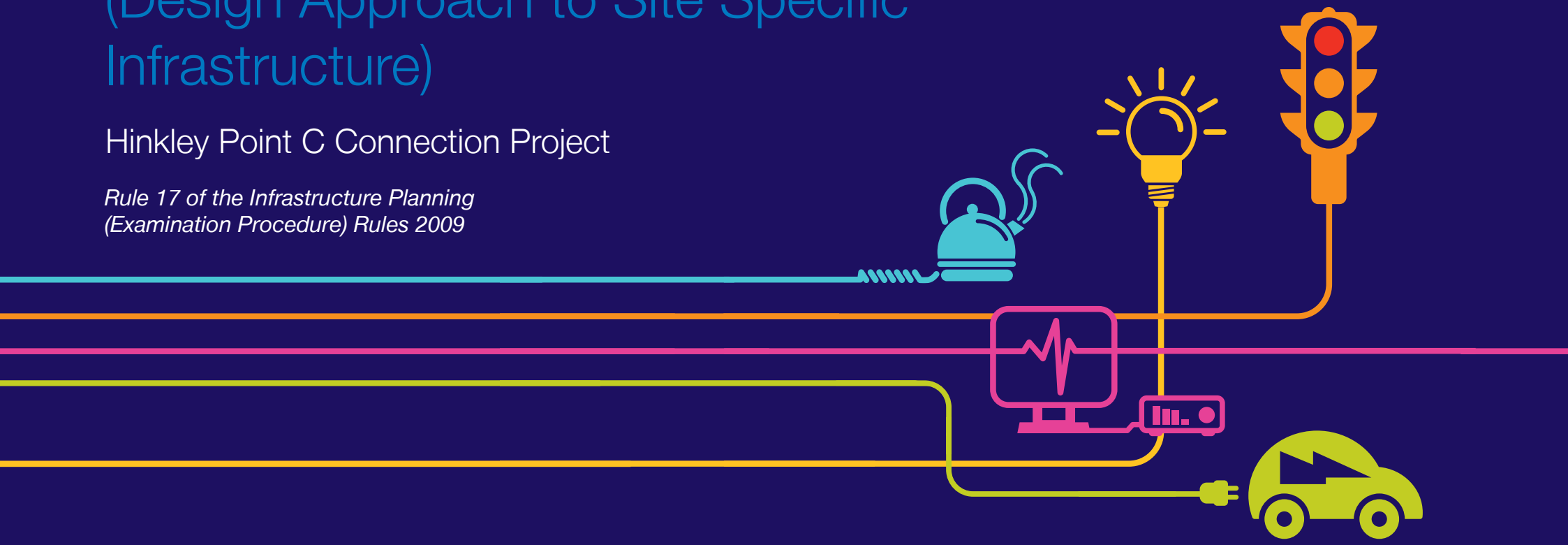
Document 8.32

nationalgrid

Updated Appendix 2.9.26.1 (Design Approach to Site Specific Infrastructure)

Hinkley Point C Connection Project

Rule 17 of the Infrastructure Planning (Examination Procedure) Rules 2009



Application Reference EN020001

July 2015

National Grid's response to Joint Councils' Deadline 6 comments on 'Design Approach to Site-Specific Infrastructure' (Volume 8.18.2.1, Appendix 2.9.26.1)

An updated version of the 'Design Approach to Site-Specific Infrastructure' document has been submitted by National Grid at Deadline 7 (**Volume 8.32**). The document has been updated in light of the comments made by the Joint Councils' at Deadline 6 and to reflect the updated site-specific landscape mitigation plans (**Volume 5.7.3.14A**).

National Grid's response to the specific comments made by the Joint Councils at Deadline 6 is provided in the table below.

Doc Ref	Joint Councils' proposed amendment	Joint Councils' reasons	National Grid's response
Title	*The document should be retitled 'Design Guide'.*	*Makes clearer the purpose of the document.*	National Grid considers that 'Design Approach' is a suitable title which makes clear the purpose of the document. It is unnecessary to re-title the document.
Page 4	*The document should apply to the design of infrastructure associated with the HCCP across the entire scheme. The other elements of infrastructure omitted thus far should be added to the document under a detailed 'other' section or each element could have its own brief section.*	*While acknowledging the sensitivity of the site-specific infrastructure listed on page 4, and the appropriateness of their being picked out for particular attention the need for good design as set out in the NPS's applies also across the rest of the route and to all other locations where infrastructure is proposed.* *For example, as raised at the DCO ISH the design of fencing (temporary and permanent) is a relevant consideration and one on which LPA's will need to determine requirements across the scheme and not just in the locations listed.*	National Grid does not consider that the document should apply more generally to all infrastructure (excluding the proposed overhead lines and underground cables). The other site-specific infrastructure referred to, involves the extension or modification of existing substations where the overriding consideration from a maintenance perspective and also in terms of appearance is that the extensions or modifications respond to and are consistent with the existing infrastructure already there. The extensions or modifications required at the existing 132kV substations (Churchill, Portishead, Avonmouth and Seabank substations) are as a result of changes to the 132kV distribution network. These works involve the installation of electrical plant, equipment and switchgear and are largely confined to within the existing substation

Doc Ref	Joint Councils' proposed amendment	Joint Councils' reasons	National Grid's response
			compounds, which are set within an existing landscape framework. In the case of Churchill and Seabank Substations, small substation extensions are also required to accommodate the electrical connections. This would require fencing of and surfacing within the small extension, but would not require any additional vehicle accesses outside the compound. At Seabank 400kV substation the works involve the extension of an existing 400kV GIS substation building together with the installation of electrical plant and equipment and is largely confined to within the existing substation compound, which is set within an existing landscape framework. The design and appearance of fencing would be controlled by the Local Planning Authority via the DCO Schedule 3, Requirement 16, and the design and appearance of buildings at Seabank Substation would be controlled by DCO Schedule 3, Requirement 32 (**Volume 2.1.1E** or **Volume 2.1.2E**). In relation to other aspects of the HPCC Project which the Joint Councils suggest in their Deadline 6 comments should be included in the design approach document, temporary fencing proposals are contained in the CEMP (**Volume 5.26C**) which is secured by the DCO, Schedule 3, Requirement 5 . Proposals for temporary and permanent fencing are controlled via the DCO, Schedule 3, Requirement 16. Measures for the reinstatement of landscape

Doc Ref	Joint Councils' proposed amendment	Joint Councils' reasons	National Grid's response
			features (including fencing, surfacing and landform) are contained in the CEMP which is secured by the DCO, Schedule 3, Requirement 5. Reinstatement is also controlled by the Local Planning Authority via Schedule 3, Requirement 15. Replacement planting and OSPES proposals are set out in the AIA (**Volume 5.21B**) and OSPES (**Volume 5.25B**).
Page 4	**Purpose of this document** *The primary uses of the document should be made explicit, with the detailed list currently at page 4 column 2 following on.* *"The primary purpose of this document is to provide a framework of design principles:* *a. within which National Grid will develop detailed design proposals for site specific infrastructure associated with the Hinkley C Connections Project, and* *b. that will inform the Joint Councils review and determination of applications for the discharge of Requirements in relation to site specific infrastructure.* *Detailed designs for site specific infrastructure associated with the HCCP will be expected to conform to the design principles set out in this guide, unless it can be demonstrated that a different design solution would better integrate with the*	*As explained by the ExA and agreed by the Joint Councils who will be responsible for determining requirements in relation to detailed design matters.* *This will set a framework, along with the policies set out at section 1.3, within which NG should develop design proposals, and provide clear and agreed criteria against which the LPA can review proposals put to them through requests for discharge of requirements, and which will inform their decisions. This gives greater certainty and clarity to both parties.*	National Grid has added the following text at Page 4 of the document to replace the bullet point list in column 2 (new text underlined, bold text added to Joint Councils' proposed wording): *<u>The primary purpose of this document is to provide a framework of design principles:</u>* *a. <u>within which National Grid will develop detailed design proposals for site specific infrastructure associated with the Hinkley C Connections Project, and</u>* *b. <u>that will inform the Joint Councils review and determination of applications for the discharge of Requirements in relation to site specific infrastructure.</u>* *<u>In relation to the specific DCO Requirements named in **Section 10.0** of this document, the details submitted for approval by the relevant planning authority must be produced having regard to the Design Approach to Site Specific Infrastructure, unless otherwise agreed.</u>* Bullet point list of purposes in column 2 on page 4 is incorporated into the wording on document

Doc Ref	Joint Councils' proposed amendment	Joint Councils' reasons	National Grid's response
	landscape character of the surrounding area or result in reduced impact"		structure on page 5. See also changes made to Section 10.0 below.
1.3	***Background to the Project*** *This should include a general section that lists other elements of the project where design is also relevant, e.g. extensions to existing facilities, boundary treatments, fencing, paving and surfacing, earthworks, reinstatement of landscape features, replacement planting and on site and off site planting proposals (the latter could be a simple cross reference to the OSPES).*	*It needs to be made clear to both NG and to the LPA what elements of the scheme the Design Guide applies to.* *As set out above, this is more than the locations currently listed.* *It may be that where extensions to existing facilities are required, there may need to be for example replacement fencing/ access arrangements or other structures, and the policy requirements for high quality design apply to these also.*	See National Grid's response provided above about the inclusion of other elements in the Design Approach document. The following wording (underlined) is added to 1.1 Purpose of this Document (pg 4). *Whilst the Design Approach document focuses on the site-specific infrastructure listed above this does not undermine National Grid's commitment to good design, as set out in DAS (**Volume 7.2**), and in relation to all aspects of the HPCC Project.*
1.4	***Background to Design*** *It is suggested that this is retitled Policy Context.* *In addition to National Policy, this section should reference relevant local policy, including for example:* • *Core Strategy Design Policy,* • *Development Management Policies and* • *Adopted Landscape Character Assessments including for the AONB and for each local authority area (where they exist)* • *AONB design policy* • *Green Infrastructure Strategies*	*Local policy should also inform National Grid's design and will inform LPA's review and determination of applications for discharge of Requirements.*	The Design Approach document has had appropriate regard to relevant aspects of local planning policy, particularly adopted landscape character assessments (which are referenced in the document at Section 2.0). Extracting or repeating sections of these documents would unnecessarily lengthen and complicate the document. The document has been amended as follows: Section re-titled 'Design Context'. Final paragraph added to page 14 (see underlined text below): *Local Planning Policy* *In the detailed design of site-specific infrastructure*

Doc Ref	Joint Councils' proposed amendment	Joint Councils' reasons	National Grid's response
	• *Any other relevant Supplementary Planning Documents*		*appropriate regard should be given to relevant local planning policy and guidance.* Pages 14 and 15 re-ordered, so that the Horlock Rules are on page 14 and the design and access statement is on page 15.
2.0	***Site Location and Context*** *For each part of Section 2, there should be a general section identifying the general approach to reviewing the local context in terms of landscape form, features and character, vernacular architecture and built features to inform design for infrastructure at all other locations. This should explicitly cover all other infrastructure associated with the HCCP in other locations along the route and associated with the WPD works.*	*It is important that the national and local policy for high quality design and conserving and enhancing landscape character are applied in all other locations along the route.*	See National Grid's response provided above about the inclusion of other elements in the Design Approach document.
3.0	***Examples of existing infrastructure:*** *Some of the examples shown include fencing and structures that are not necessarily sensitive to their landscape context and may not be acceptable to a LPA, for example steel palisade fencing in a rural location or light coloured above ground pipework. It is suggested that only examples that meet the design criteria set out in the Design Guide should be included in the document.*	*Inappropriate or insensitively designed existing infrastructure should not provide a precedent for more of the same. All extensions, alterations and new infrastructure should comply with current design policy and not historic precedent.*	The document provides examples of existing infrastructure as a reference point, so that the reader has an understanding of its typical appearance. The design approach document's clear aspiration is to provide high quality design, which responds to the local environment. No changes made.
4.0	***Examples of Design Innovation and Aspiration:***		Noted.

Doc Ref	Joint Councils' proposed amendment	Joint Councils' reasons	National Grid's response
	The inclusion of examples of design innovation and Aspiration are welcomed.		
5.0	***The Vision** is welcomed and includes important design principles that should apply to the design of all infrastructure associated with HCCP, not just the locations currently given. Wording should be added to specifically state this.* *It is also suggested that the points are reordered to set general criteria first (that will be applicable to all infrastructure), followed by site specific principles.* *It is suggested that there are other issues not currently covered in the Vision and therefore the wording should be modified to cover these. Proposed wording for inclusion is italic underlined:* *• 'careful siting' should be reworded to say 'careful siting and orientation'* *• Local Landscape Character and Distinctiveness should be mentioned* *• 'minimising height and bulk of equipment* *• Add 'buildings to be consistent with the form and finish of vernacular buildings in the local context that make a positive contribution to landscape character'* *• With reference to material, texture and colour are important and should be specifically mentioned, and* *• Materials and finishes should avoid glint and reflectivity* *• Any earthworks should be of flowing form*	*It is considered that the Vision will form the basis for design development and design review by NG and the LPA respectively that are then expanded on in Section 7: Design Principles.* *There are additional criteria that should inform and guide design and development management decisions, and it is considered that some criteria should provide more specific guidance. Aspects of design are not mentioned and should be included including in relation to earthworks and paving/surfacing.* *It is also important to ensure that design reflects what make a positive contribution to landscape character and views and not existing poor practice that may be present in the area. It is also important that design reinforces local distinctiveness rather than standard designs and finishes that can detract from local landscape character.*	See National Grid's response provided above about the inclusion of other elements in the Design Approach document. The order of points in the vision is valid and does not alter content or meaning. No change made. The vision is amended as follows (add/~~remove~~): *The site-specific infrastructure will be designed to meet their functional and operational requirements whilst being of high quality and sensitive to their setting, to minimise environmental effects. This will be achieved by:* • *careful siting and orientation of the Sandford Substation with reference to existing landscape features and consideration of sensitive environmental receptors, such as the Mendip Hills AONB and its setting, visual receptors on high ground in the AONB, users of the Strawberry Line, users of NCR 26 and residents at Droveway Farm;* • *careful siting and orientation of the South of the Mendip Hills CSE Compound with reference to existing landscape features and consideration of sensitive environmental receptors, such as the Mendip Hills AONB and its setting, visual receptors on high ground in the AONB and users of the M5;*

Doc Ref	Joint Councils' proposed amendment	Joint Councils' reasons	National Grid's response
	to blend into the surrounding landscape. *• Paving and surfacing is not mentioned in the vision? and should be as this can be an urbanising or intrusive feature in the landscape. Paving and surfacing should be of a colour and texture that recedes into the landscape*		• *careful siting and orientation of the Bridgwater Tee CSE Compound on Horsey Level, with consideration given to sensitive environmental receptors, including visual receptors on Puriton Ridge;* • *ensuring rational use of space and minimising the height and bulk of equipment;* • *utilising materials and finishes, wherever possible, which reflect the colour, texture or materials palette found in the local landscape, and seek to avoid reflective finishes which cause glint and glare;* • *incorporating mitigation planting and mounding to assist in screening ~~whilst being~~ (planting should be in-keeping with local landscape character and mounding should have a natural form to help it blend into the surrounding landscape); and* • *employing locally appropriate and innovative designs for site boundaries, accesses, buildings and enclosures.* National Grid considers that the wording requested by the Joint Councils in relation to 'local landscape character and distinctiveness', and in relation to buildings and surfacing is already covered by the vision. Reference to local landscape character and locally appropriate design occurs throughout. The item in the vision on materials and finishes applies to surfacing and buildings, and locally appropriate designs for buildings is referred to in the last item.

Doc Ref	Joint Councils' proposed amendment	Joint Councils' reasons	National Grid's response
7.0	***The Design Principles*** *provide more detailed guidance and taken together with the Vision are key sections of this document that should inform NG design development and to which the LPA will have reference in determining Requirements. Therefore Section 7 should cross refer back to Section 5. It is also suggested that it is stated that the LPA will have regard to these in determining NG applications for discharge of requirements.* *It is also suggested that this section cross refers to examples of good practice as illustrated in Section 4.* *This section should include general principles for application across all infrastructure associated with HCCP and the WPD works, followed by the particular considerations for site specific locations.* *For example there will be general principles for e.g. Fencing design should fulfil its intended security function while also receding into the landscape.*	*The use of the document and these key sections should be made clear.*	Amend the introductory text as follows (add/~~remove~~): *Further to National Grid's overarching design principles set out in Section 5 of the DAS (**Volume 7.2**) and ~~in~~ **Section 1.0** of this report, and the examples of design innovation and aspiration and the vision at **Sections 4.0 and 5.0**, a specific set of design principles have been developed for the site-specific infrastructure. These provide a clear set of objectives which have guided the design of the site-specific infrastructure to date and will guide any future detailed design, promoting a high quality approach and providing certainty as to what will be delivered. The Local Planning Authority will have regard to these when determining National Grid's applications for the discharge of requirements.* See National Grid's response provided above about the inclusion of other elements in the Design Approach document.
8.0	***Scope for Variation in developing the detailed design:*** *An explanation of what can and cannot be varied will be useful in informing the LPA when reviewing design.*		This is already provided in Section 8.0. No change.
9.0	***Approach to detailed design***		-
10.0	***DCO Requirements and Approval***		Noted.

Doc Ref	Joint Councils' proposed amendment	Joint Councils' reasons	National Grid's response
	Process *This is an important section in the report and seems to adequately tie the document into the DCO.*		In order to be consistent with the revised wording of the DCO the second paragraph on page 96 has been amended to read: Schedule 3 of the Hinkley Point C Connection DCO has a number of specific requirements that relate to implementation of the proposed development that are relevant to this design approach document. These requirements ensure that no stage of the authorised development shall commence until written details have been submitted, by National Grid to, and approved by the relevant planning authority. Requirement 38 "Design Approach to Specific Infrastructure" ensures that the submissions made by National Grid must have regard to the Design Approach to Site Specific Infrastructure, unless otherwise agreed by the relevant planning authority. The relevant requirements within the DCO are: Requirement 8, *Control of artificial light emissions* Requirement 9, *Provision of embedded landscape mitigation* Requirement 10, *Replacement Planting* Requirement 16, *Fencing and other means of enclosure* Requirement 22, *Highway works* Requirement 30, *River Axe crossing* Requirement 32, *Approval of external appearances etc. of permanent structure*

Design Approach to Site Specific Infrastructure

HINKLEY POINT C CONNECTION PROJECT

DESIGN APPROACH TO SITE-SPECIFIC INFRASTRUCTURE

13 JULY 2015

Contents

Above: Existing view from Mendip Hills AONB looking toward the proposed Sandford Substation site

1.0 Introduction

1.1 Purpose of this Document

This Design Approach document relates to key site-specific infrastructure, namely:

- the proposed Sandford Substation and Towerhead Brook Bridge;
- the proposed South of Mendip Hills Cable Sealing End (CSE) Compound and River Axe Cable Bridge Option; and
- the proposed Bridgwater Tee Cable Sealing End (CSE) Compounds.

The document supplements the Hinkley Point C Connection Project Design and Access Statement (DAS) (**Volume 7.2**).

Whilst the Design Approach document focuses on the site-specific infrastructure listed above this does not undermine National Grid's commitment to good design, as set out in DAS (**Volume 7.2**), and in relation to all aspects of the HPCC Project.

At the Issue Specific Hearing for Landscape and Visual including Arboricultural Matters the Examining Authority (ExA) raised concerns over design issues and noted that the ExA and the Secretary of State would have to be satisfied that the matters relating to design set out in National Policy Statement (NPS) EN-1 and EN-5 have been addressed.

The ExA referred to section 4.5 of NPS EN-1 on 'good design' of infrastructure and stated that it and the Secretary of State needed to be assured that the proposals including its substation and other infrastructure comprise 'good design'.

The ExA requested that National Grid consider the design approach to site-specific infrastructure comprising the substation, CSE compounds and bridges; including landscaping, components within each structure and how they may be 'softened' to blend within the landscape.

The ExA acknowledged that the Joint Councils need to have sufficient certainty on the options and parameters related to each item of infrastructure to enable them to approve each design providing details of what they are expected to approve. Consideration must be given to the parameters of design so that it is clear how the Development Consent Order (DCO), Schedule 3 Requirements can be used to influence design.

The primary purpose of this document is to provide a framework of design principles:

- within which National Grid will develop detailed design proposals for site specific infrastructure associated with the Hinkley C Connections Project, and

- that will inform the Joint Councils review and determination of applications for the discharge of Requirements in relation to site specific infrastructure.

In relation to the specific DCO Requirements named in **Section 10.0** of this document, the details submitted for approval by the relevant planning authority must be produced having regard to the Design Approach to Site Specific Infrastructure, unless otherwise agreed.

1.0 Introduction

1.2 Structure of the Document

This Design Approach document has been structured as follows:

- **Section 1.0 -** Introduction: description of the purpose of the document, background to the project and summarises the rationale for the siting and design of the site-specific infrastructure;
- **Section 2.0 -** Site Location and Context: description and diagrams showing the location of the site-specific infrastructure, their landscape context and sensitive visual receptors
- **Section 3.0 -** Examples of Existing Infrastructure: images showing examples of existing substations, CSE compounds and bridge structures illustrating the variation in design and equipment;
- **Section 4.0 -** Examples of Design Innovation and Aspiration: best practice images of innovative and appropriate design for consideration in a rural setting;
- **Section 5.0 -** Vision: overall aspirations and design approach for the site-specific infrastructure;
- **Section 6.0 -** DCO Design and Operational Function: explains the operational process of components and how this influences the design of the site specific infrastructure;
- **Section 7.0 -** Design Principles: explanation of the design principles that will guide the detailed design, based on best practice guidance, landscape character and the local vernacular;
- **Section** 8.0 – Scope for Variation in Developing the Detailed Design: identifies what is required in terms of technical compliance and safety, and identifies fixed and flexible design elements;
- **Section 9.0 -** Approach to Detailed Design: approach to the detailed design where there is scope for variation, including built form; landscaping (including opportunities for advanced planting); boundary treatments and surfacing; and
- **Section 10.0 -** DCO Requirements and Approval Process: relevant DCO Schedule 3 Requirements that secure the design approach of flexible elements and the process for approval with the relevant planning authority.

1.0 Introduction

1.3 Background to the Project

The main component of the Hinkley Point C Connection Project is the construction of a new 400kV electricity connection of approximately 57km between Bridgwater, Somerset and Seabank Substation, near Avonmouth. The connection would comprise new overhead lines and new underground cables, along with the principal elements identified in the Project Description of the Environmental Statement (ES) at **Volume 5.3.1, Section 3.3**.

The new 400kV connection between Bridgwater, Somerset and Seabank Substation, near Avonmouth, would comprise four parts:

1. installation of a 400kV overhead line (as a new section of the existing ZG Route) connected to the existing 275kV VQ Route on Horsey Level in Section A (which would be uprated to 400kV operation), via the Bridgwater Tee CSE compound, and extending to the ZG Route 400kV overhead line north of Woolavington in Section B;

2. installation of a new 400kV overhead line north from the ZG Route 400kV overhead line in Section B to a proposed CSE compound south of the Mendip Hills and the River Axe in Section B;

3. installation of 400kV underground cables through the Mendip Hills AONB in Section C; between a CSE compound south of the Mendip Hills and the proposed Sandford Substation; and

4. installation of a 400kV overhead line from the proposed Sandford Substation in Section D to Seabank Substation in Section G.

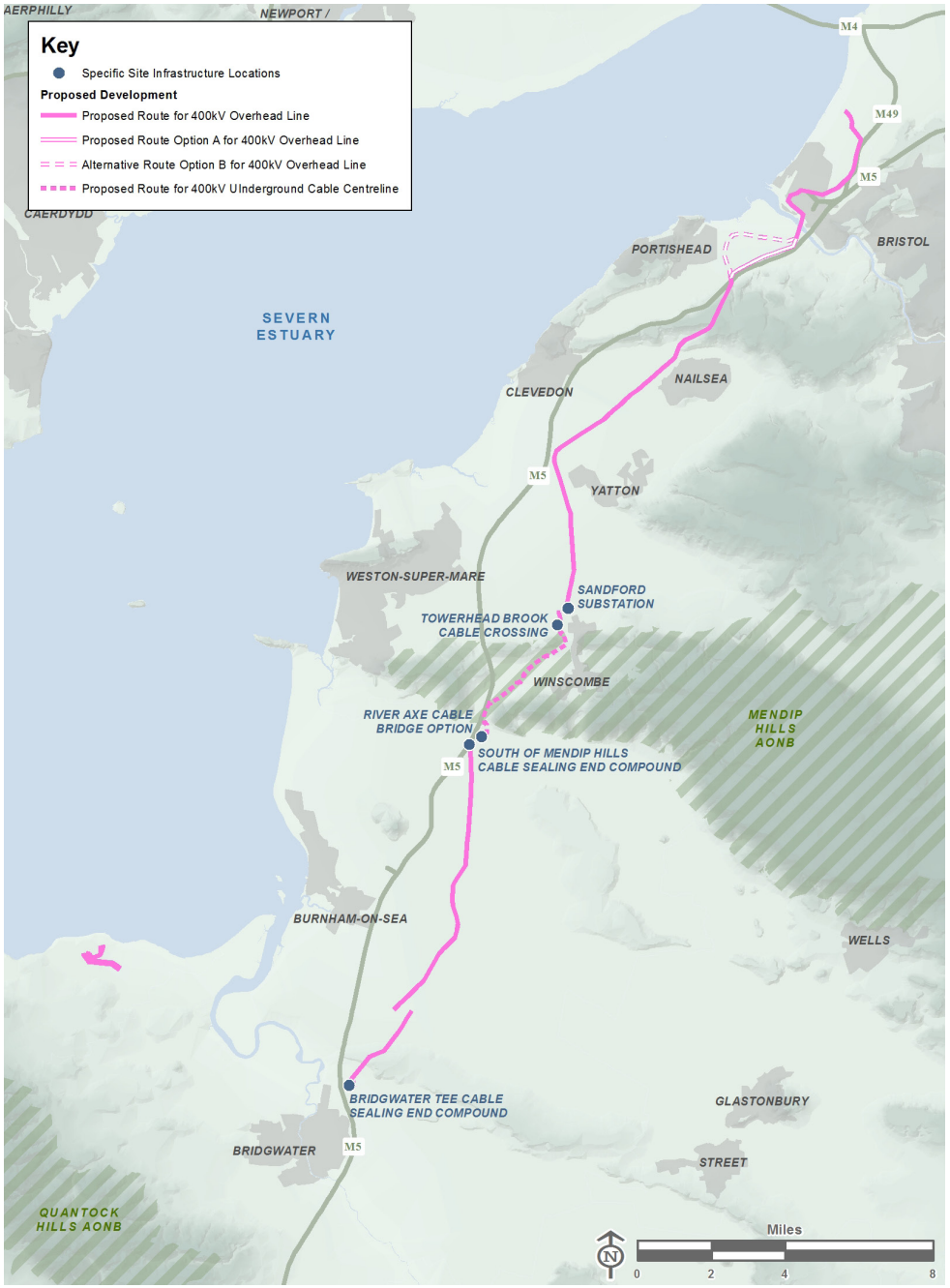


Figure 1: Overview of Hinkley Point C Connection Project

1.0 Introduction

1.3 Background to the Project

Sandford Substation

National Grid's proposals require the removal of Western Power Distribution's (WPD) 132kV overhead line between Bridgwater and Avonmouth substations. Removing this overhead line would disconnect the electricity supply to consumers in the Weston-super-Mare and Churchill areas.

To maintain supplies to the local electricity network, National Grid and WPD identified the need for a Grid Supply Point (GSP) substation in the Churchill/Sandford area, as detailed in the Distribution Systems Options Report ES **Volume 5.2.2.7, Appendix 2L**.

A high level environmental and planning assessment of the feasibility of options for siting a new 400kV/132kV GSP substation in the Churchill/Sandford area of North Somerset was undertaken during 2012. The Western Power Distribution Substation Siting Study ES **Volume 5.2.2.8, Appendix 2M** identified that a GSP substation to the west of Nye Road in the vicinity of Sandford in Section D would represent the least environmentally constrained option.

A Substation Siting Appraisal was undertaken in 2012 to identify the least environmentally constrained area for siting the substation to the west of Nye Road in Section D as presented at **Volume 5.2.2.9, Appendix 2N**.

Sandford Substation would provide a link between the 400kV connection between Bridgwater and Seabank and the 132kV distribution network, providing two 132kV connections between the substation and the AT Route and the N Route.

As part of the mitigation of adverse effects arising from the Project, National Grid's proposals include the re-alignment of a section of the Strawberry Line Long Distance Route near Sandford Substation (described at ES **Volume 5.6.1, Section 6.7** and ES **Volume 5.7.1.2, Section 7.7**). Presently, the Strawberry Line long distance route (cycleway and footpath) runs along the road on Drove Way and over Drove Way Bridge adjacent the substation site. National Grid's proposed re-alignment follows the route of the disused railway, passing adjacent to the substation. The mitigation proposals also include a public car park with ten parking spaces adjacent to the re-aligned Strawberry Line as a start and finish point to the route.

Towerhead Brook Bridge

An access route is required from Towerhead Road to access the substation at the western boundary and enable the delivery of the Super Grid Transformers (SGTs). A road and cable bridge crossing of Towerhead Brook would be required as part of this access route, with the 400kV underground cables installed in the bridge.

The location of the bridge at Towerhead Brook has been largely constrained by the necessary alignment of the access road. The connection of the access road to Towerhead Road to the south has been safely located where there is maximum visibility, whilst limiting effects on existing vegetation. The alignment of the access road between Towerhead Road and Sandford Substation has been designed to minimise cut and fill requirements and accommodate the SGT delivery vehicle which has restricted manoeuvrability. To minimise effects on biodiversity, the crossing point has avoided a tree with a bat roost in it to the west, has avoided impacts on great crested newt habitat to the east, and the crossing has been aligned to be perpendicular to the brook to minimise effects on the brook and associated vegetation.

1.3 Background to the Project

South of Mendip Hills Cable Sealing End (CSE) Compound

A double circuit CSE compound is required south of the Mendip Hills AONB in Section B to provide a point of connection between the 400kV overhead line proposed through the Somerset Levels and Moors and the underground cables proposed through the Mendip Hills which connect directly to Sandford Substation.

An environmental review of the options for siting the CSE compound to the south of the Mendip Hills AONB in Section B was undertaken during 2012 and is presented at **Volume 5.2.2.5, Appendix 2J.**

It was concluded that the least environmentally constrained location for the South of Mendip Hills CSE compound was on the farmland adjacent to the M5 motorway south of the River Axe as this option was the most distant from settlement and individual properties (including Listed Buildings). The screening and sense of enclosure provided by the M5 motorway, the Hams Lane road bridge and trees along the north western boundary would help to minimise effects on landscape character and views, including effects on the AONB and views from it.

River Axe Cable Bridge Option

The proposed location of the South of Mendip Hills CSE compound on land adjacent to the M5 motorway south of the River Axe, means that the proposed underground cables extending north from the CSE compound would need to cross the River Axe before passing into the Mendip Hills AONB through Loxton Gap. The DCO application presents two options which could be used to achieve this river crossing: a below-ground option using Horizontal Directional Drilling (HDD); or an above-ground cable bridge option. It is considered that HDD may not be achievable at this location because of the depth of the HDD that would be required. Until a cable manufacturer and approved design is in place there remains a degree of uncertainty over whether cables installation by HDD could be achieved. Two options were included in the DCO to ensure that a feasible method of crossing the Axe is available should consent be granted.

The routeing of the proposed 400kV underground cables, including the route on each side of the River Axe as well as the crossing, has sought to avoid or minimise adverse environmental effects.

The alignment of the 400kV underground cables between the South of Mendip Hills CSE Compound and the River Axe has been designed to have a minimal number of bends as well as ditch and hedgerow crossings. The position of the cable bridge was determined by a number of constraints which included the Old River Axe, an existing water pipe, the existing overhead line and areas of tree planting adjacent to the M5 motorway. The proposed location of the cables bridge is east of the water pipe and west of the Old River Axe.

To minimise visual effects the bridge was positioned as close as possible to the water pipe and next to an existing line of trees north of the river. This also maximises the distance from residential properties to the east and allows space for the temporary bridge, which is needed during construction, to the immediate east.

1.0 Introduction

1.3 Background to the Project

Bridgwater Tee Cable Sealing End (CSE) Compounds

The proposed route corridor for the first part of the proposed 400kV overhead line (the ZGA Route) was restricted by the requirement to connect with the VQ Route and ZG Route alignments. The route corridor was identified as it maximises the distance from properties in the area and crosses a narrower part of Puriton Ridge obliquely, which together with mature woodland blocks to either side would offer opportunities for backgrounding. The F Route 132kV overhead line, which runs close to Knowle, Bawdrip and Woolavington would be removed and the new 400kV overhead line would be more distant from these settlements.

Where a 400kV double circuit overhead line connects to another, as in the case of the Bridgwater Tee where the VQ Route and the proposed 400kV overhead line (ZGA Route) would connect, one circuit would connect to the nearest circuit while the other must 'duck-under' the nearest circuit to connect to the far circuit. To comply with security, safety and operating requirements a short section of single circuit underground cables is needed to achieve this and two single circuit CSE compounds would be required to connect the overhead lines to the underground cables.

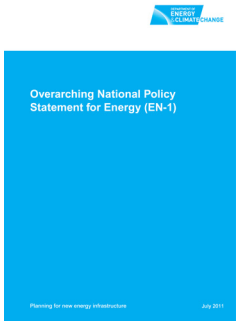
An environmental review of the options for siting of CSE compounds to the north of Bridgwater on Horsey Level in Section A was undertaken during December 2013 and is presented at **Volume 5.2.2.5, Appendix 2I**.

It was concluded that the most appropriate location for the Bridgwater Tee CSE compounds is the location presented in the DCO application as this option is closest to the VQ Route and would minimise effects on landscape, views and ecology.

Above: Existing view from the A39 Bath Road looking across Horsey Level

1.0 Introduction

1.4 Design Context



EN-1

Section 4.5 of Overarching National Policy Statement for Energy (EN-1) sets out the criteria for “good design” for energy infrastructure, whilst recognising the importance of the functional requirements and physical constraints which apply to infrastructure projects of this nature.

EN-1 states that applying “good design” to energy projects should produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. EN-1 acknowledges, however that the nature of much energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area.

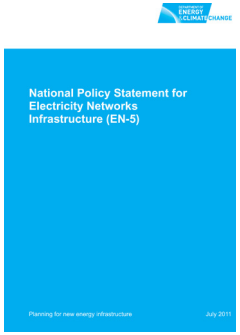
In considering applications EN-1 states that the Secretary of State should take into account the ultimate purpose of the infrastructure and bear in mind the operational, safety and security requirements which the design has to satisfy.

This Design Approach document explains how the HPCC Project has taken into account functionality (including fitness for purpose and sustainability) and aesthetics (including contribution to the quality of the area in which it would be located) in the design of the site-specific infrastructure.

This document explains the studies, principles and approaches that have influenced the siting, design including colour and materials, and landscaping schemes for the site-specific infrastructure to ensure they are sustainable, attractive, durable and adaptable. This has included siting relative to existing landscape character, landform and vegetation to help mitigate adverse effects. Materials and design of buildings associated with site-specific infrastructure has also been given careful consideration.

1.0 Introduction

1.4 Design Context



EN-5

Section 2.5 of National Policy Statement for Electricity Networks Infrastructure (EN-5) states that proposals for electricity networks infrastructure should demonstrate good design in their approach to mitigating the potential adverse impacts which can be associated with overhead lines, particularly those relating to:

- landscape and visual;
- biodiversity and geological conservation;
- noise and vibration; and
- electric magnetic fields (EMFs).

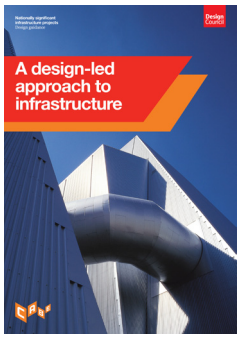
EN-5 paragraph 2.8.2 states that new substations, sealing end compounds and other above ground installations that form connection, switching and voltage transformation points on the electricity networks can also give rise to landscape and visual impacts.

In accordance with EN-5 paragraph 2.8.10 this Design Approach document sets out the opportunities for mitigating potential adverse landscape and visual impacts of the site-specific infrastructure. This has included consideration of network reinforcement options (where alternatives exist) to allow improvements to an existing line rather than the building of an entirely new line; and selection of the most suitable type and design of structure in order to minimise the overall visual impact on the landscape.

EN-5 paragraph 2.8.11 identifies specific measures that might be taken through landscape schemes and screening. This document identifies site-specific mitigation proposed through screening, comprising localised planting in the immediate vicinity of residential properties and principal viewpoints to help screen or soften the effect of the site-specific infrastructure, reducing the visual impact from particular receptors. In addition this document outlines other landscape schemes proposed as part of the HPCC Project, comprising off-site tree and hedgerow planting to further soften the effects of the site-specific infrastructure whilst providing some screening from important visual receptors. However, as stated in EN-5, these can be implemented only with the agreement of the relevant landowners.

1.0 Introduction

1.4 Design Context



Commission for Architecture and the Built Environment (CABE): A Design-led Approach to Infrastructure

The CABE design guidance relates to Nationally Significant Infrastructure Projects (NSIPs) and is based on ten design principles intended to help NSIP applicants design successful proposals as set out in the criteria for good design in the National Policy Statements (NPS). NSIPs must make design an integral part of their planning process and demonstrate that good design and the concerns of communities and stakeholders have been taken on board in the planning process.

Principle 1 'setting the scene' states that design thinking should be part of creating the vision and brief for a new project, with a suitable budget to ensure that building and landscape design matches the quality of technical equipment and that they can be maintained long-term.

Principle 2 'multi-disciplinary teamwork' states that collaborations between stakeholders must begin early and be sustained. From the start of planning, the design team should include not just engineers and technical specialists but also architects and landscape designers.

Principle 3 'the bigger picture' states that holistic thinking is required to ensure that projects are part of an integrated process that fits into bigger strategies such as regional or sub-regional planning.

Principle 4 'site masterplan' states that good design will do much to reconcile the infrastructure project with its environment by creating a facility that responds to its context. The value of and impact on existing structures, landscape and archaeology should also be a key consideration and feed into decisions about site clearance and mediation.

Principle 5 'landscape and visual assessment' states that for power lines, visual impact assessment and landscape character assessment is an obvious part of the planning process. Visual impact assessment should be used as a design tool to inform location, orientation, composition and height. This should take in a large number of viewpoints right from the beginning of design. For large scale projects, which may spread over the landscape the assessment of verified photomontages needs to be representative of what the eye actually sees and perceives.

Principle 6 ‘landscape design’ states that intelligent landscape design mitigates the impact of an infrastructure installation and can enhance its setting. It should be developed in parallel with the proposal and take into account site topography and other aspects including, for example, existing flora.

Principle 7 ‘design approach’ states that a clear concept can manifest itself through symmetry (or asymmetry) and balance, repetition of organisational elements such as the grid, the frame or the bay and resonance between elements of different scales. The structure of the built form: the system of bearing elements (girders, columns and walls), can significantly inform the overall appearance. In a good design, such choices will seem compelling and inevitable, clearly expressing what the project is about and working well with its setting.

Different structures will require different levels of architectural ambition. There are places for an expressive or assertive approach and places for modesty, dictated both by a project’s context and its purpose and status. In most cases less is more: simple (but not simplistic), straightforward designs go well with functional and efficient infrastructure.

Principle 8 ‘materials and detailing’ states that high quality materials and careful detailing will limit the need for maintenance and allow schemes to weather and age well. Local materials and traditional building methods, for example, might inform the design. Design intent for key details should be developed alongside the Concept and Scheme Design stages so that the architectural potential can be understood by approval bodies and consultees.

Principle 9 ‘sustainability’ states that given the complexity of infrastructure projects, sustainability must be integral to the design from the very beginning.

Principle 10 ‘visitor centre’ states many large infrastructure proposals offer the opportunity to provide a centre where visitors can learn about the plant operation and be introduced to the concepts of sustainability, energy generation, waste management and humanity’s impact on the environment. Whilst a visitor centre is not considered appropriate given the modest scale of site-specific infrastructure proposed on the HPCC Project, opportunities to incorporate other means of interpretation should be considered.

1.4 Design Context

The Horlock Rules

The Horlock Rules set out the approach to substation siting and design in the context of National Grid's duties under Schedule 9 of the Electricity Act. The Horlock Rules were applied in determining the location of proposed site-specific infrastructure comprising substation, CSE compounds and bridge structures and aim to:

- minimise environmental effects;
- seek to avoid internationally and nationally designated areas of the highest value;
- protect areas of local amenity value, important existing habitats and landscape features;
- take advantage of screening provided by landform and existing features and utilise site layout and levels to minimise intrusion into surrounding areas;
- consider land use effects of the proposal when planning siting;
- consider options available for terminal pylons, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practical minimum;
- use space effectively to limit the development area and provide appropriate mitigation to minimise adverse effects on land use and rights of way;
- ensure the design of access road, perimeter fencing, earthworks, planting and ancillary development forms an integral part of the site layout and design to fit in with the surroundings;
- keep high voltage line entries visually separate from low voltage lines and other overhead lines to avoid a confusing appearance; and
- ensure the inter-relationship between pylons and substation structures and background and foreground features are studied to reduce the prominence of structures from main viewpoints.

1.0 Introduction

1.4 Design Context

Hinkley Point C Connection Project Design and Access Statement

The DAS (**Volume 7.2**) sets out the background to the Proposed Development, describes the typical design of the permanent elements and National Grid's approach to, and development of, good design.

Section 3 of the DAS considers the policy context for the consideration of design issues, focusing on EN-1 and EN-5.

The design evolution for the Proposed Development has been an iterative process. National Grid has looked at ways to achieve good design by investigating alternative options and solutions at each site. The DAS illustrates the design approach adopted by National Grid from project inception through to the DCO application. The DAS seeks to identify why particular options have been brought forward and demonstrates how the design development process has responded positively to consultation and, where practical and beneficial, incorporated consultation responses into the design.

The DAS charts the design evolution and alternative options which have been considered through the iterative design of the Proposed Development and in particular seeks to demonstrate how National Grid has sought to satisfy the requirements of good design identified in EN-1 and EN-5.

Local Planning Policy

In the detailed design of site-specific infrastructure appropriate regard should be given to relevant local planning policy and guidance.

2.0 Site Location and Context

2.1 Sandford Substation and Towerhead Brook Cable Crossing

Site Context

The site of the proposed Sandford Substation and Towerhead Brook crossing is in the southern part of Section D north of Sandford. The substation site is to the west of Nye Road on land adjacent to Droveway Bridge, north of Droveway Farm. The bridge is to the north of Towerhead Road crossing Towerhead Brook.

The closest residential properties on Nye Road and Mead Lane are approximately 100m and 500m away from the proposed Sandford Substation site and 250m away from the proposed Towerhead Brook Bridge. The F Route is to the west and the N Route to the south of the substation site. The Strawberry Line long distance footpath and cycle route passes close to the site of the substation on Nye Road.

The landscape baseline and the assessment of landscape effects in Section C and Section D is provided in the Landscape Assessment of the Environmental Statement (ES) at **Volume 5.6**.

Landscape Context

Mendip Hills Area of Outstanding Natural Beauty (AONB)

Sandford in the southern part of Section D is situated within the setting of the Mendip Hills AONB (see **Figure 2** opposite) which forms part of Section C.

The Mendip Hills comprise a range of limestone hills which stretches eastwards from the Bristol Channel rising dramatically above the flat Somerset Levels and Moors.

The Mendip Hills AONB is of national importance and was designated under the 1949 National Parks and Access to the Countryside Act 1949 (the 1949 Act), the primary purpose of which is to conserve and enhance the natural beauty of the landscape.

Included amongst the special qualities set out in the current Mendip Hills AONB Management Plan (2014 to 2019) are the distinctive limestone ridge with windswept plateau and impressive rocky outcrops, views toward the Mendip Hills from the Somerset Levels and Moors and views out from high ground including across the Somerset Levels to the Somerset coast. The list of special qualities also recognises that the landscape is enjoyed by large numbers of people for a wide range of interests and outdoor pursuits, including cycling and walking.

2.0 Site Location and Context

2.1 Sandford Substation and Towerhead Brook Cable Crossing

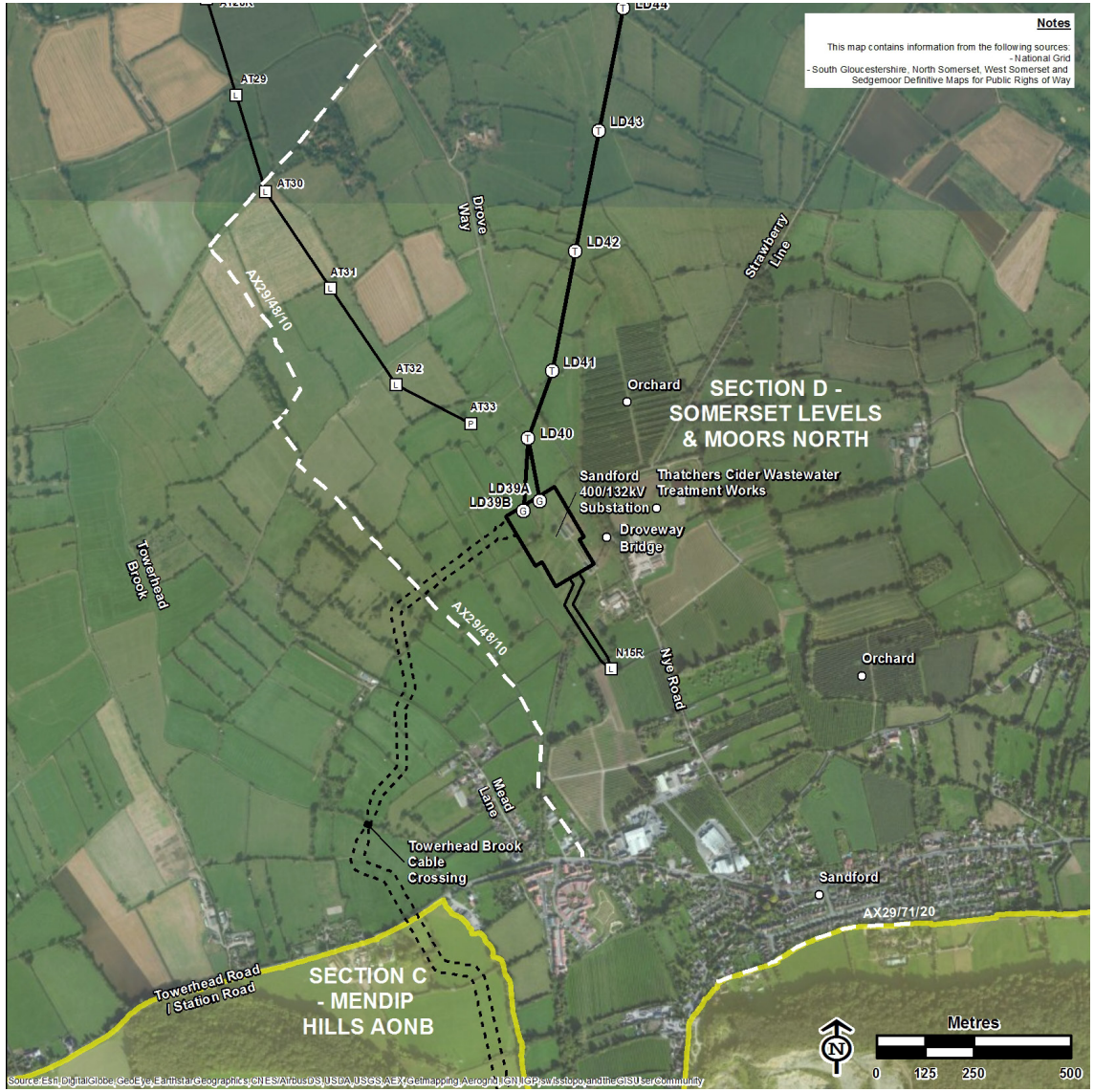


Figure 2: Site Location and Landscape Context

2.0 Site Location and Context

2.1 Sandford Substation and Towerhead Brook Cable Crossing

Landscape Context

Published Landscape Character Assessments

Sandford in Section D is part of the Somerset Levels and Moors National Character Area (NCA) 142. The Somerset Levels and Moors (NCA 142) is described as a broad area of wet pasture, arable and wetland surrounded and divided by 'rhynes' which form a planned reclaimed 'chequer-board' pattern in the landscape. Whilst buildings on the open Levels and Moors are scarce, the character description notes that the M5 motorway and railway lines run north south, linking several of the larger towns, including Weston-Super-Mare and Bridgwater. Incremental development and industrialisation from the towns is especially evident on the west side of the motorway.

North Somerset Council's (NSC) Landscape Character Assessment (adopted 2005) should be referred to in developing detailed designs for Sandford Substation and Towerhead Brook Cable Crossing. In NSC's landscape assessment, Sandford which is in the most southern part of Section D, is characterised as the River Yeo Rolling Valley Farmland (LLCA J2). To the south is the Mendip Ridge (LLCA E1) and to the north is Locking and Banwell Moors (LLCA A4). The River Yeo Rolling Valley Farmland (LLCA J2) is described as an extensive area of gently undulating lowland along the northern edge of the Mendip Limestone Ridges and Combes.

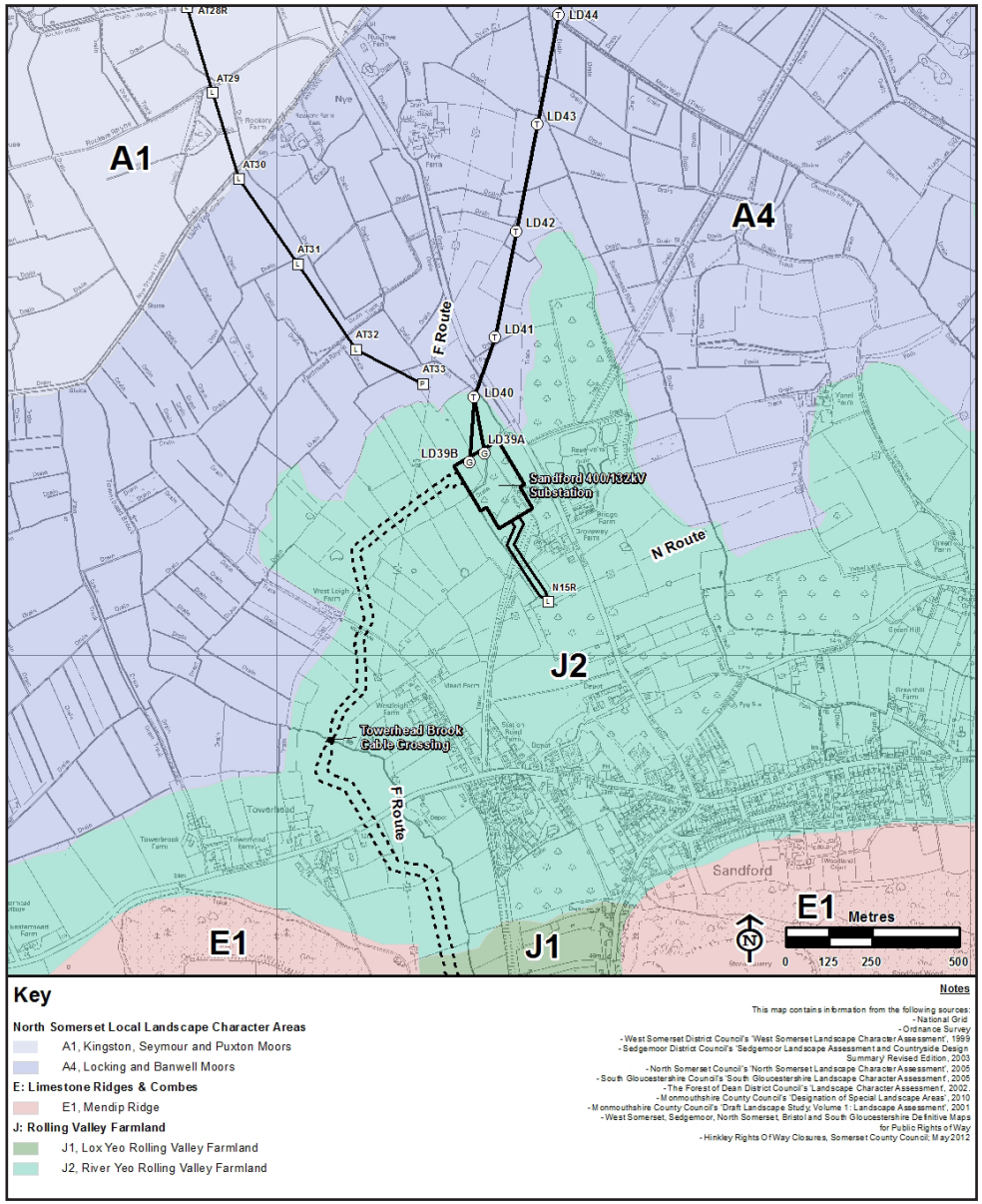


Figure 3: Published Local Landscape Character Areas

2.0 Site Location and Context

2.1 Sandford Substation and Towerhead Brook Cable Crossing

Landscape Context

Local Landscape Character Description from Site Assessment

In the southernmost part of Section D the land falls to a lowland pastoral landscape north of the A368 along the northern boundary of the Mendip Hills AONB (in Section C) at Sandford. The landform is also undulating north of the A371 further west (near the M5 motorway) and includes Woolvers Hill. There are cider orchards north of Sandford associated with the Thatcher's Cider factory and shop. Settlement west of Sandford includes Banwell adjacent to the A371 and individual farms north of Banwell. The predominantly pastoral landscape in this part of Section D includes well maintained mature hedgerow and frequent mature hedgerow trees. Trees also line Towerhead Brook in the south of this Section.

Below: View from Strawberry Line on Drove Way Bridge facing west

2.0 Site Location and Context

2.1 Sandford Substation and Towerhead Brook Cable Crossing

Landscape Context

Local Landscape Colours, Materials and Details

1. Drainage ditches or rhynes
2. Pantile red clay roofs
3. Cider orchards in the local area
4. Local stone
5. Summer view taken from Drove Way adjacent to Nye Farm

1 2 3 4

5

The photographs below and opposite identify appropriate colours and examples of materials and details, which are found in the local landscape.

2.0 Site Location and Context

2.1 Sandford Substation and Towerhead Brook Cable Crossing

Landscape Context

1. Agricultural access track
2. Pilhay farmstead in Section D
3. High stone walls and gate piers at entrance to Droveway Farm
4. Example of timber clad agricultural building
5. Winter view from Drove Way looking south

2.0 Site Location and Context

2.1 Sandford Substation and Towerhead Brook Cable Crossing

Sensitive Visual Receptors

The description of baseline views and assessment of visual effects for visual receptors in Section D, and on the northern boundary of Section C, is provided in the ES at **Volume 5.7**. Each visual receptor in Section C and Section D is assessed in the Visual Assessment Tables at ES **Volume 5.7.2.1, Appendix 7C** and **Appendix 7D** and illustrated at **Volume 5.7.3.1, Figure 7.2**.

Section D comprises the expansive flat landscape of the Levels and Moors between the Mendip Hills (Section C) in the south and Tickenham Ridge (Section E) in the north. Receptors near Sandford in Section D have views across the Levels with varying degrees of filtering provided by ditch and hedgerow trees and vegetation. The Mendip Hills in Section C provide backgrounding in views south with the gap between Banwell Hill and Sandford Hill visible. Tickenham Ridge and Cleeve Ridge background views north and east. Receptors near Sandford have views of the F Route and N Route often visible above trees, hedgerows and vegetation with the AT Route visible to the north.

The low lying landform and mature tree belts in this landscape means that the proposed substation would only be visible from PRoWs, properties and roads close to the substation and from receptors on elevated ground in the Mendip Hills AONB, such as Sandford Hill and Banwell Hill. After 15 years the planting proposed around Sandford Substation would have matured to provide more robust screening of views experienced by sensitive visual receptors, with only the tops of gantries and the terminal pylon visible above.

Existing hedgerow vegetation would allow only glimpsed views of Towerhead Brook Cable Crossing from a small number of visual receptors close to the crossing.

Public visual receptors of high to low sensitivity which would have views of the proposed Sandford Substation and/or Towerhead Brook crossing comprise:

- people using the Strawberry Line long distance route and National Cycle Route (NCR) 26 between Sandford and Nye Road (visual receptor reference D2.S1.1 and D2.S1.2);
- people using public right of way (PRoW) AX 29/71/20 to the rear of properties on Somerville Road in Sandford (visual receptor reference C1.F25);
- people using PRoW AX29/48/10 between Sandford and Nye Drove Track and PRoW AX3/42/10 on Havage Drove (visual receptor reference D1.F1, D1.F7 and D1.F8); and
- people using Towerhead Road, Nye Road, Drove Way and Mead Lane (visual receptor reference D1.R1, D1.R3, D1.R4 and D1.R5).

Private visual receptors of medium sensitivity which would have views of the proposed Sandford Substation and/or Towerhead Brook crossing comprise:

- properties accessed off the lane east from Hill Road, Sandford (visual receptor reference C1.H63);
- properties on Towerhead Road in Towerhead (visual receptor reference D1.H3 and D1.H4);
- properties on Mead Lane in Sandford (visual receptor reference D1.H5 and D1.H6); and
- Dorvic House, Droveway Farm and Nye Farm on Nye Road and Drove Way (visual receptor reference D1.H11, D1.H13 and D1.H14).

2.0 Site Location and Context

2.1 Sandford Substation and Towerhead Brook Cable Crossing

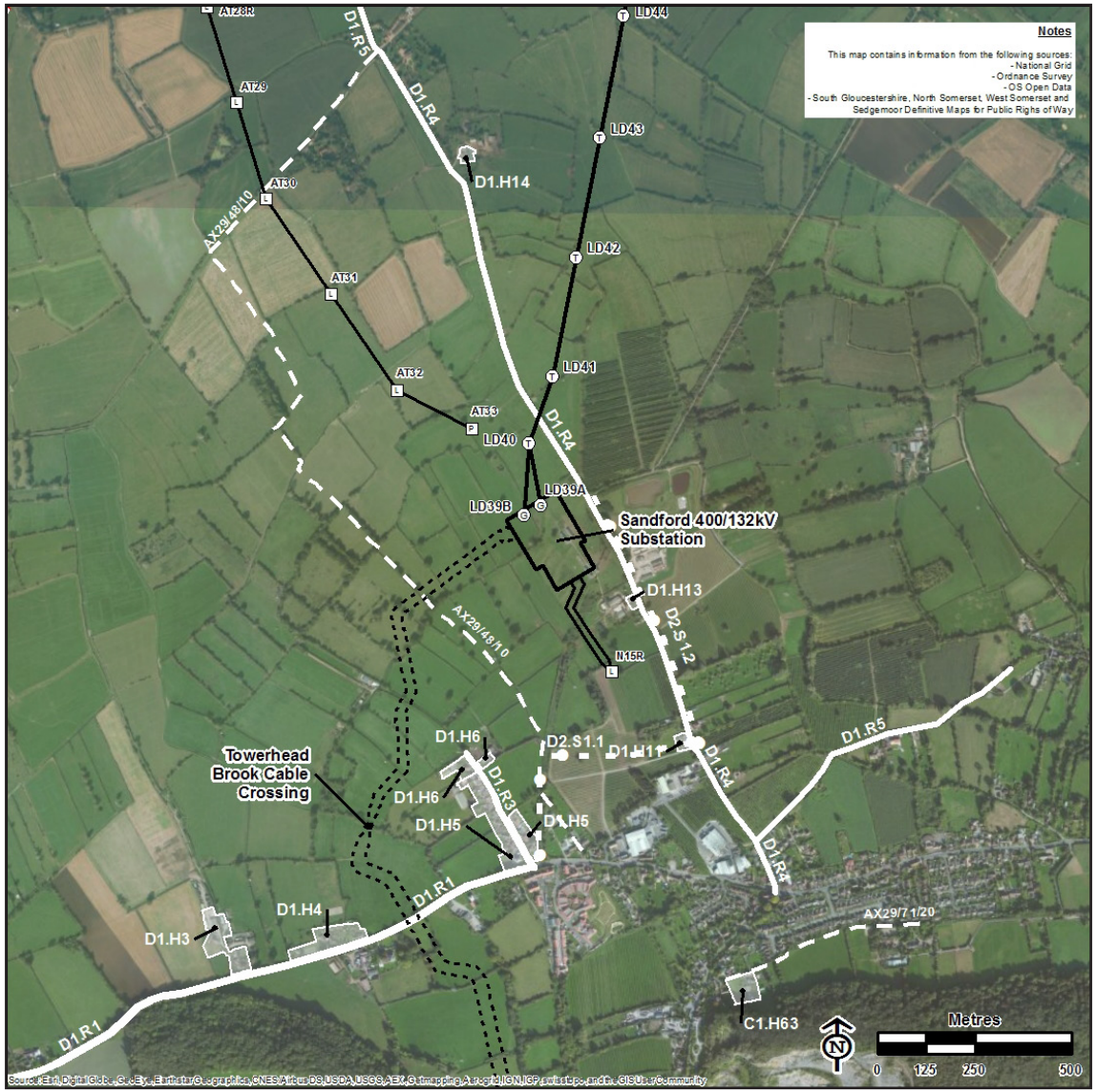


Figure 4: Sensitive Visual Receptors

2.0 Site Location and Context

2.2 South of Mendip Hills CSE Compound and River Axe Cable Bridge

Site Location

The site of the proposed South of Mendip Hills CSE compound is to the immediate east of the M5, approximately 1km south of the Mendip Hills AONB and 0.5km to the south of the River Axe in Section B. Settlement at Loxton and Webbington (on the southern edge of the Mendip Hills AONB) is approximately 1km to the north, the settlements of Tarnock and Rooks Bridge are approximately 2km to the south on the A38 Bristol Road. The hamlet of Biddisham is approximately 1km to the southeast of the CSE compound location. Biddisham Lane, which provides access to a number of farmsteads, extends north of the village and at its closest would be approximately 0.6km east of the proposed CSE compound.

The River Axe Cables Bridge Option would be approximately 0.5km northeast of the proposed CSE compound and approximately 0.4km to the east of the M5. The nearest residential properties to the potential cables bridge would be farmsteads at the northern end of Biddisham Lane, which would be approximately 0.2km to the east and properties along Kennel Lane (south of Webbington), which would be approximately 0.5km to the northeast.

The landscape baseline and the assessment of landscape effects in Section B and Section C is provided in the Landscape Assessment of the ES at **Volume 5.6**.

Landscape Context

Mendip Hills Area of Outstanding Natural Beauty (AONB)

The northern part of Section B is in the setting of the Mendip Hills AONB (see **Figure 5** opposite) which forms part of Section C. Details regarding the AONB are provided at **Page 16**.

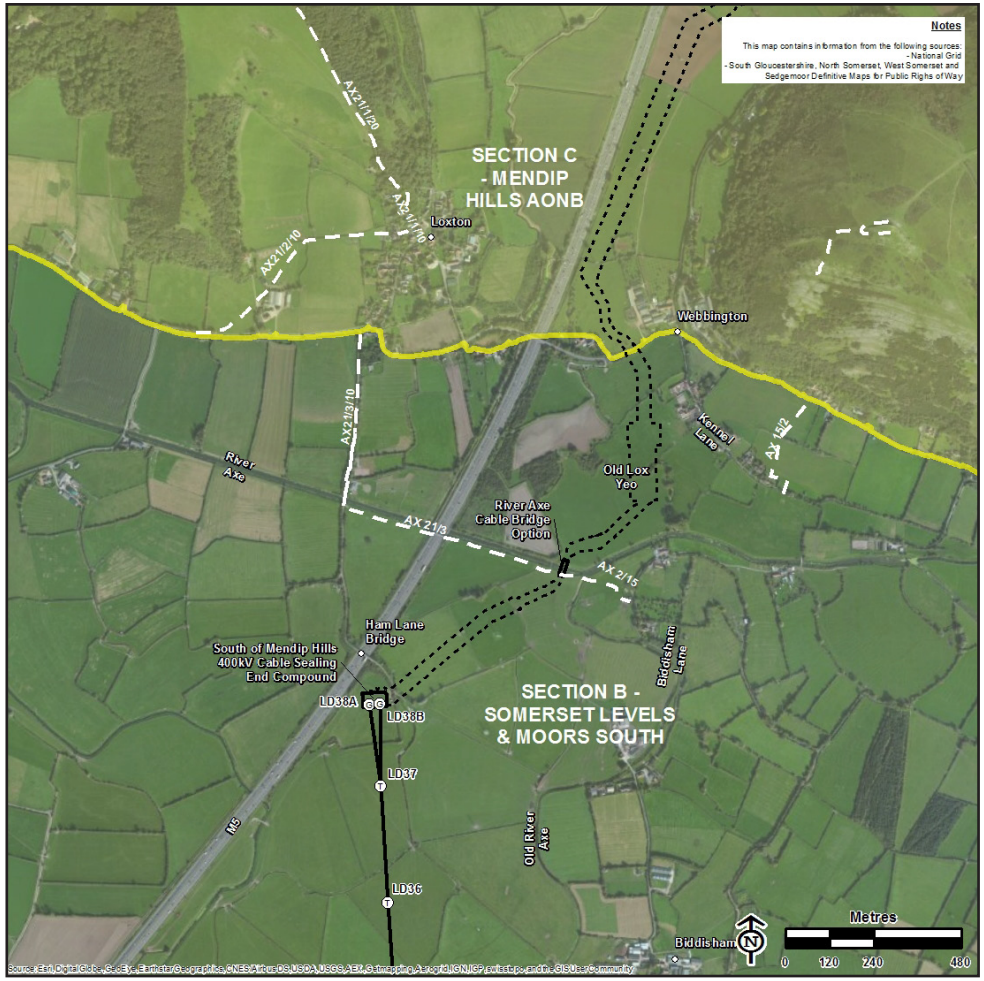


Figure 5: Site Location and Landscape Context

2.0 Site Location and Context

2.2 South of Mendip Hills CSE Compound and River Axe Cable Bridge

Landscape Context

Published Landscape Character Assessments

The northern part of Section B is part of the Somerset Levels and Moors National Character Area (NCA) 142. The Somerset Levels and Moors (NCA 142) is described as a broad area of wet pasture, arable and wetland surrounded and divided by 'rhynes' which form a planned reclaimed 'chequer-board' pattern in the landscape. Important features include prominent hills such as Brent Knoll (designated as a Scheduled Monument) and Mendip Hills which rise above the Levels and Moors, with settlement mainly concentrated on higher ground and the edge of hills. Whilst buildings on the open Levels and Moors are scarce, the character description notes that the M5 motorway and railway lines run north south, linking several of the larger towns.

Sedgemoor District Council's (SDC) Landscape Assessment and Countryside Design Summary (revised edition adopted 2003) should be referred to in developing detailed designs for the South of Mendip Hills CSE Compound and River Axe Cable Bridge. In SDC's landscape assessment the land in the northern part of Section B is part of the Levels Local Landscape Character Area (LLCA L). This LLCA is to the south of the NSC's Local Landscape Character Areas which cover Bleadon Moor to the northwest and the Mendip Hills to the north (see **Figure 6** opposite). The Levels (LLCA L) are a largely flat landscape with irregular field patterns, defined by sinuous drainage ditches or 'rhynes' and hedges. The area is mostly used for pasture for dairy cattle, with some arable cropping, especially for animal feeds. There are several separate islands of land which sit above the level of surrounding Moors (such as Brent Knoll which is part of the Isolated Hills (IH) LLCA and the Isle of Wedmore (W) LLCA).

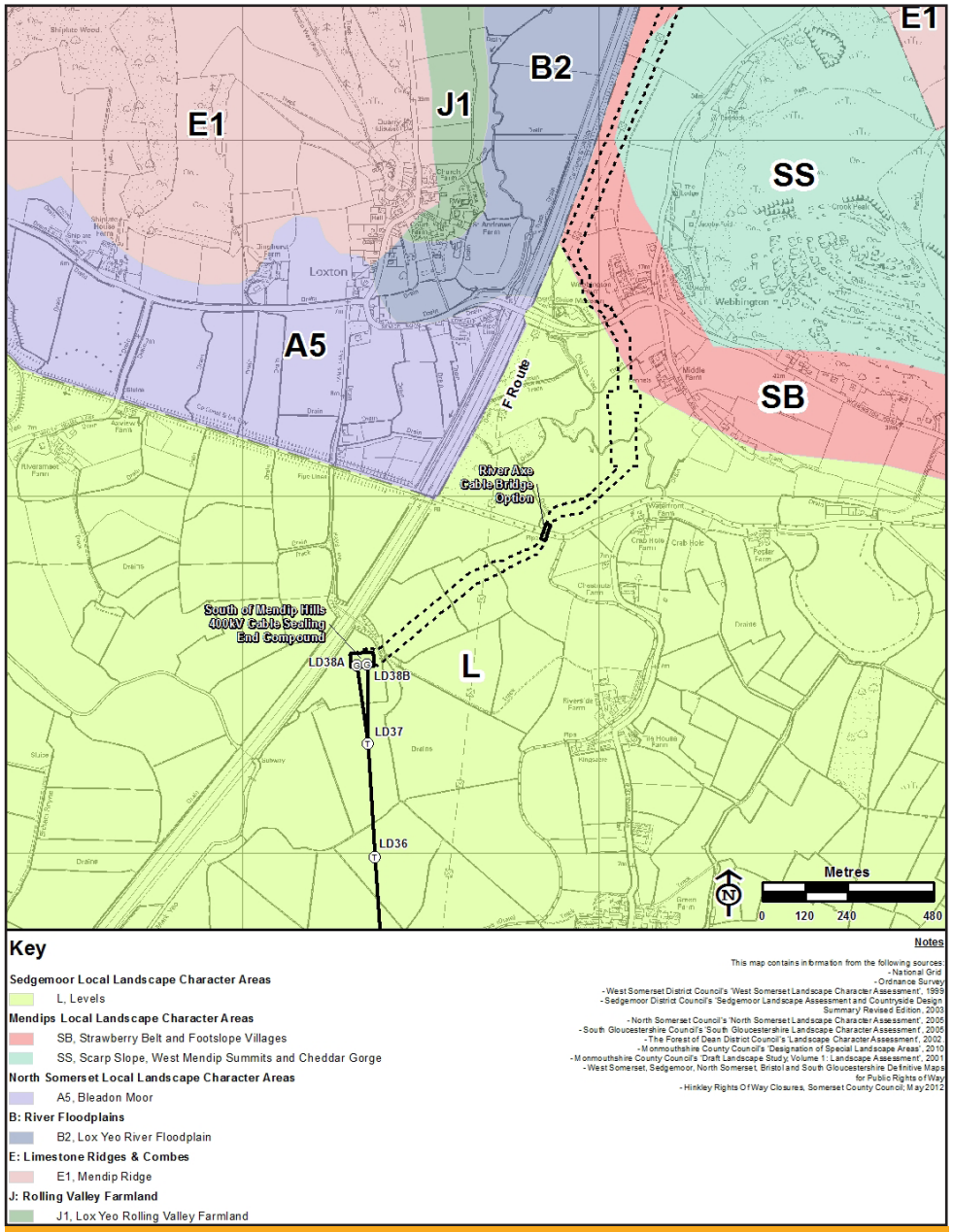


Figure 6: Published Local Landscape Character Areas

2.0 Site Location and Context

2.2 South of Mendip Hills CSE Compound and River Axe Cable Bridge

Landscape Context

Local Landscape Character Description from Site Assessment

Flat low-lying farmland in the northern part of Section B is divided by numerous field drains and 'rhynes', for example Blind Pill Rhyne and Plash Rhyne between Knoll View Farm and Rooks Bridge. There are also mature hedgerows and hedgerow trees along field boundaries and drains. Hedgerows are overgrown and or gappy in places and well-maintained in others. Other features in the landscape include the Old River Axe and Mark Yeo which generally meander across farmland in the northern part of Section B.

Linear settlements in the northern part of Section B include residential properties at and near Rooks Bridge; Tarnock; Biddisham; and Edingworth. There are other scattered individual farms and groups of residential properties. Other development perceptible in the landscape includes the M5 motorway and the F Route 132kV overhead line.

The local landscape in which the CSE compound and River Axe Cables Bridge would be sited is broadly consistent with the written descriptions of the character but has a more enclosed feel than other parts of the Levels due to localised landform and vegetation along the M5, vegetation along the River Axe and Old Lox Yeo, and proximity to the Mendip Hills.

2.0 Site Location and Context

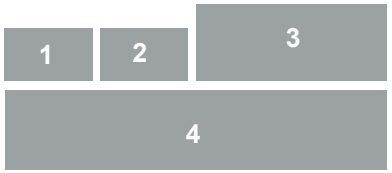
2.2 South of Mendip Hills CSE Compound and River Axe Cable Bridge

Landscape Context

Local Landscape Colours, Materials and Details

The photographs below identify appropriate colours and examples of materials and details, which are found in the local landscape.

1. Local building materials and agricultural fencing
2. Example of timber clad agricultural building in the local landscape
3. Winter view from car park viewpoint on Webbington Road looking southwest
4. Summer view from Crook Peak



2.0 Site Location and Context

2.2 South of Mendip Hills CSE Compound and River Axe Cable Bridge

Sensitive Visual Receptors

The description of baseline views and assessment of visual effects for visual receptors in Section B and Section C is provided in the ES at **Volume 5.7**. Each visual receptor in Section B and Section C is assessed in the Visual Assessment Tables at ES **Volume 5.7.2.1, Appendix 7B** and **Appendix 7C** and illustrated at **Volume 5.7.3.1, Figure 7.2**.

In the northern extent of Section B, the proposed 400kV overhead line, the South of Mendip Hills CSE compound and the potential cable bridge over the River Axe would introduce some localised adverse visual effects in public and private views from receptors to the south of the Mendip Hills AONB. There are open expansive views across the flat and generally open Levels landscape, which includes views from the M5 motorway and associated foot and road bridges in this location. The Mendip Hills (Section C) provide backgrounding in views north and the lowland hills of Brent Knoll and the Isle of Wedmore are also characteristic features in views. There are also elevated views across the northern extent of Section B from receptors on rising ground in the Mendip Hills AONB, with some filtering and screening in views by field boundary hedgerow and trees. The route of the proposed 400kV overhead line, site of the South of Mendip Hills CSE Compound and site of the River Axe Cables Bridge option are visible but a small part of expansive views.

After 15 years the planting proposed around the South of Mendip Hills CSE compound would have matured to provide a more robust screen to the lower parts of the proposed CSE compound in views experienced by sensitive visual receptors, with only the tops of gantries and sealing ends and the terminal pylon visible. Planting proposed at the River Axe Cables Bridge option would have also matured, providing greater screening for the nearest sensitive visual receptors.

Public visual receptors of high to medium sensitivity which would have views of the proposed South of Mendip Hills CSE Compound and/or the River Axe Cables Bridge comprise:

- people using PRoWs AX 21/3 and AX 2/15 along the south side of the River Axe (visual receptor reference B1.F27);
- people using PRoW AX 21/3 on the west of the M5 motorway and footbridge along the south side of the River Axe (visual receptor reference B1.F28);
- people using PRoW AX15/2 to the northeast of Kennel Lane (visual receptor reference B1.F32);
- people using the M5 motorway (visual receptor reference B2.S2.3);
- people using the northern section of Biddisham Lane (visual receptor reference B1.R31); and
- people using Sevier Road and Shiplate Road receptor (visual receptor reference B1.R34).
- people using limited sections of PRoW AX21/2 west of Loxton (visual receptor reference C1.F1);
- people using PRoW AX 21/1, also the West Mendip Way LDR on Loxton Hill (visual receptor reference C1.F2); and
- people using PRoW on Crook Peak (visual receptor references C1.F5b and C1.F5c).

2.0 Site Location and Context

2.2 South of Mendip Hills CSE Compound and River Axe Cable Bridge

Private visual receptors of high to medium sensitivity which would have views of the proposed South of Mendip Hills CSE Compound and/or the River Axe Cables Bridge comprise:

- Riverside Farm (visual receptor reference B1.H140);
- Chestnuts Farm (visual receptor reference B1.H141);
- Waterfront Farm and Holiday Cottages (visual receptor reference B1.H142);
- properties on Kennel Lane (visual receptor references B1.H144 to B1.H147);
- properties on Cowslip Lane receptor (visual receptor reference B1.H149);
- properties on White House Lane (visual receptor reference B1.H152);
- properties on Webbington Road (visual receptor references C1.H14 and C1.H15);
- Webbington Farm and Holiday Cottages, and Webbington Hotel (visual receptor references C1.M1 and C1.M2);
- Dinghurst Farm on Shiplate Road and a property on higher ground northwest of Dinghurst Farm (visual receptor references C1.H1 and C1.H2);
- properties on Sevier Road (visual receptor reference C1.H3); and
- properties in Loxton on higher ground, and on lower ground with views south between trees (visual receptor references C1.H5, and C1.H7 to C1.H11).

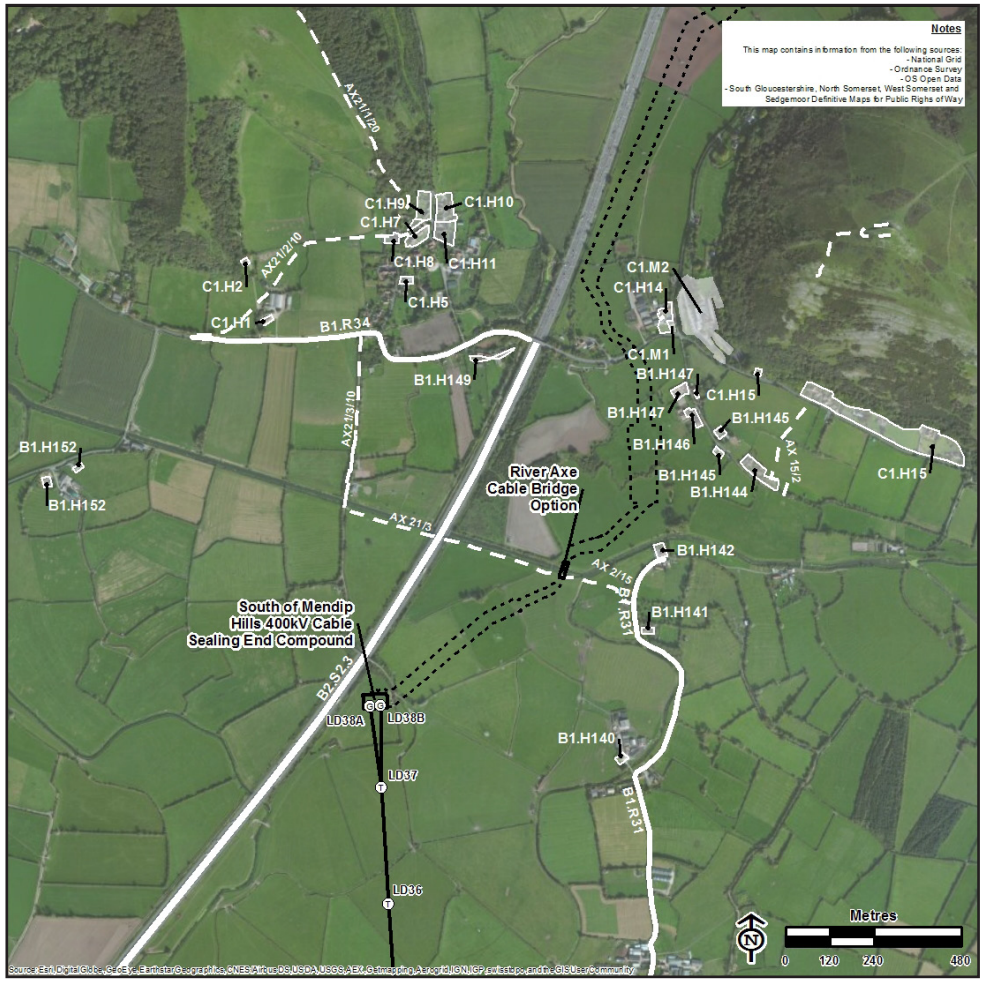


Figure 7: Sensitive Visual Receptors

2.0 Site Location and Context

2.3 Bridgwater Tee CSE Compounds

Site Location

The sites of the proposed Bridgwater Tee CSE compounds are adjacent to the existing VQ Route overhead line, approximately 1km to the northeast of Bridgwater, and to the east of the M5 motorway on Horsey Level in Section A. The closest residential properties are approximately 0.5km to the south on the A39 Bath Road and Horsey Lane, which are in the small village of Horsey.

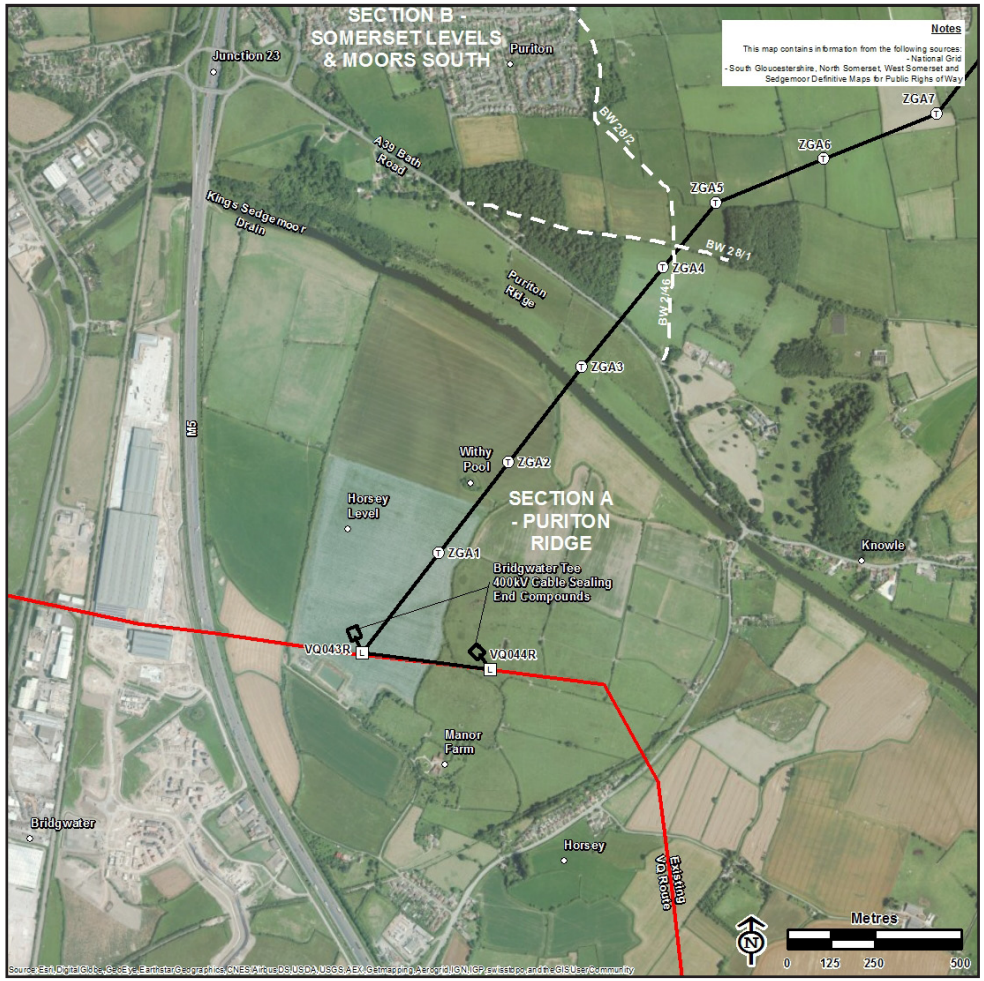


Figure 8: Site Location and Landscape Context

2.0 Site Location and Context

2.3 Bridgwater Tee CSE Compounds

Landscape Context

The landscape baseline and the assessment of landscape effects in Section A is provided in the Landscape Assessment of the Environmental Statement (ES) at Volume 5.6.

Published Landscape Character Assessments

Horsey Level in Section A is part of the Somerset Levels and Moors National Character Area (NCA) 142. The Somerset Levels and Moors (NCA 142) is described as a broad area of wet pasture, arable and wetland surrounded and divided by 'rhynes' which form a planned reclaimed 'chequer-board' pattern in the landscape. Whilst buildings on the open Levels and Moors are scarce, the character description notes that the M5 motorway and railway lines run north-south, linking several of the larger towns, including Weston-Super-Mare and Bridgwater. The published character assessment notes that incremental development and industrialisation from the towns is especially evident on the west side of the motorway.

SDC's Landscape Assessment and Countryside Design Summary (revised edition adopted 2003) should be referred to in developing detailed designs for the Bridgwater Tee CSE Compounds. In SDC's landscape assessment Horsey Level is part of the Levels Local Landscape Character Area (LLCA L) to the south of Puriton Ridge which is part of the Polden Hills LLCA (LLCA PO). The Levels (LLCA L) are described as a largely flat landscape with irregular field patterns, defined by sinuous drainage ditches or 'rhynes'.

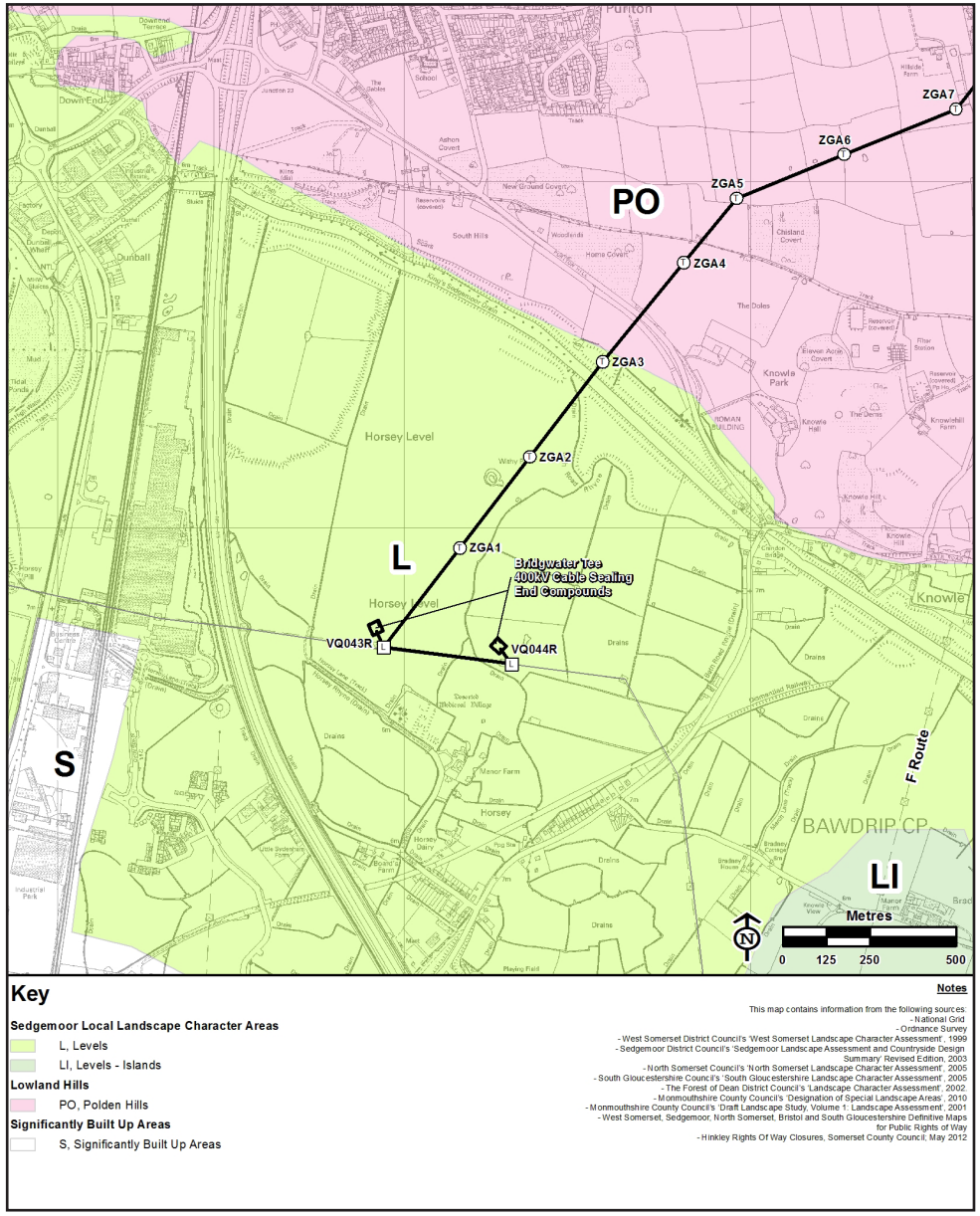


Figure 9: Published Local Landscape Character Areas

2.0 Site Location and Context

2.3 Bridgwater Tee CSE Compounds

Landscape Context

Local Landscape Character Description from Site Assessment

Horsey Level comprises flat low-lying farmland divided by field drains and 'rhynes' and mature hedgerow in places.

Puriton Ridge provides a distinct backdrop to the north of Horsey Level, and from higher ground on the ridge there are distant views south across Horsey Level and the wider Levels and Moors landscape.

Farmland is both pasture and arable on the Levels and on Puriton Ridge, with a larger field pattern across Horsey Level compared to the field pattern on the south facing slopes of the ridge. Woodland is a feature of Puriton Ridge.

Hedgerows define field boundaries on Horsey Level and are generally intact. Some hedgerow field boundaries are overgrown with gaps in places and some are low and maintained in particular running northwest of the A39 Bath Road. There are mature hedgerows and trees along field boundaries surrounding Manor Farm, along Horsey Lane (track) extending northwest of Manor Farm, and along the dismantled railway running southwest from the A39. There is young tree planting adjacent Horsey Lane and along the east side of the M5 motorway. There is an area of 'man made' raised ground with scattered scrub approximately 300m north of Horsey Manor Farm and Coach House. There is a water-body named 'Withy Pool' surrounded by mature trees and in the centre of a large flat field, south of King's Sedgemoor Drain.

The M5 motorway, the A39 (Puriton Hill and Bath Road), and King's Sedgemoor Drain form the boundaries of Horsey Level. There are residential properties on lower ground including on Bath Road and Horsey Lane and new housing on the edge of Bridgwater west of the M5 motorway. The M5 motorway and traffic on the M5 are particularly discernible, along with urban and industrial development on the edge of Bridgwater to the east, including the large Morrison's distribution centre.

There are existing overhead lines present in the area, including the 275kV VQ Route (on 400kV pylons) to the south of Puriton Ridge and the 132kV F Route which runs north south over Puriton Ridge.

2.0 Site Location and Context

2.3 Bridgwater Tee CSE Compounds

Landscape Context

Local Landscape Colours, Materials and Details

The photographs below identify appropriate colours and examples of materials and details, which are found in the local landscape.

1. Local agricultural fencing
2. Example of local stone building with red clay roof
3. Summer view from north of Bradney looking northwest toward Puriton Ridge
4. Winter view from Puriton Ridge looking south across Horsey Level with Withy Pool visible

Sensitive Visual Receptors

The description of baseline views and assessment of visual effects for visual receptors in Section A is provided in the ES at **Volume 5.7**. Each visual receptor in Section A is assessed in the Visual Assessment Tables at ES V**olume 5.7.2.1, Appendix 7A** and illustrated at **Volume 5.7.3.1, Figure 7.2.1**.

Receptors to the south of Puriton Ridge in Section A typically have open and some filtered distant views across the flat Levels landscape towards Puriton Ridge which rises steeply. In places, particularly to the east and southwest, intervening landform of Knowle Hill, along with field trees, hedgerows and built form limit views. The VQ Route (on 400kV steel lattice pylons) and the F Route (on 132kV steel lattice pylons) are visible in most views above trees, hedges and built form, with some views becoming filtered or screened. From the top of Puriton Ridge near Home Covert and South Hills distant views are available south across the flat Levels landscape, backgrounded by the Quantock Hills Area of Outstanding Natural Beauty (AONB) in the distance.

Sensitive visual receptors at the southern extent of Section A, would have views of the proposed 400kV overhead line supported by T-pylons and the Bridgwater Tee CSE compounds would be visible connecting to the VQ Route supported by steel lattice pylons. The CSE compounds would introduce localised adverse visual effects for visual receptors, visible in a small proportion of views. The presence of the VQ Route would limit the adverse effect of the CSE compounds.

After 15 years tree and shrub planting around the proposed CSE compounds would have matured to provide a more robust screen of the lower parts of the CSE compounds in views with only the tops of gantries and sealing ends visible.

Public visual receptors of medium to low sensitivity which would have views of the proposed Bridgwater Tee CSE compounds comprise:

- people using public right of way (PRoW) BW2/46, BW28/1 and BW28/2 along the top of Puriton Ridge near Home Covert (visual receptor reference A1.F4, A1.F5 and A1.F7);
- people using the M5 motorway (visual receptor reference A2.S7.3); and
- people using Horsey Lane, A39 Bath Road and A39 Puriton Hill (visual receptor reference A1.R2, A1.R5 and A1.R7.

Private visual receptors of medium to low sensitivity which would have views of the proposed Bridgwater Tee CSE compounds comprise:

- properties on Horsey Lane including Manor Farm and Board's Farm (visual receptor reference A1.H1 to A1.H5);
- properties on the A39 Bath Road between Bradney Lane and Crandon Bridge (visual receptor reference A1.H9 to A1.H13);
- properties on the eastern edge of King's Down residential development (visual receptor reference A1.H20 and A1.H21);
- properties on the A39 Puriton Hill (visual receptor reference A1.H22 to A1.H25); and
- Knowle Hall (visual receptor reference A1.B4).

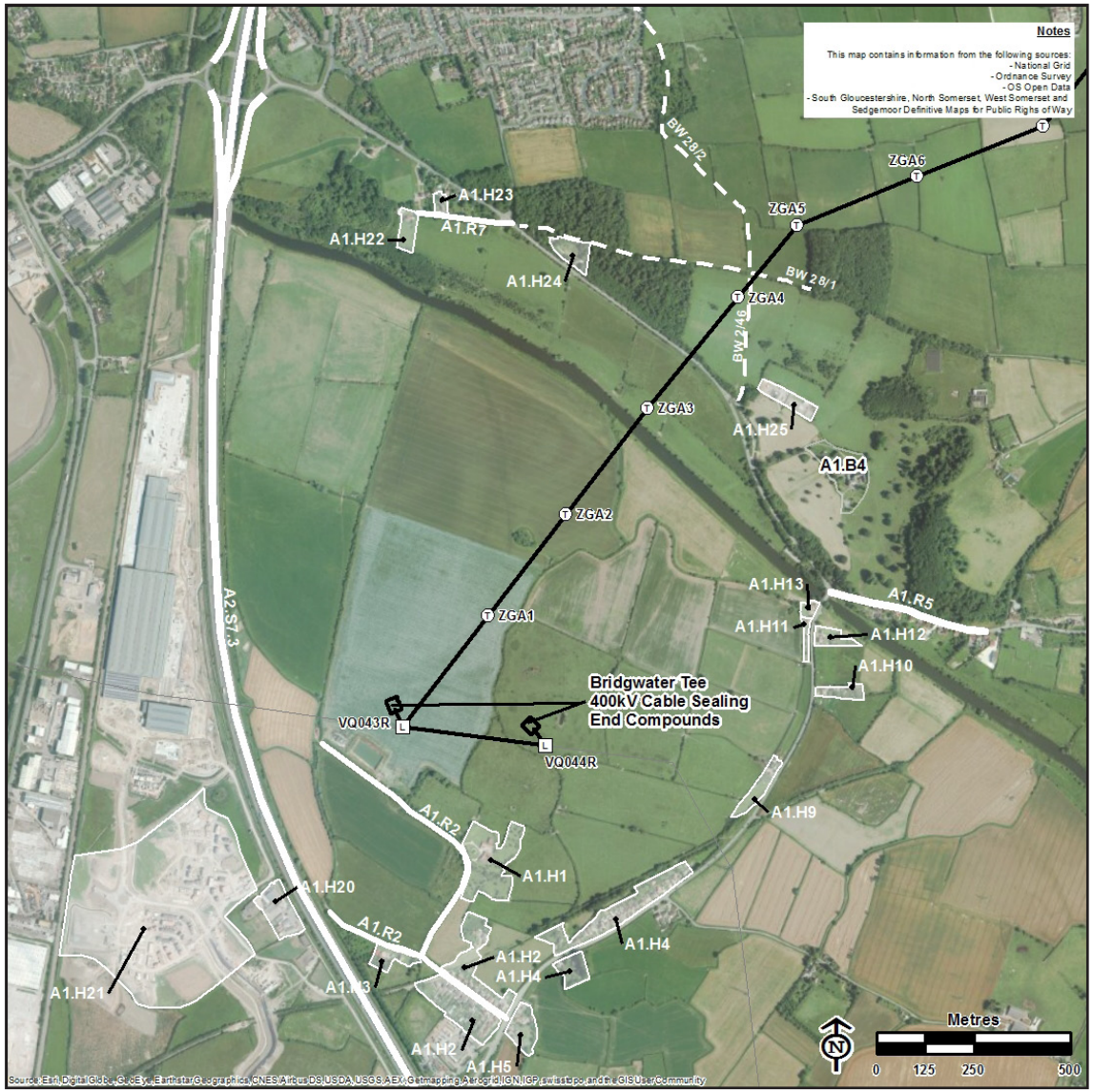


Figure 10: Sensitive Visual Receptors

3.0 Examples of Existing Infrastructure

3.1 Existing Substations

There are two main types of 400kV/132kV Grid Supply Point (GSP) substations: Air Insulated Switchgear (AIS) substations, where electrical equipment is outdoors, and Gas Insulated Switchgear (GIS) substations, where equipment is contained in a building. AIS substations also sometimes contain Hybrid Insulated Switchgear (HIS), where equipment is insulated using gas.

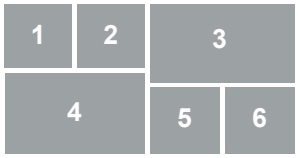
In appearance HIS equipment is comparable to AIS as the equipment is all outdoors. Sandford Substation is proposed to be an AIS GSP substation, with some HIS equipment. The photographs of existing substations on this page have been chosen as they are representative of the AIS substation proposed at Sandford.

1. Bicker Fen Substation (AIS)
2. Stoke Bardolph GSP Substation (AIS)
3. Walham Substation entrance (AIS)
4. Stoke Bardolph GSP overhead line entry
5. Stoke Bardolph GSP buildings

3.0 Examples of Existing Infrastructure

3.2 Existing Cable Sealing End Compounds

1. Newby Cable Sealing End Compound
2. Nunthorpe Cable Sealing End Compound
3. Nunthorpe Cable Sealing End Compound
4. Ross Cable Sealing End Compound
5. Modular building at Newby Cable Sealing End Compound
6. Newby Cable Sealing End Compound



3.0 Examples of Existing Infrastructure

3.3 Existing Cable Bridges

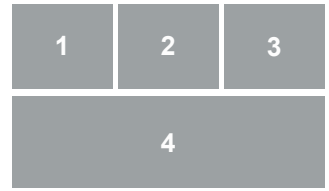
1. Bulrake Stream Cable Bridge
2. Hinksey Stream Cable Bridge
3. Hinksey Stream Cable Bridge

1 2 3

3.0 Examples of Existing Infrastructure

3.4 Existing Bridges on the River Axe

1. Hams Lane bridge and pipe crossing
2. M5 motorway bridge
3. Pipe crossing
4. M5 motorway bridge and footbridge

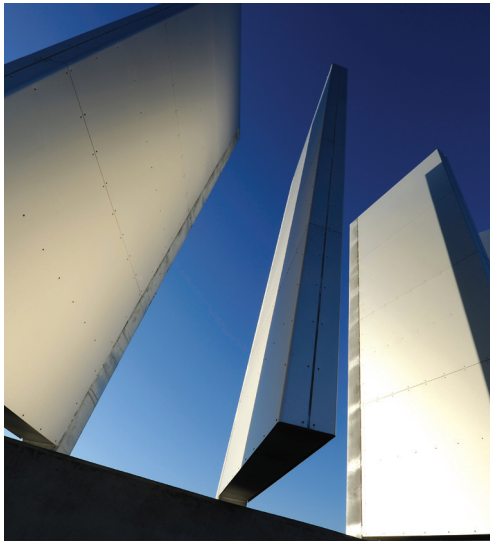


4.0 Examples of Design Innovation and Aspiration

4.1 Introduction

This section provides existing examples of design innovation in relation to the site-specific infrastructure, where this exists. The images also explore the potential for innovative or alternative materials, which could be applicable to elements of the site-specific infrastructure.

4.2 Sandford Substation



Photos 1-3: Cleve Hill Substation, Graveney, Kent
Screen mounds around substation designed to help it blend into the hillside. The substation features a 10m high north wall which is made up of a series of concrete panels and fins to help screen views.

(Credit: London Array Ltd)

1 2 3

4.0 Examples of Design Innovation and Aspiration

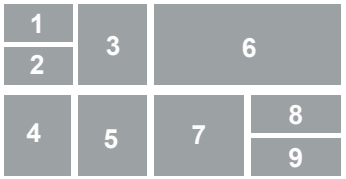
4.2 Sandford Substation

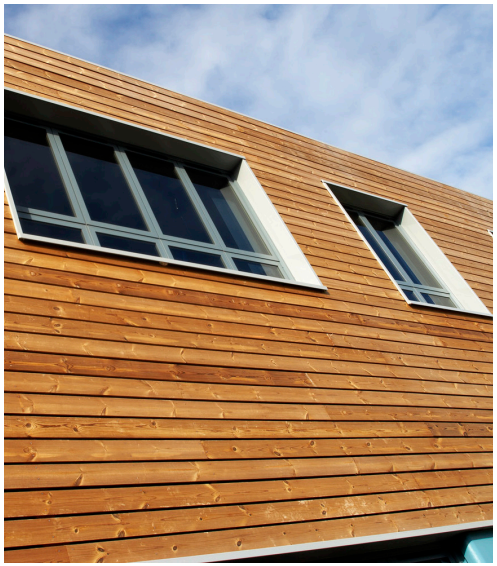
1. Local stone aggregate surfacing
2. Brick slip cladding
3. Corten exterior panelling

4 & 5: Timber clad security fencing

6. Corten rain screen
7. Timber cladding

8 & 9: Stone cladding



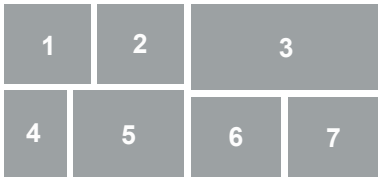


Images for illustrative purposes only

4.0 Examples of Design Innovation and Aspiration

4.3 Cable Sealing End Compounds

1. Reinforced grass
2. Timber clad modular building
3. Example of timber cladding on modular building
4. Local stone aggregate
5. Green roof
6. Timber clad security fencing
7. Timber clad security fence detail



Images for illustrative purposes only

4.0 Examples of Design Innovation and Aspiration

4.4 Cable Bridges

1. Reinforced grass surfacing
2. Coloured metal cladding
3. Example of steel and timber parapet
4. Example of stone clad bridge
5. Corten screen
6. Local stone
7. Timber cladding
8. Variation of materials

Images for illustrative purposes only

5.0 Vision

The site-specific infrastructure will be designed to meet their functional and operational requirements whilst being of high quality and sensitive to their setting, to minimise environmental effects. This will be achieved by:

- careful siting and orientation of the Sandford Substation with reference to existing landscape features and consideration of sensitive environmental receptors, such as the Mendip Hills AONB and its setting, visual receptors on high ground in the AONB, users of the Strawberry Line, users of NCR 26 and residents at Droveway Farm;
- careful siting and orientation of the South of the Mendip Hills CSE Compound with reference to existing landscape features and consideration of sensitive environmental receptors, such as the Mendip Hills AONB and its setting, visual receptors on high ground in the AONB and users of the M5;
- careful siting and orientation of the Bridgwater Tee CSE Compound on Horsey Level, with consideration given to sensitive environmental receptors, including visual receptors on Puriton Ridge;
- ensuring rational use of space and minimising the height and bulk of equipment;
- utilising materials and finishes, wherever possible, which reflect the colour, texture or materials palette found in the local landscape, and seek to avoid reflective finishes which cause glint and glare;
- incorporating mitigation planting and mounding to assist in screening (planting should be in-keeping with local landscape character and mounding should have a natural form to help it blend into the surrounding landscape); and
- employing locally appropriate and innovative designs for site boundaries, accesses, buildings and enclosures.









6.0 DCO Designs and Operational Function

6.1 Sandford Substation

A GSP substation is the electrical interface between the high voltage transmission network owned and operated by National Grid and the distribution network operated by the Distribution Network Operator (DNO) which in this case is Western Power Distribution (WPD). The typical designs for the substation are shown in the DCO application at **Volume 4.8.4, Sheets 30 and 31**. Substations are a method of controlling power flows and voltages between the transmission system and distribution system.

The typical design is presented in the diagrammatic illustration opposite. This illustration explains the function of the various elements required.

Key:

A. **National Grid Amenity Building:** office and welfare building. Modular construction, prefabricated steel unit which can be road transportable: approximate dimensions:10x15x3m (LxWxH).

B. **Diesel Generator:** provides backup power, approximate dimensions: 5x10x4m (LxWxH).

C. **National Grid Control Building**: Houses protection equipment, control equipment, LVAC distribution board, battery systems, telecommunications and control/permit room. Modular construction, prefabricated steel unit which can be road transportable. Approximate dimensions: 50x10x4m (LxWxH).

D. **Circuit Breaker (400kV):** interrupts power flow. Materials: mixture of metal body and silicone/ porcelain insulators. Dimensions: 3m x 2m x 9m (LxWxH).

E. **LVAC Building**: houses the 11kV/415V transformer for site supplies. Modular steel prefabricated building. Approximate dimensions: 10x15x3m (LxWxH).

F. **WPD Amenity and Control Building**: (as per descriptions for items A and C above)

G. **Cable Sealing End (132kV):** interface between air insulated conductor (busbar) and underground cables, one required per cable. Typically a silicone insulator above a steel structure. Approximate dimensions: 1x1x4m (LxWxH) per individual unit.

H. **Overhead Line Gantry (132kV):** transfers high voltage conductors from an overhead line under tension to substation equipment. Approximate dimensions: 15x2x10m (LxWxH).

I. **Post Insulators/Busbar Circuit Breakers (132kV):** Support HV conductors to keep them away from earth. Typically porcelain insulators above a steel structure. maximum height of equipment in this part of the substation would be 10m.

J. **Cable Sealing Ends (400kV):** interface between air insulated conductor (busbar) and underground cables, , one required per cable. Typically a silicone insulator above a steel structure. Approximate dimensions: 2x2x9m (LxWxH) per individual unit.

K. **Hybrid Switchgear (400kV):** interrupts the power flow and capable of disconnecting and earthing (safety precautions). Materials: mixture of metal body and silicone or porcelain insulators. Approximate dimensions: 10x2x9m (LxWxH).

L. **Full Line Tension Gantry (400kV):** The overhead line conductors terminate on this structure. Construction from tubular steel. Approximate dimensions: 20x2x16m (LxWxH).

M. **Water Tank**: fire fighting requirement to provide 120 l/s for 1 hour. Glass fused to steel construction with a galvanised steel frame. Approximate dimensions: 8m diameter and 4 m height.

6.0 DCO Designs and Operational Function

6.1 Sandford Substation

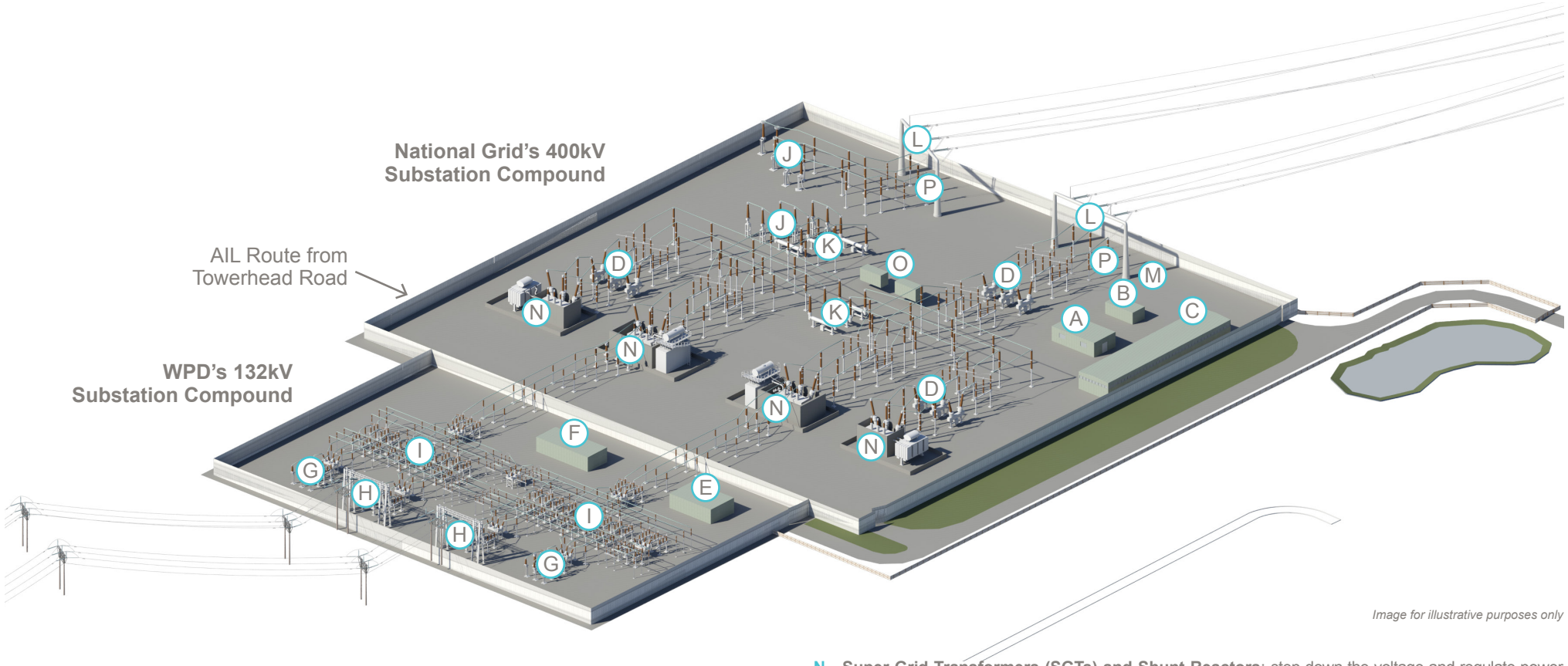


Image for illustrative purposes only

N. Super Grid Transformers (SGTs) and Shunt Reactors: step down the voltage and regulate power flow with a cooler bank attached to each side. Acoustic enclosures attenuate noise and are constructed from modular steel frames. Overall approximate dimensions: 15x25x11m (LxWxH).

O. Earth Store and Workshop: Storage of safety equipment and tools. Steel shipping containers. Approximate dimensions: 10x3x3m (LxWxH).

P. Earth Switch/Post Insulator (400kV): to apply safety precautions for work on this equipment and supports HV conductor to keep it away from earth. Typically porcelain insulator above a steel structure. Approximate dimensions: 1x1x4m (LxWxH) per individual unit.

6.0 DCO Designs and Operational Function

6.2 South of Mendip Hills CSE Compound

The typical design for the South of Mendip Hills CSE Compound is presented in the DCO application at **Volume 4.8.2, Sheet 1**. The double circuit CSE compound would occupy a footprint of approximately 65m x 40m. The CSE compound would comprise two Full Line Tension Gantries (approximately 13m high to the cross-beam and 16m to the earth spike) which terminate the overhead line and connect to Cable Sealing Ends and other electrical equipment. A small control room approximately 4m wide and 3m long may be required in each compound. The compound would be surrounded by a 2.4m high fence to protect the equipment.

The typical design is presented in the diagrammatic illustration below. This illustration explains the function of the various elements required.

A. **Cable Sealing End**: interface between air insulated conductor (busbar) and underground cables, one required per cable. Materials: porcelain/silicone. Height: 9-10m including support structure.

B. **Surge Arrester**: protects other equipment by absorbing high frequency transients. Materials: porcelain/silicone. Height: 9-10m including support structure.

C. **Support Structure**: ensures high voltage equipment is safely elevated. Materials: lattice structure, galvanised steel. Height: 3m.

D. **Post Insulators**: supports high voltage conductors away from earth. Materials: porcelain (good electrical insulation properties). Height: 3m (to ensure electrical clearance).

E. **DNO Supply**: switchboard, transformer and meter from local electricity network. Materials: modular fibreglass building. Dimensions: W 2m x L 2m x H 3m

F. **LVAC and Comms Building**: enclosure for auxiliary systems. Materials: modular fibreglass building. Dimensions: W 3m x L 4m x H 3.3m.

G. **Full-Line Tension Gantry**: to minimise height, the overhead line terminates on this structure, avoiding traditional pylon and gantry arrangement. Materials: tubular steel (similar to T-pylon. Dimensions: L 20m x H 16m (to earth spike).

H. **High Voltage Conductor/Busbar**: connects the items of equipment together. Materials: aluminium (stranded or tubular, good electrical conductors, low weight).

I. **Disconnector / Earth Switch**: to provide safety precautions to work on the underground cable. Materials: porcelain. Dimensions W 3m x L 10m x H 8m.

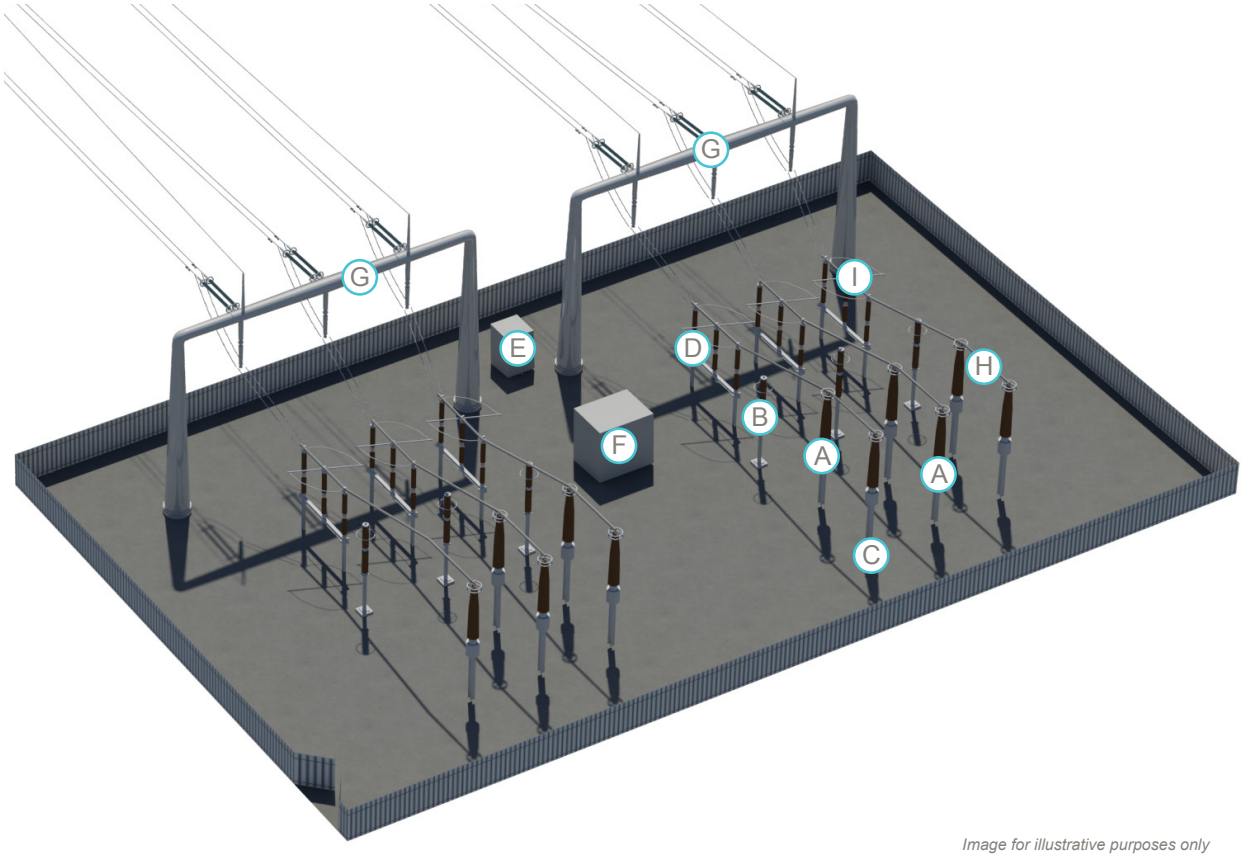


Image for illustrative purposes only

6.0 DCO Designs and Operational Function

6.3 Bridgwater Tee CSE Compounds

The typical designs for the Bridgwater Tee CSE Compounds are presented in the DCO application at **Volume 4.8.2, Sheet 2**. The single circuit CSE compounds would each occupy a footprint of approximately 34m x 30m. Each CSE compound would comprise a gantry (approximately 13-14m high) which then connects to CSEs and other electrical equipment. A small control room approximately 4m wide and 3m long may be required in each compound. The compound would be surrounded by a 2.4m high fence to protect the equipment.

The typical design is presented in the diagrammatic illustration below. These illustrations explain the function of the various elements required.

A. **Cable Sealing End**: interface between air insulated conductor (busbar) and underground cables, one required per cable. Materials: porcelain/silicone. Height: 9-10m including support structure
B. **Surge Arrester**: protects other equipment by absorbing high frequency transients. Materials: porcelain/silicone. Height: 9-10m including support structure
C. **Support Structure**: ensures high voltage equipment is safely elevated. Materials: lattice structure, galvanised steel. Height: 3m
D. **Post Insulators**: supports high voltage conductors away from earth. Materials: porcelain (good electrical insulation characteristics). Height: 3m (to ensure electrical clearance)
E. **DNO Supply**: switchboard, transformer and meter from local electricity network. Materials: Modular Fibreglass building. Dimensions: W 2m x L 2m x H 3m
F. **LVAC and Comms Building**: enclosure for auxiliary systems. Materials: Modular Fibreglass building. Dimensions: W 3m x L 4m x H x 3.3m
G. **Overhead Line Gantry**: transfers high voltage conductors from overhead line tower to the CSE equipment. Materials: galvanised steel lattice structure. Dimensions : W 4m x L 22m x H 13m
H. **High Voltage Conductor/Busbar**: connects the items of equipment together. Materials: Aluminium (stranded or tubular, good electrical conductors, low weight).

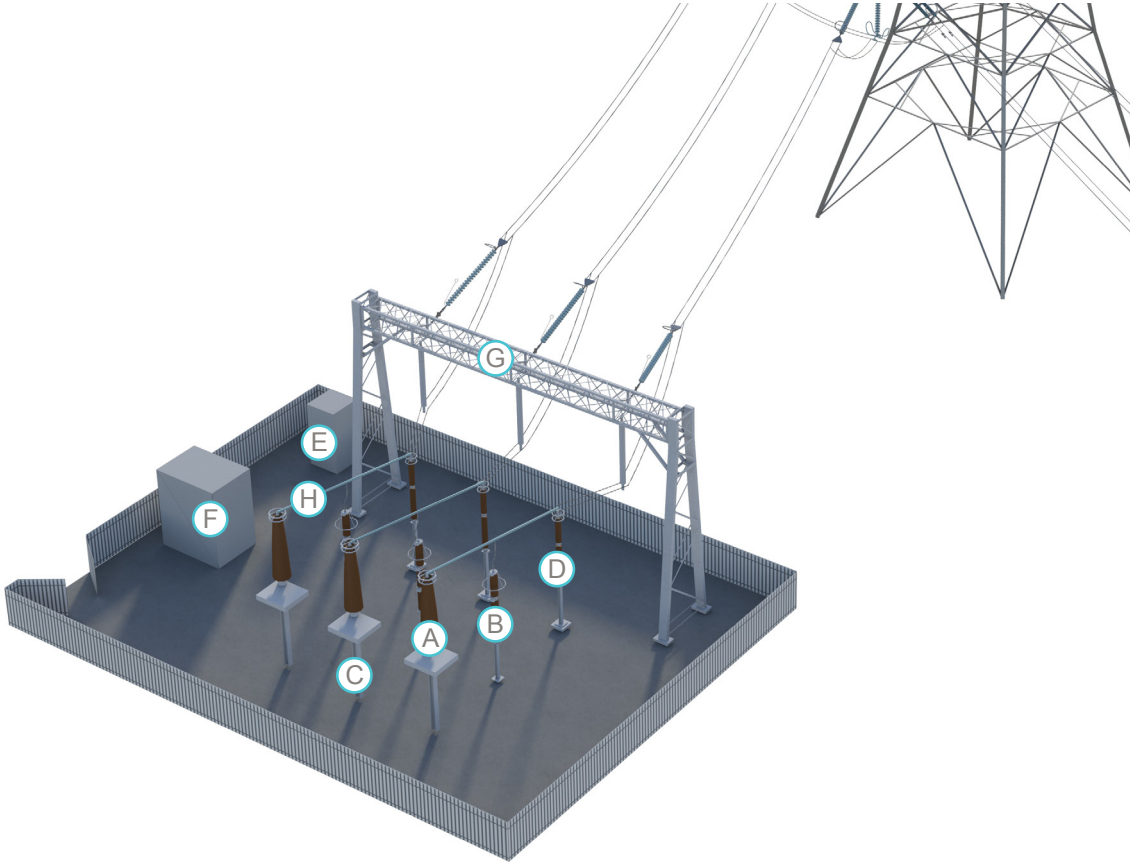


Image for illustrative purposes only

6.0 DCO Design and Operational Function

6.4 Towerhead Brook Cable Crossing

The typical designs for the Towerhead Brook Cable Crossing are presented in the DCO application at **Volume 4.8.2, Sheets 16-19**. There are two design options, either a culvert crossing or bridge crossing. Both options are required to provide an abnormal load vehicle access (for substation transformers) across the brook.

The culvert crossing option would use a pre-cast concrete box culvert of approximately 3m. The bridge crossing option would be constructed with concrete abutments on either side, with a concrete beam and slab structure above with a span of approximately 8m. Both bridging structure options would allow railings to be used to form the parapets. Kerbs would be used to contain vehicles on the structure and railings would be used to provide pedestrian restraint on the edge of the parapets.

In order to accommodate access for abnormal load vehicles during construction and operation, and to allow space for the four accessible cable troughs, the crossing would be approximately 13.5m wide. The required clearance of the crossing above the watercourse channel means that vehicle access ramps constructed of fill material would be required either side of the crossing. Fencing would be needed to either side of the ramps leading up to the crossing to provide a suitable vehicle restraint.

The typical design of the culvert crossing option is presented in the diagrammatic illustration below. This explains the function of the various elements required.

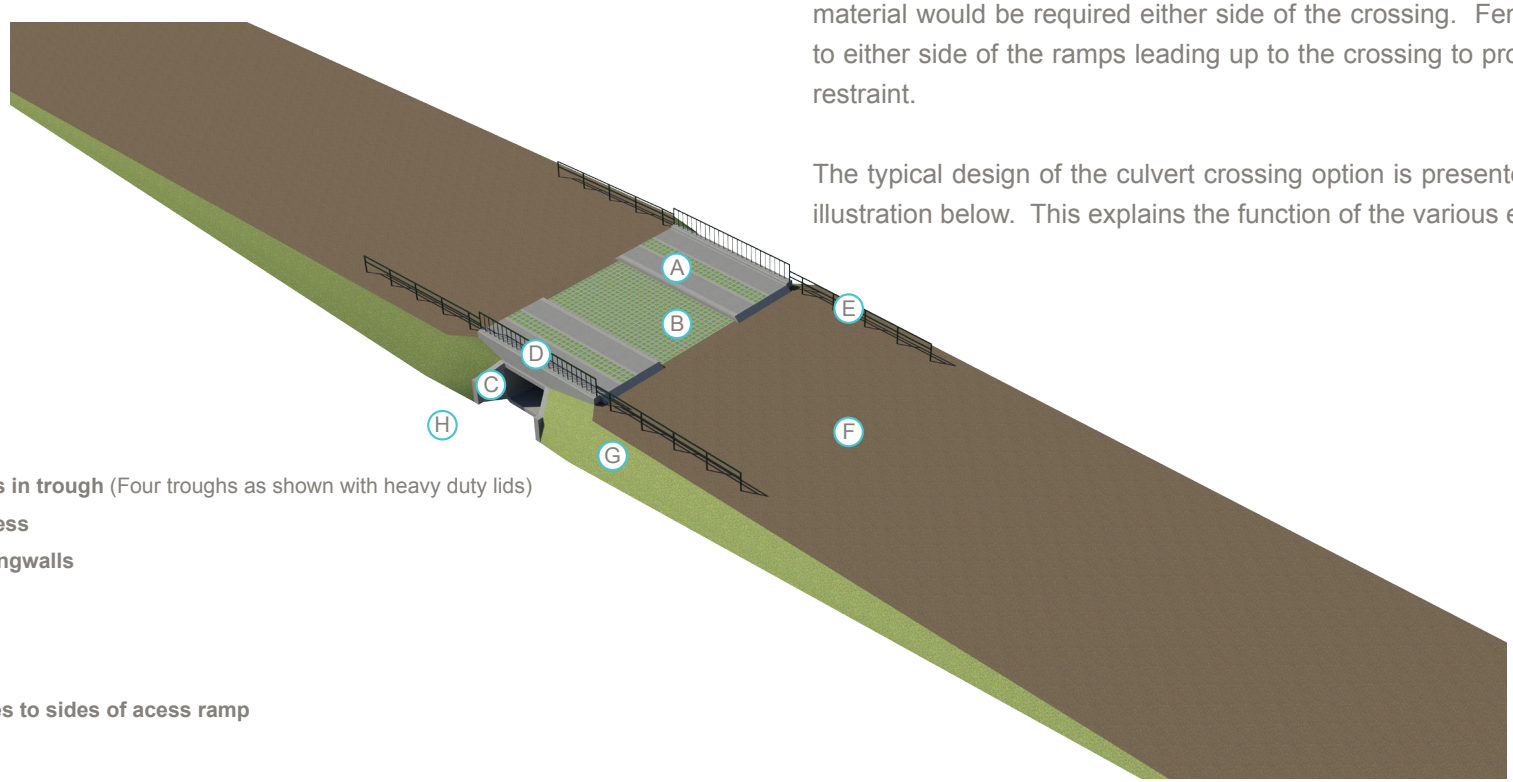


Image for illustrative purposes only

A. 400kV power cables in trough (Four troughs as shown with heavy duty lids)
B. Abnormal load access
C. Box culvert with wingwalls
D. Railings
E. Vehicle restraint
F. Access ramp
G. Graded grass slopes to sides of acess ramp
H. Towerhead Brook

6.0 DCO Design and Operational Function

6.5 River Axe Cable Bridge

The typical design for the River Axe Cable Bridge option is presented in the DCO application at **Volume 4.8.2, Sheets 12 and 13**. The half-through girder bridge structure proposed would provide a clear span of approximately 34m (depending on the exact crossing location). In order to accommodate access for light vehicles during operation and four accessible cable troughs, the bridge would be approximately 14m wide. The required clearance of the bridge above the river channel means that vehicle access ramps constructed from fill material would be required either side of the bridge. The PRoW on the southern river bank would either need to be routed over the access ramp using steps or diverted around.

The typical design is presented in the diagrammatic illustration below. This illustration explains the function of the various elements required.

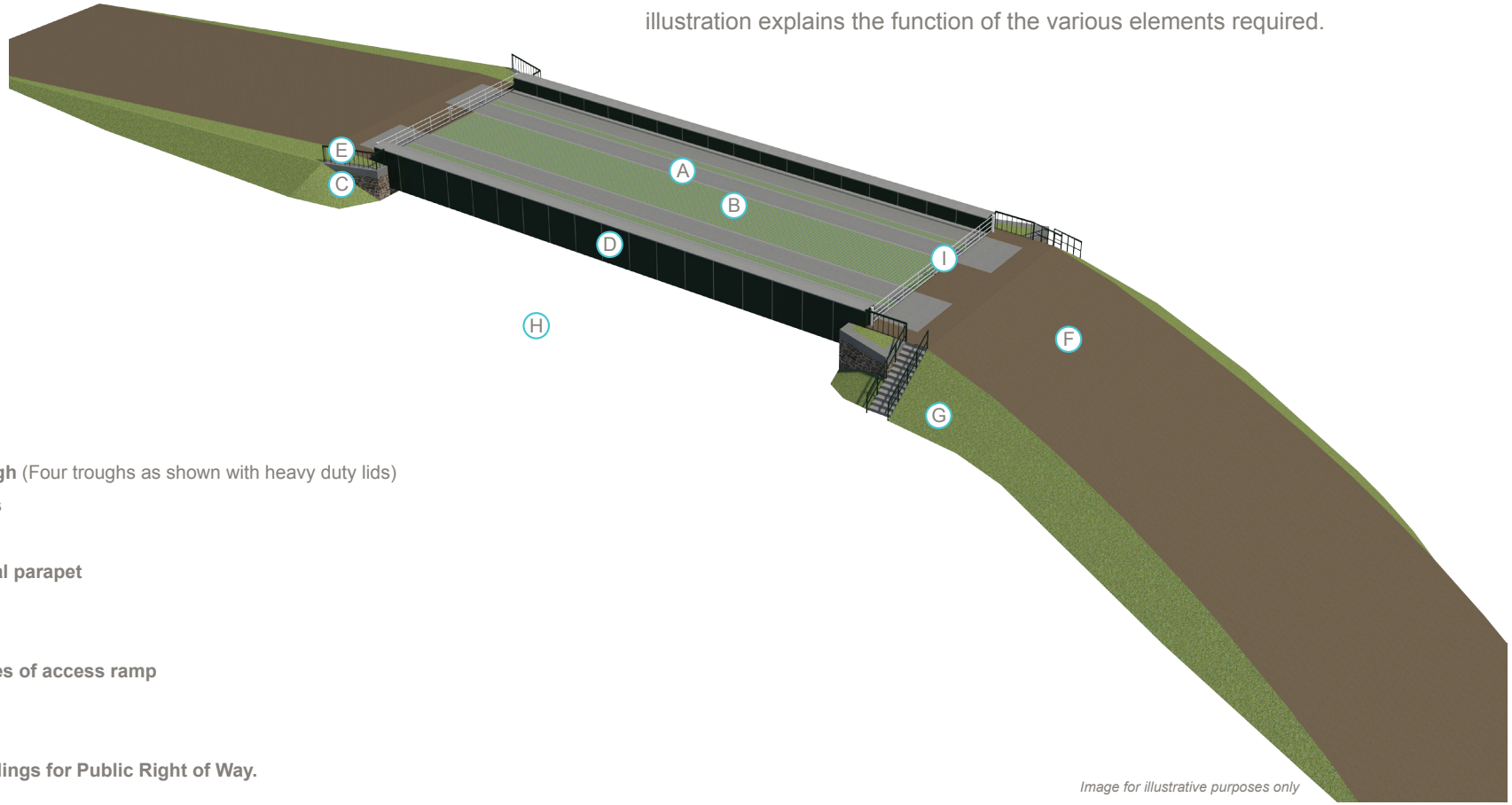


Image for illustrative purposes only

- **A. 400kV power cables in trough** (Four troughs as shown with heavy duty lids)
- **B. Maintenance vehicle access**
- **C. Bridge abutment**
- **D. U-frame bridge with intergral parapet**
- **E. Vehicle restraint**
- **F. Access ramp**
- **G. Graded grass slopes to sides of access ramp**
- **H. River Axe**
- **I. Gated Access**
- **J. Potential steps and handrailings for Public Right of Way.**

7.0 Design Principles

7.1 Introduction

Further to National Grid's overarching design principles set out in Section 5 of the DAS (**Volume 7.2**) and **Section 1.0** of this report, and the examples of design innovation and aspiration and the vision at **Sections 4.0 and 5.0**, a specific set of design principles have been developed for the site-specific infrastructure. These provide a clear set of objectives which have guided the design of the site-specific infrastructure to date and will guide any future detailed design, promoting a high quality approach and providing certainty as to what will be delivered. The Local Planning Authority will have regard to these when determining National Grid's applications for the discharge of requirements.

7.2 Sustainability

National Grid is committed to a sustainable approach to design, in keeping with its 'Our Contribution' environmental sustainability framework. The design of the site-specific infrastructure should reflect the three key themes of 'Positive about Resources', 'Enhancing Ecosystems' and 'Climate Positive'. This will involve reducing where possible material use in construction especially away from high carbon materials such as concrete and cement. Wildlife should be preserved, with habitats enhanced where possible. Buildings both temporary and permanent should be energy and resource efficient.

7.3 Function and Operational Requirements

It is essential that the design of Sandford Substation, the CSE compounds and cables bridges meets their function, as set out in **Section 6.0**, as well operational requirements which relate to electrical safety, security and access for operation and maintenance. In the case of the cables bridges, there is also a requirement that the function of the watercourses is not compromised. (See **Section 8.0** for further information).

7.4 Response to Context

Section 1.0 refers to the siting studies carried out in relation to Sandford Substation, the CSE Compounds and cable bridges, and **Section 2.0** provides relevant information on landscape context. Further to this there is an opportunity to respond to context in developing landscape proposals (also see **7.5** and **7.6** which follow in relation to responding to context).

Sandford Substation and Towerhead Brook Cable Crossing

Sandford Substation and Towerhead Brook Cable Crossing are proposed in a lowland pastoral landscape, where there is a high proportion of intact hedgerows and hedgerow trees which enclose fields. There are cider orchards associated with the Thatcher's Cider factory north of Sandford. The site of the proposed substation, adjacent to landform and mature vegetation associated with Drove Way Bridge, would help to accommodate the substation in the local landscape.

The pattern of vegetation in the local landscape provides opportunity for further hedgerow, tree and orchard planting as part of the landscape proposals for site-specific infrastructure.

South of the Mendip Hills CSE Compound and River Axe Cable Bridge

The Somerset Levels landscape south of the Mendip Hills is a generally open landscape, with large flat agricultural fields defined by drainage ditches or 'rhynes'. There are also mature hedgerows and hedgerow trees along field boundaries and drains. Hedgerows are overgrown and or gappy in places and well-maintained in others.

The presence in the local landscape surrounding the South of the Mendip Hills CSE Compound of mature hedgerows, vegetation adjacent to the motorway and young woodland planting provides an opportunity for additional structure, hedgerow and tree planting as part of the mitigation proposals. The locally raised landform around the Hams Lane bridge also provides an opportunity for localised mounding, in conjunction with planting proposals.

To the east of the M5, there are examples of young woodland planting and mature tree and scrubby vegetation lining the north side of the River Axe. There are also mature hedgerows and trees along some field boundaries north and south of this section of the River Axe and also mature trees lining the Old Lox Yeo to the north. The local landscape context provides an opportunity for tree and hedgerow planting to be used to help accommodate the River Axe Cables Bridge Option in the landscape.

Bridgwater Tee CSE Compounds

The Bridgwater Tee CSE compounds will be on Horsey Level which comprises flat low-lying farmland divided by field drains and 'rhynes' and bound by hedgerows which are generally intact and contain some hedgerow trees. The presence of existing hedgerows and hedgerow trees provides an opportunity for additional planting and management activities as part of the mitigation proposals.

The existing landscape feature to the immediate north, of mature trees surrounding Withy Pool offers an opportunity for a similar approach to be taken to mitigation planting surrounding the compounds. There is also some localised mounding in a field to the south of Withy Pool and north of the VQ Route, which has scrub vegetation to its north facing slope.

7.0 Design Principles

7.5 Massing and Scaling

The mass and scale of site specific infrastructure should be minimised to avoid or reduce effects on the landscape and in views.

As shown by the illustrations in **Section 6.0**, the use of open-air electrical equipment at appropriate spacing in the compound and of varying height will limit the perceived mass and scale of the substation and CSE compounds.

The numbers and sizes of buildings in the substation and CSE compounds should be kept at a minimum.

There is potential to reduce the perceived scale and mass of the substation and CSE compounds, including buildings, by varying the materials and colour finish used so that there is not the predominant use of a single material or colour.

There is also potential to reduce the perceived scale and mass of the cables bridge by varying the materials and colour finish used so that there is not the predominant use of a single material or colour. Bridge parapets should be kept to the minimum height required for safety and structural support.

7.6 Materials and Textures

Wherever possible, the materials or colour of the elements within the substation, CSE compounds and watercourse crossings should be chosen to be consistent with the local Levels landscape, and the finish of materials or coatings should be selected to avoid glimmer and shine.

7.7 Design Style

Buildings, bridge abutments and parapets, fencing, gates and surfacing should be designed to be consistent with good examples found in the local landscape where possible, but otherwise should be consistent with the rural character of the local Levels landscape in general.

Above: Cider orchards near Sandford

8.0 Scope for Variation in Developing the Detailed Design

8.1 General Maintenance Requirements

The design life required for different elements within the site-specific infrastructure varies depending on whether it is possible for maintenance to be carried out whilst high voltage equipment is in operation. For example, the electrical equipment and compound fencing at the substation and CSE compounds are designed to have a 40 year life. Whereas the design life for buildings (to first maintenance) is typically 15 years. Any variation to typical design or materials will need to be carefully considered in this regard

8.2 Sandford Substation

This section explains where there is scope for variation within the detailed design. In summary the areas where there is scope for variation are:

- the internal layout of the substation compounds;
- the vertical LoD;
- the external finish of substation buildings and acoustic enclosures;
- the boundary treatments and surfacing; and
- the landscape mitigation proposals.

Substation electrical connections and horizontal Limits of Deviation (LoD)

- The points of connection to the substation (400kV overhead line or underground cables) are fixed design elements and no horizontal LoD is required for the substation.

Size and layout of substation compound

- National Grid designs its substations according to a set of safety instructions, policies, standards and guidance notes based on international standards. A substation layout is designed to protect staff working in it, protect the equipment in the substation and allow safe access to install, maintain, remove all or part of the substation. These design requirements and the dimensions of the electrical equipment determine the overall size of the substation.

Separation between electrical equipment

- The requirements National Grid adheres to set out the basic dimensions that have to be maintained between equipment and between live equipment and the ground or any ancillary structures, buildings, masts, roads and fences. (Live equipment is any equipment that is energised or electrically “turned on”.)

- Without adequate clearance between items of electrical equipment and vehicles requiring access into the substation, more than one part of the substation may need to be turned off, which may compromise the integrity of the system and supply to local users. For these reasons National Grid and WPD design their systems so that no more than one part of the system needs to be switched off for any work to be done on it.

- Generally the distance required between equipment, and between equipment and other structures depends on the system voltage and the size of any vehicles or working platforms required to access equipment which is not at ground level.

8.0 Scope for Variation in Developing the Detailed Design

8.2 Sandford Substation

Separation between electrical equipment continued

- Equipment containing oil (such as the transformers and shunt reactors) require a bund surrounding them to contain any spillage. The equipment and their bunds then need adequate separation so that if there is a fire it does not cause damage to other critical items of equipment. (The transformers and shunt reactors also have an acoustic enclosure surrounding them to limit noise emitted, but this does not add to the space required.)

Arrangement of the substation

- As shown in the illustration in **Section 6.0**, Sandford Substation consists of two compounds, the 400kV part of the substation and the 132kV part of the substation. Once constructed, these will be operated separately by National Grid (400kV substation) and WPD (132kV substation). Each operator requires its own security fence, control buildings and vehicle access, including for large vehicles such as cranes, heavy goods vehicles and abnormal loads (to deliver and remove the transformers and reactors if required).

- At Sandford Substation, the proposed 400kV overhead line approaches from the north and has dictated the position of the 400kV part of the substation, which is to the north of the 132kV part of the substation.

- In general the buildings are positioned where there is space and so as not to increase the overall footprint of the substation. Where a building is connected to electrical equipment by low voltage wires, the layout seeks to minimise the distance of such wires.

Scope for variation

- During the detailed design by the appointed specialist contractor, the internal layout of the substation may be altered in order to make more efficient use of space (to minimise the overall footprint of the substation) or to establish a better working arrangement.

- The maximum dimensions for the Sandford Substation are 217m x 143m and this will not increase.

Electrical equipment

- The electrical equipment required to operate the substation is governed by standards and type tests which confirm a product meets strength and capability requirements.

- There is no scope to vary the colour and finish of the electrical equipment needed. Typically busbars and clamps are manufactured from aluminium (dull silver grey). Insulators are either porcelain (usually reddish brown/grey) or silicone (usually grey) and the manufacturers of equipment vary in their preference. Steel support structures within the compound would be left in a galvanised finish (dull silver grey) to avoid maintenance requirements in close proximity to ‘live’ equipment.

8.0 Scope for Variation in Developing the Detailed Design

8.2 Sandford Substation

Substation vertical LoD

- The typical design for the Sandford Substation is presented at **Volume 4.8.4, Sheets 30 and 31**. A vertical LoD, which provides a tolerance of 10% for each component is required to allow for the detailed design by a specialist contractor using specific manufacturers' components.

Substation buildings

- Modular, prefabricated buildings are preferred due to the programme and safety benefits they offer for construction on site, as interior and exterior equipment and finishes can be applied in a quality controlled environment. Generally buildings have flat roofs to minimise their visual impact, but pitched roofs may be considered where appropriate. For some of the larger modular buildings, alternative material finishes could be applied to exterior walls, using stone, red brick, Corten or cedar hardwood cladding.
- Typically the small buildings required within substations are prefabricated containers in fibreglass or steel. These have a colour finish to suit the local environment.

Acoustic enclosures

- Acoustic enclosures to the SGTs and shunt reactors are typically made of modular steel units. These can have a colour finish applied that is appropriate to the local environment.

Substation boundaries (fences, walls and gates)

- There is a statutory obligation for substations to be secured using a perimeter boundary treatment which is 2.4m high. National Grid policy requires a 1.6m additional electric fence above to provide Perimeter Intrusion Detection (PID).
- Typically galvanised steel or painted palisade fencing or coated steel weld mesh fencing is used. Fencing can be used in combination with hedgerow planting, provided the hedge is offset so as not to act as a climbing aid.
- Consideration can be given to varying the materials used for boundary treatments, subject to maintenance and design requirements, including strength to withstand windloading, compatibility with PID, not increasing fire risk and detering climbing.
- Vehicle gates into the substation compound should be the same height and specification as boundary treatments.
- There are no particular requirements for the design of other fencing and gates on National Grid owned land beyond the substation compound, but these should be appropriate to the local landscape.

8.0 Scope for Variation in Developing the Detailed Design

8.2 Sandford Substation

Substation roads, footpaths and other surfacing

- A general requirement for surfacing within substations is that it should require very minimal or no maintenance.
- The stone aggregate used as the surfacing beneath and between electrical equipment needs to be 20mm graded clean stone, free draining, interlocking, must not degrade and must have good electrical resistance.
- Permanent vehicle access is required during the operation of the substation, with parking spaces provided for 6 vehicles. Typically tarmacadam would be used for vehicle access and car parking areas depending on the frequency of use. Other options could include reinforced gravel or reinforced grass surfacing.

Substation mitigation planting and landform

- Detailed designs for landscape proposals at Sandford Substation were submitted with the DCO application. There is scope for minor variation to these proposals as part of the development of detailed designs provided that the aims of the proposals (listed opposite) are still met; including the requirement to ensure that proposals are in-keeping with local landscape character.

- The detailed designs were subsequently updated during the DCO examination in response to the proposals at **Section 9.0** of this document. These are provided at **Volume 5.7.3.14A, Figure 7.35**. These proposals have been developed in order to:

  1. retain existing trees and vegetation and reinforce through additional planting to strengthen landscape character and filter and screen views.
  2. reinforce characteristic features of the landscape field boundaries through lines of riparian trees along rhynes and ditches, and orchards surrounded by shelterbelt trees to provide a buffer, additional filtering and screening of the proposed substation and to reinforce landscape character;
  3. reflect the pattern and composition of hedgerows, hedgerow trees and woodland blocks typical of the Somerset Levels landscape in Section D;
  4. minimise adverse effects in views across the relatively open Levels landscape and in more distant views from elevated viewpoints in the Mendip Hills AONB; and
  5. re-align a section of the Strawberry Line long distance route along the disused railway and provide a public car park with ten parking spaces.

- Landscape proposals are also limited by the restriction on tree planting above the 400kV underground cables (the easement is a 10m offset either side of the outer cable channel) and the clearance required beneath the downleads from the 400kV overhead line (easement is a 10m offset either side of the conductors), which restricts tree planting and use of localised earth mounding.

8.0 Scope for Variation in Developing the Detailed Design

8.3 Cable Sealing End Compounds

This section explains where there is scope for variation within the detailed design of the CSE Compounds. In summary the areas where there is scope for variation are:

- the internal layout of the substation compounds;
- the vertical LoD;
- the external finish of substation buildings and acoustic enclosures;
- the boundary treatments and surfacing; and
- the landscape mitigation proposals.

Electrical Connections and Horizontal Limits of Deviation (LoD)

- The points of connection to the CSE compounds (400kV overhead line or underground cables) are fixed design elements and no horizontal LoD is required for the substation.

Size and Layout of CSE Compounds

- National Grid designs its CSE compounds according to a set of safety instructions, policies, standards and guidance notes based on international standards. A CSE compound layout is designed to protect staff working in it, protect the equipment in the CSE compound and allow safe access for maintenance. These design requirements and the dimensions of the electrical equipment determine the overall size of the CSE compound.

Separation between electrical equipment

- The requirements National Grid adheres to set out the basic dimensions that have to be maintained between equipment and between live equipment and the ground or any ancillary structures, buildings, masts, roads and fences. (Live equipment is any equipment that is energised or electrically “turned on”).

- Without adequate clearance between items of electrical equipment and vehicles requiring access into the CSE compound, more than one part of the CSE compound may need to be turned off, which may compromise the integrity of the system and supply to local users. For these reasons National Grid designs its system so that no more than one part of the system needs to be switched off for any work to be done on it.

- Generally the distance required between equipment, and between equipment and other structures, depends on the system voltage and the size of any vehicles or working platforms required to access equipment which is not at ground level.

- The overall size of the CSE compound has to provide space for the temporary accommodation of CSE testing equipment which is mounted in a lorry (requires approximately 40m x 6m).

8.0 Scope for Variation in Developing the Detailed Design

8.3 Cable Sealing End Compounds

Arrangement of the CSE compounds

- The orientation and arrangement of the overhead line entry into the CSE compounds has influenced the orientation and layout of the CSE compounds. The compounds are orientated to be perpendicular to the incoming overhead line to simplify the arrangement of electrical equipment and minimise the overall footprint.

- The buildings are positioned where there is space to provide the necessary clearance from electrical equipment, but so as not to increase the overall footprint of the CSE compounds.

Scope for variation

- During the detailed design by the appointed specialist contractor, the layout of the CSE compounds may be altered in order to make more efficient use of space (to minimise the overall footprint of the CSE) or to establish a better working arrangement.

- The dimensions of the CSE compounds were provided in the DCO application (see typical designs presented at **Volume 4.8.2, Sheets 1 and 2**). These dimensions will not increase.

Electrical Equipment

- The electrical equipment required to operate the CSE compounds is governed by standards and type tests which confirm a product meets strength and capability requirements.

- There is limited scope to vary the colour and finish of the electrical equipment needed. Typically busbars and clamps are manufactured from aluminium (dull silver grey). Insulators are either porcelain (usually reddish brown or grey) or silicone (usually grey) and the manufacturers of equipment vary in their preference. Steel support structures within the compound would be left in a galvanised finish (dull silver grey) to avoid maintenance requirements in close proximity to 'live' equipment.

Vertical Limits LoD

- The typical designs for the Bridgwater Tee CSE Compounds and South of Mendip Hills CSE compound are presented at **Volume 4.8.2, Sheets 1 and 2**. A vertical LoD, which provides a tolerance of 10% for each component is required to allow for the detailed design by a specialist contractor using specific manufacturers' components.

8.0 Scope for Variation in Developing the Detailed Design

8.3 Cable Sealing End Compounds

CSE compound buildings

- Typically the small buildings required within CSE compounds are modular, prefabricated containers in fibreglass or steel. These can have a colour finish to suit the local environment, or consideration can be given to alternative material finishes, such as red brick or cedar hardwood cladding.
- Generally buildings in CSE compounds have flat roofs to minimise their visual impact. Consideration can be given to brown or green roof systems where appropriate.

CSE compound boundaries (fences, walls and gates)

- There is a requirement for CSE compounds to be secured using a perimeter boundary treatment which is 2.4m high. Typically galvanised steel or painted palisade fencing or coated steel weld mesh fencing is used. Fencing can be used in combination with hedgerow planting, provided the hedge is offset so as not to act as a climbing aid.
- Consideration can be given to varying the materials used for boundary treatments, subject to maintenance and design requirements, including strength to withstand windloading, not increasing fire risk and detering climbing.
- Vehicle gates into the CSE compound should be the same height and specification as boundary treatments.
- There are no particular requirements for the design of other fencing and gates on National Grid owned land beyond the CSE compounds, but these should be appropriate to the local landscape.

CSE Compound Roads, footpaths and other surfacing

- A general requirement for surfacing within CSE compounds is that it should require very minimal or no maintenance.
- The stone aggregate used as the surfacing beneath and between electrical equipment needs to be 20mm graded clean stone, free draining, interlocking, must not degrade and must have good electrical resistance.
- Vehicle access would be required during the operation of the South of Mendip Hills CSE Compound (utilising Hams Lane), and with parking spaces provided for 4-6 vehicles. Occasional vehicle access would be required during operation of the Bridgwater Tee CSE Compounds and temporary trackway would be used to cross agricultural land. Within each compound there would be parking provided for one vehicle.
- Typically tarmacadam would be used for vehicle access and car parking areas depending on the frequency of use. Other options could include reinforced gravel or reinforced grass surfacing.

8.0 Scope for Variation in Developing the Detailed Design

8.3 Cable Sealing End Compounds

CSE Compound Mitigation planting and landform

- Landscape proposals are limited by the restriction on tree planting above the 400kV underground cables (the easement is a 10m offset either side of the outer cable channel) and the clearance required beneath the downleads from the 400kV overhead line (easement is a 10m offset either side of the conductors), which restricts tree planting and use of localised earth mounding.

South of the Mendip Hills CSE Compound

- The detailed designs for landscape proposals at the South of Mendip Hills CSE Compound were submitted with the DCO application. There is scope for minor variation to these proposals as part of the development of detailed designs provided that the aims of the proposals (listed opposite) are still met and proposals are in-keeping with local landscape character. There is also potential to consider advance planting in the vicinity of the South of Mendip Hills CSE Compound.

- The detailed designs were subsequently updated during the DCO examination in response to the proposals at **Section 9.0** of this document and landowner meetings. These are provided at **Volume 5.7.3.14A, Figure 7.33**. These proposals have been developed in order to:

1. provide beneficial screening to the lower elevations of new built form as it establishes and give longer term screening to taller structures.
2. minimise adverse effects in views from: PRoW (AX 21/3, AX 2/15 and AX 15/2), properties in Loxton and Webbington and from higher ground to the north; Riverside Farm on Biddisham Lane to the southeast; Riversmeet Farm and adjacent properties to the northwest on Whitehouse Lane; and the M5 motorway to the west.

Bridgwater Tee CSE Compounds

- The detailed designs for landscape proposals at the Bridgwater Tee CSE Compounds were submitted with the DCO application. There is scope for minor variation to these proposals as part of the development of detailed designs provided that the aims of the proposals (listed below) are still met and proposals are in-keeping with local landscape character. The space required during construction means that there is no potential to consider advance planting in the vicinity of the Bridgwater Tee CSE Compounds.

- The detailed designs were subsequently updated during the DCO examination in response to the proposals at **Section 9.0** of this document. These are provided at **Volume 5.7.3.14A, Figure 7.32**. These proposals have been developed in order to:

1. reinforce field boundaries to provide additional filtering and screening of the proposed CSE compounds and to reinforce landscape character;
2. reflect the pattern and composition of hedgerows, hedgerow trees and woodland blocks typical of the Somerset Levels landscape in Section A; and
3. minimise adverse effects in views across the relatively open Horsey Level landscape and in more distant views from elevated viewpoints on Puriton Ridge.

8.0 Scope for Variation in Developing the Detailed Design

8.4 Towerhead Brook Cable Crossing

This section explains where there is scope for variation in the detailed design of the cable crossing. In summary the areas where there is scope for variation are: the crossing option (box culvert or long-span bridge); external finishes to the crossing structure and parapet railings, other boundary treatments, bridge and ramp surfacing; and mitigation planting.

Structural Design and Layout

- The cable crossing would either be a box culvert or long-span bridge deck option. The design of the crossing is influenced by the width of Towerhead Brook at the crossing point and its function and operational requirements. The final solution must minimise impacts on river bank habitat and ensure that the structure does not compromise Towerhead Brook's function as a brook or affect flood risk. The final solution must also minimise the approach ramp height, which will also influence the length and size of the ramp structure. Agreement of the final bridging solution will be sought from the relevant environmental statutory bodies.

- The structural form of the clear-span bridge which is proposed (beam and slab), provides the strength needed to convey a replacement transformer and maintenance vehicles across the span required, which is dictated by the width of the brook and the clearance needed to avoid additional flood risk.

- Kerb features are required on the structure to contain the vehicle loadings and allow a pedestrian parapet railing system to be used, reducing the overall visual impact of the structure.

- The width of the crossing is dictated by the requirements to provide a vehicle carriageway and the separation distance between cable troughs to allow for cable heat dissipation.

- The extent of the earth ramps either side of the crossing is dictated by the requirement for a maximum gradient of 5%, with a minimum transition of 20m from 0-5% gradient. Battered earth slopes are also required at the sides of the ramp at a maximum gradient of 1:2. Battered earth slopes will be seeded and the final grading will take into account the need for structural stability and safe maintenance, whilst seeking to minimise the footprint of the ramps.

Materials and finishes

- The beam and slab construction will comprise a reinforced concrete deck with parapet railings. There is potential to clad these elements in alternative materials, such as painted metal, Corten steel, hardwood timber, brick slips, or natural stone, provided that this does not result in the need for a larger structure to support the weight and does not represent an untenable fire-risk or long-term maintenance liability.

Surfacing

- The surfacing for the vehicle access over the bridge typically would be reinforced grass surfacing. Other options would include reinforced gravel, tarmacadam or a stone aggregate.

8.0 Scope for Variation in Developing the Detailed Design

8.4 Towerhead Brook Cable Crossing

- The heavy duty access lids on the cable troughs typically would be constructed of concrete. To help the surfacing of the bridge blend in with the surrounding landscape, there is potential for these to either be colour pigmented (in green), or metal lids could be used, which could either have a coloured finish or could be indented to accommodate artificial turf.

Parapet Railings, Fencing and Gates

- The parapet railings, fencing and gates would be needed either side of the bridge to prevent unauthorised vehicle access. There is the potential for timber elements in the steel parapet railings, depending on maintenance requirements. The railings, fencing and gates would need to be a minimum height of 1.2m. The fencing and gates could be constructed from colour coated weld mesh or could be a timber post and rail fence with a five-bar timber field gate.

- As part of the risk assessment during the detailed design additional fencing may be required to the edges of the access ramp. This could be timber post and rail fencing and could incorporate hedge planting.

Bridge Mitigation Planting

- The detailed designs for landscape proposals at Towerhead Brook Bridge were submitted with the DCO application. There is scope for minor variation to these proposals as part of the development of detailed designs provided that the aims of the proposals (listed above) are still met, including the requirement to ensure that proposals are in-keeping with local landscape character. The space required during construction means that there is no potential to consider advance planting in the vicinity of the Towerhead Brook Cable Crossing.

- The detailed designs are presented at **Volume 5.7.3.14A, Figure 7.36** and have been developed in order to:

  1. replace hedgerow and trees removed to accommodate the permanent cables bridge crossing; and

  2. to filter and screen views towards the bridge crossing from a number of properties on higher ground on Mead Lane to the northeast.

- Landscape proposals are also limited by the restriction on tree planting above the 400kV underground cables (the easement is a 10m offset either side of the outer cable channel) and clearance from top of bank required to maintain access to the watercourse.

8.0 Scope for Variation in Developing the Detailed Design

8.5 River Axe Cable Bridge

This section explains where there is scope for variation in the detailed design of the cable bridge. In summary the areas where there is scope for variation are: external finishes to the bridge, boundary treatments, bridge and ramp surfacing; PRoW proposals and mitigation planting.

Structural Design and Layout

- The design of the cable bridge is influenced by the width of the River Axe at the crossing point and its function and operational requirements, which include providing a clear-span bridge which minimises impacts on river bank habitat and ensuring that the structure does not compromise the River Axe's function as a main river or affect flood risk.
- The structural form of the clear-span bridge which is proposed (half-through girder with integral steel parapets), provides the strength needed to convey maintenance vehicles (light vehicles) across the span required, which is dictated by the width of the river and the clearance needed to avoid additional flood risk.
- The width of the bridge is dictated by the requirements to provide a vehicle carriageway and the separation distance between cable troughs to allow for cable heat dissipation.
- The use of the proposed structural form minimises the height of the adjacent approach ramp when compared to a beam and slab option.
- The extent of the earth ramps either side of the bridge structure is dictated by the requirement for a safe gradient of 1:10 for vehicles. Battered earth slopes are also required at the sides of the ramp maximum gradient 1:2. Battered earth slopes will be seeded and the final grading will take into account the need for structural stability and safe maintenance, whilst seeking to minimise the footprint of the ramps.
- As part of the detailed design there may be scope to reduce the depth of the half-through girder bridge.

Bridge materials and finishes

- Whilst the abutments, slab and parapets to the bridge will be constructed from reinforced concrete, there is potential to clad these in alternative materials, such as painted metal, corten steel, hardwood timber, brick slips, or natural stone, provided that this does not result in the need for a larger structure to support the weight and does not represent an untenable fire-risk or long-term maintenance liability.

Bridge Surfacing

- The surfacing for the vehicle access over the bridge typically would be reinforced grass surfacing. Other options would include reinforced gravel, tarmacadam or a stone aggregate.
- The heavy duty access lids on the cable troughs typically would be constructed of concrete. To help the surfacing of the bridge blend in

with the surrounding landscape, there is potential for these to either be colour pigmented (in green), or metal lids could be used, which could either have a coloured finish or could be indented to accommodate artificial turf.

Bridge Fencing and Gates

- Fencing and gates would be needed either side of the bridge to prevent unauthorised vehicle access. The fencing and gates would need to be a minimum height of 1.2m. They could be constructed from colour coated weld mesh or could be a timber post and rail fence with a five-bar timber field gate.
- As part of the risk assessment during the detailed design additional fencing may be required to the edges of the access ramp. This could be timber post and rail fencing and could incorporate hedge planting.

PRoW Proposals

- There is flexibility as to the materials that could be used for the potential steps and handrail to the PRoW.

Bridge Mitigation Planting

- The detailed designs for landscape proposals at the River Axe Cable Bridge were submitted with the DCO application. There is scope for minor variation to these proposals as part of the development of detailed designs provided that the aims of the proposals (listed above) are still met, including the requirement to ensure that proposals are in-keeping with local landscape character. There is potential to consider advance planting on the south side of the River Axe. Planting to the north side of the river would require the temporary bridge crossing to be constructed and would be further restricted by working areas to install the underground cables.
- The detailed designs were subsequently updated during the DCO examination in response to the proposals at **Section 9.0** of this document. These are provided at **Volume 5.7.3.14A, Figure 7.34**. These proposals have been developed in order to:
  1. filter and screen views towards the cable bridge from Waterfront Farm;
  2. filter and screen views from properties on Kennel Lane to the northeast; and
  3. minimise landscape and visual effects experienced from high ground in the Mendip Hills AONB.
- Landscape proposals are also limited by the restriction on tree planting above the 400kV underground cables (the easement is a 10m offset either side of the outer cable channel) and the 5m clearance from top of bank required by the Environment Agency to maintain access to the watercourse.

9.0 Approach to Detailed Design

9.1 Sandford Substation

Subject to the DCO being granted, the following section sets out the approach to the detailed design of Sandford Substation where there is scope for variation.

Buildings

It is proposed that the larger amenity and control modular buildings are clad in a combination of either local stone or red brick slips with cedar hardwood. Consideration should be given to using dual-pitched roofs on National Grid's control building and WPD's amenity and control buildings. Whilst this would increase their height, the use of pitched roofs would be consistent with existing buildings in the local area. Roofing materials should match the colour of the roofs found locally, for example the use of Corten would be consistent the colour of pantile clay roofs. An alternative to using pitched roofs would be green or brown roofs.

It is suggested that the smaller ancillary buildings or containers (such as diesel generator, earth store and storage workshop) are supplied as modular steel units with a colour paint finish, such as RAL 6013 Reed Green, RAL 6003 Olive Green, RAL 7006 Beige Grey or RAL 7013 Brown Grey. As shown in **Section 2.0** these colours have been selected to blend in with the surrounding landscape in winter months, as well as summer months. The use of colour will help to reduce the perceived mass of the substation in views.

Acoustic Enclosures

The modular steel acoustic enclosures will also be provided in a coloured paint finish, using RAL 6013 Reed Green, RAL 6003 Olive Green, RAL 7006 Beige Grey or RAL 7013 Brown Grey.

RAL 7006 Beige Grey

RAL 6003 Olive Green

RAL 6013 Reed Green

RAL 7013 Brown Grey

Images for illustrative purposes only

9.0 Approach to Detailed Design

9.1 Sandford Substation

Boundaries (fences, walls and gates)

It is proposed that 2.4m high zinc coated welded-mesh fence panels incorporating timber slats with galvanised steel posts (Jacksons Fencing: Trident Combi 2 High Security Fencing or equivalent) is used to secure the substation compounds, with an electric fence on top to a combined height of 4.0m. This is subject to further consideration of technical compliance as set out in **Section 8.0**. If this fencing does not prove to be compliant, the alternative would be a palisade or welded-mesh fence in a colour finish (see suggested RAL colours on **Page 68**). Vehicle gates into the substation would match the walls and fencing proposed.

In the event that pallisade or welded-mesh fencing is used for the substation compound, then a secondary boundary treatment to the east and south of the substation could be provided, which broadly follows the re-aligned Strawberry Line Long Distance Route. This would be constructed using a combination of local stone or timber and would be used in conjunction with hedgerow planting to help screen and filter views toward the substation (see section on 'Further Scope for Variation in the Detailed Design' at **Page 72**).

It is suggested that at the main vehicle entrance to Sandford Substation and the Strawberry Line Car Park on Nye Road, piers and walls constructed from local stone are used to create a high quality, distinctive and locally appropriate gateway.

Treated softwood timber post and rail and five-bar field gates would be used to mark the boundaries of land owned by National Grid beyond the substation.


Example of welded-mesh fence incorporating timber slats


Example of welded-mesh fence

Images for illustrative purposes only

9.0 Approach to Detailed Design

9.1 Sandford Substation

Roads, footpaths and other surfacing

The stone aggregate used for the surfacing beneath and between electrical equipment must meet National Grid's specification (set out in **Section 8.0**) and should be sourced as locally as possible. Opportunities should be sought to vary the colour of aggregates used to provide contrast with the finish of the majority of electrical equipment and help to reduce the perceived mass of the substation in any elevated views. The colour of aggregate used should blend in with the varying colours of the local agricultural landscape, for example buff-grey or red-brown colour.

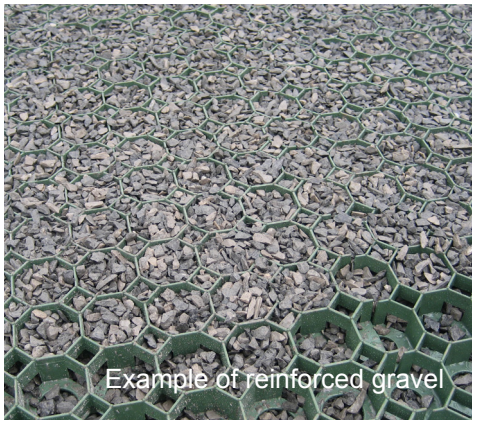
Generally, vehicle access routes, parking and turning spaces within the substation compound and Strawberry Line Car Park should be surfaced in gravel, reinforced gravel or grass. If gravel is used then the considerations regarding sourcing and colour set out above apply. If a bound tarmacadam surface is required in limited areas, then consideration should be given to the use of alternative colours (for example LaFarge Tarmac Ulticolour, 6mm Natural or Buff Quartzite or equivalent) for the reasons set out above.

The re-aligned section of the Strawberry Line Long Distance Route will provide a surfaced 3m wide footpath cycleway off road. The footpath cycleway will be buff-grey self-binding gravel as detailed on **Volume 5.7.3.14, Figure 7.35.2**.

Signage

There is also an opportunity to include some signage and interpretation at the Strawberry Line car park. It is suggested that information could be provided about the Strawberry Line, the proposed Sandford Substation and T-pylon supports.


Example of reinforced grass


Example of reinforced gravel


Example of red-brown stone


Example of buff-grey stone


Buff-grey self-binding gravel

Images for illustrative purposes only

9.0 Approach to Detailed Design

9.1 Sandford Substation

Mitigation Planting

Mitigation proposals relating to Sandford Substation were presented in the DCO application. Mitigation proposals around the proposed substation have been prepared in accordance with landscape guidelines included in North Somerset Council's 'North Somerset Landscape Character Assessment'. Sandford Substation is proposed in a relatively open landscape with little woodland. However, lines of riparian trees along rhynes and ditches, and orchards surrounded by shelterbelt trees are characteristic features of the landscape. This type of planting has been incorporated into mitigation proposals for the proposed substation.

Existing Trees, Shrubs and Hedgerows

Drove Way runs in a north-south direction to the east of the proposed substation, passing over the disused railway on Drove Way Bridge. The embankments of this bridge are heavily vegetated with trees and shrubs, which will be retained and reinforced with new tree and shrub planting to provide additional screening of the proposed substation from the east.

The retention and enhancement of the existing orchard tree planting next to Droveway Farm south of the dismantled railway line shown in the mitigation proposals will assist in filtering and screening views from the south.

Images for illustrative purposes only

9.0 Approach to Detailed Design

9.1 Sandford Substation

Mitigation Planting

Parish Rhyne and Attenuation Pond

Parish Rhyne will be retained and realigned as part of the proposed substation works. Mitigation planting proposed along Parish Rhyne includes native hedgerow, riparian tree planting and aquatic planting that will be in keeping with the local character of the area. The proposals for the area between the existing rhyne and Drove Way incorporate proposed meadow grassland and scrub with scattered tree planting to enhance wildlife habitats. An attenuation pond with marginal aquatic vegetation is included on the east side of the proposed substation in the proposals.

Orchards and Native Tree Planting

Landscape mitigation proposals include orchard planting around the northern and western boundaries of the proposed substation, to create a landscape buffer and partial screening to the proposed substation. Orchards and native tree planting proposed immediately adjacent the substation will provide partial filtering and screening of the proposed substation in views. To assist the establishment of new orchard planting, the mitigation proposes that the outer edges are to be planted with shelter belt trees. The detailed design and proposed management of orchards have been prepared in accordance with Natural England guidelines.

Native Woodland Structure Planting

Native woodland structure planting is included in mitigation planting along the eastern boundary of the proposed substation. This will provide screening of proposed infrastructure and will provide longer term screening to taller structures in views from receptors to the east, including on Drove Way.

Strawberry Line Long Distance Route Re-alignment

The re-alignment of the Strawberry Line will include native woodland structure planting providing a buffer and partial screen to the substation. The mitigation proposals envisage that existing vegetation along the disused railway line will be enhanced with new planting and will be managed to provide greater screening of the proposed substation in views from the potential re-alignment of the Strawberry Line long distance route along the dismantled railway. It also will provide additional screening in views for properties to the south along Nye Road.

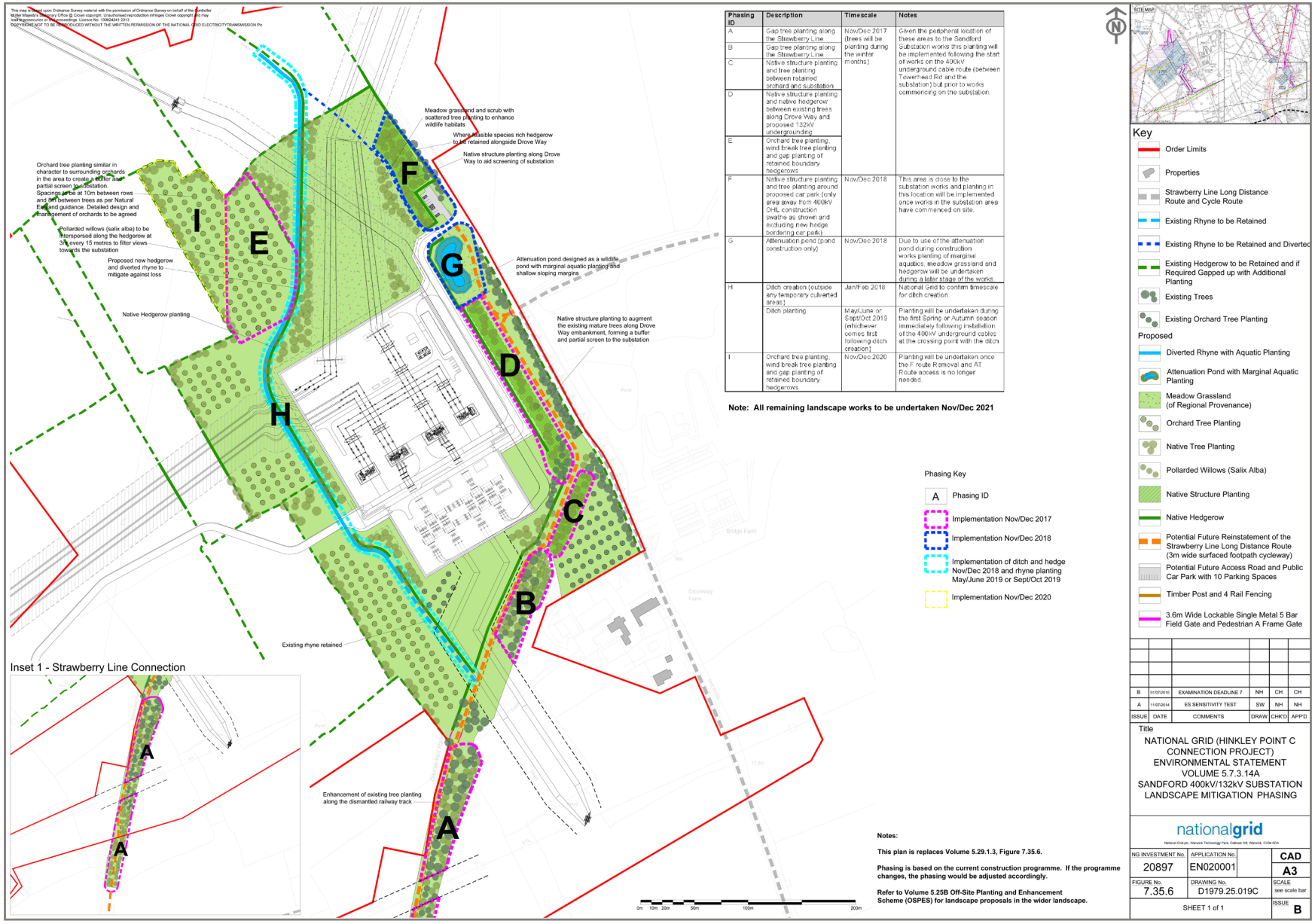
Variation to the Detailed Design

In order to provide further screening for users of the re-aligned Strawberry Line Long Distance Route, additional hedgerow planting between the route and the substation has been incorporated in the updated detailed designs for landscape proposals, presented at **Volume 5.7.3.14A, Figure 7.35**. This hedgerow is also shown on **Figure 11** opposite.

Advance Planting at Sandford Substation

To minimise the period of habitat loss at Sandford Substation, advance planting would be undertaken in 2017. Advance planting is shown on **Figure 11** opposite.

A scaled version of **Figure 11** is provided at **Volume 5.7.3.14A, Figure 7.35.6**.



Phasing ID	Description	Timescale	Notes
A	Gap tree planting along the Strawberry Line	Nov/Dec 2017 (trees will be planting during the winter months)	Given the peripheral location of these areas to the Sandford Substation works this planting will be implemented following the start of works on the 400kV underground cable route (between Towerhead Rd and the substation) but prior to works commencing on the substation.
B	Gap tree planting along the Strawberry Line		
C	Native structure planting and tree planting between retained orchard and substation		
D	Native structure planting and native hedgerow between existing trees along Drove Way and proposed 132kV undergrounding		
E	Orchard tree planting, wind break tree planting and gap planting of retained boundary hedgerows		
F	Native structure planting and tree planting around proposed car park (only area away from 400kV OHL construction swathe as shown and excluding new hedge bordering car park)	Nov/Dec 2018	This area is close to the substation works and planting in this location will be implemented once works in the substation area have commenced on site.
G	Attenuation pond (pond construction only)	Nov/Dec 2018	Due to use of the attenuation pond during construction works planting of marginal aquatics, meadow grassland and hedgerow will be undertaken during a later stage of the works.
H	Ditch creation (outside any temporary culverted areas)	Jan/Feb 2018	National Grid to confirm timescale for ditch creation.
	Ditch planting	May/June or Sept/Oct 2019 (whichever comes first following ditch creation)	Planting will be undertaken during the first Spring or Autumn season immediately following installation of the 400kV underground cables at the crossing point with the ditch
I	Orchard tree planting, wind break tree planting and gap planting of retained boundary hedgerows	Nov/Dec 2020	Planting will be undertaken once the F route Removal and AT Route access is no longer needed.

Note: All remaining landscape works to be undertaken Nov/Dec 2021

Phasing Key

- A — Phasing ID
- Implementation Nov/Dec 2017
- Implementation Nov/Dec 2018
- Implementation of ditch and hedge Nov/Dec 2018 and rhyne planting May/June 2019 or Sept/Oct 2019
- Implementation Nov/Dec 2020

Notes:

This plan is replaces Volume 5.29.1.3, Figure 7.35.6.

Phasing is based on the current construction programme. If the programme changes, the phasing would be adjusted accordingly.

Refer to Volume 5.25B Off-Site Planting and Enhancement Scheme (OSPES) for landscape proposals in the wider landscape.

SITE MAP

Key

- Order Limits
- Properties
- Strawberry Line Long Distance Route and Cycle Route
- Existing Rhyne to be Retained
- Existing Rhyne to be Retained and Diverted
- Existing Hedgerow to be Retained and if Required Gapped up with Additional Planting
- Existing Trees
- Existing Orchard Tree Planting

Proposed

- Diverted Rhyne with Aquatic Planting
- Attenuation Pond with Marginal Aquatic Planting
- Meadow Grassland (of Regional Provenance)
- Orchard Tree Planting
- Native Tree Planting
- Pollarded Willows (Salix Alba)
- Native Structure Planting
- Native Hedgerow
- Potential Future Reinstatement of the Strawberry Line Long Distance Route (3m wide surfaced footpath cycleway)
- Potential Future Access Road and Public Car Park with 10 Parking Spaces
- Timber Post and 4 Rail Fencing
- 3.6m Wide Lockable Single Metal 5 Bar Field Gate and Pedestrian A Frame Gate

ISSUE	DATE	COMMENTS	DRAW	CHK'D	APP'D
B	01/07/2015	EXAMINATION DEADLINE 7	NH	CH	CH
A	11/07/2014	ES SENSITIVITY TEST	SW	NH	NH

Title

NATIONAL GRID (HINKLEY POINT C CONNECTION PROJECT)
ENVIRONMENTAL STATEMENT
VOLUME 5.7.3.14A
SANDFORD 400kV/132kV SUBSTATION
LANDSCAPE MITIGATION PHASING

nationalgrid

National Grid plc, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA

NG INVESTMENT No.	APPLICATION No.		CAD
20897	EN020001		A3
FIGURE No. 7.35.6	DRAWING No. D1979.25.019C		SCALE see scale bar
SHEET 1 of 1			ISSUE B

Figure 11: Sandford Substation Updated Landscape Mitigation and Phasing Plan

9.0 Approach to Detailed Design

9.1 Sandford Substation

Off-Site Planting and Enhancement Scheme (OSPES) Proposals

Figure 12 opposite shows the planting proposals near Sandford Substation which are included in the OSPES, and which are set out in further detail at **Volume 5.25B**. These proposals are subject to landowner agreement but have been designed to further strengthen landscape character and screen views.

Illustrative Elevations

The illustrations on **Page 75** (opposite) provide an indication of the how Sandford Substation could look (after 15 years establishment), based on the proposals in this document.

Photomontage Views

In addition, the following photomontages illustrate anticipated views of Sandford Substation:

- **Volume 5.18.2.8, Figure 18.2.52**: VPC13;
- **Volume 5.18.2.9, Figure 18.2.54**: VPD1 winter view;
- **Volume 5.18.2.9, Figure 18.2.55**: VPD1 summer view;
- **Volume 5.18.2.9, Figure 18.2.56**: VPD19 winter view;
- **Volume 5.18.2.9, Figure 18.2.57**: VPD19 summer view;
- **Volume 5.18.2.10, Figure 18.2.58**: VPD20 winter view;
- **Volume 5.18.2.10, Figure 18.2.59**: VPD20 summer view;
- **Volume 5.18.2.10, Figure 18.2.60**: VPD2;
- **Volume 8.7.3.5, Figure 8.7.3.25**: VPD31;
- **Volume 8.7.3.5, Figure 8.7.3.26**: VPD33; and
- **Volume 8.7.4.2, Figure 8.7.4.8**: VPC12.

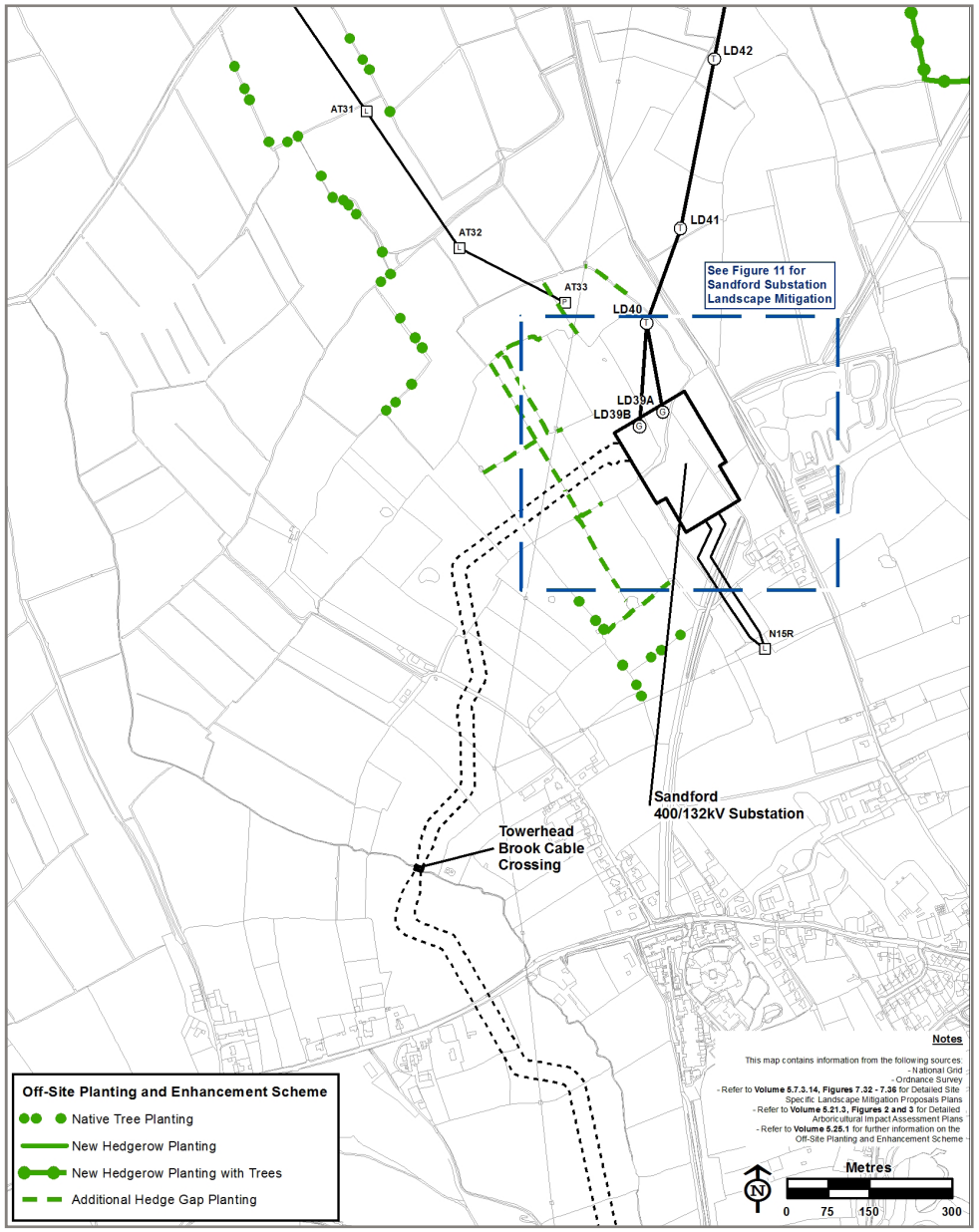
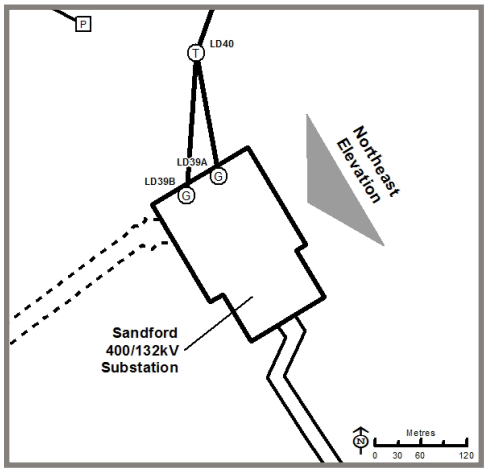


Figure 12: OSPES Extract

Northeast Elevation (viewed from re-aligned Strawberry Line Long Distance Route)

Detail of Northeast Elevation (viewed from re-aligned Strawberry Line Long Distance Route)



Images for illustrative purposes only

Above: Illustrative Elevations for Sandford Substation

9.0 Approach to Detailed Design

9.2 South of Mendip Hills CSE Compound

Subject to the DCO being granted, the following section sets out the approach to the detailed design of the South of the Mendip Hills CSE Compound where there is scope for variation.

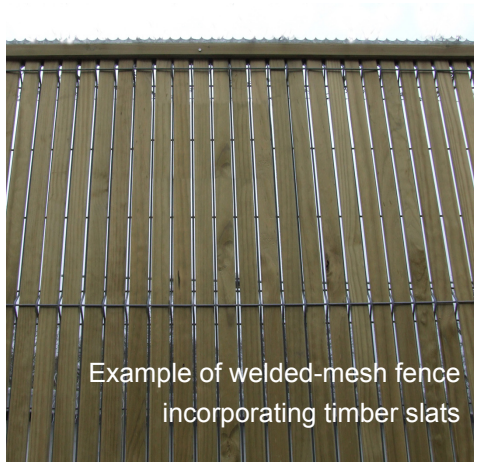
Buildings

It is proposed that the buildings within the CSE compound are supplied as modular prefabricated steel units with vertical cladding in cedar hardwood or similar, or painted using RAL 6013 Reed Green, RAL 6003 Olive Green, RAL 7006 Beige Grey or RAL 7013 Brown Grey (see opposite page). At this location it is considered that the use of hardwood timber or appropriate colour finish will assist in reducing the overall perceived mass of the CSE compound, as well as helping the buildings blend in with the surrounding landscape throughout the year.

Boundaries (fences, walls and gates)

It is proposed that 2.4m high zinc coated welded-mesh fence panels incorporating timber slats with galvanised steel posts (Jacksons Fencing: Trident Combi 2 High Security Fencing or equivalent) is used to secure the CSE compound. This is subject to further consideration of technical compliance as set out in **Section 8.0**. If this fencing does not prove to be compliant, the alternative would be a palisade or welded-mesh fence in a colour finish, using RAL 6013 Reed Green, RAL 6003 Olive Green, RAL 7006 Beige Grey or RAL 7013 Brown Grey (see opposite page). Vehicle gates into the CSE compound would match the walls and fencing proposed.

Treated softwood timber post and rail and five-bar field gates would be used to mark the boundaries of land owned by National Grid beyond the substation.

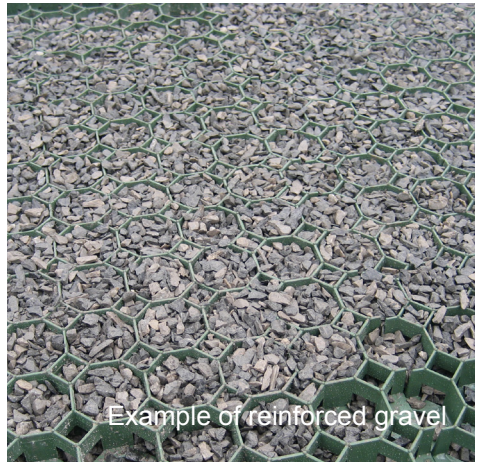


Images for illustrative purposes only


Example of red-brown stone


Example of buff-grey stone


Example of reinforced grass


Example of reinforced gravel

RAL 7006 Beige Grey

RAL 6003 Olive Green

RAL 6013 Reed Green

RAL 7013 Brown Grey

Images for illustrative purposes only

Roads, footpaths and other surfacing

The stone aggregate used for the surfacing beneath and between electrical equipment must meet National Grid's specification (set out in **Section 8.0**) and should be sourced as locally as possible. Opportunities should be sought to vary the colour of aggregates used to provide contrast with the finish of the majority of electrical equipment and help to reduce the perceived mass of the CSE compound in elevated views. The colour of aggregate used should blend in with the varying colours of the local agricultural landscape, for example buff-grey or red-brown colour.

The vehicle access entrance into the CSE compound (off Hams Lane) and parking and turning spaces within the compound should be surfaced in gravel, reinforced gravel or grass. If gravel is used then the considerations regarding sourcing and colour set out above apply.

9.2 South of Mendip Hills CSE Compound

Mitigation planting and landform

Landscape Mitigation Proposals at the South of the Mendip Hills CSE Compound

As described in **Section 8.0**, the detailed designs for landscape proposals at the South of Mendip Hills CSE Compound were submitted with the DCO application. Mitigation planting includes native trees and shrub species, of local provenance where available, and will be designed to reflect and support the local hedgerow and woodland pattern of the area.

As shown on **Figure 13** (opposite), proposals include:

- New native structure planting to the north, east and west of the proposed CSE compound and to the east of the existing minor road bridge embankments. This planting would be used in conjunction with areas of earth mounding.
- Additional woodland structure planting, scattered trees and pollarded willow planting to the northeast of the existing minor road bridge embankments along the boundary to the M5 motorway and along field boundaries; and
- Strengthening the existing hedgerows to the south with tree planting.

Variation to the Detailed Design

In order to help 'embed' the CSE compound into the planted edge associated with the M5, and redefine the boundary to the open field of meadow to the south, native structure and tree planting to the west of the CSE compound and native hedgerow planting to the south of the CSE compound have been added to the updated detailed designs for landscape proposals, presented at **Volume 5.7.3.14A, Figure 7.33** (and shown in **Figure 13** opposite). Tree planting proposals to the south have also been adjusted on the plans at **Volume 5.7.3.14A, Figure 7.33** to reflect recent discussions with landowners. The wider Levels landscape character generally is open and it would be inappropriate to supplement further the tree planting proposed.

Volume 5.7.3.14A, Figure 7.33 includes additional localised earth mounding, to be used in conjunction with the area of native structure planting proposed to the southeast of the CSE compound to aid screening. This additional mounding would be appropriate given the proximity to existing embankments adjacent to the M5. Over time the mounding would be obscured by established planting.

Advance Planting at South of the Mendip Hills CSE Compound

There is scope for advance planting around the CSE Compound and in wider area. This advance planting is identified in **Figure 13**.

A scaled version of **Figure 13** is provided at **Volume 5.7.3.14A, Figure 7.33.1**.

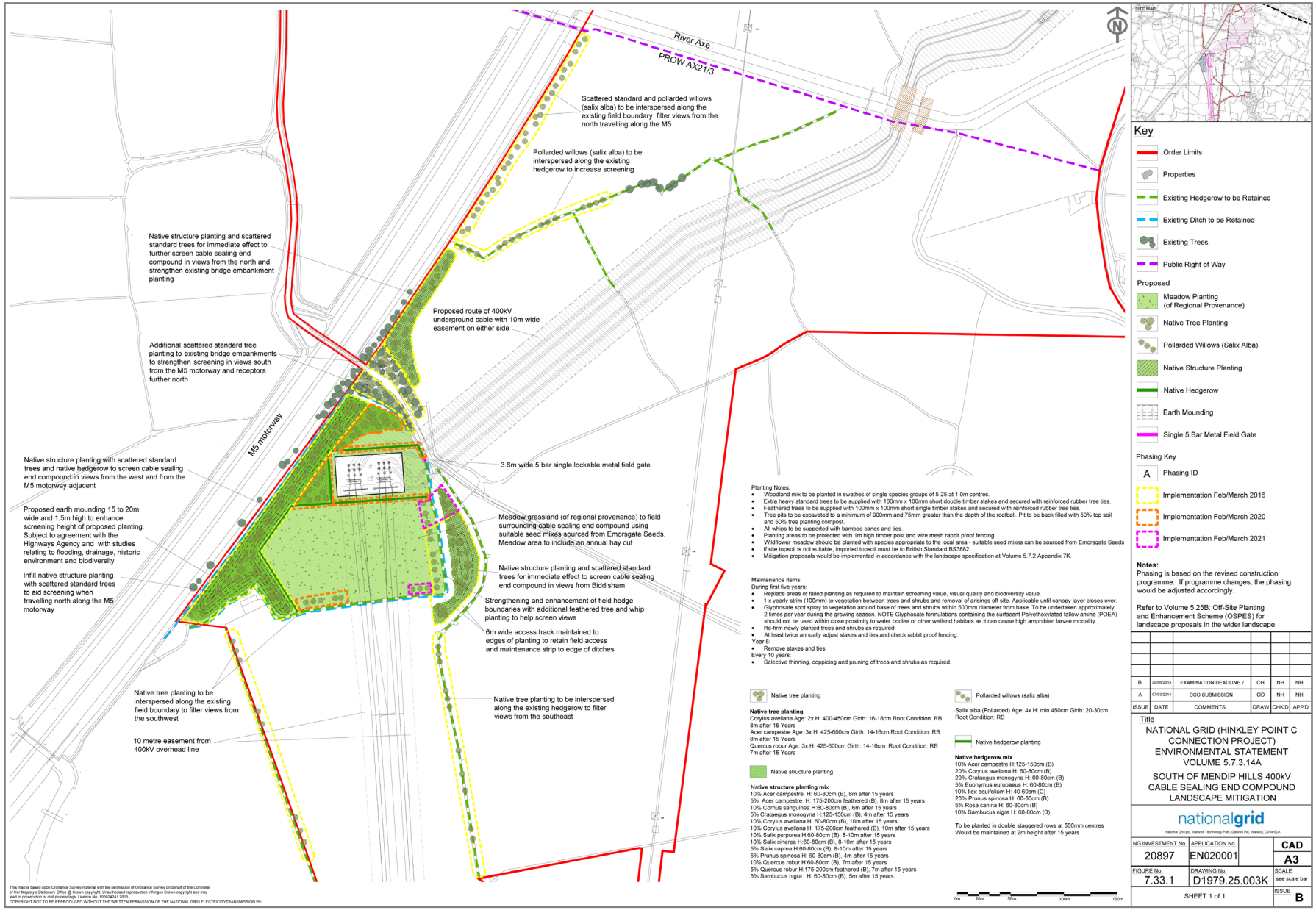


Figure 13: South of the Mendip Hills CSE Compound Updated Landscape Mitigation and Phasing Plan

9.0 Approach to Detailed Design

9.2 South of Mendip Hills CSE Compound

OSPES Proposals

Figure 14 shows an extract of the planting proposals near the South of the Mendip Hills CSE Compound which were included in the OSPES. Further details on the OSPES are provided at **Volume 5.25B**. These proposals are subject to landowner agreement but have been designed to further strengthen landscape character and screen views.

Illustrative Elevations

The illustrations on **Page 81** (opposite) provide an indication of the how the South of Mendip Hills CSE Compound could look, based on the proposals in this document.

Photomontage Views

In addition, the following photomontages illustrate anticipated views of the South of Mendip Hills CSE Compound:

- **Volume 5.18.2.5, Figure 18.2.26**: VPB18;
- **Volume 5.18.2.5, Figure 18.2.27**: VPB19 winter view;
- **Volume 5.18.2.5, Figure 18.2.28**: VPB19 summer view;
- **Volume 5.18.2.6, Figure 18.2.32**: VPB23 winter view;
- **Volume 5.18.2.6, Figure 18.2.33**: VPB23 summer view;
- **Volume 8.7.4.1, Figure 8.7.4.2**: VPB20; and
- **Volume 8.7.4.1, Figure 8.7.4.3**: VPC2.

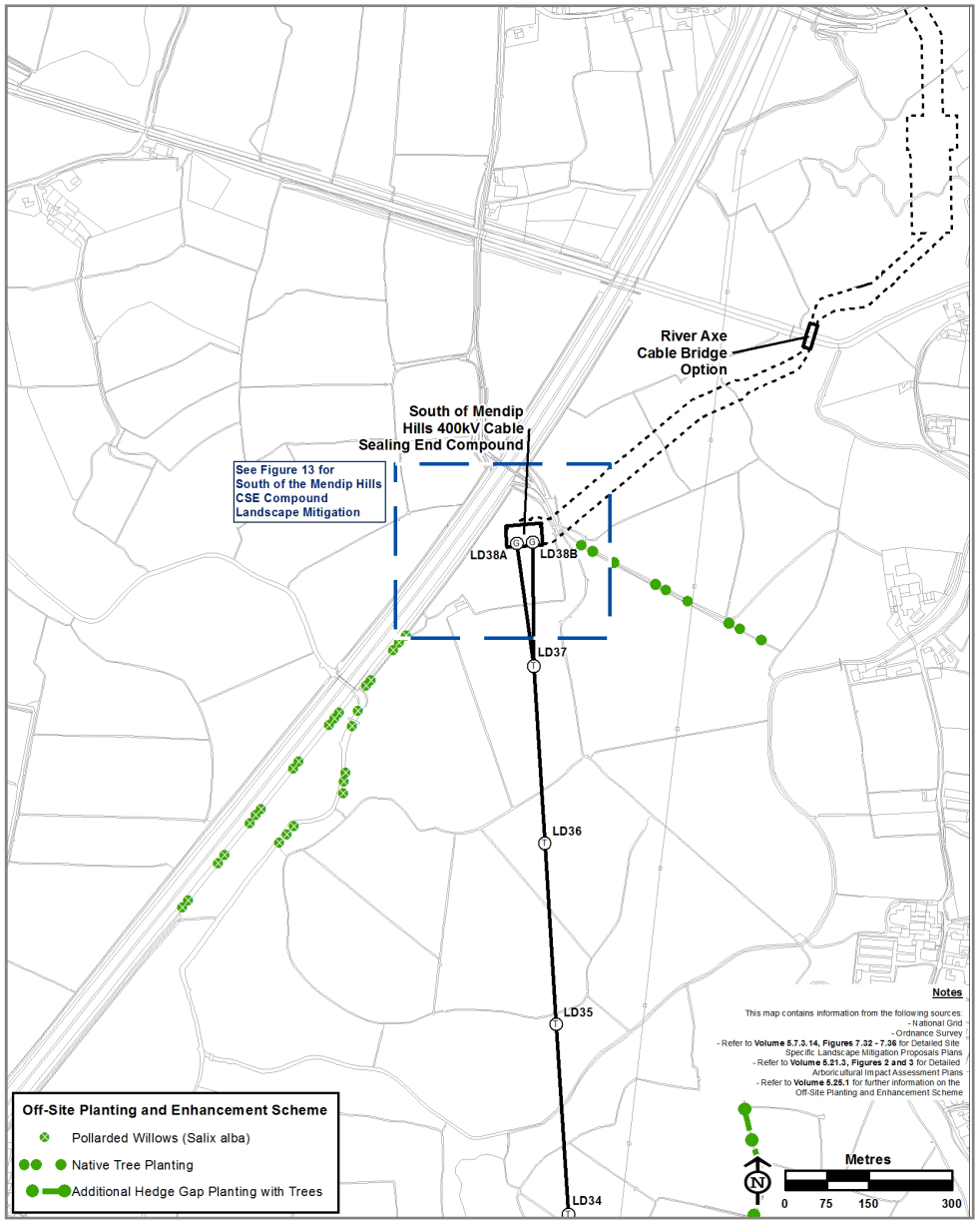
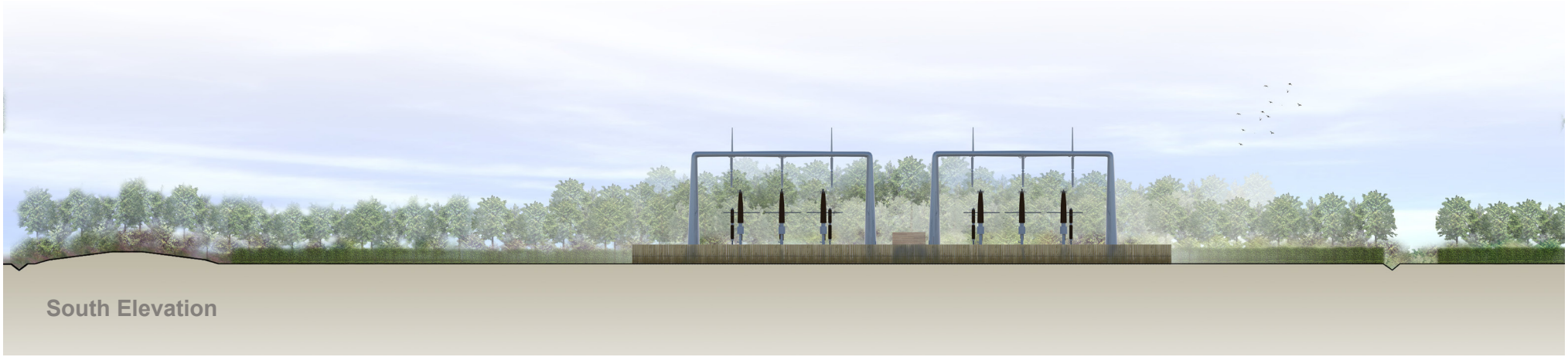
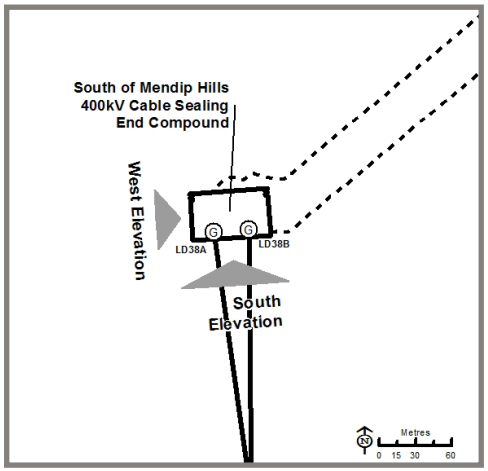


Figure 14: OSPES Extract





Images for illustrative purposes only

Above: Illustrative Elevations for the South of Mendip Hills CSE Compound

9.0 Approach to Detailed Design

9.3 Bridgwater Tee CSE Compounds

Subject to the DCO being granted, the following section sets out the approach to the detailed design of the Bridgwater Tee CSE Compounds where there is scope for variation.

Buildings

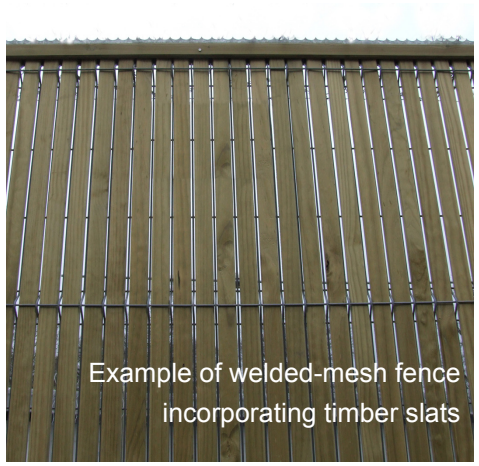
It is proposed that the buildings within the CSE compounds are supplied as modular prefabricated steel units with vertical cladding in cedar hardwood or similar, or painted using RAL 6013 Reed Green, RAL 6003 Olive Green, RAL 7006 Beige Grey or RAL 7013 Brown Grey (see opposite page). At this location it is considered that the use of hardwood timber or appropriate colour finish will assist in reducing the overall perceived mass of the CSE compound, as well as helping the buildings blend in with the surrounding landscape throughout the year.

Boundaries (fences, walls and gates)

It is proposed that 2.4m high zinc coated welded-mesh fence panels incorporating timber slats with galvanised steel posts (Jacksons Fencing: Trident Combi 2 High Security Fencing or equivalent) is used to secure the CSE compounds. This is subject to further consideration of technical compliance as set out in **Section 8.0**. If this fencing does not prove to be compliant, the alternative would be a palisade or welded-mesh fence in a colour finish, using RAL 6013 Reed Green, RAL 6003 Olive Green, RAL 7006 Beige Grey or RAL 7013 Brown Grey (see opposite page). Vehicle gates into the CSE compounds would match the walls and fencing proposed.

Treated softwood timber post and rail and five-bar field gates would be used to mark the boundaries of land owned by National Grid beyond the substation.

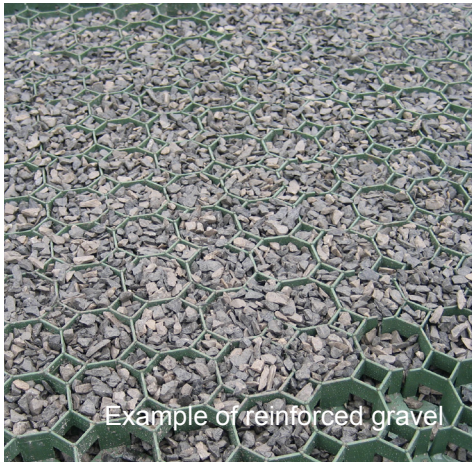

Credit: Yorkon Modular Buildings


Example of welded-mesh fence incorporating timber slats


Example of pallisade fence

Images for illustrative purposes only

Example of reinforced grass



Example of reinforced gravel

RAL 7006 Beige Grey

RAL 6003 Olive Green

RAL 6013 Reed Green

RAL 7013 Brown Grey

Images for illustrative purposes only

Roads, footpaths and other surfacing

The stone aggregate used for the surfacing beneath and between electrical equipment must meet National Grid's specification (set out in **Section 8.0**) and should be sourced as locally as possible. Opportunities should be sought to vary the colour of aggregates used to provide contrast with the finish of the majority of electrical equipment and help to reduce the perceived mass of the CSE compounds in elevated views. The colour of aggregate used should blend in with the varying colours of the local agricultural landscape, for example buff-grey or red-brown colour.

The vehicle access entrance into the CSE compounds and parking and turning space within the compounds should be surfaced in gravel, reinforced gravel or grass. If gravel is used then the considerations regarding sourcing and colour set out above apply.

9.0 Approach to Detailed Design

9.3 Bridgwater Tee CSE Compounds

Mitigation planting and landform

Landscape Mitigation Proposals at the Bridgwater Tee CSE Compounds

As described in **Section 8.0**, detailed designs for landscape proposals at the Bridgwater Tee CSE Compounds were submitted with the DCO application. Mitigation planting includes native trees and shrub species, of local provenance where available, and will be designed to reflect and support the local hedgerow and woodland pattern of the area.

As shown on **Figure 15** opposite, proposals include:

- New hedgerow planting to 'gap up' and thicken existing hedgerows near the Bridgwater Tee CSE compounds.
- Native structure planting, scattered trees and native hedgerow planting, similar in character to existing vegetation surrounding Withy Pool on Horsey Level, intended to filter and screen new infrastructure at CSE compounds.
- Mitigation planting around the eastern CSE compound consists of additional planting to 'thicken' existing hedgerows using whips and feathered trees.

Further Scope for Variation in the Detailed Design

Given the limitations on planting in relation to the underground cables route and 400kV overhead line, additional planting proposals adjacent to the CSE compounds would not be appropriate. Considering the wider landscape character of Horsey Level which is generally open with some hedgerow trees, the hedgerow tree planting proposed should not be added to any further.

To further aid screening indicative areas of localised earth mounding, which would be used in conjunction with planting proposals surrounding the CSE compounds, have been added to the updated detailed designs for landscape proposals, presented at **Volume 5.7.3.14A, Figure 7.32** (and shown in **Figure 15** opposite). The mounding would be consistent with the existing localised mounding in the agricultural field, north of the VQ Route and south of Withy Pool and over time the mounding would be obscured by established planting.

A scaled version of **Figure 15** is provided at **Volume 5.7.3.14A, Figure 7.32.1**.

Advance Planting at the Bridgwater Tee CSE Compounds

As explained in **Section 8.0** there is no scope for advance planting at the CSE Compounds, due to the space required for construction access and activities.

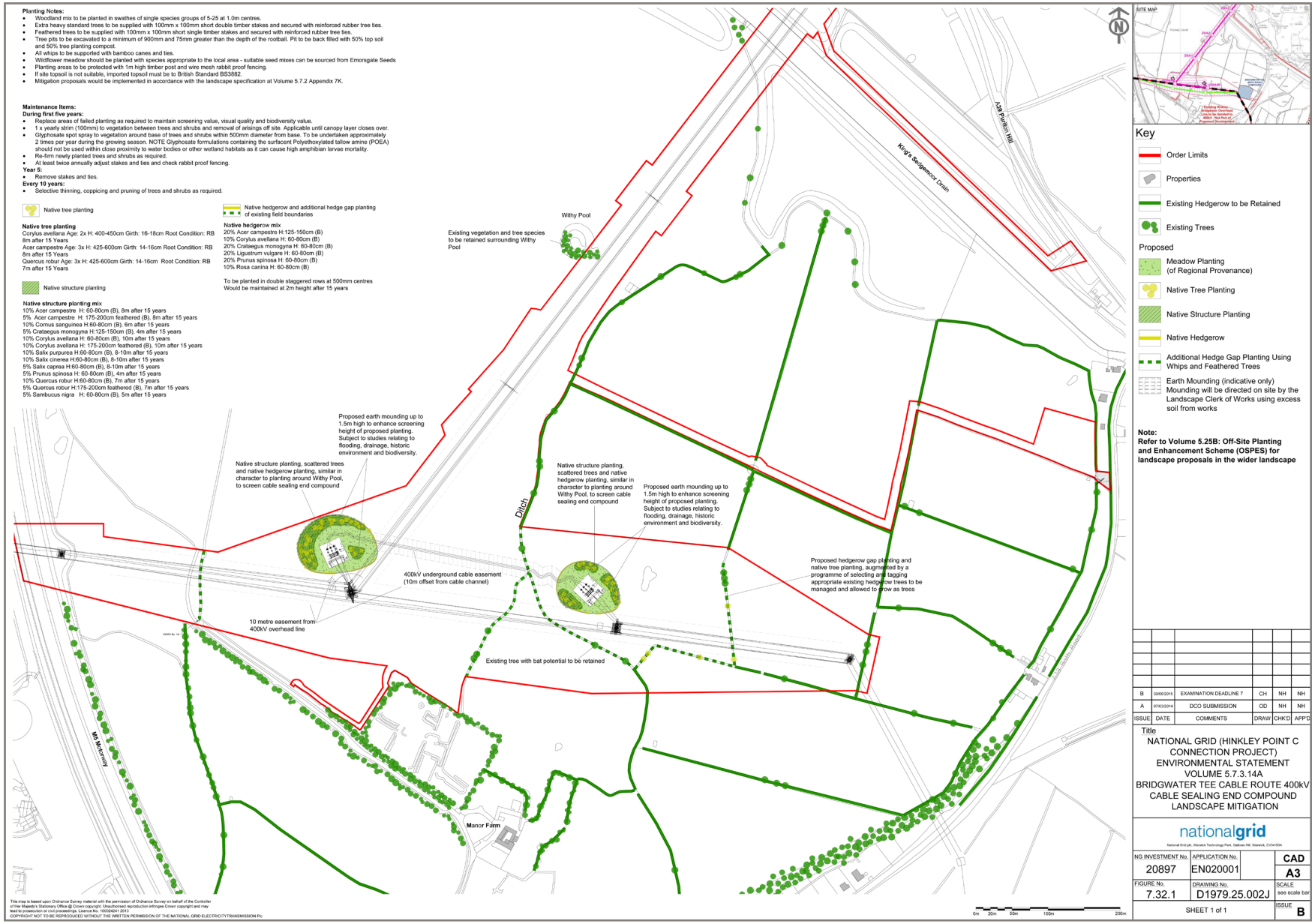


Figure 15: Bridgwater Tee CSE Compounds Landscape Mitigation Plan

9.0 Approach to Detailed Design

9.3 Bridgwater Tee CSE Compounds

OSPES Proposals

Figure 16 (opposite) shows the planting proposals near the Bridgwater Tee CSE Compounds which were included in the OSPES (see **Volume 5.25B** for further information). These proposals are subject to landowner agreement but have been designed to further strengthen landscape character and screen views.

Illustrative Elevation

The illustration on **Page 87** (opposite) provides an indication of the how the Bridgwater CSE Compounds could look, based on the proposals in this document.

Photomontage Views

In addition, the following photomontages illustrate anticipated views of the Bridgwater Tee CSE Compounds:

- **Volume 5.18.2.1, Figure 18.2.1**: VPA1;
- **Volume 5.18.2.1, Figure 18.2.2**: VPA3;
- **Volume 5.18.2.1, Figure 18.2.3**: VPA4;
- **Volume 5.18.2.2, Figure 18.2.6**: VPA7; and
- **Volume 5.18.2.2, Figure 18.2.8**: VPA9.

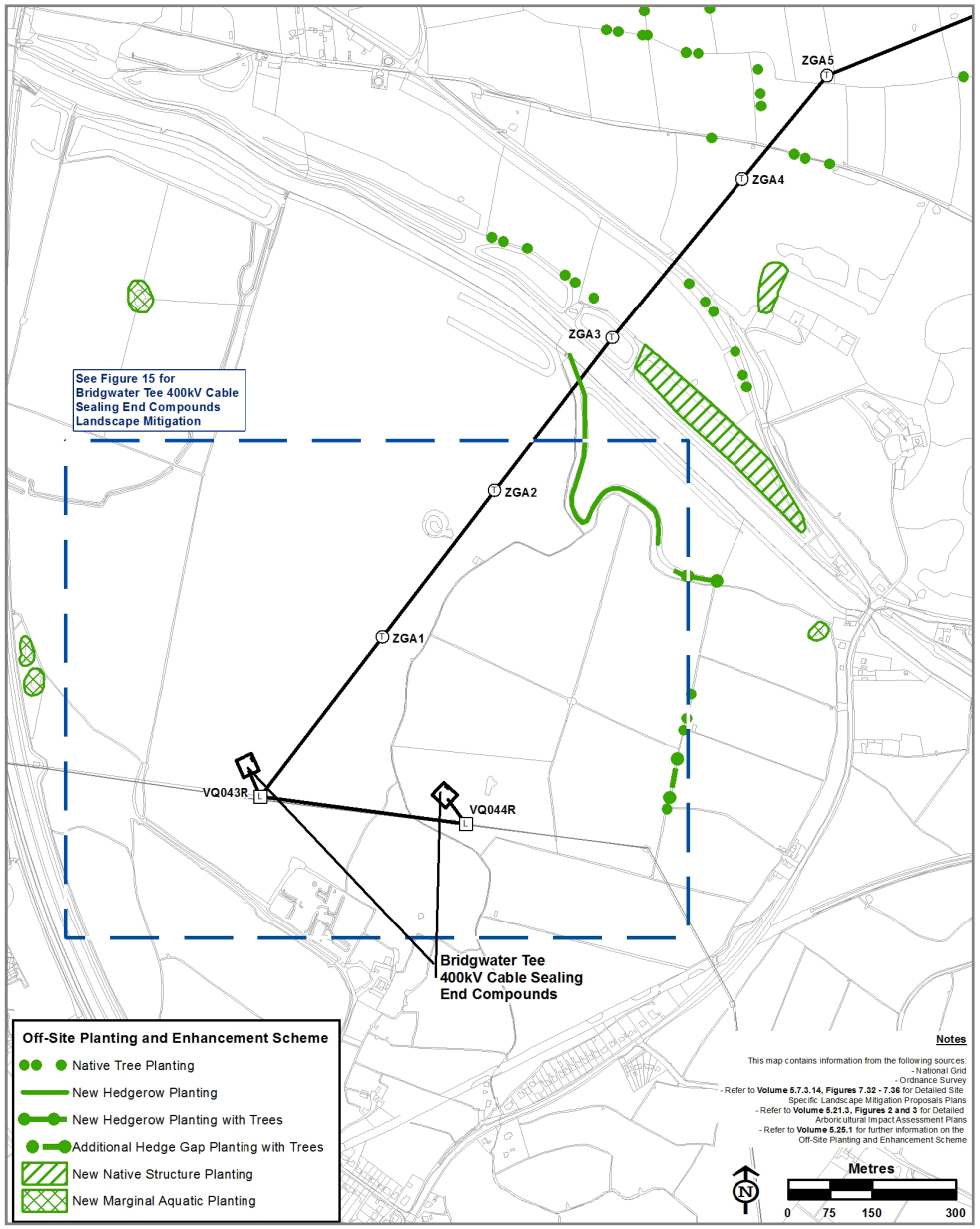
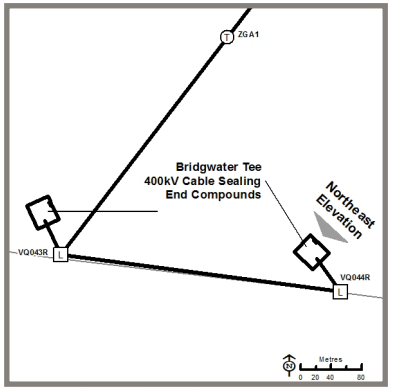


Figure 16: OSPES Extract



Northeast Elevation of Eastern CSE Compound

Image for illustrative purposes only

Above: Illustrative Elevation for Bridgwater Tee CSE Compounds

9.0 Approach to Detailed Design

9.4 Towerhead Brook Cable Crossing

Structural Design and Layout

As previously described, as part of the detailed design consideration will be given to whether the bridge should be a box culvert or clear-span bridge.

Materials and Finishes for the Crossing

In order to reduce the perceived scale and mass of the crossing structure and help it blend into the landscape the following materials and finishes are proposed:

- The abutments (if a bridge crossing) should be clad in locally sourced coursed stone.
- The metal parapet railings will have a colour paint finish, such as RAL 6013 Reed Green, RAL 6003 Olive Green, RAL 6009 Fir Green or RAL 7006 Beige Grey. These colours have been selected to blend in with the surrounding landscape in winter months, as well as summer months.

Surfacing

The following proposals will ensure that the bridge appears as a continuation of the neighbouring agricultural land, particularly when viewed from higher ground:

- Reinforced grass surfacing should be used for the vehicle access across the bridge and the access ramps. The embankment sides to the access ramp would be seeded.
- The heavy duty access lids on the cable troughs should be finished in a muted green colour, such as RAL 6013 Reed Green.


Stone clad crossing structure


Local stone


Painted metal railings
Credit: CTS Bridges


Example of reinforced grass

RAL 7006 Beige Grey

RAL 6003 Olive Green

RAL 6013 Reed Green

RAL 6009 Fir Green

Images for illustrative purposes only

9.0 Approach to Detailed Design

9.4 Towerhead Brook Cable Crossing

Vehicle Restraint to Ramp

A treated softwood timber post and rail fence would be used at the edges of the vehicle access ramp.

Mitigation Planting

As described in **Section 8.0**, the detailed designs for landscape proposals at the Towerhead Brook cable crossing were submitted with the DCO application.

As shown on **Figure 17** opposite, proposals comprise native hedgerow and native extra-heavy standard trees planted either side of the crossing. Planting will help to filter and screen views towards the bridge crossing from a number of properties on higher ground on Mead Lane to the northeast.

A scaled version of **Figure 17** is provided at **Volume 5.7.3.14A, Figure 7.36.1**.

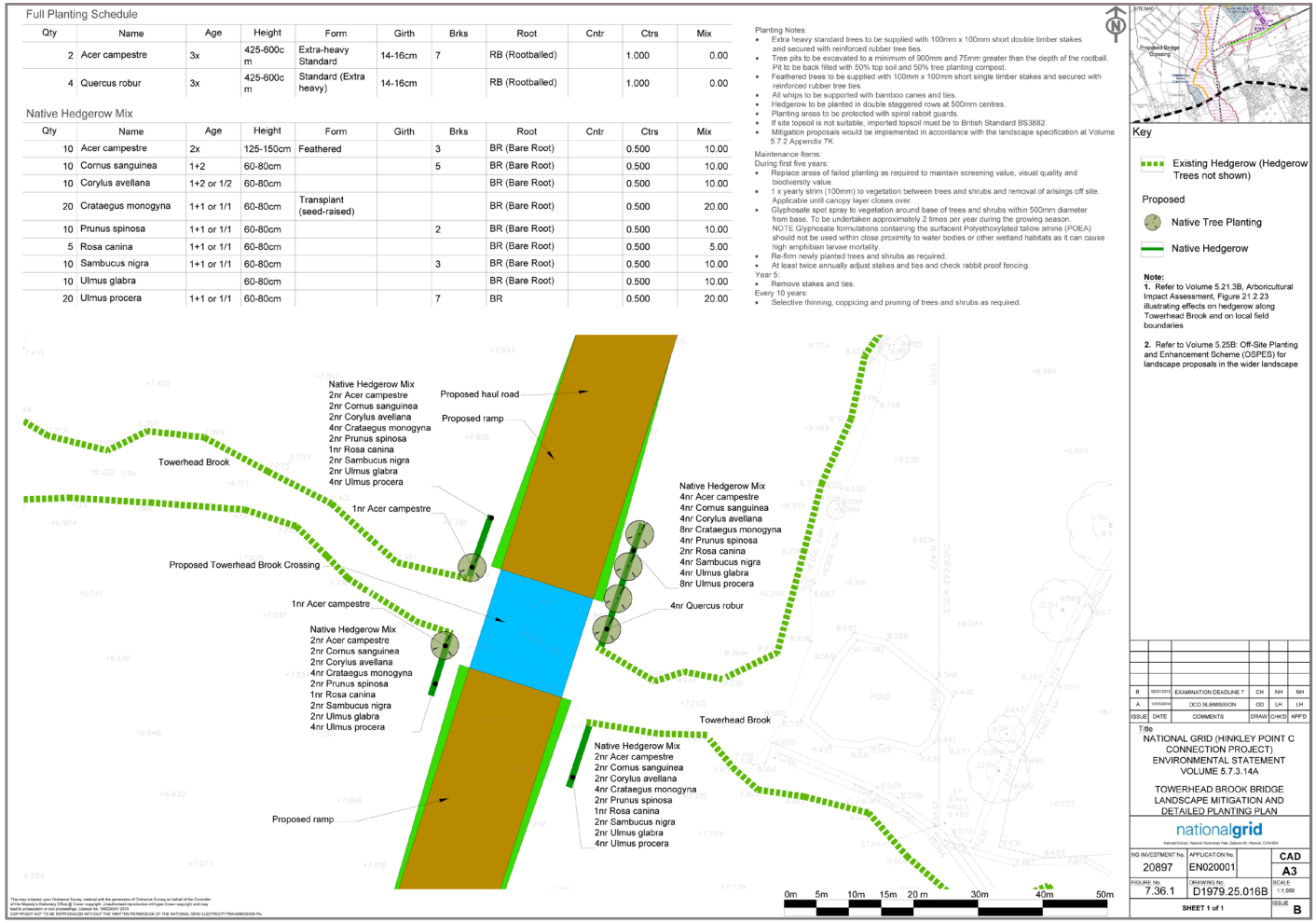


Figure 17: Towerhead Brook Cable Crossing Landscape Mitigation Plan

9.0 Approach to Detailed Design

9.4 Towerhead Brook Cable Crossing

Illustrative Elevation

The illustration below provides an indication of the how the Towerhead Brook Cable Crossing (culvert option) could look, based on the proposals in this document.

Photomontage View

In addition, **Volume 8.7.4.2, Figure 8.7.4.8** provides an anticipated view (VPC12) of the Towerhead Brook Cable Crossing.

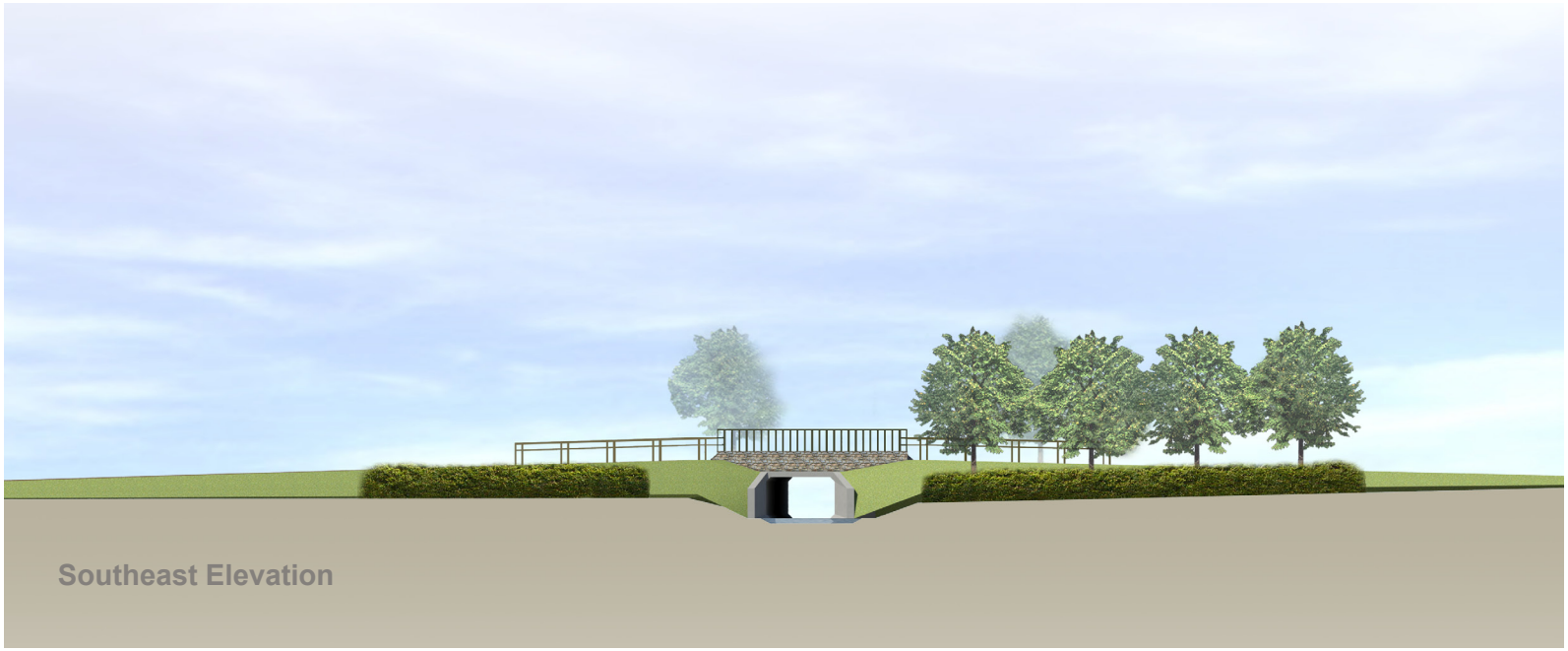
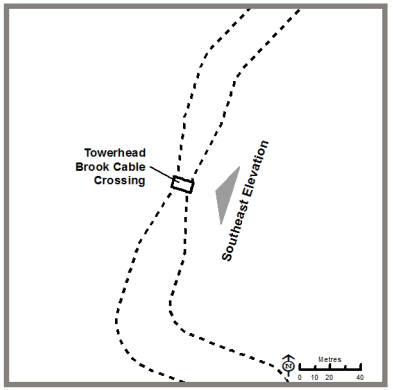


Image for illustrative purposes only



Above: Illustrative Elevation for Towerhead Brook Cable Crossing (Culvert Option)

Above: Rhyne in Section D

9.0 Approach to Detailed Design

9.5 River Axe Cable Bridge

Structural Design and Layout

As part of the detailed design consideration will be given to reducing the depth of the half-through girder bridge where possible by reviewing deck infill materials, refined bridge span and other detailing issues.

Bridge materials and finishes

In order to reduce the perceived scale and mass of the bridge structure and help it blend into the landscape the following materials and finishes are proposed:

- The abutments should be clad in locally sourced coursed stone.
- The parapets should either be clad in hardwood timber or a metal with a colour paint finish, such as RAL 6013 Reed Green, RAL 6003 Olive Green, RAL 6009 Fir Green or RAL 7006 Beige Grey. Consideration should be given to longevity and maintenance requirements in the final choice of cladding.

Bridge Surfacing

The following proposals will ensure that the bridge appears as a continuation of the neighbouring agricultural land, particularly when viewed from higher ground:

- Reinforced grass surfacing should be used for the vehicle access across the bridge. The access ramps and embankment sides should be seeded. If a more durable surface is needed for the access ramp, then reinforced grass should be used.
- The heavy duty access lids on the cable troughs should be constructed from indented metal with artificial grass or resin bound gravel (of a suitable colour) set into them, or be finished in a muted green colour.


Metal cladding


Timber cladding


Local stone


Example of reinforced grass

RAL 7006 Beige Grey

RAL 6003 Olive Green

RAL 6013 Reed Green

RAL 6009 Fir Green

Images for illustrative purposes only

9.0 Approach to Detailed Design

9.5 River Axe Cable Bridge

Bridge Fencing and Gates

A treated softwood timber post and rail fence with five-bar timber field gates should be used to prevent unauthorised vehicle access across the bridge. Any additional fencing required at the edges of the ramp should also be treated softwood timber post and rail.

PRoW Proposals

In order to balance the ongoing maintenance requirements with the rural setting, it is suggested that concrete formed steps with a hardwood timber handrail are used for the potential route of the PRoW across the access ramp. National Grid will liaise with the local planning authority over the detailed design of the PRoW proposals.

Mitigation planting

As described in **Section 8.0**, the detailed designs for landscape proposals at the River Axe Cables Bridge were submitted with the DCO application.

As shown on **Figure 18** opposite, mitigation planting includes native trees and shrub species, of local provenance where available, and will be designed to reflect and support the local hedgerow and woodland pattern of the area. The proposals include:

- New native hedgerow and structure planting will be supplemented with extra-heavy standard native trees, north of the River Axe and close to the cable bridge, to provide additional height and some instant screening of the cable bridge.
- South of the River Axe, native hedgerow with extra-heavy standard native trees will be planted to filter and screen views from Waterfront Farm, supplemented with native structure planting adjacent to existing trees along the south western boundary of this property.

There is scope for advance planting to the south of the river, near Waterfront Farm. This is shown on **Figure 18** below. A scaled version of **Figure 18** is provided at **Volume 5.7.3.14A, Figure 7.34.1**.

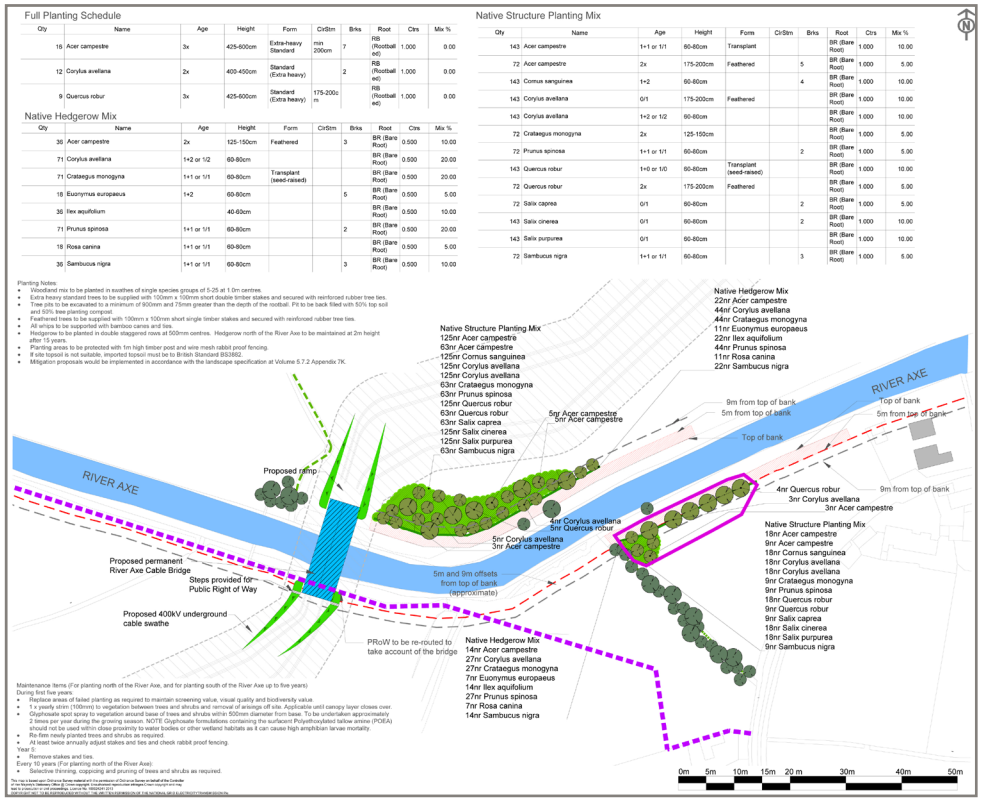


Figure 18: River Axe Cable Bridge Landscape Mitigation and Phasing Plan

Illustrative Elevation

The illustration on this page provides an indication of the how the River Axe Cable Bridge option could look, based on the proposals in this document.

Photomontage Views

In addition, the following photomontages illustrate anticipated views of the River Axe Cable Bridge:

- **Volume 8.7.4.1, Figure 8.7.4.2**: VPB20; and
- **Volume 8.7.4.1, Figure 8.7.4.3**: VPC2.

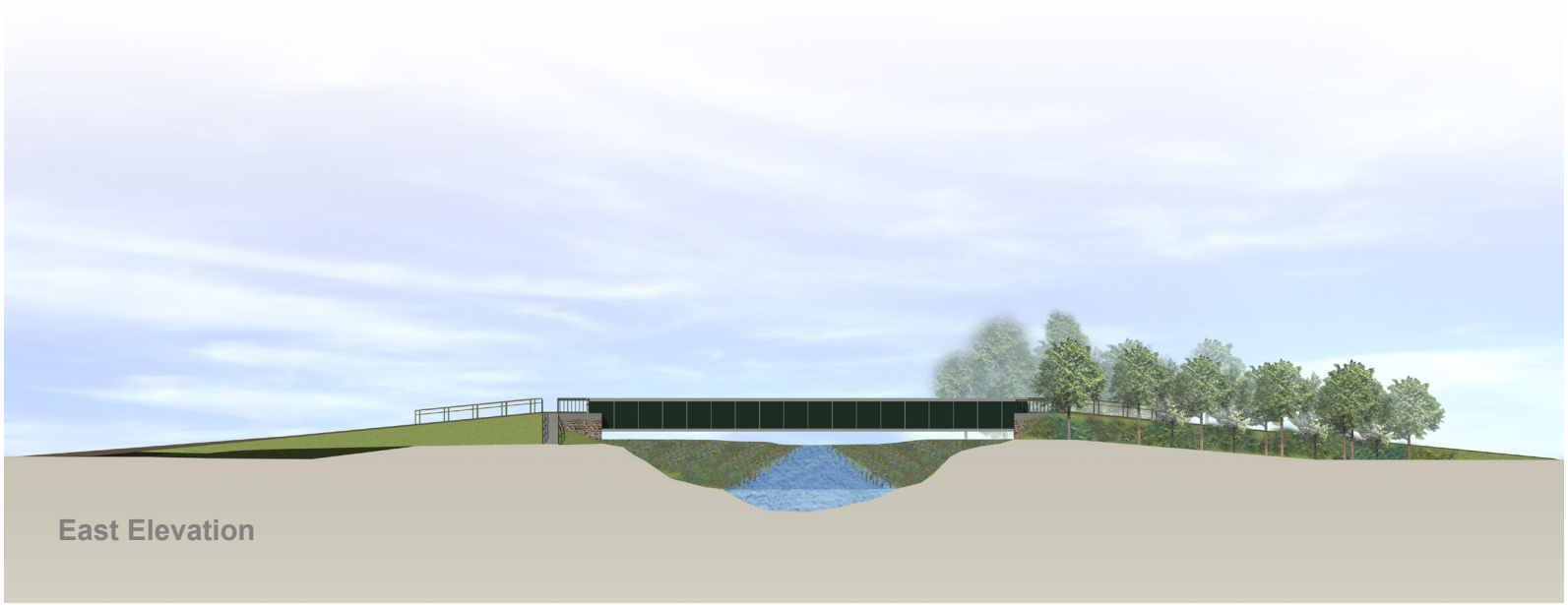
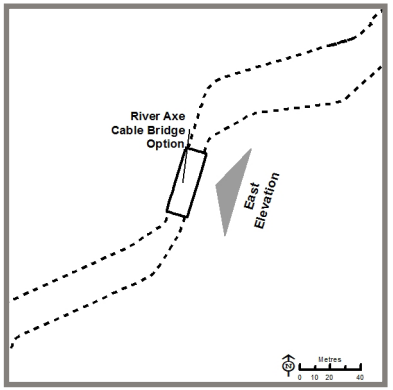


Image for illustrative purposes only



Above: Illustrative Elevation for River Axe Cable Bridge

Above: View looking across the River Axe looking toward Crook Peak

10.0 DCO Requirements and Approval Process

10.0 DCO Requirements and Approval Process

Schedule 3 of the Hinkley Point C Connection DCO has a number of specific requirements that relate to implementation of the proposed development that are relevant to this design approach document. These requirements ensure that no stage of the authorised development shall commence until written details have been submitted, by National Grid to, and approved by the relevant planning authority.

Requirement 38 *'Design Approach to Specific Infrastructure'* ensures that the submissions made by National Grid must have regard to the Design Approach to Site Specific Infrastructure, unless otherwise agreed by the relevant planning authority. The relevant requirements within the DCO are:

Requirement 8, *Control of artificial light emissions*
Requirement 9, *Provision of embedded landscape mitigation*
Requirement 10, *Replacement Planting*
Requirement 16, *Fencing and other means of enclosure*
Requirement 22, *Highway works*
Requirement 30, *River Axe crossing*
Requirement 32, *Approval of external appearances etc. of permanent structure*

Above: Example of timber clad agricultural building viewed from Tile House Road (in Section B)