Document 5.19

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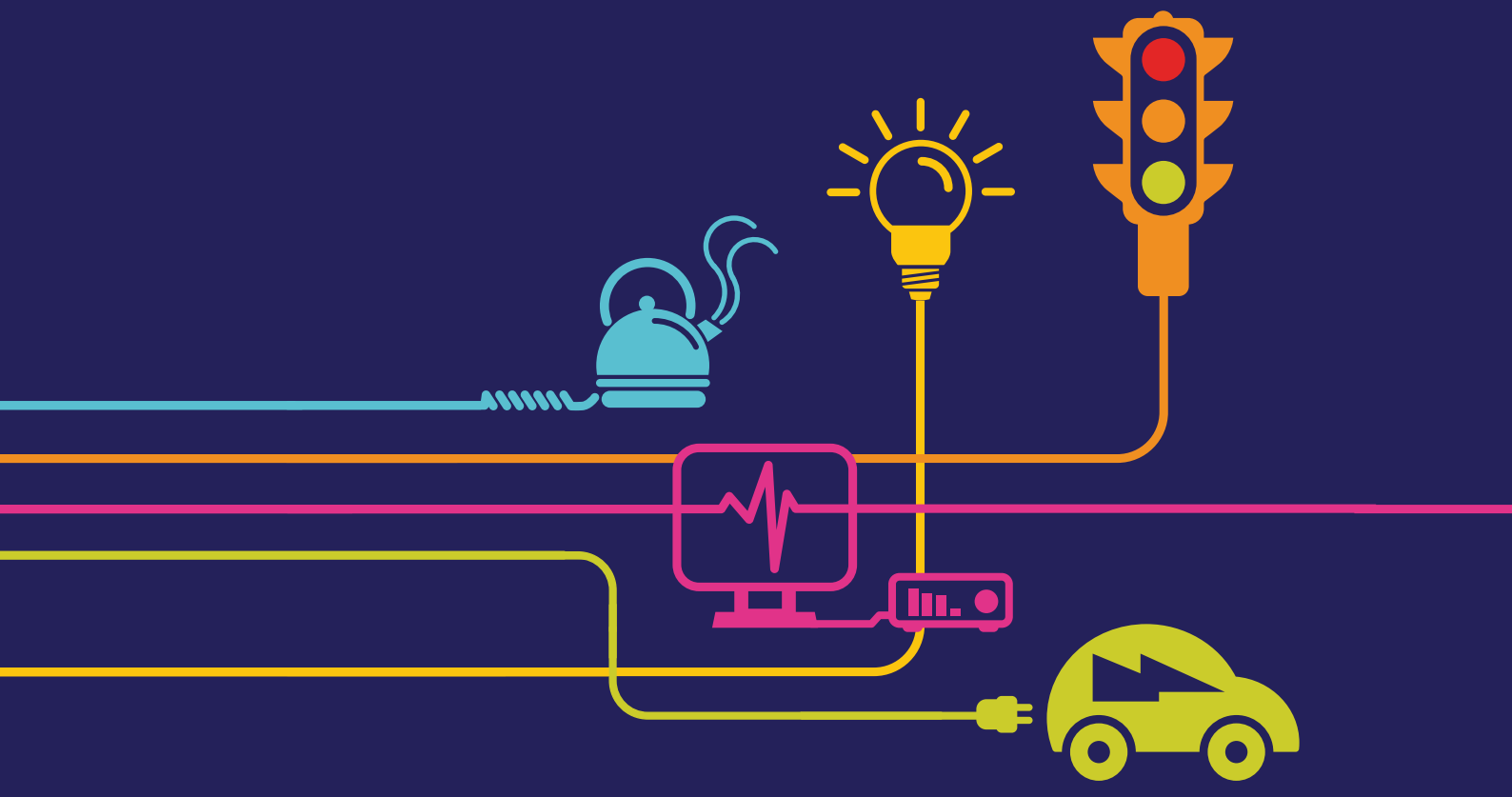
Environmental Statement Non-technical Summary

Hinkley Point C Connection Project

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



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Hinkley Point C Connection Project

ENVIRONMENTAL STATEMENT – MAY 2014

VOLUME 5.19, NON-TECHNICAL SUMMARY

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1. INTRODUCTION

1.1 General Introduction

1.1.1 This document provides a summary of an Environmental Statement (ES) which accompanies an application by National Grid Electricity Transmission plc (National Grid) to seek powers to construct, operate and maintain a new 400,000 volt (400kV) connection, between Bridgwater, Somerset and Seabank Substation, north of Avonmouth together with a range of related modifications to the electricity transmission and distribution networks ("the Proposed Development").

1.1.1 That part of the Proposed Development that comprises an electric line above ground is a Nationally Significant Infrastructure Project (NSIP). Under Section 37 of the Planning Act 2008, the consenting process requires an application to be submitted for a Development Consent Order (DCO).

1.1.2 The ES presents the findings of an assessment of the effects of the Proposed Development on the environment and explains the measures used to avoid or reduce adverse effects.

1.2 The Applicant

1.2.1 National Grid operates the high voltage electricity transmission system in Great Britain and owns the system in England and Wales. The system operates mainly at 400,000 and 275,000 volts, connecting the electricity generators to substations where the high voltages are transformed to lower voltages, enabling the power to be distributed to homes and businesses by Distribution Network Operators (DNO) who operate at a maximum of 132,000 volts. In the area of the Proposed Development, the DNO is Western Power Distribution (WPD).

1.2.2 National Grid is required, under the terms of the Electricity Act, 1989, to have regard to the desirability of preserving the environment and to do what it reasonably can to reduce the effects on the environment when putting together new proposals to transmit electricity.

1.3 Project Need

1.3.1 EDF Energy has been granted a Development Consent Order for a new nuclear power station at Hinkley Point. A number of other projects such as offshore wind farms are also proposed. These low carbon energy projects will help meet the country's increasing demand for energy in a sustainable way.

1.3.2 It is National Grid's role to connect these new electricity generators to the network so that all can benefit from the energy they produce. It needs to provide additional electricity capacity in the South West to ensure these new connections are safe and reliable.

1.3.3 Following technical, economic and environmental studies and options appraisals, National Grid proposes that the best way to provide this additional capacity is to remove the existing 132,000 volt overhead electricity line owned by WPD and build

a new 400,000 volt connection between Bridgwater and Seabank. This new connection is referred to as the Proposed Development.

1.3.4 A detailed explanation of the need for the Proposed Development is provided in **Volume 5.2.1**.

1.4 Project Overview

1.4.1 The Proposed Development is in the administrative boundaries of the county of Somerset, the districts of, West Somerset, Sedgemoor, North Somerset and South Gloucestershire and the City of Bristol in the southwest of England as shown at **Inset 1.1**.

Inset 1.1: Location Plan of Proposed Development

Key

Existing Infrastructure
- Existing Substation
- Proposed Shurton 400kV Substation

Proposed Development
- Order Limits

Other Information
- Motorway
- Severn Estuary
- Urban Area
- Area of Outstanding Natural Beauty

This map includes data from the following sources:
- National Grid
- Ordnance Survey

1.4.2 The Proposed Development would include the following main elements:

- construction of a 57km 400kV electricity transmission connection between Bridgwater in Somerset and Seabank, near Avonmouth, comprising:
  - installation of a 400kV overhead line; and
  - installation of 400kV underground cables.

- modifications to existing overhead lines at Hinkley Point, Somerset;
- construction of three 400kV cable sealing end (CSE) compounds along the route of the connection;
- construction of a 400/132kV substation at Sandford, North Somerset;
- extension of the existing 400kV substation at Seabank;
- the removal of existing 132kV overhead lines and the construction of replacement 132kV overhead lines and 132kV underground cables;
- extensions or other changes to existing 132kV substations at Churchill, Portishead, Avonmouth and Seabank; and
- associated works, for example, temporary access roads, highway works, temporary construction compounds, scaffolding, work sites and ancillary works.

1.4.3 For most of its length, the 400kV overhead line would be supported by the new 'T-pylon', as illustrated in **Inset 1.2**.

Inset 1.2: The 'T-Pylon' (Photomontage)

1.5 Policy and Legislation

1.5.1 The environmental impact assessment (EIA) process and the published ES are subject to a number of legal and policy requirements. Regulations set out when EIA is required and identify the information which should be provided.

1.5.2 Nationally significant infrastructure projects such as the Proposed Development are determined in accordance with national planning policy (NPS). National planning policy also contains principles for EIA. National planning policy for energy projects is led by the 'Overarching National Policy Statement for Energy (EN-1)' (Ref.1). EN-1 recognises that 'Nationally Significant Infrastructure Projects' for energy could have significant effects on the environment.

1.5.3 It sets out 'Assessment Principles' which give guidance on what should be included in an EIA and how the findings should be presented in the ES. EN-1 includes suggestions for 'mitigation measures' which are ways to reduce negative (adverse) effects where they cannot be avoided.

1.5.4 National Policy Statement for Electricity Networks Infrastructure (EN-5) (Ref.2)), sets out more Assessment Principles which are specifically related to Electricity Infrastructure projects. These concentrate on Climate Change 'proofing'; biodiversity and geological conservation; landscape and visual effects; and noise and vibration effects.

1.5.5 The ES has referred to the National Planning Policy Framework and to local planning policies which set out the protection that should be given to aspects of the environment. Reference has been made to these policies in considering the sensitivity of receptors and the importance of effects. **Volume 5.4.1** of the ES presents a summary of national and local planning policy relevant to the Proposed Development and explains how planning policy has framed National Grid's approach to identifying the environmental effects to consider and the significance of those effects. Specific planning policies relevant to the environmental topics covered in the ES are summarised in the specialist topic chapters.

1.6 Structure of the ES and Supporting Documents

1.6.1 The required contents of the ES is set out in Regulations and includes:

- background to the 'Need' for the 400kV connection and an outline of the main 'alternatives' considered by National Grid in the design;
- a description of the Proposed Development;
- a description of the aspects of the environment which may be affected by the Proposed Development;
- a description of the likely significant effects on those aspects of the environment as a result of the Proposed Development; and
- a description of the proposals to avoid, reduce or 'off-set' significant adverse effects of the Proposed Development.

1.6.2 The background to the Proposed Development and the EIA approach are set out the first part of the ES as follows (Volume numbers for the DCO application are included for easy reference):

- Chapter 1: Introduction (including compliance with regulatory requirements for the EIA and ES) **Volume 5.1.1**;
- Chapter 2: Project Need and Alternatives **Volume 5.2.1**;
- Chapter 3: Project Description **Volume 5.3.1**;
- Chapter 4: Planning Policy Context (review and compliance with policy requirements for the EIA and ES) **Volume 5.4.1**; and
- Chapter 5: EIA Approach and Method **Volume 5.5.1**

1.6.3 The 'aspects' of the environment which may be affected by the Proposed Development were identified at an early stage in the 'Scoping' part of the EIA process. These aspects form 'Topic chapters' in the ES (and this NTS) as follows:

- Chapter 6: Landscape **Volume 5.6.1**;
- Chapter 7: Visual Effects **Volume 5.7.1**;
- Chapter 8: Biodiversity and Nature Conservation **Volume 5.8.1**;
- Chapter 9: Ground Environment **Volume 5.9.1**;
- Chapter 10: Hydrology and Water Resources **Volume 5.10.1**;
- Chapter 11: Historic Environment **Volume 5.11.1**;
- Chapter 12: Traffic and Transport **Volume 5.12.1;**
- Chapter 13: Air Quality and Emissions **Volume 5.13.1;**
- Chapter 14: Noise and Vibration **Volume 5.14.1**;
- Chapter 15: Socio-economic and Land Use **Volume 5.15.1**;
- Chapter 16: Electric and Magnetic Fields (EMF) **Volume 5.16.1**; and
- Chapter 17: Cumulative Effects (presents a summary of potential effects that the Proposed Development might have in combination with other development proposals in the vicinity) **Volume 5.17.1**.

1.6.4 The ES has supporting documents as follows:

- **Volume 5.18**: ES Photomontages.
- **Volume 5.19**: ES Non-Technical Summary (NTS) (this document).
- **Volume 5.20**: The Applicant's Report to Support Habitats Regulations Assessment (HRA).
- **Volume 5.21**: Arboricultural Impact Assessment (AIA).
- **Volume 5.22**: Transport Assessment (TA).
- **Volume 5.23**: Flood Risk Assessments (FRAs).
  - **Volume 5.23.1** Bridgwater Tee CSE Compounds FRA.
  - **Volume 5.23.2** South of Mendip Hills CSE Compound FRA.
  - **Volume 5.23.3** Sandford Substation FRA.
  - **Volume 5.23.4** Seabank Substation FRA.
  - **Volume 5.23.5** Hinkley Point C Connection Route FRA.
- **Volume 5.24**: Statement of Statutory Nuisance (SoSN).
- **Volume 5.25**: Off-site Planting and Enhancement Scheme (OSPES).
- **Volume 5.26.1**: Draft Construction Environmental Management Plan (CEMP).
  - **Volume 5.26.2**: Draft CEMP Appendix 1: Outline Waste Management Plan (Outline WMP).
  - **Volume 5.26.3:** Draft CEMP Appendix 2: Biodiversity Mitigation Strategy (BMS).
  - **Volume 5.26.4:** Draft CEMP Appendix 3: Outline Written Scheme of Investigation (Outline WSI) for the Mitigation of Effects on Archaeological Remains.
  - **Volume 5.26.5:** Draft CEMP Appendix 4: Draft Construction Traffic Management Plan (CTMP).
  - **Volume 5.26.6:** Draft CEMP Appendix 5: Public Rights of Way (PRoW) Management Plan.
- **Volume 5.27**: Schedule of Operational Mitigation and Enhancement Measures.

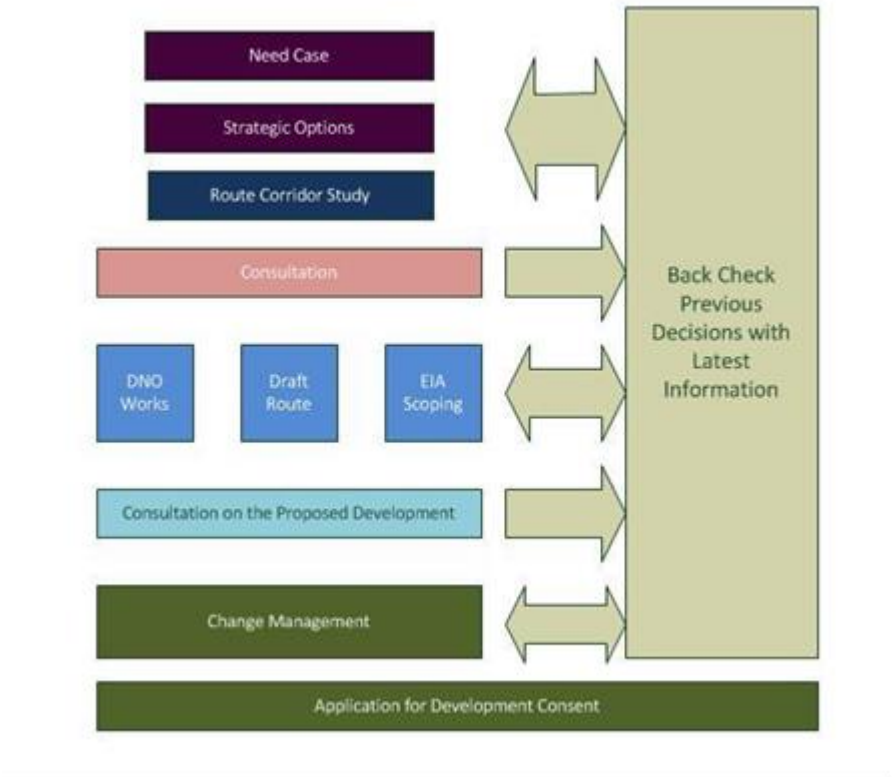
2. BACKGROUND TO THE PROJECT

2.1 Project Development Process

2.1.1 Steps taken in developing the project is described below and illustrated at **Inset 2.1**. :

- need case: to confirm the need and requirement for transmission infrastructure reinforcement;
- strategic optioneering: to develop and assess strategic options that would meet the identified need, including assessment of alternative technologies, high level environmental constraints and costs and selection of the option to take forward;
- Route Corridor Study (RCS): to take account of environmental constraints and define potential areas of land or 'route corridors' for the new connection and identify the most appropriate option to take forward;
- initial consultation: to obtain the views of statutory bodies, other agencies and the general public on the potential route corridors;
- back-check and review of options: to take the opportunity before corridor selection to verify whether the need case and review of strategic options remained valid in light of any changes in circumstances and consider representations received;
- route corridor selection: to consider and evaluate which of the possible route corridors would be preferred and once identified announce the preferred corridor;
- assessment of impact of infrastructure changes on the local electricity network and development of options to ensure electricity supplies are maintained (resulting from the proposed removal of existing 132kV overhead lines and where the Proposed Development interacts with the existing local electricity network);
- Draft Route: to develop the connection detail within the preferred route corridor and to consult on this;
- EIA Scoping: to outline the approach and scope of the EIA for the project;
- statutory pre-application consultation: to consult statutory bodies, other agencies and the general public on the details of the proposed application, including seeking views on the proposed 400kV pylon design options (steel lattice and T-pylons);
- consultation feedback report: review of representations received during the statutory pre-application consultation; and
- change control: consideration of all suggestions to amend the Proposed Development following this consultation, including a proposed realignment in Southwick, which was subject to its own ‘mini- consultation’.

Inset 2.1: Project Development



2.2 Need Case

2.2.1 As has been described in Chapter 1, it is National Grid's role to connect new electricity generators to the network so that all can benefit from the energy they produce

2.2.2 In order to connect the new generators into the national electricity network (the 'National Grid') it was calculated that a new 400kV connection needed to be made to transmit the electricity. These will be needed by 2021.

2.2.3 A detailed explanation of the need for the Proposed Development is contained in the National Grid Need Case (Ref 2.3).

2.3 Options Considered

High Level Options

2.3.1 National Grid considered how best to make these new connections by looking at all of the high level (strategic) options available; this is detailed in the 'Hinkley Point C Connection Strategic Optioneering Report' (Ref. 2.4).

2.3.2 The first option to be considered was to upgrade the existing network; however it was established that this would not deliver what was needed for the new generators, and new connections would still be required.

2.3.3 Options for onshore (across land) and offshore (subsea) connections that would meet future needs were assessed in detail for their technical suitability and costs; the conclusion was that an onshore connection between Bridgwater and Seabank would be the best type of option to be taken forward for further assessment. The next step was to decide whether the connection should be by overhead line, supported by pylons, or by underground cable. The appraisal concluded that the overhead line was the most economic, although either could be used from a technical perspective.

2.3.4 Potential 'routes' for an overhead line between Bridgwater and Seabank were set out and assessed in the Route Corridor Study (RCS) (Ref 2.5); two route corridors for a connection were assessed at the next stage with Route Corridor 1 having two variants: A and B.

- Route Corridor 1 Option A: based on an existing 132kV overhead line owned and operated by Western Power Distribution (South West) plc. Involved the removal of the existing WPD 132kV overhead line which travels in a broadly north-to-south direction between Bridgwater and Seabank, via Portishead in North Somerset and the construction of a new 400kV overhead line in its place;

- Route Corridor 1 Option B: based on an existing 132kV overhead line owned and operated by WPD. Option B considered the construction of a new 400kV overhead line parallel to the existing 132kV overhead line, either to the east or west of the existing overhead line. For this option the existing WPD 132kV overhead line would not be removed; and

- Route Corridor 2: involved the construction of a new 400kV overhead line between Bridgwater and Seabank Substation. This route corridor aimed to avoid the paralleling of overhead lines, although this would not be possible in certain locations due to environmental constraints and urban areas. The existing WPD 132kV overhead line would remain.

2.3.5 The RCS concluded that Route Corridor 1 Option 1A was the least environmentally constrained corridor as it would use the route of an existing 132kV overhead line. The relatively wide corridor identified for much of the route would also allow an alignment to be identified to minimise the scale of change and effects on the environment.

Representations Received

2.3.6 To help inform the preferred route corridor selection, National Grid invited the views of local people, communities and other interested parties living in the vicinity of the proposed works on the proposed route corridor options (Stage 1 Consultation).

2.3.7 The majority of representations from consultees questioned the strategic options considered and discounted by National Grid in putting forward for consultation only overhead line route corridors between Bridgwater and Seabank. However, a number of comments were received regarding the feasibility of alternatives to the two route corridors put forward for consultation. These included:

- could the overhead line use a route parallel to the M5 motorway corridor;
- could the route avoid the Mendip Hills AONB;
- National Grid should switch between corridors in parts of the route;
- could the overhead line follow the existing railway line; and
- could the overhead line follow the coastline.

Selection of Preferred Route Corridor (Stage 2 Consultation)

2.3.8 In response to the representations received during the Stage 1 Consultation, National Grid undertook an assessment to consider the relative merits of the two route corridors against a range of factors. This assessment also considered opportunities to mix and match the corridors to achieve the optimum route for the connection.

2.3.9 The appraisal concluded that Corridor 1 Option A should form the basis for the connection as it would result in the least impact on the Mendip Hills AONB, would result in the least degree of change within the landscape, would comply most closely with guidance provided by the Holford Rules and would result in less effect on landscape and views, the historic environment and ecological receptors.

2.3.10 Whilst the appraisal identified Corridor 1 Option A as the basis for the preferred route corridor further analysis was undertaken to for the following discrete sections of the route to determine whether benefits could be achieved by mixing and matching Corridor 1 Option A and Corridor 2; it was concluded that this could be achieved between Bridgwater and the Huntspill River and Yatton and Portishead.

2.3.11 Following this, during 2012 and 2013, the preferred route corridor was separated into a number of study areas (later renamed ‘sections’) within which a range of overhead line routes were developed. An underground cable route was also developed within each of the sections and a comparison was made to determine whether the benefits from the underground alternative would clearly outweigh any additional economic, social and environmental impacts and technical difficulties.

2.3.12 The conclusion of these studies was in Study Area (Section) C only, through the Mendip Hills AONB, the benefits from the use of underground cables as an alternative to an overhead line would clearly outweigh any extra economic, social and environmental impacts and the additional costs of undergrounding could therefore be justified.

2.3.13 CSE compounds are required where overhead lines transition to underground cables and vice versa. These were identified as being needed in two locations:

- Bridgwater Tee: two would be needed where the new Hinkley to Seabank (south to north) 400kV connection would connect into the existing Hinkley to Melksham (east west) 275kV connection; and
- South of Mendips Hills: one would be needed to facilitate the transition of the 400kV overhead line to underground cables through the Mendip Hills AONB. A second CSE compound was not required at the other end of the underground cable connection at Sandford as the transition would be facilitated through the components of a new substation.

2.3.14 At both locations, siting options were identified and assessed for their technical, financial and environmental cost and benefits.

Pylon Design (Stage 3 Consultation)

2.3.15 Following the identification of the draft route and subsequent consultation, National Grid undertook an appraisal to consider the use of a new pylon design, the T-pylon, as an alternative to the traditional steel lattice design for the overhead line sections of the connection.

2.3.16 The T-pylon and steel lattice pylon were assessed against each other on a section by section basis (except in Section C, the underground section) using a range of environmental criteria and professional judgement to balance the issues and compare the effects of the routes to identify the preferred option, or combination of options.

2.3.17 The conclusions of this appraisal were that T-pylons should be used on the overhead line from just north of the Huntspill River (Section B) to the crossing of the River Avon (Section G). In Section A, Standard Lattice pylons would be used, except on Puriton Ridge where low height lattice pylons would be used.

WPD Infrastructure (Stage 3 Consultation)

2.3.18 Adopting Corridor 1 Option 1A meant that a new substation and connections to the 132kV network needed to be developed to maintain local electricity supplies after the 132kV overhead line was removed. In June and July 2012, National Grid and WPD consulted on the location for a new substation and four possible route corridors for a new connection to the 132kV network. The process leading to this decision is documented in the Local Electricity Network Preferred Options Report (Ref. 2.6) and in the additional Substation Siting Appraisal Report (Ref. 2.7).

2.3.19 The conclusions of these studies and appraisals, which included technical, financial and environmental appraisals, was that a new substation was needed at Sandford; a new 132kV connection was needed between Sandford substation and the existing ‘AT Route’ at Puriton; the existing 132kV ‘W route’ west of Nailsea would be undergrounded between Nailsea and Portishead; and the existing 132kV ‘BW Route’ would be undergrounded between Portishead substation and Avonmouth substation.

Statutory (Stage 4) Pre-Application Consultation

2.3.20 Stage 4 of the consultation process was the statutory consultation required under the Planning Act 2008. It took place between 3rd September and 29th October 2013. The Consultation Report (**Volume 6.1**) accompanying the DCO Application provides details about the representations received and how National Grid has taken them into account.

2.3.21 1,635 representations were received during the consultation many of which included requests to consider alternatives to the Proposed Development. These included requests to consider alternate strategic options and alternate route corridors options which have been described in the relevant section above.

2.3.22 The remaining representations which requested a change to the design of the Proposed Development were considered using a Change Control Process. The process was developed to ensure that each change request was effectively assessed by a number of specialist areas covering, planning, environment, design & construction and land rights.

2.3.23 The process resulted in a number of changes including to the detailed routeing of the 400kV overhead line across all sections; the 400kV underground cable swathe; the underground routes for the W and BW routes; the design of gantries at CSE compounds; and the pylon design in Section A, which was changed from Standard Lattice pylons to T-Pylons.

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Location

3.1.1 The area is predominantly rural, low-lying with much of the land comprising pasture fields. Built development is largely focused along the Severn Estuary to the west of the Proposed Development and includes settlements at Bridgwater, Burnham-on-Sea, Weston-super-Mare, Clevedon, Portishead and Avonmouth. Smaller towns, villages, hamlets and individual farmhouses and residential properties are dispersed widely throughout the area.

3.1.2 The area is characterised by a series of prominent ridges which run east to west and include: Puriton Ridge, north of Bridgwater; the Mendip Hills east of Weston-super-Mare and Tickenham Ridge north of Nailsea. There are expanses of low open ground between the ridges.

3.1.3 The main roads in the wider area include the M5 and M49 motorways and the A370, A38, A39 and the A368 which provide links to Bristol. The local road network comprises minor roads which connect to the main roads.

3.1.4 The Mendip Hills Area of Outstanding Natural Beauty (AONB) which extends across the route of the proposed connection. The internationally designated sites of the Severn Estuary (Special Protection Area (SPA), Special Area of Conservation (SAC) and Ramsar), Somerset Levels and Moors (SPA and Ramsar), the North Somerset and Mendip Bats SAC and the Mendip Limestone Grasslands SAC lie to the east and west of the Proposed Development.

3.1.5 The route of the 400kV connection from Bridgwater to Seabank has been divided into 'Sections' based on areas of similar landscape character (Sections A-G). An additional Section covers the area of works for the Hinkley Line Entries (Section H). The eight Sections are as follows:

- Section A – Puriton Ridge;
- Section B – Somerset Levels and Moors South;
- Section C – Mendip Hills;
- Section D – Somerset Levels and Moors North;
- Section E – Tickenham Ridge;
- Section F – Portishead;
- Section G – Avonmouth; and
- Section H – Hinkley Line Entries.

3.2 The Proposed Development

3.2.1 The proposed Hinkley Point C Connection project includes the following principal elements:

- construction of a 57km 400kV electricity transmission connection (see **Volume 5.3.3, Figure 3.1 and Figure 3.2**) between Bridgwater in Somerset and Seabank, near Avonmouth, comprising:

- installation of a 400kV overhead line; and
- installation of 400kV underground cables.

- modifications to existing overhead lines at Hinkley Point, Somerset (see **Volume 5.3.3, Figure 3.1.20**);
- construction of three 400kV CSE compounds along the route of the connection (see **Volume 5.3.3, Figure 3.1.2** and **Figure 3.1.6**);
- construction of a 400/132kV substation at Sandford, North Somerset (see **Volume 5.3.3, Figure 3.1.9**);
- extension of the existing 400kV substation at Seabank (see **Volume 5.3.3, Figure 3.1.19**);
- the removal of existing 132kV overhead lines and the construction of replacement 132kV overhead lines and 132kV underground cables (see **Volume 5.3.3, Figure 3.1**);
- extensions/modifications to existing 132kV substations at Churchill, Portishead, Avonmouth and Seabank (see **Volume 5.3.3, Figures 3.1.10, 3.1.16, 3.1.18** and **3.1.19**); and
- associated works, for example, temporary access roads, highway works, temporary construction compounds, scaffolding, work sites and ancillary works (see **Volume 5.3.3, Figure 3.1**).

400kV Transmission Connection

3.2.2 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 as described below:

400kV Overhead Line

3.2.3 The new 400kV overhead line between Bridgwater, Somerset and Seabank Substation, near Avonmouth, would comprise three parts:

1) Construction of a new 400kV overhead line of approximately 4.5km from the existing Hinkley to Bridgwater 275kV overhead line at Bridgwater Tee (which would be uprated to 400kV operation) to the existing Hinkley to Melksham 400kV overhead line north of Woolavington.
2) Construction of a new 400kV overhead line of approximately 12.75km from the existing Hinkley to Melksham 400kV overhead line north of Woolavington to a proposed CSE compound south of the Mendip Hills and the River Axe.
3) Construction of a 400kV overhead line from the proposed Sandford Substation to Seabank Substation. In the Portishead/Portbury area two options are included within the DCO application: National Grid's preferred route (Option A); and an alternative route (Option B). The total length of the preferred route is approximately 29.8km (Option A) and the alternative route is 31.2km (Option B).

3.2.4 The 400kV overhead line would comprise conductors supported by steel lattice pylons and T-pylons. It is proposed that Sections A (Puriton Ridge), B (Somerset

Levels and Moors South), D (Somerset Levels and Moors North), E (Tickenham Ridge) and F (Portishead) would utilise the T-pylon and that Section G (Avonmouth) would utilise steel lattice pylons.

Installation of 400kV Underground Cables

3.2.5 As part of the connection between Bridgwater and Seabank, National Grid is proposing to install 400kV underground cables in two locations. These comprise:

- approximately 300m of underground cables between two single circuit CSE compounds at Bridgwater Tee, north of Bridgwater where two trenches each with up to three cables could be installed; and
- approximately 8.5km of underground cables between a CSE compound south of the Mendip Hills and the proposed Sandford Substation within which the cable sealing ends for the underground cables would be sited. The cables would be installed in four trenches approximately 1.8m deep and 2m wide each containing up to three cables.

Modifications to the Overhead Lines at Hinkley Point

3.2.6 To connect the proposed Hinkley Point C Power Station to the high voltage transmission network National Grid is proposing to construct a 400kV substation (Shurton Substation) within the boundary of the power station complex. This substation formed part of EDF Energy's proposals, which were granted Development Consent in March 2013 and therefore does not form part of this Proposed Development. To connect the proposed Shurton Substation to the transmission network, two of the existing overhead lines which currently connect into Hinkley B Power Station will need to be diverted into the new Shurton Substation and a new overhead line interconnector constructed between the proposed Shurton Substation and the existing Hinkley B Substation.

3.2.7 These works would include the construction of approximately 4.5km of new 400kV overhead lines and the removal of approximately 2.3km of existing overhead lines. It is proposed that the new overhead lines would utilise steel lattice pylons.

Construction of CSE Compounds

3.2.8 CSE compounds are required where overhead lines and underground cables connect to each other and typically include switchgear, support structures and perimeter security fencing.

3.2.9 Two single circuit CSE compounds of approximately 34m by 30m are proposed at Bridgwater Tee, north of Bridgwater to achieve a crossing of electrical circuits where the new overhead line interfaces with the existing Hinkley to Bridgwater overhead line.

3.2.10 A double circuit CSE compound of approximately 65m by 40m is proposed adjacent and east of the M5 motorway to the south of the Mendip Hills and the River Axe. This compound provides the interface point between the overhead line

proposed through the Somerset Levels and Moors and the underground cables proposed through the Mendip Hills which connect directly to Sandford Substation.

Construction of a 400/132kV Substation at Sandford

3.2.11 To maintain supplies on the 132kV distribution network following the removal of the existing 132kV overhead line, a new 400/132kV substation is proposed adjacent to Nye Road in Sandford, North Somerset. The substation would be sited within a compound of approximately 143m by 217m and would include 400kV and 132kV electrical plant and equipment, super grid transformers (SGTs) and shunt reactors, electrical switchgear, perimeter fencing, access roads, landscaping and the cable sealing ends onto which the underground cables through the Mendip Hills would connect.

Extension of the Existing 400kV Substation at Seabank

3.2.12 To facilitate connection of the proposed 400kV overhead line onto Seabank Substation an extension to the existing substation building of approximately 24m and a minor extension to the substation perimeter fence are required together with the installation of electrical plant, equipment and switchgear.

The Removal of Existing 132kV Overhead Lines

3.2.13 As part of the Proposed Development, over 65km of existing 132kV overhead lines would be removed. The overhead lines proposed for removal are as follows:

- Approximately 53.2km of the existing overhead line (**F and G Route**) between Bridgwater and Avonmouth substations.
- Approximately 9km of the existing overhead line (**W Route**) between Nailsea and Portishead Substation (to be replaced with underground cables).
- Approximately 1.5km of the existing overhead line (**AT Route**) to the south of Puxton.
- Approximately 550m of the existing overhead line (**N Route**) near Mead Lane, Sandford.
- A short section of the existing overhead line (**BW Route**) between Portishead and Avonmouth to achieve a crossing of electrical circuits (to be replaced with underground cables).
- Approximately 2.1km of existing overhead line (**G Route**) from the existing Avonmouth substation northwards (to be replaced with underground cables).
- A short section of three existing 132kV overhead lines (**G, DA and BW Routes**) in the vicinity of Seabank Substation to achieve a crossing of electrical circuits (to be replaced with underground cables).

Construction of 132kV Overhead Lines

3.2.14 To maintain connections with the existing 132kV distribution network in North Somerset 132kV overhead line connections are required between the proposed Sandford Substation and the existing overhead lines feeding Weston-super-Mare (**AT Route**) (2.3km) and Churchill (**N Route**) (285m) and between Churchill

Substation and an existing overhead line that currently bypasses the substation (264m).

Construction of 132kV Underground Cables

3.2.15 To facilitate construction of the proposed 400kV overhead line and to maintain connections with the existing 132kV distribution network a number of sections of 132kV underground cables are required. The underground cables proposed are as follows:

- A short section of approximately 220m of underground cable (**Y Route**) to connect Churchill Substation with an existing overhead line that currently passes by the substation.
- Approximately 600m of underground cables (**AT Route**) in the vicinity of the proposed Sandford substation.
- Approximately 10km of underground cables (**W Route**) between Nailsea and Portishead Substation.
- Approximately 2.3km of underground cables (**G Route**) between the existing Avonmouth substation and just south of the Bristol to Avonmouth railway line.
- A short section of approximately 170m for Option A and 620m for Option B of underground cable (**BW Route**) to allow the 400kV overhead line to cross an existing 132kV overhead line to the north east of Portishead.
- Three short sections of underground cable (**G, DA and BW Routes**) of between 150m and 300m to allow the 400kV overhead line to cross three existing 132kV overhead lines in the vicinity of Seabank Substation.

Extensions/Modifications to Existing 132kV Substations

3.2.16 As a result of changes to the 132kV distribution network, modifications are required to existing 132kV substations at Churchill, Portishead, Avonmouth and Seabank. These works involve the installation of electrical plant, equipment and switchgear and are largely confined to within the existing substation compounds. In the case of Churchill and Seabank Substations, small substation extensions are also required to accommodate the electrical connections.

Associated works, for example, temporary access roads, highway works, temporary construction compounds, work sites and ancillary works

3.2.17 In addition to the above, a number of other works would be required during construction and operation of the Proposed Development. These include temporary masts and supports for overhead line construction, temporary and permanent access roads, modifications to the highway network and construction storage and working areas.

Construction of the Proposed Development

3.2.18 Construction of all components of the Proposed Development would commence with the preparation and installation of temporary access roads and working areas, where necessary improvements to the existing highway network would be undertaken to facilitate construction access and activities. Temporary contractor's compounds, offices and welfare facilities would also be established along the proposed route to house the staff, equipment and materials for the works. Any topsoil and subsoil excavated would be stored separately along the working area in accordance with the Draft CEMP (see **Volume 5.26.1**) so that it can be put back once construction activities are complete. The construction compounds would take approximately four weeks to establish and would be in use for the same duration as the construction of the associated proposed Development component set out above.

3.2.19 For the 400kV overhead line, foundations would be installed and the pylon components delivered to site. The lattice pylon would be erected in sections, with a mobile crane used to lift the assembled sections into position. The T-pylon consists of approximately ten sections and would either be constructed on the ground and lifted by a crane in to position or by lifting each individual section in to place. The insulators would be fastened to the pylons in preparation for the installation of the conductors (wires). The conductors would be delivered to site on drums using HGVs and would be installed in sections between tension pylons using tensioning and pulling machines. Once the overhead line is constructed, the temporary access tracks and working areas at the pylon sites would be removed and the ground reinstated by removing stone and trackways.

3.2.20 For the 400kV underground cables, a working area approximately 100m wide would be created along the length of the underground cables and protected by post and wire fencing. Vegetation would be cleared and topsoil would be stripped from the areas of ground to be disturbed in the working area. Where required, drainage improvement works would be implemented to ensure the site of the cables installation is free from risk of flooding. Cable drums would be delivered to working areas using HGVs, with smaller vehicles such as tractors used to transport the drums and other materials along a temporary haul road. Up to three cables would be installed into four trenches approximately 1.8m deep and 2m wide. The required separation between each cable trench will vary depending on ground conditions, cable depth and cable manufacturer, but a typical cable easement once installed would be approximately 40m, apart from horizontal directional drilling (HDD) sites where it would be wider. Fibre optic cables would also be installed to ensure the connection could be periodically monitored. Above ground link boxes/ link box pillars would be required where individual cable sections are jointed. The joints between lengths of underground cables installed from the drums would be made on-site in controlled and clean conditions. Once the cables have been laid and the trenches backfilled, the temporary haul road and access tracks would be removed and soil replaced. Wherever possible hedgerows would be planted or replaced although trees cannot be planted on top of the cables.

3.2.21 For the substations and CSE compounds, topsoil would be removed and a clean and stable working platform established for the development. Construction of concrete foundations for some of the electrical equipment would be undertaken

including installing troughs for the underground cables connections. A series of earth tapes or an earth grid would be installed below the ground to create an 'earth mat' to make the compound electrically safe. The substation support structures and electrical equipment and the CSE structures would then be erected. Prior to the substation or CSE compounds being brought into service, commissioning tests would be undertaken. Upon completion of the works, temporary site installation facilities and working areas would be removed and the soil replaced. For works at existing substations construction activities would be similar to those outlined above but on a smaller scale.

3.2.22 The construction process for 132kV steel lattice pylons would be similar to that outlined above for 400kV overhead lines. The 132kV wood pole overhead lines would not require cranes or stone pads for installation and the poles would be installed in a single operation and secured at the end of each activity avoiding the need for the working area to be fenced. The conductors would be delivered to site on drums using HGVs and would be installed in sections between tension poles using tensioning and pulling machines. Once the overhead line is constructed, the temporary access tracks and working areas would be removed and the ground reinstated by removing stone and trackways.

3.2.23 To facilitate the removal of the existing 132kV overhead lines, the area around each pylon would be cleared and where appropriate fenced. Fittings such as dampers and spacers would be removed from the conductors and the conductors would be cut into manageable lengths or winched on to drums in a reverse process to that used during installation. The pylons would either be dismantled by crane, with sections cut and lowered to the ground, or the legs of the pylon would be cut and it would be pulled to the ground using a tractor before being dismantled. Foundations would be removed to a depth of approximately 1m and subsoil and topsoil reinstated. In exceptional circumstances the entire foundation may be removed.

3.2.24 For the 132kV underground cables, a working area approximately 60m wide would be created along the length of the underground cables and protected by post and wire fencing. As with the 400kV underground cables vegetation would be cleared, topsoil would be stripped from the areas of ground to be disturbed and where required, drainage improvement works would be implemented to ensure the site of the cables installation is free from risk of flooding. Cable drums would be delivered to working areas using HGVs, with smaller vehicles such as tractors used to transport the drums and other materials along a temporary haul road. Up to tree cables would be installed into two trenches approximately 1.2m deep and 1m wide. The required separation between each cable trench will vary depending upon ground conditions, cable depth and cable manufacturer, but a typical cable easement once installed would be approximately 20m, apart from HDD sites where it would be wider. Fibre optic cables would also be installed to ensure the connection could be periodically monitored. Below ground link pits would also be required where individual sections of cable are jointed. The joints between lengths of underground cables installed from the drums would be made on-site in controlled and clean conditions. Once the cables have been laid and the trenches backfilled, the temporary haul road and access tracks would be removed and soil replaced. Wherever possible hedgerows would be planted or replaced although trees cannot be planted on top of the cables.

3.2.25 Should development consent be granted, National Grid intends to start construction in autumn 2015 and the construction should be complete by approximately autumn 2019.

4. PLANNING POLICY

4.1 Introduction

4.1.1 **Volume 5.4.1** of the ES presents a summary of national and local planning policy relevant to the Proposed Development and explains how planning policy has framed National Grid's approach to identifying the environmental effects to consider and the significance of those effects. Specific planning policies relevant to the environmental topics covered in this ES are summarised in the specialist topic chapters.

4.2 National Policy

National Policy Statements

4.2.1 NPSs are of primary importance to the decision–making process for DCO applications. Two NPSs are relevant to the Proposed Development: Overarching National Policy Statement for Energy (EN-1); and National Policy Statement for Electricity Networks Infrastructure (EN-5).

Overarching NPS for Energy EN-1

4.2.2 Part 4 of EN-1 sets out the Assessment Principles that must be followed by applicants, and Part 5 sets out the Generic Impacts that must be assessed. **Volume 5.4.1** of the ES sets out the detail of how these requirements are addressed. Part 4 also requires applicants to provide information to support the HRA that must be carried out whether the project may have a significant effect on a protected European site or species. **Volume 5.20.1** contains this information.

4.2.3 Part 4 of EN-1 also requires applicants to demonstrate that their project is sustainable; that it is as durable, attractive and adaptable as it can be; that it is going to be resilient to potential future natural events, such as flooding. National Grid has undertaken a risk assessment of all of its electricity assets with respect to climate change and documents the findings in its Climate Adaptation Report of 2010. This covers the resilience of, for example, pylons and conductors to increased storminess, fluctuations in temperature and increased flooding. The FRAs contained in **Volume 5.23** include models for future climate change scenarios and how these might affect the Proposed Development. Climate change was also taken into account in the topic specific assessments and the proposed mitigation measures.

4.2.4 Part 5 of EN-1 requires a number of specific topics to be assessed. The compliance table in **Volume 5.4.1** sets out how the ES complies with these requirements.

NPS for Electricity Networks Infrastructure EN-5

4.2.5 This NPS sets out further requirements and guidance on the assessment of specific topics considered to be of particular relevance to electricity networks:

- climate change;

- biodiversity and geological conservation;
- landscape and visual;
- noise and vibration; and
- EMF.

4.2.6 Resilience to climate change is highlighted as a key issue by EN-5. As noted above, FRAs have been undertaken for Sandford Substation, Seabank Substation extension, Bridgwater Tee CSE compounds, South of Mendip Hills CSE compound and the remaining components of the Proposed Development in the 'Hinkley Point C Connection Route FRA' (**Volumes 5.23.1** to **5.23.5**).The potential effects of wind, storms and increasing temperatures as a result of climate change have been considered by National Grid in its Climate Change Adaptation Report (CCAR) (Ref.4.8).

4.2.7 EN-5 also requires applicants to demonstrate good design in respect of landscape and visual amenity and in the design of the project to mitigate adverse effects such as noise and electric and magnetic fields. Assessments of these potential effects have informed the location and design of the Proposed Development throughout its evolution.

4.2.8 EN-5 recognises that National Grid's existing rules for the routeing of overhead lines (known as 'the Holford Rules') should form the basis of the approach to routeing NSIPs that are transmission lines. National Grid has therefore used them in designing the route of the Proposed Development. Taking into account the Holford Rules, as well as technical, financial and other environmental considerations, National Grid proposes to install the 400kV connection through the Mendip Hills AONB as underground cables, to minimise the landscape and visual effects of the Proposed Development. In addition, National Grid proposes to bury underground 8km of the existing 132kV overhead line between Nailsea and Portishead to reduce the overall effect of the Proposed Development on the landscape of Somerset.

National Planning Policy Framework

4.2.9 The National Planning Policy Framework (NPPF) published in March 2012 sets out the Government's planning policies for England, and is supported by Planning Practice Guidance, published in March 2014. Whilst the above mentioned NPSs are the primary policy tools for determination of applications for development consent, the NPPF remains relevant in terms of shaping and guiding the environmental topic assessments. The relevant parts of the NPPF have been considered for each of the environmental topics in the ES.

4.2.10 In accordance with NPPF principles *to protect and enhance the natural and built environment*, the design, construction, operation and eventual decommissioning of the Proposed Development and the approach to the EIA, have particularly taken into account the following relevant sections of the NPPF:

- Section 4: Promoting sustainable transport;

- Section 7: Requiring good design;
- Section 10: Meeting the challenge of climate change, flooding and coastal change;
- Section 11: Conserving and enhancing the natural environment; and
- Section 12: Conserving and enhancing the historic environment.

Local Policy

4.2.11 As the NPSs form the basis for decision making on NSIPs, local planning policy does not determine whether NSIPs are approved. However, some local plan policies are relevant where they inform the assessment of potential effects e.g. by identifying land allocations and environmentally sensitive areas. Key themes from local planning policies have been taken into account in the topic assessments.

5. EIA APPROACH AND METHOD

5.1 Embedded Mitigation

5.1.1 High level environmental constraints were identified by National Grid during the initial stages of the development process in 2009. The aim of the EIA process has been to integrate environmental considerations into the design process so that potential effects can be considered and avoided or minimised at the earliest stages. Avoidance is achieved by careful routeing to ensure that some features of environmental value are not affected or, where effects are unavoidable, that the routeing minimises the effects. This 'embedded mitigation' approach ensures that potential environmental effects would be avoided or reduced as far as possible.

5.2 EIA Scoping

5.2.1 The scope of the EIA was identified through early engagement with stakeholders and iteratively throughout the evolution of the project development process.

5.2.2 A Scoping Report identifying the potential for environmental effects and explaining how these could be assessed was submitted to PINS on 16 April 2013 asking for a 'Scoping Opinion'.

5.2.3 In response, and following consultation with statutory bodies, PINS issued its Scoping Opinion on 31 May 2013, confirming the topics to be included in the ES.

5.3 Preliminary Environmental Information

5.3.1 As part of the formal consultation process, National Grid published a Preliminary Environmental Information Report (PEIR) on 3 September 2013. Responses to this consultation helped to guide the EIA process

5.4 Environmental Statement

5.4.1 Generally, the assessment method and approach set out below has been used for all environmental assessment topics. Where an alternative approach has been adopted (for example where specific guidance or legislation relevant to that environmental topic is available), the adopted method is described in that environmental topic chapter.

General Approach to Assessment

5.4.2 As noted earlier, to manage the assessment and presentation of environmental information, the Proposed Development was divided into Sections. Where appropriate, the EIA was carried out and the ES sets out the assessment of potential effects on a Section by Section.

5.4.3 Each topic chapter describes the aspects of the environment likely to be significantly affected by the Proposed Development ('the Baseline'). This Baseline was identified using desk top studies, consultation and field surveys. While the Baseline data, and the geographic area that might be affected, vary between

topics, it reflects the most up to date information available for that topic and in most cases was gathered up to December 2013. The ES then considers how the environment might change over the length of the construction period, to produce a 'future baseline', and how other major development proposals (referred to as 'committed developments' might influence the future baseline.

5.4.4 The nature of the future baseline will vary between the environmental topic chapters and is influenced by a combination of natural and man-made processes. For example, **Volume 5.12.1** (Traffic and Transport) and **Volume 5.22.1** (TA) identify future baseline traffic flows by applying a growth factor to the traffic surveys in accordance with recognised appraisal techniques.

Assessment Years

5.4.5 The anticipated construction programme for the Proposed Development (and all of the permanent works) is that works are anticipated to start in Q3 2015 and are anticipated to be completed by Q3 2019.

5.4.6 However, as the construction programme might change The ES has also considered, at a high level, the potential for environmental effects to occur for alternative construction programme scenarios and these are detailed in **Volume 5.5.1, section 5.6**.

Study Areas

5.4.7 The Study Area is the geographical area within which the Proposed Development has the potential to give rise to environmental effects. Each specialist topic chapter describes the extent of the Study Area(s) used for the assessment and makes reference to Figures for illustration. The extent of the Study Areas varies across topics and is dependent upon the nature of the potential effects.

Order Limits

5.4.8 The ES assumes that the Proposed Development will be carried out within the 'Order Limits', which are identified in the Proposed Development Plans (see **Volume 5.3.3 Figure 3.1**) as a red outline, and which is effectively the planning boundary for the Proposed Development.

5.4.9 Some components are fixed in the positions marked on the Proposed Development Plans, such as the CSE compounds, substation, construction compounds and highway accesses. Other components/activities may be sited anywhere within the Order Limits (subject to local authority approval) and have been assessed as such in the ES. These include: haul roads; scaffolding; ditch crossings and the storage of topsoil.

Design Flexibility

5.4.10 The routes of the overhead line and underground cables are subject to Limits of Deviation (LoD) which provide necessary flexibility as to the final alignment of the works. The LoD identify a maximum distance or measurement of variation within which these works must be constructed.

5.4.11 For the overhead line and the underground cables, lateral (side to side) and longitudinal (along the line) and vertical (changes to height) have been defined as follows:

- overhead line 400kV T-pylon: 80m (40m either side of the pylon centre line; +/- 40m along the line);
- overhead line 400kV lattice pylon: 60m (30m either side of the pylon centre line; +/- 40m along the line);
- overhead line 132kV (lattice and wood pole) pylon: 52m (26m either side of the pylon centre line); and
- underground 400/132kV cables: variable.

5.4.12 The assessments have been carried out on the basis of the 'Reasonable Worst Case Scenario' that might arise as a result the Proposed Development moving according to the LoD (see **Volume 5.5.1, section 5.6**).

5.4.13 In some locations, more than one design option is available. For example, the 400kV underground cable crossing at the River Axe includes two options: HDD; or open cut installation. In these circumstances, both options have been assessed where relevant to do so.

Assessing Significance of Effects

5.4.14 To assess the overall significance of an effect on the environment, the EIA considers the change that would occur (the magnitude of impact) and the sensitivity of the aspect of the environment (including people and living things) that would be affected.

5.4.15 The magnitude of potential effects (both beneficial and adverse) on the relevant receptor has been identified through the detailed consideration of the Proposed Development taking into account the following:

- the degree to which the environment is potentially affected e.g. whether the quality is enhanced or impaired;
- the scale or degree of change from baseline conditions as a result of the proposed development;
- the duration of the effect e.g. whether it is temporary or permanent; and
- the reversibility of the effect.

5.4.16 The sensitivity varies according to the relative importance of the existing feature (e.g. whether it is of national, regional or local importance) and the nature of other receptors which would potentially be affected.

5.4.17 A combination of the magnitude of the likely effect and the sensitivity of the receptor determines the overall significance of effects. The significance of the likely

effects arising from the Proposed Development is categorised throughout the ES as follows (unless stated otherwise):

- Major adverse.
- Moderate adverse.
- Minor adverse.
- none.
- minor beneficial.
- moderate beneficial.
- major beneficial.

Types of Effect

5.4.18 The prediction of possible environmental effects in each environmental topic includes:

- direct and indirect (or secondary) effects;
- temporary and permanent effects;
- adverse (negative) and beneficial effects;
- construction, operation and decommissioning effects;
- the combination of effects on a topic from more the whole project;
- effects on one topic as a result of effects on another topic (e.g. water quality affecting wildlife in rivers);
- the combination of effects with other proposed developments in the vicinity; and
- remaining effects after measures have been take to avoid or reduce effects.

Avoiding or Reducing Effects (Mitigation Measures)

5.4.19 Mitigation is typically used to eliminate or reduce environmental effects when they cannot be avoided. Mitigation measures have been built into the design as far as possible. A Draft CEMP at **Volume 5.26.1** has been prepared which includes mitigation measures to avoid or reduce adverse effects during construction. Mitigation measures for other stages of the Proposed Development (operational, maintenance and decommissioning) are described.

5.4.20 Minimisation of effects can be achieved by working methods such as avoiding clearing vegetation during bird nesting season. Examples of mitigation built-in to the Proposed Development are screen planting around Sandford Substation and design of culverts to allow species to pass through.

5.4.21 Mitigation comprises measures which are embedded in the design and routeing of the Proposed Development and measures which form part of the DCO application. The assessment takes account of this mitigation when reporting on ‘residual effects’.

Enhancement Measures

5.4.22 National Grid has proposed other measures in its OSPES at **Volume 5.25.1.** These measures are subject to landowner agreement. They have not been taken into account when reporting on residual effects.

6. LANDSCAPE

6.1 Introduction

6.1.1 **Volume 5.6.1** of the ES describes the assessment of the likely significant effects on the landscape as a result of the Proposed Development.

6.2 Method

6.2.1 The method for this landscape assessment is based on the Guidance for Landscape and Visual Impact Assessment 3rd Edition (GLVIA3) and has been informed by the scoping opinion; responses to consultations; stakeholder engagement field assessments and site appraisal work.

6.2.2 The potential direct and indirect effects on landscape character have been considered within 3km of the Proposed Development.

6.2.3 The 3km study area for this landscape assessment in Sections A to H, is illustrated on **Volume 5.6.2, Figures 6.2 to 6.3**. These figures also illustrate 1km from the LoD for the Proposed Development within which the greatest direct and indirect landscape effects are anticipated.

Assessing the Significance of Landscape Effects

6.2.4 Landscape sensitivity considers the landscape's susceptibility to change to the type of development proposed and the value of the landscape:

- the susceptibility of a landscape to change is dependent on the characteristics of the receiving landscape and the type and nature of the development proposed; and
- landscape value assessment considers the relative value that is attached to a landscape. For example, highly valued landscapes are typically identified by national level designations such as National Parks and AONB.

6.2.5 The magnitude of impact considers the scale of change (i.e. whether it is high, medium, low or negligible); its nature (adverse, beneficial or neutral); and its duration (short, medium or long-term) and its reversibility.

6.3 Baseline Environment

Landscape Designations

6.3.1 Three national landscape designations were identified as part of the landscape assessment:

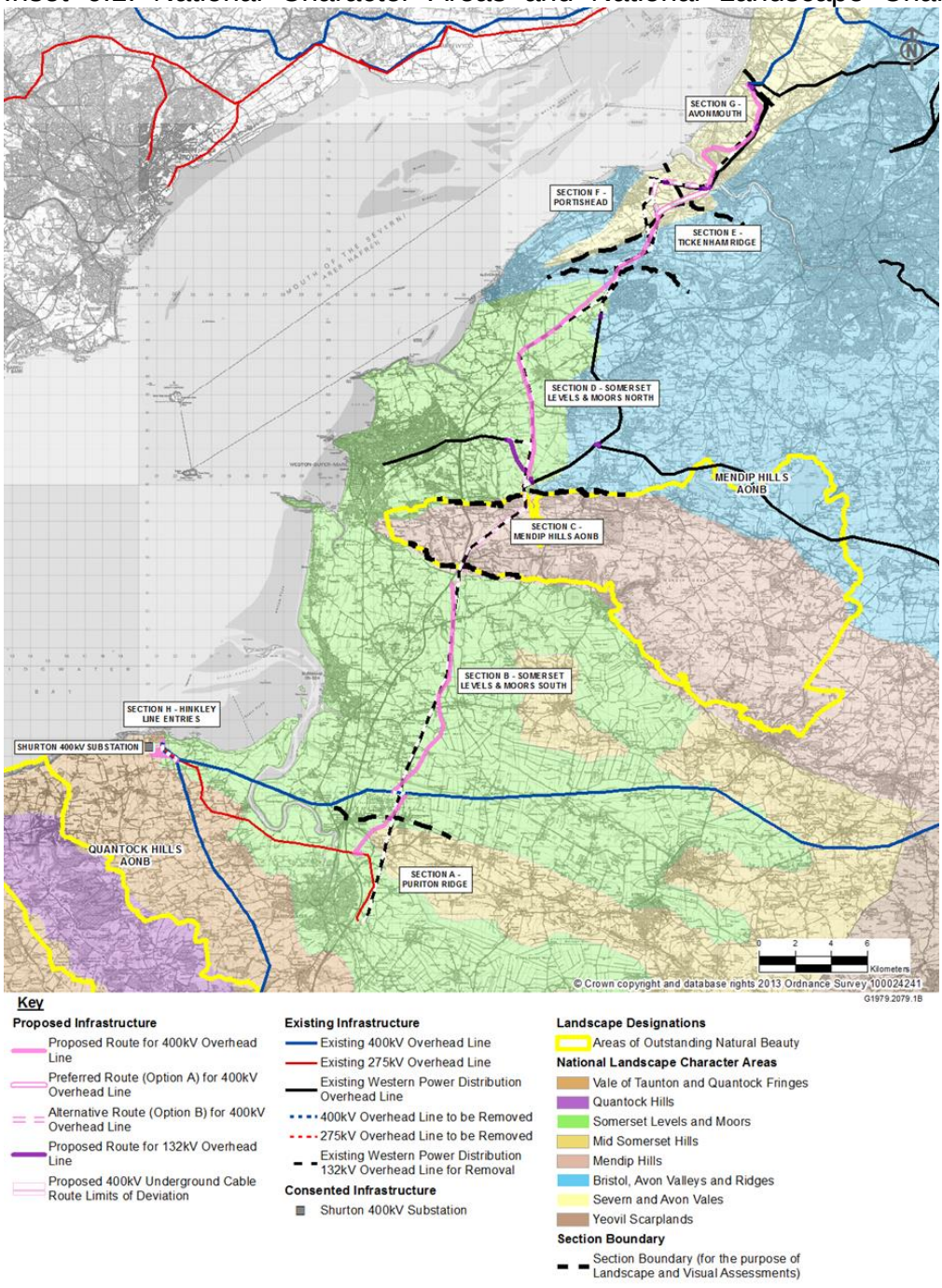
- Mendip Hills AONB;
- Quantock Hills AONB; and
- Exmoor National Park.

Landscape Character Assessment

6.3.2 Natural England has divided England into 159 distinct natural areas defined by their landscape, biodiversity, geodiversity and cultural and economic activity. These areas are known as National Character Areas (NCAs) and National Landscape Character Areas (NLCAs) and have been considered as part of the landscape assessment.

6.3.3 The NCAs and NLCAs are shown at **Inset 6.1**.

Inset 6.1: National Character Areas and National Landscape Character Areas



6.3.4 Local Landscape Character Areas (LLCAs) have also been considered as part of this landscape assessment.

6.3.5 The Forest of Avon is one of twelve Community Forests in England and extends over 57,000 hectares across four local authority areas including North Somerset, Bath and North East Somerset, Bristol and South Gloucestershire.

6.3.6 The Forest of Avon extends across the most northern part of Section D, across Tickenham Ridge in Section E, across Section F and across parts of Section G outside the predominantly urban areas.

Existing Landscape Character

Section A: Puriton Ridge

6.3.7 Section A includes Horsey Level, part of the wider Somerset Levels and Moors, comprising flat low-lying farmland divided by field drains and 'rhynes', including Bath Road Rhyne, and mature hedgerow in places.

Photograph 6.1: View from a footpath on Puriton Ridge looking south down the southern slopes of Puriton Ridge towards and across Horsey Level on flat lower lying ground

Section B: Somerset Levels and Moors South

6.3.8 Section B includes a significant part of the wider Somerset Levels and Moors including Woolavington Level, Huntspill Moor and Mark Moor.

Photograph 6.2: View across pasture to the east of Brent Knoll

Section C: Mendip Hills

6.3.9 Section C includes the western part of the Mendip Hills AONB and includes the broad low-lying valley of the Lox Yeo River, which is surrounded by higher ground of the Mendip Hills including Crook Peak, Compton Hill and Wavering Down to the south; Loxton Hill to the west; and Banwell Hill and Sandford Hill to the north and northeast.

Photograph 6.3: View from Christon Road on higher ground in Loxton looking east towards Crook Peak

Photograph 6.4: View from Crook Peak looking north and northeast across the Lox Yeo Valley and the Mendip Hills AONB

Section D: Somerset Levels and Moors North

In the south, is a lowland pastoral landscape, north of the A368 along the northern boundary of the Mendip Hills AONB at Sandford. There are cider orchards north of Sandford associated with the Thatchers Cider business. The predominantly pastoral landscape includes well maintained mature hedgerow and frequent mature hedgerow trees. Trees also line Towerhead Brook in the south of this Section.

Photograph 6.5: View from the Strawberry Line cycleway and footpath looking west and northwest across an orchard off Nye Road towards the existing overhead line known as the N Route

Section E: Tickenham Ridge

6.3.10 Tickenham Ridge rises steeply from lower lying land and provides a distinctive backdrop to the Levels in the south and Clapton Moor to the north. In the south of Section E the landscape is enclosed in parts with localised low ground and woodland blocks on higher ground to the north and south.

Photograph 6.2: View from PRoW LA16/1 (north of Stone-edge Batch) looking northeast up Tickenham Ridge along the existing overhead lines, F Route and the W Route

Section F: Portishead

6.3.11 Section F is characterised by generally flat low-lying land across Clapton Moor and across the Gordano Valley to the southwest. The land falls towards lower-lying land north of the M5 motorway which is built on an embankment. Farmland is predominantly pasture with some arable fields in particular to the south of the A369 The Portbury Hundred. There are numerous horse paddocks and stables in Section F.

6.3.12 Mature trees and hedgerow define field boundaries across Clapton Moor and in Portbury Wharf Nature Reserve. There are also mature trees and hedgerow on both sides of the A369 The Portbury Hundred and along the dismantled railway. The A369 runs approximately east to west and the disused railway approximately southeast to northwest across the southern part of this Section.

Photograph 6.3: View from Sheepway looking south across low-lying horse pasture towards the wooded Tickenham Ridge

Section G: Avonmouth

6.3.13 Section G is generally flat low-lying land between the River Severn and the River Avon. The area is dominated by industry and dock development including large warehouses and depots, car storage areas comprising large areas of fenced

hardstanding, a coal stockyard, large industrial buildings, wind turbines, cranes, dock activity, numerous industrial and trading estates, a sewage treatment works, gas works and Seabank Power Station in the north of this Section. Industry continues northeast of Seabank Power Station and includes Severnside Works, Severn View Industrial Park, Avalon Works and the Western Approach Distribution Park. The M49 and M5 motorways are to the east.

Photograph 6.4: View from Clayton Street in Avonmouth looking southwest towards industrial buildings at Avonmouth Dock

Section H: Hinkley Line Entries

6.3.14 This Section is characterised by the remote coastline and coastal marsh with the prominent power station in the background. There is low-lying mixed farmland and wetland with ditches and rhynes dividing fields, sometimes with scrubby vegetation.

Photograph 6.5: View from the West Somerset coastal path looking southwest across coastline and coastal marsh towards Hinkley Point Power Station and the existing overhead lines backgrounded by the Quantock Hills AONB

6.4 Prediction and Assessment of Significance of the Potential Effects

6.4.1 The assessment identifies and assesses the likely significant effects of the Proposed Development on landscape character during its construction, operation and decommissioning phases.

Construction Effects

6.4.2 Landscape effects associated with construction activities would be temporary and short term (0 to 5 years). However, construction works would require the removal of trees, hedgerows and shrubs, and would introduce the following elements and activity into the landscape:

- construction compounds;
- lighting at construction compounds;
- construction machinery and vehicles;
- vehicle movements;
- new bell mouths and modifications to existing bell mouths; and
- temporary access bridges.

6.4.3 The works to remove the F route would not give rise to significant effects on the landscape in any of the Sections.

6.4.4 The significance of effect on the landscape during construction would vary depending on the character and sensitivity of the landscape affected and the magnitude of effect. Construction effects would vary from **neutral** to **moderate adverse** significance and are reported for each Section in **Volume 5.6.1.**

Operational Effects

Section A: Puriton Ridge

6.4.5 The presence of the proposed CSE compounds at Bridgwater Tee and new 400kV overhead line would have **moderate adverse** effect on the local landscape.

6.4.6 The removal of the F Route to the south and on the top of Puriton Ridge and the operation of the proposed 400kV overhead line in a different position to that of the F Route would result in a **minor beneficial** effect on the landscape in the local vicinity.

Section B: Somerset Levels and Moors South

6.4.7 The proposed 400kV overhead line would have a **moderate adverse** effect on the Somerset Levels and Moors landscape. There would be a greater adverse effect where the proposed 400kV overhead line takes an alternative alignment to the F Route, including where it crosses the linear settlement of Southwick and Mark on a different alignment to the F Route. However the significance of this effect would also be **moderate adverse**.

6.4.8 In the northern part of Section B the Proposed Development would have an overall **moderate to minor adverse** effect on the Somerset Levels landscape in part of the setting of the Mendip Hills AONB.

Verified Photomontage 6.6 (Viewpoint VPB7): Anticipated view west and northwest, from PRoW AX 23/5 along Green Drove, of the proposed 400kV overhead line supported by T-pylons running north passing over Mark Causeway during operation

Section C: Mendip Hills AONB

6.4.9 The proposed 400kV underground cables would have no significant effect on landscape character, and the removal of the F Route would result in a **moderate beneficial** significance of effect on this designated landscape

6.4.10 There would be indirect effects on landscape from the South of Mendip Hills CSE compound proposed to the south of the Mendip Hills AONB, and the proposed Sandford Substation in Section D to the north when seen from high ground. The significance of these localised indirect effects would be of **minor adverse** or **neutral** significance.

Section D: Somerset Levels and Moors North

6.4.11 The proposed 400kV overhead line generally would have a **moderate adverse** effect on the Somerset Moors landscape, where it runs on the same or similar alignment as the F Route to be removed; it would have a greater effect (although remaining **moderate adverse**) on the local landscape where it would change direction between Lampley Road and Kenn Road and where it deviates from the route of the F Route across Nailsea Moor. The proposed removal of the W Route and replacing it with 132kV underground cables would result in effects of **minor beneficial** significance on the landscape close to Nailsea.

Section E: Tickenham Ridge

6.4.12 The proposed 400kV overhead line would generally have a **moderate adverse** effect on Tickenham Ridge. The proposed replacement of the W Route with underground cables, and the removal of the F Route as part of the Proposed Development in Section D would help to offset adverse effects on this landscape.

Verified Photomontage 6.20 (Viewpoint VPE9): Anticipated view of the 400kV overhead line supported by T-pylons in the southern part of Section E, including the removal of F and W Routes

Section F: Portishead

6.4.13 Overall a new 400kV overhead line, on both route options, would have an effect of **moderate adverse** significance on landscape character.

6.4.14 As part of the preferred route (Option A), the removal of the F Route and the W Route would result in a beneficial effect on the landscape in the vicinity of these 132kV overhead lines. This would be a **moderate beneficial** effect. The removal of the G Route running northeast from Portishead Substation would result in a localised beneficial effect of **minor beneficial** significance, as the BW Route would remain in situ.

6.4.15 As part of the alternative route (Option B), the removal of the F Route where it runs across Clapton Moor on a more distant route to the west of the W Route would result in a low beneficial magnitude and **minor beneficial** effect on landscape character.

Section G: Avonmouth

6.4.16 The proposed 400kV overhead line in Section G would have a generally **minor adverse** effect with effects reducing to **neutral** in the wider Severn and Avon Vales, and Bristol, Avon Valleys and Ridges landscape. This adverse effect would be greater (although remaining of **minor adverse** significance) close to residential areas in Avonmouth; and would be greater in the northeast of Section G, increasing to a **minor to moderate adverse** effect, where the proposed 400kV overhead line would run northwards across farmland, to the east of industry.

Section H: Hinkley Line Entries

6.4.17 The proposed Hinkley Line Entries would have a localised **minor adverse to neutral** effect on local landscape character.

Decommissioning Effects

6.4.18 Decommissioning of the Proposed Development would typically result in very similar landscape effects to those predicted during construction works. However, the duration of activities would generally be shorter.

Climate Change Effects

6.4.19 There may be changes to aspects of the landscape as a result of climate change. However the assessment of the effects of the Proposed Development on landscape is not anticipated to change as a result of climate change effects.

6.5 Inter-relationship of Potential Effects

6.5.1 Beyond the clear connection between landscape and visual effects, potential inter-relationship of effects is identified between Landscape and biodiversity, amenity and flood risk.

6.6 Mitigation

Mitigation during Construction

6.6.1 Specific measures would include the protection of plants, to be kept, and reinstatement works. Stockpiled soils would be protected, traffic would be managed and the siting and height of temporary buildings, cabins, equipment and lighting carefully considered, in order to reduce effects on the landscape.

6.6.2 Bunds (short 'walls', constructed out of excavated soil) and mesh fencing or green hoarding along boundaries of compounds and works areas, to screen them and help them blend into the landscape, would be put in place at:

- Tarnock compound off Fletchers Lane;
- River Axe cable bridge (if constructed) and the underground cable works near Waterfront Farm, Biddisham Lane;
- the compound and 400kV underground cable works at Towerhead;
- the 132kV underground cable works along Engine Lane, Nailsea; and
- the compound and 132kV underground cables works on the northwest edge of Nailsea.

Mitigation during Operation

6.6.3 Planting is often used to reduce the effects of new structures on landscape character (and on views). However, it is not possible to screen views of pylons by planting trees or shrubs close to them: trees cannot be planted close to overhead lines, for safety reasons; and the pylons for the Proposed Development would be too tall for trees to completely screen them from views. As a result, National Grid has tried to reduce the effects on landscape character through careful routeing and design.

6.6.4 Planting can and would be used to reduce landscape and visual effects at the proposed CSE compounds, Sandford Substation and the River Axe cable bridge.

Enhancement

6.6.5 The OSPES, **Volume 5.25**, has also been developed to further reduce the overall effects and to help strengthen local landscape character. These measures are

subject to landowner agreement. They have not been taken into account when reporting on residual effects.

6.7 Residual Effects

Construction Effects

6.7.1 Implementation of the CEMP would help to minimise the magnitude of landscape effects resulting from proposed construction works; however it is anticipated that the significance of residual effects on landscape character during construction would be the same as those predicted in the landscape assessment.

Operational Effects

6.7.2 As no mitigation measures are proposed for the overhead lines, the residual effects would be the same as the initial assessment, as described above.

6.7.3 The residual effect of the removal of the F Route would be **minor beneficial**.

6.7.4 For the underground cables, the re-establishment of hedgerows, trees and grassland would reduce effects on landscape and views to **neutral.**

6.7.5 For structures such as CSE compounds and substations, operational effects have been assessed for year 0 (upon completion), at five years and at 15 years following completion, to assess whether the establishment of plants around these structures would make a difference to the potential effects. It is expected that there would continue to be some significant effects on landscape, as the proposed landscaping would not remove effects of the Proposed Development altogether. However, the significance of these effects would reduce in some areas following 15 years of operation, as hedgerows and trees re-establish and new plants mature.

6.7.6 The residual effects on landscape character from these structures are summarised in **Table 6.1** below:

Table 6.1 Summary of the Significance of Effects on Landscape during the Operation of the Proposed Development (between year 0 and year 15, and after 15 years)

Component of the Proposed Development	**Embedded Landscape Mitigation**	**Significance of Effect during Operation (short and medium-term)**	**Significance of Effect during Operation (long term)**
Proposed Bridgwater Tee CSE compounds	Site-specific landscape mitigation proposals	**Minor adverse** (localised)	**Minor adverse to neutral**
Proposed South of Mendip Hills CSE compound	Site-specific landscape mitigation proposals	**Moderate to minor adverse**	**Minor adverse**
Proposed cables bridge option (River Axe)	Site-specific landscape mitigation proposals	**Moderate to minor adverse**	**Minor adverse**
Proposed Sandford Substation	Site-specific landscape mitigation proposals	**Moderate adverse**	**Minor adverse**

Decommissioning Effects

6.7.7 Throughout Sections A to H, decommissioning typically would result in very similar landscape effects as those predicted during construction works. However the duration of activities would generally be shorter. In the likely event that 400kV and 132kV underground cables would be left in situ, there would no associated effects on the landscape due to decommissioning other than at each end of the underground cables route.

6.8 Cumulative Effects

6.8.1 Significant potential cumulative landscape effects are predicted mainly as a result of the proposed 400kV overhead line in combination with:

- in Section B - the possible Huntspill Energy Park at Woolavington Level and the possible effect of thirteen wind turbines in the Somerset Levels;

- in Section D - the possible Photovoltaic Park and solar panels south of Hewish. the possible new industrial unit and wind turbine on the western edge of Yatton and a possible mixed use development on the northwestern edge of Nailsea; and

- in Section G - the Scottish Power Avon Power Station and Seabank 3 combined cycle gas turbine (CCGT) Power Station.

6.8.2 In each case, the other major development is the greatest contributor to the adverse effect on landscape character.

7. VISUAL EFFECTS

7.1 Introduction

7.1.1 **Volume 5.7.1** of the ES describes the assessment of the likely significant effects on views as a result of the construction, operation and decommissioning of the Proposed Development. Potential effects and mitigation measures have been described that could be implemented to reduce or avoid effects.

7.2 Method

7.2.1 The visual assessment has been informed by a combination of field assessments and site appraisal work, also taking account of representations and stakeholder engagement. The methods used to undertake the visual assessment include:

- a desk-based assessment to identify visual receptors;
- consultation with relevant local authorities, other organisations with an interest in landscape and views including consultation with the Landscape and Views Thematic Group, and consultation with local communities through community forum groups;
- site assessment to consider existing views and how they may change; and
- assessment of visual effects.

Study Areas

7.2.2 Views and potential visual effects have been considered within 3km of the LoD for the proposed 400kV overhead line, where visual effects of the greatest significance would be experienced. Valued views, identified by stakeholders, more than 3km from the LoD for the proposed 400kV overhead line were also assessed.

7.2.3 The study area boundary in Section C is 3km from the LoD for the proposed 400kV underground cable swathe, as adverse visual effects would arise during construction associated with the installation of the 400kV underground cables and removal of the F Route in this Section.

Assessing the Significance of Visual Effects

Receptor Sensitivity

7.2.4 Visual receptors are people who potentially would have a view of the Proposed Development. The sensitivity of a visual receptor depends on the susceptibility of the visual receptor to change and the value of the view.

Susceptibility to Change

7.2.5 The susceptibility of different visual receptors to potential changes in views and visual amenity is mainly a function of:

- the occupation or activity of people experiencing the view at particular locations; and

- the extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at particular locations.

7.2.6 The land use planning system considers that public views are of greater value than views from private property. Visual assessment work gives equal weight to the assessment of public views and private views.

Value of the View

7.2.7 Judgements about the value attached to the views experienced has been considered in the context of the value placed on a scene, alternatives available and the relative scenic quality of a view.

Magnitude of Impact

7.2.8 The magnitude of impact evaluates is influenced by the size or scale of a development; the geographical extent of the area influenced; the nature of the effect (adverse or beneficial); and its duration and reversibility. More weight is usually given to impacts that are greater in scale and long-term in duration.

Significance of Effect

7.2.9 The assessment of the significance of visual effects of the Proposed Development is a judgement based on the sensitivity of the receptor and the magnitude of the impact. Large-scale changes which introduce new, discordant or intrusive elements into the view of a sensitive receptor are more likely to be more significant than small changes or changes involving features already present in the view or changes in the views of less sensitive receptors. Changes in views from recognised and important viewpoints, such as scheduled monuments or outdoor tourist attractions, or from important amenity routes, such as long distance footpaths or national cycle routes, are likely to be most significant.

7.3 Baseline Environment

7.3.1 Views of the landscape are broadly characterised by the flat low-lying Somerset Levels and Moors and the Severn and Avon Vales. Views across these flat landscapes are limited by valleys and ridges including Puriton Ridge, the Mendip Hills AONB, Tickenham Ridge, Portishead Ridge and the Quantock Hills AONB. Other elevated landforms are characteristic features in views including Brent Knoll, the Isle of Wedmore, Crook Peak, Cleeve Ridge and King Weston Hill.

7.3.2 Overhead lines are generally visible across large scale flat landscapes. Typically most receptors have views of overhead lines, including the F Route, above intervening field trees, hedgerows and vegetation with the top of pylons and conductors visible above.

7.3.3 In the main, views are of local value across the large scale flat landscape with views to and from hills and ridges being locally distinctive. Views in the Mendip Hills AONB have regional value and are of regional distinction with the scenic value

of views promoted in tourist literature. Views in Avonmouth and Seabank are locally valued and are generally have low amenity value due to the industrial nature of the area.

7.3.4 The main public views of the F Route across the wider study area are experienced by visual receptors using long distance footpaths and cycle routes, PRoW, public open spaces, outdoor visitor attractions, roads and motorways.

7.3.5 Private views of the F Route across the wider study area are typically experienced by individual properties and settlements within 1km. In general views from settlements are typically experienced from the settlement edge with views within the settlement often screened by built form, trees and shrubs.

7.3.6 Individual properties and settlements beyond 1km of the Proposed Development typically have open views across large scale flat landscapes. Overhead lines are often in views and typically visible above intervening trees and hedgerows in a small part of the view.

7.3.7 Often, views extend beyond the overhead lines and the route of the proposed 400kV overhead line to the wider landscape and where overhead lines are present these are not visible in the distance above trees, landform and built form or are completely backgrounded and cannot be distinguished.

7.3.8 A digital model of the landscape and the Proposed Development has been constructed and photomontages have been produced.

7.4 Prediction and Assessment of Significance of the Potential Effects

Construction Effects

7.5.1 Construction effects typically would be of relatively short duration. The effects of construction on views would vary depending on the proximity to works, the amount of activity which would be visible and how long works would continue.

7.5.2 The 400kV underground cables would take the longest time to install and compounds would be in place for the majority of the construction programme. In other places, such as pylon sites, construction activities would take place for a relatively short time and works at height as the pylon was constructed are likely to be the most noticeable activities in views.

7.5.3 The significance of anticipated effects on views ranges from **negligible** where there would be no discernible change to **moderate adverse** significance in views where construction operations would be seen in close proximity across a large proportion of the view.

Operational Effects

7.5.4 In each case, the adverse effects of the greatest significance would be experienced in views closest to the proposed 400kV overhead line (within 1km of its LoD).

Section A: Puriton Ridge

7.5.5 For the majority of people living in or visiting Section A, the proposed 400kV overhead line crossing Puriton Ridge would be visible on completion and in the medium-term, particularly where it crosses the highest point of the ridge where there is limited backgrounding. The greatest effects on views would be experienced by users of PRoWs that would pass under the proposed 400kV overhead line conductors and the nearest residential properties. These would be of **moderate** significance.

7.5.6 The point of connection of the proposed 400kV overhead line (supported by T-pylons) to the existing 'VQ Route' (275kV Bridgwater substation to Hinkley overhead line, supported by steel lattice pylons) would appear in views from the southern part of Puriton Ridge and across the Somerset Levels and Moors. The Bridgwater Tee CSE compounds, to be built close to the VQ Route, would introduce localised adverse visual effects for visual receptors to the south of Puriton Ridge where the flat generally open Levels landscape allows expansive open views with limited screening. The presence of the VQ Route in many views would mean that the significance of adverse effects would be lower than if there were no existing overhead lines in views. Overall, these structures would result in a **minor adverse or negligible** effect on views on completion and in the medium-term.

7.5.7 For many visual receptors the F Route would be removed from views. Visual effects of **minor beneficial** significance would occur in views from Knowle and the southern edge of Woolavington where the F Route 132kV overhead line would be removed.

Section B: Somerset Levels

7.5.8 The proposed 400kV overhead line in Section B, and the South of Mendip Hills CSE compound, and potential cable bridge over the River Axe in the northern extent of this Section would have an adverse effect on views from public and private visual receptors.

7.5.9 There would be 'link pillars' approximately 1.5m high, 1m long and 0.6m wide installed at approximately 700m to 1000m intervals along the 400kV underground cables route in the northern part of Section B. There would be four link pillars at each jointing bay surrounded by timber post and rail fencing, and approximately forty four or forty eight link pillars in total along the 400kV underground cables route. These would be small features in some views, filtered and screened in places by intervening hedgerow and trees. They would result in a low adverse or negligible magnitude of effect where they would be seen.

7.5.10 There would be a small alteration in the majority of views assessed within the 3km study area in Section B and in all views assessed beyond 3km and only a small proportion of the view would be affected. This would result in visual effects of **minor adverse** or **negligible** significance in most receptor views. Some receptors closest to the proposed 400kV overhead line, and the South of Mendip Hills CSE compound and the potential cable bridge over the River Axe would experience a

moderate adverse significance of effect in views where the Proposed Development would be seen in a moderate proportion of the view.

Section C: Mendip Hills AONB

7.5.11 During the operation of the Proposed Development effects on views generally would be **moderate** to **minor beneficial** for receptors within Section C, following the removal of the F Route and as the land above the proposed 400kV underground cables swathe re-establishes and would be a barely perceptible element of the view. The link pillars would be visible at intervals as described for Section B above.

7.5.12 Hedgerows removed during construction works would be replanted and stock-proof fencing would be seen protecting reinstated hedgerow in short-term views. New hedgerow would become established within approximately 5 years following reinstatement of the cable swathe. Short term visual effects arising from the removal of hedgerow within the cable swathe would reduce in the medium-term as hedgerows mature restoring field boundaries and providing filtering and screening in some views from lower ground within the valley. Minor tree loss in hedgerows removed within the underground cable swathe would be perceptible in some views close to the cable swathe; however visual effects would be of **minor adverse** or **negligible** significance.

Section D: Somerset Levels and Moors North

7.5.13 The greatest adverse effect on views during operation in the short and medium-term would be from visual receptors closest to the proposed Sandford Substation, N Route wood poles and AT Route underground cables. The proposed 400kV overhead line would also be visible further away. In combination, these would result in a **moderate** to **major adverse** effect on the closest receptors, where these structures would occupy a large extent of the view.

7.5.14 For the majority of views in Section D that would be affected by the Proposed Development the F Route overhead line is presently in views above trees, with the AT Route, W Route and N Route overhead lines also visible above trees in some views. In most views the F Route would be replaced with the proposed 400kV overhead line, which would be more visible above trees and hedgerows due to the greater height of the pylons. This would result in a **minor adverse** or **negligible** effect in most views.

7.5.15 There would be a **moderate beneficial** or **minor beneficial** effect on views from a number of public and private receptors where the F Route, a section of the AT Route, W Route or N Route would be removed from views. Visual effects of the greatest beneficial significance would be experienced in views closest to the F Route, W Route and N Route 132kV overhead lines to be removed where the new overhead line would be further away.

Section E: Tickenham Ridge

7.5.16 In the majority of public and private views the F Route and W Route would be removed and replaced with the proposed 400kV overhead line. The new 400kV overhead line would be more visible on the ridge landform than the F or W Routes and would result in a **moderate adverse** or **minor adverse** effect on views.

Section F: Portishead

7.4.1 There are two potential options for the route of the proposed 400kV overhead line in Section F, referred to as the preferred route (Option A); and the alternative route (Option B).

7.4.2 The new 400kV overhead line in Section F on either route would have an adverse effect on public and private visual receptors in the local area. Receptors would also have views of the new 400kV overhead line on the higher ground of Tickenham Ridge in Section E; it would be particularly visible where it crosses the highest point of the ridge.

7.4.3 The greatest adverse effects on views would be of **moderate adverse** significance and be experienced by receptors close to the new 400kV overhead line (on either route) and would include users of PRoW, cycleways, Portbury Wharf Nature Reserve and the nearest residential properties.

7.4.4 The greatest beneficial effects on the preferred route (Option A) would be of **moderate beneficial** significance and be experienced by users of PRoWs and bird hides in Portbury Nature Reserve and residents on the eastern edge of Portbury Wharf. These would result from the removal of the F Route and the W Route between the M5 and Portishead Substation, in combination with the new 400kV overhead line being on the preferred route (Option A).

7.4.5 For alternative route (Option B), there would be a **minor beneficial** effect on views experienced by users of PRoWs and bird hides in Portbury Nature Reserve and residents at Sheepway, as a result of the removal of the F and W Routes, in places where the new 400kV overhead line is not visible, or where it is in a small proportion of a view that previously included the F and W Routes.

Section G: Avonmouth

7.5.17 The proposed 400kV overhead line in Section G on either the preferred route (Option A) or the alternative route (Option B) would have an **minor adverse or negligible adverse** effect on most public and private views.

7.5.18 On the preferred route (Option A) south of the River Avon visual receptors would experience a **moderate adverse** significance of effect on views along the disused railway south of Royal Portbury Docks and Marsh Lane north of Easton-in-Gordano;

7.5.19 On the alternative route (Option B) south of the River Avon the visual receptors identified above would experience a **minor adverse** or **negligible** effect.

7.5.20 North of the River Avon there is one option for the route of the proposed 400kV overhead line and effects of the **moderate adverse** significance would be experienced by the closest visual receptors in Avonmouth, including: PRoWs which pass under the line and across Hallen Marsh; and residential properties between Packgate Road and Lawrence Weston Road and on Moorhouse Lane.

Section H: Hinkley Line Entries

7.5.21 The proposed overhead line entries in Section H would have an adverse effect of **minor adverse** or **negligible** significance on most public and private views. Some receptors would experience a **moderate to minor adverse** significance of effect in views.

Decommissioning Effects

7.4.6 Decommissioning of the Proposed Development would typically result in very similar effects on views to those predicted during construction works. However, the duration of activities would generally be shorter. The main sources of effects from decommissioning would be operations to remove Sandford Substation, the substation extensions and CSE compounds.

7.4.7 Underground cables are typically left in the ground when no longer needed unless there are overriding reasons related to the environment or health and safety that would require their removal. If they were removed, the effects on views would be similar to those predicted during construction works.

Climate Change Effects

7.4.8 The assessment of the effects of the Proposed Development on views is not anticipated to change due to climate change effects.

7.5 Inter-relationship of Potential Effects

7.5.1 Beyond the clear connection between landscape and visual effects, potential inter-relationship of effects is identified between landscape and biodiversity, amenity and flood risk.

7.6 Mitigation

Mitigation during Construction

7.6.1 Specific measures would include the protection of plants, to be kept, and reinstatement works. Stockpiled soils would be protected, traffic would be managed and the siting and height of temporary buildings, cabins, equipment and lighting carefully considered, in order to reduce effects on the landscape.

7.6.2 Bunds (short 'walls', constructed out of excavated soil) and mesh fencing or green hoarding along boundaries of compounds and works areas, to screen them and help them blend into the landscape, would be put in place at:

- Tarnock compound off Fletchers Lane;

- River Axe cable bridge (if constructed) and the underground cable works near Waterfront Farm, Biddisham Lane;
- the compound and 400kV underground cable works at Towerhead;
- the 132kV underground cable works along Engine Lane, Nailsea; and
- the compound and 132kV underground cables works on the northwest edge of Nailsea.

Mitigation during Operation

7.6.3 Planting is often used to reduce the effects of new structures on landscape character (and on views). However, it is not possible to screen views of pylons by planting trees or shrubs close to them: trees cannot be planted close to overhead lines, for safety reasons; and the pylons for the Proposed Development would be too tall for trees to completely screen them from views. As a result, National Grid has tried to reduce the effects on landscape character through careful routeing and design.

7.6.4 Planting can and would be used to reduce landscape and visual effects at the proposed CSE compounds, Sandford Substation and the River Axe cable bridge.

Enhancement

7.6.5 The OSPES, **Volume 5.25**, has also been developed to further reduce the overall effects and to help strengthen local landscape character. These measures are subject to landowner agreement. They have not been taken into account when reporting on residual effects.

7.7 Residual Effects

Construction Effects

7.7.1 Implementation of the CEMP would help to minimise the magnitude of landscape effects resulting from proposed construction works; however it is anticipated that the significance of residual effects on landscape character during construction would be the same as those predicted in the landscape assessment.

Operational Effects

7.7.2 As no mitigation measures are proposed for the overhead lines, the residual effects would be the same as the initial assessment, as described above.

7.7.3 The residual effect of the removal of the F Route would be **minor beneficial**.

7.7.4 For the underground cable routes (400kV and 132kV), the re-establishment of hedgerows, trees and grassland would reduce effects on landscape and views to **neutral**.

7.7.5 For structures such as CSE compounds and substations, operational effects have been assessed for year 0 (upon completion), at five years and at 15 years following completion, to assess whether the establishment of plants around these structures would make a difference to the potential effects.

7.7.6 For the proposed CSE compounds, tree and shrub planting would have matured to provide a more robust screen of the lower parts of the structures in views with only the tops of gantries and sealing ends visible. Effects on views towards the proposed CSE compounds (Bridgwater Tee and South of Mendip Hills) would reduce however the significance of the residual effect would remain the same after 15 years as on completion due to effects of the proposed 400kV overhead line.

7.7.7 For the majority of receptors close to Sandford substation and its associated works, residual effects after 15 years would remain the same as those on completion. However tree planting along the rhynes and ditches, within the orchards and the shelterbelts would have matured to provide a more robust screen to adjacent receptors. The low lying landform and mature tree belts in this landscape means that the substation would be visible only from PRoW, properties and roads close to the substation. Effects on views from Droveway Farm would reduce to **moderate adverse** significance as orchard and tree planting along the southern boundary of the substation mature and screen views of all but the tops of gantries and the terminal pylon.

Decommissioning Effects

7.7.8 Throughout Sections A to H, decommissioning of the Proposed Development typically would result in very similar effects on views as those predicted during construction. However the duration of activities would generally be shorter. In the likely event that 400kV and 132kV underground cables would be left in the ground when redundant, there would no effects on views due to decommissioning other than at each end of the underground cables route.

7.8 Cumulative Effects

7.8.1 Significant potential cumulative landscape effects are predicted mainly as a result of the proposed 400kV overhead line in combination with:

- in Section B - the possible Huntspill Energy Park at Woolavington Level and the possible effect of thirteen wind turbines in the Somerset Levels;
- in Section D - the possible Photovoltaic Park and solar panels south of Hewish. the possible new industrial unit and wind turbine on the western edge of Yatton and a possible mixed use development on the north western edge of Nailsea; and
- in Section G - the Scottish Power Avon Power Station and Seabank 3 CCGT Power Station.

7.8.2 In each case, the other major development is the greatest contributor to the adverse effect on landscape character.

8. BIODIVERSITY AND NATURE CONSERVATION

8.1 Introduction

8.1.1 **Volume 5.8.1** of the ES describes the assessment of the likely significant effects on the ecological environment as a result of the Proposed Development, together with mitigation measures to reduce or avoid effects.

8.1.2 The Applicant's Report to Support Habitats Regulations Assessment, **Volume 5.20.1** has been prepared to allow an assessment of the Proposed Development in accordance with The Conservation of Habitats and Species Regulations 2010. The HRA Report considers potential effects on the integrity of Natura 2000 sites. It focuses on the 'qualifying features' of these sites that have the potential to be affected by the Proposed Development. These features primarily are birds and bats.

8.2 Method

8.2.1 The assessment was informed by the scoping opinion from PINS; responses to consultations; and stakeholder engagement.

8.2.2 Potential direct and indirect effects that may occur on biodiversity during the lifespan of the project were considered as the scheme design evolved. The study area for each ecological receptor was determined and is in **Volume 5.8.2, Appendix 8A**.

8.2.3 Ecological field surveys commenced in 2009 across two Route Corridor options. The scope of surveys has been refined to focus on the preferred corridor and then the Order Limits for the Proposed Development.

Assessing Significance

8.2.4 The significance of an effect on an ecological receptor (a habitat or species) is assessed by reference to the value of the receptor and the magnitude of the impact. Each receptor is assigned a value in terms of the conservation of genetic resources, and its viability at the geographic level being considered. (This is similar to the conservation status for a species, so the rarer it is, the higher its value.)

8.2.5 These values are assigned purely on the innate value of the flora, fauna and habitats in terms of the conservation of genetic resources; they do not take account of the amenity or economic values of the ecological resources, or whether they are legally protected species.

8.2.6 The magnitude of a potential effect is the degree of change caused in an ecological receptor assessed against the baseline conditions. It relates to the sensitivity of a receptor to the nature of a given effect and takes into account the duration, seasonal timing and frequency of effects; whether the effects are permanent or can be reversed; and the area in which the effect would occur.

8.3 Baseline Environment

8.3.1 A review of wildlife site designation data and species and habitat records was undertaken early in the design process. Internationally designated sites within 10km radius, national sites across 2km radius and for local and county designated sites across a 1km radius.

8.3.2 More information was gained from survey reports for other planning applications, from wildlife monitoring reports and from research papers associated with the area.

Designated Wildlife Sites

8.3.3 A high proportion of land in southwest England falls in national and international statutory designations protecting the natural environment. International, national and county designations were identified as follows:

- SAC: Special Area of Conservation, is an area which has been given special protection under the European Union's Habitats Directive;
- SPA: Special Protection Area, is an area of land, water or sea which has been identified as being of international importance for the breeding, feeding, wintering or the migration of rare and vulnerable species of birds found within the European Union;
- Ramsar: Ramsar sites are wetlands of international importance, designated under the Ramsar Convention (an international agreement signed in Ramsar, Iran, in 1971);
- SSSI: Site of Special Scientific Interest, is one of the country's very best wildlife and/or geological sites;
- NNR: National Nature Reserve, is one of the finest sites in England for wildlife and/or geology; and
- SNCI: Site of Nature and Conservation Interest, is a site of substantive local nature conservation and geological value.

8.3.4 There are many designated habitats along the route of the Proposed Development which are described in **Volume 5.8.1.** These include:

- Somerset Levels and Moors (SAC, SPA, Ramsar, SSSI);
- Severn Estuary (SAC, SPA, Ramsar);
- North Somerset & Mendip Bats (SAC);
- Mendip Limestone Grasslands SAC;
- Biddle Street, Yatton SSSI;
- Tickenham, Nailsea & Kenn Moors SSSI; and
- Portbury Wharf SNCI.

Habitats and Flora

8.3.5 Woodland habitats are generally uncommon across the route, although many are also designated as local wildlife sites; Tickenham Ridge is the most wooded Section along the route.

8.3.6 The networks of hedgerows and field drainage ditches, known locally as 'rhynes' (Somerset) or 'rhines' (Gloucestershire) are present across the majority of the route, with the exception of heavily built-up areas at Royal Portbury Docks. The rhynes help irrigate the extensive low-lying areas in dry periods and drain excess water during wet periods. They are important in reducing risk of flooding and are subject to dredging and vegetation clearance on cycles of one to five years.

8.3.7 Avonmouth Old Sidings is the only peatland habitat identified in the Order Limits and nearby.

8.3.8 Other wetland habitats in the Order Limits include running water; ponds; swamp; and saltmarsh and intertidal mudflats.

8.3.9 Grassland habitat dominates the rural areas that would be crossed by the proposed 400kV overhead line. There are a number of different types of grassland, however semi-improved neutral grassland, poor semi-improved grassland and improved grassland make up the majority.

Fauna

Birds

8.3.10 Bird types recorded and considered in the assessment include:

- Wildfowl;
- Waders;
- Raptors and Owls;
- Herons and Egrets;
- Farmland birds; and
- 'Schedule 1 species', such as Cetti's Warbler, kingfisher and barn owl.

Bats

8.3.11 A number of UK bat species are known to be resident in Somerset, most of which breed in the county and include:

- Horseshoe bats
- Barbastelle Bat;
- Long-eared bats
- Pipistrelle bats
- Bats of *Nyctalus* genus
- Serotine bats

- Bats of the *Myotis* genus

8.3.12 A Bat Tree Roost survey was undertaken. Following daytime ground-level and aerial inspections, 123 trees were subject to nocturnal roost surveys. Bat roosts were identified in 21 trees in the Order Limits. The survey findings are in **Volume 5.8.2**, **Appendix 8H** and illustrated at **Volume 5.8.3, Figure 8.25**.

8.3.13 A tree on the southern edge of Chisland Covert was classed as a maternity roost for whiskered bats and also may be a hibernation roost.

Other Mammal Species

8.3.14 Surveys were carried out to identify the presence and range of populations for other protected species including:

- Hazel dormouse: no records within the Route Corridor; none found during field survey;
- Water vole: widespread across the Order Limits for the Proposed Development;
- Otter: widespread across the Order Limits for the Proposed Development;
- Badger: records for setts along the Proposed Development route; 20 confirmed by field survey; and
- Other mammals identified in records: brown hare, hedgehog, harvest mouse and polecat.

Amphibians

8.3.15 Records show Great Crested Newts (GCN) to be reasonably widely distributed across the North Somerset area, although records become increasingly sparse further south west.

8.3.16 The distribution of common toad across Somerset is similar to that of GCN, although records generally extend further south west. Incidental records of common toad species were noted during the GCN surveys.

Reptiles

8.3.17 Data searches have revealed that reptiles are widespread across the Somerset area around the route corridor particularly grass snake and more rarely slow worm, common lizard and adder.

8.3.18 Low numbers of grass snake, slow worm and common lizard were recorded at select locations across the Proposed Development. Eight of the 17 targeted survey sites were found to support reptiles.

Ditch Invertebrates and Flora

8.3.19 The desk study identified 1,381 invertebrate records along the route of the Proposed Development including 8 species classified by the International Union for

Conservation of Nature (IUCN) as Vulnerable or Near-threatened, 40 nationally listed species and 10 species listed under the Natural Environment and Rural Communities (NERC) Act 2006. The records are in **Volume 5.8.2, Appendix 8N**.

8.3.20 Two of the 8 IUCN classified invertebrates are associated with water bodies. There are 2 records of great silver water beetle and 40 records of variable damselfly. The majority of these records are Tickenham, Nailsea & Kenn Moors SSSI.

Fish

8.3.21 The Severn Estuary SAC is designated for migratory fish and sea lamprey, river lamprey and twaite shad are the Annex II species forming the primary reason for designation. The Huntspill, Brue, Axe, Lox Yeo, Yeo, Kenn, Land Yeo Rivers and tributary streams flow into the SAC. It has not been established whether and how the migratory fish use the network of rivers although there are no known records for either shad or lamprey in the Order Limits.

8.3.22 Environment Agency fisheries surveys show that the majority of fish in the rivers are common freshwater fish. There are many records of European eel at each of the sampling locations. The European eel is on the IUCN Red List – Critically Endangered, a NERC species and an Avon Biodiversity Action Plan priority species

8.3.23 In broad terms, the fisheries data recorded a greater diversity of species within the Huntspill River (11 species) and Old River Axe (12 species) in comparison to the Rivers Banwell, Yeo and Kenn (5-6 species each).

8.4 Prediction and Assessment of Significance of the Potential Effects

Construction Effects

8.4.1 Potential construction effects on biodiversity would include permanent habitat loss from the physical development of infrastructure such as CSE compounds, the footprint of pylons and the development of substations and substation extension. There would be permanent habitat loss through the removal of trees from land which would be kept clear beneath overhead lines and above underground cables.

8.4.2 Medium term temporary effects on biodiversity would result from land take for temporary land uses including construction compounds and laydown areas, and undergrounding cables.

Designated Sites

8.4.3 The Severn Estuary SPA, SAC, Ramsar Site may experience a **moderate adverse** effect as a result of disturbance to a small number of SPA species of birds during construction works either side of the River Avon and works close to waterbodies in Portbury Wharf.

8.4.4 North Somerset and Mendip Bat SAC lies outside of the Order Limits, however parts of the Proposed Development lie within the SAC 'Consideration Zone' (CZ). During the construction phase, hedgerow removal within the SAC CZs would potentially disrupt bat flyways and, together with loss of pasture could reduce

availability of bat foraging habitat. The effect on the qualifying bats is predicted to be of **major adverse** significance.

8.4.5 The Mendip grasslands SAC is designated for horseshoe bats and lies slightly closer to the Proposed Development Order Limits than the Mendip Bat SAC. The temporary loss and degradation of foraging habitat on the qualifying bats during construction and until the hedgerow replacement and site-specific landscape planting establish, is an effect predicted to be **major adverse** significance.

8.4.6 Within Biddle Street Yatton SSSI, the ditches form the special interest and the SSSI designation applies also to the land extending 6m from the bank top either side of the ditches. Three watercourse crossings (two culverts and one bridge) are proposed; the effect is of **moderate adverse** significance.

8.4.7 Similarly, Tickenham, Nailsea and Kenn Moors SSSI is designated for its ditch habitats and the SSSI designation extends 6m from the bank top on either side of each ditch. The undergrounding is largely outside the SSSI, but it crosses 3 SSSI ditches in the northeast of the site, however these would be crossed by drilling underneath them. To install the new 400kV overhead line across the SSSI ditches there would be 32 temporary ditch crossings (28 culverts and 4 bridges) to accommodate the access roads across the SSSI; the effect is predicted to be **major adverse** significance.

8.4.8 The Portbury Wharf SNCI and the Portbury Wharf Nature Reserve SNCI Avon Wildlife Trust Reserve would both be subject to land take and disturbance as a result of the works to underground the existing lines, and, if the alternative route (Option B) was chosen, semi-improved neutral and marshy grasslands, hedgerows and trees would also be affected. These effects are predicted to be of **moderate adverse** significance.

Habitats and Flora

8.4.9 Loss of trees and woodland on the route of the underground cables and overhead lines represents a permanent loss. Prior to mitigation, this permanent loss of scattered trees and woodland habitats would be of **major adverse** significance.

8.4.10 **Minor adverse** effects on ditches and watercourses are predicted from culverting for access tracks; **moderate adverse** effects from culverting for 400kV underground cables and the realignment of Parish Rhyne; and **major adverse** effects from the spreading of ‘alien’ and invasive species, principally aquatic waterweeds.

8.4.11 Effects on grassland habitats are largely predicted to be of **minor adverse** significance, across all habitat types.

Fauna

Birds

8.4.12 Displacement and disturbance effects on bird species are predicted to include **moderate adverse** (wader and wildfowl species associated with the Severn

Estuary SPA/Ramsar or Somerset Levels SPA/Ramsar); and **minor adverse** (wader, raptor species, farmland birds associated with other habitats).

8.4.13 Effects relating to habitat loss for bird species are predicted to be either **minor adverse** or **not significant.**

Bats

8.4.14 Effects on bats as result of habitat loss would include **moderate adverse** (loss of up to seven tree roosts); **major adverse** (fragmentation and severance of habitat for Horseshoe bats at proposed 400kV underground connection construction swathe) and **major adverse** (on Bechstein's bats as a result of lighting at Sandford substation and construction compounds).

8.4.15 Land near Portbury Wharf has notable bat activity. Habitats that support roosts would be affected by the selection of the Alternative Route (Option B) and two trees that host non-breeding roosts would be identified during the field surveys would be lost under this option.

Great Crested Newts

8.4.16 There would be no permanent loss of pond or ditch habitat at any of the locations where GCN were recorded. The effect on GCN is predicted to be of **minor adverse** significance.

8.4.17 The loss and fragmentation, of terrestrial habitat used by GCN, would also affect common toad, frog and the small newt species. The effect on GCN and the wider amphibian assemblage is predicted to be of **moderate** and **minor** significance respectively.

Water Voles

8.4.18 Potential effects on water voles as a result of watercourse crossings or construction works in close proximity to watercourses would be **minor adverse** (for example from permanent bridge crossings); **moderate adverse** (for example in HDD areas); and **major adverse** (from medium-term culvert crossings and by the short-term cable ducts installation).

Otter

8.4.19 Potential effects on otters as a result of watercourse crossings or construction works in close proximity to watercourses are expected to be of **minor adverse** significance.

Badger

8.4.20 Potential effects on badger (and setts) include **moderate adverse** comprising where setts are lost or directly affected by works; potential for injury or death of badgers from falling into excavations; loss and severance of habitats.

Operational Effects

8.4.21 Once installed, no further habitat loss or severance effects further to those assessed under the construction phase are expected to occur. Habitats sown and planted in as reinstated construction areas will continue to establish and naturally colonise.

8.4.22 The main effect on biodiversity during operation relates to the risk of collision for certain bird species in specific locations although this is partially mitigated through design by the removal of considerable lengths of existing overhead line. Overall collision risk associated with the Proposed Development would be **not significant.** However, there is some uncertainty about potential effects in respect of the Severn Estuary SAC/SPA/Ramsar and the Somerset Levels and Moors SAC/SPA/Ramsar. Land at Hallen Marsh, in Avonmouth has been proposed as compensatory or 'offsetting' land for the Severn estuary SPA. This land may in the future be used by SPA species, and the birds may fly across the new 400kV overhead line. If they did, they would be in the collision risk zone and an effect of **major adverse** significance would result.

8.4.23 Cables generate heat when they carry a current and could potentially have a heating effect on surrounding terrestrial and aquatic habitats. Given the depth of the cables, the soil used to backfill around the cables, the cooling effects of flowing water (aquatic habitats) and the dissipation of heat away from its source, it is predicted that effects would be **not significant** (aquatic) to **minor adverse** (terrestrial).

Decommissioning Effects

8.4.24 The activities described for the construction of the Proposed Development are similar to those the activities that would be undertaken during its decommissioning. The effects arising from decommissioning would be similar to those identified for construction. If the underground cables are left in the ground when redundant, there will be very few effects from decommissioning that part of the Proposed Development.

Climate Change Effects

8.4.25 There would be no direct effect on designated sites. The mitigation measures proposed would avoid worsening existing pressures on the sites. The replacement hedgerows and other new landscapes would be planted in accordance with guidance on addressing climate change as set out by the Forestry Commission.

8.5 Inter-relationship of Potential Effects

8.5.1 Inter-relationships of effects are identified for the following topics:

- landscape and visual (landscape planting proposals);
- ground environment (peat soils, heat transfer on soils);
- hydrology (water chemistry, hydromorphology);
- historic environment (intrusive ground investigations);
- air quality (nitrogen deposition);

- noise (effects on badgers)

8.6 Mitigation

Mitigation during Construction

8.6.1 Mitigation of potential construction effects would largely be achieved through the implementation of the proposed BMS detailed in **Volume 5.26.3.** The BMS sets out mitigation and enhancement measures for implementation on site.

8.6.2 The aims of the BMS are to:

- ensure that construction works would be carried out in such a way as to ensure that any disturbance to ecological interests including designated sites, is controlled and minimised;
- ensure that that appropriate measures are adopted to protect the ecosystems within the working area;
- avoid impacts on protected species in accordance with relevant good practice, statutory provisions and legislative requirements; and
- ensure that all habitats are fully reinstated and where feasible, enhancement opportunities are implemented following completion of works.

8.6.3 Mitigation measures include:

- provision of temporary bat flyways where cable installation would result in substantial gaps in hedges important to SAC bats;
- installation of bird flight diverters where there is evidence of collision risk to birds associated with the SPA and Ramsar sites;
- inspection of trees prior to felling to ascertain if any SAC bat species have roosted;
- surveys to identify the presence and necessary protection of badger setts and installation of badger fencing around excavations;
- avoiding works which would result in ground disturbance within 50m of a great crested newt breeding pond during the hibernation period; and
- measures to prevent water pollution at watercourse crossings. A fish rescue would also be implemented during temporary de-watering during installation and removal of water crossings.

Mitigation during Operation

8.6.4 Post construction monitoring would continue at designated wildlife sites and would be compared against the baseline to inform long term condition monitoring.

8.6.5 Management of habitats and flora planted as reinstatement will continue for 5 years informed by on-going monitoring.

8.6.6 Monitoring of specific receptors such as bats would also continue throughout the operational period of the Proposed Development. Results will be compared to the baseline surveys to ensure any adverse effects can easily be detected and trigger appropriate remedial action.

8.7 Residual Effects

8.7.1 Bird Collisions: the provision of bird flight diverters in areas where bird movements are likely to occur (through stretches of the overhead line crossing the three potential flight corridors – the Huntspill River, King's Sedgemoor Drain and the River Brue) would reduce effects to **minor adverse**.

8.7.2 For the Mendip Limestone Grasslands and North Somerset & Mendip Bats SACs, the provision of temporary flyways using brushwood and ivy screens after hedgerow removal, following lines of former hedges would result in **no significant** effect.

8.7.3 Hallen Marsh is compensatory land for third-party development affecting the Severn Estuary SPA Ramsar. Habitat reinstatement would occur in line with the aspirations to create habitats suitable for wintering birds. This would result in effects of **moderate adverse** significance.

8.7.4 At Biddle Street Yatton and Tickenham, Nailsea & Kenn Moors SSSIs, the effects of the temporary loss of aquatic habitats would be reduced to **not significant** following the implementation of BMS measures.

8.7.5 The effects grassland, trees, hedgerows, GCN habitat, water voles and invertebrates and nesting bird habitat at Portbury Wharf SNCI would be reduced to **minor adverse** following implementation of the BMS measures.

8.7.6 The restriction on re-establishment of trees below overhead lines and above underground cables and the restriction on creating wetlands above the underground cables. Tree replacements are proposed to be delivered through mitigation and enhancement proposals together. Effects on woodland species would reduce to **minor adverse** following implementation of the Arboricultural Method Statement (minimising losses).

8.7.7 The Proposed Development would also result in some permanent land-take in designated sites and priority habitats, due to pylon bases and other small working areas. These losses are **not significant** in terms of affecting the ecological function or the management of the sites.

8.7.8 The Proposed Development would have medium-term effects arising from vegetation clearance, wildlife displacement and exclusion for the construction period of approximately four years, followed by a period of habitat re-establishment during which time ecological functions will gradually recover. The principal medium-term effects would be loss of mature trees and tree groups and loss of important and particularly species-rich hedgerows. Hedgerows would be replaced but will regain ecological diversity functions only in the long-term.

Offsetting

8.7.9 National Grid would provide a sum for offsetting adverse effects on county and local designated sites in recognition of the adverse effects that could arise on biodiversity, notwithstanding the habitat reinstatement measures, the embedded BMS proposals and the OSPES (**Volume 5.25.1**).

8.7.10 This would allow for habitat creation and management works in the affected local sites and others to which they are connected in ecological networks. These offsetting activities would compensate for adverse effects arising from the loss of trees and construction-stage disturbance and wildlife exclusion; and in some cases would provide enhancements.

8.7.11 The offsetting measures fall into three categories:

- a contribution to biodiversity offsetting for local wildlife sites;
- a Tilting Weir for Tickenham, Nailsea and Kenn Moors SSSI; and
- a contribution to the Hallen Marsh project

8.8 Cumulative Effects

8.8.1 The cumulative assessment is provided at **Volume 5.17.1** and includes potential cumulative effects of the Proposed Development together with other major development proposals. 32 developments have been identified with potential significant cumulative effects in relation to biodiversity. None of the predicted cumulative effects is greater than the predicted effect of the Proposed Development.

9. GROUND ENVIRONMENT

9.1 Introduction

9.1.1 **Volume 5.9.1** of the ES describes the assessment of the likely significant effects on the ground environment as a result of the construction, operation and decommissioning of the Proposed Development. Potential effects have been described with mitigation measures that would reduce or avoid effects.

9.2 Method

9.2.1 The Ground Environment Assessment has been informed by the scoping opinion from PINS; responses to the Stage 4 consultation; and stakeholder engagement.

9.2.2 The assessment has been based on a detailed understanding of the local geological and regional hydrogeological regimes. This was obtained by carrying out a site visit, reviewing an environmental database including historical maps, review of other information, such as the Environment Agency website, and reviewing information provided by relevant organisations that were consulted. Environment Agency maps were used including groundwater vulnerability maps and the online aquifer designation and groundwater source protection zone (SPZ) maps.

9.2.3 Assessment of significance has been determined by considering the magnitude of anticipated impact and the sensitivity of receptor.

9.3 Baseline Environment

Geology

9.3.1 Geologically, the south west is a diverse region, with the rocks and sediments in the Proposed Development area spanning the last 440 million years of time.

9.3.2 The Mendip Hills are of particular note. They are formed in blocks of folded Carboniferous Limestone, and representing the remnants of a much higher range of hills that existed hundreds of millions years ago.

9.3.3 The Somerset Coalfield in northern Somerset is an area where coal was mined from the 15th century until 1973. It is part of a larger coalfield which stretched into southern Gloucestershire. The Somerset coalfield stretched for approximately 662km^2 from Cromhall in the north to the Mendip Hills in the south, and from Bath in the east to Nailsea in the west. Clusters of pits close together, often with the same owner, worked the coal seams. Many pits shared the trackways and tramways which connected them to the Somerset Coal Canal or railways for distribution.

Soils

9.3.4 Soils in the Somerset Levels and Moors are mainly clay or peat, both of which have also been dug as a mineral resource in some localities. There is relatively little

derelict land. The Avonmouth area of Bristol is a heavily industrial and has many contaminative uses.

9.3.5 There is potential for contaminated ground to be present in land crossed by the Proposed Development. The potential contamination is associated with present day land uses including landfill tips, sewage works and agricultural operations.

9.3.6 The Environment Agency has carried out research into the degradation of soil structure in southwest England. It found that few sites sampled had good soil structure and almost half of the sites' soils were degraded.

9.3.7 The soils with the most damage are sandy, silty and light loamy soils. The shallow chalk and limestone soils are the least damaged.

Land Use

9.3.8 Agriculture is the predominant land-use in the Proposed Development area, only becoming more developed industrially as the route travels north to Nailsea and then northwest towards Avonmouth. Most of the agricultural land is of Grade 3 land quality.

9.3.9 To the north of the Proposed Development, the Avonmouth and Severnside Enterprise Area comprises a mix of industrial, storage and distribution, power generation, waste recycling and disposal, sewage treatment and gas storage facilities, the Port of Bristol and agricultural land.

Groundwater

9.3.10 The Environment Agency has defined SPZs for groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. The maps show three main zones (inner, outer and total catchment.

9.3.11 The majority of the route and sites of the Proposed Development lies outside of any designated SPZ. A small section of the route lies within a SPZ 1 (Inner Zone) on Tickenham Ridge. A section of the underground 400kV cables through the Mendip Hills crosses between two SPZs.

9.4 Prediction and Assessment of Significance of the Potential Effects

Construction Effects

9.4.1 The majority of potential effects to the ground environment are predicted to occur during the construction of the Proposed Development and are considered possible if there were no appropriate mitigation measures.

9.4.2 Potential effects that may arise on the ground environment, common to all aspects of the Proposed Development are summarised as follows:

- damage to designated geological sites: **negligible;**

- sterilisation of areas of mineral resources (both current and future): **negligible to minor adverse;**
- collapse of unstable ground by construction works: **minor adverse** (subsidence and collapse of the near surface at former coal workings in Nailsea);
- creation of additional ground migration pathways for mine gas, ground gas or landfill gas: **negligible to minor** for most of the route; **moderate adverse** (comprising proposed underground cable route at West End, Nailsea across a former colliery; the proposed underground cable route within Section F across a historic landfill beneath the western part of the Substation; and historic landfills at Seabank substation);
- loss of or damage to structure of topsoil during soil stripping operations and reinstatement, leading to poor crop establishment and lower yields: **moderate adverse** (peat deposits drying);
- loss of or damage to structure of topsoil during soil stripping operations and reinstatement, leading to significant changes in soil drainage: **minor adverse** (soil excavation for access tracks, most of route) to **moderate adverse** (soil excavation for underground cables) and haul roads (peat deposits);
- introducing sediment or silts into surface water courses: **minor adverse** effects;
- contamination of by site activities: **minor adverse** effects;
- contamination of groundwater aquifers by site activities: **minor adverse** (most of the proposed route); **moderate adverse** effects (Proposed Development would cross SPZ1 at Tickenham Ridge and would be close to groundwater abstractions at the Mendip Hills and near Churchill substation);
- disturbing contamination into groundwater by site activities: **minor adverse** (most of route); **moderate adverse** (construction works near former railway on Huntspill Moor and at historic landfill sites in Section F and G);
- disturbing contaminated soils at the surface during site activities: **negligible** to **minor adverse** for all of route; and
- accidental introduction or spreading of contaminated material within the working area during site activities: **minor adverse** (most of route) and **moderate adverse** (SSSIs).

Operational Effects

9.4.3 There are unlikely to be significant effects to the ground environment caused as a result of the operation of the Proposed Development. However, the operation of the proposed underground cable across the Tickenham Moor within Section D may impact peat deposits within this area through the heating and subsequent drying of peat in the immediate vicinity of the underground cable.

Decommissioning Effects

9.4.4 The activities described for the construction of the Proposed Development are similar to those activities that would be undertaken during the decommissioning of the Proposed Development, although the impacts to ground environment would be of shorter duration and of limited extent compared to the construction. The

significance of effects from decommissioning would be similar to those identified for construction. If the underground cables are left in the ground when redundant, the ground environment along the cables route would not be disturbed.

Climate Change Effects

9.4.5 The overall significance of effect of climate change on the potential effects on the ground environment would be **negligible** over the operational lifetime of the Proposed Development.

9.4.6 Potential climate change effects to hydrology (flooding) are effects that may occur during the operational lifetime of the Proposed Development.

9.5 Inter-relationship of Potential Effects

9.5.1 The potential for interaction between effects on the ground environment and other aspects of the environment are identified as follows:

- biodiversity (contaminated soils, groundwater, effects on peat and heat in soils);
- hydrology (groundwater and hydrogeological environment); and
- historic environment (peat deposits).

9.6 Mitigation

Construction

Contaminated Land

9.6.1 Site-specific intrusive ground investigation would be undertaken in accordance with Contaminated Land Report 11.

9.6.2 Ground investigation would be undertaken guided by desk study of existing information. The results of the investigations will be used to ensure that foundations and temporary works for the Proposed Development are stable and to ensure that any contaminated land is treated appropriately.

9.6.3 Any detailed mitigation measures would be presented to the local authority and other appropriate regulators for approval prior to implementation. On completion of any works, reports confirming what has taken place also will be supplied to the local authority.

Soil Management Plan

9.6.4 Prior to each stage of construction of the Proposed Development, ground and soil surveys will be undertaken. These will identify what the soils are like and where there may be areas where it would be difficult to dig or handle soils. It will also identify areas where it may be difficult for construction machinery to cross soils. The results of the surveys will be detailed in a soil management plan (SMP). The SMP will include information on how to undertake the following works:

- site preparation;
- soil stripping;
- soil storage;
- soil erosion and siltation prevention;
- soil re-instatement; and
- cropping and aftercare.

9.6.5 A Pollution Incident Control Plan (PICP) will be prepared and will be held on all construction sites to follow in the event of an environmental emergency. The PICP would identify how the risk of pollution due to construction works, materials and extreme weather events will be controlled. It would also set out the actions to be taken in the event of an incident.

9.6.6 The intended storage of waste on site is detailed in the Draft CEMP **(Volume 5.26.1)** and in the Outline WMP **(Volume 5.26.2).** Facilities will be provided for the collection, segregation, treatment and disposal of solid and liquid waste in accordance with the Outline WMP.

9.6.7 Measures will be implemented on site for the prevention of spills in accordance with the Oil Storage Regulations (2001).

Coal

9.6.8 National Grid has completed a coal risk assessment for works in the area of Nailsea (Section D – Somerset Levels and Moors North) at the former coal working site at West End Trading Estate. It identifies that the construction of the Proposed Development should not disrupt the site. The assessment has been agreed with North Somerset Council and Coal Authority. During construction, the contractor will be aware of any disturbances to the area. All construction workers will be briefed via toolbox talks on the site history; the potential for the presence of below ground mining features; and to remain vigilant for any sudden or unexpected changes in ground conditions. The contractor(s) will undertake gas monitoring in excavations. If high levels of methane or carbon dioxide are encountered or former coal workings and associated voids are encountered works will stop immediately and the incident procedure will be followed as described in the Draft CEMP **(Volume 5.26.1)**.

Monitoring

9.6.9 Monitoring will be undertaken in accordance with the CEMP **(Volume 5.26.1)**. Daily inspections will be undertaken by the contractor(s) and weekly inspections will be undertaken by National Grid, WPD and the contractor(s). Monitoring assessment forms will be completed during the daily and weekly inspections. The monitoring reports will be made available on request.

9.6.10 In particular monitoring will be undertaken of:

- ground and surface water conditions for spills or uncontrolled tipped surface spoil;

- oil tanks and associated bunds for leaks; and
- plant containing oils will be inspected daily and maintained to both prevent and identify leaks.

Operational Phase

9.6.11 The principal potential effects on the ground environment identified for the operational phase comprises the following:

- contamination of soils during, operation via on site activities; and
- contamination of groundwater aquifers during operation via on site activities.

9.6.12 These potential impacts on ground environment will be principally mitigated through appropriate design of Proposed Development components. Appropriate use and storage of potential contaminants will be undertaken in accordance with the statutory guidance and best practice. The work will be undertaken in accordance with component specific method statements and risk assessments and in line with the design specification for individual components of the Proposed Development

9.6.13 The assessment of cumulative effects has identified that the combination of the Proposed Development and other major development proposals would have a **negligible** to **minor adverse** residual significance of effect on the ground environment following implementation of appropriate mitigation measures.

9.7 Residual Effects

Construction Effects

9.7.1 Overall the majority of the Proposed Development would have a **negligible** significance of effect on the ground environment, following implementation of mitigation appropriate to each potential environmental impact during construction.

9.7.2 There are however areas of greater sensitivity along the route of the Proposed Development where the residual significance of effect to the ground environment has been assessed as having a **minor adverse** effect following the implementation of mitigation measures. These include:

9.7.3 The coal mining risk assessment, undertaken for the Proposed Development between West End and Nailsea to Stone-edge Batch within Section D indicates a **negligible** overall effect following implementation of mitigation measures, on ground stability arising from large scale open cast surface mining practices.

9.7.4 For most of route where the creation of migration pathways for ground gas, landfill gas or mine gas is possible, effects would be reduced to **negligible** following the implementation of mitigation measures. An exception is in Section D at Nailsea where the Proposed Development crosses former coal workings and is close to

residential and commercial properties, where **minor adverse** effects would be expected after mitigation.

9.7.5 The loss of soil structure leading to changes in soil drainage and crop establishment has been identified as a **minor adverse** effect, particularly where larger scale excavations are proposed, such as along the proposed underground cable routes within Section C, D, E and F; and

9.7.6 Disturbance of contaminants in groundwater from the construction of the Proposed Development, particularly close to areas of industrial land use such as within Section G Avonmouth or close to landfills would result in a **negligible** to **minor adverse** effect to the ground environment following implementation of mitigation measures.

Operational Effects

9.7.7 The residual significance of effect to the ground environment following implementation of mitigation measures during the operational phase of the Proposed Development would to be **negligible**.

Decommissioning Effects

9.7.8 The residual significance of effect to the ground environment, following implementation of mitigation measures during the decommissioning phase of the Proposed Development would be similar to those identified for the construction phase and would be **negligible to a minor adverse** effect.

9.8 Cumulative Effects

9.8.1 The cumulative assessment is provided at **Volume 5.17.1** and includes potential cumulative effects of the Proposed Development together with other major development proposals.

9.8.2 The primary cumulative effects identified for the ground environment from the Proposed Development and other nearby major development proposals are as the same as those identified for the Proposed Development above.

10. HYDROLOGY AND WATER RESOURCES

10.1 Introduction

10.1.1 **Volume 5.10.1** of the ES describes the assessment of the likely significant effects on the water environment as a result of the construction, operation and decommissioning of the Proposed Development. Potential effects and mitigation measures have been described that could be implemented to reduce or avoid effects.

10.1.2 Separate FRAs have been carried out as follows:

- Bridgwater Tee CSE Compounds FRA (**Volume 5.23.1**);
- South of the Mendip Hills CSE Compound FRA, (**Volume 5.23.2**);
- Sandford Substation FRA (**Volume 5.23.3**);
- Seabank Substation FRA (**Volume 5.23.4**); and
- Hinkley Point C Connection Route FRA (**Volume 5.23.5**).

10.1.3 Summaries of key findings of the FRAs and proposed mitigation measures are included in this chapter

10.2 Method

10.2.1 The potential effects of the Proposed Development on water resources have been identified using a combination of desk-based and site-based techniques to assess the existing water resources and flood risk relevant to the Proposed Development.

Assessment of Effects

10.2.2 Potential effects of the Proposed Development on the water environment have been identified and assessed using criteria from the Institute of Environmental Management and Assessment (IEMA 2011).

10.2.3 Significance of effect is a judgement about the combination of the magnitude of effect and the sensitivity of the receiving environment or receptor.

10.2.4 Sensitivity has been assessed with reference to the relative importance of receptors on or near to the Proposed Development which would potentially be affected (e.g. whether features are of national, regional or local value).

10.2.5 The scale or magnitude of potential effects (both beneficial and adverse) on hydrological baseline conditions is identified through the consideration, through the application of professional judgement and supporting evidence, of details of the Proposed Development.

10.2.6 An assessment of likelihood was carried out on the identified effects, based on professional judgement along with an understanding of the water environment and the nature of the Proposed Development.

10.3 Baseline Environment

10.3.1 Southwest England generally has good water quality. The Water Framework Directive (WFD) sets standards for water quality; in the South West River Basin, 34% of water bodies were assessed as achieving Good Ecological Status in 2010.

Groundwater

10.3.2 The majority of the Proposed Development lies outside of any designated groundwater SPZ. A small section of the route on Tickenham Ridge lies in a SPZ 1 (Inner Zone). A section of the underground 400kV cables through the Mendip Hills crosses between two SPZs.

10.3.3 Most of the Proposed Development will take place in areas that are classed as having surface water not available for abstraction. There are 36 groundwater abstractions along the route of the Proposed Development, most of which are for general farming and domestic use at farms.

Surface Water

10.3.4 The route of the Proposed Development crosses a number of watercourses generally flowing from east to west. These include the King's Sedgemoor Drain, the Huntspill River, the River Brue, the River Axe, the Lox Yeo River, the River Yeo and the River Avon.

10.3.5 There are many connected networks of drainage ditches (rhynes) crossed by the Proposed Development. Four Sites of Special Scientific Interest (SSSI) relate to these drainage areas: Puxton Moor SSSI; Biddle Street Yatton SSSI; Tickenham, Nailsea and Kenn Moors SSSI; and Bridgwater Bay SSSI.

10.3.6 The watercourses are of varying water quality including poor for the River Brue, moderate for the River Axe, and good for Blackditch Rhyne

Flood Risk

10.3.7 According to the Environment Agency, (Environment Agency, 2010) around 204,000 properties are at risk of flooding from rivers or the sea in the South West region. 116,000 (57%) are residential and 68,000 (33%) commercial properties. 82% of the residential properties and 66% of commercial properties are in high risk drainage systems.

10.3.8 North Somerset and Sedgemoor feature in the top ten areas with the highest number of properties at significant risk of flooding but this does not take account of existing flood defence schemes and future spending.

10.3.9 The Environment Agency publishes Flood Zone maps for much of England and Wales with categories of risk from flooding. Flood Zone 3b is the floodplain; Flood Zone 3a is at high risk of flooding; Flood Zone 2 is at moderate risk of flooding; and Flood Zone 1 is at low risk of flooding. The latest Environment Agency Flood Zone

Mapping indicates that the Proposed Development would cross land in each of the Flood Zones in various locations. The flood zones are associated with flooding from various sources.

10.4 Prediction and Assessment of Significance of the Potential Effects

Summary of Findings of Flood Risk Assessments

10.4.1 FRAs have been carried out for the route, substations and CSE compounds. The Hinkley Point C Connection Route FRA considers the construction effects of all components of the Proposed Development (including CSE compounds and substations) and operational effects for the proposed 400kV and 132kV connections. The CSE compounds and substations FRAs focus on operational effects.

CSE Compounds

10.4.2 Flood risk from surface water, groundwater, sewers, reservoirs and other artificial sources is low.

10.4.3 The potential effect of the proposed CSE compounds on flood risk elsewhere is demonstrated to be low. There would be no loss of flood plain storage, and no increase in the amount of water running off to watercourses. Minor localised runoff from impermeable surfaces at the CSE compounds would infiltrate into surrounding permeable ground.

10.4.4 As the ground levels at the sites are below predicted flood levels (1 in 200 probability) there is a need to design the sites' layouts to take account of this to protect essential infrastructure.

Sandford Substation

10.4.5 Sandford Substation would be in an area designated by the Environment Agency as Flood Zone 1. This means that the site has less than a 1 in 1,000 (0.1%) annual probability of flooding from rivers or the sea.

10.4.6 The minimum floor level proposed for the substation would be above that needed to avoid flooding, taking account of climate change and its design life of 40 years. This would meet National Grid's Flood Mitigation Policy requirements of protection to the 1 in 1,000 annual probability flood event. The flood risk from rivers or tidal inundation is low.

10.4.7 Flood risk from other sources (surface water, groundwater, sewers, reservoirs and other artificial sources) is also low.

10.4.8 The substation site is currently a green field. The proposed substation would increase the potential rainfall runoff rate and the volume of water that would need to be drained.

Seabank Substation

10.4.9 The existing substation to be extended is on a low-lying site and there is a flood risk in the event of extreme tidal flood events, even with the existing flood defences along the Severn Estuary.

10.4.10 Flood risk from other sources (surface water, groundwater, sewers, reservoirs and other artificial sources) is low.

10.4.11 The minimum floor level proposed for the substation would be above that needed to avoid flooding, taking account of climate change and its design life of 40 years. This would meet National Grid's Flood Mitigation Policy requirements of protection to the 1 in 1,000 annual probability flood event. The flood risk from rivers or tidal inundation is low.

Hinkley Point C Connection Route

10.4.12 The overhead lines and cable route is 57km in length and would cross all three Flood Zones. Approximately of the route length would be in Flood Zone 3.

10.4.13 Key points to note are as follows:

- the highest risks to the Proposed Development occur during the construction works associated with both the overhead lines and underground cables;
- the likelihood of a flood occurring during the 5 year construction phase is lower than during the 40 year operational phase;
- the fluvial flood hazard is high in some locations as the route crosses fluvial (associated with rivers) Flood Zone 3;
- within each section that follows (for each route section), the primary focus is on fluvial and tidal flood risk. The hazard from other sources is identified by exception wherever it applies, e.g. Reservoirs for Sections B and D; and
- during the temporary works for both Overhead lines and underground cables there is the potential risk of flooding.

10.4.14 Potential effects of the Proposed Development on flood risk elsewhere, by flood source, are as follows:

- **Fluvial**: loss of floodplain storage; compartmentalisation of the floodplain; watercourse conveyance capacity reduced by culverts or sediment.
- **Tidal**: none.
- **Surface water**: increased impermeable area leading to increased runoff rates and volumes; disruption of existing flow paths.
- **Groundwater**: dewatering of excavations leading to local lowering, or temporary works for excavations requiring cut-off leading to barrier to groundwater flow; local disruption to groundwater flow paths due to piling.
- **Water services**: none.
- **Reservoirs**: no impact in general; marginal loss of floodplain storage or compartmentalisation of floodplain due to temporary works.

Operational Effects

10.4.15 Key points to note are as follows:

- Once the works are complete there is minimal flood risk because the structures are resilient to inundation and therefore the severity of the impact is low;
- The fluvial flood hazard is high in some places (FZ3);
- Underground cables are resilient to flooding – there is no impact upon these assets as cables, jointing bays and all associated elements are waterproof;
- Overhead lines and pylons are resilient to prolonged periods of inundation – there will be no impact of flooding on these assets; and
- The proposed pylons are designed so that the 400kV overhead lines are suspended a minimum of 8.1m from the ground surface and 6.7m from the ground for 132kV overhead lines. Although there are a number of pylons proposed to be situated within Flood Zone 3 the minimum cable height in all cases is above the maximum flood depth and allowing for a safe clearance distance for electrical flashover including when undertaking watercourse maintenance.

10.4.16 Potential effects of the Proposed Development on flood risk elsewhere, by flood source, are as follows:

- **Fluvial**: loss of floodplain storage; compartmentalisation of the floodplain; watercourse conveyance capacity reduced by culverts or sediment;
- **Tidal**: none
- **Surface water**: small modification of surface water flow paths from pylons' impermeable areas, leading to a slight increase in runoff volumes;
- **Groundwate**r: pylon foundations may create a short term and localised increase in groundwater levels 9where there is sufficient head);
- **Water services**: none
- **Reservoirs**: none

Other Construction Effects on the Water Environment

10.4.17 If pollution prevention and other mitigation measures were not implemented, effects from the Proposed Development could arise as follows:

- **Major adverse** effects from small spillages of substances (such as concrete and cement) into watercourses described as having good water quality, for example the River Kenn, Blackditch Rhyne and Easton in Gordano Stream. Potential effects on the Bristol Avon are considered **negligible** due to its size and its flow at the crossing location.

- **Major adverse** effects from small spillages in highly sensitive areas such as the Puxton Moor SSSI, Biddle Street Yatton SSSI and the Tickenham, Kenn Moor and Nailsea SSSI.

- **Major adverse** effects from large spillages close to King's Sedgemoor Drain, Huntspill River, Old River Axe, River Axe, Lox Yeo, the Laydown Area NE of Winsome, Towerhead Brook Congresbury Yeo, Blackditch Rhyne, the River Kenn, Portbury Ditch, Drove Rhyne and the River Avon (major adverse effects are also predicted to occur at the Portbury Wharf Nature Reserve- SNCI prior to assessment of likelihood).

- The proposed compounds at Tarnock, off the A38, and to the North East of Winsome have the potential to cause **major adverse** effects because of the relatively large number of potential sources of pollution at the site. The compounds would house welfare cabins; be a site for storing oil and construction materials; include car parking and vehicle washing. Foul sewage would not be a cause of risk as foul water would be contained and disposed of off-site.

- During underground cable installation, a **major adverse** effect could occur if mitigation was not in place as a result of interruption to land drainage networks and to flows in drains and ditches.

- **Moderate adverse** effects could occur at river crossings along the route without mitigation because some smaller spillages could give rise to a **moderate significant** impact.

10.4.18 Major changes to aspects of the water environment such as re-routeing Parish Rhyne at Sandford Substation have been designed to minimise effects so that there is no deterioration in WFD classification.

10.4.19 There is a similar range of significance of effects prior to mitigation (minor to major) for the Proposed Route (Option A) and the Alternative Route (Option B) at Sections F and G.

Operational Effects

10.4.20 The operation the Proposed Development would have **no significant** effects on the water environment.

10.4.21 No tracks or culverts would be needed during inspection and maintenance of the overhead lines and underground cables. Without mitigation there could be a **negligible adverse** effect from small fluid leaks from vehicles.

10.4.22 Any surface water drainage infrastructure installed would be subject to maintenance to ensure effective operation of the system. A programme of inspection and maintenance would be established.

Decommissioning Effects

10.4.23 The decommissioning of the overhead lines would be similar to that outlined in the construction phase of this development. Removal of the pylons would be in stages with the foundations typically left approximately 1m below ground level.

10.4.24 If the underground cables are removed, the activities would be similar to those of construction with similar effects. If the underground cables are left in the ground when redundant, there would be little disturbance to the water environment.

10.4.25 The decommissioning of the substations and cable sealing end compounds would be carried out in line with the guidance and best practice at the time. Effects would be similar to those from construction.

Climate Change Effects

10.4.26 The overall significance of effect of climate change on the Proposed Development would be **negligible** over the operational lifetime of the Proposed Development.

10.5 Inter-relationship of Potential Effects

10.5.1 Possible inter-relationships could occur between the water environment and ecology. Effects on water quality may have direct and indirect effects on protected species and habitats and culverting watercourses on may affect species.

10.5.2 National Grid has calculated that there would be an extremely small rise in water temperature from a 400kV underground cable. This would be a **negligible** effect.

10.5.3 Inter-relationships between the water environment and ground conditions also may occur through changes in soil drainage parameters, by sediment or migration of contamination to surface water courses.

10.6 Mitigation

Construction

General Measures

10.6.1 A Drainage Management Plan (DMP) will be required for specific areas which will detail and evaluate the existing land drainage for the Proposed Development and identify areas where specific mitigation may be required

10.6.2 Construction activities may adversely affect the quality of surface water runoff or ground water discharge from the construction site and steps will be undertaken to minimise or avoid this. Environment Agency Pollution Prevention Guidance (PPGs) will be followed on site to prevent pollution.

10.6.3 The DMP will determine potential risks in relation to the water environment, including land drains, and identify appropriate control measures to avoid or reduce the risks.

10.6.4 Storage of plant and materials will not be within the following distances from watercourses, unless otherwise agreed with the consenting authority:

- 10m from Inland Drainage Board watercourses;
- 9m from Environment Agency watercourses; and
- 6m from watercourses in a SSSI.

10.6.5 Discharges to controlled waters, including rivers, other watercourses and soakaways, will require a permit from the Environment Agency. Discharges to sewer will require a permit from the local sewerage undertaker. Discharges will not be made without prior consent from the Environment Agency or sewerage undertaker other than uncontaminated surface water run-off.

Flood Risk

10.6.6 The FRAs include the following mitigation measures to reduce flood risk:

CSE Compounds

10.6.7 The primary measure to be taken at the CSE compounds to mitigate flood risk is the design which would raise all water sensitive equipment above the design flood level.

10.6.8 A safe access and egress plan would be included within the management plan for each site to ensure that arrangements are allowed for in the event that personnel are at the site during a flood event.

Sandford Substation

10.6.9 The potential increase in runoff rate and volume would be addressed on site using a storage pond as part of the sustainable drainage strategy for the site. The storage volume installed would be approximately 400m^3 which would allow the rate of runoff to be the same as the 'greenfield' rate.

10.6.10 A safe access and exit plan would be included within the management plan for the site to ensure that personnel could evacuate at the site during a flood event. This is linked primarily to the risk of flooding of access routes to the north and east of the site. The site would receive relevant Flood Warnings issued by the Environment Agency through the Floodline Warnings Direct Service.

Extension to Seabank Substation

10.6.11 The primary measure to mitigate tidal flood risk would be to build a perimeter flood defence wall with flood gates at the entrance to the site. The minimum proposed defence level would be sufficient for the 1 in 1000 (0.1%) annual probability event at the end of the design life, taking account of sea level rise associated with climate change.

10.6.12 A safe access and exit plan would be included in the management plan for the site to ensure that personnel could evacuate the site during a flood event. The site

would receive relevant Flood Warnings issued by the Environment Agency through the Floodline Warnings Direct Service.

Hinkley Point C Connection Route

10.6.13 Specific mitigation measures, relating to the stockpiling of topsoil, construction of haul roads and compounds, and culvert crossings, would have the objective of ensuring there is minimal interruption to the flow of surface or near-surface waters and no loss of flood storage.

10.6.14 To reduce the effect of flooding elsewhere, compounds would be surfaced with material that is at least as permeable as the topsoil removed, except in limited areas where hard-standing would be required, to retain the previous runoff rate. Runoff from the compounds will be to the vegetated ground in line with sustainable drainage principle which may include storage, infiltration trenches or 'soakaways'. Where there are bunds or other forms of barriers, there would be appropriate gaps in the screening (or culverts through earth bunds) to allow free flow of water. Offices and other site facilities would be raised above the estimated 1 in 10 (10%) annual probability event level. There would be minimal stockpiling of materials and where it is necessary to store materials, they would be stored above the 1 in 10% (10%) annual probability event level. There would be minimal storage of potential pollutants e.g. fuel, hazardous substances and each compound would have a site evacuation plan. The specific measures in each case would relate to the extent of flood risk at that site.

10.6.15 An Emergency Response Plan for Flood Events will be prepared prior to each stage of construction which will detail the emergency procedures in the event of a flood.

Operational Effects

10.6.16 It is predicted that there would be no significant effects on the water environment during the operational phase, as a result of embedded mitigation, in the design of the Proposed Development components; the appropriate use and storage of potential contaminants (including hydrocarbons), which would be undertaken in accordance with statutory guidance and best working practice; and regular maintenance work in accordance with statutory guidance and best practice.

10.6.17 In order to avoid any incidents which may give rise to pollution of surface or groundwater, sites would be managed according to existing best practice such as, the Environment Agency's PPG1 General Guide to the Prevention of Pollution.

Decommissioning Effects

10.6.18 Mitigation measures applied during the decommissioning phase are considered to be similar to those applicable for the construction phase as identified in the Draft CEMP at **Volume 5.26.1**. It is noted that the decommissioning phase will be of shorter duration and lesser extent, therefore the magnitude of effect of proposed decommissioning activities on the ground environment would be lower.

10.7 Residual Effects

Through the application of the proposed mitigation measures outlined above, the overall significance of the impacts of the Proposed Development would be reduced to **not significant** and **minor adverse**.

Water Framework Directive Assessment

10.7.1 The WFD assessment is provided in detail in **Volume 5.10.2, Appendix 10E** and summarised in **Volume 5.8.1** and **Volume 5.10.1**.

10.7.2 Following the implementation of mitigation measures, there would be no deterioration in the WFD classification for water chemistry quality elements or elements which relate to flow, as a result of the Proposed Development.

10.8 Cumulative Effects

Cumulative effects may occur with a number of other developments in close proximity to the Proposed Development. The main effects are borne out of an increase in sediment or pollutant entering any nearby watercourses compounded by the cumulative construction activities of the developments. It has been assumed that for other developments, best practice will have been followed, and as such any residual cumulative effects have been considered to be negligible. The cumulative effects are described at **Volume 5.17.1**.

11. HISTORIC ENVIRONMENT

11.1 Introduction

11.1.1 **Volume 5.11.1** of the ES describes the assessment of the likely significant effects on the historic environment as a result of the construction, operation and decommissioning of the Proposed Development. Potential effects and mitigation measures have been described that could be implemented to reduce or avoid effects.

11.1.2 Heritage receptors are referred to in this chapter as 'assets'.

11.2 Method

11.2.1 The historic environment assessment has been informed by the scoping opinion from PINS; responses to consultations; stakeholder engagement and guidance documents.

11.2.2 Desk based assessments and field surveys were undertaken to identify the historic assets that would be affected by the Proposed Development, including: listed buildings, Registered Parks and Gardens, Scheduled Monuments, Conservation Areas, Registered Battlefields, non-designated historic parks, important hedgerows, historic landscape character zones and non-designated heritage assets up to 10km from the Proposed Development.

11.2.3 The historic environment has been taken into account during the design and routeing of the Proposed Development from the identification of route corridors, to selection of a preferred route corridor and then identification of a draft route and during on-going environmental assessment. Potential adverse effects on a number of heritage assets have been reduced or avoided completely.

Assessing Significance of Effects

11.2.4 In common with other topics, and following the approach set out in EN-1, a staged assessment was carried out to determine the significance of effects of the Proposed Development on the historic environment. This involved establishing the historic environment baseline to determine the heritage significance of assets that may be affected. The assessment included considering any contribution made by setting to that significance, and assessing the magnitude of effect of the Proposed Development on the heritage significance. By comparing the heritage significance of the asset and the magnitude of change the overall significance of effect has been determined.

11.3 Baseline Environment

Designated Heritage Assets

11.3.1 There are 1,451 designated heritage assets within the areas of search.

11.3.2 Within the Order Limits there is only one designated heritage asset; Mere Bank, within Section G at Avonmouth. This is a 3-5m wide earthwork monument with flanking ditches, which runs across Avonmouth, thought to date from the 12th century.

11.3.3 Within 1km of the Order Limits there are 309 designated heritage assets, comprising:

- 11 grade I listed buildings;
- 16 grade II* listed buildings;
- 271 grade II listed buildings;
- two grade II registered parks and gardens;
- 17 scheduled monuments; and
- two conservation areas.

11.3.4 A further 426 designated heritage assets are further than 1km but within 2km of the Order Limits:

- 27 grade I listed buildings;
- 24 grade II* listed buildings;
- 332 grade II listed buildings;
- 22 Scheduled Monuments;
- 16 Conservation Areas;
- three grade II* and 1 grade II Registered Parks and Gardens; and
- one Registered Battlefield.

11.3.5 The remaining 850 designated assets comprise grade I and II* listed buildings, grade I Registered Parks and Gardens, and Scheduled Monuments within the area of search that extended to 10km for those classes of monument.

11.3.6 These assets are all of high or very high heritage significance.

Non-designated Assets

11.3.7 Within the Order Limits of the Proposed Development, there are eight non-designated assets that are of potentially high heritage significance. These are:

- archaeological remains associated with Horsey Deserted Medieval Village (DMV) Scheduled Monument (AR20), near Bawdrip in Section A;
- Crandon Bridge Roman settlement (AR29), near Knowle in Section A;
- Webbington shrunken Medieval settlement (AR77), in Section B;
- Roman settlement at Max Mills (AR90), near Winsome in Section C;
- the site of a Bishop's Palace at Towerhead (AR99), Sandford, in Section D; and
- an extant stable and dairy at Stone Edge Batch (BH36) in Section E.

11.3.8 253 sites of non-designated archaeological remains from a variety of periods and site types have been identified. Potential for Previously Unknown Archaeological Remains

11.3.9 As yet unknown buried archaeological remains are expected to survive within the area of the Proposed Development. There is high potential for archaeological remains to be present in the upland areas of Puriton Ridge (Section A), the Mendip Hills (Section C), and Tickenham Ridge (Section E) and where the upland areas meet the levels. This is because the higher areas would have formed 'islands' in the surrounding historically wet lands, providing areas suitable for domestic, agricultural and ritual uses.

11.3.10 There are 81 non-designated built heritage assets. These include historic farm dwellings and other buildings, as well as civic buildings, including a masonic hall and a public house.

11.3.11 There are 104 non-designated heritage assets that are associated with historic landscape character or historic land use. This category of assets also includes roads and tracks, railway infrastructure, parklands, open areas, and the remains of field systems dating from all periods since late prehistory.

11.4 Prediction and Assessment of Significance of the Potential Effects

Construction Effects

11.4.1 Construction works that disturb the ground by topsoil stripping or excavations for drainage, cable trenches, foundations or HDD are likely to result in physical effects on archaeological remains and historic landscape features.

11.4.2 The construction phase of the Proposed Development will have no physical effects on any designated heritage assets.

11.4.3 The significance of effect is predicted to be **major adverse** in relation to ten non-designated heritage assets. These comprise four assets of high heritage significance and six of moderate heritage significance. These assets are:

- at Horsey Level (Section A): Remains associated with Horsey deserted medieval village and Crook deserted medieval settlement site;
- near Max Mill (Section C): Geophysical anomalies corresponding to a rectilinear enclosure and two ditches which contained Iron Age and Roman pottery; multiple Roman buildings; and a well-defined group of enclosures on both sides of Max Mill Lane;
- north west of the proposed Sandford substation site (Section D): Geophysical survey group of possible pit-like anomalies and one circular anomaly;
- east of Tickenham Court Farm (Section D): Roman buildings, possible settlement site; and
- Hinkley (Section H): Probable barrow (Pixie's Mound) within arable field on the north-facing crest of the ridge; and Lynchets and terraces interpreted as a pre-medieval field system.

Operational Effects

11.4.4 Adverse effects on settings of heritage assets mainly are visual but also include consideration of noise, light, change to general character, changes to land use, land cover and accessibility and social and communal uses.

11.4.5 Where the existing F and W Route 132kV overhead lines adversely affect the settings of heritage assets, there would be a **beneficial** effect on these assets from removal of these routes within sections of the Proposed Development where there would not be a new 400kV overhead line.

11.4.6 Overall, operation of the Proposed Development would result in some loss of appreciation of the heritage significance of the historic landscape character of the area affected, and some gain where infrastructure is permanently removed. The overall significance of effect on historic landscape character is concluded to be **negligible adverse**.

Decommissioning Effects

11.4.7 Areas of the ground where disturbance would occur during decommissioning (e.g. removal of equipment) would have been assessed and mitigated during construction of the project. No additional direct physical impacts on archaeological remains or historic landscape features are predicted during the decommissioning phase.

11.4.8 The beneficial effects of the absence of the existing F Route and W Route 132kV overhead lines would continue during and after decommissioning.

11.4.9 The predicted adverse effects on heritage assets and historic landscape character described above would be fully reversible on decommissioning, assuming the removal of above ground infrastructure associated with the Proposed Development.

Climate Change Effects

11.4.10 The potential effects of future scenarios relating to climate change have been taken into account in the assessment of effects of the Proposed Development and in the proposed mitigation measures which are resilient to climate change scenarios. The predicted effects would not alter (either adversely or positively) as a result of any climate change scenarios anticipated to occur during the lifespan of the Proposed Development.

11.5 Inter-relationship of Potential Effects

11.5.1 The effects on the historic environment, and any works that are carried out to mitigate those effects, could lead to effects on environmental factors considered by other disciplines.

11.5.2 Effects on hedgerows will often be common to the historic environment, biodiversity and landscape topics. Where hedgerow and woodland planting would take place as part of the Proposed Development, options have been considered to ensure compatibility with or enhancement to historic landscape character. Consideration

has also been given to any possible effects that ecological and landscape mitigation might have on archaeological remains.

11.5.3 There may be additional physical effects on biodiversity and landscape and views as a result of archaeological mitigation works. There also may be additional temporary, indirect effects on land use and from noise and traffic, resulting from archaeological mitigation works that take place before the main construction works begin.

11.5.4 The on-site planting has the potential to impact on as yet unknown buried archaeology. The Outline WSI, **Volume 5.26.4** identifies the measures proposed to mitigate the effects of the Proposed Development including areas of on-site planting.

11.6 Mitigation

11.6.1 Mitigation of effects on heritage assets through design has been achieved principally through seeking to avoid the sites of known archaeological remains, built heritage and historic landscape features, and their settings.

11.6.2 These are direct, physical impacts which can be mitigated through a proportionate programme of archaeological work. Detail of the archaeological work proposed is provided in the Outline WSI (**Volume 5.26.4**). The proposed works include:

- further field evaluation to provide additional, more detailed archaeological information which would help to establish the precise nature, extent and condition (the heritage significance) of buried archaeology within the development footprint, and allow for asset-specific appropriate mitigation strategies to be determined;
- the identification of archaeological remains through archaeological controlled strip;
- the identification of archaeological remains through archaeological watching brief;
- the mitigation of effects on archaeological remains through archaeological excavation;
- the mitigation of effects on archaeological remains through preservation in situ;
- the mitigation of effects on palaeo-environmental and geo-archaeological evidence that would be disturbed during construction;
- the mitigation of effects on historic landscape assets; and
- a procedure for the assessment, analysis, and public dissemination of the results of the programme of archaeological work.

Enhancement

11.6.3 The predicted indirect effects resulting from development within the setting of the heritage assets cannot be mitigated readily but could be reduced through appropriate schemes of landscape planting. The OSPES includes proposals to specifically address some of the predicted adverse effects on the settings of heritage assets. However the beneficial effects of planting shown in the OSPES

have not been included in the assessment of residual effects because it is not certain that the planting will be undertaken in the form shown.

11.7 Residual Effects

11.7.1 The likely residual effects of the Proposed Development on the historic environment are summarised below.

Construction Effects

11.7.2 Direct physical effects are predicted in relation to 64 non-designated heritage assets. Measures are proposed to mitigate these effects prior to and during construction. On completion of the proposed mitigation, of these predicted direct physical adverse effects, 38 would be reduced to **neutral**, 23 to **negligible** and only three adverse effects of **minor significance** are predicted.

Operational Effects

11.7.3 Adverse effects are predicted in relation to development within the settings of 39 designated and seven non-designated heritage assets. Measures are not proposed to mitigate these effects and the OSPES has not been taken into account in predicting the residual effect with regard to the settings of heritage assets. Therefore, the residual effect during the operational phase of the Proposed Development comprises three **moderate adverse** effects relating to the settings of one grade I listed building (Tickenham Church) and two Scheduled Monuments (Horsey medieval village and Pixie's Mound). These effects are not equivalent to substantial harm. There are also 43 **minor adverse** residual effects, also relating to the settings of heritage assets. These effects are also less than substantial, and in relation to all of the predicted adverse effects that relate to the settings of listed buildings, the special architectural or historic interest is preserved.

Decommissioning Effects

11.7.4 Any areas required for ground works during decommissioning (e.g. removal of equipment) will be within the Order Limits and would therefore have been assessed and mitigated during the construction phase of the project. Therefore no residual effects on archaeological remains or historic landscape assets are predicted during the decommissioning phase.

11.7.5 The beneficial effects of removal of the existing 132kV F Route and W Route overhead lines on seven designated heritage assets would continue throughout the decommissioning phase.

11.7.6 The predicted adverse effects on 39 designated heritage assets and seven non-designated heritage assets would be fully reversible on decommissioning, assuming the removal of above ground infrastructure associated with the Proposed Development.

11.8 Cumulative Effects

11.8.1 The cumulative assessment is provided at **Volume 5.17.1** and includes potential cumulative effects of the Proposed Development together with other major development proposals.

11.8.2 Of the developments identified as having the potential for cumulative effects on the historic environment 83 were scoped out and are described in **Volume 5.17.2, Appendix 17D**, 16 were assessed as having potential cumulative effects.

11.8.3 These include one significant potential cumulative effect. This relates to the effect of a possible mixed use residential scheme at Nailsea, in combination with the proposed overhead line, within the setting of listed buildings at Tickenham. The predicted potential residual cumulative effect on the significance of the assets at Tickenham is moderate adverse. This is the same as the predicted effect of the Proposed Development individually.

11.8.4 The other predicted potential residual cumulative effects are of minor or negligible significance or are neutral, following mitigation. None of the predicted cumulative effects is greater than the predicted effect of the Proposed Development.

11.8.5 The exception is the predicted cumulative effect in relation to Pixies Mound which is predicted to be lower than the effect of the Proposed Development, given that the decommissioning of Hinkley Point A and Point B would better reveal the significance of that SM. The predicted potential residual cumulative effect on the significance of this asset is **minor adverse**, whereas the predicted effect of the Proposed Development individually is moderate adverse.

12. TRAFFIC AND TRANSPORT

12.1 Introduction

12.1.1 **Volume 5.12.1** of the ES describes the assessment of the likely significant effects on traffic and transport as a result of the construction, operation and decommissioning of the Proposed Development. Potential effects and mitigation measures have been described that would be implemented to reduce or avoid effects.

12.1.2 The assessment of effects on traffic and transport is supported by the TA at **Volume 5.22.1** and the Draft CTMP at **Volume 5.26.5**.

12.1.3 The TA has been produced to provide an assessment of the likely impacts of the construction traffic associated with the Proposed Development during all phases of the works and should be read alongside this ES.

12.1.4 The Draft CTMP sets out in detail the mitigation measures proposed and discusses methods of monitoring and management as the scheme is constructed

12.2 Method

12.2.1 The method of assessment has been informed by the scoping opinion from PINS; responses to consultations; stakeholder engagement and topic-specific professional guidance documents.

12.2.2 The assessment has been undertaken using a combination of desk-based and site-based techniques. Traffic data has been collected at important locations and at places along proposed traffic routes within the study area. For this assessment the study area has been defined by identifying links or locations where development traffic would require access.

12.2.3 An assessment has been undertaken identifying the likely effects on local receptors from severance, driver delay, pedestrian delay, pedestrian amenity and highway safety.

Assessment of Effects

12.2.4 As for other topics, the significance of the effect was formulated as a function of the receptor sensitivity and the magnitude of the impact. The approach to assigning significance of effect used reasoned argument, professional judgement and taking on board the advice and views of stakeholders.

12.2.5 A wide range of receptors was considered in the assessment including:

- people at home;
- people at work;
- children, elderly and disabled persons;
- sensitive locations such as hospitals, churches, schools, historical buildings;
- pedestrians;

- cyclists;
- open recreational spaces;
- sites of ecological/nature conservation value; and
- sites of tourist/visitor attraction.

12.2.6 Impacts assessed for magnitude are:

- severance;
- pedestrian delay;
- pedestrian amenity;
- fear and intimidation;
- driver delay; and
- highway safety.

12.3 Baseline Environment

12.3.1 For the majority of the Proposed Development it follows a north to south alignment roughly parallel to and east of the M5. The M5 forms part of the strategic motorway network and provides national highway connections.

12.3.2 The Proposed Development, as it runs from south to north, would cross a number of major and minor highways. Many of these are of strategic importance, such as the A39, A38 and A370, or important local link roads. A number of the A roads, and some of the minor roads, will form part of the major construction traffic route during the construction of the development. In order to assess the baseline traffic flows along the construction access routes, a number of Automatic Traffic Counters (ATCs) were placed across the Proposed Development Sections.

12.3.3 There are a number of national cycle routes within the vicinity of the Proposed Development. National cycle route 26 passes close to the proposed substation at Sandford along a disused railway line between Yatton and Axbridge (the Strawberry Line).

12.3.4 PRoW are commonplace and numerous throughout the Proposed Development area, including a number on and around Tickenham Ridge and Portbury Wharf Nature Reserve.

12.3.5 Buses run on all of the major roads to be crossed by the Proposed Development such as the A39 and A38 and bus stops are often close to the working areas for its construction.

12.4 Prediction and Assessment of Significance of the Potential Effects

Construction Effects

12.4.1 The primary traffic and transportation effects associated with the Proposed Development would be as a direct consequence of an increase in traffic flows on

local roads nearby. This refers in particular to HGVs bringing plant and equipment to site.

12.4.2 The increases in traffic flows would be associated with the installation of accesses (including haul road construction), pylon foundations, pylon assembly and erection, 132kV pylon removals, cable installations, access reinstatement, haul road removal and construction employee vehicle movements.

12.4.3 PRoWs are predicted to be affected by the construction of the Proposed Development and would be managed. In most instances where this occurs it is anticipated that the PRoW would remain open, with the crossing points managed to ensure the safety of PRoW users.

12.4.4 The anticipated effects predicted, range from **negligible to major** significance, depending on the volume of construction traffic and the sensitivity of local receptors. Increases in HGV traffic of less than 10% are generally accepted as having little or no discernible environmental impact. There are a number of situations where the predicted peak daily construction flow is likely to result in traffic flows greater than 10%.

12.4.5 Prior to mitigation, other construction traffic effects were assessed as having the following significance of effects:

- severance – **slight** to **moderate adverse;**
- driver delay - **slight** to **moderate adverse**;
- pedestrian and cyclist delay - **slight** to **moderate adverse**;
- fear and intimidation - **moderate** to **major adverse**;
- accidents and safety – **slight adverse**; and
- dust and dirt – **slight adverse**.

12.4.6 For abnormal load vehicle movements, given the number of vehicles that would use the identified delivery routes to access the works and the temporary nature of the traffic increase, it is considered that there is the potential for some temporary **slight adverse** effects

Operational Effects

12.4.7 Once operational, it is envisaged that the development would generate very few vehicle movements and operational effects are expected to be **negligible**.

Decommissioning Effects

12.4.8 During decommissioning many of the same potential effects as for the construction phase could occur, however, the overall volume of traffic forecast to be required and the time taken to decommission the Proposed Development is anticipated to be much less than for construction.

Climate Change Effects

12.4.9 It not anticipated that climate change would have any discernable related impacts associated with the traffic and transport from the Proposed Development.

12.5 Inter-relationship of Potential Effects

12.5.1 The proposed access arrangements and the increase in vehicle numbers associated with the development may trigger environmental effects associated with related disciplines:

- landscape and visual effects associated with the built environment, heritage and conservation;
- effects associated with socio-economic factors;
- effects associated with hydrology and drainage; and
- effects associated with noise, vibration and air quality.

12.6 Mitigation

12.6.1 Mitigation measures will be implemented in accordance with the Draft CTMP and Draft CEMP. The objectives of the Draft CTMP are to:

- Ensure that movements of people and materials are achieved in a safe, efficient, timely and sustainable manner;
- Keep freight and construction traffic to a minimum during network peaks in order to reduce the impact on the highway network during busy periods;
- Ensure that the impact and disruption to the local communities and tourists is minimised through mitigation and management measures;
- Minimise construction trips where possible;
- Ensure the continued monitoring, review and updating of the CTMP and its mitigation measures;
- Limit the impacts on the Strategic Road Network (SRN) and Local Road Network (LRN); and
- Limit the impacts on the natural and built environment.

12.6.2 The Draft CTMP provided at **Volume 5.26.5** outlines a number of issues and constraints identified at the strategic planning and design phase and how it is proposed they would be mitigated.

12.7 Residual Effects

12.7.1 Mitigation will be extensive throughout the proposed working corridor and along all construction routes providing access to the Proposed Development. As such it is likely that in a number of circumstances the level of impact would be reduced. However, there are likely to be a number of slight and moderate residual, adverse

environmental effects that cannot be fully mitigated. These have been set out below.

12.7.2 These primarily include those relating to severance, driver, pedestrian, cyclist delay and fear and intimidation. However, these effects would be mitigated wherever possible and are only likely to be temporary effects during the construction works and are not associated with the operation of the Proposed Development.

12.7.3 Residual effects during construction are predicted to be:

- severance – **slight to moderate adverse**;
- driver delay - **slight to moderate adverse**;
- pedestrian and cyclist delay - **slight to moderate adverse**;
- fear and intimidation - **moderate adverse**;
- accidents and safety – **negligible**; and
- dust and dirt - **negligible**.

Operational Effects

12.7.4 All residual effects during operation of the Proposed Development would be **negligible**. There would be very few vehicular trips associated with operation.

Decommissioning Effects

12.7.5 Residual decommissioning effects would be similar to those for construction.

12.8 Cumulative Effects

12.8.1 The approach to assessing the cumulative traffic and transport effects has been agreed with the local authorities. It was agreed that the TEMPro model (a software package published by the Department for Transport) would be used to calculate future growth in background traffic. Predicted future operation or construction traffic was added from additional developments identified by the local authorities.

12.8.2 It is anticipated that along key highway links there is the potential for a number of **negligible to minor adverse** effects associated with the combined increases in road traffic. This is discussed in **Volume 5.17.1** and further detail provided as part of the accompanying TA.

13. AIR QUALITY AND EMISSIONS

13.1 Introduction

13.1.1 **Volume 5.13.1** of the ES describes the assessment of the likely significant effects on the air quality environment together with mitigation measures to reduce or avoid effects.

13.1.2 The Proposed Development would not adversely affect air quality during its operation. Sulphur hexafluoride is a gas used in substations and its emissions are discussed in the assessment. Other effects on air quality during the operation of the development were removed from the scope of the assessment during EIA scoping (see **Volume 5.5.2, Appendix 5B**).

13.2 Method

13.2.1 The method of assessment has been informed by the scoping opinion from PINS; responses to consultations; stakeholder engagement and topic-specific professional guidance documents.

13.2.2 A desk-based air quality impact assessment was carried out to determine the potential air quality effects on receptors arising from construction, operation and decommissioning of the Proposed Development.

13.2.3 Current air quality conditions were determined using data from local authorities' air quality monitoring programmes and from the Department for Environment, Food and Rural Affairs (DEFRA) online monitoring records.

13.2.4 A quantitative assessment of road traffic emissions using the method outlined in the Design Manual for Roads and Bridges (Ref.9) was not carried out because none of the roads met the significance criteria.

Assessment of Effects

13.2.5 The criteria for assessment of the significance of effects of the four construction activities, before applying mitigation measures, consider the risk of giving rise to dust effects and the sensitivity of the surrounding area.

13.2.6 To assess the potential impacts, construction activities are divided into four types:

- demolition;
- earthworks;
- construction; and
- 'trackout' of material onto local roads.

13.2.7 For each construction activity, the risk of dust annoyance, health or ecological effects is determined using three risk categories: low, medium and high risk. The risk category is different for each of the four activities.

13.2.8 Receptors include:

- Human:
  - populated areas (rural, suburban, urban);
  - hospitals, schools;
  - commercial and industrial areas;
  - wildlife sites, including woodlands; and
  - horticultural land.

13.2.9 Determining the sensitivity of the receptors takes into account the type of receptor and either its vulnerability to air pollution (e.g. hospital, school) or the size of the receptor being affected (e.g. densely populated areas more sensitive than rural areas).

13.3 Baseline Environment

An Air Quality Management Areas (AQMA) is an area designated by a local authority as requiring measures to reduce air pollution concentrations to acceptable levels. The Proposed Development does not pass through or near to any AQMAs.

13.4 Prediction and Assessment of Significance of the Potential Effects

Construction Effects

13.4.1 Construction and demolition activities may impact on air quality in a number of ways:

- exhaust emissions from site plant, equipment and vehicles; and
- fugitive dust emissions from construction and overhead line removal activities.

13.4.2 The operation of vehicles and equipment powered by internal combustion engines results in the emission of exhaust gases containing the pollutants oxides of nitrogen (NO_x), particulates (PM_{10}), volatile organic compounds (VOCs), and carbon monoxide (CO).

13.4.3 Fugitive emissions are emissions from diffuse or non-specific sources such as dust from construction activities. The most significant fugitive emissions are likely to be dust from construction and demolition activities.

13.4.4 The significance of the effects of the construction activities as a result of the Proposed Development prior to mitigation are **moderate adverse** in Sections A, B, E and F and **substantial** adverse in Sections C, D, G and H.

13.4.5 Construction traffic would also have an effect on air quality. The operation of site equipment, vehicles and machinery would result in emissions to atmosphere of exhaust gases. However such emissions would be **not significant**.

Operational Effects

13.4.6 The operation of overhead lines, underground cables and CSE compounds would not in general give rise to emissions to air or direct effects which could influence air quality.

13.4.7 The proposed 400/132kV Sandford Substation and the proposed extension at Seabank 400kV Substation would utilise sulphur hexafluoride (SF_6) in Gas Insulated Switchgear (GIS). Leakage of SF6 from electrical equipment is very minor. Overall, there is not likely to be a significant effect arising from SF_6 gas usage during the operation of the Proposed Development.

Decommissioning Effects

13.4.8 The activities described for the construction of the Proposed Development are similar to those activities that would be undertaken during the decommissioning of the Proposed Development. If the underground cablese were left in the ground when redundant, there would not be a need to excavate which gives rise to dust emissions.

Climate Change Effects

13.4.9 The construction and decommissioning of the Proposed Development will cause emissions of 'greenhouse gases' from activities such as the production of materials and the operation of vehicles and plant. These emissions are likely to be comparable with those of similar infrastructure projects.

13.5 Inter-relationship of Potential Effects

13.5.1 The effects on air quality as a result of emissions from the construction phase of the Proposed Development could lead to effects on amenity, agriculture and on protected species and habitats.

13.5.2 These aspects are included in the assessment of receiving environment sensitivity, and will be controlled by the mitigation measures described in the mitigation section and enacted via the CEMP**, Volume 5.26.1.**

13.5.3 Potential impacts of emissions together with other potential effects (such as noise, visual effects) on overall amenity (in terms of the ability to use or enjoy a particular amenity facility) are considered further in **Volume 5.15.1.**

13.5.4 The use of water suppression to mitigate dust generation may lead to effects on water resources (see **Volume 5.10.1**) and ecology (see **Volume 5.8.1**). The seeding of stockpiles to mitigate dust generation may lead to effects on ecology (see **Volume 5.8.1**).

13.5.5 The assessment of the ground environment, reported in **Volume 5.9.1**, found that the Proposed Development passes close to a number of completed former landfill sites and there may be a risk of odour emissions.

13.6 Mitigation

Construction Phase

13.6.1 Mitigation measures would be implemented on site via the CEMP, **Volume 5.26.1** to reduce the significance of effects. These are summarised in **Table 13.1** below.

Table 13.1 Summary of Mitigation Measures

Aspect	Mitigation Measures
Fugitive emissions from construction and similar activities.	• Good housekeeping practice would be applied at all times. • Daily inspections. • Dust suppression techniques will be adopted • Potentially dust creating plant and activities will be positioned away from receptors, where reasonably practicable. • Dusty materials, such as aggregate and limestone dust, will be sheeted or prevented in some other way from becoming wind-borne. • Materials kept at site, including the stockpiling of soils, will be covered; • Loaded vehicles that are carrying dust generating materials will be covered, • There will be no burning of materials on site.
Exhaust Emissions from Plant and Vehicles.	• All plant and vehicles will be maintained in good order so that they do not emit dark smoke, grit or dust. • Engines would be turned off when vehicles are not in use, to avoid 'idling'. • The use of diesel generators will be minimised and mains or battery power will be used where available.
Effects on nearby receptors.	• Records would be kept of air quality complaints and incidents. They would be investigated and remedial action would be taken. Where required, actions would be agreed with the Local Authority.
Odour	• Odour monitoring would be carried out by site staff according to Environment Agency Horizontal Guidance on Odour H4.

Operational Phase

13.6.2 The SF_6 gas would be housed inside the substation within pipes sealed using a double sealing method to prevent leakage of the gas. All equipment insulated by SF_6 gas is tested in the factory to ensure that as far as practically possible there is no leakage.

13.6.3 Any potential leakages of SF_6 gas will be detected by equipment in the substation. A very small leakage of gas would be detected and appropriate action taken as required.

13.7 Residual Effects

Construction Effects

13.7.1 After mitigation measures have been adopted during the construction of the Proposed Development, the significance of effects would reduce.

13.7.2 The significance of residual construction effects in Sections A, E and F would be **negligible**. The significance of residual construction effects in Sections B, C, D, G and H would be **slight adverse**.

13.7.3 The increase in traffic on local roads due to construction activities is not considered so great that quantitative assessment (dispersion modelling) would be required.

Operational Effects

13.7.4 No significant effects on air quality are anticipated during the operational phase. Some leakage of SF_6 gas may occur from substations. The equipment is designed and tested to minimise such leakage, and the magnitude of leakage is likely to be small.

Decommissioning Effects

13.7.5 Decommissioning of the Proposed Development is likely to have similar effects on air quality to those effects identified in the construction phase.

13.8 Cumulative Effects

13.8.1 The cumulative assessment is provided at **Volume 5.17.1** and includes potential cumulative effects of the Proposed Development together with other major development proposals.

13.8.2 During construction, the main potential for cumulative effects is associated with emissions from the Proposed Development interacting with those from other nearby construction projects, and increased exhaust emissions from traffic associated with the Proposed Development and other developments.

13.8.3 The mitigation measures proposed represent best practice and it is assumed that appropriate mitigation will be required for other developments.

13.8.4 The potential for cumulative assessment is not considered likely to increase the residual effects.

14. NOISE AND VIBRATION

14.1 Introduction

14.1.1 **Volume 5.14.1** of the ES describes the assessment of potential noise and vibration effects as a result of the Proposed Development, together with mitigation measures to reduce or avoid effects.

14.1.2 There would be different effects arising from construction of the Proposed Development and from its operation. Construction noise is assessed differently to noise from operation because construction noise is an inevitable by-product of required works and construction activities are temporary. The effects of construction are considered first and effects of operation follow.

14.2 Construction and Decommissioning Phase

Method

14.2.1 A combination of desk-based assessment, on-site noise monitoring data and previous experience of similar developments elsewhere, has been applied to identify and evaluate the potential noise and vibration effects on receptors arising from the construction of the Proposed Development.

14.2.2 In addition, the construction noise assessment uses the construction method statements and noise levels from equipment manufacturers or from British Standards to determine the noise levels that can be expected at the nearest receptors.

14.2.3 A combination of receptor sensitivity and magnitude of effect before and after mitigation has been used to determine the overall significance of the effect.

14.2.4 Receptors considered include:

- education, healthcare facilities;
- residential areas;
- areas used primarily for leisure activities, including PRoW, sports facilities and sites of historic or cultural importance; and
- all other areas such as those used primarily for industrial or agricultural purposes.

14.2.5 Magnitude is determined by the extent to which noise levels are predicted to exceed BS5228 trigger levels and the duration of any exceedance.

Baseline Environment

14.2.6 The Proposed Development would be mainly in rural areas but also in some urban and industrial areas. This means that there is a varied existing noise environment.

14.2.7 The existing noise levels near the Proposed Development are strongly influenced by distance from the M5 motorway and other main highways.

14.2.8 Noise levels are based on quieter, night time data. The information indicates that daytime noise levels would be low along the majority of the route. This assumption leads to a robust, worst case assessment.

14.2.9 The baseline noise environment would not be expected to change prior to the commencement of the Proposed Development.

Prediction and Assessment of Significance of the Potential Construction and Decommissioning Noise Effects

Construction Noise Effects

14.2.10 **Table 14.1** provides a summary of the anticipated noise effects during construction, prior to mitigation.

Table 14.1 Anticipated Noise Effects from Construction, Prior to Mitigation

Construction Activity	Receptors	Sensitivity of Receptor	Magnitude of Effect	Significance of Effect
400kV overhead line T-pylon construction	All receptors beyond 108m	All	Negligible	**Negligible**
	Residential receptors within 108m	Medium	Low	**Minor adverse**
400kV and 132kV overhead line Lattice pylon construction	All receptors beyond 131m	All	Negligible	**Negligible**
	Residential receptors within 131m	Medium	Low	**Minor adverse**
Underground cable construction (excluding transition jointing)	All receptors beyond 82m	All	Negligible	**Negligible**
	Residential receptors within 82m	Medium	Low	**Minor adverse**
HDD	All receptors beyond 75m	All	Negligible	**Negligible**
	Residential receptors within 75m	Medium	Low	**Minor adverse**

Construction Activity	Receptors	Sensitivity of Receptor	Magnitude of Effect	Significance of Effect
132kV overhead line decommissioning	All receptors beyond 112m	All	Negligible	**Negligible**
	Residential receptors within 112m	Medium	Low	**Minor adverse**
Sandford Substation	Residential to south	Medium	Negligible	**Negligible**
Seabank Substation	Residential to east	Medium	Negligible	**Negligible**
Portishead Substation	Residential to west (Wren Gardens)	Medium	Low	**Minor adverse**
Churchill Substation	Dwelling on Stock Lane to south east	Medium	Low	**Minor adverse**
	Other nearby residential	Medium	Negligible	**Negligible**
Construction Compounds: Bridgwater Tee (Bath Road) Barton Road Towerhead Road Churchill Nailsea Church Lane Clevedon Road Whitehouse Lane	Residential receptors within 79m	Medium	Low	**Minor adverse**

Construction Activity	Receptors	Sensitivity of Receptor	Magnitude of Effect	Significance of Effect
Construction compounds: A38 Bristol Road (UGC) A38 Bristol Road (OHL) South Mendip Hills (Hams Lane) Sandford Substation AT Route OHL Engine Lane Caswell Hill Sheepway BW UGC Route West BW UGC Route East St Andrews Road Kings Weston Lane G Route UGC (East of M49) Seabank (Severn Road)	Residential receptors beyond 79m	Medium	Negligible	**Negligible**
CSE compounds	Other nearby residential	Medium	Negligible	**Negligible**
Transition jointing (daytime)	Residential receptors within 86m	Medium	Low	**Minor adverse**

Construction Activity	Receptors	Sensitivity of Receptor	Magnitude of Effect	Significance of Effect
Transition jointing (worst case night time)	Residential receptors within 86m	Medium	Low to Medium	**Minor adverse** to **moderate adverse**
Construction traffic noise on existing roads	Industrial and residential	Low to Medium	Negligible to Low	**Negligible** to **minor adverse**
Construction traffic noise on temporary routes	Industrial and residential	Low to Medium	Negligible to Low	**Negligible** to **minor adverse**
Construction traffic vibration	Industrial and residential	Low to Medium	Negligible to Low	**Negligible** to **minor adverse**
Construction vibration	Industrial and residential	Low to Medium	Negligible to Low	**Negligible** to **minor adverse**

Construction Vibration Effects

14.2.11 Vibration from construction traffic would be most likely to be caused if there was poor road surfacing on the haul roads, which could be easily rectified.

14.2.12 Vibration through the ground and through the air would be caused from construction of the Proposed Development. It is difficult to predict the degree of vibration that would occur because this depends on a number of factors. However the level of vibration required to cause structural damage is very high and is very unlikely to be reached during the construction of this Proposed Development.

14.2.13 Airborne vibration typically would be controlled effectively via the mitigation measures to reduce the effect of airborne noise.

14.2.14 Most construction activities are not significant sources of ground vibration. Activities such as earth-working, using cranes and concreting would produce relatively low levels of ground vibration. Piling activities could produce perceptible levels of vibration, although mitigation measures would be in-built to reduce the effect. The significance of effect of ground vibration would be **negligible to minor adverse**.

Decommissioning Noise Effects

14.2.15 The magnitude of noise from decommissioning activities would be similar to those for construction with the exception of transition jointing which would not be

required. The significance of noise effects from decommissioning would be **minor adverse** or **negligible**.

Inter-relationship of Potential Effects

14.2.16 Noise and vibration is considered in **Volume 5.8.1** (Biodiversity and Nature Conservation) in relation to the effect on fauna. Construction noise is unlikely to have a significant effect on species.

14.2.17 Noise and vibration is considered in **Volume 5.15.1** (Socio-economics and Land Use). An amenity effects assessment has been undertaken (see **Volume 5.15.2, Appendix 15J**) which considers effects arising as a result of the inter-relationship of other environmental effects which together could affect the amenity of receptors during construction, operation and decommissioning. The assessment has considered likely effects on the amenity various receptors including:

- visitor attractions, PRoW, recreational routes, tourism accommodation and recreational areas; and
- local communities and community facilities (including health, education and community gathering).

14.2.18 Construction and decommissioning noise and vibration are not expected to lead to significant effect on socio-economics and land use.

Mitigation

14.2.19 The mitigation of construction noise is not always possible. Works will be undertaken in accordance with the Noise and Statutory Nuisance Act 1992 and in accordance with BS5228-1. The following measures will be implemented to reduce effects from noise and vibration from the construction activities of the Proposed Development:

- construction traffic routes would be used in accordance with the CTMP (**Volume 5.26.5**);
- reverse alarms will incorporate at least one of the following features: directional sounders, broadband signals, self-adjusting sounders, and flashing warning lights;
- internal haul roads will be well maintained;
- works would be undertaken within the hours set in the CEMP **(Volume 5.26.1)**;
- the local authorities and surrounding communities will be informed of known activities that will be undertaken outside of the core working hours. Where advised, consent will be sought under Section 61 of the Control of Pollution Act 1974;
- loading and unloading activities will be located as far as reasonably possible from residential properties or screened;
- mains electricity will be used rather than diesel generators where connection to mains electricity is possible;
- exhaust silencing and plant muffling equipment will be fitted and maintained in good working order;

- low-noise generators and quieter plant and equipment will be used and will conform to European standards;
- the bunding (soil stockpiles) and fencing proposed at the construction compounds will also help to attenuate noise;
- vehicles will not wait or queue on the public highway with engines idling;
- engines would be turned off when vehicles are stationary to avoid 'idling';
- plant and equipment will be shut down when not in use;
- plant and equipment will be started-up sequentially rather than simultaneously;
- the jointing of cables will be undertaken in a covered working area; and
- drop heights of materials will be minimised.

14.2.20 Monitoring will be undertaken in accordance with the CEMP **(Volume 5.26.1)**.

Residual Effects

14.2.21 The assessment of the significance of effects due to construction noise and vibration has concluded that:

- the significance of noise from construction activities (excluding cables jointing) is assessed as being **negligible** to **minor adverse**;
- due to night time working, the significance of noise from cables jointing may be **moderate adverse**;
- the significance of construction traffic noise and vibration would be **minor adverse** to **negligible**; and
- construction vibration would be **minor adverse** to **negligible**.

14.2.22 The significance of decommissioning noise is assessed as being **minor adverse** to **negligible** as it would involve similar activities to construction with the exception of creating joints between cables.

14.3 Operational Phase

Substation Noise

14.3.1 There are three basic sources of audible noise from substations. Each of these has its own frequency spectrum and pattern of occurrence.

14.3.2 Transformer and shunt reactor noise is practically constant, with a low frequency hum. Transformers generally run continuously and the shunt reactors proposed for the Proposed Development would also be in use most of the time. Transformer and shunt reactor coolers typically emit a broadband noise; however, their operation depends on temperature and loading.

14.3.3 Switchgear noise usually comes from the operation of circuit breakers and occurs for a short period of time. Switchgear operations would be very infrequent. Modern switchgear operates with a dull 'thud'.

14.3.4 Substations have standby diesel generators and air compressors to provide emergency back-up power to cooling plant. When present and operating, these may contribute to the broadband noise climate. They do not run continuously, and in any case, are housed in a building or outdoor acoustic enclosure. It is rare to hear noise from their operation beyond the substation perimeter fence.

400kV Overhead Line Noise

14.3.5 400kV overhead lines using a twin conductor bundle can produce audible noise under certain conditions. The highest noise levels from a 400kV overhead line generally occur during and soon after periods of rainfall. Fog may also give rise to increased noise although lower than noise during rain. Noise generated by the overhead line in rain and fog is referred to as 'wet noise'.

14.3.6 After a prolonged spell of dry weather, without heavy rain to wash the conductors, contamination may result in increased noise. Under these circumstances, the noise is referred to as 'dry noise'.

Method

14.3.7 A combination of desk-based and site-based techniques have been employed in the assessment of effects on noise of the operation of the Proposed Development.

14.3.8 The following information has been used in the assessment:

- Ordnance Survey mapping;
- topographical data;
- previous experience of similar developments elsewhere;
- on-site noise monitoring data; and
- CadnaA noise modelling software.

Significance of Effects

14.3.9 Receptors for operational noise are the same as for construction noise.

14.3.10 Magnitude of effects was determined by using predicted rating levels above existing background noise levels.

14.3.11 A combination of receptor sensitivity and magnitude of effect before and after mitigation was used to determine the overall significance of the effect

Baseline Environment

14.3.12 The Proposed Development would be mainly in rural areas but also in some urban and industrial areas. This means that there is a varied existing noise environment.

14.3.13 Although much of the development is in a rural environment, measured noise levels close to sensitive receptors were typical of those likely to be influenced by nearby existing noise sources such as motorways and existing industrial facilities.

14.3.14 The baseline environment would not be expected to change prior to the commencement of the Proposed Development.

Prediction and Assessment of Significance of the Potential Operational Noise Effects

14.3.15 Noise effects are likely to be generated from the operation of the proposed Sandford Substation and from the proposed overhead lines.

14.3.16 At Sandford Substation the transformers and shunt reactors will be in use 24-hours a day, except during maintenance periods. Assuming no mitigation is implemented, an adverse effect would be experienced by the nearest receptors including Droveway Farm, Droveway Cottage and Mead Farm. The significance of effect would be **minor adverse** or **negligible**

14.3.17 Detailed assessments have been made of the impact of dry and wet overhead line noise. Results indicate that the magnitude of 400kV overhead line operational noise would be low or negligible or would have no effect at the majority of receptors. All receptors are of medium sensitivity and the significance of effect would be **minor adverse**, or **negligible** for dry and wet conditions except at two locations:

- During dry conditions there would be an effect of **moderate adverse** significance at the Star Inn.
- During wet conditions there would be an effect of **moderate adverse** significance at the flat above a garage (Tarnock), Tarnock Cottage, Moorland Park and the Star Inn.

Inter-relationship of Potential Effects

14.3.18 Operational noise is considered in **Volume 5.8.1** (Biodiversity and Nature Conservation) in relation to the effect on fauna. Operational noise is unlikely to have a significant effect on species.

14.3.19 Operational noise is considered in **Volume 5.15.1** (Socio-economics and Land Use). An amenity effects assessment has been undertaken (see **Volume 5.15.2, Appendix 15J**) which considers effects arising as a result of the inter-relationship of other environmental effects which together could affect the amenity of receptors during construction, operation and decommissioning. The assessment has considered likely effects on the amenity various receptors including:

- visitor attractions, PRoW, recreational routes, tourism accommodation and recreational areas; and

- local communities and community facilities (including health, education and community gathering).

14.3.20 Operational noise is not expected to lead to significant effect on socio-economics and land use.

Mitigation

14.3.21 To mitigate operational noise from Sandford substation, an enclosure would be fitted to the transformer and shunt reactor tanks.

14.3.22 Noise from overhead lines cannot be practically mitigated. Care would be taken during installation to ensure that conductors would be kept clean and free of surface contaminants during stringing. This would minimise the risk of excessive dry noise once the new overhead line is in operation.

Residual Effects

14.3.23 The assessment of the significance of effects due to operation noise has concluded that:

- the significance of operational noise from Sandford Substation is assessed as being **minor adverse** or **negligible**;
- the significance of operational dry noise from 400kV overhead lines is assessed as being **minor adverse** or **negligible** at all receptors except The Star Inn, where the significance of dry overhead line noise is assessed as being **moderate adverse**; and
- the significance of operational wet noise from 400kV overhead line noise is assessed as being **minor adverse** or **negligible** at all receptors except at The Star Inn, Flat above garage (Tarnock), Tarnock cottage and Moorland Park where the significance of wet 400kV overhead line noise is assessed as being **moderate adverse**.

14.4 Cumulative Effects

14.4.1 The cumulative assessment is provided at **Volume 5.17.1** and includes potential cumulative effects of the Proposed Development together with other major development proposals.

14.4.2 Cumulative construction and operational effects have been considered for all other major developments with regards to noise and vibration. No significant cumulative effects are expected.

15. SOCIO-ECONOMICS AND LAND USE

15.1 Introduction

15.1.1 **Volume 5.15.1** of the ES describes the assessment of the likely significant effects on the social and economic environment as a result of the construction (including removal of existing overhead lines), operation and decommissioning of the Proposed Development. Potential effects and mitigation measures have been described that would be implemented to reduce or avoid effects.

15.2 Method

15.2.1 The method adopted for this socio-economic and land use assessment takes into consideration the EIA Scoping Opinion from PINS and other representations received to the Scoping Report and Statutory Stage 4 consultation.

15.2.2 The assessment considers the following topics in the assessment of likely significant socio-economic and land use effects:

- economic consequences, for example employment and spending effects through the supply chain;
- land take and temporary or permanent effects upon land holdings;
- preventing or delaying planning permissions or allocations in plans being developed in part or in their entirety (for example, through limiting the potential for development); and
- amenity effects arising as a result of the inter-relationship of other environmental effects, such as changes in views, traffic and noise.

15.2.3 Desk-based assessments and site visits have been used to assess the likely significant socio-economic and land use effects during construction, operation and decommissioning of the Proposed Development. The surveys undertaken include:

- PRoW, recreational route and land use site walkover;
- PRoW, recreational route count surveys;
- user questionnaire surveys; and
- business questionnaire surveys.

Study Area

15.2.4 The spatial scope of the assessment comprises:

- The Local Area of Influence – within which direct socio-economic and land use effects of the Proposed Development are likely to occur. For the purpose of this assessment that comprises the Proposed Development's Order Limits and land approximately 250 metres (m) around the Order Limits.

- The Wider Study Area – including the Local Area of Influence (LAI) and the wider extent over which socio-economic and land use receptors have the potential to be significantly affected by the Proposed Development.

Significance Criteria

15.2.5 There are no published socio-economic standards that define receptor sensitivity or magnitude. The definitions in **Tables 15.1** and **15.2** have been developed and applied to the socio-economic and land use assessment and are based on professional judgement and precedent assessments including those prepared in respect of other similar projects.

Table 15.1 Sensitivity of Receptor to Socio-Economic and Land Use Effects

Receptor Sensitivity	
Very high	The receptor is of international importance and/or has little or no ability to absorb change and/or recover or adapt to the change and/or is used by sensitive groups such as older people, children, and people of poor health.
High	The receptor is of national importance and/or has little ability to absorb change and/or recover or adapt to the change and/or is used by sensitive groups such as older people, children, and people of poor health.
Moderate	The receptor is of regional or local importance and/or has medium ability to absorb change and/or recover or adapt to the change and/or is used by sensitive groups such as older people, children, and people of poor health.
Low	The receptor is of local importance and/or has some ability to absorb change and/or recover or adapt to the change and/or is used by sensitive groups such as older people, children, and people of poor health.
Negligible	The receptor is of local importance and/or is able to absorb change and/or recover or adapt to the change and is not specifically for the use by sensitive groups such as older people, children, and people of poor health.

Table 15.2 Magnitude of Socio-Economic and Land Use Effects

Magnitude of Effect	
High	An effect that will dominate over baseline conditions, and/or will be very likely to affect large numbers of businesses and/or people (with number depending on the local context) and/or persists over many years.
Moderate	An effect that can be demonstrated to change the baseline conditions and likely to affect a moderate number of businesses and/or people (with number depending on the local context) and/or is of medium duration.
Low	An effect that will result in a perceptible difference from baseline conditions and is likely to or may affect a small number of businesses and/or people (with number depending on the local context) and/or is of a short duration.
Negligible	An effect that does not result in a variation beyond the baseline conditions and/or is unlikely to measurably affect the well-being of businesses and/or people.

15.2.6 The significance of an effect is classified from a combination of the receptor sensitivity and effect magnitude, as shown in **Volume 5.5.1**. A negligible effect also has been included in the effects classification to identify effects that exist but that do not result in a variation beyond the baseline conditions or which are unlikely to affect the well-being of businesses or people.

15.3 Baseline Environment

15.3.1 The area enclosed in the Proposed Development's Order limits is approximately 1,330ha principally extending from north eastern Bridgwater to Avonmouth. The Proposed Development also includes an area of approximately 38ha around Hinkley Power Station, and an area of approximately 9ha near Churchill Substation.

15.3.2 The Local Area of Influence for the whole Proposed Development covers an area of approximately 6,898ha.

15.3.3 The Order Limits comprise approximately 1124ha of agricultural land and 96ha of non-agricultural and urban land.

15.3.4 The information collected as part of the baseline surveys established that the South West region's economy is dominated by the service sector. Agriculture is the main land use with employment and community land uses principally along the Severn Estuary to the west of the Proposed Development.

15.3.5 The larger settlements in the Wider Study Area are Bridgwater, Burnham-on-Sea, Weston-Super-Mare, Nailsea, Clevedon, Portishead, Bristol and Avonmouth. Smaller towns, villages and hamlets are dispersed widely throughout the study area including Woolavington, Puriton, East Huntspill, Mark, Rooks Bridge, Loxton, Sandford, Stone-Edge-Batch and Portbury.

15.3.6 Income levels vary across the relevant local authority areas. North Somerset workers earn the most and West Somerset workers the least with the latter being below the regional average.

15.3.7 An assessment of current job vacancies identified a significant number in the construction trades. Whilst some of these are likely to be temporary and caused by 'churn' within the labour market, others may be more permanent. This may suggest that National Grid would need to look beyond the immediate area for recruitment, and bring in workers from other parts of the country.

15.3.8 The Visit Somerset Visitor Survey (2009/2010) stated that the Cheddar Caves and Gorge, Wells Cathedral and Clarks Village were the most popular attractions within Somerset. Approximately 60% of all tourist visits to the top attractions within the County were to these attractions. None of the top attractions listed in the report is within 2km of the Proposed Development.

15.3.9 The Mendip Hills AONB provides the principal focus of tourism and recreation activities in the area. There are also locally and regionally valuable attractions in the study area and they provide areas for recreation, including an extensive network of PRoW, National Routes and National Cycleways. Other important visitor attractions within the LAI include Puxton Park and Noah's Ark Zoo.

15.3.10 A number of annual events occur within the Local Area of Influence and Wider Study Area and draw visitors to the area. These include the North Somerset Show, Bridgwater Carnival and the Glastonbury Festival.

15.4 Prediction and Assessment of the Significance of the Potential Effects

Construction Effects

Economy and Employment

15.4.1 The Proposed Development is expected to have a **negligible to minor** beneficial effect through the creation of employment opportunities in the local labour market due to the short-term in-migration of construction workers.

15.4.2 The placement of construction workers in hotels and other overnight accommodation is considered to have a **negligible** effect on the availability of tourism accommodation during construction.

15.4.3 The overall effect on unemployment and the labour market would be **negligible**; however the Proposed Development would offer significant opportunities for certain employment types, such as security and labouring in building and woodworking trades.

15.4.4 Based on the Business Survey results, the Proposed Development would have a **negligible** effect overall on the local economy. The survey highlights that at the individual business level both positive and negative effects could occur, but the overriding perception is that the Proposed Development would not affect individual businesses.

Land Use

Business Operators

15.4.5 The direct effects on existing businesses and agricultural operations have been considered in relation to land use. The construction of the Proposed Development would require the temporary use of land for the construction corridor, access roads, construction compounds and lay down areas.

15.4.6 Short-term effects caused by severance or loss of functionality would be compensated in accordance with National Grid statutory obligations; a corresponding loss within the local economy would not occur. However, a limited number of businesses have the potential to be significantly affected due to the scale of land take in their immediate area. Taking account of compensation from National Grid there would be **negligible** effects.

15.4.7 The most sensitive part of the Proposed Development for businesses which are not related to agriculture or tourism is Section G, Avonmouth Severnside. The Avonmouth Severnside area includes land parcels which have been committed for development of certain land uses and parcels which are covered by planning permission granted in 1957/58. In consultation with the landowners, South Gloucestershire and Bristol Councils, National Grid has sought to identify a 400kV overhead route which minimises effects on these land parcels.

Agricultural Land and Operations

15.4.8 Short-term effects caused by severance or loss of functionality would be compensated in accordance with National Grid statutory obligations and there would not be a loss in the local economy. A limited number of agricultural operations have the potential to be significantly affected due to the scale of land take in their immediate area.

15.4.9 Overall, the socio-economic effect of the Proposed Development on the agricultural sector would be **negligible.**

15.4.10 In relation to the potential effect on Best and Most Versatile (BMV) agricultural land, a worst case scenario would be that all agricultural land within the Limits of Deviation would be temporarily affected during construction. If so, approximately 551ha of BMV would be temporarily affected which is approximately 10% of the BMV land within the Local Area of Influence (250m around the Proposed Development). Overall, this would be an impact of **negligible to minor adverse** significance on land use. Landowners would be compensated for the land being taken out of production temporarily so there would be **negligible** economic effects.

Operational Effects

Economy and Employment

15.4.11 Once in operation, the majority of parts required would come from international suppliers. Works during are likely to be specialist tasks which would be contracted to a network of national suppliers. Contractors carrying out works during operation would spend in the local economy. Overall, the Proposed Development's operation is expected to have effects of **negligible** significance on the local economy.

15.4.12 During its operation the Proposed Development would strengthen the region and the UK's grid system. It would provide economic and social benefits through energy security and the maintenance of ongoing and reliable power supplies to both commercial and domestic customers. These benefits are not scoped into this assessment, although further information on the Need Case is provided in **Volume 5.2.1.**

Land Use

Business Operators

15.4.13 Once operational, the amount of land removed from its current use would be notably less than the land required for construction. Within the overhead line corridor, direct land take would be limited to the footprint of the newly erected pylons. The footprint of the three CSE compounds and Sandford Substation would require permanent land take.

15.4.14 Due to National Grid's compensation mechanism, there are unlikely to be significant effects on the functionality of any businesses, except for one, which would have to relocate as a result of the Proposed Development.

15.4.15 Restrictions would be placed on what can be developed above underground cables or beneath overhead lines e.g. tree planting and would apply to businesses with part of the Proposed Development on their land or where they are under the new overhead line .The restrictions are not expected to limit the current business land use functions along the Proposed Development corridor and the operational effects would be **negligible**.

Agricultural Land and Operations

15.4.16 Overall, the Proposed Development is anticipated to have a **negligible to minor adverse** socio-economic effect on agricultural operations and employment of the area in which the Proposed Development is located.

Planning Allocations and Permissions (Construction and Operational Effects)

15.4.17 The Proposed Development could have direct effects on eight planning allocations and two planning permissions, ranging from **negligible** to **moderate adverse** effects. The assessment has addressed the 1957/1958 planning permission in the Avonmouth Severnside Enterprise Area.

Visitor Attractions and Areas for Recreation (Construction and Operational Effects)

15.4.18 The Proposed Development is anticipated to have direct effects on 14 visitor attractions and areas of recreation in the Local Area of Influence.

15.4.19 Construction effects on these attractions and areas would range from **minor** to **moderate adverse**; operational effects would range from **negligible** to **minor adverse**.

15.4.20 The direct effects of the Proposed Development on the use and function of visitor resources and areas for recreation would be at their greatest during construction and decommissioning. Some of these receptors would have existing infrastructure removed and during operation, the majority of effects would be of **negligible** significance. The assessment identifies that there could be long term effects upon the use of the Motocross facility on Caswell Hill.

Decommissioning Effects

15.4.21 The activities described for the construction of the Proposed Development are similar to those the activities that would be undertaken during the decommissioning of the Proposed Development. The significance of effects during decommissioning would be similar to those for construction.

Climate Change Effects

15.4.22 The potential effects of climate change on the socio-economics and land use assessment of the Proposed Development has been considered.

15.4.23 The predicted effects of climate change are not expected to have a material influence on the socio-economic effects assessed for the Proposed Development. The Proposed Development is also not considered to have a significant effect on the predicted effects of climate change on the South West.

15.5 Inter-relationship of Potential Effects

15.5.1 The inter-relationship of other environmental effects from the Proposed Development with socio-economics and land use has been accounted for within the amenity effects assessment at **Volume 5.15.2, Appendix 15J.**

15.5.2 Amenity value is the enjoyment and well-being that people gain from a receptor together with its intended function. An amenity effects assessment was undertaken which considered effects arising as a result of the inter-relationship of other environmental effects which together could affect the amenity value of receptors during construction, operation and decommissioning.

15.5.3 The assessment considered likely amenity effects on over 100 receptors within 250m of the Proposed Development or receptor groups, including:

- visitor attractions, PRoW, recreational routes, tourism accommodation and recreational areas; and

- 42 local communities or settlements and also community facilities (including health, education and community gathering).

15.5.4 Potential effects were considered qualitatively with respect to the functionality and enjoyment of existing land uses and business operations, particularly some recreational and tourism resources considered to be more sensitive to changes in amenity. The assessment of amenity effects is presented in **Volume 5.15.2, Appendix 15J.**

15.5.5 **Negligible to moderate adverse** effects are predicted for the amenities assessed.

15.6 Mitigation

15.6.1 Mitigation of effects on socio-economics and land use through considered design has offered opportunities for likely effects to be reduced or avoided.

15.6.2 Measures are proposed to minimise the extent to which usage of PRoW and recreational routes are disrupted. Where PRoW must be temporarily closed, diversion routes, clear signage and advanced warning of the closure will be put in place.

15.7 Residual Effects

Construction Effects

15.7.1 During construction the Proposed Development is expected to have **minor beneficial** effect in terms of inward investment to the local economies.

15.7.2 The Proposed Development would require the short-term in-migration of construction workers. This would have a **negligible** adverse effect on the availability of tourism accommodation.

15.7.3 Surveys of business operators and recreational users have provided evidence to suggest that the Proposed Development would have no more than a **minor adverse** effect on the visitor economy.

15.7.4 Avonmouth Severnside and Puriton Energy Park are allocated planning areas for economic growth along the route of the Proposed Development. The Proposed Development has been assessed to have a **minor adverse** effect during construction on the Avonmouth Severnside area.

15.7.5 The construction of the Proposed Development would have a **moderate adverse** effect on BMV land during construction. However, following reinstatement of works areas to the current quality, the operational effect would reduce to a negligible effect.

15.7.6 The assessment has identified that there are individual recreational and visitor attractions which would have **negligible** to **moderate adverse** effects during construction.

Operational Effects

15.7.7 Once the Proposed Development is in operation some of users of land and some businesses would benefit from the removal of existing 132kV infrastructure. For others, the adverse effects of the new 400kV connection would continue in operation.

15.7.8 In overall socio-economic terms for the Wider Study Area, the level of employment put at risk through this Proposed Development would be **minor adverse**.

15.7.9 The Proposed Development's presence during operation is not considered to present constraints to the future development of Avonmouth Severnside which would limit the employment and economic potential of the area being achieved.

15.7.10 In relation to the Puriton Energy Park the assessment identified that there would be minimal interaction with the Proposed Development area, mainly due to the removal of 132kV lines. There would be **no effect** on this allocation during operation.

Decommissioning Effects

15.7.11 Residual decommissioning effects are expected to be similar to those identified for construction.

15.8 Cumulative Effects

15.8.1 The Bridgwater to Hinkley overhead line reconductoring, the N Route reconductoring and the Helius Energy Project collectively would have a cumulative effect ranging from **negligible** to **moderate beneficial** significance on unemployment and the labour market.

15.8.2 The cumulative demand from these projects can be satisfied within the existing accommodation stock without displacing tourist users, as Hinkley Point C Power Station will provide accommodation in the area for its workforce. There would be **negligible** cumulative effect overall.

15.8.3 In terms of long-term effect on visitor economy, the Bridgwater substation project, Bridgwater to Hinkley overhead line reconductoring project N Route reconductoring project and Helius Energy project were scoped out from the assessment of effects on local visitor economy and are not considered here.

15.8.4 The Proposed Development is likely to have **minor adverse** to **minor beneficial** cumulative effects with the Steart Peninsula Project owing to the likely overlap in receptors. The Proposed Development is likely to have a **minor adverse** to **major beneficial** cumulative effect with the Hinkley Point C Public Information Centre. Collectively there would be **minor adverse** to **major beneficial** cumulative effect.

16. ELECTRIC AND MAGNETIC FIELDS

16.1 Introduction

16.1.1 **Volume 5.16.1** of the ES describes the assessment of the likely significant effects on electric and magnetic fields as a result of the construction (including removal of existing overhead lines), operation and decommissioning of the Proposed Development. Potential effects and mitigation measures have been described that would be implemented to reduce or avoid effects.

16.1.2 Electric and magnetic fields (EMFs) and the electromagnetic forces they represent are an essential part of the physical world. Their sources are the charged fundamental particles of matter (principally electrons and protons). Electromagnetic forces are partly responsible for the cohesion of material substances and they mediate all the processes of chemistry, including those of life itself. EMFs occur naturally within the body in association with nerve and muscle activity. Humans also experience the natural static magnetic field of the Earth (to which a magnetic compass responds) and natural static electric fields in the atmosphere.

16.1.3 EMFs occur in the natural world, and people have been exposed to them for the whole of human evolution. The advent of modern technology and the wider use of electricity and electrical devices have inevitably introduced changes to the naturally occurring EMF patterns. Energised high-voltage power-transmission equipment, along with all other uses of electricity, is a source of EMFs. These EMFs have the same frequency as the voltages and currents that produce them, which is 50 hertz (Hz) in the UK. The fields are described as power-frequency or extremely-low-frequency (ELF) alternating electric and magnetic fields, and exist in addition to the Earth's steady natural fields.

16.1.4 Electric fields depend on the operating voltage of the equipment producing them and are measured in V/m (volts per metre). The operating voltage of most equipment is a relatively constant value. Electric fields are shielded by most common building materials, trees and fences and diminish rapidly with distance from the source.

16.1.5 Magnetic fields are measured in μT (microtesla) depend on the electrical currents flowing, which vary according to the electrical power requirements at any given time. They are not significantly shielded by most common building materials or trees but do diminish rapidly with distance from the source.

16.2 Method

16.2.1 The assessment considers the EMFs produced from the electricity assets associated with the Proposed Development. Desk based assessments and calculations have been undertaken in accordance with the relevant guidance

16.3 Baseline Environment

16.3.1 The Proposed Development is located within a mixture of rural, urban and equipment that generates, distributes or uses electricity produces EMFs. The UK power frequency is 50 industrial areas, all of which accommodate existing electrical assets. All Hz which is the principal frequency of the EMFs produced, also known as Extremely Low Frequency (ELF) EMFs.

16.3.2 Electric and magnetic fields both occur naturally. The Earth's magnetic field, which is caused mainly by currents circulating in the outer layer of the Earth's core is roughly 50 µT in the UK. This field may be distorted locally by ferrous minerals or by steelwork such as in buildings. At the Earth's surface there is also a natural electric field, created by electric charges high up in the ionosphere, of about 100 V/m in fine weather.

16.3.3 Currently there is an existing 132kV overhead line which produces EMF; however this will be removed as part of this project.

16.4 Prediction and Assessment of the Significance of the Potential Effects

Construction Effects

16.4.1 During construction, and prior to energisation, transmission equipment will not produce any significant EMFs and therefore will have a **neutral** significance of effect. The construction effects on EMFs were therefore not considered further.

Operational Effects

Overhead Lines

16.4.2 Overhead lines are designed to ensure that EMFs do not breach exposure limits. The maximum EMF produced by the proposed overhead line are less than the relevant public exposure limits and therefore have a **neutral** effect.

Underground Cables

16.4.3 As a consequence of their design, underground cables do not produce an EMF. Magnetic fields produced by direct buried cables fall quickly with distance as you move away and the highest magnetic fields are observed directly above the cables. All of the underground cable sections comply with the relevant exposure limits Underground cables will therefore have a **neutral** effect on EMF.

Cable Sealing End Compounds

16.4.4 There is no equipment within a CSE compound that produces high EMFs. The EMFs produced by a CSE compound are determined by the underground cable and overhead line entering and exiting the site. CSE compounds are deemed to be compliant with exposure guidelines, therefore the significance of effect will be **neutral**.

Substations

16.4.5 All of the existing equipment and the new proposed equipment does not and will not contain any reactive equipment with air-cored reactors. Therefore the design is compliant with the UK Government guidelines and a **neutral** effect is predicted.

Decommissioning Effects

16.4.6 When the equipment is de-energised and decommissioned no EMFs will be produced, as during constriction, and is therefore considered to have a **neutral** significance of effect on EMFs.

16.5 Inter-relationship of Potential Effects

16.5.1 The potential effect of EMFs on bats has been considered. Bats use echolocation to detect prey and to aid navigation. This has widely been reported to operate between the frequency ranges of 20 to 200kHz. National Grid overhead lines do not produce significant fields at these frequencies, and are therefore highly unlikely to interfere with the bats' navigation or foraging.

16.5.2 The NPS for Electricity Networks Infrastructure (EN-5) (July 2011) in Part 2, section 2.10.8 states "There is little evidence that exposure of crops, farm animals or natural ecosystems to transmission line EMFs has any agriculturally significant consequences."

16.6 Mitigation

16.6.1 No mitigation measures are necessary as the Proposed Development has been demonstrated to comply with the current public exposure guidelines and will not result in any adverse effects.

16.7 Residual Effects

16.7.1 The Proposed Development has been demonstrated to comply with the current public exposure guidelines as detailed in NPS EN-51. If these requirements are met NPS EN-5 states that "EMF effects are minimal."

16.8 Cumulative Effects

16.8.1 The cumulative assessment is provided at **Volume 5.17.1** and includes potential cumulative effects of the Proposed Development together with other major development proposals.

16.8.2 It is National Grid's and the electricity industry's policy to ensure that all electrical assets comply with Government exposure limits and policies. As all of the proposed developments will comply with these exposure limits the cumulative effects are not anticipated to be not significant.

17. CUMULATIVE EFFECTS

17.1 Introduction

17.1.1 Cumulative effects are the effects of the Proposed Development combined with the potential effects of other major developments. This chapter of the NTS provides a summary of the approach used in **Volume 5.17.1**.

17.1.2 A summary of the cumulative effects assessment is included in each of the topic chapters of this NTS and is not be repeated below.

17.2 Method

17.2.1 The method for the assessment of potential cumulative effects takes into account relevant regulations and guidance; the Scoping Opinion and representations made to the Scoping Report; and consultations.

Identification of Major Developments

17.2.2 Over 10,000 planning applications within 1km from the outer edge of the Proposed Development's Order Limits were considered to identify major development proposals to include in the assessment of potential cumulative effects.

17.2.3 In addition, major developments up to 10km from the Order Limits were considered for some EIA topics.

17.2.4 Consultation was undertaken with the Local Planning Authorities and statutory bodies over two stages to identify additional major development proposals with the potential to result in cumulative effects.

17.2.5 The list comprises 99 major development proposals and is provided in **Volume 5.17.1**. The location of all development proposals is shown at **Volume 5.17.3, Figure 17.1** and where the indicative start and end dates are known they are provided at **Volume 5.17.2, Appendix 17B**.

17.3 Assessment of Potential Cumulative Effects

17.3.1 An assessment of the potential cumulative effects was undertaken for each environmental topic area to determine the likely significance of effects.

17.3.2 The method used to determine significance of effect is the same as that set out in **Volume 5.5.1** (EIA Approach and Method) and the environmental topic chapters (**Volume 5.6.1 to 5.16.1**). This has enabled a consistent approach to be adopted for the ES assessment approach.

1.1 Department for Energy and Climate Change (DECC 2011a), Overarching Energy Policy (EN-1)
1.2 Department for Energy and Climate Change (DECC 2011b), Electricity Networks Infrastructure Policy (EN-5)
2.3 National Grid: Hinkley Point C Connection Need Case for the South West and the South Wales and Gloucestershire Regions (April 2014).

2.4 National Grid, Hinkley Point C Connection Strategic Optioneering Report (December 2009).
2.5 National Grid, Hinkley Point C Connection Route Corridor Study, 2009
2.6 WPD, Local Electricity Network Preferred Options Report
2.7 National Grid, Substation Siting Appraisal Report
4.8 National Grid Electricity Transmission plc, Climate Change Adaptation Report (CCAR) (September 2010)
13.9 Design Manual For Roads and Bridges, Volume 11 Section 3, Environmental Assessment Techniques, Part 1, Air Quality, Highways Agency, London, 2007.