YG-DCO-032

Yorkshire Green Energy Enablement (GREEN) Project

Volume 5

Document 5.2.3 ES Chapter 3: Description of the Project

Final Issue A

November 2022

Planning Inspectorate Reference: EN020024

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(a)

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3. Description of the Project

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3. Description of the Project

3.1 Introduction

3.1.1 The description of the Yorkshire Green Energy Enablement (GREEN) Project (referred to as Yorkshire GREEN or the Project in this ES) provided in this chapter explains its construction, operation, dismantling and decommissioning, activities, to enable an assessment of those elements of the Project which could potentially have significant environmental effects.

3.1.2 It has been prepared in compliance with the requirements in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[1] (as amended) (EIA Regulations) including Schedule 4 of the EIA Regulations. The guidance set out Planning Inspectorate Advice Note 9[2], on the use of the Rochdale Envelope approach in the case of an application for a Nationally Significant Infrastructure Project (NSIP) has also been taken into account.

3.1.3 Consideration has also been given to the decommissioning of the Project at the end of its lifespan at the request of the Planning Inspectorate (paragraph 2.3.9 in the Scoping Opinion, **Appendix 4A, Volume 5, Document 5.4.4A**).

3.1.4 Further information on technical terms used in this document can be found in the Glossary (**Volume 1, Document 1.4**).

3.1.5 This chapter is supported by a number of appendices as listed below which are provided in **Volume 5**.

- **Document 5.3.3A**: Embedded measures schedule.
- **Document 5.3.3B**: Code of Construction Practice.
- **Document 5.3.3C**: Archaeological Written Scheme of Investigation.
- **Document 5.3.3D**: Biodiversity Mitigation Strategy.
- **Document 5.3.3E**: Outline Soil Management Plan.
- **Document 5.3.3F**: Construction Traffic Management Plan.
- **Document 5.3.3G**: Public Rights of Way Management Plan.
- **Document 5.3.3H**: Noise and Vibration Management Plan.
- **Document 5.3.3I**: Arboricultural Impact Assessment.

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[1] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, SI 2017: 572. (Online) Available at: https://www.legislation.gov.uk/uksi/2017/572/contents/made (Accessed 13 May 2021).

[2] Planning Inspectorate (2018) Advice Note 9: Using the Rochdale Envelope. (Online) Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/ (Accessed October 2022).

3.2 Project location and surroundings

3.2.1 The Project is sited within Yorkshire, with the most northerly components approximately 1.5km north-east of the village of Shipton and approximately 10km north-west of York city centre, and the most southerly components at Monk Fryston Substation, located to the east of the A1 and immediately south of the A63.

3.2.2 The Project currently[3] falls within six local authority boundaries:

- Hambleton District Council;
- City of York Council;
- Harrogate Borough Council;
- Selby District Council;
- Leeds City Council; and
- North Yorkshire County Council.

3.2.3 The Order Limits form the boundary of the Project for which development consent is being sought and within which all works would take place (see **Section 3.3**). For the purposes of describing the Project location it has been split into the following six sections, which are also shown on **Figure 1.2, Volume 5, Document 5.4.1**:

- Section A: Osbaldwick Substation;
- Section B: The North West of York Area;
- Section C: Moor Monkton to Tadcaster;
- Section D: The Tadcaster Area;
- Section E: Tadcaster to Monk Fryston; and
- Section F: Monk Fryston Substation Area.

3.2.4 The detail of the Project is shown on **Figures 3.1 to 3.6, Volume 5, Document 5.4.3**.

Section A: Osbaldwick Substation

3.2.5 Osbaldwick 400kV Substation is located 4km east of the centre of York, 50m north of the A1079 and 600m west of the A64/A1079 junction. Surrounding land uses comprise wooded areas, some of which is priority habitat; agricultural fields to the north and east; a business park to the north-west and the residential area of Osbaldwick 200m to the west. A short section (two pylons) of the southern end of the existing 400kV Norton to Osbaldwick (YR) overhead line falls within the Order Limits where this overhead line connects into Osbaldwick Substation. Osbaldwick Substation is located within the administrative area of the City of York Council (**Figure 3.1, Volume 5, Document 5.4.3**).

[3] The local authorities' boundaries and titles are correct at the time of submission November 2022. North Yorkshire County Council, Hambleton District Council, Selby District Council, Ryedale District Council, Scarborough Borough Council, Harrogate Borough Council, Craven District Council and Richmondshire District Council are expected to form a new single council (North Yorkshire Council) on 1 April 2023 as a result of Local Government Reorganisation.

Section B: North west of York Area

3.2.6 The North west of York Area largely comprises agricultural land and is between 2km and 10km to the north-west of York (**Figure 3.2, Volume 5, Document 5.4.3**). The settlements of Shipton-by-Beningbrough, Skelton and Overton are 800m north-west, 400m south-east and 100m south respectively from the North west of York Area (see **Section 3.3**).

3.2.7 The East Coast Mainline (ECML) Railway (traveling from London to Edinburgh) runs through the North west of York Area in a south-east to north-west direction. There are no trunk roads but there are two A roads connecting to the City of York (A19 and A59). The Way of the Roses National Cycle Network (NCN Route 65) crosses through the North West of York Area linking the City of York with Beningbrough Hall (a Grade I listed building owned by the National Trust) via the villages of Overton and Shipton by Beningbrough.

3.2.8 The River Ouse passes through the North west of York Area in a north-west to south-east direction, with Flood Zone 2 and Flood Zone 3 land either side. Other notable watercourses in the North west of York Area include Moor Gutter, Hurns Gutter and Hurns Drain. There is one area of ancient woodland, Overton Wood, adjacent to the Order Limits, located north of the River Ouse.

3.2.9 Existing electricity infrastructure in the North West of York Area includes the 400kV Norton to Osbaldwick (2TW/YR) overhead line route which is located in the north of the North west of York Area, 1.6km north-west of Haxby at its closest point. It connects Norton 400kV Substation, approximately 64km north of the Project, with Osbaldwick 400kV Substation to the east of York. A 2.4km section (eight pylons) of this existing overhead line falls within the North west of York Area and this section of overhead line crosses the B1363 Sutton Road and Bull Lane. Land uses beneath the overhead line and in the surrounding area largely comprise agricultural land and individual scattered residential and farm buildings.

3.2.10 A section of the existing 275kV Poppleton to Monk Fryston XCP overhead line route also falls within the North west of York Area between Moor Monkton and north-east of Nether Poppleton, adjacent to and north of the River Ouse. This overhead line is a total of 38km in length and connects Poppleton 275kV Substation on the north-western outskirts of York with the existing Monk Fryston 275kV/400kV Substation, approximately 26km to the south-west of York. Within the North west of York Area the overhead line runs broadly east-west crossing the ECML Railway and the River Ouse.

3.2.11 The North west of York Area lies within the administrative areas of Hambleton District Council, City of York Council, Harrogate District Council and North Yorkshire County Council.

Section C: Moor Monkton to Tadcaster

3.2.12 Within this section the existing 275kV Poppleton to Monk Fryston XC overhead line is aligned north-south, crossing the A59, the York – Harrogate Railway Line, the Battle of Marston Moor Registered Battlefield, B1224 Wetherby Road, the River Wharfe and the A659 (**Figure 3.3, Volume 5, Document 5.4.3**).

3.2.13 This section of the Project lies within the administrative areas of Harrogate District Council, Selby District Council and North Yorkshire County Council.

Section D: Tadcaster Area

3.2.14 The Tadcaster Area is approximately 3km south-west of Tadcaster comprising agricultural land to the north-east of the A64/A659 junction. There are a limited number of scattered residential properties in the locality with Toulston Polo Ground approximately 800m to the north.

3.2.15 Existing infrastructure in the Tadcaster Area includes a section of the 275kV Poppleton to Monk Fryston (XC) overhead line. This connects the 275kV Tadcaster Tee to Knaresborough (XD/PHG) overhead line route approximately 2.5km south-west of Tadcaster, a 2.7km section of which is located within the Tadcaster Area. Within the Tadcaster Area the 275kV Tadcaster Tee to Knaresborough (XD/PHG) overhead line crosses the A659 and Warren Lane and oversails agricultural land with individual scattered residential and farm buildings in the surrounding area (**Figure 3.4, Volume 5, Document 5.4.3**).

3.2.16 This Tadcaster Area lies within the administrative areas of Selby District Council, Leeds City Council and North Yorkshire County Council.

Section E: Tadcaster to Monk Fryston

3.2.17 South of Tadcaster the existing Poppleton to Monk Fryston 275kV XC overhead line runs adjacent to the Battle of Towton Registered Battlefield and Huddleston Wood Ancient Woodland before crossing railway lines connecting York and Leeds and Selby and Leeds. The southern end of this overhead line is aligned parallel to the east of the A1(M) (**Figure 3.5, Volume 5, Document 5.4.3**).

3.2.18 This section of the Project lies within the administrative areas of Selby District Council and North Yorkshire County Council.

Section F: Monk Fryston Area

3.2.19 The Monk Fryston Substation Area is located approximately 2km south-west of the village of Monk Fryston, south of the A63 and west of the A1(M). The land within the Monk Fryston Substation Area is predominantly agricultural land and also includes the existing Monk Fryston 275kV/400kV Substation as well as Rawfield Lane which runs north-south through the area connecting with the A63 to the north and the A1246 to the south. There are two residential properties adjacent; Pollums House Farm (and associated farm buildings) located approximately 500m west and the Grade II listed Monk Fryston Lodge (and associated buildings) approximately 200m to the east of the existing substation (**Figure 3.6, Volume 5, Document 5.4.3**).

3.2.20 Existing infrastructure within the Monk Fryston Substation Area comprises the 275kV Poppleton to Monk Fryston (XC) overhead line route which connects into the existing Monk Fryston Substation from the west and the 400kV Monk Fryston to Eggborough (4YS) overhead line route which connects into the existing substation from the east. This overhead line connects the existing Monk Fryston Substation with Eggborough Substation approximately 10km south-east of the Project. Only a short section (750m) of this overhead line falls within the Monk Fryston Substation Area to the east of the existing substation. This section oversails fields and an area of priority habitat woodland with Monk Fryston Lodge, a Grade II Listed Building, approximately 350m to the north.

3.2.21 The Monk Fryston Substation Area lies within the administrative areas of Selby District Council and North Yorkshire County Council.

3.3 Design parameters

3.3.1 The Project would be constructed within the Order Limits and such Limits of Deviation (LoD), or other parameters as may be specified for the individual works.

Order Limits

3.3.2 **Figure 1.2 (and Figures 3.1 to 3.6) within Volume 5, Documents 5.4.1 and 5.4.3** illustrate the proposed Order Limits, which is the maximum extent of land within which the Project may be carried out. If approved, the Development Consent Order (DCO) will provide consent for the Project. The Order Limits cover the area within which the Project (the authorised development) could take place. Authorised development would include but not be limited to the following: new overhead lines, substations and Cable Sealing End Compounds (CSECs) as well as access roads; Public Rights of Way (PRoW) diversions; construction compounds and laydown areas; and the works to existing infrastructure. The land within the Order Limits is referred to as 'the Site' in some of the chapters in this ES.

Limits of Deviation

3.3.3 As recognised in guidance provided by the Planning Inspectorate[2], a necessary and proportionate degree of flexibility often needs to be incorporated into the design of proposed development so that unforeseen issues that are encountered after a development has been consented can be dealt with. For example, previously unidentified poor ground conditions may require a pylon to be re-sited slightly for geotechnical reasons. Therefore, to allow for this, new infrastructure would be constructed within specified Limits of Deviation (LoD) which identify a maximum distance or measurement of variation within which the works must be constructed. These comprise lateral (i.e., on the ground) and vertical limits (in relation to height).

3.3.4 The proposed LoD for the Project are shown on **Figures 3.1 to 3.6 within Volume 5, Documents 5.4.3** and are required for:

- new overhead lines (400kV YN north of Overton 400/275kV Substation, new sections of 275kV overhead line south of Overton 400/275kV Substation (XC and SP overhead lines)) lateral limits: up to 100m lateral LoD (50m either side of the proposed overhead line centre line);
- temporary overhead line diversions lateral limits: up to 100m lateral LoD (50m either side of the proposed temporary overhead line centre line);
- overhead line vertical limits (all new overhead lines, pylons and temporary overhead line diversions): proposed pylon heights (refer to Indicative Overhead Line Profiles provided in **Volume 2, Document 2.15**) up to 6m vertical LoD;
- cable sealing end compounds: up to 25m lateral LoD around the edge of each CSEC;
- Overton 400/275kV Substation (lateral LoD): up to 20m lateral LoD from the east, south and west of the substation boundaries and up to 10m lateral LoD from the north boundary; and
- Overton 400/275kV Substation and proposed Monk Fryston 400kV Substation (vertical LoD): No vertical LoD is proposed but both substations would not exceed 15m in height above the finished ground level.

3.3.5 The proposed lateral LoD are not fixed along the entirety of the overhead lines but deviate depending on constraints that are present along the route. In some locations, the LoD have been reduced to avoid the loss of, or impacts on, trees, such as veteran trees, woodland and other environmentally sensitive receptors. No vertical LoD are proposed in relation to below ground works such as underground cabling. The assessment is based on an assumed depth of excavation (1.2m) for these works. An increase in the depth of excavation is unlikely to change the conclusions of the assessment on the basis that substantial increases in depth would necessitate a different type of construction methodology (i.e. horizontal directional drilling rather than open trench). For the purposes of the assessment the maximum depth of excavation for open trenches is assumed to be up to 2m (**Volume 5, Chapter 7: Historic Environment, Document 5.2.7, Chapter 10: Geology and Hydrogeology, Document 5.2.10, Chapter 11 Agriculture and soils, Document 5.2.11**).

3.3.6 New overhead lines have been designed to meet minimum statutory safety clearances for all overhead lines, which are legally prescribed[4]. The statutory safety clearances must be maintained between conductors and the ground, trees, buildings and any other structure such as street lighting columns. The clearance required depends on the operating voltage of the line, its construction and design, the topography of the location over which the line passes, and the type of development proposed.

Embedded environmental measures

3.3.7 The Project includes environment measures which have been 'embedded' into the Project design. These measures relate to the construction stage, operational stage and dismantling works. **Chapter 4: Approach to Preparing the ES, Volume 5, Document 5.2.4** sets out the approach to environmental measures applied in the ES. The environmental assessments presented in **Chapters 6** to **17, Volume 5, Documents 5.2.6 to 5.2.17** provide details of how the embedded environmental measures are proposed to avoid or reduce environmental effects.

3.3.8 The Embedded Measures Schedule sets out all the embedded environmental measures and how these are to be secured in the DCO (**Appendix 5.3.3A, Volume 5, Document 5.3.3A**).

3.4 Project proposals (permanent infrastructure)

Section A: Osbaldwick Substation

3.4.1 A new circuit breaker and isolator along with associated cabling would be installed at Osbaldwick Substation, minor works would be implemented for pylon YR001A. These would switch the arm of the pylon from which the downleads to the gantry come off, and remove and dismantle an existing gantry on which one of the Norton to Osbaldwick circuits terminates to free up space for new equipment. A new gantry (up to a maximum of 15m in height) would be installed on existing operational land at the substation, and cable sealing ends would be in place, allowing a cable connection (approximately 50m) to the existing substation bay. A substation bay is a power line within an electrical substation which connects a circuit such as a feeder or a Super Grid Transformer to the substation busbar system. Each bay typically includes circuit breakers, disconnectors, earth switches, instrument transformers and surge arresters.

[4] Energy Networks Association – Technical Specification 43-8

3.4.2 All new infrastructure as well as the requirement for any construction compounds, would be constructed within operational land at Osbaldwick Substation. **Figure 3.1, Volume 5, Document 5.4.3** shows the Order Limits at Osbaldwick and plans showing the substation parameter plan, illustrative substation layout and indicative substation elevation are provided in **Volume 2, Document 2.15**.

Section B: North west of York Area

Changes to 400kV Norton to Osbaldwick (2TW/YR) overhead line route

3.4.3 A 2.4km section of this overhead line falls within the Order Limits (between pylon YR035 to the east and pylon 2TW168 to the west) (see **Figure 3.2, sheets 1 to 3, Volume 5, Document 5.4.3**). The section of overhead line between pylons YR036 and 2TW169 would be reconductored. Pylon YR040T, which is a suspension pylon (approximately 44m in height), would be dismantled and replaced with a new tension pylon (YR040) approximately 30m to the east of its existing location to allow the connection with the new 400kV YN overhead line. This pylon would be approximately 58m in height and would have downleads (wires) to connect to Shipton North 400kV CSEC.

400kV YN overhead line and cable sealing end compounds

3.4.4 The new 400kV YN overhead line would be approximately 2.8km long and would comprise eight lattice pylons (YN001 to YN008). It would be aligned north-south connecting the existing 400kV Norton to Osbaldwick (YR) overhead line with the new 400/275kV Overton Substation. At the northern end of the overhead line, two CSECs (Shipton North 400kV CSEC and Shipton South 400kV CSEC) would connect the new and existing overhead lines. A CSEC would be required to transition the overhead lines from overhead conductors to underground cables via overhead 'downlead' conductor connections from the adjacent terminal pylon. Approximately 230m of underground cabling would connect the two CSECs.

3.4.5 Pylons YN001 to YN008 would vary between 46m and 55m in height with the taller pylons located at the southern end of the overhead line, reflecting the need to cross the A19 as well as changes in ground levels. The overhead line would connect onto two full line tension gantries within Overton 400/275kV Substation, which would be up to a maximum of 15m in height.

3.4.6 Shipton North and South CSECs would have typical footprints of 45m by 85m (3,825m^2) and 40m by 45m (1,800m^2) respectively. Each CSEC would have a permanent access track with a security fence with a gate around it and be connected via a gantry (Shipton South CSEC) or an anchor block solution (Shipton North CSEC). An anchor block comprises a concrete block on the ground. The downleads from the CSEC come down off the structure and connect to this block. The blocks are smaller than gantries and can be located much closer to the pylon and are therefore used at locations, such as at Shipton North CSEC, where the space is compromised. An image of a typical CSEC and connection onto a gantry is shown in **Figure 3.7** and the location of the CSECs as well as the 400kV YN overhead line is shown on **Volume 5, Document 5.4.3, Figure 3.2, sheets 3 to 7**.

Figure 3.7 - Example Cable Sealing End Compound with gantry

Overton 400/275kV Substation

3.4.7 As the existing 400kV Norton to Osbaldwick (2TW/YR) overhead line route to the north and the existing 275kV Poppleton to Monk Fryston (XCP) overhead line route to the south are at different voltages, a new substation (Overton 400/275kV Substation) would be needed to convert the voltage.

3.4.8 The substation would have a footprint of approximately 60,000m^2 and contain four Super Grid Transformers (SGTs) which would convert the voltage levels. The SGTs would be installed within concrete bunds. The substation would also contain two full line tension, and four gantries (two per overhead line) where each overhead line connects into the substation, as well as a control building. For the purposes of the assessment, it is assumed that both the substation equipment and gantries would be up to a maximum height of 15m above the finished ground level. Underground cabling within the substation would connect one Overton - Poppleton circuit from the overhead lines into the substation. The substation would be enclosed by an electrified palisade fence in line with National Grid Electricity Transmission plc ("National Grid") standards. A small transformer compound, which would be operated by Northern Power Grid, would be located outside the perimeter of the substation and connected to the substation by a short section of underground cable. A permanent access road surfaced with impermeable pavement would provide access from Overton Road. This would be designed to accommodate the Abnormal Indivisible Loads (AIL) required to install the SGTs at the substation. Drainage measures would be incorporated into the design of the substation (**Flood Risk Assessment, Appendix 5.3.9D, Volume 5, Document 5.3.9D**) with an outfall to the Hurns Gutter. The substation would be unmanned on a permanent basis with regular maintenance visits to the Substation. Lighting at the substation would comprise security lighting on sensors.

3.4.9 **Figure 3.8** and **Figure 3.9** show an image and typical layout for a substation and **Figure 3.2, sheet 7 and 8, Volume 5, Document 5.4.3** shows the location of the substation.

Figure 3.8 - Typical substation (existing Monk Fryston Substation)

Figure 3.9 - Typical substation layout (existing substation at Monk Fryston)

Proposed landscape strategy at Overton 400/275kV Substation

3.4.10 At Overton 400/275kV Substation, areas of planting and landscape bunding are proposed. The area of planting form part of the overall landscape strategy and will also contribute to Biodiversity Net Gain (BNG) (**Chapter 6: Landscape and Visual Amenity, Volume 5, Document 5.2.6** and **Biodiversity Net Gain Report, Volume 7, Document 7.9**) These are summarised as follows and shown on **Figure 3.10, Volume 5, Document 5.4.3**.

- New native woodland planting and scrub on earth mounding up to 2m high with 1:3 slopes along the south side of the A19 between Overton Road and Hurns Gutter. The design objective is to reduce the visibility of the Overton 400/275kV Substation from the A19.
- New native woodland planting and scrub on earth mounding up to 3m high with 1:3 slopes to the north-west of Overton 400/275kV Substation and Overton Road designed to allow retention of existing mature/veteran trees. The design objective is to reduce the visibility of Overton 400/275kV Substation from Overton Road, National Cycle Route 65 and the ECML Railway.

- Reinforcement of existing hedgerows in sections along the A19 and Overton Road to comprise infilling of gaps and/or thickening and/or introduction of hedgerow trees. The design objective is to reduce the visibility of the Overton 400/275kV Substation from Overton Road, National Cycle Route 65 and the A19.
- Introduction of species rich meadow planting around Overton 400/275kV Substation boundary, under pylons to the north and south of Overton 400/275kV Substation and in locations at the perimeter of the field in which the Overton 400/275kV Substation is sited, where there are limitations to productive arable cultivation due to the shape and size of the land parcels and/or likely poor drainage. Links to adjacent hedgerow and woodland planting provides enhanced green infrastructure potential and the species rich meadow planting will also contribute to Biodiversity Net Gain opportunities.

3.4.11 The landscape planting proposals have been developed to reflect Hambleton Adopted Local Plan (2022) Policy E4 Green Infrastructure and Policy E7 Hambleton's Landscapes. The landscape bunding will be developed using spoil excavated within the Order Limits at Overton 400/275kV Substation. Further information regarding the assessment of landscape and visual effects and the embedded measures proposed is provided in **Chapter 6: Landscape and Visual Amenity, Volume 5, Document 5.2.6**.

New sections of 275kV overhead line

3.4.12 Two new sections of 275kV overhead lines would connect into Overton 400/275kV Substation from the south (see **Figure 3.2, sheets 8 to 15, Volume 5, Document 5.4.3**).

3.4.13 A new section of 275kV overhead line would connect to Overton 400/275kV Substation from the south-west. It would connect to the existing 275kV Poppleton to Monk Fryston (XCP) overhead line to the south forming part of a 275kV overhead line, known as the XC 275kV overhead line comprising new and existing infrastructure which would connect the proposed Monk Fryston and Overton Substations. The new section of overhead line would be approximately 1.95km long and would comprise seven new lattice pylons (XC422 to XC416) with pylon XC422 being a replacement for existing pylon XCP007. This new section of overhead line would be aligned south-west to north-east with pylon XC422 located approximately 400m south of the River Ouse. North of the river the overhead line would be aligned east of Overton Wood and west of Overton Grange before crossing Overton Road and the ECML Railway to connect to Overton 400/275kV Substation. The new pylons would be between 47m and 60m in height.

3.4.14 A new section of 275kV overhead line would connect to Overton 400/275kV Substation from the south-east. It would connect to the existing 275kV Poppleton to Monk Fryston (XCP) overhead line to the south forming part of a 275kV overhead line, known as the SP 275kV overhead line, comprising new and existing infrastructure which would connect Overton 400/275kV Substation with Poppleton Substation. The new section of overhead line would be approximately 1.5km long and would comprise four new lattice pylons (SP006 to SP003). This new section of overhead line would run from approximately 500m west of Skelton with pylon SP006 located approximately 280m north of Stripe Lane. The new section of overhead line would be aligned parallel to the east of the ECML railway and cross Hurns Gutter twice then connect into Overton 400/275kV Substation. The new pylons would be between 43m and 52m in height.

Changes to the existing 275kV Poppleton to Monk Fryston (XCP) overhead line route

3.4.15 The installation of the new sections of XC and SP 275kV overhead lines would require modifications to the existing 275kV Poppleton to Monk Fryston (XCP) overhead line, where it falls within the Order Limits, including the replacement and dismantling of pylons.

3.4.16 Existing pylon XCP014 to the east of the ECML railway and west of Skelton would remain in place and form part of the SP overhead line connecting Overton and Poppleton Substations. Pylon XCP014 would be renamed as pylon SP007. North from SP007 the new overhead line and pylons would connect into Overton 400/275kV Substation (pylons SP003 to SP006) as shown on **Figure 3.2, sheets 8 to 10, Volume 5, Document 5.4.3**.

3.4.17 Between Moor Monkton in the west and Skelton in the east, the existing XCP overhead line (approximately 5km in length) would be replaced with some pylons permanently removed. The overhead line would be realigned from south-east of Moor Monkton to connect into the proposed Overton 400/275kV Substation forming the realigned XC Overton to Monk Fryston overhead line. This would require:

- the permanent removal of 2.35km of the existing XC/XCP overhead line from new pylon XC422 and SP007 and six pylons between the ECML railway and Woodhouse Farm to the north of Overton (existing pylons XCP008 to XCP013);
- the replacement of four pylons south of the River Ouse and north of Thick Penny Farm along the same overhead line alignment, but in new locations (approximately 25m to 70m east of the existing pylon locations). The replacement pylons (pylons XC425 to XC422) would be taller in height than the existing pylons with the new pylons being between 47m and 50m above ground level compared to 40m to 50m in height at present;
- the replacement of three pylons to the south-east of Moor Monkton and south of Redhouse Wood along a new alignment up to 230m south of the existing overhead line alignment. The existing pylons are currently between 40m and 45m in height above ground level whereas the replacement pylons would all be approximately 50m in height (XC426 to XC428);
- the permanent removal of the existing pylon (XC428T) closest to Moor Monkton as the realigned overhead line would lie further to the south; and
- the replacement of pylon XC429 at a location approximately 30m north of the existing pylon. The replacement pylon would be taller (approximately 53m) than the existing pylon (approximately 35m in height).

Section C, D and E: 275kV Poppleton to Monk Fryston (XC) overhead line

3.4.18 The existing overhead line 275kV Poppleton to Monk Fryston (XC) overhead line falls within Sections C, D and E as follows:

- Section C: north of pylon XC430 to south of pylon XC479 (**Figure 3.3, Volume 5, Document 5.4.3**);
- Section D: north of pylon XC480 to south of pylon XC 485 (**Figure 3.4, Volume 5, Document 5.4.3**); and
- Section E: north of pylon XC486 to south of pylon XC521 (**Figure 3.5, Volume 5, Document 5.4.3**).

3.4.19 Within Sections C to E this existing overhead line would be re-conductored, which would include switching the existing single conductor system (from pylon XC429 at Moor Monkton, Section C to the southern end of the XC overhead line at Monk Fryston, Section F) to a twin conductor system as well as replacing the earthwire. At every pylon there would be works to change the insulators and fittings. In addition, where required, pylon steelwork would be replaced or strengthened, crossarm tie members replaced or modifications made to the existing crossarms, including changing the conductor attachment points. Where needed insulators and fittings would be replaced, and foundations repaired or strengthened.

Section D: Tadcaster Area

New 275kV cable sealing end compounds

3.4.20 Two new CSECs would be installed in the Tadcaster Area: Tadcaster Tee East 275kV CSEC and Tadcaster Tee West 275kV CSEC (see **Figure 3.4, sheet 2, Volume 5, Document 5.4.3**) with approximate footprints of 40m by 50m (2,000m^2) and 31m x 37m (1,150m^2) respectively. A short section (approximately 350m) of underground cable would connect to the two CSECs (see **Figure 3.4, sheet 2, Volume 5, Document 5.4.3**). A gantry of up to 15m would be installed Tadcaster Tee West with an anchor block solution for Tadcaster Tee East, due to the lack of space between Tadcaster Tee East and the embankment to the A64. Fencing, permanent access and permanent drainage would be installed for each CSEC.

3.4.21 Currently the existing Poppleton to Monk Fryston (XC) overhead line connects to the 275kV Knaresborough (XD/PHG) overhead line in the Tadcaster Area. There are electricity circuits between Poppleton and Knaresborough Substations, Monk Fryston and Knaresborough Substations and Monk Fryston and Poppleton Substations. The CSECs and underground cable in the Tadcaster Area are needed to create two circuits connecting Overton, Knaresborough and Monk Fryston Substations to help balance power flows on the overhead lines as a result of the increased rating requirement on the XC overhead line.

Proposed landscape strategy at the Tadcaster Area

3.4.22 At Tadcaster, new planting is proposed to mitigate localised landscape and visual effects, considering technical constraints including underground services and to maximise the retention of productive agricultural land. The area of planting forms part of the overall landscape strategy and will also contribute to Biodiversity Net Gain (BNG) (**Chapter 6: Landscape and Visual Amenity, Volume 5, Document 5.2.6** and **Biodiversity Net Gain Report, Volume 7, Document 7.9**) These measures are summarised as follows and shown on **Figure 3.11, Volume 5, Document 5.4.3**.

- Native scrub planting on the embankments around the western CSEC close to the A64 to soften the appearance of the engineered embankment as perceived form the A64.
- Reinforcement of existing field boundary hedgerows along the edge of the A659 and reinstatement of a historic hedgerow north of the proposed access track to the western CSEC to partially restrict views from the A659 and Garnet Lane of the lower parts of the western CSEC.

- Establishment of a new native hedgerow along the boundary with the A64 highway verge to partially restrict views from the A64 of the lower parts of the eastern CSEC and associated embankments.
- Introduction of species rich meadow planting in the field adjacent to the A64 highway verge, currently used for cultivating Christmas trees. Given the extent of new underground services and associated easements, this area could no longer be cultivated for tree planting. In addition to enhancing green infrastructure and landscape character this proposal will also contribute to Biodiversity Net Gain.

3.4.23 The planting proposals reflect the location of the Project within the Locally Important Landscape Area (a non-statutory local landscape designation). Polices that apply include Policy SP18 Protecting and Enhancing the Environment and Policy SP19, Design Quality of the Selby District Core Strategy Local Plan (2013). Preferred Approach SG5, NE2 and NE3 of the Selby draft Local Plan Preferred Options (Jan 2021) also apply covering protection and enhancement of landscape character and green infrastructure. Further information regarding the assessment of landscape and visual effects is provided in **Chapter 6: Landscape and Visual Amenity, Volume 5, Document 5.2.6**.

Existing 275kV Tadcaster Tee to Knaresborough (XD/PHG) overhead line route

3.4.24 Changes to the existing infrastructure in the Tadcaster Area would comprise the removal of pylon XD001T (38m in height above ground level) which would be replaced with a new pylon on the same alignment (XD001) (approximately 54m in height) approximately 30m to the south-east to allow a connection using downleads to the Tadcaster Tee West CSEC (see **Figure 3.4, Volume 5, Document 5.2.3**). Limited works are proposed to the XD overhead line between pylons XD002 and XD007 and comprise the cutting of the overhead lines between XD002 and XD003 in order to implement a temporary diversion and replacement of the overhead lines once the temporary diversion is removed. The section of overhead line between XD002 and XD007 is included in the Order Limits should further design development indicate works, for example re-tensioning of the overhead lines, be required.

Section E: Tadcaster to Monk Fryston Area

3.4.25 The works in this section would be the same as described above for Sections C, D and E.

Section F: Monk Fryston Substation Area

New 400kV Monk Fryston Substation

3.4.26 A new 400kV Substation would be installed adjacent to (and connecting into) the existing Monk Fryston 400/275kV Substation to enable the uprated XC overhead line to connect into the Electricity Transmission System[5] (see **Figure 3.6, Volume 5, Document 5.4.3**). The new substation is required as the existing substation equipment is only rated to take a certain amount of power, and the increased rating of the XC overhead line would be above the capability of the equipment at the existing substation so cannot be used. The proposed substation would have a footprint of approximately 90,000m^2 and is likely to be similar in height to the buildings and infrastructure at the existing substation (assumed for the purposes of assessment to be 15m). The new

[5] Refer to **Chapter 1, Volume 5, Document 5.2.1**.

substation would contain four super grid transformers (SGTs) within concrete bunds to step up the 275kV voltage of the XC overhead line to 400kV to connect into the new substation. Underground cables (approximately 600m in length) would be installed within the substation to connect one circuit of the XC overhead line to the substation. The new substation would also contain switchgear and equipment, a control building housing equipment and car parking. The substation would be enclosed by an electrified palisade fence in line with National Grid standards. A small transformer compound, which would be operated by Northern Power Grid, would be located inside the perimeter of the substation and connected to the substation by a short section of underground cable. Drainage measures will be incorporated into the design of the substation (**Appendix 5.3.9D: Flood Risk Assessment, Volume 5, Document 5.3.9**). At this stage of the assessment it is assumed the substation would be unmanned on a permanent basis with regular maintenance visits to the substation. Lighting at the substation would comprise security lighting on sensors.

Proposed landscape strategy at the proposed 400kV Monk Fryston Substation

3.4.27 At the proposed Monk Fryston Substation, areas of planting are proposed. The area of planting form part of the overall landscape strategy and will also contribute to Biodiversity Net Gain (BNG) (**Chapter 6: Landscape and Visual Amenity, Volume 5, Document 5.2.6** and **Biodiversity Net Gain Report, Volume 7, Document 7.9**) These are summarised as follows and shown on **Figure 3.12, Volume 5, Document 5.4.3**.

- New native woodland planting and scrub on earth mounding up to 3.5m high with 1:3 slopes to the north of the Monk Fryston Substation. Design objective to reduce the visibility of the Monk Fryston Substation from parts of Rawfield Lane, the A63, the curtilage of Monk Fryston Lodge and high sensitivity receptors to the north including PRoW near Lumby.
- New native woodland planting and scrub on earth mounding up to 3.5m high with 1:3 slopes to the south-east of the Monk Fryston Substation considering the location of the consented battery storage scheme (Ref 2021/0633/FULM). The design objective is to reduce the visibility of the Monk Fryston Substation from the nearby public footpath to the south noting that an existing woodland belt closer to the footpath would be maintained as part of the Project.
- New native woodland planting and scrub on earth mounding up to 3.5m high with 1:3 slopes to the east of the Monk Fryston Substation to reinforce the establish landscape character pattern of significant woodland cover and to reinforce existing woodland screening around Monk Fryston Lodge to the north-east.
- Re-establishment and reinforcement of historic field boundary hedgerows to the east of the Monk Fryston Substation to mitigate hedgerow loss under the footprint of the proposed substation and to enhance green infrastructure.
- Re-establishment of part of a historic field boundary hedgerow along a section of Rawfield Lane under the new XC overhead line where tree planting is not possible to partially screen views of the north-western end of the proposed Monk Fryston Substation from Rawfield Lane and Pollums House Farm.
- Introduction of species rich meadow planting between the mounds and proposed Monk Fryston Substation where the small piecemeal parcels of residual farmland could not be efficiently cultivated for arable crops. In addition to enhancing green infrastructure and landscape character this proposal will also contribute to Biodiversity Net Gain.

3.4.28 The planting proposals reflect Policy SP18 Protecting and Enhancing the Environment and Policy SP19, Design Quality of the Selby District Core Strategy Local Plan (2013). Preferred Approach SG5, NE2 and NE3 of the Selby draft Local Plan Preferred Options (Jan 2021) also apply covering protection and enhancement of landscape character, green infrastructure, and tree coverage.

3.4.29 The landscape bunding will be developed using spoil excavated within the Order Limits at Monk Fryston Substation. Further information regarding the assessment of landscape and visual effects is provided in **Chapter 6: Landscape and Visual Amenity, Volume 5, Document 5.2.6**.

Changes to 275kV Poppleton to Monk Fryston (XC) overhead line route

3.4.30 The existing 275kV Poppleton to Monk Fryston (XC) overhead line west of the existing Monk Fryston 400/275kV Substation would be realigned and reconfigured between pylons XC521 and XC525T so that this overhead line could be moved from the existing Monk Fryston 400/275kV Substation to connect into the proposed Monk Fryston 400kV Substation (**Figure 3.6, Document 5.4.3, Volume 5**).

3.4.31 Approximately 1.45km of the existing overhead line would be reconfigured and new spans of overhead line included to connect into the proposed substation. The reconfigured overhead line would be slightly increased in length (to approximately 1.6km). Pylon XC521 would remain in place but parts of the steelwork would be replaced or strengthened, and the overhead line and conductors replaced. The reconfigured overhead line would, from this pylon, run along a similar alignment and up to 40m west of the existing overhead line east of the A1(M). Pylon XC522T and XC523T would be dismantled and removed with new pylons (XC522 and XC523) installed approximately 40m west and 40m south-east of the existing pylons respectively. From pylon XC523 the overhead line would be reconfigured slightly south of the existing alignment. From XC524T it would then run north-east to connect into the new substation. Pylon XC524T would be dismantled and removed with a new pylon (XC524) installed 40m west of the existing pylon. Pylon XC525T within the existing substation would be removed. A replacement pylon for XC525T (XC525) would be located in the field west and on the opposite side of Rawfield Lane to the existing substation (180m north-west). A new pylon (XC526) and two new gantries would be installed on the eastern side of Rawfield Lane adjacent to the new substation to allow the overhead line to connect to the new substation. The realigned XC overhead line would have one additional pylon in this area when compared to the current overhead line in this area.

3.4.32 The four pylons that would be dismantled as part of this work (XC522T to XC525T) range in height from approximately 35m to 42m above ground level. The replacement pylons (XC522 to XC525) would range in height from approximately 48m to 60m. The additional pylon (XC526) would be approximately 48m above ground level.

Changes to 400kV Monk Fryston to Eggborough (4YS) overhead line route

3.4.33 A short section of the existing 400kV Eggborough to Monk Fryston overhead line between existing pylons 4YS029 and 4ZZ01A, east of the existing substation would be removed and reconfigured to connect into the proposed Monk Fryston Substation. A span approximately 370m long of existing overhead line between 4YS029 and 4ZZ01A would be dismantled.

Generic pylon description

3.4.34 The new overhead lines which form part of the Project would carry electrical conductors[6] supported by lattice pylons. Conductors are made of material such as aluminium or aluminium alloy through which electricity can easily flow. The conductors are connected to the pylon by an insulator set (insulators are components made from a material with a high resistance to the flow of electric current such as glass or porcelain), steel insulator fittings and a conductor clamp (the conductor clamp forms the connection between the conductor and one end of the insulator set).

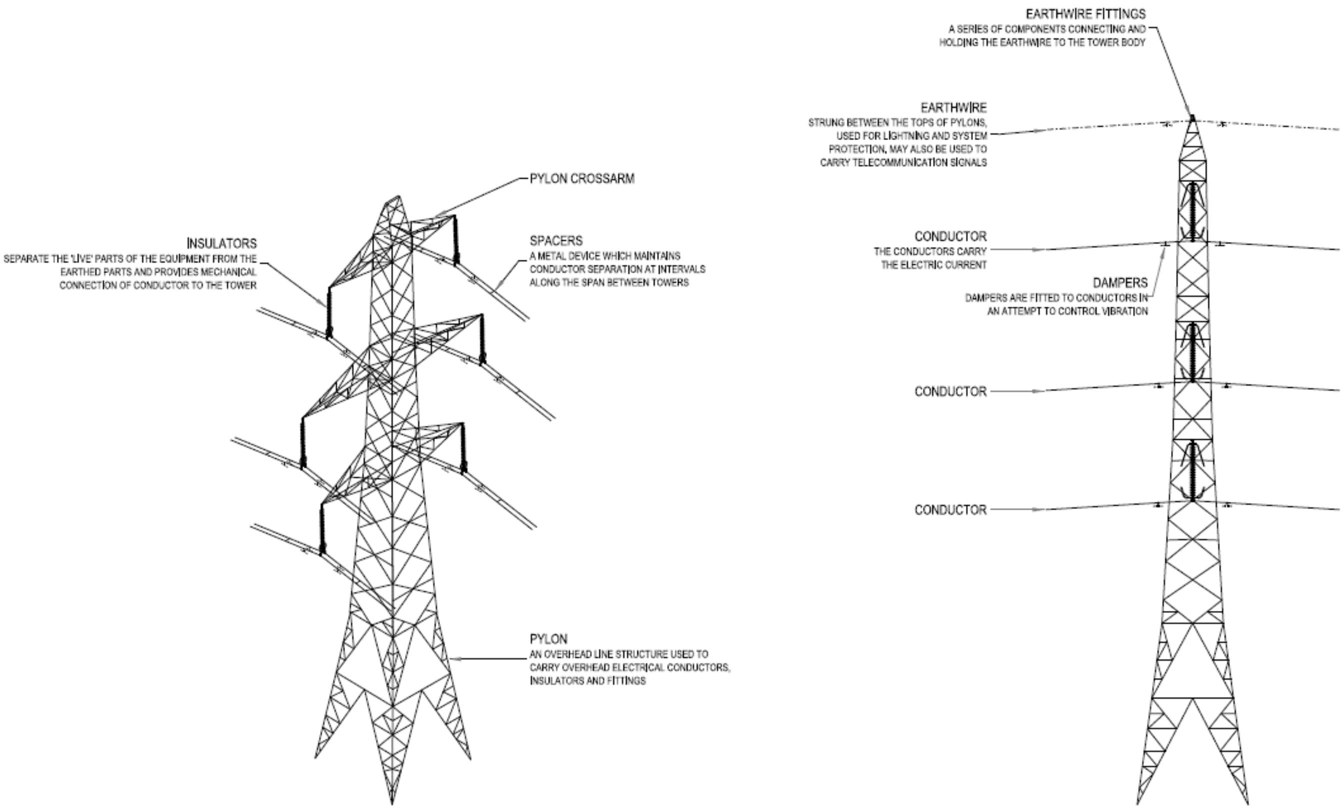
3.4.35 There are three types of pylons:

- suspension pylons: these are used when the route travels in a straight line;
- tension pylons: these are used to turn corners or maintain tension on the conductors when there are long straight runs; and
- terminal pylons: these terminate the overhead line when the line is connected into substations or CSECs.

3.4.36 The key components found on pylons are shown in **Figure 3.13. Figure 3.14** shows two examples of pylons with single conductors and twin conductors.

[6] Electricity flows along the conductor (the wires which are strung from pylons). This means that there are 12 conductors (2x6) on each pylon, plus one central earth wire.

Figure 3.13 - Example of a 400kV double circuit lattice pylon



ISOMETRIC VIEW ON PYLON
L8(c) D STD

SIDE VIEW ON PYLON
L8(c) D STD

Figure 3.14 – Example of single conductors (left image) and twin conductors (right image)

3.4.37 Pylon heights can vary according to environmental conditions such as topography, or technical requirements, for example, they may need to be taller when crossing roads, railways or navigable rivers or to maintain appropriate clearances. Minimum statutory clearances[7] must be maintained between conductors and the ground, trees, buildings and any other structures such as street lighting columns. The clearance required depends on factors such as the operating voltage of the line, topography and the obstacle being crossed. The pylons need to be sufficiently tall to ensure that statutory clearances from the bottom conductors are achieved.

3.5 Project proposals (temporary infrastructure)

Temporary overhead line diversions

3.5.1 In order to undertake the proposed works to the existing overhead line routes within the Order Limits, temporary diversions of the existing overhead line would be required to maintain electricity flows. No temporary diversions are proposed in Sections A (Osbaldwick Area) or E (Tadcaster to Monk Fryston). The temporary diversions proposed in Sections B to D and F are described as follows. The temporary diversions would be in place for up to three years.

[7] Energy Networks Association, 2016, Technical Specification 43-8: Overhead line clearances

Section B: North west of York Area

3.5.2 Whilst pylon YR040T is being replaced and the CSECs being installed, a temporary diversion of approximately 1.1km would be installed along the existing 400kV Norton to Osbaldwick (2TW/YR) overhead line, between pylons 2TW169 and YR038, up to 120m south of the current overhead line (see **Figure 3.2, sheet 2 and 3, Volume 5, Document 5.4.3**). The temporary diversion would require the installation of two temporary structures, which would comprise either a temporary mast or a temporary pylon, 320m south-west and 315m south-east of Newlands Farm. These structures are likely to be approximately 49m and 55m in height respectively.

3.5.3 On the existing 275kV Poppleton to Monk Fryston (XCP) overhead line an approximate 1.9km temporary diversion would be installed 50m north of the existing overhead line to enable the installation of pylons XC425 to XC422 on the realigned overhead line into Overton 400/275kV Substation (**Figure 3.2, sheet 12,15,18, 19, Document 5.4.3**). Four temporary structures would be installed in close proximity to the existing pylons for the duration of the diversion and would be between 44m and 50m in height.

Section C: 275kV Poppleton to Monk Fryston (XC) overhead line route between Moor Monkton and Tadcaster

3.5.4 An approximate 565m long temporary diversion would be installed between pylons XC428T and XC430 whilst the realigned overhead line is installed south-east of Moor Monkton, which would be located up to 40m west of the existing overhead line. One temporary structure up to 55m in height would be installed for the duration of the diversion approximately 95m north-west of pylon XC429T (**Figure 3.3, sheet 1, Document 5.4.3**).

Section D: Tadcaster Area

3.5.5 During the construction phase, a temporary diversion of the existing 275kV Tadcaster Tee to Knaresborough (XD/PHG) overhead line would be needed to maintain electricity flows along this line whilst pylon XD001T is removed and replaced with pylon XD001. The temporary diversion would be approximately 1km long from XD003 to XC481 and up to 60m north of the existing overhead line (see **Figure 3.4, Volume 5, Document 5.4.3**). The temporary diversion would require the installation of two temporary structures approximately 110m east and 150m west of the A659, both of which would be approximately 39m in height.

Selection F: Monk Fryston Area

3.5.6 During construction, a temporary diversion of approximately 1.1km would be installed on the existing 275kV Poppleton to Monk Fryston (XC) overhead line whilst the reconfigured overhead line between XC522 and XC526 was being constructed to maintain electricity flows (**Figure 3.6, Document 5.4.3**). The temporary diversion would be up to 40m north and east of the existing overhead line with two temporary structures installed approximately 170m south-west and 160m south-east of Pollums House Farm. These structures would be between 49m and 60m in height.

3.5.7 Other temporary construction infrastructure that would be installed across the Project (access roads, scaffolding, working areas) are described in **Section 3.6**.

Temporary construction compounds

3.5.8 This section outlines information on the location and size of the temporary construction compounds as part of the temporary infrastructure required to construct the Project. **Section 3.6** outlines further information on construction methodology including information on how elements needed during construction (for example temporary drainage and access) to manage and build the Project as well as how permanent elements of the Project (for example permanent access) would be constructed. Temporary construction compounds would be installed at four locations within the Order Limits, the details of which are set out below. With the exception of the Tadcaster Area where only one compound is proposed, there would be two separate compounds for the overhead line and substation/CSECs works which would be contracted separately. The compounds would contain storage areas including laydown areas and soils storage and areas for equipment and fuel, drainage, generators, car parking and offices and welfare areas (portacabins). An illustrative construction compound layout plan is provided in **Volume 2, Document 2.15**.

- Section B: North west of York Area: Construction compounds would be sited at two separate locations for this part of the Project:
  - Two construction compounds in the northernmost part of Section B, each will be approximately 14,300m^2 (130m by 110m) (see **Figure 3.2, sheet 3 and 4, Volume 5, Document 5.4.3**). The construction of the new 400kV YN overhead line and the CSECs and works to the existing 400kV Norton to Osbaldwick (2TW/YR) overhead line would be managed from these compounds, which would be located to the north of Corban Lane and east of the access road to Newlands Farm.
  - Two construction compounds to the north-west of Overton 400/275kV Substation; one to the west of Overton Road and north of the ECML railway and the second to the east of Overton Road and south of the A19 (see **Figure 3.2, sheet 7, Volume 5, Document 5.4.3**). Works to construct the new overhead lines and substation would be managed from these compounds both of which would be 14,300m^2 in area.
- Section C: Tadcaster Area: One construction compound located south of pylon XD001T in land between the A64 and A659 which would be approximately 24,000m^2 in area (see **Figure 3.4, sheet 2 Volume 5, Document 5.4.3**). Works to construct the new CSECs and to the existing overhead lines substation would be managed from these compounds.
- Section F: Monk Fryston Area: Two construction compounds to the east and west of Rawfield Lane. Each compound is assumed to be 14,300m^2 (130m by 110m) (see **Figure 3.6, sheet 3, Volume 5, Document 5.4.3**). Works to construct the proposed substation and works to the existing overhead lines would be managed from these compounds.

3.5.9 There would be no construction compounds located along the existing 275kV Poppleton to Monk Fryston (XC) overhead line (Sections C and E). Instead works would be managed from all other compounds in the North west of York, Tadcaster and Monk Fryston Substation Areas. At Osbaldwick Substation a compound or laydown area would be installed within the existing boundary of the substation.

3.6 Construction methodology

Introduction

3.6.1 This section explains the methodology that will be used to install both temporary and permanent aspects of the Project design. It also describes the methodology for the refurbishment and reconductoring works needed for the existing overhead lines. A description of the construction working hours and an overview of the programme are also provided.

Construction working hours

3.6.2 The core construction working hours would be as follows:

- Monday to Friday: 07.00 – 19.00; and
- Saturday, Sunday and Public Holidays: 08.00 - 17.00.

3.6.3 No piling works would take place on Sundays or Public Holidays and would be restricted to 09.00-14.00 on Saturdays.

3.6.4 The core working hours would exclude start up and close down activities which would take up to one hour before or after the core working hours.

3.6.5 The following operations may take place outside the core working hours:

- the jointing of underground cables, with the exception of cable cutting which will take place only during core working hours;
- the installation and removal of conductors, pilot wires and associated protective netting and structures across highways, railway lines or watercourses;
- the completion of operations commenced during the core working hours which cannot safely be stopped;
- any highway works requested by the relevant highway authority to be undertaken on a Saturday or a Sunday or outside the core working hours;
- oil processing of transformers or reactors in substation sites;
- the testing or commissioning of any electrical plant installed as part of the authorised development;
- the completion of works delayed or held up by severe weather conditions which disrupted or interrupted normal construction activities; and
- security monitoring.

Installation of access routes

3.6.6 Construction works would be phased (see **Table 3.1**) and access routes implemented prior to each element or phase of the Project being progressed to provide suitable access for construction plant and traffic. Temporary and permanent access routes would be implemented as part of the Project. Temporary access surfacing would be removed and land reinstated to its previous use once construction is complete. Agricultural land would be restored and any hedgerows re-instated except where a field gate or bellmouth was installed. In relation to hedgerow replanting it has been assumed that there would be a permanent loss of 8m where a bellmouth has been installed. After construction was complete, the bellmouth would be removed and an 8m fence or gate installed with hedgerow replanting up to the edge of the gate or fence. For temporary access routes through field boundaries where bellmouths would not be required, it is assumed that a 4m fence or gate would be installed with hedgerow replanting up to the edge of the gate or fence.

3.6.7 The only permanent access routes would comprise those access routes to the CSECs at Shipton and Tadcaster and the access route to Overton 400/275kV Substation. No permanent access routes are required at Monk Fryston Substation as the access route to the existing substation would be used for construction access and continue to be used for the new substation (**Figures 3.2 and 3.4, Volume 5, Document 5.4.3**)

3.6.8 Construction of the temporary and permanent access routes would comprise vegetation removal and management; construction of bellmouths (see **Figure 3.16**) at access entrances from the public highway; installation of temporary wheel wash/'rumble strip' facilities, where required, to remove excess material before vehicles re-join the highway; fencing and gateways to keep livestock and the public away from construction activities; drainage; and where required, culvert crossings and temporary bridges to cross watercourses. Various surfaces would be used for the temporary access routes depending on ground conditions. Access routes and the typical types of surfaces these would comprise are as follows:

- Existing surface: Use of existing access routes with minimal, if any, improvements required (e.g. works to the existing surface if condition requires).
- Panel (also referred to as trackway): Used for the majority of temporary access routes for the reconductoring works and access to existing infrastructure, these comprise temporary metal or plastic interlocking panels normally laid directly onto the ground which would be delivered to site by HGV. These would be off-loaded and laid on the ground without the need for vegetation/ topsoil stripping. This form of access would typically be 3m in width and all panels would be removed once construction works are complete.
- Stone: Used for the majority of temporary access routes to new pylons, these surfaces are typically formed of imported stone (or crushed rock) on a geotextile membrane. Topsoil would be removed and stockpiled avoiding higher risk flood zones 2 and 3 wherever feasible and a geotextile membrane laid to separate the stone from the underlying soil. Stone would be delivered via tipper trucks, spread on site and using a vibrating roller compacted to the desired finish. The final finish is generally gently cambered to aid with removal of water and would sit just above the existing ground level either side. The stone road would be dismantled in the reverse procedure, geotextile membrane recovered and ground reinstated. Such access routes would be 4.5m wide and up to 9m wide for passing places excluding any soil storage or fencing running along the access.
- Black top: Used for permanent access routes, these surfaces comprise of tarmac, or similar road finishing surface.

3.6.9 **Figure 3.15** illustrates the key stages from the construction of a stone access road and **Figure 3.16** illustrates how a bellmouth is installed. Illustrative layout and cross-section plans showing interlocking panels and stone access roads as well as an illustrative bellmouth layout are provided in **Volume 2, Document 2.15.**

Figure 3.15 – Installation of a stone access road

Step 1 The topsoil is stripped from the land where the road would be built

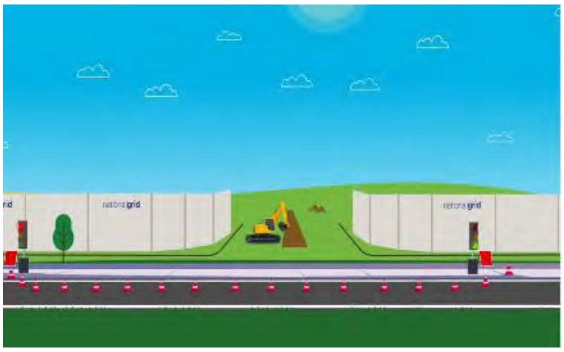
Step 2 A layer of synthetic material is installed to allow water to filter through the service, and protect the subsoil from the stone laid for the road surface

Step 3 Highways specification stone is then laid for the road surface

Step 4 The road is then rolled and topped with a layer of smaller stones which vehicles can drive over

Step 5 Wheel washes are installed to ensure dust and soil from site does not leave

Figure 3.16 – Installation of a bellmouth



Step 1 Safety measures including hoarding where needed and traffic management are installed prior to works beginning

Step 2 The soil is stripped to a depth of at least 1 metre. Any services in the verge would either be diverted or worked around

Step 3 Kerb lines would be installed along the edge of the bellmouth

Step 4 Highway specification stone is laid on to the excavated site

Step 5 A suitable, durable layer of material is laid as the final road surface

Step 6 Road markings (for permanent bellmouths) are painted and traffic signs installed as per agreement with the local highways authority

Access roads and construction traffic

3.6.10 An assessment of traffic and transport effects is presented in **Chapter 5.2.12. Traffic and Transport, Volume 5, Document 5.2.12.** In addition, a **Construction Traffic Management Plan (CTMP)** (**Volume 5, Document 5.3.3F**) details the measures which would be implemented during construction to minimise effects on users of the public highway network.

3.6.11 A number of vehicle types would be used during the construction works. **Table 3.1** provides a list of the types of vehicles required during construction of the elements of the Project, outlined by classification.

Table 3.1 – Vehicle classifications

Light Vehicles (LVs)	Heavy Goods Vehicles (HGVs)
4x4/Pickup	Fuel Tanker
Crewe Minibus	Grab Wagon
Welfare Van	20 tonne Tipper
Maintenance Van	Low Loader
Cars	Concrete Mixer
Security Vans	HIAB Wagon
Tractor	Skip Wagon
Towed Elements	Small Crane
ATV	Medium Crane
	Large Crane
	Road Sweeper
	Abnormal Indivisible Loads (AILs)

3.6.12 **Table 3.1** is not exhaustive and has been based on projects of a similar type/scale/complexity. Construction machinery and on-site plant, vehicles and generator fuel tanks would be re-fuelled on site.

3.6.13 During the construction phase, there is a requirement for delivery of abnormal loads to the substations, which include Super Grid Transformers (SGTs) at Overton and Monk Fryston Substations and for the cable drums to be delivered to the construction compounds at Shipton and Tadcaster. Overton 400/275kV Substation and Monk Fryston Substation. These abnormal loads would constitute Abnormal Indivisible Loads (AIL) as they cannot be broken down into smaller loads for transport. The requirements for AIL deliveries are expected to be via the following routes:

- SGT and cable drums to Monk Fryston Substation: Access via A1(M) – A63 – Rawfield Lane;
- SGT and cable drums to Overton 400/275kV Substation: Access via A1(M) – A64 – A1237 – A19 – Overton Road;
- Cable Drum delivery to the Tadcaster CSEC construction compound: Access via A1(M) – A63 – A659; and
- Cable Drum delivery to the Shipton CSEC construction compound: Access via A1(M) – A64 – A1237 – B1363 – Corban Lane.

3.6.14 Further information on the AIL assessment is provided in the CTMP (**Volume 5, Document 5.3.3F**).

3.6.15 Proposed construction traffic routes for Light Goods Vehicles (LVs) and Heavy Goods Vehicles (HGVs) have been identified and agreed with the Local Highways Authorities. The main considerations for the routes chosen were to:

- use the shortest route from the bellmouths to the primary distributive network (i.e. local roads managed by NYCC, CYC, LCC);
- avoid settlement and any other sensitive receptors to reduce congestion and minimise effects in cities, towns and villages; and
- minimise travel on the local road network by using internal access routes where possible.

3.6.16 All construction traffic will be required to adhere to the prescribed routeing strategy set out in the **CTMP** (**Volume 5, Document 5.3.3F**). No road closures are proposed as part of the construction works for the Project but traffic management measures such as temporary traffic signals and road narrowing/widening would be implemented at some locations.

3.6.17 Temporary signage will be erected along construction traffic routes on the local road network to provide access (directional) routeing information. These will be placed to ensure that construction vehicles and staff are able to travel directly to the Site from the strategic road network (motorways and trunk roads managed by National Highways).

3.6.18 Temporary signage will also be erected in the vicinity of each construction access location and will also warn other road users of the likely presence of construction vehicles.

3.6.19 Internal site access routes will have temporary signage to provide drivers with information on distances to destination and warning (hazard) information relating to potential vehicle conflict or pedestrian conflict areas (cross over points).

Compounds

3.6.20 Typically, construction compounds for the Project would be installed by stripping topsoil, which would be temporarily stored on site as bunding within and around the construction compound. The compound would then be constructed, in a fenced-off area, with material laid to surface the compound, which would typically be aggregate comprising crushed hardcore and concrete. Temporary site drainage including installation of any filter drains or ditches and construction of any measures to attenuate run-off, would be installed. Temporary structures would then also be installed such as welfare and office facilities for construction personnel and diesel generators installed. For the purposes of the environmental assessment, at this stage of the design it is assumed that any temporary cabins or structures at the compounds would be double storey in height (approximately 5.5m). An illustrative compound layout is provided in **Volume 2, Document 2.15**. Where required, the fencing type would take account of the need to minimise landscape and / or noise effects on nearby receptors (**Embedded measures schedule, Volume 5, Document 5.3.3A**).

Lighting

3.6.21 During construction, lighting along the overhead line will be required only exceptionally with the majority of activities being undertaken in daylight hours. There may be a need for lighting during limited night-time works. Further information on the construction lighting scheme can be found in the **CoCP, Volume 5, Document 5.3.3B**.

Working areas

3.6.22 Construction working areas would be established around each pylon to provide a secure area within which works would take place.

3.6.23 The typical pylon working area around both new and existing pylons would be approximately 50m by 50m (2,500m^2), depending on ground conditions and location. In some locations the working area has been reduced to avoid sensitive features such as veteran trees. Measures to ensure ground protection for the loads that are to be imposed by construction plant such as piling rigs, mobile cranes and mobile elevating work platforms (MEWPs) and for the delivery of materials would be implemented as part of the working area.

3.6.24 For the new pylons, construction of working areas would comprise stripping and stockpiling of the topsoil, laying of geotextile membrane which would then be covered with a stone layer, and drainage where required. On completion of the works, the stone and geotextile membrane would be recovered and removed from site, topsoil replaced and the area reinstated, including any planting which may be required. For existing pylons, trackway panels would be used to provide a stable area for material delivery, storage and handling. Each working area would be fenced and welfare facilities provided.

3.6.25 Working areas would also be required at locations where works would be needed to lift equipment onto the pylons. This could include lifting insulator sets, smaller pieces of pylon steelwork or working platforms. For new suspension pylons an area of approximately 25m^2 either side of the working area would be required for these activities. For a new build tension type lattice pylon an additional temporary 'holding out' area (an area used to install the conductors) of approximately 35m by 25m beyond the cross-arms each side of the working area would be used. For pylons being dismantled, working areas up to 60-80m along the alignment from the pylon may be required to attach stays (wires) to facilitate the dismantling process.

3.6.26 Equipotential Zones (EPZs) are working areas (illustrative lattice pylon working area plans are provided in **Volume 2, Document 2.15**) which to provide protection to personnel from the effects of electrical voltage differences that may arise whilst lowering, raising or restringing overhead line conductors. These would be created where all the stringing equipment and machinery would be positioned. The EPZs would comprise a mat of linked conducting metal panels, which the stringing machine sites would sit on. The EPZs would be positioned within the larger stringing area at tension pylon sites, where required.

Installation of scaffolding

3.6.27 Temporary scaffolding would be required at various locations during the works as a safety measure to protect other infrastructure such as roads and railways from the accidental dropping of conductors and any of the associated equipment during the construction works for the new overhead lines and works to existing overhead lines including temporary overhead line diversions. Some trees are likely to require removal or trimming to allow for placement of the scaffold structures or the netting between the scaffold structures. A detailed tree survey and Arboricultural Impact Assessment (AIA) has been completed (see **Appendix 3.I** within **Volume 5, Document 5.3.3I**). The Trees and Hedgerow Potentially Affected Plan (**Volume 2, Document 2.11**) indicates those trees and hedgerows which are likely to be removed, affected or potentially affected by the works. The scaffolding would be typically transported to the site using a lorry or tractor and trailer and assembled by hand either side of the infrastructure being protected. Scaffolding would be needed in two locations across the River Ouse. Navigation would be maintained whilst scaffolding is in place. The Public Rights of Way Management Plan (**Volume 5, Document 5.3.3G, Appendix 3G**) provides further information on how effects on navigation whilst scaffolding was being installed would be managed. Scaffolding protection areas are shown on **Figures 3.1 to 3.6, Volume 5, Document 5.4.3.**

Culvert crossings

3.6.28 Where access routes need to cross a drainage ditch or watercourse it is likely a temporary culvert would be installed. To construct the culvert a dam made from sandbags and geotextile would be installed in order to create a dry work area within the ditch/watercourse. Silt-laden water from the work area would be pumped out into a sediment trap, before being dispersed into the watercourse. Clean water upstream of the dam, would be diverted around the area of works and pumped downstream.

3.6.29 The base of the watercourse would be excavated to approximately 100mm to prevent scouring of the bed of the watercourse downstream of the flume. A flume would be put in place and the area around it backfilled with subsoil or hardcore or concrete placed on a layer of geotextile membrane to complete bridging up to sub-grade level. Culverts would take between 1 – 5 days to install depending on the scale of the works. Culvert construction details and cross-sections are shown on the Illustrative Culvert Construction Details plan in **Volume 2, Document 2.15** and culvert locations are shown in **Figures 3.1 to 3.6, Volume 5, Document 5.4.3.**

Temporary bridges

3.6.30 Temporary short span bridges would need to be installed for access over those watercourses that are not suitable for culverts either due to the physical properties of the watercourse or due to nature conservation constraints. Installing a temporary bridge avoids the need for any in-channel waterworks which can produce silt and damage to the banks of the watercourse (see the Illustrative Bridge Details for Overhead Line Construction Plan, **Volume 2, Document 2.15** for typical short span temporary bridge details).

3.6.31 Civil works are undertaken either side of the crossing to provide pads and ramps for the temporary bridge. Typically beams are placed over the watercourse onto each side of the bank and then connected. Roadway panels are then lifted onto the beams and connected to allow safe passage of vehicles. Locations where the use of temporary bridges rather than culverts is proposed are set out in the Embedded Measures Schedule (**Appendix 5.3.3A**, within **Volume 5, Document 5.3.3A**) shown on **Figures 3.1 to 3.6, Volume 5, Document 5.4.3**.

Diversion of existing third party utilities

3.6.32 Where the proposed overhead lines crosses over a number of third party utilities, these would need to be diverted or in the case of lower voltage overhead lines, placed underground. These comprise

- undergrounding of 11kV overhead lines which cross the existing or proposed alignments between YR037 and YR038, YN004 and YN005, YN006 and YN007, XC426 and XC 427, XC477 and XC478, XC494 and XC 495, XC498 and XC499, XC511 and XC512 and along the proposed access to SP005;
- undergrounding of 33kV overhead lines between XCP008 and XCP009, XC477 and XC478, XC481T and XD002T and XC497 and XC498;
- diversion of a medium pressure gas pipeline at Tadcaster Tee East CSEC and underground cable; and
- diversion of watermain pipeline at Monk Fryston Substation.

3.6.33 The locations for these diversions are shown on **Figures 3.1 to 3.6, Volume 5, Document 5.4.3.**

3.6.34 For the undergrounding of the 11kV and 33kV overhead lines the extent of working areas would be 12.5m either side of the centre line of the 11kV or 33kV route. A mini digger would be used to dig the cable trenches and install the underground cables in ducts to a depth of 1.2m from the top of the duct. At the end of cable sections, the cable would run up the wooden pole, terminate and connect to the overhead 11kV or 33kV lines. However, new wooden poles may be required at either end of the cable sections to support the underground cable, its terminations and fixings. The poles would be installed by auger from a lorry or unimog. It would take approximately two weeks to complete each crossing and these would commence in advance of construction works for the Project taking place. The cables do not require the loss of any substantial or sensitive vegetation and are short stretches of undergrounding. There would be ground disturbance for a short duration during construction, however the soil would be replaced and re-seeded where necessary with the ground restored to its former vegetative cover and could be deep ploughed due to the depth of the cable ducts.

Construction of new pylons

3.6.35 Once working areas are in place, new foundations would be installed for each new pylon. Detailed design by the main works contractor taking account of ground investigation works would be undertaken to determine the specific nature and design of the foundations, but they are likely to comprise one of the following installation methods.

- Pad and column foundations: Excavations would be made for each of the four pylon legs; the concrete would be cast to create the pad and column for each pylon leg. Once the concrete has ‘set’ (hardened), the excavation can be backfilled with soil and then compacted in layers back to ground level. Remaining subsoil would be spread around the foundation legs. Tension pylons and terminal pylons generally require larger and deeper foundations than suspension pylons.
- Piled foundations: In areas where ground conditions are unsuitable for standard pad and column foundations, vertical/inclined tube pile foundations or bored mini pile foundations, both connected by a pile cap at or below ground level would be installed. The tube piles would be driven into the ground using a piling hammer supported by a piling rig. The piling rig and hammer can have a combined weight of approximately 55 tonnes and would be transported to site on a low loader(s).

3.6.36 Once the foundations are in place crane pads, which would be needed for new or dismantled pylons, or for pylons which need works to be carried out to the cross arms, would be installed within the pylon working area. Such foundations would accommodate the weight of loads imposed by the crane and consist of steel plates, timber (sleepers) or a depth (approximately 600mm) of compacted stone with geotextile membrane, or a combination of both.

3.6.37 The steelwork making up the pylon would be delivered to the pylon working area in bundles from one of the construction compounds using seven tonne trucks equipped with small hydraulic cranes for offloading. Alternatively, if access conditions permit, the pylon steelwork would be delivered directly from the supplier using larger HGV transport with a small crane to off-load the steelwork at the pylon working area.

3.6.38 Pylon steelwork would be bolted together on site in sections. A telehandler or tractor with a rear mounted crane is typically used to manoeuvre panels on site for assembly and can also be used to erect the lower pylon panel on the foundation stubs. A mobile telescopic crane would be brought onto site to lift the remaining assembled sections of lattice pylon into position.

3.6.39 The final stage, known as stringing, would be to install the overhead conductors (including the earthwire or optical ground wire (OPGW) – the wire which runs along the top of the pylons). Scaffolding, typically 20m depth, would be required at locations where the overhead conductors would cross over roads, railways and rivers, with protection measures put in place to prevent overhead conductors coming into contact with the feature they are crossing. The overhead conductors are typically installed in sections between two tension pylons. The new conductors and obstacles that they oversail must be protected from damage during the stringing procedure so the conductors are pulled with a winch at one end of the section, and a tensioner (effectively a hydraulic brake) at the other so they remain above ground under tension as they are pulled through.

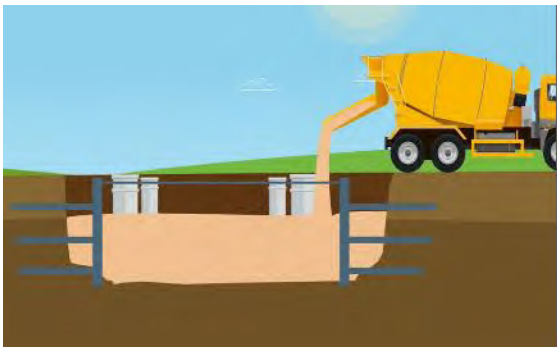
3.6.40 Light pilot wires are run out at ground level (and over temporary scaffolding protecting obstacles, roads etc.) along the full length of the section, between the two ends of the stringing section. Light pilot wires may be pulled through by tractor or tracked vehicle. The light pilot wires are fed through running out blocks (large pulley wheels to enable the conductors to travel freely) suspended beneath the cross arms of all the pylons in the section and then fed round stringing machines at the winch and tensioning sites in preparation for pulling through the section. The light pilot wires are used to pull through heavier stronger pilot wires which in turn are used to pull the conductors through from their drums. When the new conductor is fully run out, it is raised to its finished tension and height above ground, clamped to tension insulator strings at the tension pylons and lifted from the running out blocks into suspension fittings at the end of insulator strings on suspension pylons. Finally, conductor fittings such as vibration dampers and conductor spacers are installed through each span.

3.6.41 The earth wire or OPGW which runs along the top of the pylons would be installed using a similar method. The OPGW contains optical fibres to allow the transmission of data around the system to ensure safe operation. Fibre optic joint boxes are installed at pylon locations to allow the transmission of data along the overhead line. At each substation the fibres are taken via underground cable into a control room for interface with the control and communication system and wider transmission to overall UK network control centre. **Figure 3.17** illustrates how a lattice pylon is constructed. Plans showing illustrative pylon footprints and foundations are also provide in **Volume 2, Document 2.15.**

Figure 3.17 – Construction of a lattice pylon

Step 1 A temporary site access is built for construction traffic

Step 2 The area is cleared at each pylon site to create a working area



Step 3 The pile foundations are built and kept in place with pile caps which the legs of the pylon sit on top of

Step 4 The pylon is lifted into place in four parts

Step 5 Insulators are attached to each arm and cables are pulled through each insulator and connected to the next pylon

Step 6 Once everything has been checked, the site access is removed and land reinstated as per agreement with the landowner

Refurbishment and reconductoring works at existing pylons

3.6.42 Works to existing pylons would comprise repair or strengthening of foundations, replacement of steelwork and replacement of the overhead conductors and fittings, where required. Some existing pylons within the Order Limits would require works to their foundations. Further investigation would be completed by the appointed contractor to determine the pylons that would need foundation repairs. An overview of the foundation works that may be required comprise the following:

- Vegetation management: Removal of any vegetation around the pylon legs so that the foundations can be inspected and repaired as required.

- Major repairs: Works comprising excavation down to a depth of approximately 0.5m and the removal and replacement of concrete foundations where the existing concrete has become cracked or damaged.
- Minor repairs: Localised repairs needed to reinstate the concrete finish on the foundations where the visible part of the concrete foundation has damage such as cracked or chipped concrete.
- Buried repairs: Where concrete foundations are not visible (or are only just visible) at ground level this involves excavation and removing the top surface of the concrete and adding new concrete to above ground level.
- Strengthening: Bespoke foundation works, the requirement for which would be identified through ongoing investigations. Strengthening works could range from the installation of additional kentledge (weights) placed on the ground through to installation of mini-piles, concrete ring beams and tying all back to the existing foundations.
- Painting: All foundation muffs would be painted with protective paint to ensure long term protection where required.

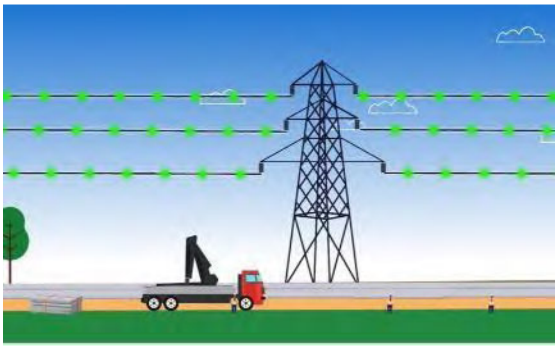
3.6.43 Some existing pylons would require the replacement of pieces of steelwork and fittings, although the pylon itself would remain in place. The cross arms would also need to be upgraded on some of the pylons prior to the installation of the new conductor system. New crossarm steelwork would be delivered to site, assembled, the existing crossarms and conductors removed and new crossarms installed using a mobile telescopic crane.

3.6.44 The conductor system on the existing pylons on the 275kV XC overhead line between Overton and Monk Fryston would be changed from a single conductor system to a twin conduction system and upgraded so that two individual conductors can be attached to the crossarm ends via the insulator string and fittings. Some pylons would require additional steelwork to be attached to the crossarms to enable attachment of the proposed twin conductors.

Removal of existing pylons

3.6.45 Where required, the dismantling of pylons would involve removing the conductors and then lowering the insulators and fittings to the ground. Where the pylon is located in a clear area and it is safe to do so, the pylon would be removed by cutting the pylon legs, attaching a steel wire rope or bond to the top of the pylon and then pulling over the pylon using a tractor with a winch. Alternatively, a mobile crane would dismantle the structure in sections which would then be lowered to the ground. Once dismantled, the pylon steelwork is typically broken up on site then removed. The reinforced concrete foundation would then be removed (for the purposes of the assessment this is assumed to be to a depth of approximately 1.5m below ground level), the remaining section of the pylon leg (stub) cut off, the excavation backfilled, ground reinstated and the concrete, reinforced concrete and steelwork removed from site to a suitable licensed waste management facility or recycled. **Figure 3.18** illustrates how a pylon is dismantled.

Figure 3.18 – Dismantling of a pylon



Step 1 A temporary site access is built for construction traffic

Step 2 The wires and insulators are removed by winching the equipment to the ground

Step 3 Pylon sections are removed using cranes (felling) and the steel is taken off site to be recycled

Step 4 The remaining structure is secured in place whilst the legs are cut and the pylon is lowered safely to the ground and dismantled

Step 5 The final stage is to remove the foundations (to 1.5m) and the road, and reinstate the ground

Installation of temporary diversions of overhead lines

3.6.46 Each temporary diversion of an overhead line would be designed specifically to the ground conditions present, and would use temporary structures. The overhead line diversion would be constructed using the methodologies outlined in this section. Once construction works are complete the temporary diversion would be removed, including any foundations (to a depth of 1.5m), and the ground conditions reinstated.

Construction of CSECs

3.6.47 Once construction compounds and access roads are installed, the topsoil at the CSEC site would be stripped and removed from site. Earthworks, including any required cut and fill, will then be undertaken to establish a level platform upon which the CSEC would be constructed. Any required surface water drainage features would be installed at this point. Working areas would be established within the compound footprint for equipment foundations. Surplus material from constructing the CSEC foundations would be removed from site.

3.6.48 The main CSEC construction works would comprise the installation of site perimeter security fencing 2.4m in height, stone surfacing and reinforced concrete pads, which would form the foundations of the equipment, including gantries and anchor blocks. It is assumed no piles are required at this stage of the assessment, but this will be confirmed through ground investigation.

3.6.49 The equipment supporting structures within the compound would be installed and constructed on the prepared concrete foundations, including gantries, earth switches, disconnectors and post insulators on steel or aluminium structures.

3.6.50 The high voltage (HV) cables would be pulled into place and terminated into the new cable sealing equipment. The overhead line conductors would be dropped onto the new gantries/anchor blocks and commissioned with all other HV plant. The final elements of the works would be to undertake works to test the new HV plant, cables and amended overhead lines.

3.6.51 The CSEC locations are shown on **Figures 3.2 and 3.4 (Volume 5, Document 5.4.3).**

Installation of CSEC underground cables

3.6.52 Underground cables would typically be installed in trenches, assumed at this stage to be approximately 1.0m deep to connect the CSECs. The cabling route would be fenced off and within this area drainage, stockpiles for topsoil and sub-soil, access or haulage road and trenches would be installed.

3.6.53 In the Tadcaster Area, it is assumed that horizontal directional drilling (HDD) would be used to install the cable due to the presence of gas pipelines with appropriate health and safety measures implemented. This would comprise the construction of two pits at either end of the section of cable to be installed. At one end of the cable route, drilling equipment would be launched to drill the cable route to the second pit. A wire called a bond would be attached to the drill and this would be used to pull the cable routes through the drilled cable route.

3.6.54 Any excavated material from the cable installation at Tadcaster would be moved off-site. Cable drums would be delivered to site using an abnormal indivisible load (AIL) and a crane used to offload and position the cables. Cables would typically be winched into position along the trench, and where applicable through each duct as part of the finished HDD work, before being laid onto a specially prepared layer of supporting material. Each cable trench is likely to be part filled with a specially selected backfill material to improve thermal properties and cable and circuit performance. Once works are complete the construction works area would be reinstated and any waste material removed from site.

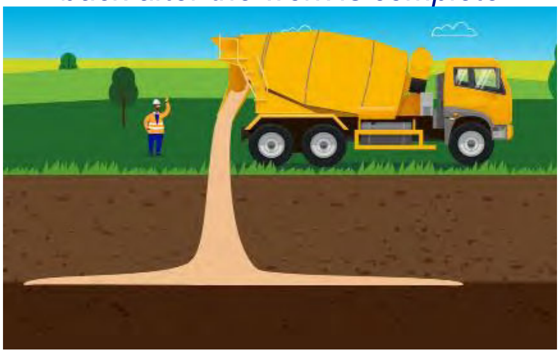
3.6.55 **Figures 3.19 and 3.20** illustrate how underground cables are laid using open trenches and HDD methods. The underground cable locations are shown in **Figures 3.2 and 3.4 (Volume 5, Document 5.4.3)** and illustrative plans showing 400kV and 275kV underground cable cross sections as well as an HDD cross section are provided in **Volume 2, Document 2.15.**

Figure 3.19 – Installation of underground cables using open trenches

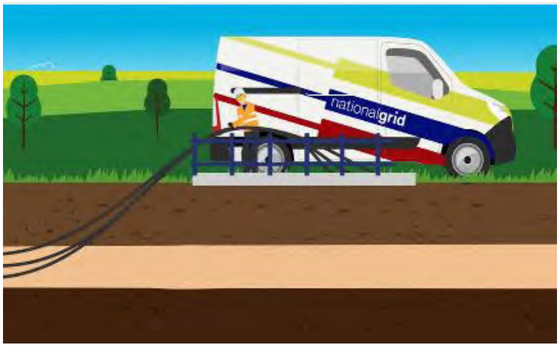
Step 1 Cables are installed in six trenches, adjacent to the temporary site access

Step 2 The topsoil is removed and stored alongside the trenches so it can be put back after the work is complete

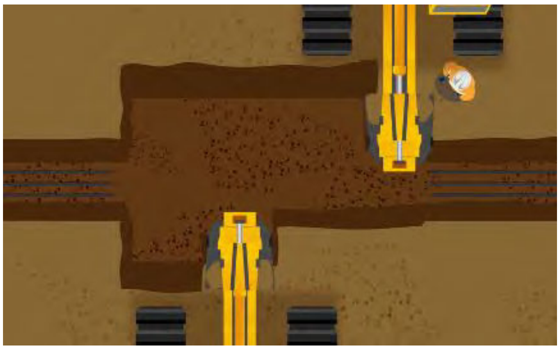
Step 3 Trenches are dug



Step 4The trenches are filled with cement to manage the any heat transmitted from the cables



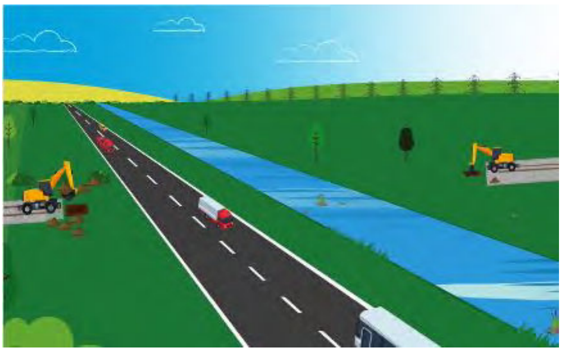
Step 5 The cables are then laid along the length of the trench, either directly on the cement or within ducts



Step 6 Trenches are then joined via a wider area called a joint bay

Step 7 The topsoil is reinstated on top of the trenches and the site access removed

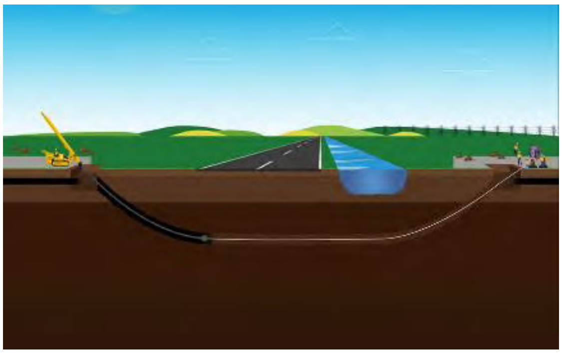
Figure 3.20 – Installation of underground cables using HDD



Step 1 The topsoil is removed for the temporary site access and two pits are dug either side of the section of cable

Step 2 From one pit a drilling machine that drills beneath the obstacle to the other side is launched

Step 3 A wire called a bond is attached to the drill and is pulled back to the other side of the works



Step 4 The bond is used to pull the ducts (the tubes that house the cables) through the newly drilled route

Step 5 Once complete the above ground sites are reinstated and the site access removed

Construction of substations

3.6.56 Once construction compounds and access roads are installed, the topsoil at the substation site would be stripped and stored for permanent landscaping and cut and fill undertaken to establish a level platform upon which the substation could be constructed. Surplus material from constructing the substation foundations would be retained on site as permanent bunding. Working areas would be established within the substation footprint for equipment foundations.

3.6.57 The main works required for the construction of new substations would comprise the installation of site perimeter security fencing 2.4m in height, stone surfacing and a reinforced concrete pad, which would form the foundations of the substations building and equipment. It is assumed no piles are required at this stage of the assessment, but this will be confirmed through ground investigation. Ducting and trenches would be installed for high and low voltage cables and permanent site drainage constructed, which is likely to comprise filter drainage and an attenuation pond for surface water and piped drainage for the oily water drainage system. Bunds for the SGTs would be constructed and connected to the drainage system.

3.6.58 The structures within the substation would be installed and constructed on the prepared concrete foundations, including a diesel generator, full line tensions gantries and the SGTs, as well as high voltage plant (such as earth switches, disconnectors, circuit breakers and busbars) installed on steel or aluminium structures. Other low voltage equipment would also be installed. A control building would be constructed and connected to electricity and water supplies as well as the drainage system and control and protection equipment installed within the building. The final elements of the works would be to install and/or modify existing protection and control equipment including associated cabling and undertake works to test the new and amended overhead lines.

Reinstatement works

3.6.59 Once the Project is constructed, the temporary access routes and working areas at the associated pylon, scaffold sites and around the CSECs and substations would be removed (except where temporary access has been put in through a hedge or fence line where the access route would be replaced with 4m gate or fence) and the ground reinstated by removing stone and, where appropriate, trackway panels. The ground would then be reinstated, and soils would be restored to their previous condition. Other surfaces would be reinstated, and widened accesses would be restored to a condition like, but no worse than their condition at the commencement of the works.

3.6.60 Tree planting and hedgerow replanting would be implemented following construction as part of the reinstatement works. The majority of new planting would be at the same location as trees that are removed but where this is not possible (for example, because they are within a pylon footprint) planting would be at a suitable location as close as possible to the original trees. Further details about the way trees and hedgerows are affected by the Project are provided in the AIA (**Appendix 5.3.3I** within **Volume 5.3, Document 5.3.3I)**.

3.6.61 A Tree and Hedgerow Protection Strategy (THPS) will be prepared in accordance with BS 5837:2012 (Trees in relation to design, demolition and construction) identifying the trees, groups of trees and hedgerows to be retained and protected during the works.

Land drainage

3.6.62 Construction works would be undertaken in fields where land drains are known to exist (by way of land drainage plans and landowners knowledge) and in areas where, although no plans are available, they are considered likely to exist.

3.6.63 Land drainage works would be undertaken to retain the integrity of the existing land drainage systems. Works would also be undertaken to mitigate against potential surface water flooding during the construction works. Land drainage is proposed for each of the working areas within the Order Limits. The detailed arrangement of land drainage pipes has not been designed and is subject to highly variable localised changes in topography, existing land drainage and the location of an appropriate outfall point.

3.6.64 Pre-construction land drainage would be installed prior to topsoil stripping and after temporary fencing or spraying off/removal of standing crops. Land drainage would be installed to a depth below ground level to establish positive connections of existing land drainage systems or via drainage stone backfill wherever possible and where levels allow. Trench widths are likely to be a minimum of 125mm and maximum of 200mm for pipe diameters as specified and an average of 1m deep. Any removed topsoil stockpile would be placed back over the drain or spread back over the local area.

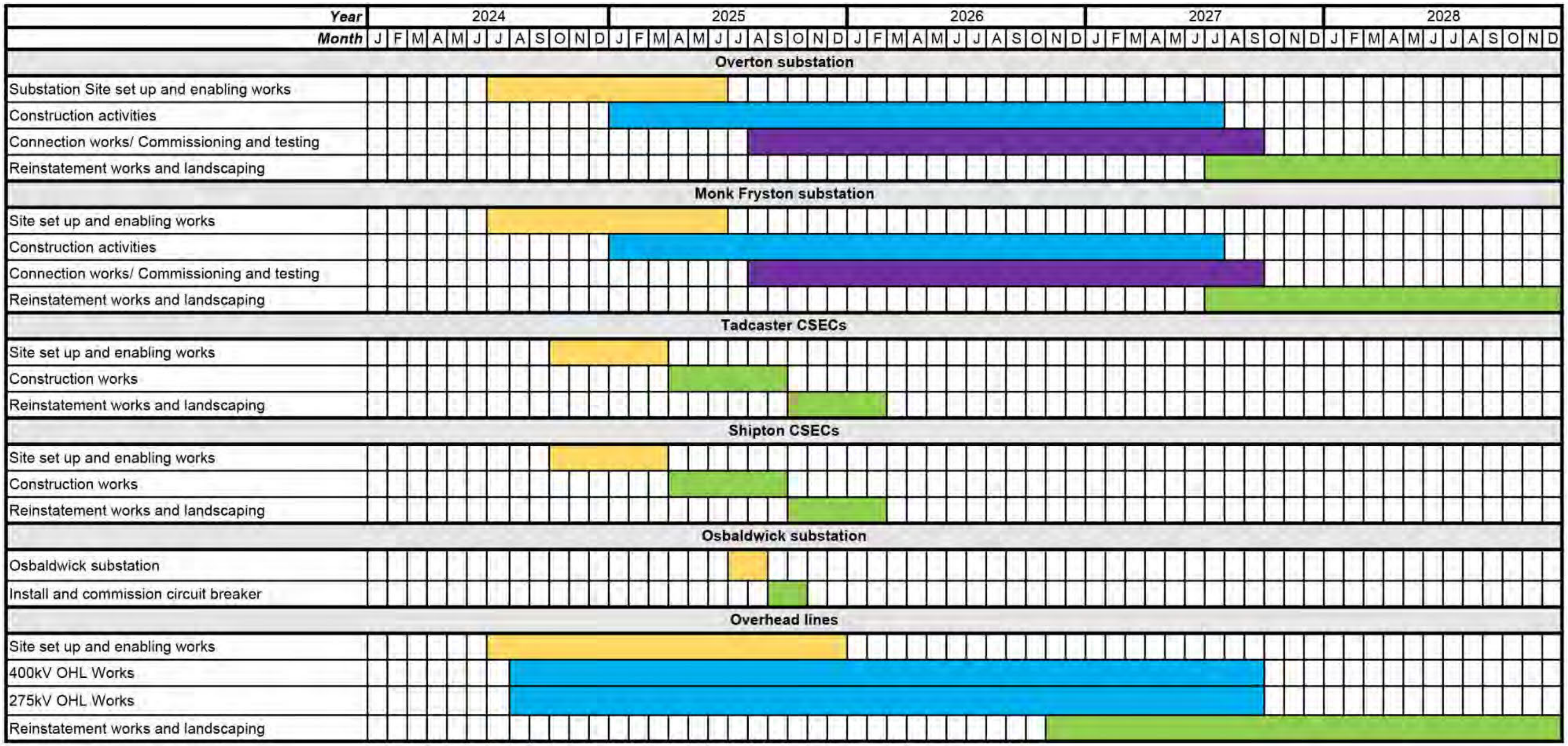
3.6.65 Land Drainage Consent (also known as Flood Defence Consent) would be required from the Environment Agency (EA) (Main Rivers) and/or the Internal Drainage Board (IDB) (within the IDB District) for works within 8m of a watercourse. Consent would be required for all other watercourses, but only where in-channel works would be undertaken. Applications for such consents will be undertaken separate to the DCO process.

Project programme

3.6.66 Should consent be granted in early 2024, it is anticipated that access and construction of the project would commence later in 2024, starting with the installation of construction compounds and access. The main construction works would continue through to 2028 when reinstatement is to be completed, with the project becoming operational in 2027.

3.6.67 An indicative construction programme is set out in **Table 3.2**.

Table 3.2 – Indicative construction programme



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3.7 Code of Construction Practice and accompanying management plans

3.7.1 The **Code of Construction Practice (CoCP)** (see **Volume 5.3, Document 5.3.3**) provides an overview of the standard construction management measures that would be implemented as part of the Project. It seeks to ensure that construction activities for the Project are carried out in accordance with legislation and best practice to minimise the effects of construction on the environment and local communities.

3.7.2 The objectives of the CoCP are to:

- provide a mechanism for delivering many of the embedded environmental measures described in the ES, various management plans and the Requirements of the DCO;
- ensure compliance with legislation through consultation with, and by obtaining necessary consents and licences from, statutory bodies (see also **Volume 7, Document 7.3**);
- ensure environmental best practices are adopted throughout the construction stage;
- ensure a prompt response should any unacceptable adverse effects be identified during the works; and
- provide a framework for mitigating unforeseen or unidentified effects, should they occur.

3.7.3 The CoCP is prepared and submitted as part of this application and will be secured via DCO Requirement 5. It is accompanied by the following plans, scheme and strategy.

- Archaeological Written Scheme of Investigation (V**olume 5.3, Document 5.3.3C**): Sets out the aims, objectives, proposed scope, standard for completion (including any post excavation analysis of artefactual material and dissemination of results) and project management procedures for the proposed investigative works which are intended to mitigate the adverse effects of the construction of the Project on archaeology.
- Biodiversity Mitigation Strategy (**Volume 5.3, Document 5.3.3D**): Sets out the general and species or habitat specific biodiversity measures to be implanted during construction and operation to avoid, reduce and compensate for negative biodiversity effects to comply with legislation and best practice in respect of biodiversity.
- Outline Soil Management Plan (**Volume 5.3, Document 5.3.3E**): Sets out the principles and procedures for good practice as well as bespoke mitigation measures in soil handling, storage and reinstatement that the appointed Contractor will follow to minimise adverse effects on the nature and quality of the soil during construction.
- Construction Traffic Management Plan (**Volume 5.3, Document 5.3.3F**). Sets out the measures to be implemented to provide mitigation for the traffic generated during the construction of the Project to minimise the impact on existing users of the public highway network.
- Public Rights of Way Management Plan (**Volume 5.3, Document 5.3.3G**): Sets out the construction management measures that would be implemented to avoid and minimise effects on PRoW as well as navigation along the River Ouse during this phase of the Project.

- Noise and Vibration Management Plan (**Volume 5.3, Document 5.3.3H**): Sets out the noise and vibration control measures and monitoring proposals for all above and below ground works associated with the construction and operation of the Project. It provides the overarching general principles, controls and arrangements that will be applied to the Project, subject to any amendments that may be agreed through the DCO process, to protect noise sensitive receptors.

Other plans

3.7.4 A number of other plans/strategies would be needed prior to commencement of the works and will be secured via DCO Requirement 6. These are currently anticipated to be:

- soil and aftercare management plan;
- drainage management plan;
- pollution incident control plan;
- lighting scheme;
- emergency response plan for flood events;
- site waste management plan; and
- tree and hedgerow protection strategy; and
- detailed soil management plan.

3.8 Enhancement measures and biodiversity net gain

3.8.1 Biodiversity Net Gain (BNG) is defined by the Department for Environment, Food and Rural Affairs as "*development that leaves the natural environment in a measurably better state than beforehand*."[8] It follows a process of avoiding and minimising biodiversity loss in the first instance, and providing positive habitat interventions, which result in a measurable net improvement to biodiversity for a development. BNG is measured in 'units' using a biodiversity metric[9], and is addressed separately for habitat areas, linear habitats (hedgerows and lines of trees), and rivers.

3.8.2 The Environment Act 2021 will mandate for NSIPs to achieve BNG and is expected to come into force in 2025, with a requirement to achieve a minimum 10% uplift in biodiversity value. The Environment Act 2021 requires that this is calculated using an appropriate biodiversity metric and maintained for a specified period, as will be detailed in the biodiversity gain statement of the applicable National Policy Statement (NPS). The current NPSs (EN-1, EN-5) do not make explicit reference to BNG.

[8] Defra. (2019). Biodiversity Net Gain Definitions and Current Practice. (Online) Available at: https://consult.defra.gov.uk/land-use/net-gain/user_uploads/02.-definitions-and-current-practice.pdf (Accessed: 25 July 2022).

[9] Natural England (2022). The Biodiversity Metric 3.1: Auditing and accounting for biodiversity; Calculation Tool.

3.8.3 In September 2021 government published the Draft NPS EN-1[10] for consultation. Section 4.5 Environmental and Biodiversity Net Gain sets out the government's draft policy as it applies to NSIPs. It notes that projects should seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity where possible, encouraging applicants to use "*the most current version of the Defra biodiversity metric*". It also highlights that "*any habitat creation or enhancement delivered for biodiversity net gain should generally be maintained for a minimum period of 30 years*".

3.8.4 Government also issued a Draft NPS EN-5[11] in September 2021. Advice on the specific opportunities provided by linear electricity networks infrastructure is provided in Section 2.8 of Draft NPS EN-5.

3.8.5 National Grid's commitment to delivering environmental gain and BNG is independent of development consent requirements. However, the framework and Biodiversity Metric being developed by Defra/Natural England on behalf of the UK Government to fulfil the mandatory delivery of BNG provides a robust, recognised, and supported system for delivery. Adopting this approach will allow inter-operability with the BNG elements of National Grid's capital projects, and would be consistent with the Government's mandatory approach, as well as the approach of other regulated businesses and Government agencies (e.g. National Highways).

3.8.6 The BNG Report (**Volume 7, Document 7.9**) provides an initial BNG calculation undertaken for the Project using Biodiversity Metric V3.1 and is based on a worst-case scenario in terms of the temporary and permanent habitat loss likely as a result of the Project. Scenarios for achieving the minimum 10% BNG in line with the Biodiversity Metric trading rules have been modelled. The BNG report identifies the type and quantity of BNG that the Project may need to deliver, noting that for recommendations are made to refining this as the Project construction details are progressed in more detail prior to construction.

3.8.7 The potential for off-site (i.e. outside of the Order Limits) landscape enhancement measures have been considered as part of the landscape and visual assessment. Chapter 6 Landscape and Visual (**Volume 5, Document 5.2.6**) provides more information on the potential off-site enhancement that could be implemented with regards to receptors which are likely to experience significant visual effects.

3.8.8 Therefore BNG and off-site landscape planting have been considered but not assessed in the ES as the delivery of both may fall outside the Order Limits.

3.9 Maintenance

3.9.1 The overhead lines would be subject to annual inspection. The inspection would identify if there are any visible faults or signs of wear and indicate if vegetation growth, or any development has occurred which may risk infringing safety clearances or potentially

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[10] Department for Business, Energy & Industrial Strategy, September 2021, Draft Overarching National Policy Statement for Energy (EN1). (Online) Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf (Accessed 25 July 2022)

[11] Department for Business, Energy & Industrial Strategy, September 2021, Draft National Policy Statement for Electricity Networks Infrastructure (EN5). (Online) Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015238/en-5-draft-for-consultation.pdf (Accessed 25 July 2022).

compromise the integrity of the assets. Following inspections, the programme for undertaking any maintenance or refurbishment work would be confirmed.

3.9.2 The overhead line is made up of a variety of materials, from concrete and steel for the foundations, steelwork for the pylon, glass or porcelain and steel for the insulators and fittings and aluminium for the conductors. All these materials have an expected lifespan, which varies depending on how the overhead line is used and where it is located. Typically, pylons have a life expectancy of approximately 80 years, the conductors have a life expectancy of approximately 40-50 years and the insulators and fittings have a life span of approximately 20-40 years

3.9.3 Infrequent refurbishment work is undertaken typically on one side (circuit) of the pylon and then the other, so that one circuit can be kept 'live' and in use.

3.9.4 Refurbishment can involve:

- the replacement of the insulators and steel fittings that secure the conductors to the pylons;
- the replacement of all the conductors and earth wire and all their associated insulators and fittings; and painting or replacing the pylon steelwork.

3.9.5 During refurbishment there would be activity along the overhead line, more so at tension pylons where sections of the conductor are installed, and the old conductor taken down.

3.9.6 LVs would be used to carry workers in and out of site and HGVs would be used to bring new materials and equipment to site and remove old equipment. Temporary works including installation of access routes and installation of scaffolding to protect roads, railways and footpaths would be required as necessary for the overhead line refurbishment (similar to the initial construction requirements).

3.9.7 The substations are assumed to be unmanned on a permanent basis. Visual checks would be undertaken on a monthly inspection visit to the substation. Maintenance of the substations would be undertaken approximately every three years and would involve electrical isolation of equipment before it is worked on. If the substation requires refurbishment or replacement works, vehicles would be used to carry workers in and out of site and suitable vehicles would be used to bring new materials and equipment to site and to remove old equipment.

3.10 Future decommissioning

3.10.1 The lifespan of the Project is likely to be longer than the anticipated 80 year design life, depending on its condition, any refurbishments carried out and future transmission network requirements, as over time all parts are likely to be refurbished or replaced through maintenance.

3.10.2 At the end of its lifetime, if the overhead line connection is no longer required, overhead lines would be removed. Similarly, equipment within the substations would be removed, structures such as the gantries dismantled and broken up, concrete and buildings demolished, underground cables and other materials removed, and the site restored. Upon removal, most of the material would be re-used if feasible or taken for recycling. Similar access would be required as outlined for construction.

3.10.3 In the event that, at some future date, decommissioning of the Project is required, the draft DCO (**Volume 3, Document 3.1**) sets out a requirement for National Grid to submit a written scheme of decommissioning to the relevant planning authority, at least six months prior to any decommissioning works being carried out.

3.10.4 Any decommissioning works required would then be carried out in accordance with the approved scheme.

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