

2 PROJECT DESCRIPTION

2.1 Need for the Proposed Project

- 2.1.1 National Grid is funded by a price control mechanism which is agreed with, and set by Ofgem, the electricity and gas markets regulator. Ofgem agreed a set of price controls and incentives for the period from April 2013 to March 2021. The price controls and incentives include a provision of £500 million to mitigate the visual impact of existing electricity infrastructure in nationally protected landscapes in Great Britain. National Grid has referred to this as the Visual Impact Provision (VIP). The VIP represents a major opportunity to conserve and enhance the natural beauty, wildlife and environmental heritage within Great Britain's most protected landscapes.
- 2.1.2 In 2012-2013 National Grid prepared a VIP policy statement, setting out how it proposed to use the fund and how stakeholders would be engaged in identifying opportunities for maximising benefits from it. After a public consultation on the draft between July and September 2013 the policy statement was presented to Ofgem for review. The policy statement made it clear that National Grid's objective is *'to achieve the maximum enhancement to the landscape from the available funds whilst ensuring that no significant adverse impacts arise as a result.'*
- 2.1.3 National Grid appointed expert landscape consultants to carry out landscape assessments in 30 English and Welsh AONB and National Parks and to identify suitable VIP Projects to take forward.
- 2.1.4 Following the results of the landscape and visual impact assessment (National Grid Visual Impact Provision Landscape and Visual Impact Assessment of Existing Electricity Transmission Infrastructure in Nationally Protected Landscapes in England and Wales – Technical Report 2014), covering 571km of overhead line (OHL) within the scope of the VIP Project, those sections of OHL which had the greatest visual impact on the surrounding landscape were identified.
- 2.1.5 A national Stakeholder Advisory Group (SAG) was set up by National Grid in early 2015 to guide and advise National Grid in identifying and selecting projects to use the fund in the most efficient way and deliver maximum benefit in terms of enhancing the landscape. The SAG comprises organisations dedicated to conserving the landscape and countryside throughout England and Wales. The SAG helps National Grid to make decisions according to the guiding principles set out in the VIP policy document¹.
- 2.1.6 The SAG reviewed the Technical Report (2014) and endorsed its findings, short listing 12 sections of OHL in eight AONBs and National Parks as having the most significant landscape and visual impact. Each of the short-listed AONBs and National Parks were studied to examine their ecology, archaeology, land ownership, geology and a range of other important factors including views obtained during stakeholder engagement. Local Stakeholder Reference Groups (SRG) were formed in the eight short listed areas.
- 2.1.7 An initial Options Appraisal (OA) report was prepared (May to July 2015) for each of the 12 short listed areas to consider potential mitigation options. A further short list of the projects was prioritised for further detailed work by the SAG.
- 2.1.8 The SAG considered a wide range of factors and in September 2015 recommended that the following four projects be taken forward for potential engineering work:

¹ <http://peakdistricteast.nationalgrid.co.uk/route-options/visual-impact-provision-policy/>

- Dorset Area of Outstanding Natural Beauty (AONB);
- New Forest National Park;
- Peak District (East) National Park; and,
- Snowdonia National Park.

2.2 Proposed Project Objectives

2.2.1 The VIP Peak District (East) Project (here on referred to as the Proposed Project) represents a major opportunity to mitigate the visual impact of existing electricity infrastructure within the Peak District National Park near Dunford Bridge and to conserve and enhance the natural beauty, wildlife and environmental heritage of the area. The OHL in this area (OHL 4ZO.2 subsection) is judged to have:

- **Landscape impacts of a high level of importance** particularly relating to strong localised topographical variety around Dunford Bridge, together with the proximity of nearby areas of high conservation interest, recreational value and relative tranquillity, which all serve to increase the value of the landscape. Although the impact of the VIP Subsection is geographically contained, the scale of impact is high with the Terminal Pylon and SEC being locally dominant man-made features.
- **Visual impacts of a high level of importance** with Dunford Bridge serving as a local gateway for visitors to the Pennine Moors. The pylons are in views from visitors to the promoted Trans Pennine Trail car park, picnic area and walkers and cyclists on the Trans Pennine Trail National Cycle Route 62. The scale of visual impacts on the local community in and around Dunford Bridge is also considered to be high due to the proximity of the OHL and its elevated situation in relation to this settlement.

2.3 Consideration of Alternatives

Peak District National Park (Eastern Section) Options Appraisal Study 2015

2.3.1 An initial Options Appraisal study was undertaken to consider OHL subsection 4ZO.2, the findings of which are reported in National Grid Visual Impact Provision Peak District National Park Eastern Section Options Appraisal Study (2015)². The appraisal considered an alternative pylon design along the existing alignment (Option 1), an OHL along an alternative alignment (conventional or alternative pylon design) (Option 2), and underground Cable Corridors for either 50% (Option 3a) and 100% (Option 3b) of the 4ZO.2 subsection. Two search areas for SECs were identified in relation to the above as follows:

- SEC Search Area A identified for Option 3a located to the south of Townhead; and
- SEC Search Area B identified for Option 3b located to the south of Castle Hill.

2.3.2 For both the alternative pylon design along the existing alignment, and OHL along an alternative alignment (conventional or alternative pylon design) option, it was considered that the alternative structures would still be highly visible in the landscape, and following discussions with the project team, together with the feedback from stakeholder engagement it was agreed that these options would not be investigated further. The stakeholders agreed that the best way to reduce impacts would be to remove a section of this OHL and replace it

²Visual Impact Provision – Peak District National Park Eastern Section Options Appraisal Study (<http://peakdistricteast.nationalgrid.co.uk/wp-content/uploads/2016/06/150821-Peak-District-East-DOR-for-SAG.pdf>)

with electricity lines buried underground. It was felt that screening or camouflaging pylons would not have sufficient benefit.

- 2.3.3 For the underground Cable Corridor, although Option 3b was approximately three times longer than Option 3a it was not considered to provide proportionally more mitigation benefits than Option 3a. Option 3a was also not favoured by the SRG and other stakeholders as it would have been difficult to conceal a SEC in the Castle Hill area and it was likely that the visual impact of the infrastructure could be made potentially worse. Option 3a which was also anticipated to be preferable on economics and efficiency grounds was taken forward for further consideration.

Peak District East Appraisal Study 2019

- 2.3.4 During the period 2015-2019 further options appraisal work was undertaken to consider the project development of subsection 4ZO.2.

- 2.3.5 The options appraisal considered the following:

- Underground route alignment option; (for both XLPE cable and Gas Insulated Line (GIL) cable technology);
- The location of the proposed new SEC; and
- The location of temporary laydown areas.

- 2.3.6 A brief summary of the findings of the options appraisal is provided below. A more detailed description of the options consideration is provided in the Peak District East Options Appraisal Study 2019³.

Underground Cable Routing

- 2.3.7 In common with other types of linear development, the effect that an underground cable may have on the environment largely depends on the route selected. The development of the preferred option has considered engineering and environmental constraints in the vicinity of the Proposed Project identified from baseline studies, site walkovers and discussions with stakeholders and landowners. These included:

- Topography. The existing OHL runs through a valley with steep slopes in the surrounding farmland, and cloughs to the south of the Trans Pennine Trail;
- The River Don dissects the valley and would require crossing for any potential cable route/SEC options north of the river;
- Space constraints to install an underground route within the valley, considering the existing OHL, Yorkshire Water facilities, a potential Trans Pennine Trail diversion, the Trans Pennine Trail visitor car park, the River Don and its associated steep banks and equipment within the existing National Grid Dunford Bridge substation site;
- Proximity of residential properties to the proposed works within Dunford Bridge and the surrounding area;
- The Trans Pennine Trail and its users, and maintaining a suitable alternative diversion for the Trans Pennine Trail during construction if affected;

³ <http://peakdistricteast.nationalgrid.co.uk/category/documents/>

- Designated ecological sites, protected species and mature trees.
- Archaeological assets, notably Listed Buildings
- Permanent accesses; and
- Other existing utilities and structures.

2.3.8 Alignment options considered included:

- Option 1A: Cable bridge from Dunford Bridge Car Park with a cable route and SEC to the north of the River Don (note the cable route proposed is further south than that suggested in Option 1B below);
- Option 1B: Cable bridge from Dunford Bridge Car Park with a cable route and SEC to the north of the River Don (note the cable route proposed is further north than that suggested in Option 1A above).;
- Option 2: Horizontal Directional Drill (HDD) from Dunford Bridge Car Park with a cable route and SEC to the north of the River Don.
- Option 3: HDD from the Trans Pennine Trail with a cable route and SEC to the north of the River Don.
- Option 4: Cable route along the Trans Pennine Trail with a cable bridge to a SEC on the northern side of the River Don.
- Option 5: Cable route along the Trans Pennine Trail with a SEC on the southern side of the River Don; and
- Option 6: Cable route in moorland south of the Trans Pennine Trail with a SEC on the southern side of the River Don.

Option Conclusion

- 2.3.9 Option 5 was taken forward as the preferred option with the installation of the cable using direct burial and cable trough techniques from the Woodhead Tunnel along the Trans Pennine Trail to a SEC located within Wogden Foot LWS. A diversion of the Trans Pennine Trail will be required on the northern side of the River Don. This option was considered the only practical and feasible engineering solution for the Proposed Project that is in line with the VIP guiding principles, would not increase safety and system security risk and would not have led to other major significant environmental or socio-economic effects.
- 2.3.10 The preferred option would facilitate the removal of eight pylons (one to be replaced) and 2km of OHL, providing the maximum landscape and visual benefit of all options considered.
- 2.3.11 Locating the SEC in Wogden Foot LWS could provide better options for screening from views from the north rather than a SEC in open farmland on the northern side of the River Don. The overall landscape and visual benefits are anticipated to be greater than the other options considered.

SEC

- 2.3.12 Discussions regarding the location of the SEC within the search area for Option 5 were undertaken with the SRG in 2016. Space within the SEC search area south of the river is very constrained, and at that time fell within Wogden Foot Local Wildlife Site (LWS) and land immediately adjacent outside of the designation boundary. A location was identified that initially fell outside the LWS designation; however, it is noted that Barnsley Metropolitan Borough Council subsequently amended the boundary in 2017 resulting in this location also falling within the LWS.

- 2.3.13 The preferred location of the proposed SEC within Wogden Foot was largely guided by the views of stakeholders, although due to the space constraints mainly entailed micro-siting indicative layouts and orientations. Stakeholders requested that the proposed SEC be moved slightly east from the area initially identified to avoid permanent land take within a particular area of grassland, and to enable the associated replacement tension pylon to be located on the northern side of the river Don (rather than within the SEC), minimising permanent loss within the LWS

Temporary laydown area location options

- 2.3.14 National Grid identified the need to have a main laydown area on site close to Wogden Foot, and undertook an options appraisal of the proposed laydown areas to avoid significant environmental impacts from the outset. Details of this options appraisal are provided within the 'Visual Impact Provision (VIP) Peak District (East) Project Main On Site Laydown Area Options Appraisal Report, Jan 2019' (appendix to the Options Appraisal Study 2019).
- 2.3.15 In summary an initial ecological and engineering appraisal/ workshop with stakeholders in 2017 concluded that area WF-B or WF-C would be the preferred locations for a laydown within Wogden Foot. Additional detail was requested by the Stakeholder Reference Group (SRG) in 2018 who following further assessment work and discussion agreed that laydown area WF-B should be taken forward.
- 2.3.16 National Grid also considered a range of options for an access road to the eastern end of the project taking into account landowner considerations, access points off the highway, environmental constraints and the steep gradients for construction on the northern slopes which provided a constraint. The northern access road proposed from Brook Hill Lane minimises environmental effects whilst maximising the use of the lowest gradients down to the River Don.

Trans Pennine Trail diversion options

- 2.3.17 A significant proportion of the construction work will take place along the alignment of the Trans Pennine Trail, and as such, a section of the Trail (near Dunford Bridge) will need to be diverted for a period of approximately 1 – 1.5 years to enable the safe installation of the cable beneath and the subsequent reinstatement of the Trans Pennine Trail. A suitable diversion will be created to provide users of the Trans Pennine Trail with an alternative route.
- 2.3.18 Options to divert a section of the Trans Pennine Trail during the construction works were considered, taking the following into account:
- the requirement to keep the Trans Pennine Trail fully open via a diversion rather than temporarily close this section;
 - the requirement from the Trans Pennine Trail National Office and Barnsley Metropolitan Borough Council that the diversion should seek to be as compliant as possible with the relevant gradient requirements of the Equalities Act (2010) (formerly covered under the Disability Discrimination Act);
 - the variety of different Trans Pennine Trail users along this section;
 - the route of the Trans Pennine Trail which runs almost parallel to the River Don, in the base of a valley with the topography rising up on both sides;
 - ecological designations and associated constraints in moorland to the south of the Trans Pennine Trail and
 - the use of other existing trails in the area would require users to travel over a much greater distance, up much steeper gradients and/or along the local road network.

- 2.3.19 The Trans Pennine Trail diversion identified is:

- close to the existing route;
- allows access to continue directly from Dunford Bridge car park;
- avoids the use of the local road network;
- enables the majority of the route to comply with the relevant gradient requirements of the Equalities Act (2010), apart from two short stretches by the bridges;
- seeks to ensure suitability for all users; and
- provides open countryside views across the River Don that are not currently available to the public.

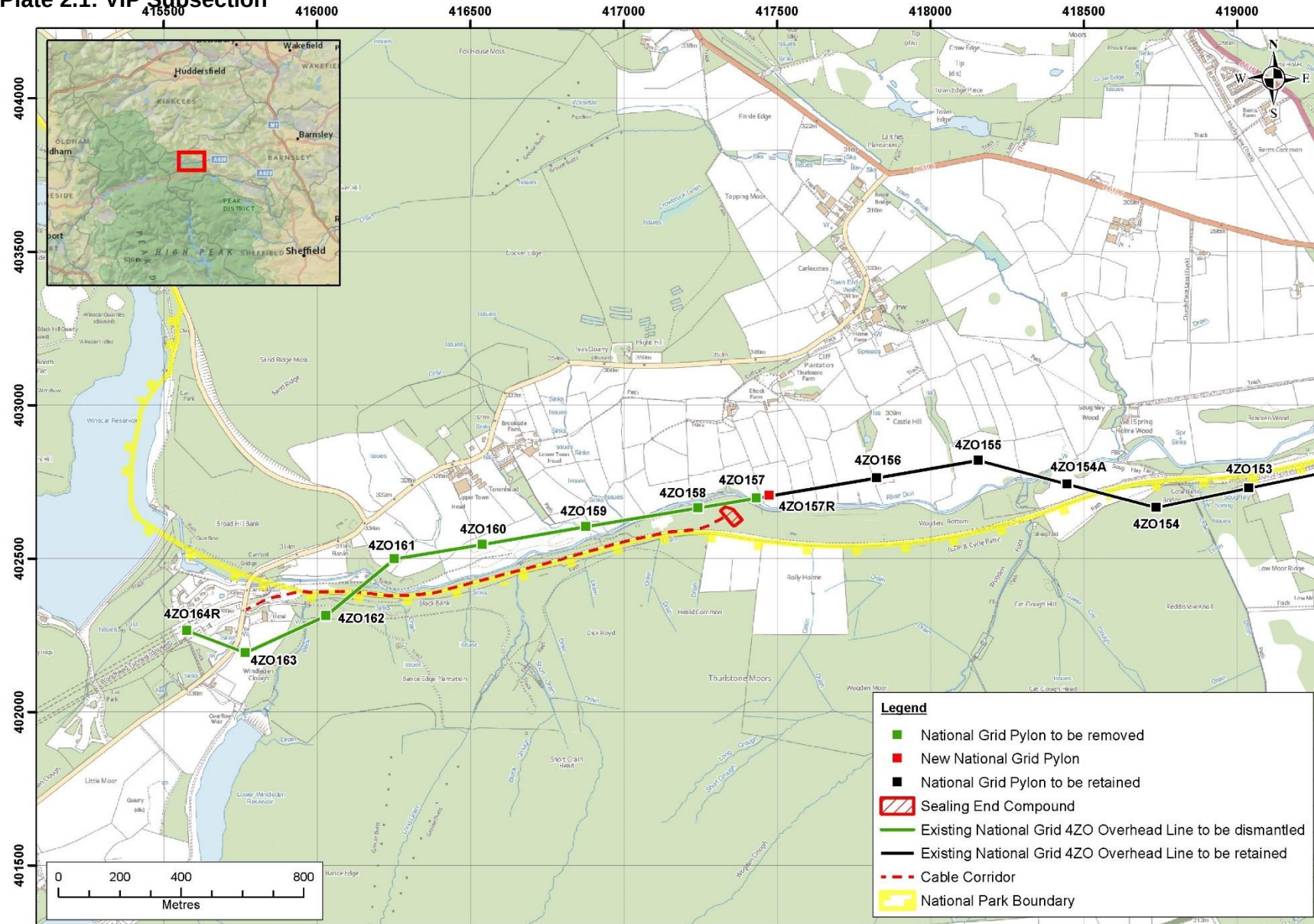
2.3.20 Following the options appraisal exercises, the preferred locations of the project elements were taken forward and comprise the Proposed Project. The sections below commence with an overview of the Proposed Project, followed by more detailed construction methodology.

2.4 Overview of the Proposed Project

2.4.1 The existing 4ZO 400kV OHL connects Stalybridge, Stocksbridge and Thorpe Marsh 400kV substations. The OHL was constructed between 1966 and 1967 with standard lattice pylon design and strung with twin and quad conductor bundles along various sections. Fittings were subsequently refurbished in 2015 on 4ZO131 (high side) to 4ZO164R. A refurbishment scheme was also carried out in 2017-2018, with the conductors replaced along the route from Thorpe Marsh pylon ZZH2A-4ZO 131 (low side) There is a high voltage cable section installed in the Woodhead Tunnel between Dunford Bridge and Woodhead connecting the eastern and western section of the OHL. The location of the VIP Subsection (the focus of this Environmental Assessment) is shown in Plate 2.1 below.

2.4.2 The VIP Subsection runs eastwards from the existing Dunford Bridge Sealing End Compound (SEC) near the eastern entrance of the Woodhead Tunnel (Pylon 4ZO164R). It crosses the Peak District National Park boundary and continues north over the Upper Don River and the Trans-Pennine Trail, south of the hamlet of Townhead towards Castle Hill. The VIP Subsection (as shown on Plate 2.1, including Pylons 4ZO164R, 4ZO163, 4ZO162, 4ZO161, 4ZO160, 4ZO159, 4ZO158 and 4ZO157) proposed to be put underground is approximately 2km in length.

Plate 2.1: VIP Subsection



Key Components

2.4.3 The undergrounding of the VIP Subsection includes the following main elements that comprise the Proposed Project:

- Removal of the existing Dunford Bridge SEC to a depth of 1.1m below ground level. The existing tunnel shaft cap will be lowered, and mounding created over the shaft for landscaping purposes. Gabion baskets (of approximately 1m in height and width) will be used to protect the shaft from any vehicle access;
- Removal of the existing VIP Subsection including eight pylons (one of which will be replaced, see replacement pylon below) and 2km of OHL (shown on Plate 2.1 above);
- An underground XLPE cable 'here on referred to as the Cable Corridor' of approximately 1.8km beneath the route of the Trans Pennine Trail from the entrance of the Woodhead Tunnel to a proposed new SEC;
- Construction of a new SEC within Wogden Foot Local Wildlife Site (LWS) and a separate replacement tension pylon located approximately 40m north east of the SEC on the northern side of the River Don, close to the location of the existing pylon 4ZO157. Within the SEC the circuits will terminate onto two full tension gantries to connect the Cable Corridor to the remaining existing OHL. A permanent access off the Trans Pennine Trail will be required to the proposed SEC;
- Temporary laydown areas, access tracks (including from the highways of Windle Edge and Brook Hill Lane), to the pylons to be removed and along the Trans Pennine Trail to the SEC at Wogden Foot as well as site offices to facilitate construction activities; and
- Construction and removal of a temporary Trans Pennine Trail diversion for use during the construction phase of the Proposed Project. The diversion will involve the use of two bridges, one being a permanent replacement of an existing bridge; the other a temporary bridge to cross over the River Don. The diversion is proposed in farmland immediately north of the River Don.

2.5 The Design Phase

2.5.1 An integral part of the iterative design and assessment process has been the consideration of mitigation through sensitive design development. The design and layout of the Proposed Project has considered the results of the Option appraisals and Environmental Assessment Surveys. Through a series of meetings and discussions with stakeholders the design and layout of the Proposed Project has sought to take on board findings and feedback from the stakeholders wherever possible, balanced with engineering constraints. A summary of the key design considerations are outlined below:

- The extent of the Cable Corridor has been minimised as much as is possible to reduce the effects upon the Trans Pennine Trail habitats, tree cover and associated faunal interest.
- The permanent footprint of the SEC and associated access road have been minimised as much as engineering constraints will allow to reduce the effects on existing tree cover, landscape character, habitat;
- The extent of all working areas have been minimised as far as possible along the Trans Pennine Trail diversion to reduce effects upon the River Don aquatic habitats and associated fauna, and around pylons and associated infrastructure to be removed;

- Careful consideration of the positioning of the SEC within Wogden Foot LWS to avoid and protect grassland of greatest botanical value, whilst also minimising visual effects to visual receptors, as discussed at stakeholder meetings;
- Positioning of the new replacement pylon (4ZO157R) to the north of the River Don (within habitat of low importance) to minimise potential effects upon Wogden Foot LWS;
- Identifying areas of woodland or trees which require retention, particularly along the Cable Corridor where more mature trees are present and to retain connectivity along the River Don embankment and corridor on the southern side of Trans Pennine Trail;
- Designing the Cable Corridor such that it was heightened over Clough Beck culvert following the identification of the confirmed bat roost to avoid direct effect and retention integrity of the structure, whilst also looking at gradients which balance the requirements for access along the Trans Pennine Trail whilst minimising effects on trees;
- Completion of an options appraisal of the potential laydown areas to minimise environmental effects allowing stakeholders to determine preferred location;
- Avoidance of areas of notable grassland and heathland where feasible;
- Reinstatement proposals for the site of the Dunford Bridge SEC have been designed to balance landscape and ecological mitigation;
- Reinstatement of an open drain located along the Trans Pennine Trail corridor and avoidance/ reinstatement of waterfall type features along Trans Pennine Trail;
- Routing of AP7 and the northern access road to minimise disturbance on ground nesting birds (closer to existing residential, less visible to birds which may be present in habitat further north to work with lower contours in topography or closer to stone wall field boundaries which are less likely to be used by ground nesting species such as curlew which prefer an open aspect); and
- Consideration of surfacing types to minimise visual impacts and blend in with surrounding environment.

2.6 The Construction Phase

- 2.6.1 The construction phase of the Proposed Project includes installation of the new electrical equipment and removal of the section of existing OHL as well as the reinstatement of the Trans Pennine Trail and removal of the Trans Pennine Trail diversion. The footprint of construction activities is shown on Figures 2.1 and 2.2 and referred to as the Works Area. National Grid will employ a Main Works Contractor to build, test and commission the Proposed Project.

400kV Cable (Undergrounding)

Works within the Existing Operational National Grid Compound at Dunford Bridge

- 2.6.2 The new section of cable will be connected in the tunnel in close proximity to the existing tunnel shaft.
- 2.6.3 From the west, six 150mm diameter cables (two circuits accompanied by control cables) will emerge out of the southern Woodhead Tunnel. These cables will be buried in cable troughs approximately 500mm below ground level. Cable troughs are generally used where the width of the Cable Corridor is restricted, or within the boundary of a substation, or where vegetative reinstatement is not required. The troughs would consist of reinforced concrete and can either be surface laid (level with the existing ground level) or buried so the trough

top is approximately 0.3m below the existing ground level. In some cases, the troughs can be installed on top of existing ground, effectively raising the ground level. The utilisation of this cable installation reduces the total width of the working/construction area and permanent easement/ wayleave. The cable trough construction area would be much less than that of standard direct burial. The cable troughs will be excavated using mechanical diggers and hand tools. The ground excavated for the cable troughs will be removed from site to an appropriate waste disposal facility. The cable troughs will be filled with a stabilised backfill, for example Cement Bound Sand (CBS). The cable troughs will look similar to those already present emerging from the western end of the Woodhead Tunnel (see Plate 2.2 below).

Plate 2.2: Existing Cable Troughs at the Woodhead Tunnel



- 2.6.4 The six cables will initially be routed in a line (flat circuit layout) (See drawing PDD-33492-LAY-033). Due to space constraints and the presence of an existing control building these are likely to split into two swathes which pass between the two bridges and routed east towards the Trans Pennine Trail.
- 2.6.5 A section of the existing embankment (see Plate 2.3 and also shown on Fig 2.1 (PDD 33492-LAY 037)) may need to be removed to accommodate the proposed routing. The embankment which is predominantly rock can be broken out in various ways from blasting, to using concrete peckers (hydraulic breakers), or to using expanding slurries in pre-drilled holes. Depending upon the limitations of vibration in this area (adjacent to the Victorian tunnels and the telecommunications building) a choice of the above will be determined by the main works contractor. Back actors/diggers or similar, and lorries will be used to transport the broken up rock.

Plate 2.3: Embankment to be partially removed to accommodate Cable Corridor

- 2.6.6 It is proposed that the broken up rock may be used to install the temporary access off Windle Edge (access track AP7, see Section 2.6.48 below). Bank stabilisation may be required; this is likely to take a form similar to existing bank stabilisation measures (see Plate 2.3).

Works within the Trans Pennine Trail and Wogden Foot Local Wildlife Site

- 2.6.7 Construction activities will take place in the Cable Corridor which will be excluded from members of the public for safety. Access to the Works Area will be restricted to construction staff for the duration of construction activities, which are anticipated to be approximately 1.5- 2.5 years.
- 2.6.8 The Cable Corridor will follow the Trans Pennine Trail (outside of the existing National Grid compound) for approximately 1700m. The Works Area is shown on Figure 2.1.
- 2.6.9 Sections of the Trans Pennine Trail along the route of the proposed cable circuits are narrow which will impact on the installation design and strategy. In general, the maximum width permitted to be affected along the Trans Pennine Trail permissible is 14.10m (See Drawing PDD-33492-LAY-077). However, within this width only 10.15m can be excavated (to retain the root protection zone for the cables). The boundaries shown on Figures 2.1 reflect these dimensions.
- 2.6.10 In order to manage the health and safety of the construction activities, protection fencing, or other demarcation will be installed along the Trans Pennine Trail to clearly demark the Works Area.

Plate 2.4: Trans Pennine Trail



- 2.6.11 Fencing will also be erected at either end of the Trans Pennine Trail to demark the Works Area.
- 2.6.12 Members of the public will be temporarily diverted to the northern side of the River Don (see Section 2.5.60 below for details). The requirements of the Local Authority Rights of Way Officers will be adhered to during the diversion of the Trans Pennine Trail. These measures will include appropriate signage detailing timings and durations of the agreed diversion route.
- 2.6.13 Ahead of construction, the Works Area will be surveyed and pegged out in consultation with the landowner/occupier. Where appropriate, pre-construction drainage will be installed. The design of the drainage will pay particular attention to the need to ensure that the drains do not act as pathways for contamination or cause flooding off-site, consulting with the Local Flood Authority wherever necessary.
- 2.6.14 Permanent records of the land drain locations encountered will be made and passed to the landowners/occupiers.
- 2.6.15 A small drainage ditch is present to the southern side of the Trans Pennine Trail. This drainage ditch may need to be temporarily diverted underground as part of construction activities but will be reinstated following construction. See the Outline Landscape and Ecological Management Plan (LEMP) for further details.

Plate 2.5: Drainage Ditch South of Trans Pennine Trail

- 2.6.16 A waterfall feature is present along the Trans Pennine Trail, which has been highlighted as locally important, and runs off the hills (See photo in Plate 2.5 above). This waterfall feature (i.e. the rock structure the water falls down) will be fenced off and protected during construction activities, and the water from this feature may be temporarily diverted underground. The final drainage design will be subject to temporary works designs associated with the volume of water currently running off the ground and forming the waterfall feature. The installation of the required drainage solution may have an indirect impact on the waterfall feature, as the current waterfall feature is created from issues with the existing drainage system along the route.
- 2.6.17 Prior to the start of construction activities pre-construction ecological surveys will be completed. Where necessary, additional mitigation will be put in place to minimise any previously unforeseen impacts, for example newly excavated badger setts. Requirements for environmental mitigation will be clearly conveyed on-site to the construction workforce, prior to the start of works and noted within the Construction Environmental Management Plan (CEMP) and the LEMP.
- 2.6.18 Tree and scrub removal will be required to facilitate the construction of the Proposed Project including on both sides of the Trans Pennine Trail and in Wogden Foot LWS. Tree and vegetation removal will be kept to a minimum and will only take place where necessary. In proximity to the cable installation all trees and deep rooted scrub will need to be removed within 3m of the cables. Vegetation removal will take place outside of the bird nesting season, wherever possible, or be removed under the supervision of an ecologist. Protective fencing will be installed around trees to be maintained where appropriate within the Working Area.
- 2.6.19 Existing third-party services will be located, marked and protected. Goalposts and bunting will be erected for OHL.
- 2.6.20 Existing pedestrian and equestrian signs, bollards and other street furniture will be taken up and either stored for later reuse or replaced on completion of construction.
- 2.6.21 For some of the grassland areas close to the car park, some areas of the Trans Pennine Trail and some areas in Wogden Foot LWS, topsoil will be stripped and stored for later reuse where this is in accordance with the LEMP and waste management objectives. Most

topsoil stripping will be undertaken using bulldozers and excavators. The precise method of stripping and the depth to which the soil will be stripped will be decided prior to stripping taking place. An archaeological watching brief will take place where indicated in Chapter 8 (Archaeology and Cultural Heritage).

- 2.6.22 The topsoil stack will generally not exceed 3m in height. It will be kept free from disturbance to reduce the risk of physical damage and compaction.
- 2.6.23 Topsoil stripped from river banks, woodland strips and other notable botanical habitats (as identified in Chapter 7 (Ecology)) will be stored separately to facilitate reinstatement. Storage of topsoil within the canopy spread of trees will be avoided so as not to compact tree roots.
- 2.6.24 Where it is necessary to strip and store topsoil in a floodplain during the flood season, methods will be employed to ensure that the soil is protected, and flood waters are not impeded (See Chapter 9 (Water Resources/ Hydrology)). Topsoil stacks will be set back from watercourses and measures such as berms and vegetated strips will be used to control sediment run-off.
- 2.6.25 Space within the Trans Pennine Trail and adjacent verges is highly constrained for the installation of cables. Although subject to the awarded contractor's final installation methodology, it is currently envisaged that the cables will be laid one circuit (three cables) at a time so that one half of the Trans Pennine Trail could be used as the construction haul road at the same time. Once one circuit is constructed it would be backfilled and the situation reversed so that the haul road would be above the recently backfilled trench while the second circuit is constructed.
- 2.6.26 The cable will be installed within a cable trench which will be excavated to a depth of approximately 1.0m. The approximate width of the cable duct trench open at any one time (one circuit) is anticipated to be approximately 3m.
- 2.6.27 The trench will be dug either with mechanical excavators straddling or running alongside the trench. The material excavated from the trench, comprising the subsoil, rock or made ground, will be stored away from the topsoil to prevent mixing of subsoil and topsoil and used in reinstatement.
- 2.6.28 Trench supports, and close sheet piling may be required to aid construction and in order to maintain the integrity of the excavated trench.
- 2.6.29 Dewatering of the trench may be required in some areas to stabilise the surrounding ground during construction. Dewatering and discharge of water will be carefully controlled to prevent the risk of sediment laden run-off entering watercourses.
- 2.6.30 A range of additional measures and precautions will be taken in potentially contaminated areas, as detailed in Chapter 10 (Geology, Soils and Contaminated Land).
- 2.6.31 Cable will arrive on site carried by special vehicles on cable drums in section lengths of approximately 650m. The cables will be installed via either open cut or installation of ducts, subject to the awarded delivery contractors design solution.
- 2.6.32 The cable will be laid in the trenches on a bed of stabilised backfill, for example CBS, and then surrounded by an additional layer of stabilised backfill and originally excavated material where suitable. Protective tiles will be laid above the stabilised backfill to protect the cables from future excavation works. Marker tape will be installed above the protective tiles in the trench as an additional warning that cables lie beneath.
- 2.6.33 In certain locations where there are constraints such as reduced installation and working space for construction activities (e.g. in the Dunford Bridge compound (as previously discussed in Paragraph 2.5.5) or at the proposed SEC), or above culverts and other obstacles where installation depth and conventional installation methods associated with direct burying is constrained, there may be a requirement to install the cables within a concrete trough arrangement in specific locations along the route.

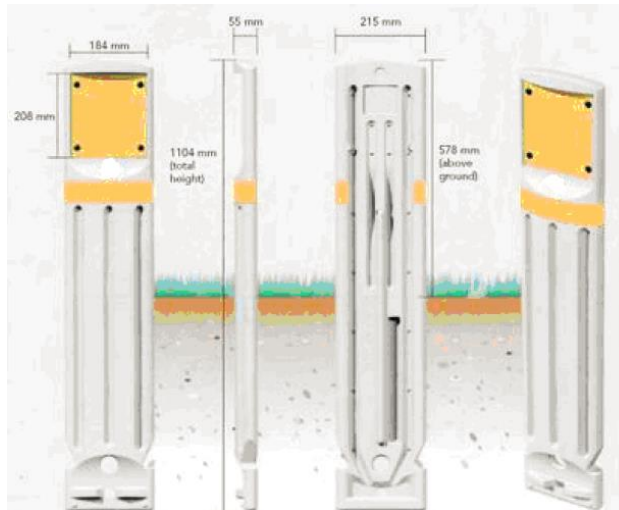
- 2.6.34 Cable lengths will need to be jointed together at joint bays along the Trans Pennine Trail. Link pillars will be required at each joint bay; these above ground structures measure 1m by 0.4m and are approximately 1m in height and will be offset from the main Trans Pennine Trail. There is not a requirement for these link pillars to be fenced. It is anticipated that approximately four link pillars will be required along the Trans Pennine Trail; none are required within Wogden Foot LWS.

Plate 2.6: Example Link Pillar



- 2.6.35 Additional link pillars will be required on structures at terminations within compounds.
- 2.6.36 Marker Posts as detailed below in Plate 2.10 are required at changes of direction, changes of land boundary/ fence lines and at points where any existing services cross the Cable Corridor. At this point in time it is envisaged that marker posts will be required at the intersection of existing culverts and at the entrance to Wogden Foot LWS.

Plate 2.7: Marker Posts



- 2.6.37 It is anticipated that surplus material from trench excavation will be re-utilised on site (if not restricted due to potential contamination) and as a last resort be removed from site to an appropriately licensed waste disposal facility. Any necessary waste management licence exemptions will be notified to the Environment Agency.
- 2.6.38 The Trans Pennine Trail will be reinstated to original levels where practicable. However, there may be a need to raise the ground level of the Trans Pennine Trail above Clough Beck culvert. There may be insufficient depth above the culvert to install the cable with the appropriate level of mechanical protection.
- 2.6.39 If this is required, the ground would be levelled very gradually in the surrounding area so any slight localised elevation would not be noticeable to Trans Pennine Trail users. The Trail would be raised over the limited cable depth length and ramped down to match the existing levels at maximum slopes as shown in the illustrative drawing P10727-00-001-803 as discussed with Barnsley Metropolitan Borough Council as a worst case scenario slope of 1:20. The illustrative regrading plan uses minimum gradients, so any raising would not be discernible on completion.
- 2.6.40 It is understood that this section of the existing route of the Trans Pennine Trail is not located within a floodplain; therefore, this will not give rise to any localised increases in ground level on floodplains.
- 2.6.41 The surface material specification to be used in the reinstatement of the Trans Pennine Trail will be agreed with Barnsley Metropolitan Borough Council. The bridleway element of the Trans Pennine Trail will be reinstated and seeded with the appropriate grass variety as advised by the ecological consultant and landscape architect. A Trans Pennine Trail Management Plan has been prepared and is provided as an appendix to the CEMP (Appendix 2B.6).
- 2.6.42 The new section of installed cable will require testing before full energisation/commissioning.
- 2.6.43 It is currently anticipated that works within the Trans Pennine Trail will take approximately 78 weeks.

Sealing End Compound

- 2.6.44 The proposed SEC would be located at the eastern end of the new underground cable, to achieve the transition from the underground cable to the existing OHL. The location of the proposed SEC is shown on Figure 2.3. The proposed SEC would be located within Wogden Foot LWS and occupy an area of approximately 36m x 67.9m to the fence line. There will

be a planting exclusion zone outside of the fence line; this will increase the SEC footprint to approx. 40m x 75m (i.e. a 2m planting exclusion beyond the fence line). Permanent fencing will enclose the proposed SEC which will typically be galvanised steel palisade fencing (approximately 2.4m high) topped with electric pulse fencing for security. The total height of the fencing would be up to 4m high.

- 2.6.45 The contractor will determine the appropriate foundation type for the SEC although it is anticipated that piled or deep pad foundations will be required.
- 2.6.46 The highest points within the proposed SEC are the landing gantries at approximately 14.9m high (See Drawing PDD-33492-LAY-003).
- 2.6.47 Construction of the SEC is likely to take approximately 20 weeks (excluding any cable installation works). A temporary laydown area is proposed in Wogden Foot LWS adjacent to the SEC (see Section 2.5.108 below).
- 2.6.48 Access to the proposed SEC during construction will initially be via vehicle access road AP7 (shown on Figure 2.1) prior to the opening of the Trans Pennine Trail diversion. After opening of the Trans Pennine Trail diversion to members of the public, access to the SEC will predominantly be from the existing route of the Trans Pennine Trail. Limited managed access will still be available via the temporary bridge over the River Don whilst the temporary Trans Pennine Trail is open. Discussion with Barnsley Metropolitan Borough Council has involved informal agreement for up to 10 vehicles per day to use the temporary bridge access whilst the temporary Trans Pennine Trail is in use.

Construction of replacement Pylon 4ZO157R

- 2.6.49 A new replacement pylon will form the start of the 400kV OHL beyond the Cable Corridor and SEC (see Plate 2.1). The new replacement pylon (known as Pylon 4ZO157R) will be constructed. The area of topsoil to be removed for construction activities would be approximately 200m². The foundation for Pylon 4ZO157R will be constructed by the excavation of four holes each approximately 5m x 5m x 6m deep (the excavation within the subsoil would therefore be approximately 100m²). Excavated top soil and subsoil will be stored separately away from the banks of the River Don.
- 2.6.50 The bottom of each of the four legs will be encased in concrete and reinforcing bar (see Plates 2.8 and 2.9).

Plate 2.8: Reinforcing bar in place



Plate 2.9: Concreting completed



- 2.6.51 Once the concrete has cured, the excavations will be backfilled with the earth previously excavated and the site restored. Any surplus subsoil will be removed from site.
- 2.6.52 Pylon 4ZO157R will be erected using either a Mobile Hydraulic Crane, limited to total weight of 40 tonnes, subject to final weight restrictions over the existing bridges at Dunford Bridge or with a derrick to erect the pylon in small sections. Pylon erection will require a laydown and assembly area of roughly 40m x 40m for laying out and assembling the steelwork into the lifting sections. Steelwork will be delivered to site on trucks, and then assembled in sections around the pylon base. A tractor with a light crane or tele-handler may assist in the moving of and erecting steelwork on the ground. The first panel will be lifted by the crane and manoeuvred into position over the foundation stubs and fixed into place by locating the connecting bolts. Once in place the panel will be stayed to hold its position. Subsequent sections will be assembled using a controlled lift and staying sequence with each panel or boxed section bolted in turn to the previous erected panel until the pylon is complete and secured.

Plate 2.10: Pylon Erection using a Mobile Hydraulic Crane

Replacement of Conductors and Connection to the SEC

- 2.6.53 The existing conductors between Pylon 4ZO155 and Pylon 4ZO157R will be replaced with new conductors starting with the top conductors, moving to the middle conductors and then finally to the bottom conductors. A pulling platform will be located to the eastern side of Pylon 4ZO155 to facilitate the stringing works. Access to Pylon 4ZO155 will be required for platform erection sagging of conductors and conductor termination. Access to pylon 4ZO156 will be required for installation of running out blocks and to clamp in the conductors. Access to Pylon 4ZO154A will be necessary to install drain earths and for tensioning works. Works at Pylon 4ZO154A will entail access along the Trans Pennine Trail by a van and a trailer (access from the Trans Pennine Trail to the pylon will be by quad bike and/or walking access); however, works will be completed over a short period of time and will not require a further diversion or closure of the Trans Pennine Trail.
- 2.6.54 New conductors between Pylon 4ZO157R and the tension gantries within the proposed SEC will be installed. The installation will be carried out via replacement of the existing conductors under reduced tension so as not to allow the conductors to come into contact with the ground, or with the installation of scaffold stools to protect the conductor from coming into contact with the ground / River Don. The temporary Trans Pennine Trail will be briefly re-aligned to the west side of the new SEC whilst the installation of the new conductors is carried out, as an alternative to removing additional vegetation and install scaffold protection structures.
- 2.6.55 On completion of this stage, the OHL will be connected on both circuits between the new SEC, through the underground cable into the Woodhead Tunnel.

The Trans Pennine Trail Diversion

- 2.6.56 National Cycle Route 62 and the Trans Pennine Trail (Dunford Bridge to Penistone section) largely follows the alignment of the former Woodhead railway line, on the east of the Pennines along the upper Don Valley to the market town of Penistone, from west to east. The Trans Pennine Trail also forms part of European Long Distance Footpath E8. The existing Trans Pennine Trail is used by pedestrians, equestrians and cyclists and is made of a bound surface, approximately 3m wide, with an adjacent equestrian soft ground track.

- 2.6.57 During the construction of the Proposed Project, the Trans Pennine Trail will be diverted along a temporary route north of River Don to allow for the installation of the buried cable (see Figure 2.1).
- 2.6.58 Public rights of way (public footpaths, bridleways or restricted byways) are highways protected by law. To divert a right of way, a public path order will need to be requested from Barnsley Metropolitan Borough Council. Diversions can take place for between one day and six months to allow for site works to be carried out safely. Extensions to this will be required to fulfil the requirements of the construction programme.
- 2.6.59 A Trans Pennine Trail Management Plan has been prepared and is provided as an appendix to the CEMP (Appendix 2B.6). The Trans Pennine Trail Management Plan details how users of the Trans Pennine Trail will be managed and co-ordinated with construction activities (see Figure 2.1 for the proposed diversion route and Drawing PDD-33492-LAY-032) for the Temporary Diversion Construction Detail).
- 2.6.60 The proposed diversion will leave the car park at Dunford Bridge and follow an existing farm track which will be upgraded to meet the gradient requirements of the Equality Act 2010 as far as possible. The diversion will cross onto the northern side of the River Don and pass across the fields before crossing back to the southern bank over a newly constructed temporary bridge (see Section 2.6.67 for further details).
- 2.6.61 Prior to merging back into the Trans Pennine Trail, the diversion will pass east of the proposed SEC and in close proximity to the laydown area that will be used adjacent to Wogden foot. Two manned access gates will be installed along the diverted Trans Pennine Trail at the vicinity of the SEC to prevent potential conflict between Trans Pennine Trail users and the construction traffic that will move between the SEC and the north side of the River Don. For the majority of the time, the access gates will be open to allow the free movement of pedestrians and other users along the diversion. During periods of construction vehicle movements (e.g. up to 10 vehicle movements per day once the diversion is in place), which require the closure of the gates, a site operative will be positioned at each gate to control the movements in a safe manner.
- 2.6.62 The diversion will be approximately 1.6km in length and will be in place for approximately 1-1.5 years. The Trans Pennine Trail diversion route and its design will be agreed with Barnsley Council prior to commencement of works.
- 2.6.63 Construction of the Trans Pennine Trail diversion will require the excavation of approximately 200mm of topsoil, which will be stored alongside the diversion to form a bund (outside of the flood plain). The excavated surface will be lined with a geotextile membrane and filled with Type 1 granular sub-base and finished with a 100mm layer of hoggin or equivalent. Hoggin is a compactable fill material that is composed of a mixture of clay, gravel, and sand or granite dust that produces a buff-coloured permeable surface. The diversion will be typically 7m wide wherever possible to include a 5m wide compacted hard surface and 1m wide embankment on either side. It will be built on a 300mm embankment (approximate) above the existing surface, with the sides chamfered down to the existing ground level.
- 2.6.64 Where possible the Trans Pennine Trail diversion will be designed to comply with the relevant gradient requirements of the Equality Act, 2010, in order to be accessible to people with limited mobility, including wheelchair users, and to those with sensory impairments. The following have been incorporated into the design:

Table 2.1: Typical design provisions to comply with the Equality Act, 2010

Width of path	Greater than 2m to allow for 2 wheelchairs, or two people, side by side
Gradient of path	Maximum gradient of 1:20 (there are few areas where compliance may not be possible due to site/topography constraints)
Camber	Maximum camber of 1:100

Surface finish	Hoggin or equivalent –provides a firm surface with good grip and drainage
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- 2.6.65 Due to the nature of the topography, some sections of the diversion may require cuts or levelling in order to achieve compliance with the Equality Act, 2010. There are two areas where compliance with the Equality Act 2010 has not been possible; where there are adverse slopes (further details are provided in the Trans Pennine Trail Management Plan Appendix 2B.6), appropriate resting platforms (i.e. level areas on the slope adjacent to the Trans Pennine Trail) will be installed.
- 2.6.66 Following discussions with land owners, temporary water supplies and troughs will be provided for livestock as necessary.
- 2.6.67 A permanent replacement bridge will be constructed (Bridge 1 shown on Figure 2.1). This will be approximately 8.3m in length with timber side barriers. A temporary bridge (Bridge 2 shown on Figure 2.1) will also be required for the duration of construction activities to allow users of the Trans Pennine Trail diversion and occasional construction traffic to cross the River Don. The temporary bridge will be approximately 36.5m long and span the River Don and its banks. It will have solid wooden boarded sides as deemed preferable for equestrian use through stakeholder discussions. Bridges 1 and 2 have been designed to the 1:100 flood level.
- 2.6.68 Other watercourses and drainage ditches crossed by the diverted Trans Pennine Trail will be flumed (by the installation of temporary pipes) and ramped over to allow uninterrupted flow of water within the watercourse and a track for users of the Trans Pennine Trail and farm vehicles. Land Drainage Consents may be required from the Local Planning Authority for the installation of these temporary bridges and/or flume crossings depending on their design which will be discussed with the Local Planning Authority and constructed to minimise the risk of sediment run-off to watercourses and obstruction to migratory fish.
- 2.6.69 Regular monitoring will be put in place to ensure that the surface functions as intended and check on the drainage system including for ensuring that no material from the diverted Trans Pennine Trail falls into the watercourse. Generally, flumes/ bridges will be installed at the start of construction activities and removed during restoration.
- 2.6.70 The pedestrian and equestrian signs along with any other furniture removed during works will be stored and re-erected or replaced on completion of construction activities.
- 2.6.71 Following construction of the SEC, undergrounding of the cable, and reinstatement, the diversion of the Trans Pennine Trail will cease, and members of the public will use the existing Trans Pennine Trail (see Section 2.6.119 below for details of how the Trans Pennine Trail will be reinstated).
- 2.6.72 Following construction of the temporary Trans Pennine Trail diversion a four-week handover period is required during which both the existing Trans Pennine Trail and the temporary Trans Pennine Trail diversion are open for use by the public. This four-week handover period will be required following construction of the Trans Pennine Trail diversion (prior to the Trans Pennine Trail being closed for public use) and following the completion of the Trans Pennine Trail (with cables beneath it, and before the reinstatement of the Trans Pennine Trail diversion can take place).

Removal of Existing Infrastructure (VIP Subsection)

- 2.6.73 The completion of the removal of the OHL (Pylons 4ZO157 to 4ZO164R) will follow the commissioning of the new underground cable circuits.
- 2.6.74 The location of land affected during the OHL removal phase is shown on Figure 2.2.

Overhead Line (Conductor) Removal

- 2.6.75 It is not necessary to complete conductor removal in a particular order or in turn, this will be programmed by the main works contractor taking into account the farming operations, safety, environmental, and economic factors.
- 2.6.76 Winch tractors will be installed in turn at each of the pylons and bonds from the winch tractors attached to the OHL conductors. The winch tractors will take the tension of the OHL conductors so that they can be detached from the pylon cross arm and lowered slowly to the ground. The lowered conductors will then be cut on the ground and will be collected in short sections or wound onto a drum and removed from site. This will be carried out via brief temporary roads/footpath closures to enable the conductors to be lowered and subsequently removed from site. Temporary back stays may also be required to be installed behind a couple of the pylons prior to commencement of the conductor removal works, this will be confirmed and detailed by the awarded OHL contractors detailed programme of works.
- 2.6.77 Windle Edge Road is located between Pylons 4ZO164R and 4ZO163. The road and the 11kV OHL on wooden poles (NPG are currently working to underground this 11kV OHL crossing, the works are scheduled to be completed prior to commencement of the construction of the Proposed Project) in this area will be protected by a number of short road closures for approximately 10 minutes at a time for conductor removal (see Plate 2.12). The use of road closures avoids the need for scaffolding and its associated vegetation clearance, and therefore is generally less intrusive.

Plate 2.12: Overhead Conductors on Road Ready for Removal



- 2.6.78 Similarly, the River Don, Public Rights of Ways, local access tracks etc. may also be protected by closing the area for as little time as possible.
- 2.6.79 Pylon fittings, such as dampers and spacers, will be removed from the conductors in advance prior to commencing the dismantling works.
- 2.6.80 Once lowered to the ground the OHL conductors will be cut at locations along the route and then wound onto large drums (see Plate 2.13).

Plate 2.13: Overhead Conductors Wound onto Drums

- 2.6.81 This operation is repeated for the other individual OHL conductors and the one earthwire.
- 2.6.82 After the lowering of the OHL conductors, the insulators and fittings on all the suspension pylons will also be lowered slowly to the ground and then removed from site by lorry.

Dismantling of Pylon Structures

- 2.6.83 The dismantling of the pylons will not progress until all the conductors have been removed. Because of access and other site constraints/ restrictions the pylons will be dismantled using one of three proposed methods:
- 2.6.84 **Hydraulic Crane:** Pylons can be dismantled using a large mobile hydraulic crane which is positioned on a crane pad at the pylon location. The crane pad will be approximately 20m x 6m (subject to crane size/site constraints) and may be constructed on a temporary stoned area following topsoil removal (topsoil will be stored for use during reinstatement). It will take approximately one day to dismantle a pylon using a crane (following advanced site preparation i.e. installation of the crane pad and progressing of advanced works on the pylon prior to commencement of works with the crane).

Plate 2.14: Mobile Hydraulic Crane Removing Parts of a Pylon

- 2.6.85 The sections of the pylon will be cut/ broken up as they are lowered to the ground using a steelwork breaker/ mechanical shears fitted to an excavator (see Plate 2.15 below). The cut sections of the pylon are then placed into waste skips (which could be located within the crane pad or on temporary track way joining the crane platform) and removed from site for reuse or recycling.

Plate 2.15: Top Section of a Pylon being Positioned on the Ground



Plate 2.16: Steelwork Breaker and Steelwork Ready for Loading into a Skip



- 2.6.86 It is currently proposed that the 'Hydraulic Crane' method of pylon removal will be used on the following pylons, however it should be noted that the main works contractor will confirm removal methods once they have undertaken a detailed assessment of the site:
- Pylon 4ZO157
 - Pylon 4ZO158 (removal of Pylon 4ZO158 (located with Wogden Foot LWS) will take place prior to the re-opening of the Trans Pennine Trail to members of the public to prevent further disruption. Temporary closures will be required to firstly remove the conductors and subsequently dismantle the pylon with a crane. A number of other very short duration closures of the Trans Pennine Trail and / or Trans Pennine Trail diversion

will be required to facilitate the dismantling of the OHL/pylons. These will be confirmed and managed by the main works contractor.

- Pylon 4ZO159, two methods considered. Hydraulic crane removal or pulling over the pylon (to be confirmed by main work contractor)
- Pylon 4ZO162, two methods considered. Hydraulic crane removal or dismantle with a derrick (to be confirmed by main work contractor)
- Pylon 4ZO163
- Pylon 4ZO164R

2.6.87 ***Fell by Pulling Over:*** This method avoids the need to use a mobile hydraulic crane but can only be used where there is sufficient room to pull over the pylon without damaging roads, utility services, and fixed boundary features such as hedges.

2.6.88 A wire bond will first be taken and fitted to the top of the pylon. A winch tractor will be positioned approximately 1.5 to 2 times the pylon height away from the pylon. The base of the pylon (the two back legs of the pylon are cut) is then partially cut through and the winch tractor used to pull over the pylon using the attached bond.

Plate 2.17: Pylon ‘Pulled Over’



2.6.89 The sections of the pylon will then be broken up using a steelwork breaker/ mechanical shears, loaded into skips and removed from site for reuse or recycling.

2.6.90 It is currently proposed that the ‘Fell by Pull Over’ method of pylon removal will be used on the following pylons; however, it should be noted that the main works contractor will confirm removal methods once they have undertaken a detailed assessment of the site:

- Pylon 4ZO159, alternative method, dismantle via crane (see Section 2.6.84), to be confirmed by main works contractor.
- Pylon 4ZO160
- Pylon 4ZO161

2.6.91 ***Use of Mobile Winch and Derrick:*** This method will only be used as a last resort as it is labour and time intensive and is used where it would be impossible to get a large mobile hydraulic crane to the pylon location and/ or where the fell method is not possible due to safety/ environmental constraints.

2.6.92 A small mobile winch and a derrick will be taken to the site. The derrick will be raised up to the top of the pylon such that approximately one third of the derrick is above the top of the pylon (see Plate 2.18). Four stay wires will be required (for support) at right angles from the

top of the derrick down to backstays which are positioned at least one and a half times the maximum height of the derrick away.

- 2.6.93 The pylon will act as a scaffold and dismantled from the inside in small sections which will be individually lowered to the ground using the winch and derrick.
- 2.6.94 The sections will be broken up using a steelwork breaker/ mechanical shears and removed from site for reuse or recycling.

Plate 2.18: Derrick Method



- 2.6.95 It is currently proposed that the 'Mobile Winch and Derrick' method of pylon removal will be used on the following pylon, however it should be noted that the main works contractor will confirm removal methods once they have undertaken a detailed assessment of the site:
- Pylon 4ZO162, alternative method, dismantle via crane (see Section 2.6.84), to be confirmed by main works contractor.

Removal of Pylon Foundations

- 2.6.96 Discussions with landowners and stakeholders regarding the removal of pylon foundations will be undertaken and take into account land owner wishes (for example, removal of foundations to a typical depth of 1.4m to allow for ploughing) and environmental issues. Where applicable, for assessment purposes it has been assumed that pylon foundations will be removed as below.
- 2.6.97 Generally, the ground around each of the four pylon footings will be excavated to a depth of approximately 1.4m by an excavator and then a hydraulic breaker fitted to the excavator will be used to break off the concrete to a minimum depth of 1.4m. The remaining concrete will be left in situ.
- 2.6.98 The steelwork will be cut level with the concrete left in situ. The excavation will then be backfilled and reinstated using imported topsoil/ subsoil where required.

- 2.6.99 Some of the pylons have large concrete bases located above ground level, where this is the case the concrete will be removed using a breaker.
- 2.6.100 Exception to the above is Pylon 4ZO158 where the foundations are acting as a retaining structure for the embankment. For this pylon the stubs shall be cut flush to the top of the concrete slab and the concrete retaining structure shall remain in place. Foundations removed below the ground surface would need to be backfilled and any surplus material would need to be removed from site.
- 2.6.101 The cut steelwork and broken concrete will be removed from site.

Removal of the Existing Sealing End Compound and Pylon 4ZO164R

- 2.6.102 All above ground equipment, including compound fencing, earthing grid, the pylon, SEC and all other plant will be removed. The tunnel shaft will be capped and landscaped above. The area of the SEC inclusive of perimeter footpath will be removed and reinstated as appropriate (grass land).

Temporary Construction Compounds/ Lay Down Areas

- 2.6.103 Areas for temporary construction compounds and lay down areas will be required to facilitate construction activities. These are shown on Figure 2.1 and 2.2 as part of the 'Works Area'.
- 2.6.104 National Grid owned land located to the east of the bridge and the existing National Grid compound at Dunford Bridge (in front of the road bridge, across the disused railway line) will be utilised for construction compounds/ laydown area. This land is located on existing hard standing ground and is likely to house portacabin offices, welfare facilities, waste skips and storage area.
- 2.6.105 The car park at Dunford Bridge will be used by members of the public and construction activities as shown on Drawing PDD-33492-LAY-10.

Plate 2.19: Dunford Bridge Car Park



- 2.6.106 An area (approximately 10,000m², 1ha) of soft ground located within Wogden Foot LWS, to the west of the proposed SEC has been identified as an area required for laydown. This area is the largest of the temporary construction compounds/ lay down areas and will be used to

store excavated soil, sealing end compound plant, excavators, backfill materials, welfare facilities and waste storage.

- 2.6.107 Where present, topsoil will be stripped and stored during the establishment of the temporary construction compounds/ lay down area and reinstated once construction operations are completed. The temporary compounds/ lay down areas will be either on hard standing or stoned ground over a geotextile membrane. To reach ecological mitigation objectives it is possible that the topsoil in Wogden Foot will remain in situ (see Section 7).
- 2.6.108 Fuel storage facilities will be in accordance with best practice, and The Control of Pollution (Oil Storage) (England) Regulations, 2001. Fully bunded fuel stores will be used and they will be located at least 10m from any watercourse and 50m from any borehole or well.
- 2.6.109 Waste storage areas will be situated on hard standing and waste fuel/waste chemical storage areas will be bunded. Foul and surface water disposal facilities will be designed in accordance with Local Planning Authority/ Environment Agency requirements, and permission for appropriate connections to foul sewers will be sought from the relevant Sewerage Undertaker.

Temporary Access Tracks

- 2.6.110 Temporary Access Tracks will be required to facilitate construction activities. The proposed locations of these are provided on Figure 2.1 and Figure 2.2. The Temporary Access Tracks could be made of stones or portable access roads.
- 2.6.111 AP7 will require a new access to be made off the existing highway (Windle Edge) to access the Works Area, the location of this is shown on Figure 2.1.
- 2.6.112 Typically, the stone roads will require topsoil removal and be built on top of subsoil by laying a layer of crushed stone or concrete on a geotextile membrane. Fenced and gated crossing points will be installed to allow movement of animals and farming vehicles from one side to another where required.
- 2.6.113 Portable access roads made of aluminium or plastic rafting are usually formed by laying interconnecting sheets either on existing topsoil or on soil removed of topsoil if the surface is too soft.
- 2.6.114 Temporary access roads will be required for works including construction of bridges, the removal of the redundant pylons and erecting the new 4ZO157R. The construction timing of the temporary access roads will depend upon the programming sequence, although it is anticipated that the first access roads will be for the construction of the temporary bridge structure over the River Don to enable construction works to commence at the new SEC.
- 2.6.115 Following pylon removal activities all temporary access roads will be removed from site and land levelled and returned to their original state.

Construction Machinery and Vehicles

- 2.6.116 Construction traffic generated by construction activities can be divided into two types: Heavy Goods Vehicles (HGVs) and smaller vehicles (such as vans and 4 x 4 vehicles). HGVs are used to deliver plant, cable components and materials to the Temporary Construction Compound, storage areas or directly to the proposed SEC.
- 2.6.117 It is anticipated that a labour peak of up to 60-70 personnel on-site will occur during the busiest period including all contractors and sub-contractors. The peak plant usage could be up to 40 plant items and would include wheeled and tracked excavators, tractors, trailers, mobile cranes, bulldozers, and specialist plant such as cable installation equipment, OHL installation plant, augering and drilling machines.

Reinstatement

- 2.6.118 Following completion of the cable installation, the ground would be returned to its previous use, unless specified otherwise in Section 7 Ecology or the Landscape and Ecological

Management Plan (LEMP) (provided as an appendix to the CEMP 2B.3) or as part of agreements for the Trans Pennine Trail re-surfacing. All materials, including temporary culverts and geotextile membranes, will be removed on completion of the work.

- 2.6.119 After re-grading of the working area to reflect the original profile (where possible), a replacement drainage scheme will be installed, where appropriate, following discussions with the landowner/occupier. The design of these drainage schemes will be agreed between National Grid and the landowners/occupiers and will pay particular attention to the need to ensure that the drains do not act as pathways to watercourses for sediment/contamination or cause flooding off-site.
- 2.6.120 Trees and other field boundaries would be reinstated. Trees felled cannot be replanted over or in close proximity to the buried cable but would be replaced locally elsewhere on or off site.
- 2.6.121 Trees removed will be replanted using a suitable mix of native species of local provenance, where available, to reflect the species removed. Replanting will be undertaken using container-grown stock. All plants will be protected with guards, supplemented by stock and rabbit-proof fencing as required to protect from damage by grazing domestic animals and wildlife.
- 2.6.122 The Trans Pennine Trail will be reinstated to the specification agreed with the Local Planning Authority (see the Trans Pennine Trail Management Plan in Appendix 2B.6).
- 2.6.123 Within Wogden Foot LWS the working area will be cleared, the subsoil will be loosened ("ripped") to a suitable depth to relieve compaction, stones and debris will be removed. Prior to handling of topsoil, the storage mounds will be checked for any protected species that may have taken up residence.
- 2.6.124 Fencing installed around the works area will be retained until the re-seeded sward has sufficiently recovered to withstand grazing pressures.
- 2.6.125 All reinstatement measures will be incorporated into the LEMP which will include details of fencing and boundary treatment, soil handling, seed sources and mixes, plant sources and mixes and after-care regimes.

Embedded Mitigation During Construction Phase

- 2.6.126 An important aspect of the detailed design will be the further development of the main works contractors CEMP to control and monitor environmental performance throughout construction of the Proposed Project; this will include pollution incident control and emergency response measures. The main works contractor will also develop, in consultation with National Grid a Site Waste Management Plan (SWMP).
- 2.6.127 Environmental Advisors will be employed for the duration of the project. The workforces will be briefed about relevant environmental issues, including pollution control, before work begins and at regular intervals throughout construction. Further details are provided in Appendix 2B (Outline CEMP).
- 2.6.128 The following measures have been embedded into the design of the Proposed Project:
 - A CEMP will be prepared and used to manage environmental impacts during construction; this will include measures for controlling dust and general pollution from construction operations to the surface and groundwater environments and details of the approach to soil management to ensure protection, conservation and reinstatement of soil material, its physical and chemical properties and functional capacity for its intended end use.
 - The Trans Pennine Trail will be diverted, with the diversion remaining open for the duration of underground cable and SEC installation activities. The conditions of the diversion will be agreed with the Rights of Way Officer. The measures set out in the Trans Pennine Trail Management Plan will be adhered to.

- Appropriate industry best practice and published guidelines will be followed to reduce pollutant and sediment movement during construction.
- All fuel and chemical storage will comply with relevant storage regulations.
- Suitable precautions will be taken to prevent spillages from equipment containing small quantities of hazardous substances.
- Deep excavations may require de-watering. Water pumped or removed from excavations will be passed through a silt-separator tank or equivalent, and discharge to ground. If there was a requirement to discharge to surface water a permit would be sought from the Environment Agency prior to undertaking such operations.
- Environment Agency guidance on the assessment of risks from potentially contaminated land will be followed in line with Contaminated Land Report 11 (CLR11)⁴.
- Work will stop in the vicinity of any previously unidentified contamination if encountered until the nature and concentration of the contaminant(s) are determined and appropriate risk control measures implemented.
- Clay bungs or other vertical barriers will be constructed within trench excavations where deemed necessary to prevent the creation of preferential drainage pathways or to prevent the creation of preferential migration pathways for contaminants (where suspected).
- Stabilised backfill will be packed around cables in order to aid heat dissipation.
- A Construction Traffic Management Plan will be prepared to secure appropriate routing and management of construction traffic.
- All soils will be stored as far away from watercourses as practical and any potentially contaminated soil will be stored on an impermeable surface and covered to reduce leachate generation and potential migration to surface waters.
- Measures contained in relevant DEFRA and Environment Agency best practice guidance on the control and removal of invasive weed species will be implemented.
- The main works contractor will cease work and advise the Animal Health Regional Office should animal bones be discovered which indicate a potential burial site.
- Prior to construction an Archaeological Written Scheme of Investigation (WSI) will be produced, agreed and implemented on site.
- Following completion of construction operations all agricultural land will be restored to its previous condition unless specified otherwise in the LEMP. Topsoil will be prepared and seeded using an appropriate seed mix or returned to previous cultivation. A LEMP has been prepared to detail restoration objectives in key sensitive areas such as Wogden Foot LWS.
- Permanent surface water/ agricultural drains will be re-installed to reinstate any pre-existing field drainage systems to pre-construction condition.
- Removal of trees and scrub will be conducted outside of the bird breeding season wherever possible, or the vegetation will be examined for active nests by an ecologist immediately prior to removal.

⁴ Environment Agency, Management of Land Contamination, Contaminated Land Report 11

- Following the completion of all cable installation construction works, the land within the working width will be fully reinstated as near as practically possible to its former condition, or as agreed with landowners and stakeholders in advance (this will include the reinstatement of most stretches of drainage ditches and existing culverts).
- Trees which will have been removed during the construction period will be replanted as required in the LEMP. Trees will not be planted above or within 3m of the cables to avoid the risk of damage to the cable by tree roots.
- The use of artificial light will be minimised to that required for safe working with down lighting to minimise light scatter.
- Unless specified in the LEMP areas of habitat will be restored to equivalent habitat condition post-construction. Restoration will seek to replace vegetation with the same species identified in the extended Phase 1 habitat survey as far as is practicable, unless a specification is provided in the LEMP.
- Mitigation planting/ Screening will be provided at the SEC as outlined within the LEMP.
- In relation to temporary land take requirements or access limitations National Grid will liaise with landowners to agree commercial terms with affected parties including any loss of ongoing payments or fines relating to agri-environmental stewardship schemes. In addition, in discussion with landowners, temporary water supplies and troughs will be provided for livestock as necessary.
- All construction activities shall adhere to the best practices outlined in British Standards Institution code of practice for noise and vibration control on construction and open sites (Part 1 and Part 2) BS 5228⁵.
- All construction equipment will be maintained in good working order and any associated noise attenuation measures such as engine casings and exhaust silencers shall remain fitted at all times.
- Construction will not be undertaken during extreme wet weather where erosion of sediments and risk from flooding may increase and where there is a risk of structural damage to soils during handling.
- The implementation of an Operational Phase SuDS Maintenance and Management Plan for the SEC including the permanent access road.
- National Grid will be responsible for the management and maintenance of the proposed SuDS solutions for the SEC and its permanent access road over the intended lifetime of the Proposed Project.
- A Considerate Constructors Scheme will be in place to ensure that everything is done, where practicable, to reduce the effect on the environment and this will include awareness-raising, through tool box talks, of the sensitivity required should livestock be in close proximity to works. In addition, temporary fencing will be erected to limit the potential for livestock to be in danger during the construction of the temporary Trans Pennine Trail diversion.

2.7 The Operational Phase

2.7.1 The permanent electrical infrastructure in the Proposed Project includes:

⁵ British Standard Institute, Code of practice for noise and vibration control on construction and open sites (Part 1 and Part 2) 2009 and 2014

- Cable installation
- Proposed SEC;
- A permanent access to the SEC, accessed from Dunford Bridge, along the Trans Pennine Trail (this will be gated at its junction with the Trans Pennine Trail to prevent animals leaving Wogden Foot LWS, and unfenced within Wogden Foot LWS to allow the free movement of animals across the site);
- Replacement Pylon 4ZO157R; and,
- OHL connection between replacement Pylon 4ZO157R and the SEC.

2.7.2 The location of land affected by permanent infrastructure is shown on Figure 2.3.

2.7.3 The electrical equipment will be owned and operated by National Grid, who will be responsible for condition monitoring and maintenance of the electrical infrastructure. Comprehensive operating procedures are in place to ensure efficient, safe operation of the electrical transmission system. The cable will be included in National Grid's existing maintenance procedures.

400kV Cable Corridor and SEC

2.7.4 Maintenance of the Proposed Project will be required during its operational lifetime which is anticipated to be 40 years. Typical maintenance procedures are summarised in Table 2.2.

Table 2.2: Typical maintenance works during operational lifetime

Proposed Project Element	Typical Maintenance Works	Frequency
Underground Cable/ SEC	Maintenance is expected to be limited to occasional inspections	As required for maintenance.
	The underground cables will have above ground kiosks or link pillars (where the cable sections join) that allow monitoring of the High Voltage underground cable systems. Monitoring is carried out via fibre optic cables installed with the underground cables.	Monthly
	Monthly visual checks would be required of the above ground kiosks and checks on the electrical equipment within the SEC.	Annual
	Annual maintenance activities will be carried out where access will be required to all control cabinets to inspect secondary systems.	
	Vans would be used to carry workers in and out of site and trucks would be used to bring new materials and equipment to site and remove old equipment (using permanent SEC access road).	

Tension pylons	Infrequent visits for replacement of pylon fittings/ anti climbing devices (ACDs), pylon steelwork / bracing. Painting pylon steelwork.	As required
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Electric and Magnetic Fields

- 2.7.5 All equipment that generates, distributes or uses electricity produces Electric and Magnetic Field (EMFs). The UK power frequency is 50Hz which is therefore the principal frequency of the EMFs produced, which are also known as Extremely Low Frequency (ELF) EMFs.
- 2.7.6 Electric fields depend on the operating voltage of the equipment producing them and are measured in V/m (volts per metre). The voltage applied to equipment is a relatively constant value. Magnetic fields depend on the electrical currents flowing, which vary according to the electrical power requirements at any given time and are measured in μT (microteslas). Both fields diminish rapidly with distance from the source and are present in all areas where electricity is in use (e.g. office and homes), arising from electric cabling and equipment in the area.
- 2.7.7 Substations and SECs do not produce significant EMFs outside their boundaries. In EMF terms, therefore, the principal effect of this Proposed Project is to replace a length of OHL (the VIP subsection) with a length of underground cable. Unlike OHLs, underground cables produce no external electric fields, but they do produce magnetic fields. OHL and underground cables both produce their highest magnetic fields on, or close to, the route centreline. In both cases, the fields comply with the relevant exposure limits. The magnetic fields from both the OHL and the underground cables fall rapidly with distance to the side of the route. The field from the underground cable falls more rapidly, falling to the levels found in UK homes in general in perhaps 20m compared to perhaps 100m for an OHL, though both these values depend on the specifics of the design.
- 2.7.8 This means that, in general, the underground cable produces lower exposures to people, but, because all fields from both OHLs and underground cables comply with the relevant exposure limits, no particular significance attaches to this fact.
- 2.7.9 Whilst there are no statutory regulations in the UK that limit the exposure of the public to power-frequency electric or magnetic fields, responsibility for implementing appropriate measures for the protection of the public from EMFs lies with the UK Government. In 2004, the Government adopted guidelines published in 1998 by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) (ICNIRP, 1998) in the terms of the 1999 EU recommendation (European Council, 1999) on public exposure to EMFs. This policy of compliance with guidelines was reaffirmed in 2009, when one additional precautionary policy relating to high-voltage power lines, optimum phasing, was introduced. The National Policy Statement for Electricity Network Infrastructure EN-5 (NPS EN-5) (Department of Energy and Climate Change (DECC), 2011a) also repeats these two policies and the DECC has published three Codes of Practice (DECC, 2012 a, b and 2013) which have been agreed between the Energy Network Association and the Government, which specify how compliance with these exposure guidelines and with the policy on optimum phasing will be determined.
- 2.7.10 There is some scientific evidence concerning the possibility that magnetic fields, at levels below the exposure guidelines that are in place, may be associated with higher rates of certain diseases, specifically childhood leukaemia. This evidence is taken into account by the relevant authorities in setting the exposure guidelines. Specifically, ICNIRP review the evidence, but conclude “*the currently existing scientific evidence that prolonged exposure to low frequency magnetic fields is causally related with an increased risk of childhood leukaemia is too weak to form the basis for exposure guidelines.*” Thus, the measures for the protection of the public that are in place in the UK, outlined in the previous paragraph, already take account of this scientific evidence.

- 2.7.11 It is National Grid's policy as set out in its Public Position Statement (National Grid, 2014) on the subject to "...as a *minimum comply with EMF regulations, guidelines and practices in force in which we operate*". This policy will be applied to this Proposed Project, and all the equipment installed will comply with the guidelines.
- 2.7.12 When the EMFs resulting from electrical equipment comply with the relevant exposure guidelines as specified by Government and with the additional precautionary policies, no significant effects from EMFs are expected. This is set out in paragraph 2.10.15 of NPS EN-5 - "...where it can be shown that the line will comply with the current public exposure guidelines and the policy on phasing, no further mitigation should be necessary" (DECC, 2011b).
- 2.7.13 A standalone document is provided in Appendix 2A which provides comprehensive information on EMFs as it relates to the Proposed Project.

Removal of Existing Infrastructure (VIP subsection)

- 2.7.14 As the 400kV OHL would be removed, no operational phases would be involved for this component of the Proposed Project.

Embedded Mitigation During Operation

- 2.7.15 The following measures have been embedded into the design of the Proposed Project:
- Use of appropriate measures to prevent spillage of potentially polluting substances.
 - Fuels, lubricants solvents etc will be stored in appropriately bunded areas and a range of other pollution prevention measures taken.
 - For areas of permanent land take or any permanent restriction of certain activities above the cables, these will be discussed with affected landowners and secured in the commercial terms.

2.8 The Decommissioning Phase

400kV Cable Corridor

- 2.8.1 This Environmental Assessment Report includes a cradle to grave assessment of the Proposed Project which includes construction, operation/ maintenance and decommissioning of the underground cables. The detailed decommissioning methodology cannot be finalised until immediately prior to decommissioning, and would be in line with relevant policy at that time.
- 2.8.2 Underground cable has a life expectancy of approximately 40 years, however, it is quite feasible that the cable would last beyond this, and National Grid would seek to utilise a maximum life expectancy. If the cable installation was no longer required when they reached the end of their life it is expected that they would remain buried in the ground to avoid disruption associated with their removal along the Trans Pennine Trail. However, if the cable needed to be replaced it would be possible to remove the redundant cable and replace with a new solution.
- 2.8.3 This environmental assessment does not include options for a replacement connection, if a connection is still required following expiry of the life of the cable. Any works associated with a replacement connection would be subject to a separate assessment based on technology and environmental conditions at that time.

Sealing End Compound

- 2.8.4 The lifespan of a SEC is approximately 40 years. When the SECs useful life has expired the materials would be removed and taken for recycling. Unless there is a compelling need for full removal of the foundations, these would be removed to approximately 1m deep and

subsoil and topsoil reinstated. If the foundations were to be completely removed, similar methods and access would be required as outlined for installation.

- 2.8.5 The detailed decommissioning methodology cannot be finalised until immediately prior to decommissioning, and would be in line with relevant policy at that time, taking into account environmental conditions and landowner requirements. For assessment purposes, this Environmental Assessment Report assumes that the SEC would be removed if no longer required, with the foundations removed to a depth of approximately 1m.

Removal of Existing Infrastructure (VIP subsection)

- 2.8.6 As the 400kV OHL would be removed, there would be no decommissioning phase for this component of the Proposed Project.

Removal of Replacement Pylon 4ZO157

- 2.8.7 If the replacement Pylon 4ZO157 was no longer required removal would be carried out in line with best practice techniques at the time of removal, it would be assumed that there would be similar methods and access required as outlined for construction.

Embedded Mitigation During Decommissioning

- 2.8.8 If the cable were no longer required when it reached the end of its life expectancy, they would remain buried in the ground to avoid disruption associated with removal along the Trans Pennine Trail.

2.9 Programme of Works

- 2.9.1 The current indicative programme is that, assuming planning consent, on site construction activities would commence June 2020 and last for a duration of between 1.5- 2.5 years until commissioning and reinstatement is complete.
- 2.9.2 It is anticipated that the construction works from first site access will take place over a 16 month period. Completion of pylon removal, reinstatement and demobilisation is estimated to take a further 8 months including a winter shut down period. Removal of the existing pylon infrastructure (the VIP subsection) will take place in the period from commencement of the outages to the commission of the new cables and construction of the new SEC. The Trans Pennine Trail diversion will be used to facilitate OHL removal and therefore will remain in situ until the completion of the OHL removal works.
- 2.9.3 The following working hours on this Proposed Project will be sought from Barnsley Metropolitan Borough Council:
- Monday to Friday 7.00am until 7.00pm
 - Saturday and Sunday 8.00am until 5.00pm