CHAPTER 3 – PROJECT DESCRIPTION

Figures (Volume 3 of this EIA Report)

Visualisations (Volume 4 of this EIA Report)

No visualisations are associated with this chapter.

Appendices (Volume 5 of this EIA Report)

3 Project Description

3.1 Introduction

3.1.1 This Chapter describes the various elements required for the construction and operation of the new double circuit steel structure 400 kilovolt (kV) overhead transmission line (OHL) to connect into new substation sites at Beauly, New Deer and Peterhead.

3.1.2 The Proposed Development, described within this Chapter and assessed within the technical chapters of Volume 2 of this EIA Report, is detailed below and illustrated in **Figure 1.2: Site Location Detail** and **Figure 3.1: Site Layout**.

3.2 Location of Proposed Development

Proposed 400 kV OHL

3.2.1 Travelling from west to east, the Proposed Development originates at the proposed Fanellan 400 kV substation to the southwest of Beauly in The Highland Council area. It initially travels northeast then east, crossing the River Beauly twice, the A833 and then running parallel to the A862 as far as Easter Moniack. Here, the Proposed Development turns southeast past Reelig and then east across The Aird, passing over the Great Glen Way and then dropping into the Great Glen, crossing the A82 and the Caledonian Canal and River Ness. It continues in a southeasterly direction passing Essich and Drummossie Muir and then east, crossing the A9 north of Daviot. Continuing east, the proposed OHL passes to the south of Saddle Hill, then south of Assich Forest to Mains of Clunas, after which it travels southeast through Newlands of Fleenas Wood, crossing the River Findhorn and passing south of Ferness.

3.2.2 The Proposed Development then moves into the Moray Council area, remaining south of the existing 275 kV OHL. It continues east, passing over the A940 and the Dava Way, then turns northeast across the River Divie towards Hill of Tomechole. It then turns east, crossing the upland forestry north of Loch Dallas and continuing east and then northeast towards Kellas. East of Meikle Hill, the Proposed Development has two options to pass the proposed Kellas Drum Wind Farm. If the windfarm application were to be consented, then the Kellas Alternative Alignment, would be constructed[1]. The preferred southern option continues northeast, passing Glenlatterach Reservoir to the south, whereas the Kellas Alternative Alignment continues north, then east, passing Glenlatterach Reservoir to the north. Both options re-join north of Pikey Hill and continue northeast past Teindland. The Proposed Development then takes a southeasterly direction crossing the Spey Valley to the north of Inchberry, taking a similar route to two existing OHLs as it crosses the River Spey and through the Wood of Ordiequish. Here it travels southeast, passing the A96 and B9016 before passing Newmill to the north, then dropping south, to the east of Keith, until it reaches the boundary with Aberdeenshire Council area.

3.2.3 Within the Aberdeenshire Council area, the Proposed Development travels east, passing between Cairnie and Ruthven. It continues in a southeasterly direction, crossing the B9022, passing Cobairdy, the River Deveron, and the A97. At Aucharnie, the Proposed Development takes a northeasterly direction, passing Drumblair, Feith Hill and Pitglassie, towards Turriff. It continues east and passes between Turriff and Hatton Castle, crosses the Idoch Water, passes Roadside and then turns southeast to connect into the proposed Greens 400 kV substation. From the proposed Greens 400 kV substation, the route continues east past Allathan and the Culsh Monument to the north of New Deer settlement. It then takes a southeasterly direction to the south of Maud, Stuartfield and Inverquhomery and then connects into the proposed Netherton Hub where the OHL ends.

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[1] There may be other circumstances associated with the status of the application for consent of the proposed Kellas Drum Wind Farm where the Kellas Alternative Alignment would be constructed.

3.2.4 The tower ranges[2] of the proposed 400 kV OHL within each local authority area are displayed in **Figure 3.1: Site Layout** and detailed below:

- The Highland Council: BC1-1 to CB7-3 (approximately 56 km);
- Moray Council: CB7-4 to CB16-15 (approximately 59 km); and
- Aberdeenshire Council: CB16-16 to NP4-29 (approximately 71 km).

3.2.5 The tower ranges for the Proposed Development from each substation location are detailed below:

- downleads into the proposed Fanellan 400 kV substation to downleads into the proposed Greens 400 kV substation: BC1-1 to BN6-23A (approximately 158 km); and
- downleads into the proposed Greens 400 kV substation to downleads into the proposed Netherton 400 kV Hub: NP1-2 to NP4-29 (approximately 28 km).

3.2.6 The total length for the Proposed OHL Alignment from Fanellan 400 kV substation to Netherton Hub is approximately 186 km.

Removal of Beauly to Knocknagael 132kV OHL (Highland)

3.2.7 The existing OHL to be removed runs east from the existing Beauly substation, across the River Beauly, and continues east until it reaches Inchberry Hill where it changes direction to travel southeast. It then passes Dunain Hill, the A82, the Caledonian Canal and the B852 until it reaches approximately 1 km northeast of Knocknagael substation to the northeast of Essich, where it goes underground to connect into the substation.

Realignment of the existing Beauly to Blackhillock 275 kV OHL (Highland)

3.2.8 The realignment of the existing Beauly to Blackhillock 275 kV OHL is approximately 2.6 km long and is located to the south of Ferness. It starts from where the existing OHL meets the A939 and ends where the existing OHL meets the Stripe of Muckle Lyne.

3.3 Development for which Section 37 Consent and Deemed Planning Permission is sought

3.3.1 The Proposed Development would include the following works, for which section 37 consent under the 1989 Act and deemed planning permission in terms of section 57(2) of the Planning Act is sought to install, operate and keep installed:

- approximately 186 kilometres (km) of new 400 kV double circuit OHL between new substation sites proposed at Beauly (Fanellan 400 kV substation), New Deer (Greens 400 kV substation) and Peterhead (Netherton Hub), including downleads into the substations, also referred to as the 'Proposed OHL Alignment';
- realignment of approximately 2.6 km section of the existing 275 kV OHL south of Ferness;
- approximately 6.3 km in total of permanent modifications to existing OHLs at six locations where the Proposed Development crosses existing transmission infrastructure; and
- approximately 5.8 km in total of temporary OHL diversions to facilitate the permanent modifications to existing OHLs required to construct the Proposed Development.

[2] The tower numbering system in this EIA report results from the optioneering process and would change as part of the detailed design stage. BC – Beauly to Caledonian Canal; CB – Caledonian Canal to Blackhillock; BN – Blackhillock to New Deer; NP – New Deer to Peterhead.

Kellas Alternative Alignment (Moray)

3.3.2 To the south of Kellas in Moray an alternative alignment is proposed (Towers CB9C-10A to CB10-8) as illustrated on page 12 of **Figure 3.1: Site Layout**. See **Chapter 1: Introduction, paragraph 1.1.4** for further information on the need for this alternative. The alignment that would be taken forward is dependent on the outcome of the section 36 application for the proposed Kellas Drum Wind Farm. The total length of the Kellas Alternative Alignment is 8.8 km. If the Kellas Alternative Alignment is constructed, the total length of new 400 kV double circuit OHL would be 187.5 km.

3.4 Ancillary Development for which Deemed Planning Permission is sought

3.4.1 The following works would be required as part of the Proposed Development, or to facilitate its construction and operation:

- removal of approximately 16.9 km of the existing 132 kV OHL and approximately 1 km of underground cable from Beauly to Knocknagael substations;
- removal of the redundant section of the existing 275 kV OHL south of Ferness, following its realignment;
- the upgrade of existing, or creation of new, bellmouths at public road access points;
- the formation of access tracks (permanent, temporary, and upgrades to existing tracks) and the installation of bridges and culverts to facilitate access;
- working areas around infrastructure to facilitate construction;
- formation of flat areas from which the conductor will be pulled during construction, which will contain earthed metal working surfaces referred to as Equipotential Zones (EPZs);
- vegetation clearance and management;
- other temporary measures required during construction, such as measures to protect road and water crossings during construction (scaffolding etc.); and
- public road improvements which would be required in some areas to facilitate construction traffic.

3.4.2 These different forms of ancillary development are described in further detail in this Chapter.

3.5 Associated Works

3.5.1 Other associated works are required to facilitate construction of the Proposed Development, or would occur because of its construction and operation, and are listed below. These works are not included in the application for Section 37 consent and do not form part of the description of the Proposed Development. On that basis they are not assessed in detail in this EIA Report. The associated works include:

- three proposed substations that the OHL will connect into include (from west to east) Fanellan substation, Greens substation and Netherton Hub. Consent for each substation is being sought separately for these developments under the Planning Act;
- borrow pits and quarries to source stone for the construction of access tracks. The final location and design of borrow pits and quarries would be confirmed by the Principal Contractor and separate planning permissions would be sought as required;
- temporary construction compounds would be required along the Proposed Development's alignment to facilitate its construction. The final location and design of temporary site compounds would be confirmed by the Principal Contractor and separate planning permissions would be sought as required;
- temporary workers accommodation to supplement existing accommodation in the region; and
- modification of the existing distribution network in some areas to accommodate the Proposed Development. These works are likely to comprise short sections of undergrounding within the vicinity of the Proposed Development and would be undertaken by Scottish Hydro Electric Power Distribution (SHEPD), who own and

operate the electricity distribution network across the north of Scotland. Consent would be sought by SHEPD as required.

3.6 Limits of Deviation

3.6.1 In general terms a Limit of Deviation (LoD) defines the maximum extent within which a development can be built. In the case of the Proposed Development, an LoD is required for each of the key components i.e. each of the new steel lattice towers being installed, access track routes and working areas.

3.6.2 It should be noted that the design of the Proposed Development described within this EIA Report has been established following the identification of detailed environmental and technical considerations. The design process has included the appointment by SSEN Transmission of an OHL Contractor to inform the design and the constructability of the Proposed Development, including construction access. Investigation of sub-surface and geotechnical conditions has not been concluded at this stage in reporting. It is possible, therefore, that the location of individual towers or other infrastructure might alter following geotechnical investigation and detailed design (referred to as micrositing) to reflect localised land, engineering, and environmental constraints, and therefore the LoD provides some flexibility in this regard.

3.6.3 Consideration is given to the following principles in defining the LoD for the Proposed Development:

- presumption in favour of the Proposed Development's alignment whilst providing flexibility for micrositing during the detailed design phase;
- presumption in favour of avoiding sensitive environmental features and minimising impacts on land use; and
- presumption in favour of avoiding residential properties.

Horizontal LoD

3.6.4 In general, the horizontal LoD for which consent is sought is as follows and is illustrated in Figure 3.2: Limit of Deviation – Proposed Development (we have also provided Figure 3.3: Limit of Deviation – Proposed Towers and OHL Alignment which presents the horizontal LoD applicable for the proposed permanent towers and OHL alignment only):

- OHL infrastructure (i.e. steel lattice towers and all working areas, EPZs, conductors and forestry Operational Corridor[3]):
  - Suspension towers: 100 m LoD radius around the tower position; Tension towers: 200 m LoD radius around the tower position;
  - OHL conductors: 100 m LoD either side of the alignment centreline;
  - All construction working areas must remain within the LoD (public road improvements works are excluded from this).
- Access tracks outwith the OHL infrastructure LoD (distance is either side of the track centre line):
  - 100 m LoD for new temporary or permanent access tracks;
  - 100 m LoD for upgrades to existing tracks in very poor condition;
  - 50 m LoD for upgrades to existing tracks in very good, good, fair, or poor condition.
  - Where access tracks are within the OHL infrastructure LoD, the LoDs would be merged.
- Widening of the LoD through areas of forestry and woodland to 145 m either side of the alignment centreline, to allow for movement to the forestry Operational Corridor in the event of tower micrositing.

[3] An Operational Corridor is required through areas of woodland and commercial forestry to ensure the safe operation of the OHL (discussed further in paragraph 3.8.21).

- Widening of LoD from towers NP2-9A to NP2-12A, as illustrated in **Figures 3.2 and 3.3**, due to significant constraints at this location (telecommunication links, private water supplies and underground gas pipeline), making micrositing challenging in the event of unsuitable ground conditions.

3.6.5 There are however areas within this horizontal LoD that would be exceptions and are therefore excluded from this micrositing zone, they are detailed in **Table 3.1**.

Table 3.1: LoD Schedule

Ref:	Feature	Towers / sections	LoD Variation	Reason
1	Residential Gardens	All	Excluded from LoD.	To prevent direct impacts within residential property boundaries.
2	N/A	All towers excluding NP2-9A to NP2-12	Micrositing of permanent towers limited to 100 m in areas where LoD is greater than 100 m.	LoDs greater than 100 m are for construction working areas only.
3	Category 1a and 2a ancient woodland	BC2-7B; BC5-16 to BC5-18A; CB1-11; CB1-12	**Appendix 12.2: The Native Woodland Management Strategy** requires the contractor to identify further opportunities to reduce felling where ancient woodland is directly affected.	To minimise impact on ancient woodland.
4	Category 1a and 2a ancient woodland	CB2-21A; CB2-22 CB16-4 and CB16-5	No infrastructure or construction working areas to be located within ancient woodland. Oversail only or potential crown reduction.	To minimise impact on ancient woodland.
5	Planning Consents	All	Within the LoD, engage with developers who hold planning consents. Restriction dependent on type of development.	To minimise impact on new development and maintain OHL clearances.
6	Beaufort Castle Garden and Designed Landscape	BC1-7A	Must be in consultation with Historic Environment Scotland.	To minimise impact on features of designated site.
7	Beaufort Castle Garden and Designed Landscape	BC1-7A	No infrastructure / construction works to be located within the designated site. Oversail only.	To minimise impact on features of designated site.
8	Torvean Landforms Site of Special Scientific Interest (SSSI)	BC5-18A to CB1-1	Must be in consultation with NatureScot.	To minimise impact on features of designated site.
9	Scheduled Monument Caledonian Canal, Dochgarroch Lock – Muirtown Locks (SM6499)	CB1-1; CB1-2	No infrastructure / construction works to be located within the designated site. Oversail only.	To minimise impact on features of designated site.
10	Scheduled Monument Mains of Daviot Farm, ring cairn and stone circle (SM3085)	CB2-19A to CB2-21A and associated access tracks	Excluded from LoD.	To prevent direct impacts.
11	Dalroy and Clava Landforms SSSI	Access tracks to towers CB3-10 to CB3-11 (and others)	Micrositing of access track must be in consultation with NatureScot.	To minimise impact on features of designated site.
12	Scheduled Monument Easter Rattich, depopulated settlement (SM11876)	CB4-7A	Excluded from LoD.	To prevent direct impacts.

Ref:	Feature	Towers / sections	LoD Variation	Reason
13	Buinach and Glenlatterach SSSI	CB9C-28A; CB9C-29B	No infrastructure / construction works to be located within the designated site. Oversail only.	To minimise impact on features of designated site.
14	Coleburn Pasture SSSI	CB11-3; CB11-4 and associated access track	No infrastructure / construction works to be located within the designated site. Oversail only.	To minimise impact on features of designated site.
15	Dipple Public Water Abstraction	CB12-12 to CB14-2B and accesses	All infrastructure and temporary construction works to be restricted in micrositing to the north in consultation with Scottish Water.	To minimise impacts to this water supply.
16	River Spey Special Area of Conservation (SAC) and SSSI	CB14-1C	No permanent infrastructure to be located within this site. Temporary construction works to be restricted in micrositing within this site.	To minimise impact on features of designated site.
17	Mill Wood SSSI	CB16-4 and CB16-5	No infrastructure / construction works to be located within the designated site.	To minimise impact on features of designated site.
18	Bellmouths	All	Where the LoD extends to the other side of a public road and there is no infrastructure located there it becomes excluded from the LoD.	LoD extent is not applicable.
19	Third party landholdings	All	Micrositing of all infrastructure and temporary construction works into third party landholdings must be in consultation with the affected landowner(s). **Figure 3.10: Landholdings Excluded from Limit of Deviation** shows the applicable landholdings to be excluded from the LoD.	To prevent impacts to third party landholdings for which wayleaves have not been agreed.

Vertical LoD

3.6.6 It is possible that further engineering analysis at the detailed design stage might alter the required heights of towers necessary to maintain statutory ground clearance. A vertical LoD, i.e. the maximum height of a tower above ground level, is therefore also sought to allow a height increase or decrease of 9 m on the proposed tower height presented within **Appendix 3.1: Tower Schedules**. The 9 m variation is consistent with the extensions to which steel lattice towers are designed, and therefore any increase or decrease of steel lattice towers would be no greater than 9 m. As noted within **paragraph 3.6.2** with respect to the location of infrastructure, there is also a high degree of certainty in relation to the height of infrastructure given the engineering design work undertaken to date. The vertical LoD provides some flexibility, nonetheless.

3.6.7 There are however exceptions where the full vertical LoD would not be acceptable; these are detailed in **Table 3.1**.

Management of Micrositing Within LoD

3.6.8 Where there is a requirement to vary the location (or height) of infrastructure within the LoDs, the relevant environmental information within the EIA Report would be reviewed to establish any potential constraints or adverse change in effect. Further advice on LoD changes would be sought from environmental specialists, and, where relevant, consultation would be sought from The Highland Council, Moray Council and Aberdeenshire Council (as planning authorities) and any relevant statutory consultees as required.

3.6.9 Prior to any change being made to the Proposed Development within the LoD, a change control process would be undertaken to ensure that there is no unacceptable increase in adverse impacts as a result of the change. This process is managed via the Applicant's internal change control process.

3.7 Description of Overhead Line Infrastructure

Steel Lattice Towers

Standard Towers

3.7.1 Three basic types of tower are proposed as OHL support structures within the Proposed Development, as illustrated in **Figure 3.4a-d: Tower Design** and as follows:

- suspension towers: these are used for straight sections of OHL where there is no need to manage uplift loads on the support structure. The conductors are suspended from the tower arms;
- angle / tension towers: these are used either for straight sections, where there is a need to manage uplift loads on the support structure, where there is an operational security requirement, or where there is a need to change the direction of the OHL alignment. The conductors extend from the tower arms horizontally; and
- terminal towers: proposed at the substations, from which the termination of the OHL to the substation is made. The conductors extend from the tower arms horizontally and downwards into the substation.

3.7.2 **Table 3.2** presents the tower designs which will be used for the Proposed Development, all lattice design, constructed from fabricated galvanised steel which will be grey in colour.

Table 3.2: Tower Design Parameters

	Proposed 400 kV OHL	Realignment of existing 275 kV Beauly to Blackhillock OHL at Ferness	Modification of 275 kV and 400 kV existing OHL infrastructure	Modification of 132 kV existing OHL infrastructure
Tower suite	Proposed AS4 Tower Suite	L2 Tower Suite	L8 Tower Suite	L4 Tower Suite
Figure reference	Figure 3.4a: Tower Design – Proposed AS4 Tower Suite	Figure 3.4b: Tower Design - L2 Tower Suite	Figure 3.4c: Tower Design - L8 Tower Suite	Figure 3.4d: Tower Design – L4 Tower Suite
Average height (m)	58	47	30	22
Design height range (m)	48 to 72 97 - special tower at the Caledonian Canal	41 to 53	17 to 58	14 to 32
Total no. of towers (permanent)	549[4]	7	17	10
Total no. of towers (temporary)	-	-	9	4

3.7.3 Tower locations, structure type and design heights (above ground level) are provided in **Appendix 3.1: Tower Schedules**. For all towers, the permanent above ground footprint at the base of each of the four legs is a maximum of 1.5 m x 1.5 m but would typically be 1 m x 1 m.

3.7.4 However, for towers in proximity to the Dipple drinking water abstractions (Towers CB12-16A and CB14-1B), the design requires the pile cap to be situated above ground level to minimise impacts on the drinking water abstractions. As such the tower footprint for these towers would be in the region of 5 m x 5 m at the base of each leg. The final dimensions will be confirmed upon completion of ground investigation and foundation design.

[4] This number would become 554 if the Kellas Alternative Alignment were taken forward.

Existing Transmission OHL Crossings

3.7.5 Where the proposed OHL crosses existing transmission infrastructure, either a 'diamond crossing' or 'duck under' tower arrangement will be used to enable the existing OHL to pass underneath the proposed OHL. For both types of crossing the existing OHL would be split into two single circuits (three conductors per circuit), which pass separately under the proposed OHL using a flat formation (horizontal) tower. Plate 3.1a-b provide illustrative examples of a diamond crossing and duck under crossing; Figure 3.5a-f: Existing OHL Crossing present an illustrative example of the flat formation tower arrangements at the six crossing locations; and more detail is provided in Figure 3.1: Site Layout. For existing 275 kV or 400 kV OHLs, the flat formation towers form part of the L8 Tower Suite. For the existing 132 kV OHLs the flat formation towers would be part of the L4 Tower Suite.

3.7.6 A permanent ground deployed earth and fibre connection would be installed between the double circuit towers and single circuit towers to maintain both earthing and communication continuity on the existing transmission infrastructure. Alternatively, where there is suitable vertical clearance between the crossing OHL circuits, an earth wire may be suspended between tower peaks above the phase conductors, between the double circuit tower and single circuit flat formation towers.

Plate 3.1a: Diamond Crossing Example (Pink OHL is proposed 400 kV OHL; blue is existing OHL)

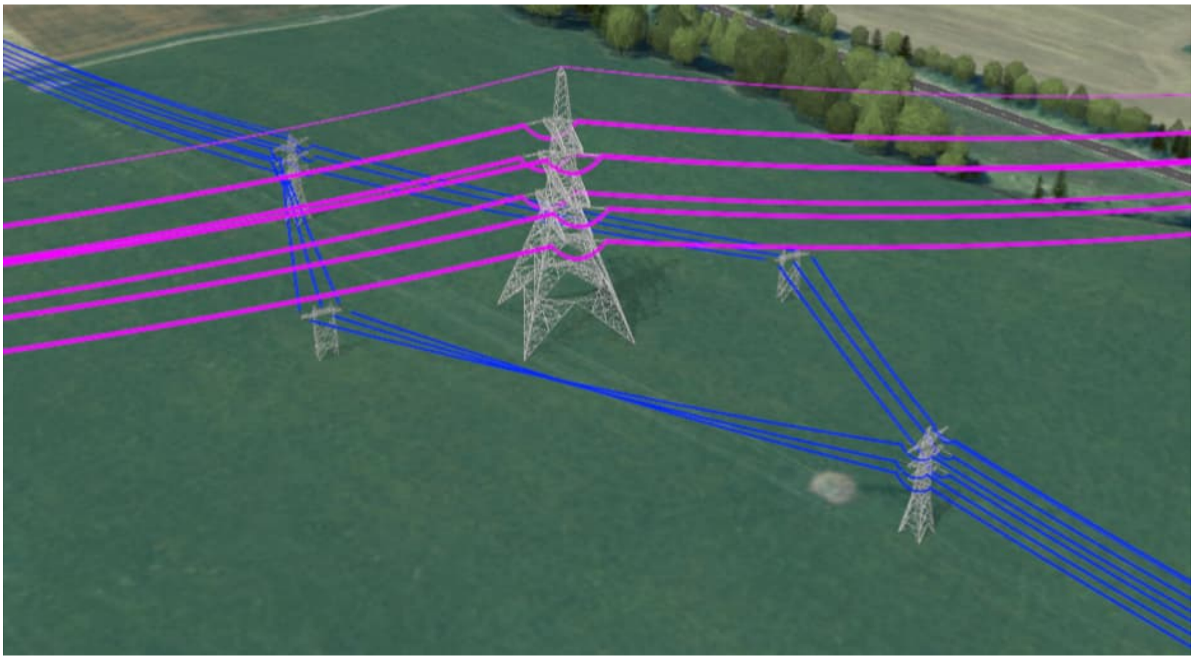
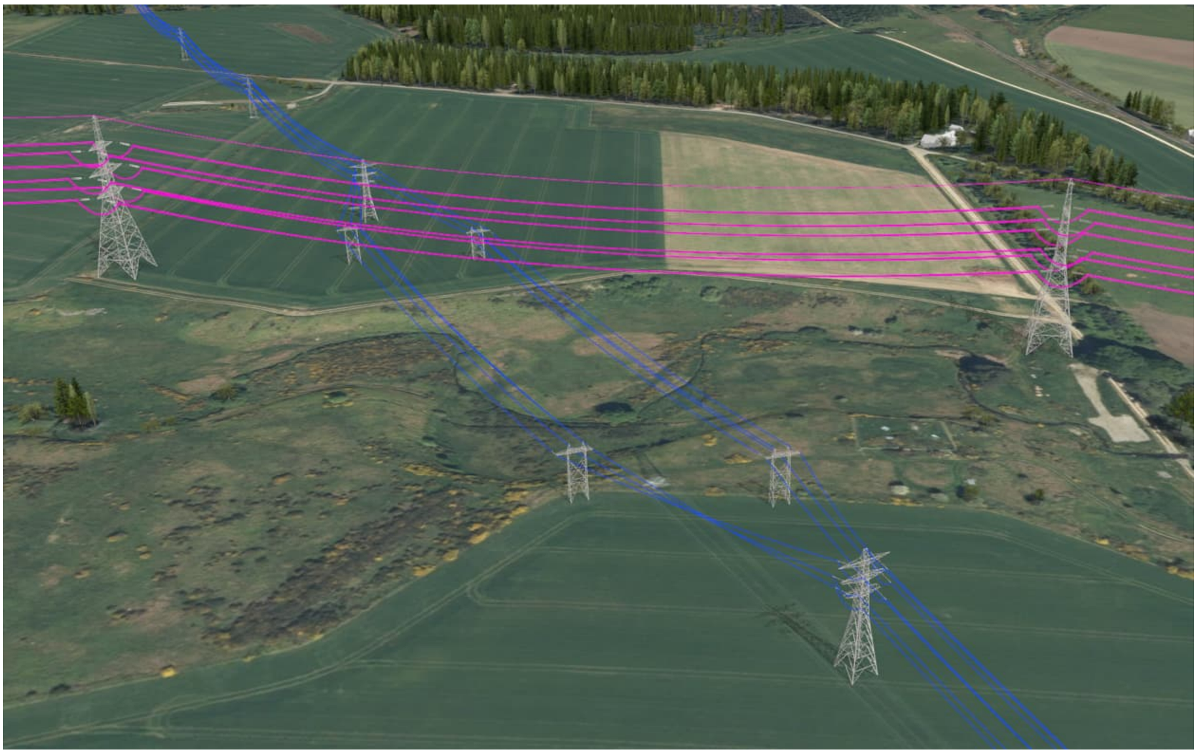


Plate 3.1b: Duck Under Crossing Example (Pink OHL is proposed 400 kV OHL; blue is existing OHL)



Conductors and Span Length

Proposed 400 kV OHL

3.7.7 The proposed steel lattice towers would support six conductor bundles (3 wires per bundle) on six horizontal cross-arms (three on each side). The conductor bundles would be supported from insulator sets (also known as suspension or tension sets) attached to each of the cross arms; insulators are proposed to be made of glass. The OHL insulator sets will use a mix of single and twin suspension strings per arm depending on the required strength and tower type. The insulator sets will be approximately 5.1 m long for suspension towers and approximately 7.7 m for tension towers.

3.7.8 The span length (distance between towers) will vary depending on topography, constraints, and land usage. The current average span length is approximately 338 m with maximum span of 517 m along the OHL alignment.

3.7.9 The diameter of the conductors will range from 23.9 mm to 37.3 mm.

3.7.10 The conductors will achieve a minimum clearance to ground of 9 m under normal operating conditions in all areas. There may be locations along the route that call for additional clearance requirements, such as the Caledonian Canal which permits vessels up to a maximum mast height of 35 m, resulting in a minimum clearance requirement of 39.1 m when considering the required electrical clearance.

3.7.11 An earth wire conductor with a fibre optic core (referred to as Optical Ground Wire or OPGW) will be suspended between tower peaks, above the phase conductors. For some tension towers where the conductor arms are of unequal lengths, the earthwire would be off-set to one side of the tower peak to maintain its position equidistant from the conductors on each side.

3.7.12 Due to the length of the OHL for the Proposed Development, voltage unbalance can occur between the different phases (conductor arrangements on either side or the tower). To reduce voltage unbalance transposition of the phases is required i.e. the conductors are moved to connect to different arms of the towers; this is illustrated in **Plate 3.2**. For the Proposed Development this will take place at two locations; Towers CB6-4A to CB6-4B and Towers CB14-24A to CB14-24B. To facilitate this, two terminal towers with extended top crossarms, as can be seen in **Plate 3.3**, will be positioned approximately 100 m apart; the location of transposition towers is presented on **Figure 3.1: Site Layout**.

Plate 3.2: Phase Transposition

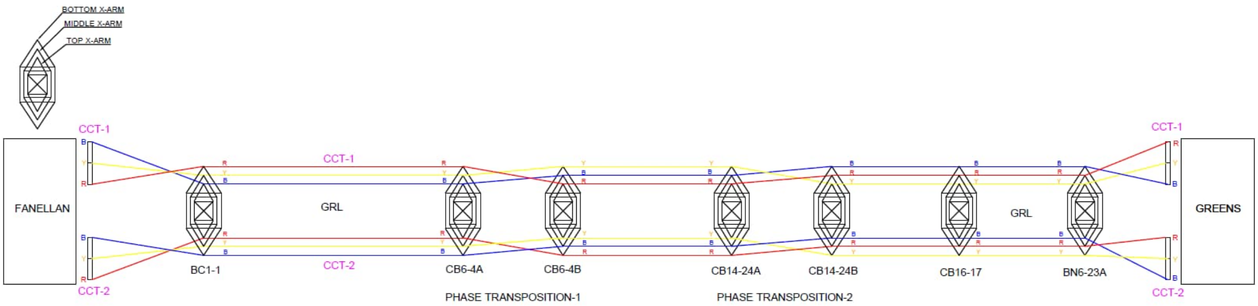
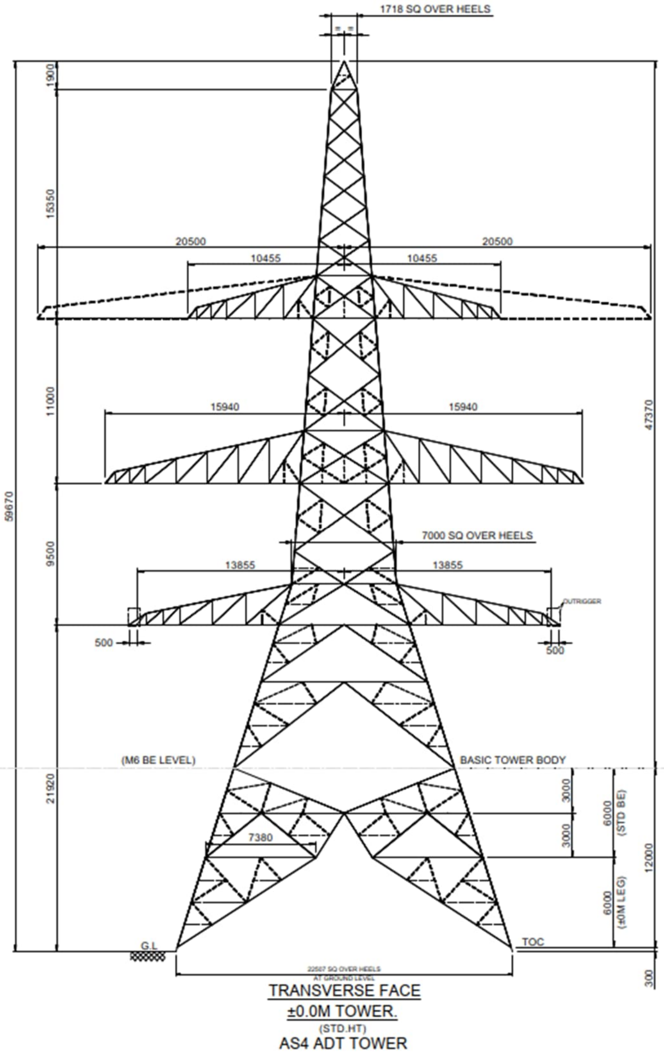


Plate 3.3: Transposition ADT Tower with Extended Crossarms



Existing 275 kV OHL Realignment at Ferness

3.7.13 The proposed steel lattice towers would support six conductor bundles (2 wires per bundle) on six horizontal cross-arms (three on each side). The conductor bundles would be supported from insulator sets attached to each of the cross arms; insulators are proposed to be glass.

3.7.14 The span length (distance between towers) will vary depending on topography, constraints, and land usage. The current average span length across the realigned section is approximately 323 m with a maximum span of 394 m.

3.7.15 The diameter of the conductors will range from 20.6 mm to 24.7 mm.

3.7.16 An earth wire conductor with a fibre optic core (OPGW) will be suspended between tower peaks, above the phase conductors.

3.8 Typical Construction Activities for Overhead Line Infrastructure

3.8.1 High voltage OHL construction typically follows a standard sequence of events as follows:

- Phase 1 – enabling works;
- Phase 2 – construction works;
- Phase 3 – commissioning;
- Phase 4 – removal of existing OHL sections; and
- Phase 5 – re-instatement.

Phase 1 - Enabling works

Existing Distribution and Transmission Lines

3.8.2 Works would be required to some existing electricity distribution network infrastructure and 132 kV, 275 kV and 400 kV transmission network infrastructure to facilitate safe working and operating conditions given the proximity of the existing OHLs to the Proposed Development. It is anticipated that these network assets would be realigned or undergrounded to make way for the Proposed Development. Where this relates to electricity transmission infrastructure (132 kV and above), it is included as part of the Proposed Development, see Section 3.7 above. For electricity distribution infrastructure specific details are not available at this stage; these works do not form part of the Proposed Development but are included here as 'associated works' for the purposes of the EIA; see paragraph 3.5.1.

Access during Construction

3.8.3 Safe construction access will be required to each tower construction site for delivery of materials, plant, fittings, fixtures, working platforms and operatives. Access requirements to each tower depend on the tower type and the construction operations required at that tower.

3.8.4 Many individual tower sites will be accessible from public roads and existing farm / forestry tracks. The location of individual towers has been developed along the Proposed OHL Alignment to utilise (where possible) existing accesses, however access spurs from these tracks may be required.

3.8.5 Many of the existing accesses have been identified as requiring upgrade to bring them to a standard required for delivery of the type of plant and volume of materials required to construct the Proposed Development. The extent of upgrade required varies along the Proposed OHL Alignment and is illustrated in Figure 3.1: Site Layout.

3.8.6 Existing road junctions will be utilised where possible, where field, forestry or farm tracks exist, however some new or upgraded access junctions will require formation in agreement with the respective local authority roads department.

3.8.7 Access track upgrades, construction and ground protection can be undertaken in a number of ways. The preferred method for each site will be selected by the Principal Contractor based on the suitability to withstand expected construction loads, cause the least environmental damage and be installed / recovered at the lowest cost.

3.8.8 The range of construction accesses proposed include:

- patching / upgrade of existing access tracks;
- installation of permanent access track routes to new tower locations to assist with ongoing operation, maintenance, and repair of the proposed asset, and where land use / land management activities can accommodate or benefit from this;
- installation of temporary metal or plastic roadway panels (e.g. Trackway, or Terrafirma etc);
- installation of temporary stone roads with geo-textile fabric base (floated track); or
- use of specialised low ground bearing pressure vehicles.

<u>Existing Accesses Upgrade and Repair</u>

3.8.9 Where possible, the Proposed Development seeks to use existing access track networks to facilitate construction. Approximately 137 km of existing access tracks require upgrading to make suitable for safe construction access. These upgrades vary in extent, from filling of potholes, to adding additional layers of aggregates to the running surface, in some cases requiring additional geotextile or geogrids as well as stone to be added to the track structure. Some accesses such as those requiring widening of the running surface may also require changes to drainage arrangements. During use, the access tracks may require ongoing maintenance to ensure a suitable running surface is maintained. For the purposes of this report the access tracks requiring upgrade have been categorised depending on the intended level of works required and assumptions have been applied for assessment purposes; Table 3.3 provides further detail.

Table 3.3: Access Track Upgrade Categories

Condition	Description	Upgrades	EIA Assessment Assumptions
Very Good	Existing stone access road in good condition. Suitable for construction traffic.	Track deemed suitable with virtually no upgrades required. Maintenance upkeep required as and when to keep the tracks integrity.	Treat as if no upgrade required, maintenance only.
Good	Existing stone road, generally suitable for construction traffic.	Pothole repairs and minimal repairs to road surfacing. 100 mm capping layer to be applied and / or widening where deemed necessary. Maintenance upkeep required as & when to keep the tracks integrity.	Treat as if capping only; i.e. no increase in track footprint. The discrete areas that may need widening are not clearly defined at this stage and as such are not included in the assessment. *
Fair	Existing stone road in need of some upgrade or surface repair. Anticipated solid base but typically surface in poor condition. Road generally wide enough for anticipated construction traffic.	Stone base and drainage ditches exist. Max. 200 mm stone capping required and / or widening where deemed necessary. Drainage, roadside ditches to be cleared where required. New culvert pipes if to be installed to be plastic twinwall.	
Poor	Existing stone road in poor condition, narrow or dilapidated. Stone base likely to exist.	Significant stone capping required at max. 300 mm and / or widening where deemed necessary. Drainage, roadside ditches to be cleared where required. New culvert pipes if to be installed to be plastic twinwall. Re-grading may be required to meet gradients.	Assume that track needs to be widened and track footprint is therefore increased.
Very Poor	Existing track only, little or no stone present, typically ATV track.	Full new stone road typically up to 500 mm. Construction on existing track route. Drainage, roadside ditches to be cleared	Treat as if it were a new track in terms of footprint and potential impact.

Condition	Description	Upgrades	EIA Assessment Assumptions
		where required. New culvert pipes if to be installed to be plastic twinwall. Re-grading may be required to meet gradients.	

* where widening is identified as being required at the detailed design stage, additional surveys and assessments will be undertaken as appropriate in line with standard pre-construction requirements.

Temporary Tracks

3.8.10 Approximately 163 km of temporary access track will be required to be installed using one of the following construction methods:

- Temporary Stone Roads: Temporary stone roads on a geo-textile fabric base may be used to facilitate safe construction vehicular access to tower locations for construction where no permanent access is required, or where nearby access is sufficient for ongoing operation of the Proposed Development. All temporary stone roads will be removed and reinstated on completion of construction. Track widths will be approximately 7 m (including drainage ditches), reduced to 5 m for floated tracks. There may be the need to include passing places or sections of two-way track which would be wider, however the locations of these are not currently known. Where there is a benefit, such as to minimise impacts to peatland, the construction of floating access tracks is proposed (see **paragraph 3.8.12**), which total 7.14 km in length.
- Temporary Roadway Panels: Metal or plastic interlocking roadway panels (e.g. Trackway, Terrafirma or similar) can be installed over existing access tracks or to form new access for the duration of construction works. Metal panels are also used at winch and tensioner positions to form EPZs to protect against induced voltages from adjacent lines or lightning strike running along the conductors during stringing operations. The delivery / installation vehicle would travel to the site loaded with panels and may also pull a trailer loaded with additional panels. The panels are usually unloaded and laid individually directly from the delivery / installation vehicle using the Hiab crane device mounted on the vehicle. The first panels would be laid onto the access then the wagon would drive onto the panels and advance along the access, installing additional panels to extend the 'road' as it proceeds.
- Specialist Low Ground Bearing Pressure Vehicles: Vehicles with low ground bearing pressure tyres or with rubber tracks may be employed for certain lightweight operations e.g. taking small quantities of material or a small team of operatives to remote sites where no track exists. Additional access protection may not be needed if these operations can be carried out without leaving track marks, usually only possible in dry conditions. The tracks for these vehicles are referred to as 'All-Terrain Vehicle (ATV)' tracks.

New Permanent Access Tracks

3.8.11 Approximately 64 km of new permanent access tracks will be required in some locations for the inspection, maintenance, and repair of the Proposed OHL Alignment during its operation. These permanent access tracks are subject to further design and landowner agreement; however, where agreement to retain an access is not acquired, the access will be removed, and the ground will be reinstated through a methodology and standard agreed with the landowner (see Temporary Stone Road section above in **paragraph 3.8.10**. The access routes shown are the current best options identified, but subject to Site Investigation and detailed design, and may be subject to change (within the specified LoD) to achieve favourable gradients or avoid identified constraints.

3.8.12 Where there is a benefit, such as to minimise impacts to peatland, the construction of permanent floating access tracks is proposed. Floating access tracks require the placing of a geotextile membrane on existing topsoil and vegetation followed by aggregate layers. Depending on ground conditions two or more layers of geotextile would be placed in layers of 300 mm to 500 mm. The access tracks would be capped with layers of Type 1 aggregate or similar material. Approximately 18 km of new permanent floated track is proposed.

3.8.13 Soil stabilisation techniques are used to enhance the durability and functionality of access tracks, whether temporary or permanent. Temporary methods, such as mechanical and chemical stabilisation, provide immediate support and reduce erosion. Permanent techniques, like cement and lime stabilisation, ensure long-term durability and minimal maintenance. These methods also reduce the need for extensive stone and vehicle movements compared to full stone access tracks, making them more efficient and environmentally friendly.

3.8.14 See **Figure 3.6: Typical Access Track Sections** for illustrations of typical track design under different circumstances. Track widths will be approximately 7 m (including drainage ditches), reduced to 5 m for floated tracks. There may be the need to include passing places or sections of two-way track which would be wider, however the locations of these are not currently known.

Access Junctions / Bellmouths

3.8.15 Formation of 127 temporary and 13 permanent new bellmouth / access junctions within the existing road network are required. A further 98 existing bellmouths will be utilised, which are anticipated to require upgrade work and additional 32 requiring no upgrade. Typical bellmouth layouts are provided in **Figure 3.7: Typical Bellmouth Layout**, and their locations are shown on **Figure 3.1: Site Layout**. Deemed consent will be sought for access tracks and junction upgrades as part of the s37 consent application.

Public Road Improvement (PRI) Works

3.8.16 To enable larger construction vehicles to access the site, a number of PRI works would need to take place. The type of works include short sections of road widening; junction widening; passing place lengthening and passing place creation. **Appendix 3.2: Indicative Public Road Improvement (PRI) Works** presents high-level information which will be progressed further at the detailed design stage, including:

- location plan;
- construction methodology and specification; and
- high-level environmental desk study.

Watercourse Crossings

3.8.17 Watercourses have been avoided in the design of the proposed tower positioning and associated accesses as far as possible, although due to the linear nature of Proposed Development and topographical challenges, some watercourse crossings will be required associated with proposed tower accesses. The design of the crossings will be agreed by the Principal Contractor as part of the detailed design, following best practice in consultation with the Scottish Environment Protection Agency (SEPA). Appropriate authorisations will be obtained by the Principal Contractor, as required. Typical designs are provided in **Figure 3.8: Typical Watercourse Crossing Sections.**

3.8.18 All watercourse crossing engineering works (including both temporary and permanent watercourse crossings) will be in compliance with the Water Environment (Controlled Activities) (Scotland) Regulations 2011[5] and will follow best practices in line with SEPA guidance. Further discussion on the water crossings proposed as part of the Proposed Development, and a schedule of watercourse crossings is provided in **Chapter 10: Water and Geological Environment.**

[5] Scottish Government (2011). The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Available at: https://www.legislation.gov.uk/ssi/2011/209/contents/made

Access during Operation

3.8.19 Permanent access tracks would only be required in more remote areas where access during construction requires a higher specification track, and where long-term maintenance needs require permanent access. It is intended however to keep requirements for permanent access tracks to a minimum. Where required, permanent tracks would be reinstated to a width suitable for 4x4 vehicles; however, the locations of these are not currently known.

Forestry Clearance

3.8.20 The Proposed Development has sought to avoid and minimise impacts on woodlands / forestry where possible, however due to the study area being heavily forested and challenging topography along the route, impacts on forestry are unavoidable.

3.8.21 Where the Proposed OHL Alignment passes through woodland or forested areas (and elsewhere), an Operational Corridor is established which is defined by the area which during the life of trees growing, they could grow to a height which would compromise the safe operation of the OHL. Trees are therefore removed within the Operational Corridor to facilitate construction and ensure continued safe operation of the OHL.

3.8.22 In general, an Operational Corridor of 90 m through plantation woodland (which may be reduced to 70 m through broadleaf woodland subject to site specific checks) has been applied, within which trees are to be permanently removed to ensure safe operation of the Proposed OHL Alignment. Additional forestry removal has also been included for new access track formation with a corridor of 20 m. Where there are new temporary access tracks or for the temporary OHL diversions (where applicable), tree re-planting will be sought to be undertaken following commissioning of the OHL and removal of the temporary development. The requirements and undertaking of felling will be in close consultation with Scottish Forestry and are documented in Chapter 12: Forestry.

3.8.23 As a result of the construction of the Proposed Development, there would be a net loss of woodland area. The area of stocked woodland in the study area would decrease by approximately 471 hectares. In order to comply with the criteria of the Scottish Government's Control of Woodland Removal Policy[6] offsite compensation planting will be required. The Applicant is committed to providing appropriate compensatory planting. The extent, location and composition of such planting will be agreed with Scottish Forestry and will take into consideration any revision to felling and restocking plans prior to the commencement of operation of the Proposed Development.

3.8.24 Within the Operational Corridor habitat will be allowed to regenerate naturally, however natural regeneration of trees will be managed through tree removal / trimming to prevent them interfering with the safe operation and maintenance of the line ('resilience felling'). The Applicant will be using a process of 'managed resilience' which will seek to retain naturally regenerated broadleaved trees and shrubs as close as possible to the line to keep as much tree cover as possible. Smaller-growing species / shrubs thus being able to be retained closer to the line than larger growing species. OHL tree maintenance would take place on a 4-yearly cycle.

3.8.25 Embedded mitigation includes fringe planting at specific locations to visually soften the forestry edge of the Operational Corridor. More detail is presented in Appendix 7.6: Forestry Landscape Mitigation Principles.

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[6] Forestry Commission Scotland (2009). The Scottish Government's Policy on Control of Woodland Removal. Available at: https://www.forestry.gov.scot/publications/285-the-scottish-government-s-policy-on-control-of-woodland-removal

Management Felling

3.8.26 Where trees are being removed to form the Operational Corridor there is the potential for the adjacent trees to have an increased risk of windblow. Management felling has been recommended to landowners to manage the risk of windblow as detailed in **Chapter 12: Forestry**. This does not form part of the Proposed Development, however it has been considered in **Chapter 12: Forestry** in terms of the forestry blocks that may be affected. The additional felling recommendation introduced by the Proposed Development would only be to potentially bring commercial felling activity forward and as such can be considered to be a temporary indirect effect, with replanting required as a condition of any statutory felling license granted. For the purpose of this EIA Report, it has been assumed that management felling would be taking place and that areas of management felling will be replanted up to the edge of the Operational Corridor following installation of the OHL (see **Chapter 12: Forestry** for further details).

3.8.27 The responsibility for applying for a felling licence lies with the individual landowners, who must submit their applications to Scottish Forestry, along with satisfactory supporting environmental information and management proposals. This process is entirely separate from the current application for the Proposed Development and is regulated independently under the Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017[7] and the Forestry and Land Management (Scotland) Act 2018[8] and in compliance with The UK Forestry Standard[9].

Site Compounds

3.8.28 It is currently anticipated that a number of construction compounds and laydown areas would be required given the scale of the Proposed Development, the locations of which would be confirmed by the Principal Contractor.

3.8.29 In addition to main compound(s) it is likely that a 'rolling' arrangement for the provision of small sub yards, offices and welfare facilities will be required at convenient positions along the Proposed OHL Alignment, with activity at these sites varying, in accordance with the phase of works at that location. The use of smaller multiple yard sites would minimise the quantity and lengths of journeys required to supply to and recover from each work area. There will also be welfare and parking facilities at each tower working area during foundation and tower erection.

3.8.30 Potential impacts from the compounds will be minimised and controlled via the Construction Environmental Management Plan (CEMP), which will be prepared and implemented by the Principal Contractor. An Outline CEMP is provided in **Appendix 3.3: Outline Construction Environmental Management Plan (CEMP)**.

3.8.31 The obtaining of any necessary planning consent or other authorisations required for the site compounds will be the responsibility of the Principal Contractor.

Temporary Diversions

3.8.32 To facilitate the construction of the Proposed Development, temporary diversions are required to be constructed to allow for continued operation of the network. It is anticipated that a total of eight temporary diversions will be required across the Proposed Development, at locations where the proposed OHL will interact with existing circuits on the network, this is presented in **Figure 3.1: Site Layout**.

3.8.33 The temporary diversions are required to be installed prior to any modifications of the existing network taking place to maintain the operability of the existing network. To minimise the outage requirements, the temporary tower or towers is usually offset from the existing alignment to create sufficient space to carry out the construction.

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[7] Scottish Government (2017). Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/113/contents

[8] Act of the Scottish Parliament (2018). Forestry and Land Management (Scotland) Act 2018. Available at: https://www.legislation.gov.uk/asp/2018/8/enacted

[9] Forestry Commission, Scottish Forestry, Natural Resources Wales, Forestry Service (2023). The UK Forestry Standard. Available at: https://assets.publishing.service.gov.uk/media/651670336a423b0014f4c5c0/Revised_UK_Forestry_Standard_-_effective_October_2024.pdf

3.8.34 The first construction activity to take place is installation of temporary access tracks to the proposed temporary tower or towers and to any of the existing towers within the same section. Once access to the tower locations is established the next step is installation of the foundations. The towers are constructed in the same process as a permanent tower which is described in Section: Phase 2 - Construction Works.

3.8.35 Once the temporary tower assembly is complete the stringing operations can then take place to move the existing circuit over to the temporary tower or towers. Access is typically required to the closest tension towers at each end of the temporary diversion on the existing line to adjust the conductors as they are moved over to the temporary tower. The sequence for moving the circuits over to the temporary towers is typically as follows:

- a short single circuit outage is taken on the existing OHL to allow for the circuit to be moved across to the temporary tower;
- this is followed by a double circuit outage to allow for the earth wire to be moved across to the temporary tower to provide lightning protection and communications for protection of the circuit; and
- upon completion of this, the circuit that has been moved over can then be energised and the temporary diversion is then complete.

3.8.36 There may be a requirement to temporarily deploy an above ground fibre connection, which would typically be mounted to strainer posts and contained within ducting. This method can reduce ground disturbance removing the requirement for a temporary undergrounding of the fibre, as well as minimise outage requirements.

3.8.37 Once the main construction works have been completed the above sequence is then reversed to move the circuit back over to the modified existing OHL and the temporary tower or towers can then be dismantled and surrounding area reinstated.

Realignment of 275kV OHL south of Ferness.

3.8.38 Where it is proposed that the existing 275kV OHL is to be realigned to create a corridor for the Proposed Development, it is anticipated that the construction sequence will be the same as is required for the main development which is described in Section 3.10.

3.8.39 The majority of the realignment will be built offline with no outages required. Outages will only be required for the replacement of the towers where the realignment joins back into the existing circuits, due to the existing towers not being able to accommodate the change in direction of the alignment. To replace these towers a temporary diversion will be installed at either end of the realignment to minimise the outages as described previously. Upon completion of the replacement tower construction, the temporary diversion will be removed, and the realignment will be energised in its new position.

Phase 2 – Construction Works

Foundations

3.8.40 Different approaches to forming foundations may be used for steel lattice towers, subject to ground conditions at each location. These are likely to comprise:

- spread type e.g. concrete pad and column; or
- piled type e.g. driven pre-cast concrete, steel tubular pile, micro pile, or continuous flight auger.

3.8.41 Foundation types and designs for each tower will be confirmed following detailed geotechnical investigation at each tower position. All tower positions will require foundations at each leg. The foundation type is expected to be a combination of conventional (concrete pad and column) and piled type. This assumption is based on an initial geotechnical desktop survey and the anticipated different construction methodologies required due to the varying terrain. Dimensions of pad and column foundations will be confirmed following micrositing but usually consist of formation to depths of between 3 m and 6 m below ground level (bgl) and will typically be in the order of 6 m x 6 m in plan size for each tower leg[10]. The foundation is located beneath the ground with a layer of soil covering it of sufficient depth for habitats to reinstate. The permanent footprint above ground is typically 1 m x 1 m (with a maximum dimension of 1.5 m x 1.5 m) and referred to as the 'concrete neck'.

3.8.42 Where conditions are suitable, the Applicant may opt to use steel equivalent foundations, known as steel grillages, instead of reinforced concrete. The construction activities and environmental impact, bar the pouring and transport of concrete, are anticipated to be effectively the same as conventional pad and column foundations where steel grillages are utilised.

3.8.43 Where ground conditions indicate deep peat (>1.5 m / 2.0 m) or near surface rock, piles, mini-piles, or rock anchors may be more appropriate engineering solutions. The piling solution within peat will depend on the material encountered below the peat, however typically a casing would be required to prevent the borehole from collapsing in on itself due to the structural instability of peat. Mini-pile solutions typically involve installing up to twelve piles (each between 150 mm and 300 mm diameter) below each tower leg. The piles are encompassed within a near surface pile cap, upon which the tower leg rests; the exception being two towers where the pile caps will be above ground as discussed in paragraph 3.7.4. The piles normally extend into the existing bedrock to satisfy both compression and uplift design loadings. Pile depths can extend up to 25 m. Where near surface rock is evident, rock anchors are normally employed. Rock anchors do not require a casing, and the pile cap normally rests on the bedrock. The pile cap is secured to the bedrock by interconnecting mini-piles.

3.8.44 For the purposes of the EIA Report, it has been assumed that individual tower foundations and associated construction activities will require a fenced off working area of up to either 80 m x 80 m for suspension towers or up to 100 m x 100 m for tension towers, around each individual tower location. The exact dimensions of the working area around each tower will be confirmed following micrositing and further design by the Principal Contractor(s).

3.8.45 Where encountered, topsoil (including peat) will be stripped from the locations within the tower working area to allow installation of tower erection pad(s) as necessary in order to accommodate construction plant (see paragraph 3.8.41). Concrete is likely to be brought to site ready-mixed, although tower locations with difficult and remote access may require limited batching on site. Once the concrete has been cast and set, the excavation will be backfilled, using the original topsoil where possible.

3.8.46 It is anticipated that formation of each tower foundation will take approximately four weeks. Plate 3.4 provides an illustrative image of tower foundation construction.

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[10] Concrete will be tankered to site.

Plate 3.4: Illustrative Image of Tower Foundation Construction

Steel Lattice Tower Construction

3.8.47 Tower construction can typically commence four weeks after the foundations have been cast, subject to weather conditions and concrete curing rates. Tower steelwork would be delivered to each tower construction site either as individual steel members or as prefabricated panels, depending on the method of installation and the available access. A working area, up to either 80 m x 80 m for suspension towers or up to 100 m x 100 m for tension towers, is required at each tower location to facilitate access, laydown, and assembly. **Figure 3.9a and 3.9b: Tower Working Area Arrangement** illustrates the tower working area arrangements which differ depending on the tower type (suspension and tension) but will have the following constituents:

- crane pad constructed out of crushed stone, geogrid, and geotextiles to form a level stable base on which the crane can safely work. The pad can be installed as soon as tower foundation is complete. It must be constructed in accordance with the temporary works design (compacted and tested) to ensure the made up ground meets the ground bearing capacity required during crane lifting operations;
- piling stone pad where required to provide suitable ground to support the piling rig during operations, either a one level pad or split-level pads to suit the ground profile. The pad can be installed as soon as access is ready. It must be constructed in accordance with the design (compacted and tested) to ensure the made-up ground meets the ground bearing capacity required for the drilling rig;
- telehandler stone pad is required to provide suitable ground to support the telehandler during operations. The pad can be installed as soon as tower foundation is complete. It must be constructed in accordance with the temporary works design (compacted and tested) to ensure the made-up ground meets the ground bearing capacity required during crane lifting operations;
- tower access surround, this area will not require stone however will be used as a laydown area for materials throughout the tower construction process. Where ground is level, trackway matting may be utilised to spread the load across the ground. If the site is particularly sloped, then the compound will be micro sited as much as possible to provide a sufficient working area; and
- tension towers require a temporary 'holding out position' to raise the tower working platforms which will be utilised when stringing the conductors (see section below). This platform is winched into position by a tractor at one and a half the tower height away and once in position gets locked off and attached to concrete sledges. Where this holding out position cannot be left in situ for the duration of the stringing works due to

on-site constraints (e.g., roads / walkways) the platform can be locked off to alternative concrete sledges closer to the tower body.

Plate 3.5: Illustrative Image of Tower Construction

Conductor Stringing

3.8.48 The conductor would be delivered to site on wooden drums in pre-determined pulling section lengths. Prior to stringing the conductors, temporary protection measures (e.g. netted scaffolds), would be required across public roads and existing access tracks.

3.8.49 **Plate 3.6** provides an illustrative image of temporary scaffolding.

Plate 3.6: Illustrative Image of Temporary Construction Scaffolds

3.8.50 Conductor stringing equipment (i.e. winches, tensioners and ancillary equipment) are set out at EPZs at either end of pre-selected sections of the OHL. They are usually placed approximately one and a half the tower height from the tension tower which terminates the section being pulled; the EPZ locations shown on Figure 3.1: Site Layout are indicative. The EPZ landforms will be restored to their original profile.

3.8.51 Pilot wires (or 'bonds') would be pulled through the section to be strung. These would be hung on blocks (wheels) at each suspension tower and connected to a winch and tensioner at the respective end of the section. The winch, in conjunction with the tensioner, is used to pull the pilot wires between the structures. The conductor is pulled via the pilot wires through the section under tension to avoid contact with the ground and any underrunning obstacles. Once the conductor has been strung between the ends of the section it is then tensioned and permanently clamped at each tower.

3.8.52 The pilot wire can be installed using multiple methods namely conventional and helicopter piloting.

3.8.53 Conventional piloting involves fitting running out blocks (wheels) to each of the cross arms and the earthwire peak. The pilot wires are reeled onto the running blocks attached to each arm and the peak of the first tower and then lowered to ground to be attached to a tractor through a spreader bar. Once attached to the tractor, pulling will commence to the next tower by driving the tractor along the alignment. Where obstacles such as ravines, poor ground conditions or environmental constraints are encountered, a polypropylene rope or winch bond can be manually laid out and connected to the end of the previously pulled pilot wires. A tractor positioned at an accessible point underneath the line will then be used to winch in the polypropylene rope / winch bond and pull the pilot ropes towards the tractor where they can be reconnected to the next set of pilot bonds. Alternatively, in areas which are inaccessible, drones can be used to pull a rope though the area which in turn can be used to pull progressively larger ropes over the inaccessible area, minimising impact. In addition to this trestles or scaffolding shall be put in place to protect crossings. Scaffold trestles / frames can be manually delivered from the nearest access point where an area is not accessible by tractor or ATV. When the next tower is reached the same procedure is repeated where all the pilot wires are lifted up to the running blocks on the tower and lowered back down to the tractor to continue to the next tower until the section is completed.

3.8.54 Where it is not considered practical to conventionally pull the pilot wires, helicopter piloting may be utilised. For this process, a similar setup is required whereby a helicopter has the bond beneath it which is then attached to the pilot wire. The helicopter then pulls the pilot wire to the first tower and lowers it into the running block before progressing to the next tower. Once the end of the section is complete the helicopter will continue past the tower before looping back to let the pilot wire rest on the ground. This is repeated for all phase conductors then earth wire. Where any obstacles are present along the route, they may require protection via trestles or scaffolding.

Phase 3 – Commissioning

3.8.55 The OHL and support towers would then be subject to an inspection and snagging process. This allows the Principal Contractor and the Applicant to check that the works have been built to specification and are fit to energise. The circuits would then be energised from the substations in a phased sequence.

Phase 4 – Dismantling existing OHLs / Underground Cables

3.8.56 The following elements of the project require dismantling / removal:

- removal of the existing 132 kV OHL and short section of underground cable from Beauly Substation to Knocknagael Substation;
- realignment of the existing 275 kV OHL south of Ferness; and
- ad-hoc tower removal at existing transmission OHL crossings locations (see Section 3.7 above).

3.8.57 Conductors and insulators would be removed. The conductors would be dropped to ground level and collected using winch and cable drum. Tower removal is typically completed by cutting the legs and felling the tower in a controlled manner. The towers are then cut into sections using hydraulic shears and sections of tower will either be extracted from the site using an ATV or flown out by helicopter depending on the location of the tower. The tower leg stubs, and concrete foundation are normally decommissioned in situ, with stubs folded into an excavation of approximately 1 m depth within the tower's footprint, and the ground reinstated.

3.8.58 The existing Operational Corridor will be returned to the landowner to be incorporated into future forestry planting plans.

3.8.59 Approximately 800 m of 132 kV underground cable will need to be removed on the approach to Knocknagael Substation. This will likely be carried out using a Cable Puller, or equivalent machine, from the final tower, in a direction away from the substation. Access would be gained through trackway panels, which will be installed to enable dismantling of towers. This method will remove, cut, and store the cable for disposal without the need for significant excavation along the length of the cable path, as well as the additional disruption that excavation would introduce. To allow safe removal of the cable around Knocknagael Substation, there may need to be localised excavations at the substation boundary to prevent risk of disturbance to other cables or utilities. The requirement or extent of this will be determined at the detailed design stage.

3.8.60 Should further surveys identify that the removal of the cable using the Cable Puller method is not possible for part or all of the length, then excavation of all or part of the cable route will be required. The cutting, exhuming and disposal of the cable would then be completed length by length, and the excavation would be backfilled and reinstated following the land management code of conduct guidance. Considering the terrain, it is unlikely that access tracks would be required, and it is anticipated these works would be carried out using tracked machines. The working area would be kept to the cable path, with access and egress from the final 132 kV tower to be dismantled.

Phase 5 - Reinstatement

3.8.61 Following commissioning of the Proposed Development, all construction sites will be reinstated. Reinstatement will form part of the contract obligations for the Principal Contractor and will include the removal of all temporary lattice tower diversions, temporary access tracks, all work sites around the tower locations and the re-vegetation of all construction compounds etc.

3.8.62 Reinstatement principles are detailed in the Applicant's **Appendix 3.5: General Environmental Management Plans (GEMPs).**

Reinstatement of Tower Access Routes

3.8.63 Reinstatement of excavated temporary stone tracks will involve the replacement of subsoil and topsoil, and grading and installation of drainage, as required, with turves replaced vegetation side up. Where required, donor turves may be sourced from adjoining areas to replace lost turves and provide a mosaic from which vegetative cover of the established species are able to recover. Where there are insufficient turves, the ground will be allowed to vegetate naturally, although some seeding may be required to stabilise sites and prevent erosion, or where landowner requirements dictate otherwise. Temporary tracks placed on top of the existing ground level (of floated construction type) may not require any reinstatement measures after removal of the stone and geotextile base.

Reinstatement of Tower Sites

3.8.64 Topsoil will be stored within the working area for each tower during construction. Where possible, turfs will be removed and stored on top of the topsoil bunds for use in the reinstatement. Sub-soils removed to enable the construction of the foundations will be temporarily stockpiled in separate bunds within the working area.

3.8.65 Each site will be allowed to re-vegetate naturally wherever possible.

Reinstatement of Construction Compound(s)

3.8.66 Construction compound site(s) will be made good at the end of construction with all buildings and materials removed and soils appropriately reinstated.

3.9 Land Use

3.9.1 **Table 3.4** summarises the indicative land take associated with the Proposed Development.

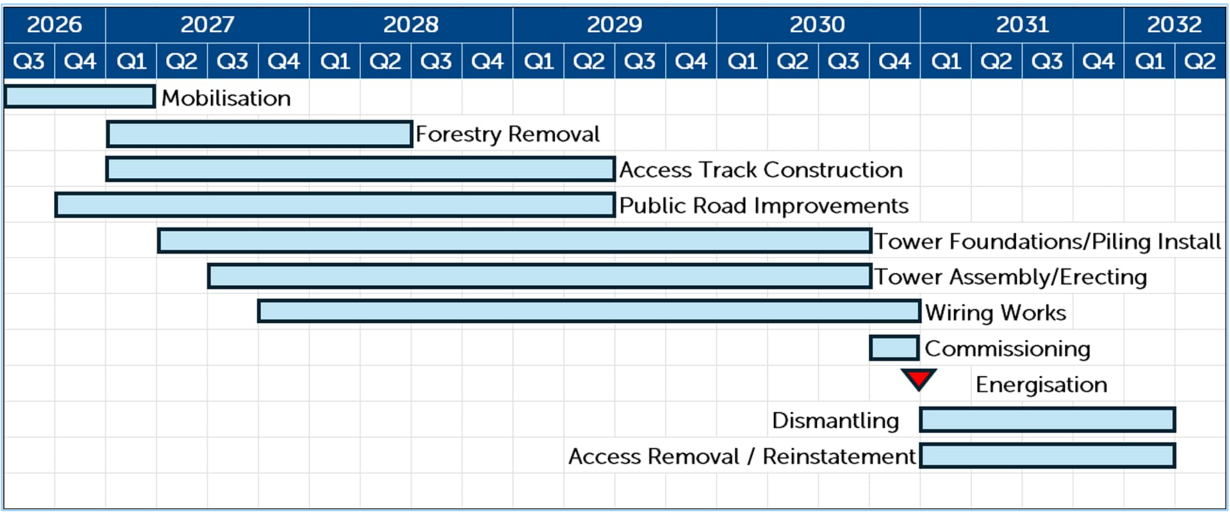
Table 3.4: Indicative Land Take for Construction and Operation of the Proposed Development

Activity	Construction	Operation
Access Track - Temporary stone (track length x width (5 m for floated tracks; 7 m for non-floated)	90.16 ha	N/A
Access Track - Temporary ATV / Trackway (track length x 5 m)	15.86 ha	N/A
Access Track - New Permanent; excluding existing accesses (track length x width (5 m for floated tracks; 7 m for non-floated)	41.55 ha	41.34 ha
Existing Track Upgrade (poor and very poor condition track – assume 3 m widening)	11.54 ha	11.25 ha
Temporary Construction Working Area at towers (inc. EPZ)	473.42 ha	N/A
Land Take for towers (1.5 x 1.5 m per tower leg)	0.01 ha (temporary)	0.53 ha (permanent)
Area of Operational Corridor woodland loss	N/A	471 ha
Permanent Land Re-instatement at towers (1 m^2 per tower leg)	N/A	0.01 ha

3.10 Construction Programme

3.10.1 It is anticipated that construction and commissioning of the Proposed OHL would take place over a four-year period, although detailed programming of works would be the responsibility of the Principal Contractor in agreement with SSEN Transmission. It is anticipated that construction of the Proposed OHL would commence in 2026, with estimated completion in Quarter 4 of 2030. Dismantling of existing OHLs and reinstatement would follow and is anticipated to be completed by Quarter 2 of 2032. The detailed construction phasing and programme would be subject to change as the design progresses and also due to necessary consents and wayleaves being agreed. **Table 3.5** presents the high-level construction phasing.

Table 3.5: Construction Programme



3.11 Construction Employment and Hours of Work

3.11.1 SSEN Transmission takes community responsibilities seriously. The delivery of a major programme of capital investment provides the opportunity to maximise support of local communities.

3.11.2 Employment of construction staff would be the responsibility of the Principal Contractor, but SSEN Transmission encourages the Principal Contractor to make use of suitable labour and resources from areas local to the location of the works.

3.11.3 It is envisaged that there would be a number of separate teams working at the same time at different locations along the Proposed Development route. The resource levels would be dependent on the final construction sequence and would be determined by the Principal Contractor.

3.11.4 Construction working is likely to be during daytime periods only. Working hours are currently anticipated to be between approximately 07:00 to 19:00 during British Summer Time (BST) and 07:00 to 18:00 during Greenwich Mean Time (GMT), seven days a week. Special measures and arrangements would be made for works in proximity to sensitive receptors. Any out of hours working would be agreed in advance with the relevant local planning authority.

3.12 Construction Traffic

3.12.1 Construction of the Proposed Development will give rise to regular numbers of staff transport movements, with small work crews travelling to and from work site areas. The construction compounds will have a safe area for parking away from public roads.

3.12.2 Vehicle movements will be required to construct temporary or upgraded access roads; deliver the foundation and tower components and conductor materials to the site and deliver and collect materials and construction plant from the main site compound and to individual tower locations. The proposed mobile cranes have been assessed as abnormal loads and are considered within Appendix 13.5: Abnormal Loads Route Assessment.

3.12.3 The Principal Contractor will determine where access is required, and for which items of plant, and prepare Traffic Management Plans in consultation with the Applicant and the local authorities. Traffic Management Plans will describe all mitigation and signage measures that are proposed on the public road accesses based on access maps and subsequent site assessments. An Outline Construction Traffic Management Plan (CTMP) is presented in Appendix 3.4.

3.12.4 Temporary traffic lights may be required at some locations (e.g. for delivery of scaffold materials or formation of new road access points). For minor tracks and other crossings, the installation of appropriate warning signs and provision of staff with stop / go boards to control any passing traffic may be adequate.

3.12.5 Details of all traffic movements are presented in Chapter 13: Transport. It is assumed that all stone will be imported, however the proposal is to use on-site borrow pits where suitable stone is available, and agreements are met.

3.13 Environmental Management during Construction

3.13.1 The assessment in this EIA Report has been carried out on the basis that all works would be carried out in accordance with industry best practice construction measures, guidance, and legislation, together with the following documents and procedures:

General Environmental Management Plans (GEMP)s

3.13.2 General Environmental Management Plans (GEMPs) have been developed by the Applicant. The GEMPs considered relevant for this project are listed below and provided in **Appendix 3.5: General Environmental Management Plans (GEMPs)**:

- Oil Storage and Refuelling;
- Soil Management;
- Working in or near Water;
- Working in Sensitive Habitats;
- Working with Concrete;
- Watercourse Crossings;
- Waste Management;
- Contaminated Land;
- Private Water Supplies;
- Forestry;
- Dust Management;
- Biosecurity on Land;
- Restoration; and
- Bad weather.

Species Protection Plans (SPP)s

3.13.3 Species Protection Plans (SPPs) have been developed by the Applicant and have been agreed with NatureScot (formerly Scottish Natural Heritage (SNH)). This full suite is listed below and provided in **Appendix 3.6: Species Protection Plans (SPPs)**:

- Badger;
- Bat;
- Beaver;
- Bird;
- Fresh Water Pearl Mussel;
- Otter;
- Red squirrel;
- Pine marten;
- Water Vole;
- Wildcat; and
- Wood Ant.

Construction Environmental Management Plan (CEMP)

3.13.4 A contractual management requirement of the Principal Contractor would be the development and implementation of a Construction Environmental Management Plan (CEMP). This document would detail how the Principal Contractor would manage the site in accordance with all commitments and mitigation detailed in the EIA Report, statutory consents and authorisations, and industry best practise and guidance. **Chapter 18: Schedule of Mitigation** provides a summary of all mitigation measures included in this EIA Report.

3.13.5 The CEMP would also reference the aforementioned GEMPs and SPPs. The implementation of the CEMP would be managed on site by a suitably qualified and experienced Environmental Advisor, with support from other environmental professionals as required.

3.13.6 An Outline CEMP is included in Appendix 3.3.

3.14 Operation and Maintenance

3.14.1 In general, OHLs require very little maintenance. Regular inspections are undertaken to identify any unacceptable deterioration of components, so that they can be replaced.

3.14.2 The Operational Corridor of the OHL is also monitored through periodic inspection to identify growth of trees which may compromise the resilience of the OHL. Where trees are identified which could pose a risk to the safe operation of the line in the future, these are felled. Removal of other vegetation, e.g. gorse and rhododendron, may be required to ensure the area under the conductors is clear so access can be taken and to facilitate safe maintenance or repair in the event of failure.

3.14.3 From time to time, inclement weather, storms, or lightning can cause damage to either the insulators or the conductors on OHLs. If conductors are damaged, short sections may have to be replaced. Insulators and conductors are normally replaced after about 40 years, and towers painted every 15 to 20 years.

3.14.4 In the event of a fault on the line, delivery of working platforms may be required to tension towers to allow the towers to be safely worked on. These platforms can be delivered on large tracked all-terrain vehicles. In steep or remote areas, it is required to retain access formation to these tension towers to ensure that safe access can be made.

3.14.5 If a section of damaged conductor is to be replaced, a new conductor may be pulled through a section, as such it is required to maintain some of the earth work formations made during construction to ensure there is a safe suitable area to create EPZs.

3.15 Decommissioning the Proposed Development

3.15.1 The Proposed Development would not have a fixed operational life. The effects associated with the construction phase can be considered to be representative of worst-case decommissioning effects, and therefore no separate assessment of decommissioning has been undertaken as part of this EIA Report.