearance and de-vegetation;
- Construction of equipment foundations;
- Erection of equipment structures;
- Modifications to existing Newarthill substation to allow reconfiguration;
- Installation of HV plant and associated equipment;
- Testing and commissioning of newly installed equipment;
- Dismantle, removal and disposal of redundant equipment; and
- Site clearance and demobilisation.

Construction Compound

4.4.86 A temporary construction site compound and laydown area will be used to provide office accommodation and welfare facilities for staff and provide a safe area for parking and temporary storage of materials, plant and equipment.

4.4.87 There are two compounds proposed at this substation to facilitate the reconfiguration works. One will be located within SPT owned land around the substation and the location of the external compound and laydown area will be subject to further landowner discussions. Access to the compound and laydown area will be via existing access from Legbrannock Road / Edinburgh Road. The indicative location of the construction site compound area is currently in a field approximately 220m north of the Newarthill Substation, while the laydown area is proposed adjacent to the north, as shown in Volume 2, Figure 4.2 Project Works Plan.

Access

4.4.88 The proposed access route for the reconfiguration works will be via existing tracks from Legbrannock Road. The existing access point to the west of Newarthill Substation will continue to be used.

4.4.89 Construction works require road legal, standard articulated lorries only. There will be no abnormal loads in terms of size (i.e. length or width) of load, however, there would be abnormal loads in terms of weight. Abnormal loads with regards to vehicle weight (over

44 tonnes) are required. These will be road legal standard articulated lorries or low loaders importing construction equipment such as plant and associated equipment.

Drainage

4.4.90 The existing drainage systems for Newarthill Substation are anticipated to be suitable and will be reviewed and modified as necessary. The condition of the existing culverts other drainage infrastructure will be inspected by the contractor. These will be extended if required if they are deemed to be in an acceptable condition, or replaced if unacceptable.

Construction Phasing

4.4.91 The construction phase would last approximately 16 months, and would comprise the following key stages:

- Site mobilisation;
- Civil works;
- Busbar connection to form new mesh corner;
- Replacement of through circuit disconnectors and associated CTs;
- Protection and control works;
- Telecommunication works; and
- Pre-commissioning testing.

Operation

4.4.92 While Newarthill Substation would continue to be an integral part of the electricity network and operate all year round it would generally be operated remotely. Access would be required for inspections, servicing or repairs should they be required. However, once operational the substation would not generate significant on-site activity.

4.4.93 Full operational lighting for maintenance/ emergencies will be temporary and sporadic. Lighting will be lower-level and be contained to security/ perimeter lighting which is assumed to operate throughout the hours of darkness. Lights will be directional, downward-facing and shielded to minimise upward skill and horizontal glare.

4.5 Additional Related Works

Distribution Line Diversion Works

4.5.1 Works to modify the electricity distribution network (referred to the as the SPD works) are required at 36 no. locations in the vicinity of the Project. These are typically where lower voltage distribution overhead lines are crossed by or in proximity to the Project. The SPD works are small-scale relating to moving or underground short sections of wood pole lines.

4.6 Proposed Construction Methods

4.6.1 In order to facilitate the construction of the New Build Overhead Line and to establish the necessary safety clearances, a number of existing distribution assets (11 & 33kV overhead line) are required to be temporarily dipped (taken down and undergrounded) and in some locations permanently diverted. The process of temporarily dipping existing distribution lines consists of digging a track between the relevant existing poles, before laying the existing

distribution line underground. Following completion of the New Build Overhead Line, the existing distribution line will then be returned to its original overhead cable state.

4.6.2 As part of the New Build Overhead Line works, 11 distribution line diversions will be required. These will allow construction of the WB Route. These diversions are listed below:

- An 11kV overhead line is to be temporarily dipped in between towers WB003 and WB004 (approximately between NS 76165 69925 & NS 76012 69969);
- An 11kV overhead line is to be permanently diverted by undergrounding in between towers WB012 and WB013 (approximately between NS 78388 71308 & NS 78128 71516);
- A 33kV overhead line is to be temporarily dipped and diverted permanently to the west in between towers WB016 and WB018 (approximately between NS 78117 72386 & NS 78039 72748);
- Two 33kV overhead lines are to be permanently diverted, by undergrounding between towers WB21C and WB26 (approximately between NS 77453 74343 & NS 79314 74785);
- An 11kV overhead line is to be temporarily dipped in between towers WB030 and WB031 (approximately between NS 80698 75845 & NS 80627 75867);
- An 11kV overhead line is to be temporarily dipped in between towers WB038 and WB039 (approximately between NS 82498 77631 & NS 82397 77753);
- Two 33kV overhead lines are to be permanently diverted and a new overhead line constructed further to the west of the WB route, parallel to towers WB040 and WB042 (approximately between NS 82457 78043 & NS 82767 78399);
- An 11kV overhead line is to be temporarily dipped in between towers WB042 and WB043 (approximately between NS 83270 78394 & NS 83178 78483);
- An 11kV overhead line is to be temporarily dipped in between towers WB046 and WB047 (approximately between NS 84464 78675 & NS 84438 78783);
- An 11kV overhead line is to be temporarily dipped in between towers WB050 and WB051 (approximately between NS 84824 79730 & NS 85196 79716); and
- A 33kV overhead line is to be temporarily dipped in between towers WB055 & WB054 (approximately between NS 84385 80732 & NS 84592 80553), and WB053 & WB052 & WB051(approximately between NS 84805 80175 & NS 84891 80183). The existing 33kV overhead line will be permanently diverted away from the WHS and undergrounded.

ZG Route

As part of the Uprated Overhead Line works, one distribution line diversion will be required across the ZG Route. These will require the same diversion process as detailed for the WB Route.

- A 33kV overhead line is to be permanently diverted, by undergrounding in between towers ZG012 and ZG013 (located approximately between NS 83807 81215 & NS 83969 81192).

XX Route

4.6.3 As part of the Uprated Overhead Line works, 11 distribution line diversions will be required across the XX Route. These will require the same diversion process as detailed for the WB Route. These diversions are listed below:

- A 33kV overhead line is to be temporarily dipped and undergrounded in between towers XX004 and XX005 (approximately between NS 71196 67519 & NS 71253 67444);
- A 33kV overhead line is to be temporarily dipped and undergrounded in between towers XX007 and XX008 (approximately between NS 72175 67688 & NS 72168 67612);
- An 11kV overhead line is to be temporarily dipped and undergrounded in between towers XX008 and XX009 (approximately between NS 72376 67738 & NS 72348 67595);
- Two 11kV overhead lines are to be temporarily dipped and undergrounded in between towers XX010 and XX011(approximately between NS 72870 67975 & NS 72867 67630, and NS 72919 68006 & NS 72916 67603) and also XX011 and XX012 (approximately between NS 73237 67775 & NS 73023 67576);
- An 11kV overhead line is to be permanently diverted, by undergrounding in between towers XX017 and XX018 (approximately between NS 75030 68312 and NS 75162 68274);
- An 11kV overhead line is to permanently be diverted, by undergrounding in between towers XX020 and XX021 (approximately between NS 75137 68283 & NS 75033 68315);
- Between towers XX025 and XX026 (approximately between NS 76985 67182 & NS 76973 67204) there is an existing 11kV pole that will be moved 20m back along route of the existing 11kV overhead line to allow for the Uprated Overhead Line works. A track will be excavated 20m back from the existing 11kV pole following the existing route. Following this, the line will be temporarily dipped using the method described above;
- An 11kV overhead line is to be permanently diverted, by undergrounding between towers XX026 and XX027 (approximately between NS 77155 66897 & NS 77301 67126);
- A 33kV overhead line is to be permanently diverted, by undergrounding between towers XX037 and XX038 (approximately between NS 78990 64539 & NS 79299 64446); and
- A 33kV overhead line is to be temporarily dipped between towers XX039 and XX040 (approximately between NS 79112 63863 & NS 79138 63803).

XR Route

4.6.4 As part of the Uprated Overhead Line works, five distribution line diversions will be required across the XR Route. These will require the same diversion process as detailed for the WB Route. These diversions are listed below:

- A low voltage overhead line is to be permanently diverted, by undergrounding in between towers XR009 and XR010 (approximately between NS 80649 60123 &NS 80676 60179);
- An 11kV overhead line is to be temporarily dipped in between towers XR011 and XR012 (approximately between NS 81263 60027 & NS 81408 59916);

- Two 33kV overhead lines are to be dipped in between towers XR019 and XR020. 11kV overhead line is to be permanently diverted, by undergrounding in between towers XR019 and XR020 (approximately between NS 83683 59065 & NS 83945 59038); and
- An 11kV overhead line is to be permanently diverted, by undergrounding in between towers XR030 and XR031 (approximately between NS 84394 55800 & NS 84552 55800).

AA Route

4.6.5 As part of the AA Route works, three distribution line diversions will be required. These will require the same diversion process as detailed for the WB route. These diversions are listed below:

- Two 33kV overhead circuits are to be temporarily dipped in between towers AA002 and AA003 (approximately between NS 84275 80271 & NS 84213 80220). This dip will also be covered for diversions between towers CB035 and CB036 (approximately between NS 84315 79687 & NS 84181 79664), and CB036 and CB037 (approximately between NS 84137 80249 & NS 84256 80414); and
- An 11kV overhead line is to be temporarily dipped in between towers AA004 and AA005 (approximately between NS 84305 79686 & NS 84182 79664). This dip will also be covered for diversions between towers CB0034 and CB0035.

CB Route

4.6.6 As part of the CB Route works, five distribution line diversions will be required. These will require the same diversion process as detailed for the WB route. These diversions are listed below:

- An 11kV overhead line is to be temporarily dipped in between towers CB014 and CB015 (approximately between NS 80698 75844 & NS 80777 75819);
- An 11kV overhead line is to be temporarily dipped in between towers CB023 and CB024 (approximately between NS 83119 77170 & NS 82971 77234)
- An 11kV overhead line is to be temporarily dipped in between towers CB034 and CB035 (approximately between NS 84275 80271 & NS 84213 80220);
- An 11kV overhead line is to be temporarily dipped in between towers CB035 and CB036 (approximately between NS 84315 79687 & NS 84181 79664); and
- An 11kV overhead line is to be temporarily dipped in between towers CB036 and CB037 (approximately between NS 84137 80249 & NS 84256 80414).

4.7 Biodiversity Measures and Compensatory Planting

4.7.1 Separate Biodiversity Net Gain (BNG) reports are provided detailing the New Build Overhead Line and Uprated Overhead Lines, Substations and Cumbernauld BNG Assessments. These reports identify the change in biodiversity value and set out the requirements to achieve a 10% gain in biodiversity value, which the Applicant has made a commitment to achieve. This 10% gain to be provided will ensure that the Project provides a significant ecological enhancement, in line with the requirements of NPF4. Further details on BNG and biodiversity enhancement measures are provided in Volume 1, Chapter 8 Biodiversity.

4.7.2 Off-site planting will be required to compensate for woodland removal. The location of off-site compensation planting is still to be determined but the principle of no net loss of woodland cover is established under the Scottish Government's Control of Woodland Removal Policy. Further details on compensatory planting are provided in Volume 1, Chapter 14 Forestry.

4.8 Construction Programme

4.8.1 Subject to gaining consent, construction works would be expected to start in January 2027 and be functionally completed by the end of 2030. Certain advance works may take place in advance of the main construction period.

4.8.2 The construction schedule would be developed as the Project progresses and would take account of seasonal constraints such as protected species breeding or hibernation seasons and reducing impacts associated with flood zones.

4.8.3 An indicative construction programme for the Project is presented in Table 4-2.

Table 4-2 Project Indicative Construction Programme

DWNO Element	Activity Name	Start	Finish	Duration (Weeks)	2027												2028												2029												2030	
Overhead Line					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
AA Route	AA Route removal works	14-Jun-27	19-Jul-27	5																																						
	Cable civil works	29-Nov-27	17-Apr-28	20																																						
	Cable installation	17-Apr-28	27-Nov-28	32																																						
WB Route	SPD OHL diversions	07-Jun-27	16-Aug-27	10																																						
	Access Works for WB route (WB001 - WB021C)	15-Oct-27	03-Mar-28	20																																						
	Construction of WB route (WB001 - WB021C)	26-Nov-27	01-Sep-28	40																																						
	Construction of WB route (WB022 - WB059)	22-Dec-28	09-Nov-29	46																																						
ZG Route	Access works for ZG Route	04-Oct-27	14-Dec-27	10.2																																						
	ZC(S) & ZG OHL reconfiguration	11-Oct-27	08-Nov-27	4																																						
	ZD / DENN 400 / 275kV SS connection	11-Nov-27	25-Nov-27	2																																						
	Conductor Uprating (ZG)	13-Dec-27	18-Apr-28	18.2																																						
	Reconfiguration works (BONN-DENN-1)	17-Apr-28	30-May-28	6.2																																						
	Reconfiguration works (BONN-DENN-2)	17-Apr-28	12-Jun-28	8																																						
XR Route	Conductor Replacement / Uprating (XR)	01-Feb-28	20-Jun-28	20																																						
XX Route	Access works For XX Route	29-Feb-28	10-May-28	10.2																																						
	Conductor Replacement / Uprating (XX)	20-Jun-28	07-Nov-28	20																																						
CB Route	CB Route removal works	01-Sep-28	22-Dec-28	16																																						
Substation					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Cumbernauld	Cumbernauld Substation construction works	07-Jan-27	12-Feb-30	161																																						

Wishaw	Wishaw Substation construction works	27-Jan-27	08-Aug-29	132
Newarthill	XX and XR Reconfiguration construction works	05-Oct-27	02-Jan-29	65
Bonnybridge	Bonnybridge Substation construction works	05-Oct-27	13-Nov-29	107.6
Denny North	Denny North Substation construction works	15-Nov-27	11-Jul-28	34.2

4.9 Construction Workforce

4.9.1 The staff required during the construction of the Project would vary throughout the construction period.

4.9.2 It is estimated that construction employment for the Project will reach an average of 205 direct gross construction workers per day over the construction programme.

4.9.3 The project-wide construction of the Project will create a peak of 400 gross direct FTE jobs during construction (expected in December 2028).

4.10 Construction Working Hours

4.10.1 The proposed construction core working hours (unless otherwise approved by Falkirk Council or North Lanarkshire Council) for all construction works associated with the Project will take place predominantly during daylight hours, as outlined in Table 4-3.

4.10.2 Weekend working will be proposed to minimise construction traffic, with areas of work generally restricted to locations with the least impact on the local community and general public.

Table 4-3 Construction Working Hours

	March to September	October to February
Monday to Friday	08:00 – 19:00	08:00 – 19:00
Saturday	08:00 – 13:00	08:00 – 13:00