Environmental Impact Assessment (EIA) Report

LT384 Tealing to Westfield Overhead Line (OHL) 400 kV Upgrade

November 2024

VOLUME 2: CHAPTER 3 – PROJECT DESCRIPTION

Figures (Volume 3 of this EIA Report)

Appendices (Volume 4 of this EIA Report)

There are no Appendices associated with this chapter.

3. PROJECT DESCRIPTION

3.1 Introduction

3.1.1 This chapter describes the various elements of the works associated with the construction and operation that constitute the Proposed Development.

3.1.2 The Proposed Development consists of the upgrading from 275 kV to 400 kV of approximately 37 kilometres (km) of OHL between Tower 182 (west of the existing Tealing Substation; north of Dundee) and the boundary with the SPEN OHL network (Westfield / Glenrothes) (mid span Towers 66 and 65) to enable operation at 400 kV. The Proposed Development is shown in Figure 3.1 (Volume 3).

3.1.3 The Proposed Development passes through the following Local Authority areas:

- Angus;
- Perth and Kinross; and,
- Fife.

3.1.4 The main components of the Proposed Development are as follows:

- replacement of conductors, insulators and fittings on the existing steel lattice towers;
- where required, tower condition works including steelwork and tower leg foundation work to strengthen the existing steel lattice towers;
- replacement of existing earthwire with OPGW;
- subject to further engineering and design checks, some modifications to the existing towers may be required, such as the inverting of cross arms to improve clearances, and changes to the insulator set configurations; and,
- subject to further engineering and design checks, the following tower works may be required:
  - to mitigate a 132 kV clearance constraint, Towers 155 and 156 may need to be extended in height using a 2 m long body extension however, inverting tower cross arms and/or the use of suspended tension sets may suffice; and,
  - due to constraints associated with the conductor type, coupled with an inability to utilise mid-span joints, it may be the case that either Tower 129 or 132 (not both) may need to be replaced. To facilitate these works, a temporary diversion tower (expected to be installed for less than 1 year) would also be required. The maximum dimensions of these towers are:
    - Tower 129 (existing height 45.49 m): The height of the new tower: 45.5 m; and the temporary diversion tower 45.5 m; **or**
    - Tower 132 (existing height 47.02 m): The height of the new tower: 51.15 m; and the temporary diversion tower 51.3 m.

3.2 Associated Works

3.2.1 The following elements or works would be required as part of the Proposed Development, or to facilitate its construction and operation, for which deemed consent will be sought under the Town and Country Planning (Scotland) Act 1997, as amended:

- vegetation clearance;
- access track construction and access track upgrades;
- temporary site compounds (at working areas, to include mobile welfare unit and refuelling /spill kits, etc.);
- laydown areas;
- crane pads;
- EPZs and temporary measures to protect road, rail and water crossings; and,
- the increase in operating voltage of the OHL requires a wider wayleave corridor, therefore some tree felling will be required where there are infringements to this corridor.

3.3 Other Related Works

3.3.1 The Proposed Development would give rise to a need to upgrade some of the existing substation infrastructure, due to asset condition and to enable operation of the 400 kV OHL. SSEN Transmission's Project Map[1] shows the location of where the Proposed Development interfaces with the following existing and proposed substations and OHL, which are being progressed separately and do not comprise part of the Proposed Development:

Tealing Substation

3.3.2 The existing OHL will be upgraded from the SPEN boundary, south of Abernethy, to Tower 182 west of the existing Tealing Substation, to enable the operation of the OHL at 400 kV. The reconductored OHL will be connected into the proposed Tealing (Emmock) 400 kV substation being developed. This will be achieved by the construction of a new OHL tie-in originating between Tower 180 and Tower 182 (likely Tower 181) on the existing line. This will result in a redundant section of OHL, likely between Tower 182 and the existing Tealing Substation, which is intended to be used to provide a connection between the proposed Tealing (Emmock) substation and the existing substation. A separate Section 37 consent for the new build tie-in will be submitted to the ECU and planning consent for the proposed Tealing (Emmock) substation will be sought from Angus Council. The application for the new substation, under the Town and Country Planning (Scotland) Act 1997, is due to be submitted Q4 2024.

SPEN OHL Boundary

3.3.3 The Applicant will seek Section 37 consent down to the licence area border that it shares with SPEN. This is mid-span between Tower 66 and Tower 65. SPEN will submit a separate Section 37 consent for works to be carried out to the OHL in their licence area. It may be the case that SPEN will reconductor a portion (1.5 spans) of the OHL within SSEN's licence boundary.

3.3.4 Cumulative effects between these projects and the Proposed Development, where details of other works are known or can reasonably be anticipated, will be considered throughout this EIA Report where appropriate, in particular see Chapters 5: EIA Approach and Methodology, Section **Error! Reference source not found.**, and 1 5: Cumulative Effects (Volume 2).

3.4 Limit of Deviation

3.4.1 The Proposed Development includes a number of elements which, for construction, will need some flexibility in final siting to reflect localised land, engineering and environmental constraints. To allow for this flexibility, the

[1] SSEN Transmission (2024) Project Map (online) Available at: https://www.ssen-transmission.co.uk/projects/project-map/ [Accessed: June 2024]

Proposed Development includes Limit of Deviations (LODs). The horizontal LODs are illustrated on Figure 3.1 (Volume 3) and are as follows:

- Access tracks:
  - ‘Upgrade to existing road / track’ (including ‘bespoke tracks’): 20 m LOD either side of track;
  - 'New temporary stone road': 100 m LOD either side of track; and,
  - 'Trackway panels': 100 m LOD either side of track;
- EPZs: 25 m LOD;
- Tower foundations (existing): 20 m LOD; and,
- Replacement Tower 129 or 132 and associated diversion tower: 100 m LOD

3.4.2 Two vertical LODs are additionally being included in the Proposed Development to allow for the potential for a tower height increase of 2 m on Towers 155 and 156.

3.5 Decommissioning the Proposed Development

3.5.1 The scope of the Section 37 application is limited to the upgrade and operation of the OHL. The Proposed Development would not have a fixed operational life; however, it is assumed that the Proposed Development would be operational for 50 years or more. Once the design life of the OHL has been reached, a decision would be taken on whether to decommission and remove the transmission infrastructure or potentially to replace or upgrade it. This EIA Report will focus on the construction and operational effects of the Proposed Development, although some commentary will also be provided on potential impacts predicted from decommissioning.

3.6 OHL Design

Conductor Replacement

3.6.1 The existing conductor system consists of twin bundled conductors, i.e., Twin Zebra Aluminium Conductor Steel Reinforced (ACSR). Each conductor has a diameter of 28.62 mm. The proposed replacement conductor system will be triple bundled and will be a High Temperature Low Sag (HTLS) type i.e., Aluminium Composite Carbon Core (ACCC AZR ULS Oslo) conductor. Each conductor has a diameter of 22.4mm. For comparison, Photograph 3-1 shows an example of a twin conductor (left) and triple conductor (right).

Insulator replacement

3.6.2 It is proposed that the existing 275 kV insulators will be replaced with 400 kV insulators. These are slightly longer than the existing insulators as they have more discs. The insulator and conductor replacement will allow the OHL to transfer a higher capacity of power. The existing string length of the 275 kV is 3.9 m, while the proposed string length for 400 kV will be 4.18 m.

Tower refurbishments

3.6.3 The proposed conductors are heavier than the existing conductors, therefore some of the tower steelwork and foundations will need to be strengthened. The refurbishments and upgrades to the steelwork and foundations will take place ahead of replacing the conductors.

Photograph 3-1 Tower showing twin conductor on left and triple conductor on right

3.7 OHL Construction

Construction Programme

3.7.1 It is anticipated that the OHL upgrade works would commence in 2025 (subject to consent being granted) and continue to 2028 prior to energisation in 2030.

3.7.2 The detailed construction programme is subject to change as the design progresses and is subject to statutory consents and wayleaves being granted and dependent on holistic network outage planning. The current construction programme is detailed below:

- Enabling Works are scheduled to start in 2026, although some works may start in July 2025;
- Outage Works (Wiring) are scheduled to start in March 2026;
- Outage Works (Wiring) are scheduled to end in September 2027; and,
- Reinstatement Works are scheduled to end in August 2028.

Standard Mitigation and Working Methods

3.7.3 A Construction Environmental Management Document (CEMD) will be prepared as part of the Contract Documents. This document details how the "Principal Contractor" will manage the site in accordance with all commitments and mitigation detailed in this EIA Report, statutory consents and authorisations, and industry best practice and guidance. The CEMD will also reference the Applicant's General Environmental Management Plans (GEMPs) and Species Protection Plans (SPPs). The implementation of the CEMD will be managed on-site by a suitably qualified and experienced Environmental Clerk of Works (ECoW), with support from other environmental professionals as required.

3.8 Construction Practices and Phasing

Phase 1 – Enabling Works

Site Compounds

3.8.1 It is currently anticipated that an offsite main compound (site offices, material storage etc.), will be required to support construction works, the location of which will be confirmed by the Principal Contractor and therefore will not be assessed within this EIA. Potential impacts from the compounds would be minimised and controlled via the CEMD, which would be prepared and implemented by the Principal Contractor. Should additional planning consent or other authorisations be required for this main compound, this would be the responsibility of the Principal Contractor.

3.8.2 In addition, it is likely that a 'rolling' arrangement for the provision of temporary site compounds may be required at working areas. These would include a mobile welfare unit and refuelling / spill kit, etc., and each would be required for a short period of time coinciding with the duration of the works.

Access Arrangements

3.8.3 Access will be required to each tower for foundation and steel upgrade works, delivery of fittings, fixtures, working platforms and plant. Access requirements to each tower depends on the tower type and the operations required at the tower. Access is also required to each EPZ. A preliminary access plan is shown in Figure 3.1 (Volume 3). This assumes a worst-case scenario for the purposes of the EIA, however, it is anticipated that the extent of these accesses will be reduced as ground investigations continue and works are confirmed.

3.8.4 Existing tower access routes utilised by the Applicant's operation and maintenance teams would be used whenever possible. Many individual tower sites would be accessible from public roads and farm tracks and in such circumstances normal site vehicles such as 4x4 Hiab wagons, transit vans, 4x4 pickup trucks, quad bikes and tractors would be utilised.

3.8.5 Where there are no public roads or farm tracks, should ground conditions permit, it may be possible in dry weather for the vehicle types indicated above to gain access to certain sites without causing ground surface damage. If damage is likely, it may be necessary to undertake access upgrades to allow the use of the above vehicles, or to use specialist low ground bearing pressure vehicles.

3.8.6 Access upgrades and protection can be undertaken in a number of ways. The preferred method would 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. Measures to mitigate the potential impact of each type of access will be addressed within this EIA Report, in general terms.

3.8.7 The range of construction access options to be considered are detailed in Table 3-1. For the purposes of the EIA, the maximum parameters have been used as a basis for the assessment.

Table 3-1 Components of Access Options

Project Component	Description
Existing road / track	To be used wherever possible. They will be repaired where damage has been caused during the construction works.
Upgrade to existing road / track	Where a surface upgrade is required to an existing road or track, the road or track may also need to be widened. Any upgrade work is to be permanent. • Width: 4-7 m. • Depth: 0.15-0.8 m. • LOD: 20 m either side
New temporary stone road / track	To be constructed where no road or track currently exists, although in some instances, this may be a footpath or a historic track which is identified on Ordnance Survey (OS) maps but is no longer visible. Post-construction, unless separate consent is sought, land will be returned to its previous condition. • Width: 4-7 m. • Depth: 0.15-0.8 m. • LOD: 100 m either side.
Trackway panels	Laid directly onto the ground. In some cases, depending on the terrain, this may require a cut / fill operation; however, this will be unnecessary in most cases. • Width: 4-7 m. • Depth: 0.15-0.8 m. • LOD: 100 m either side.
All-terrain vehicle (ATV) access	Access taken across land with no works required.
Bespoke tracks	A number of existing tracks are marked as bespoke. These have been identified as needing to be upgraded, however due to environmental constraints the following assumptions will apply: • It is anticipated that no trees lining the tracks will be felled (but lopping may be required). In the event that limited tree felling is required, it would be carried out in a sensitive manner and in agreement with the relevant local authority and statutory consultee. • Bespoke tracks will generally be narrower than typical upgraded tracks. This will be dependent on local conditions and will be confirmed pre-construction.

Tree Felling

3.8.8 As a result of the proposed increase in operating voltage of the existing OHL from 275 kV to 400 kV, there is a requirement for a wider wayleave corridor along the OHL route to ensure resilience of the OHL network is maintained during operations. This could relate to a potential 90 m full operational corridor width from woodland edge to woodland edge. Details of the tree felling requirement along the OHL route to ensure that mandatory clearance distances are provided are outlined in Chapter 10: Forestry (Volume 2).

Phase 2 – OHL Upgrade Works

Reconductoring Works

3.8.9 Reconductoring is generally undertaken in sections of between five to 15 towers in length, with each section taking approximately one to two weeks to complete depending on the number of towers within the section. Reconductoring teams usually consist of 20 to 25 suitably trained and qualified personnel.

3.8.10 For each section to be reconductored, the towers at either end would be set up for positioning of winching and tensioner equipment, conductor drums and reels. This machinery requires to be set up on an EPZ to protect the workers from potential electric shock. The EPZ would typically consist of up to 66 Aluminium TPA HD Panels (3 m by 2.45 m) and will cover a maximum area of approximately 39 m by 26 m (a further 15 m buffer will be applied to allow for cut and fill, bunding, etc., if required). Cut and fill is assumed unnecessary in most instances, however, where it is needed, an archaeological watching brief will be required. Some towers may require two EPZ areas to be set up, depending on location.

3.8.11 All towers within the pull section would be accessed to prepare the tower site and to prepare the conductors for pulling. This would involve setting up demarcation around the tower base and working areas using warning cones, ropes or temporary barriers. The tower peaks and arms would be accessed to remove existing fittings and dampers and to transfer the conductors into a running out block attached to the tower steelwork.

3.8.12 The towers at either end of the pull would be set up with a winch at one end and a tensioner machine at the other. These machines would be positioned on the EPZ and anchored. The conductor drum with the new conductor would be set up at the tensioner end tower, while empty drum reels would be set up at the winch end to spool the conductor being replaced. The towers at both ends would be accessed and rigged to the equipment on the ground. Photograph 3-2 illustrates a typical EPZ with equipment set up for reconductoring.

Photograph 3-2 Typical EPZ with equipment set up for reconductoring

3.8.13 Once works are set up, the pulling out of the new conductors would be carried out. This is done by pulling in the old conductor which in turn is connected to the new conductor. As the old conductor is pulled through and reeled up from one end of the section, the new conductor is pulled through behind it. During the pull, operatives with radio communication would be positioned at key locations within the section to observe the operations and monitor progress. The operation would continue until the new conductor has been pulled through all towers in the section with the old conductor now spooled. The winch and tensioner machines would be used throughout this operation to control the sag until the new conductor is connected into the conductor fittings at either end of the section, along with a tail formed down each end tower in preparation for jointing the conductors.

Replacement of Insulators and Fittings

3.8.14 Insulators and fittings would be replaced along each pull section at the same time as the reconductoring works are undertaken, to minimise the number of visits required to each tower location.

3.8.15 The exact method of working would be determined by the Principal Contractor. Typically, once the conductor has been transferred to a running out block attached to the tower steelwork, the old insulator string would be disconnected from the tower crossarm and lowered to the ground. The new insulator string would be lifted and attached to the crossarm.

3.8.16 This work is typically carried out by a team of four operatives plus a chargehand and a plant operator using a transit type van and/or low ground bearing pressure vehicles, where necessary. A small winch may also be used to lift and lower the insulator strings. Pull lifts would likely be used to lift and support the conductors whilst the insulators are replaced.

3.8.17 For suspension towers[2], the operatives would typically access the conductor beneath the tower crossarms by using lightweight aluminium hook ladders. The ladders may be hoisted up the tower manually or by using a small winch.

3.8.18 For tension towers[3], a tower working platform would be required to enable the operatives to access the conductors and insulators. This would be lifted into place utilising the winches set up for conductor restringing, and securely attached beneath the appropriate tower crossarm and stabilised with temporary ground anchors.

3.8.19 It is likely that one suspension insulator changing team would be able to change the insulators on two towers on one circuit (i.e., six suspension insulator sets) per day. Tension insulators would take longer to replace (approximately three insulator sets per day), due to the requirement to install a working platform. Photograph 3-3 shows a team of operatives replacing insulators sets on an existing OHL suspension tower.

Conductor Clipping In

3.8.20 On completion of reconductoring, insulator replacement and the sagging of conductor final tension, the conductors would be clamped into new suspension clamps at each suspension tower, commonly referred to as ‘clipping in’.

3.8.21 Typically, teams of four operatives, with one van and one all-terrain vehicle (ATV), would carry out clipping in operations.

[2] Suspension towers are where the conductors are suspended from vertically hanging insulators and are generally used where the OHL follows a straight route.

[3] Tension towers are towers where the insulators connect horizontally to the towers and can accommodate an angle / change of direction for the OHL route.

Photograph 3-3 Replacing insulators on an existing OHL tower

Scaffolds and Crossings

3.8.22 Where there are major roads, railways or built-up areas under the section of the route being upgraded, it is likely that a form of mechanical protection, such as scaffolding or other approved method, would need to be supplied and erected to protect members of the public and property in case of equipment failure. Photograph 3-4 shows an example of temporary construction scaffold at a road crossing.

Steel Works and Foundation Works

3.8.23 The outcome of the Principal Contractor's engineering studies and OHL condition assessments will confirm the scale of steel reinforcement works and/or foundation reinforcement works at existing tower locations along the OHL route.

Photograph 3-4 Illustrative Image of Temporary Construction Scaffolds

3.8.24 Steel reinforcement works would comprise the replacement of deteriorated or damaged steelwork and the addition of new steel bars where required to strengthen the tower. New steelwork, plant and materials would be delivered to each tower location by a 4x4 Hiab wagon or similar immediately before the commencement of the works at that location. A team of three to four engineers would undertake the steel reinforcement works, which would take approximately two days per tower location. At each tower identified for reinforcement, the working area would be demarcated with warning cones, barriers, or temporary fencing. The steel bars would be lifted and lowered in a controlled manner using a rope or winch, and new bars secured into place. On completion of the works, all scrap materials would be removed from the site and placed in skips at the project site compound for collection by a licensed waste contractor. Foundation reinforcement works may be required where engineering studies indicate that the existing foundations are not strong enough to support the new conductors. The foundation works would typically take 14 to 21 days per tower location depending on local ground conditions, and would comprise the following steps:

- Materials and plant would be delivered to the tower locations by 4x4 Hiab wagon, or similar;
- The area to be excavated would be marked out by the site engineer or foreman and excavated using a tracked excavator. Topsoil and subsoil would be stockpiled in separate areas for final replacement when backfilling;
- The excavation would be protected from collapse in accordance with the statutory regulations, and all excavations fenced off using edge safe protection barriers or fencing;
- Any excess water from the excavation would be pumped out and discharged to suitable ground, with sediment control measures implemented if required in consultation with the project ECoW;
- The excavation would be prepared for concrete pouring, repairs would be undertaken or in a worst-case situation the existing concrete column removed using the excavator with a mounted hydraulic breaker and / or hand breaker;
- Following completion of all foundation preparation works, ready-mixed concrete would be ordered for delivery to site. The concrete would be poured into the excavation until the pad and column is complete, where possible in one pour;

- Following completion of concrete works and after allowing sufficient curing time, all formwork and excavation shoring equipment would be removed from the excavation, and the excavation backfilled with suitable soil free of any large stones or boulders, and covered with topsoil to the original ground surface level; and,
- On completion of the works, all materials and equipment would be removed from the site.

Mobile Security

3.8.25 Mobile security would patrol at all non-working times where materials, plant and equipment are positioned outside the main store facilities to deter theft and vandalism.

3.8.26 Static or mobile security may also need to be considered at the main stores site and any satellite storage sites.

Phase 3 – Commissioning

3.8.27 The OHL and support towers would then be subject to an inspection process to check and repair minor defects. This allows the Principal Contractor and the Applicant to check that the works have been built to specification and are fit to energise. The Proposed Development would also go through a commissioning procedure for the switchgear, communications, and protection controls through the substations at Tealing and Westfield. The circuits would then be energised from the substations.

Phase 4 – Reinstatement

3.8.28 Following the commissioning of the Proposed Development, all construction sites would be reinstated. Reinstatement would form part of the contract obligations for the Principal Contractor and would include the removal of all temporary tower access routes, all work sites around the tower locations and the reinstatement of all construction compounds and decommissioned structures.

Reinstatement of Tower Access Routes

3.8.29 Reinstatement of excavated temporary stone tracks would involve the replacement of subsoil and topsoil, and grading and installation of drainage, as required, with turves replaced vegetation side up. Where there are insufficient turves, the ground would 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 would not require any reinstatement measures.

Reinstatement of Tower Sites

3.8.30 Where required (e.g., where foundation strengthening has occurred), the soil would be stored within the working area at each tower during the works. Subsoils and topsoil removed to enable the reinforcement of the foundations would be temporarily stockpiled in separate bunds within the working area, with stripped turves stored on top of the bunds.

3.8.31 Reinstatement would involve the replacement of subsoil and topsoil, with turves, replaced vegetation side up. Where there are insufficient turves, the ground would be allowed to re-vegetate naturally.

Reinstatement of Construction Compounds

3.8.32 Construction compound sites and sub-yards would be reinstated at the end of construction with all buildings and materials removed and soils appropriately reinstated.

Construction Employment and Hours of Work

3.8.33 The Applicant considers it important to act as a responsible developer with regards to the communities which host the construction works. The delivery of a major programme of capital investment provides the opportunity to maximise the support of local communities. Employment of construction staff would be the responsibility of the Principal Contractor; however, the Applicant would encourage the Principal Contractor to make use of suitable labour and resources from areas local to the location of the Proposed Development.

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

3.8.35 At an earlier time in the project development different construction hours were anticipated. However, as the construction phase has been refined it has been necessary to now proceed on the basis of the working hours set out in Table 3-2. This is in order to deliver this critical national infrastructure within the delivery programme for the Pathway to 2030 projects. These hours have been used as a basis for the EIA.

Table 3-2 Construction Working Hours

Season	Day	Working hours
Summer (1st March to 31st October)	Weekdays (Monday to Friday)	07:00 to 19:00
	Weekends (Saturday to Sunday)	07:00 to 17:00
Winter (1st November to 28th February)	Weekdays (Monday to Friday)	07:30 to 17:00 (or as daylight allows)
	Weekends (Saturday to Sunday)	

3.8.36 Any variation in these working hours would be agreed in advance with the appropriate local authorities.

Construction Traffic

3.8.37 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 would have a safe area for parking away from public roads.

3.8.38 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.

3.8.39 The Principal Contractor would 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 would describe all mitigation and signage measures that are proposed on the public road accesses based on access maps and subsequent site assessments. If Public Road Improvement (PRI) works are required before Section 37 consent is achieved for programming reasons (e.g., to support advanced / enabling works), the PRI works could be advanced through separate consent.

3.8.40 Temporary traffic lights may be required at some locations (e.g., for delivery of scaffold materials). 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.

3.8.41 Further details on construction traffic are detailed in Chapter 12: Traffic and Transport (Volume 2).

3.9 Operation and Management of the Transmission Connection

3.9.1 In general, an OHL requires very little maintenance. Regular inspections are undertaken to identify any unacceptable deterioration of components so that they can be replaced.

3.9.2 From time to time, inclement weather, storms or lightning can cause damage to either the insulators or the conductors. 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.