Chapter 4

Development Description

SP ENERGY NETWORKS

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Development Description

4.1 Introduction

1. This Chapter provides details of the proposed development and forms the basis of the assessments presented within **Chapters 6 to 11**.

2. Details of the permanent components of the proposed development are outlined below. Details of the temporary components of the proposed development e.g. working areas, and access tracks, which comprise ancillary development along with the forestry wayleave felling are also provided.

3. This Chapter also includes details about the construction and operation of the proposed development and describes measures proposed to ensure the protection of the environment during these stages.

4. The routeing and EIA process has been used in combination with technical design work and accurate digital terrain modelling to identify the type of new wood pole components and their locations, and the locations of the underground elements, upon which the assessment has been based. However, post consent, following detailed topographical surveys and ground investigation surveys, it is anticipated that it may be necessary and desirable to refine the final design to reflect detailed topography, ground conditions and to provide scope for further mitigation of environmental effects. The modifications would be assessed to ensure that they are not varied to such a degree as to cause an increase in the significance of likely environmental effects as identified in this EIAR. The implementation of this design process and that of appraising any likely changes to environmental effects identified in the EIAR is outlined in **Section 4.2.4**.

4.2 Proposed Development Infrastructure

5. The proposed development comprises the construction of a new 17 km 132 kV single circuit wood pole (Trident) OHL and two sections of underground cable totalling approximately 3.5 km at each end of the OHL, which together connect to the consented Kennoxhead Wind Farm Substation and to the existing Coalburn Substation.

6. The route of the proposed development is described in **Chapter 1: Introduction** and shown in **Figures 4.1a-f**, along with the locations of the ancillary development (see **Section 4.2.3**).

4.2.1 Wood Poles

7. Wood poles are proposed for the single circuit OHL operating at 132 kV. Wood poles are fabricated from pressure impregnated softwood, treated with a preservative to prevent damage to structural integrity. New wood poles are dark brown in colour and weather over the years to a light grey.

8. Double (also known as 'H') poles are proposed to be used for the proposed development, with 169 H wood poles being required in total. There are three types of wood pole required:

- Intermediate: where the pole forms part of a straight-line section;
- Angle: where the OHL requires a change of direction. All angle structures will require to be back stayed. The maximum allowable angle deviations permitted on 'H' pole section is 75°, subject to special limitations; and
- Terminal: where the OHL terminates into a substation or on to an underground cable section via a cable sealing end compound[1].

9. An intermediate support pole, angle support pole and terminal pole are shown in **Figures 4.4 to 4.6.**

4.2.1.1 Wood Pole Height and Span Length

10. While trident wood poles have a standard height above ground of 15 m (this includes steelwork and insulators), individual pole heights are determined to meet statutory clearance requirements. Pole heights may require to be increased where circumstances dictate, e.g. road and railway crossings, over elevated land, structures or features; however, pole heights do not need to be increased in all situations to achieve the minimum clearance distances. Pole sizes may also be reduced where there are short spans or on localised topography. As a consequence, the heights of the poles above ground to the top of the insulators mounted on the poles), range from 11 m to 18 m with an average height of 12.62 m.

11. The spans between poles range from 77 m to 119 m with an average span length of 101.02 m to accommodate environmental and technical constraints and variations in topography. The technical specifications are shown in **Figure 4.2** and **Figure 4.3**, and typical 'H' poles are shown below in **Figures 4.4-4.6**.

Figure 4.4: Typical trident 'H' pole

Figure 4.5: Typical angle support-H pole

1 The area which houses the connection between overhead line and underground cable. Downleads bring the conductors down to join the ends of the underground cables where they come out of the ground. There may also be some monitoring equipment, but usually no transformers or switchgear.

Figure 4.6: Typical pole mounted cable termination

4.2.1.2 OHL Components

12. The line will carry one 3-phase circuit, which means that the poles will support three conductors. Each conductor is made of aluminium alloy, with a cross-sectional area of 200 mm^2. The trident design has no earth wire however the middle phase conductor will incorporate a fibre-optic telecommunication wire for control purposes.

13. Insulators, attached to the pole cross-arms, support the conductors and prevent the electric current from crossing to the pole body. The insulators are likely to be made from a polymeric compound (grey plastic). The steelwork and insulators are approximately 1.76 m in height.

4.2.2 Underground Cable

14. Approximately 0.3 km of underground cable would be installed to connect the proposed OHL with Coalburn Substation. Another underground cable, approximately 3.2 km long would be installed to connect the proposed OHL with Kennoxhead Wind Farm substation.

15. The installation methodology of the underground cables is provided in **Appendix 4.3 Construction Methodology**. The 132 kV cable circuit will comprise three phase cables in trefoil arrangement with a duct containing two sub ducts laid alongside to allow for telecommunications control and monitoring cables. Each cable will comprise an 800 mm^2 aluminium central conductor encased in XLPE insulation material, overlaid with a metallic sheath and final outer sheath of graphite coated polythene. A typical 132 kV underground cable buried trench-section is provided as **Figure 4.7**. Concrete cable markers will be deployed at regular intervals along the proposed cable route as a warning and indication that high voltage cable exists in the vicinity. Where connected to an OHL, an underground cable may also involve the creation of a fenced compound for the siting of terminal supports and sealing end compounds above ground.

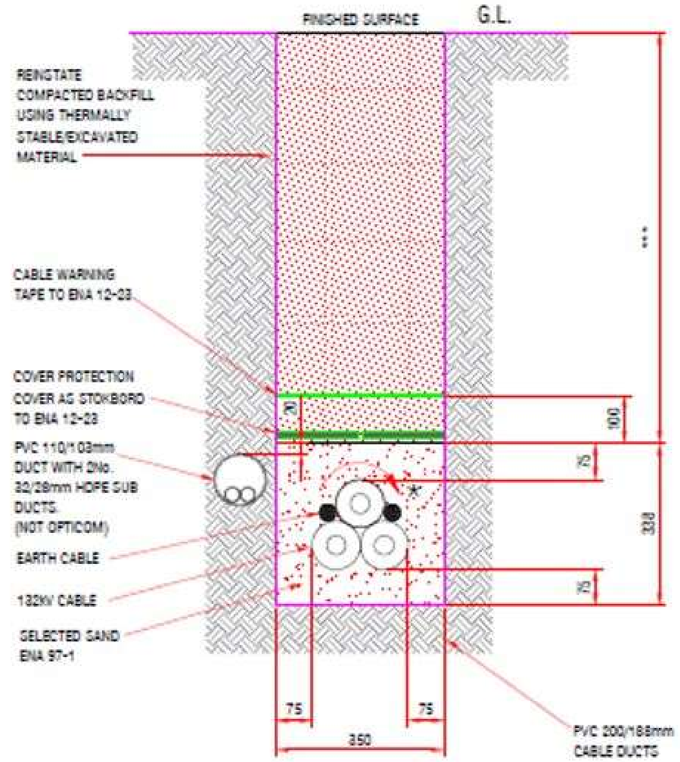

Figure 4.7: Typical direct buried trench section

4.2.3 Ancillary Development

16. In addition to the components detailed above, which are considered to be permanent for the purposes of the applications for section 37 consent and deemed planning permission and the EIA process, other ancillary development will be required during the felling and construction phase. This ancillary development will be in situ on a temporary basis, during the felling and construction phases only, and will be removed and the land reinstated once the proposed development is commissioned.

17. Deemed planning permission is sought for these ancillary components comprising:

- 60 m wayleave for the proposed route;
- Access tracks;
- Access from public roads;
- Watercourse crossings;
- Working areas (around wood poles);
- Laydown areas/construction compounds; and
- Winching/pulling areas.

18. Further details of the construction of each temporary component, and forestry felling, are provided below.

19. The location of all ancillary development is shown in **Figures 4.1a-f**.

4.2.4 Infrastructure Location Allowance (ILA)

20. 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 pole positions and heights 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.

21. To ensure that the final positions of the proposed OHL, underground cables and associated works are not varied to such a degree as to cause an increase in the significance of likely environmental effects outlined in this EIAR, an Infrastructure Location Allowance (ILA) is proposed. This would permit the siting of a pole to be adjusted within a 25 m radius of the indicative pole locations.

22. A 5 m ILA is also required laterally from the proposed underground cable alignment. A 25 m ILA is also required along the proposed underground cable alignment from the locations identified for Fibre Bays, Joint Bays and Link Boxes.

23. If any changes to the location of access tracks, pulling areas, or laydown areas is required, an approach would be taken to agree this on site with each applicable landowner, subject to appropriate environmental surveys being undertaken ahead of any change to the alignment.

24. Implementation of the ILA would be controlled through the proposed detailed Construction Environmental Management Plan (CEMP). Should a request to vary a pole or cable position within the ILA be raised, the relevant environmental baseline surveys undertaken to inform the EIA would be reviewed in the first instance as these surveys extend beyond the proposed ILA tolerances. Should this review ‘flag up’ any potential issues, further environmental advice would then be sought from retained specialists as appropriate. A procedure for notifying relevant statutory consultees of proposed ILA movements would also be agreed with these bodies prior to construction commencing.

4.3 Construction Details

4.3.1 Construction Process

25. The construction of the proposed development will follow a well-established sequence of activities as outlined below:

- Pre-construction activities, including establishment of the site compound and services;
- Felling;
- Construction of accesses and culverts;
- Establishment of working areas, excavation of foundations;
- Erection of poles and installation of underground cabling;
- Pole conductor ‘stringing’ and commissioning of the OHL; and
- Removal of temporary infrastructure and reinstatement.

26. The activities are described in further detail below. The construction process is detailed further in **Appendix 4.3: Construction Methodology**.

27. The assessments included in **Chapters 6 to 11** are based on the approach and extent of work described below.

4.3.2 Pre-Construction Activities

4.3.2.1 Establishment of the Site Compound

28. This involves setting up the contractor’s compound and offices for use by the CDM (Construction, Design and Management) Contractor and Engineers, including cabins, stores, welfare facilities and a car park. The typical size of a construction compound would be around 80 m by 150 m (see **Figure 4.8**). Preparatory works for the temporary site establishments will involve some site clearance work, minor earthworks operations to level the site, drainage works for the car park and service installation, including electrical, communications, water and sewerage facilities. Pole storage will be in a bunded area away from any watercourses and controls will be implemented to prevent potential contamination (see **Figure 4.9**).

Figure 4.8: Typical CDM setup on hard standing with parking facilities

Figure 4.9: Typical pole storage on a hardstanding area, with a non-permeable membrane with sand to prevent leaching

4.3.2.2 Service Diversions

29. It is possible some service diversions will be undertaken in advance of the main construction works, including existing distribution and transmission OHLs and other possible utilities that may obstruct the construction of the proposed development including a BT Line, water pipes and drainage pipes etc.

4.3.3 Accesses

30. Delivery of construction materials to wood pole locations will be achieved by access from public roads as shown in **Figures 4.1a-f**. Vehicular access will be required to every pole location along the route during construction, and final access arrangements will be agreed with landowners.

31. Construction plant and materials for the underground cabling installation will be delivered to the site compound and, where appropriate, directly to the working areas of the proposed underground cable routes.

32. Approximately 16 km of access routes will be required as shown in **Figures 4.1a-f**, and the type of access will depend on a variety of factors including the sensitivity of the location, the type of land use and the ground conditions, with the latter confirmed through pre-construction ground investigations. The area is crossed by a network of public roads and existing tracks from which field gates allow access to the majority of the proposed development. To facilitate access from the public road into the site, bellmouths will be required when accessing into some locations, which are marked on **Figures 4.1a-f**. On this basis, two types of temporary access tracks, as well as other methods for taking access, are proposed to reflect the ground conditions within the area:

- Low Ground Pressure Vehicles (no track required): In areas of dry pasture and level moorland, use will be made of low ground pressure vehicles (e.g. tractor, Argo cat and/or quad bikes), which do not require a track. It is important to note however, that the movement of these vehicles will still be restricted to the access routes identified. See **Figure 4.10**.
- Helicopters: Helicopters may be used for pole delivery to point of installation. This would involve flying the poles from a main laydown area to the pole position. This reduces the number of trips required by other means of machinery, reducing land damage. See **Figure 4.11**.
- Trackway (aluminium) /Terrafirma (composite) panels: In areas with wetter ground conditions and/or sensitive habitat, and where a pre-defined access is required, e.g. to access an angle pole, Trackway/Terrafirma panels will be used for access, which are a less invasive form of access routing than stone tracks. See **Figure 4.12**.
- Floating tracks. A floating track is used during the construction of temporary tracks on less competent materials such as peat, where the depth of peat is greater than 1 m deep. Geotextiles and geogrid will be placed on the existing surface then crushed stone placed and compacted as required.
- Stone Tracks: Cut and fill tracks. As a worst case option, these tracks are usually utilised where the ground is competent (i.e. not in peat >1 m). The topsoil is stripped and stockpiled onsite. The topsoil will be used during the restoration phase to reinstate the land to the original condition. If the ground requires to be levelled, then material is cut on one side of the slope and used to fill the other side of the slope. Stone is then laid and compacted on top of this surface to build the access track. Geotextiles and geogrid will be placed on the existing surface then crushed stone placed on top and compacted as required. See **Figure 4.13** and **Figure 4.14**.

33. Further detail on site accesses is provided in **Appendix 2.6 Transport Statement**.

Figure 4.10: Typical low ground pressure vehicle route

Figure 4.11: Helicopter delivering wood poles to working area

Figure 4.12: Typical trackway panel/Terrafirma installation

Figure 4.23: Typical stripping and stockpiling of topsoil and laying of geomembrane

Figure 4.34: Typical stone road installation on top of geomembrane

4.3.4 Watercourse Crossings

34. The proposed development has been designed to minimise the number of watercourse crossings; however, where a new temporary access track is required to cross a watercourse, a temporary ‘bridge’ (see **Figure 4.15**) or culvert (see **Figure 4.16**) will be utilised. No works will take place within the watercourse. Where the underground cable is required to cross a watercourse, construction works will be undertaken in accordance with the CEMP in compliance with the conditions of the General Binding Rules (GBRs).

Figure 4.45: Typical temporary bridge for construction vehicle access

Figure 4.56: Example culvert installed for temporary water course crossing for access

35. Further details of the watercourse crossings are provided in **Chapter 7: Geology, Hydrology, Hydrogeology, Water Resources and Peat** and **Appendix 7.1**.

4.3.5 Temporary Construction Compounds, Laydown Areas and Working Areas

36. One main temporary construction compound is proposed. This will be utilised for storage of material, equipment, site offices and staff welfare facilities. The temporary construction compound will be located in an area adjacent to Douglas West Wind Farm (see **Figure 4.1a-f**). The construction compound will be accessible from a temporary stone road connected to Coalburn Road. The construction compound will be lit during normal working hours as required. In addition, for site security reasons, the compounds will be fitted with electrical sensors to activate the compound lighting during the hours of darkness should movement be detected. The compounds will be fenced off during construction and the land will be restored once construction is complete and the proposed development is commissioned.

37. In addition to the temporary construction compounds, nine 50 m x 50 m and one 100 m x 100 m temporary laydown areas will be required to construct the proposed development. The laydown areas will be covered by crushed stone to provide a durable surface to support the vehicles, plant and materials (see **Figure 4.8**). The location of each laydown area is shown in **Figures 4.1a-f**.

38. Temporary working areas around each pole location will be required for foundation excavation and pole erection, with the average dimensions of typical working areas being 30 m x 15 m. Indicative working areas at each wood pole are shown in **Figure 4.1a-f**.

39. For underground cable works within the Kennoxhead Windfarm, the site establishment compound for the contractors will be inside the Kennoxhead Windfarm welfare compound adjacent to Kennoxhead Substation. For underground cable works near the Coalburn Substation, the welfare compound will be adjacent to the Coalburn Substation within SPT land ownership.

40. If necessary, temporary working areas/laydown areas will be fenced off to delineate the area for specific reasons, such as to protect permanent infrastructure during construction, for land use or for environmental protection. In accordance with the proposed ILA, further consideration will be given to varying the shape of the working area at each pole to avoid environmental constraints identified prior to construction. Following the completion of the construction works, the temporary working areas/laydown areas will be reinstated and restored.

4.3.6 Felling of Woodland

41. The felling of some woodland and individual trees will be required to physically construct the proposed development and also to maintain the statutory clearances required for its safe operation and maintenance reasons. The minimum clearance corridor (wayleave or servitude right) required for construction and operation of the OHL is 60 m (30 m either side of the line). Therefore, there is a minimum wayleave required through commercial forestry of 60 m to protect the OHL and ensure the safety of forestry operatives. The minimum clearance corridor (wayleave or servitude right) required for construction and operation of the underground cable is 20 m (a servitude of 10 m and a working area of 5 m required either side of the cable). Although the underground cable connecting the OHL with Kennoxhead Wind Farm will pass through an area of commercial forestry, it will be installed in road verges and open ground. Therefore, a full 20 m swathe will not be required; however, the working area for the OHL and cables will vary in practice due to environmental considerations.

42. Where the proposed development is routed through other woodland areas, such as scrub, an assessment of the woodland was undertaken based on the topography and characteristics of the woodland to determine whether felling would be required. To minimise felling of trees, only woodland that needed to be felled to facilitate the construction and safe operation of the OHL was considered. A description of the baseline conditions and assessment of the impacts on forestry, including details in regard to felling is included in **Chapter 11: Forestry**. SPEN will undertake regular inspections throughout the lifetime of the proposed development to ensure that no clearance infringements occur. Should these be identified then SPEN would undertake necessary assessments to ensure that clearance works are undertaken in line with SPEN's statutory and licence duties.

43. It has been calculated that 3.514 ha of forestry will be felled to enable the physical construction of the proposed development and to achieve the necessary wayleave requirements during its operation. The majority of trees proposed for felling comprise Sitka Spruce and Broadleaf plantation.

44. Felling will be undertaken utilising a mixture of mechanical harvesting, mulching and hand felling techniques as shown in **Figures 4.17-4.19**.

45. Further information in relation to forestry effects is provided in **Chapter 11: Forestry**, and areas where felling is considered necessary is shown in **Figures 11.1**, which also show the wider forestry resource through which the corridor passes).

46. The approach to compensatory planting is provided in **Chapter 11: Forestry**.

Figure 4.67: Timber mulching

Figure 4.78: Manual felling

Figure 4.89: Timber forwarding vehicle

4.3.7 OHL Installation

4.3.7.1 Wood Poles

Access

47. Access, delivery and assembly will be taken using a tracked excavator and low ground-pressure vehicles (e.g. tractor, Argo cat, quad bikes) wherever possible. In certain situations, helicopters may be used for pole delivery to the point of installation, as shown in **Figure 4.11**. Helicopter delivery would involve flying the poles from a main laydown area to the pole position, ready for installation by excavators. This reduces the number of trips back and forth by other means of machinery, reducing land damage.

48. Bog mats and temporary trac mats will be used to cross soft ground where existing access trackers are not available. Excavators may need to create a level pad to work from which would be reinstated upon completion.

Wood Pole Foundations

49. The erection of the wood poles will require an excavation to allow the pole brace block and/or steel foundation braces to be fixed in appropriate layers and used for backfilling purposes, as shown in **Figure 4.20**. Turf and topsoil will be removed together to retain the turf root system and placed separate for later reinstatement. A peat management plan from the OHL Contractor will be a mandatory requirement before construction begins and will form part of the CEMP.

50. A hole will be excavated to allow the pole, brace block and/or steel foundation braces to be positioned in place. A typical pole excavation is 3 m^2 by 2 m deep with a maximum excavation depth of 3 m. No concrete is required. The excavated material is then sorted into appropriate layers and used for backfilling.

Figure 4.20: Typical wood pole foundation excavation

Assembly and Erection of Poles

51. The poles are erected using agricultural machinery such as a digger with a lifting arm. The excavator(s) will then hoist the assembled structure into position and, once the structure has been braced in position, the trench is backfilled. Erection of an intermediate pole is shown in **Figure 4.21** below.

52. The hole will then be backfilled with soil. The soil will be place in the hole in reverse order so that it resembles the order it was excavated to ensure environmental continuity. Backfilling will be progressed in layers of approximately 300-400 mm deep, with stone hard core added as required around foundation blocks to ensure adequate compaction and suitable geotechnical conditions are maintained between each layer.

53. It is anticipated that all material excavated for the installation of the poles will be used in backfilling the excavations. Any generated waste will be removed from site and treated in accordance with the Site Waste Management Plan (SWMP).

Figure 4.21: Erection of Wood Poles using a tracked excavator. This picture is for illustration only, the pole being erected is not a trident pole.

4.3.7.2 Stringing of Conductors and Commissioning of the Line

54. Once a sufficient number of sequential poles have been erected, stringing of the conductors can commence. This requires temporary ‘pulling’ (or ‘stringing’) areas at certain pole locations along a line approximately every 3-4 km or where deviation in the route occurs. In some cases, the temporary pulling areas overlap with the temporary working areas, and elsewhere, they are located outwith the working areas. Typical pulling areas are 25 m by 15 m. The temporary pulling area will be formed using the Trackway/Terrafirma panels/Stone road installation (see **Figure 4.22**) proposed to be used at certain locations for the temporary access tracks. All temporary surfacing materials will be removed from site on completion of the stringing operations.

Figure 4.9: Typical Trackway panel/Terrafimra installation to create temporary pulling area

55. At each pole pulling area, a winch and any other necessary plant will be positioned and set up at one end of the stringing section, with a 'tensioner' set up similarly at the other end of the section. Using the winch to pull the pilot wires, the conductor will then be drawn through the section, using the tensioner to maintain a constant tension. This allows the conductor to be controlled without touching the ground, avoiding damage to both the conductor and the underlying ground. Conductor drums and tensioner for the stringing of a pole is shown in **Figure 4.23**.

Figure 4.103: Conductor drums and tensioner at tension location

4.3.8 Underground Cable Installation

4.3.8.1 Pre-Excavation

56. Appropriate signage will be put in place before works commence at the access points of the access roads to warn the general public of the works.

57. Information on all known existing utilities and underground structures will also be visually inspected. Multiple sweeps of the area are to be carried out with a calibrated Cable Avoidance Tool and identified locations marked out with marker spray paint or marker posts.

58. Pre-construction activities will also include the following:

- Ecological pre-construction work;
- Archaeological pre-construction work;
- Utilities searches;
- Drainage surveys;
- Hydrology & hydrogeology studies;
- Thermal resistivity survey to determine surface temperature and soil thermal resistivity in summer and winter; and
- Geotechnical and ground stability surveys.

59. Underground cable construction activities will begin with the establishment and preparation of the working area. Temporary fences will be erected along the boundaries of the working width where necessary.

4.3.8.2 Trench Excavation

60. Underground cable trenches will be created using tracked mechanical excavators. The working width will then be cleared of vegetation and topsoil will be stripped from the areas of ground to be disturbed. The excavated topsoil and subsoil will be stored separately within the working area in accordance with best practice in order that it can be replaced once the installation

of the underground cables is complete. The removal of topsoil will generally be over the working width and stored locally to be evenly spread over the backfilled trenches following duct installation. In areas with a high water table, it may be necessary to dewater the excavation.

61. For works in fields, ground conditions will be assessed prior to excavation and bog mats and trackways will be utilised where appropriate.

62. Land drainage systems will be maintained during construction and reinstated on completion. Temporary cut-off drains will be installed parallel to the trench-line, before the start of construction, to intercept soil and groundwater before it reaches the trench. These field drains will discharge to local drainage ditches through silt traps, as appropriate, to minimise sediment release. Any damage caused to land drains shall be identified, logged, notified to the relevant landowner and repaired at an appropriate time.

4.3.8.3 Duct Installation

63. Ducts will be supplied in lengths with a spigot and socket design. The spigot insertion depth will be predetermined by the design of the collar and spigot coupling system.

64. The final installation of the ducts and the number of bends required will vary and shall be installed into the excavated trench according to site conditions and obstructions. The ducts will be installed to occupy the excavated trench and shall be laid into formation as detailed on **Figure 4.7**. Cable ties shall be utilised at approximately 1 m intervals along the length of the ducts where ducts are to be laid in a trefoil formation.

65. Ducts shall then be surrounded with a thermally selected backfill material and marker tiles installed above.

4.3.8.4 Backfilling

66. Following trench excavation, a thin layer of stabilised backfill (sand based material) will be deposited into the trench to act as bedding for the cable ducts which will then be lowered into the trench. Each of the trenches will then be backfilled, using a stabilised backfill material up to the protection tiles with the originally excavated material above the protection tiles. During backfilling, protective cover and warning tapes will be placed over the cable circuits.

4.3.8.5 Cable Pulling

67. Cable pulling through the ducts can take place at any time after the ducts have been installed and backfilled, as the ducts are left unfilled after installation.

4.3.8.6 Reinstatement

68. Once all cable works have been completed the working width, temporary compounds and any temporary access tracks will be removed and the stored soil will be replaced. The working width temporary fencing will be removed. The land will be reinstated to its previous condition and uses in consultation with the landowners.

4.3.9 Crossing of Existing OHLs and Other Infrastructure

69. The proposed development makes several crossings of existing OHLs. **Table 4.1** provides a list of these crossings and their location along the proposed OHL route. The corresponding proposed OHL route pole numbers can be seen on Figure 4.1 a-f.

Crossing no.	Transmission Span (proposed OHL route pole no.)	Voltage	Action
1	27 - 28	11 kV	Temporary undergrounding of the existing 11 kV
2	45 – 46	11 kV	Temporary undergrounding of the existing 11 kV
3	78 – 100	33 kV	Permanent undergrounding of the existing 33 kV
4	78 – 100	11 kV	Permanent undergrounding of the existing 11 kV
5	78 – 100	11 kV	Permanent undergrounding of the existing 11 kV
6	78 – 100	33 kV	Permanent undergrounding of the existing 33 kV
7	78 – 100	33 kV	Permanent undergrounding of the existing 33 kV
8	159 – 160	11 kV	Temporary undergrounding of the existing 11 kV

Table 4.1: Existing OHL crossings

70. Works will be required to the existing OHLs to enable the proposed development to be constructed without health and safety risks to construction workers. As indicated in **Table 4.1**, this will require both temporary and permanent undergrounding in some cases. Where possible, the supply to customers will be maintained which may necessitate the temporary erection of ‘live line’ protective scaffolds over the existing lines (see **Figure 4.24**). Further consideration of these works will be set out within the CEMP.

71. The OHL will also cross multiple existing tracks, the A70 south west of Glespin, Douglas West Wind Farm, Shoulderigg Road north of Coalburn, Coalburn Road north of Coalburn, and an existing 132 kV underground cable at Coalburn substation. These crossings are shown on **Figures 4.1a-f**.

72. Where the conductors need to be strung over existing roads, protection in the form of scaffolding will be erected prior to the commencement of stringing as shown in **Figure 4.25**. The appropriate road authorities will be consulted. Scaffolding will be erected at either side of the crossing, with the span in between the scaffolding netted.

73. The potential impacts of these crossings have been assessed within the assessment chapters.

Figure 4.114: Protective scaffolding over OHL

Figure 4.125: Protective scaffolding over road/access track crossing

4.3.10 Construction Working Hours, Timescales and Personnel

74. Construction activities for the proposed development will be undertaken on Monday to Friday during daytime periods only, between 07.00 and 19.00 for felling and access installation in summer (April to September) and 7.30 to 17.00 (or as daylight allows) in winter (October to March) for all other activities. There may be a requirement to work at weekends. Where required, weekend working will only take place where there are no human or environmental sensitivities. It is anticipated that any variations to the hours stated here will be agreed in advance with South Lanarkshire Council.

75. Construction and erection of an H pole generally takes 3-4 weeks per km depending on ground conditions and location, i.e. it may take longer if the ground is softer or if shallow rock is encountered.

76. It is anticipated that the completion of the construction works (including reinstatement) for the proposed development will take approximately 12 months, assuming there will be approximately 10-12 full time contracting staff in total working on the construction during the 12-month construction programme.

77. Construction traffic will comprise vehicles for delivery of plant, equipment, temporary wood/steel matting for wood pole access tracks (where necessary) and tree removal. The vehicles used to construct the proposed development will range from HGV (low-loader) for poles, plant and equipment delivery to all-terrain vehicles. In total, 338 single poles will be delivered to site, with each HGV carrying an estimated 16 poles per load. HGVs will also be required for delivery of tracked excavators, conductor pulling winches, drums of conductor, pole top steel work, stay wire drums, etc.

78. Each pole will require four construction staff who will be transported to the pole location in 4x4 vehicles. Construction at each pole location will also require two tracked excavators.

79. An indicative construction programme for the proposed development is provided in **Table 4.2** below.

Activity	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Mobilisation												
Environmental mitigation												
Access development												
Pole delivery-assembly-erection												
Wiring works												
Site reinstatement												
Demobilisation												

Table 4.2: Indicative construction programme

4.4 Operational Details

4.4.1 Wood Pole Maintenance

80. Whilst most wood pole OHL components are maintenance free, exposed elements which suffer from corrosion, wear, deterioration and fatigue need to be inspected on a regular basis. OHLs supported on wood poles require refurbishment or replacement after approximately 30 to 40 years.

4.4.2 Wayleaves

81. It is likely that there will be an inspection of the wayleave every year, with one year the inspection being by foot and the alternate year inspection being by helicopter.

82. Appropriate tree clearance at the outset should minimise the likelihood of any major secondary undergrowth in the wayleave. However, should secondary growth be identified during the inspection visits, a maintenance team will be required to re-establish the statutory wayleave clearances to the line.

83. It is not considered likely that temporary tracks will need to be re-instated for wayleave maintenance purposes as access is likely to be by vehicles which have tracked or low ground pressure. The wayleave would then be walked and mechanical saws used to clear the secondary growth. It is likely that the volume of cut timber would be such that it could be left to decay naturally.

4.4.3 Decommissioning of the Proposed Development

84. When the operational life of the proposed development comes to an end, it is possible that the proposed OHL may be re-equipped with new conductors and insulators (30 to 40 years) and the wood poles replaced. Alternatively, the OHL may be decommissioned fully. On this basis, the operational environmental effects of the proposed development are considered to be long term.

85. Underground cables have a life expectancy of approximately 40-50 years. However, it is quite feasible that the new cables will last beyond this, and SP Energy Networks will seek to utilise a maximum life expectancy. For the purpose of this EIA, it is assumed that when the cables reach the end of their life they will be replaced if a system needs case still existed with the potential of the old cables remaining buried in the ground to avoid disruption associated with their removal.

86. An assessment of the decommissioning of the proposed development is not proposed as part of this EIA as i) the future baseline conditions (environmental and other development) cannot be predicted accurately at this stage and ii) the proposals for refurbishment/decommissioning are not known at this stage.

4.5 Environmental Management

4.5.1 Construction Environmental Management Plan (CEMP)

87. Prior to the construction of the proposed development, SPEN will develop a detailed CEMP with its appointed contractors. The CEMP will identify those responsible for the management and reporting on the environmental aspects during the construction of the proposed development. The CEMP will be used to ensure a commitment to meeting all relevant conditions attached to the section 37 consent and deemed planning permission, and delivering the environmental mitigation measures identified in the EIAR. Adherence to the CEMP will be a contractual requirement of each contractor that SPEN appoints. An example CEMP is provided in **Appendix 4.1 Example CEMP**. This contains the sections that would be expected to be included within the final CEMP, which will be agreed subject to an appropriately worded planning condition.

88. The purpose of the CEMP will be to:

- Provide a mechanism for ensuring that construction methods avoid, minimise and control potentially adverse significant environmental effects, as identified in the EIAR;
- Ensure that good construction practices are adopted and maintained throughout the construction of the proposed development;
- Provide a framework for mitigating unexpected effects during construction;
- Provide assurance to third parties that agreed environmental performance criteria are met;
- The CEMP will be updated when necessary to account for changes or updates
- Establish procedures for ensuring compliance with environmental legislation and statutory consents; and
- Detail the process for monitoring and auditing environmental performance.

89. The CEMP will be updated when necessary to account for changes or updates to legislation and good practice methods throughout construction. The CEMP will also be amended to incorporate information obtained during detailed ground investigations which will be undertaken post consent and prior to construction activities for the proposed development. Compliance with the CEMP (including procedures, record keeping, monitoring and auditing) will be overseen by a suitably qualified and experienced Environmental Manager from SPEN.

90. The CEMP will contain the following information:

- Policies and objectives;
- Regulatory controls and guidance to be followed;
- A completed register of contacts confirming the contact details for all key personnel for managing environmental issues, including SPEN representatives, the Ecological Clerk of Works (ECoW), Principal Contractor contacts and appropriate regulator contacts;
- Construction Programme and detailed working method statements;
- A site-specific action plan, providing a register of environmental risks and outlining the requirement for accompanying site specific mitigation, monitoring and management system reporting procedures;
- Audit and inspection procedures;
- Training plans; and
- Communication (onsite, key stakeholders, neighbours and community).

91. In addition, the CEMP will contain the following documents, which the Principal Contractor and their sub-contractors will be required to adhere to throughout the construction process:

- A Pollution Prevention Plan (PPP);
- Construction Method Statements (CMS);
- A Water Protection Plan (WPP);
- A Site Waste Management Plan (SWMP); and
- A Construction Traffic Management Plan (CTMP).

92. The CEMP and associated plans will be submitted to South Lanarkshire Council, and others as appropriate, prior to the commencement of construction works. A copy of the CEMP will be kept in the construction site office for the duration of the works and will be available for review at all times.

93. The Principal Contractor will be responsible for the continual development of the CEMP to take account of monitoring and audit results during the construction phase and changing environmental conditions and regulations.

94. The services of other specialist advisers will be retained as appropriate, to be called on as required to advise on specific environmental issues.

95. Performance against these documents will be monitored by SPEN's Construction Project Manager and the ECoW throughout construction. They will ensure that the works carried out are in accordance with the relevant best practice guidance documents.

96. Regular meetings will be held throughout the construction period to discuss environmental management, providing updates on the performance of the environmental mitigation measures and identifying any actions for performance improvement. The meetings will be attended by the ECoW, the SPEN Construction Project Manager, the Principal Contractor, Site Manager and any other relevant personnel or regulatory agency representative as required.

97. All site staff will be given appropriate environmental training before starting work onsite. The CEMP will also include a series of specialist information packs, 'toolbox talks', to inform site operatives of the sensitivity of particular areas and of wider safeguards to protect natural and cultural heritage. An example toolbox talk relating to cultural heritage is provided as **Appendix 4.2 Example Toolbox Talk**.

4.5.2 Embedded Mitigation Measures

98. Embedded mitigation measures, comprising general good practice measures, will be employed as standard techniques during tree felling and the construction of the proposed development. Therefore, these are not considered to be mitigation as such, but an integral part of the design and implementation of the construction phase. This is considered a realistic scenario given the current regulatory context and accepted good practice across the construction industry.

99. A list of embedded mitigation measures, identified in each topic chapter, is provided in the Schedule of Mitigation in **Appendix 2.2**.

100. Embedded measures will include (but are not limited to) measures associated with:

- Flood Risk and Increased Run-Off (such as the construction of SuDS);
- Pollution and Accidental Spillage Incidents (such as the safe storage of chemicals and fuels);
- Sedimentation and Erosion (such as temporary hay bale barriers or silt and splash fences);
- Watercourse Crossings (no works taking place within watercourses);
- Forestry Felling (adherence to SF Guidelines e.g. to ensure protection and enhancement of the water environment); and
- Peat Management (such as micro-siting infrastructure to avoid peat disturbance/excavation and unnecessary waste.

101. The assessments in this EIAR assume the implementation of these embedded/good practice measures. Any further issue/location specific mitigation measures are identified in the assessment of likely significant effects within each chapter of the EIAR.

4.5.3 Waste Management

102. Materials will be generated, and will require management, at a number of construction stages including:

- Excavation of materials for construction of pole foundations;
- Construction of ancillary works such as temporary construction compounds; and
- Occupation of temporary construction premises.

103. The Principal Contractor will be required to prepare a SWMP to ensure best practice principles are applied to reduce, re-use or recycle all materials as part of the CEMP.

104. Measures to reduce possible environmental effects associated with the storage and transportation of wastes will include:

- The careful location of stockpiles and other storage areas;
- The use of good practice in the design of waste storage areas and the use of suitable waste containers;

- The use of sheeting, screening, and damping where appropriate and practicable;
- The control and treatment of runoff from soil and waste soil stockpiles;
- Minimising storage periods;
- Minimising haulage distances; and
- The sheeting of vehicles.

105. All materials will be identified, classified, quantified and, where practicable, appropriately segregated. Any materials that cannot be reused will be disposed of according to relevant waste management legislation which will serve to address a number of possible environmental effects. This includes:

- The Duty of Care imposed by Section 34 of the Environmental Protection Act 1990; and
- The Waste Management Licensing (Scotland) Regulations 2011 (as amended), particularly provisions relating to registered exemptions from waste management licensing.

106. If materials are required to be removed from site, these will be handled in accordance with relevant waste and environmental regulations. Waste will be transferred using a registered waste carrier to a licensed waste disposal site or recycling centre.

4.5.4 Resource and Energy Use

107. It is good practice to consider energy usage during the construction of a proposed development, including associated emissions of greenhouse gases. It is recognised that energy will be used during the construction phase, including the fuel for construction plant and the energy required for the transportation of personnel. The materials used to construct the OHLs will also incorporate embodied energy, i.e. energy required to manufacture construction materials, including the energy used in the transport of the material from its source to the site, via processing plant where applicable.

108. The current scope to reduce the consumption of energy and associated CO_2 emissions by selecting energy efficient equipment, and fuels and materials with low embodied energy is considered to be limited, for example biodiesel fuel could not be used at present for all construction vehicle trips as it is not commercially available to large scale users. However, work to progress the practical application of emerging technologies is ongoing will be given further consideration prior to construction.

4.5.5 Health and Safety

109. Health and safety is of primary importance to SPEN, with commitment from the highest levels. In constructing and operating the proposed development, SPEN will take account of the health and safety of all those who could potentially be affected, including construction workers, felling operatives, SPEN company operatives and the general public.

4.5.6 Construction

110. All construction activities will be managed within the requirements of The Construction (Design and Management) Regulations 2015 and will not conflict with the Health and Safety at Work etc Act 1974. This will include outlining all construction mitigation in a Construction Phase Plan prepared by the Principal Contractor and reviewed by the Principal Designer. To further reduce possible health and safety risks, a Health and Safety Plan for the proposed development will also be drawn up. All staff and contractors working on the proposed development will be required to comply with the safety procedures and work instructions outlined in the Plan at all times.

111. To ensure that hazards are appropriately managed, risk assessments will be undertaken for all major construction activities, with measures put in place to manage any hazards identified.

112. Current industry standards will be followed to manage the risks posed by heavy equipment, falls from heights and rough and dangerous terrain. Information will be made available to the public with respect to any possible safety hazards and open excavations will be fenced off.

4.5.7 Operation and Maintenance

113. OHL components, including conductors and insulators will be designed and tested at the manufacturers to ensure compliance with relevant UK and European Standards. This will include testing the performance of insulators under stress, the carrying capability of conductors and the effects of voltage and current on the mechanical strength of the fittings.

114. In accordance with standard practice, the public will be advised of the possible danger presented by OHLs by a warning notice placed on each pole.

4.6 Community Liaison

115. In partnership with SPEN, the appointed contractors will be required to maintain close liaison with local community representatives, landowners and statutory consultees throughout the construction period. This is likely to include circulation of information about ongoing activities, particularly those that could potentially cause disturbance. A telephone number will be provided and persons with appropriate authority to respond to calls and resolve any problems made available.

116. SPEN and the appointed contractors will liaise with the local councils and communities to identify any major events in the area and to programme construction works to ensure that these do not disrupt the local road network on those days.

4.7 Reinstatement

117. Upon completion of the construction works associated with the proposed development, the contractor shall remove the temporary tracks/accesses and repair any damage. This will be undertaken as soon as possible after construction is completed and temporary road materials are removed. This will enable the subsoil to be sealed preventing sediment run-off. As described previously, topsoil will be stripped and stored adjacent to the works in a manner which ensures that the soil quality is retained. Restoration of moorland, arable and pasture areas will aim to achieve original soil profiles. The topsoil will be transported from the topsoil storage locations to the works and will be placed by a tracked excavator. Appropriate seeding if deemed necessary by the proposed development may be by hand or by machine spreading.

4.8 References

The Construction (Design and Management) Regulations 2015. Available [online] at: https://www.legislation.gov.uk/uksi/2015/51/contents/made [accessed 23 August 2022]

Environmental Protection Act 1990. Available [online] at: https://www.legislation.gov.uk/ukpga/1990/43/contents [accessed 23 August 2022]

Forestry and Land Management (Scotland) Act 2018. Available [online] at: https://www.legislation.gov.uk/asp/2018/8/contents/enacted [accessed 23 August 2022]

The Felling (Scotland) Regulations 2019. Available [online] at: https://www.legislation.gov.uk/ssi/2019/49/contents/made [accessed 23 August 2022]

Health and Safety at Work etc Act 1974. Available [online] at: https://www.legislation.gov.uk/ukpga/1974/37/contents [accessed 23 August 2022]

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