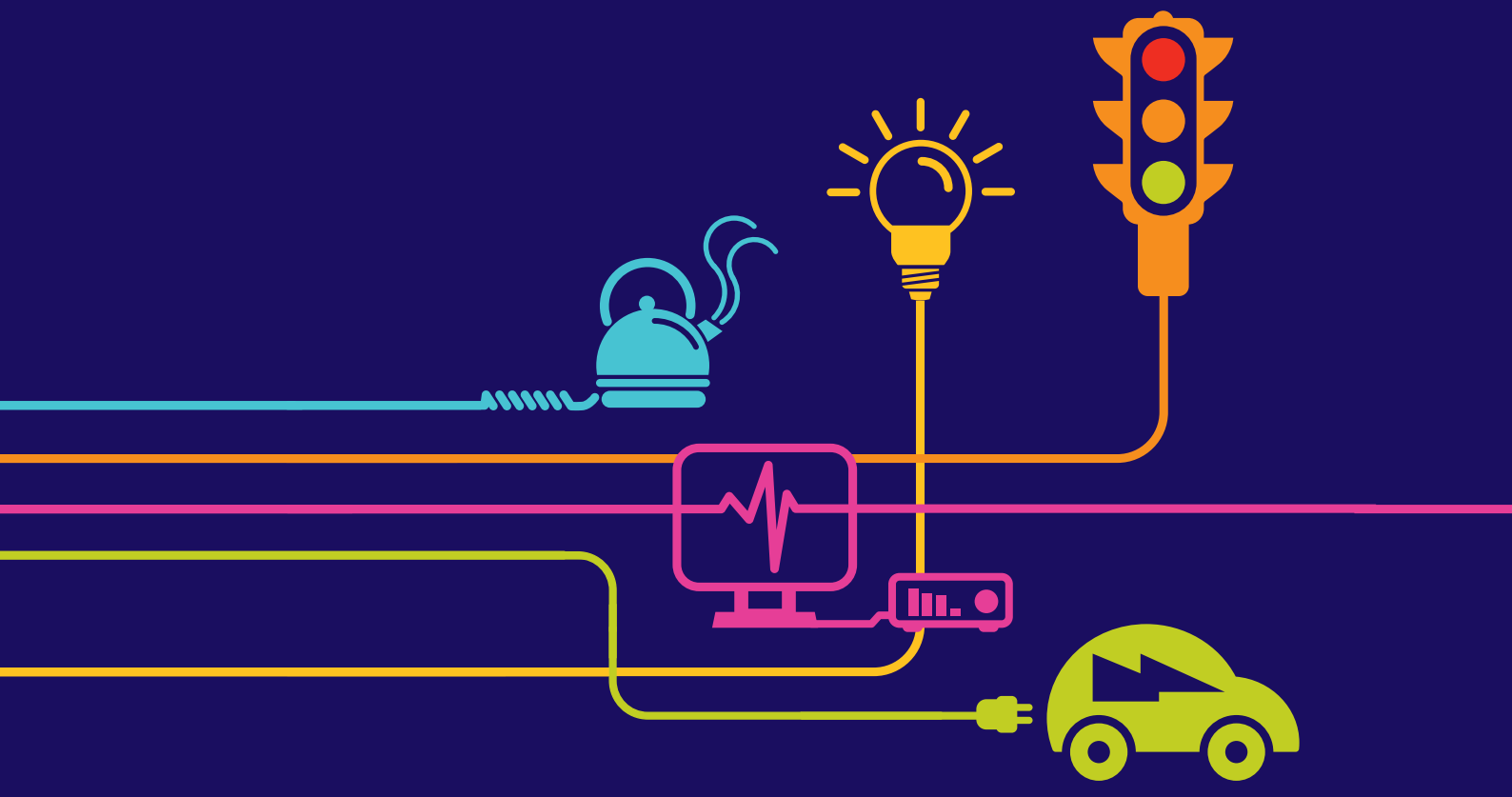
Document 5.2.2.3

nationalgrid

Environmental Statement Project Need and Alternatives Appendix 2F

Hinkley Point C Connection Project

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



Application Reference EN020001

May 2014

nationalgrid

Environmental Statement

Hinkley Point C Connection Project

5.2.2 – Project Need and Alternatives – Appendices (orange highlight indicates the contents of this Volume)

Appendix	Title
Volume 5.2.2.1	
2A	Hinkley Point C Connection Project Strategic Optioneering Report (2009)
2B	Hinkley Point C Connection Strategic Optioneering Report Additional Information (2010)
2C	Hinkley Point C Connection Project Strategic Optioneering Report (2011)
Volume 5.2.2.2	
2D	Hinkley Point C Connection Project Route Corridor Study (2009)
2E	Hinkley Point C Connection Project M5 Routeing Study (2012)
Volume 5.2.2.3	
2F	Hinkley Point C Connection Project Selection of Preferred Connection (2011)
Volume 5.2.2.4	
2G	Hinkley Point C Connection Project Connection Options Report (2012)
Volume 5.2.2.5	
2H	Hinkley Point C Connection Project Changes to the Hinkley Point Transmission Line Entry Points: Technical and Environmental Appraisal (2012)
2I	Land Hinkley Point C Connection Project Environmental Review of Technical Options at Bridgwater Tee (2013)
2J	Hinkley Point C Connection Project Cable Sealing End Siting Study (2012)
Volume 5.2.2.6	
2K	Hinkley Point C Connection Project Pylon Design Options Report (2013)
Volume 5.2.2.7	
2L	Distribution Systems Options Report (2012)
Volume 5.2.2.8	
2M	Western Power Distribution Substation Siting Study (2012)
Volume 5.2.2.9	
2N	Hinkley Point C Connection Project Local Electricity Network Substation Siting Appraisal (2012)
2O	Western Power Distribution 132kV Route Corridor Study (2012)
2P	Hinkley Point C Connection Project Local Electricity Network Preferred Options Report (2012)
Volume 5.2.2.10	
2Q	Western Power Distribution Connection between the Proposed Sandford Substation and the Existing AT Route Connection Options Report (2013)
2R	Western Power Distribution Modification Works at Churchill Substation and Turn-in of Y and W Routes Technical and Environmental Appraisal (2013)
Volume 5.2.2.11	

Appendix	Title
2S	Western Power Distribution Connection between the Proposed Sandford Substation and the Existing N Route Overhead Line Technical and Environmental Appraisal (2013)
2T	Western Power Distribution 132kV W Route Undergrounding Options Report (2013)
2U	Western Power Distribution Undergrounding Cable Sealing End Platform Pylon Location Technical and Environmental Appraisal (2013)
2V	Western Power Distribution Undergrounding of Sections of 132kV Overhead Lines G, BW Route and Seabank Line Entries Technical and Environmental Appraisal (2013)

Document Control	
Document Properties	
Organisation	**National Grid**
Author	**National Grid**
Approved By	**National Grid**
Title	**Environmental Statement – Project Need and Alternatives - Appendices**
Document Reference	**Volume 5.2.2.3**

Date	**Version**	**Status**	**Description/Changes**
14/05/14	A	Live	Final version for DCO submission

Appendix 2F – Hinkley Point C Connection Project Selection of Preferred Connection (2011)

AUGUST 2011

nationalgrid

Hinkley Point C Connection Project

Selection of Preferred Connection Report

Contents **Page No.**

Appendices

Figures

1 INTRODUCTION

Purpose of Report

1.1 This report outlines the selection of a preferred 400kV connection option which is required to connect proposed power generators, including EDF Energy's proposed nuclear power station at Hinkley Point ("Hinkley Point C"), to the national electricity transmission network. It demonstrates how statutory duties, policy considerations, technical and environmental issues and consultation feedback have shaped and influenced the selection of preferred connection.

1.2 The report is structured as follows :

- Chapter 2 - explains the background to the proposal, including the need for the connection. It also outlines how potential reinforcement alternatives were identified and assessed and reports responses to some of those alternatives, reaching a conclusion on the preferred form of connection;
- Chapter 3 - describes the potential route corridors that were evaluated. These formed the basis for the Stage 1 Consultation, which is reviewed in more detail in Chapter 9;
- Chapter 4 - identifies those factors which have been taken into account in the route corridor selection process;
- Chapter 5 - discusses other factors which were considered not to affect route corridor selection;
- Chapters 6 to 16 - assess the potential route corridors against each of the factors in Chapter 4 and note related consultation representations;
- Chapter 17 - contains an overview of the relative merits of the route corridors and provides a basis for selecting a preferred corridor, with reference to consultation representations which have influenced that selection;
- Chapter 18 - discusses potential mitigation measures, particularly the use of underground cables;
- Chapter 19 - sets out the conclusions of the report; and

- Chapter 20 - outlines the next steps, including how a detailed connection design will be identified and environmental impact assessment (EIA) and further consultations undertaken, leading to the preparation and submission of an application for development consent to the Infrastructure Planning Commission (IPC) or its successor body.

1.3 Reference is made to six separate but related project-specific reports which should be read alongside this Selection of Preferred Connection Report – the Project Need Case[1], the Strategic Optioneering Report[2], the Strategic Optioneering Additional Information Report[3], the further Strategic Optioneering Report [4], the Route Corridor Study Report[5] and the Stage 1 Feedback Report[6].

2 BACKGROUND TO THE PROPOSAL

National Grid

2.1 National Grid is the operator of the high-voltage transmission system for the whole of Great Britain and the owner of the high voltage transmission network in England and Wales[7].

2.2 National Grid's transmission system in England and Wales consists of approximately 7200km of overhead lines and a further 700km of underground cabling, operating at 400kV and 275kV. 400kV lines are at the higher voltage giving them a higher power carrying capability, while 275kV lines generally represent the older parts of the network which were established prior to the 400kV transmission system.

2.3 The overhead lines and cables connect around 340 substations to form a highly interconnected network. The substations provide points of connection for around 80 power stations and for connections to the local distribution networks, which operate at voltages from 132kV down to 240V (at which voltage, the

[1] National Grid : Hinkley Point C Connection Need Case for the South West and the South Wales and Gloucestershire Region : August 2011
[2] National Grid : Hinkley Point C Connection Strategic Optioneering Report : December 2009
[3] National Grid : Hinkley Point C Connection Strategic Optioneering Report Additional Information : June 2010
[4] National Grid : Hinkley Point C Connection Strategic Optioneering Report : August 2011
[5] TEP : Hinkley Point C Route Corridor Study for Public Consultation : October 2009
[6] National Grid : Hinkley Point C Connection Project Stage 1 Consultation Feedback Report : August 2011
[7] The transmission network in Scotland is owned by Scottish Power Transmission Limited in southern and central Scotland and by Scottish Hydro-Electric Transmission Limited in the north of Scotland.

power is distributed to domestic consumers). The distribution networks are owned by Distribution Network Operators (DNOs), including Western Power Distribution (hereafter referred to as WPD) in South West England.

2.4 National Grid has duties placed upon it by the Electricity Act 1989[8] ("the Electricity Act") and operates under the terms of its transmission licence. Those duties and terms of particular relevance to the development of the proposed connection described in this report are set out below.

Duties under the Electricity Act 1989

2.5 Under Section 9(2) of the Electricity Act, National Grid has a duty:

- to develop and maintain an efficient, co-ordinated and economical system of electricity transmission; and
- to facilitate competition in the supply and generation of electricity.

2.6 Section 38 and Schedule 9 of the Electricity Act requires National Grid, when formulating proposals for new lines and other works, to:

- "…*have regard to the desirability of preserving natural beauty, of conserving flora, fauna, and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and shall do what [it] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects*".

2.7 In its Stakeholder Community and Amenity Policy[9], National Grid sets out how the company will meet the duty placed upon it by the aforementioned legislation. This includes :

- only seeking to build new lines and substations where the existing transmission infrastructure cannot be upgraded to meet transmission security standards;

[8] Electricity Act : 1989 c29
[9] National Grid plc : National Grid's commitments when undertaking works in the UK - Our Stakeholder, Community and Amenity Policy : February 2010

- seeking to avoid nationally and internationally designated areas where new infrastructure is required; and
- minimising the effects of new infrastructure on other sites valued for their amenity.

2.8 The Stakeholder, Community and Amenity Policy also commits to the application of best practice methods, to assess the environmental impacts of proposals and identify appropriate mitigation measures, and to promoting effective stakeholder and community engagement.

Transmission Licence

2.9 Licence Condition C8 (Requirement to offer terms) sets out obligations on National Grid regarding provision of offers to provide connections to the transmission system. In summary, where any person applies for a connection, National Grid shall offer to enter into an agreement(s)[10] to connect, or to modify an existing connection, to the transmission system and the offer shall make detailed provision regarding:

- the carrying out of works required to connect to the transmission system;
- the carrying out of works (if any) in connection with the extension or reinforcement of the transmission system; and
- the date by when any works required to permit access to the transmission system (including any works to reinforce or extend the transmission system) shall be completed.

2.10 Licence Condition C17 (Transmission system security standard and quality of service) requires National Grid to *"at all times: plan, develop and operate the licensee's transmission system … in accordance with the National Electricity Transmission System Security and Quality of Supply Standard version 2.1"* (NETS SQSS)[11].

2.11 The NETS SQSS is a document that defines criteria which specify the robustness of the transmission system, in terms of the faults, and combinations of faults,

[10] Paragraph 6 of Licence Condition C8 sets out exceptions where National Grid is not obliged to make an offer (e.g. where to do so would put it in breach of certain other contracts or regulations).
[11] NETS Security and Quality of Supply Standard Issue 2.1 - 07 March 2011

that it must be able to withstand without any interruption of supplies, and the maximum interruption to supplies which is permitted for certain more onerous combinations of faults. The NETS SQSS is subject to updates through industry and regulatory working groups, with this periodic review approved by the industry regulator, Ofgem.

The Need for the Connection

2.12 In July 2007, National Grid received an application for the connection of a new nuclear power station of 3600 Megawatts (MW) at Hinkley Point (Hinkley Point C) to the national transmission network. Connection applications have also been made by other generators in the region[12].

2.13 Under Section 9(2) of the Electricity Act National Grid has a duty to "*develop and maintain an efficient, coordinated and economical system of electricity transmission*". This means that, when considering how best to provide transmission capacity, the organisation should do so in a coordinated manner by considering all potential developments that may interact with the current requirement.

2.14 In this case, the connection of Hinkley Point C triggers, in 2018, the need for additional transmission capacity. The Need Case document identified that additional capacity will also be required to facilitate the connection of both Oldbury-upon-Severn nuclear power station in 2020 and Seabank Stage 3 combined cycle gas turbine power station in 2023.

2.15 The Need Case explained that two technical limits exist within the current system. These two limits, or "boundaries", restrict the amount of electricity that can be safely exported on the transmission system from both the South West and South Wales and Gloucestershire.

2.16 Figure 2.1 below shows the boundaries. The yellow line shows the South West boundary and the green line shows the South Wales and Gloucestershire boundary.

[12] Comprises the National Grid areas of South West England and South Wales & Gloucestershire

Figure 2.1 : Transmission Boundaries in the South West and South Wales and Gloucestershire

2.17 The Need Case also explained that the technical limits of the existing transmission infrastructure will be breached over the next few years as new power stations connect to the transmission system and that to maintain compliance with the NETS SQSS, additional transmission capacity in the region is required. Specifically, by 2018 the South West region requires new transmission capacity in excess of 3200MW, while South Wales and Gloucestershire requires new capacity in excess of 3000MW by 2023.

2.18 As well as these "boundary" conditions, the Need Case also explained that additional transmission circuits will be required at Seabank 400kV substation in Bristol. These new circuits are required in order to facilitate the new generation connecting at Seabank and at the same time to maintain compliance with the NETSSQSS.

Scheme Development and Consultation Process

2.19 Developing a scheme to meet the demands for additional capacity on the South West England and South Wales and Gloucestershire transmission network involves the following main stages :

- power system analysis - to identify issues which may affect the secure operation of the National Grid transmission system, and optimal strategies for their management, as set out in the Need Case;
- strategic optioneering - to determine potential solutions to take forward for more detailed investigation, having regard to National Grid's statutory duties;
- route corridor studies - to define potential route corridors, taking environmental constraints into account;
- Stage 1 Consultation - to obtain the views of statutory bodies, other agencies and the general public on the potential route corridors;
- potential connection and route corridor preference (the subject of this report) - to select which should be preferred, based on a range of technical, environmental and other criteria, including representations received during the Stage 1 Consultation;
- detailed connection design - definition of potential route alignment(s) and pylon and substation locations and consideration of undergrounding and other mitigation techniques within the preferred corridor;
- Stage 2 Consultation - to obtain the views of statutory and non-statutory bodies, other agencies and the public on preliminary environmental information and in developing the detailed connection design and appropriate mitigation measures;
- assessment - environmental impact assessment of the detailed connection design and finalisation of proposed scheme;
- Stage 3 Consultation - to consult on the proposed detailed connection design in accordance with the Planning Act 2008 to obtain the views of statutory and non-statutory consultees, other agencies, and the public prior to the submission of an application for development consent to the IPC;
- submission - submission of Development Consent Order application to the IPC, or successor body.

Strategic Optioneering

2.20 Strategic optioneering is informed by power system analysis, undertaken within National Grid, to assess a wide range of electrical reinforcement options which could potentially meet the strategic requirement for additional transmission capacity, taking account of existing and planned generation and demand forecasts. In the case of the Hinkley C Connection Project, the initial strategic optioneering exercise identified and evaluated some 20 technical options at workshops, involving representatives of the electricity network investment, engineering and planning and environmental consents teams from National Grid and its construction partners. In evaluating the options, due regard was given to the need to develop an efficient, co-ordinated and economical system of electricity transmission (as set out in National Grid's statutory and licence obligations) and to National Grid's obligations to consider the effects of any proposal on the environment.

2.21 The strategic optioneering exercise concluded that two broad options should be taken forward. Both options would involve uprating the existing Hinkley Point to Bridgwater 275kV circuit to operate at 400kV and connecting this to the existing Hinkley Point to Melksham overhead line in the Woolavington area to form a Hinkley Point - Bridgwater - Melksham circuit. Establishing this circuit would allow the existing Hinkley Point - Melksham 400kV overhead line to be turned north, in the vicinity of Woolavington, to form the starting point for a Hinkley Point - Seabank circuit.

2.22 North of Bridgwater, the two options were to construct a 400kV overhead line route on a new alignment northwards to Seabank, or to utilise the route of the existing 132kV Western Power Distribution (WPD) overhead line between Bridgwater and Seabank, replacing the existing pylons with new 400kV pylons and rationalising/improving the route where possible.

2.23 National Grid initially considered whether a connection could be achieved by means of an overhead line. This was because of the very high cost of high voltage underground transmission coupled with certain environmental and operational disadvantages associated with undergrounding. However, whilst views were not explicitly sought on this issue, the Stage 1 Consultation revealed significant aspiration for the undergrounding of all or part of the Hinkley Point C connection, principally in order to avoid visual impacts and impacts on the

landscape. Further consideration was, therefore, given to this matter, as described in Chapter 18.

2.24 Statutory consultees, local communities and interest groups requested additional information to explain why National Grid had ruled out certain alternatives to the proposed overhead line, particularly regarding the use of subsea High Voltage Direct Current (HVDC) cables. This was presented in the Strategic Optioneering Additional Information Report in June 2010, which compared the capital costs of all subsea cable options (from Hinkley Point to Seabank, to Aberthaw and to other points in South Wales using AC and HVDC transmission as appropriate) to those of an overhead line connection between Bridgwater and Seabank. The report also considered transmission losses and the carbon footprint of HVDC connections.

Route Corridor Study

2.25 Between March and June 2009, National Grid met with a number of stakeholders to explain the background and need for system reinforcements in the region. Information was also provided on the proposed methodology for route corridor studies and initial representations were sought - these are reported in the Route Corridor Study (RCS). Stakeholders included :

- Natural England;
- English Heritage;
- Environment Agency;
- Royal Society for the Protection of Birds (RSPB);
- local authorities - Somerset County Council, Sedgemoor District Council, West Somerset District Council, North Somerset Council, Bristol City Council and South Gloucestershire Council;
- Bristol Port Authority; and
- South West Regional Development Agency and South West Department of Communities and Local Government.

2.26 Having identified that the preferred potential connection was a new 400kV overhead line between Bridgwater and Seabank, and taking into account the views of stakeholders, a Route Corridor Study was commissioned from environmental consultants TEP to identify possible route corridors between these

locations and to assess how these corridors performed against National Grid's statutory environmental obligations. A detailed desk based assessment, supplemented with site visits, was used to generate potential route corridors, in particular considering the potential impacts on key environmental constraints within the study area.

2.27 The RCS identified two principal corridors and offered a comparison of them. Corridor 1 is an 'opportunity corridor' which would follow the route of the existing WPD 132kV overhead line which travels through the area in a broadly north-south direction from Bridgwater via Portishead to Seabank. This corridor provides two options. Corridor 1 Option 1A would adopt, as far as possible, the same alignment as the 132kV overhead line and would require the removal of this line. Corridor 1 Option 1B would involve retaining the 132kV overhead line, and running a new 400kV overhead line parallel to it. Corridor 2 would involve the construction of a new 400kV overhead line between Bridgwater and Seabank separate from the existing overhead lines. In the area of Corridor 2 between the Mendip Hills and Yatton, three potential options were identified - the western, central and eastern spurs.

2.28 The RCS is separately reported.

Stage 1A Consultation

2.29 The findings of the RCS formed the principal focus for an extensive consultation exercise. This was carried out in accordance with the Project's initial Statement of Community Consultation[13] (SOCC) which was prepared in consultation with Somerset County Council, West Somerset District Council, Sedgemoor District Council, North Somerset Council, South Gloucestershire Council and Bristol City Council and takes account of their comments. It was informed by relevant government guidance[14], guidance produced by the IPC[15], the relevant local authorities' Statements of Community Involvement and National Grid's policy and experience relating to public consultation.

[13] National Grid : Hinkley Point C Connection Project : Consultation Strategy : October 2009
[14] Department of Communities and Local Government : Planning Act 2008 Consultation on the Pre-Application Consultation and Application Procedures for Nationally Significant Infrastructure Projects : March 2009
[15] Infrastructure Planning Commission : Guidance Note 1 : Pre-application stages : March 2010

2.30 The initial Stage 1A Consultation on route corridor options was carried out between October 2009 and January 2010 and included :

- a series of staffed public exhibitions at 17 venues in the local area;
- project briefing meetings with parish councils;
- project briefing meetings with members and officers of the local authorities; and
- consultation with a wide range of statutory and non-statutory organisations including the Environment Agency, Natural England, English Heritage.

Stage 1B Consultation

2.31 In response to the many questions raised by respondents concerning other options considered by National Grid, the Stage 1 Consultation was extended. During this Stage 1B Consultation, National Grid provided additional technical information on subsea and undergrounding options to consultees and undertook further public exhibitions on the Project. A further round of 24 public exhibitions and information dissemination (including a newsletter and factsheets), specifically related to these issues, took place in June and July 2010. An addendum to the Strategic Optioneering Report was also made available.

2.32 A separate detailed Feedback Report documenting the Stage 1A and 1B consultation exercises is available. Both this and the present report show how consultation representations have influenced the selection of the preferred route corridor.

Review of Strategic Options

2.33 As part of the pre-application process adopted by National Grid, a review of the SOR (December 2009) was undertaken, taking into account the issues raised during the Stage 1 Consultation, and in the context of the changes to the content and programme of new generation in the region since the original strategic optioneering exercise. The review tested whether, on the basis of the latest available information, the selection of a connection option based upon the provision of a new overhead transmission line between Bridgwater and Seabank was robust.

2.34 The review is documented in the Strategic Optioneering Report (August 2011) which:

- reviews the technology options available to meet the identified need for system reinforcement, including the use of the following technologies : AC underground cables and overhead lines; gas insulated lines; and HVDC technology;
- provides updated information on the capital costs of each connection option and considers lifetime cost implications; and
- assesses the environmental and socio-economic effects of each option.

2.35 The Need Case document explains the transmission capacity issues in the region, and the Strategic Optioneering Report (August 2011) identifies the following potential electrical connections options which could provide the necessary capacity for the Hinkley Point C connection whilst addressing the wider system reinforcements required to satisfy the needs of forecast generation and demand in the South West, South Wales and Gloucestershire regions :

- PC1 : Hinkley – Aberthaw;
- PC2 : Bridgwater – Melksham;
- PC3 : Bridgwater – Nursling;
- PC4 : Bridgwater – Seabank; and
- PC5 : Hinkley - Seabank

2.36 While all the options would involve a common series of system upgrades, there are some major differences between them, as follows. The PC1: Hinkley – Aberthaw option would require significant reinforcements of the South Wales network, including upgrading existing overhead lines, new and complete replacement substations, as well as a new cable tunnel under the River Severn. PC3: Bridgwater - Nursling would require a new cable tunnel at Chilling to increase capacity on the Fawley - Lovedean circuits.

2.37 The PC1: Hinkley – Aberthaw, PC2:Bridgwater – Melksham and PC3: Bridgwater – Nursling options would all require a new substation at Iron Acton and the rebuilding of the 30km Iron Acton – Melksham connection at 400kV. This Iron Acton – Melksham 400kV circuit is required as the additional overhead lines alone do not resolve the requirements of the NETS SQSS for all generation connecting to the South West, South Wales and Gloucestershire regions. In

addition, to meet the requirements of the NETS SQSS for the proposed new power station connection at Seabank, additional circuits between Seabank and Tockington would be required for these three options.

2.38 Due to the way their electrical connections between the South West, South Wales and Gloucestershire regions occur, the options of PC4: Bridgwater – Seabank and PC5: Hinkley – Seabank (AC) do not require the Iron Acton – Melksham 400kV circuit or the Seabank – Tockington circuits. This is because these electrical connections alone satisfy the requirement of the NETS SQSS as explained in detail in the Strategic Optioneering Report (August 2011). The PC5: Hinkley – Seabank HVDC option would require the additional Seabank – Tockington circuits.

2.39 There are a number of different technologies by which the required transmission connection could be made :

- Alternating Current (AC) Overhead transmission lines;
- AC Underground cable circuits;
- AC Gas-insulated lines (GIL); and
- High Voltage Direct Current (HVDC) cables and overhead lines.

2.40 These technologies have different features which affect when and where they are used and not all are appropriate for use on certain of the potential connections. The full list of options and each applicable technology is set out in Table 2.1.

2.41 Neither overhead lines nor GIL technology would be feasible for a Hinkley - Aberthaw subsea connection.

2.42 Bridgwater - Melksham and Hinkley - Melksham connections using AC underground cables or GIL technology were not assessed because these routes are significantly longer than a Bridgwater - Seabank connection and as such would have a greater amenity impact and incur a greater cost whilst offering no benefit over a Bridgwater - Seabank connection.

Table 2.1 : Technology options for potential connections

Technology	PC1 Hinkley – Aberthaw	PC2 Bridgwater – Melksham	PC3 Bridgwater – Nursling	PC4 Bridgwater - Seabank	PC5 Hinkley - Seabank
AC Underground Cables	Yes (subsea)	No	No	Yes	Yes (subsea)
Gas-Insulated Line (GIL)	No	No	No	Yes	No
HVDC	Yes (subsea)	No	No	No	Yes (subsea)
AC Overhead Line	No	Yes	Yes	Yes	No

2.43 The economic review showed that AC overhead line technology would be the most economic of the options. AC underground cables and GIL are less economic but could be used in combination with AC overhead lines if there is a need to mitigate the potential impacts of overhead lines on sensitive locations. HVDC generally becomes more economic where transmission takes place over long distances, which does not apply to the options in this case. HVDC and subsea AC connections, in this case, would represent the options with the highest capital, and in the case of HVDC, lifetime costs, whilst offering no significant environmental benefits over the alternatives.

2.44 The comparative capital costs of the connection options and reinforcements required to meet the needs of the NETS SQSS are shown in Table 2.2. In addition to the cost of the connection itself, these costs include for the new and upgraded substations, the upgrading of existing transmission circuits and the provision of additional circuits required in connection with each system enhancement option.

Table 2.2 : Costs of potential system enhancement options[16]

Potential Connection	Technology	Capital cost £m
Hinkley–Aberthaw	AC cables (subsea)	1626
Hinkley–Aberthaw	HVDC cables (subsea)	1542
Bridgwater–Melksham	AC overhead line	815
Bridgwater–Nursling	AC overhead line	1094
Bridgwater-Seabank	AC overhead line	613
Bridgwater-Seabank	AC cables	1721
Bridgwater-Seabank	Gas-insulated line	1388
Hinkley-Seabank	AC cables (subsea)	1573
Hinkley-Seabank	HVDC cables (subsea)	1169

2.45 In addition, lifetime costs have been calculated for each of the connections (excluding other elements of the system enhancement options). These are shown in Table 2.3 and include for the value of lifetime transmission losses and maintenance.

Table 2.3 : Costs of connection (only) options[17]

Potential Connection	Technology	Capital cost £m	Lifetime cost £m
Hinkley–Aberthaw	AC cables (subsea)	546	568.2
Hinkley–Aberthaw	HVDC cables (subsea)	604	940.5
Bridgwater–Melksham	AC overhead line	128	193.4
Bridgwater–Nursling	AC overhead line	176	266
Bridgwater-Seabank	AC cables	1038	1081.1
Bridgwater-Seabank	AC overhead line	91.2	137.8
Bridgwater-Seabank	Gas-insulated line	866.4	889.8
Hinkley-Seabank	AC cables (subsea)	912	952.4
Hinkley-Seabank	HVDC cables (subsea)	660	996.5

[16] Includes works to provide the capacity which will be required, assuming the implementation of all contracted generation (including Hinkley Point C, Oldbury and Seabank Stage 3)
[17] Costs are those related to 1) AC cables and shunt reactors 2) HVDC cables and converters 3) overhead lines only 4) gas insulated lines only

2.46 An evaluation of socio-economic factors considered the potential impacts of each connection option on the main areas of economic importance in planning policy terms and on the tourism and agricultural business sectors. It concluded that it was not possible to discriminate between options on the basis of the socio-economic evaluation.

2.47 The significant costs of the Hinkley-Aberthaw and Hinkley-Seabank subsea options, together with connection routes through the Severn Estuary, which would require further assessment to establish the potential for any significant adverse effects on the Special Protection Areas, Special Areas of Conservation and RAMSAR sites, lead to the conclusion that these options should only be pursued if there were no other practicable options.

2.48 The greater length and amenity impact, capital and lifetime costs of potential connections between Bridgwater and Melksham or Nursling compared with those of Bridgwater to Seabank means that, of the overhead line options, Bridgwater to Seabank should be preferred for further development. The two other technology options considered for a Bridgwater to Seabank connection would increase capital costs by between £775m and £1108m compared to the cost of system reinforcement incorporating an overhead line connection. While both would offer benefits in terms of landscape and views compared with an equivalent length of overhead line, the construction of underground/GIL connections would be more invasive than for an overhead line and would have a greater scale of effect on sites important for their ecology or archaeology.

2.49 The conclusion of this review was that the option of constructing an overhead transmission line between Bridgwater and Seabank would best meet National Grid's technical, economic and environmental obligations and should remain the preferred option to take forward for further investigation, taking National Grid's statutory duties and environmental obligations into account.

3 ROUTE CORRIDORS

Potential Route Corridors

3.1 The two broad corridors between Bridgwater and Seabank which were identified by the RCS, the basis for which has been confirmed by the review of strategic options, are shown in Figure A.

Corridor 1

3.2 Corridor 1 follows the route of the existing 132kV overhead line which runs from Bridgwater to Seabank. The corridor is approximately 57km in length.

3.3 The corridor commences at a point on the existing Hinkley to Bridgwater overhead line, north east of Bridgwater and runs to the west of Bawdrip and Woolavington before crossing the existing Hinkley to Melksham overhead line north of that settlement. It then continues in a northerly direction to the east of East Huntspill and west of Mark, before reaching the edge of the Mendip Hills AONB at Webbington and following the floor of the Lox Yeo Valley in a north easterly direction for approximately 6km.

3.4 North of the Mendip Hills, Corridor 1 passes to the west of Yatton before turning north east and running along the western edge of Nailsea. The corridor then turns north again, passing close to the eastern edge of Portishead then running around the southern and eastern edges of the port estates at Portbury and Avonmouth. Further technical studies will be required to determine the best approach to routeing through the port areas, which are heavily constrained by port activities, built development and other infrastructure.

3.5 Corridor 1 Option 1A would involve replacing the 132kV line with a 400kV overhead line on a similar alignment (in some sections, following the exact alignment may not be possible because development has taken place since the original line was erected). The removal of the 132kV line means that Corridor 1 Option 1A would result in the need for additional works to the 132kV distribution network to maintain supplies. This may include the construction of a new 400/132kV grid supply point (GSP) substation in the Churchill/Sandford area (North Somerset). If this corridor is selected, the extent and location of these works will be the subject of further studies by WPD and National Grid and will be the subject of consultation during the next stage of the Project.

3.6 Corridor 1 Option 1B would involve constructing a 400kV overhead line in parallel with, and to either the east or west, of the existing 132kV overhead line. No additional works to the 132kV distribution network would be required.

Corridor 2

3.7 Corridor 2 proposes an entirely new route, also approximately 57km in length, which runs from the existing Hinkley to Bridgwater overhead line, north east of Bridgwater and heads in a north easterly direction, passing to the north of Woolavington and between the settlements of Mark and Blackford before turning to the north. The corridor then runs to the west of the settlements of Chapel Allerton, Stone Allerton and Badgworth, entering the Mendip Hills AONB at the same place as Corridor 1 at Webbington.

3.8 At Webbington, the corridor splits to provide two alternative crossings of the AONB. The western spur option follows the M5 motorway, passing to the west of Banwell and close to the eastern edge of Weston-super-Mare. The central and eastern spur options follow the existing 132kV line route as far as Sandford. From this point, the central spur option runs to the west of Puxton, while the eastern spur option stays to the east of the existing 132kV line as far as the north of Yatton where all three options come together.

3.9 From Yatton, Corridor 2 heads in a north-easterly direction, passing around the southern and eastern edges of Nailsea before turning north towards Portishead. East of Portishead, Corridor 1 and Corridor 2 are common.

Route Corridor Initial Views

3.10 It would be technically feasible to construct an overhead line in any of these corridors.

3.11 The RCS concluded that the Mendip Hills AONB forms the greatest constraint to the routeing of overhead line corridors within the study area and cannot be avoided in any feasible route between Bridgwater and Seabank. All corridors use the same entrance to this designated area (an area of low lying land comprising the valley of the Lox Yeo River between Loxton and Webbington). The RCS concluded that Corridor 1 Option 1A would offer the least degree of change within this designated landscape. At the northern end of the study area,

the urbanised Avonmouth area was also considered to pose a constraint to the routeing of overhead line corridors.

3.12 Early consultation on the RCS with key stakeholder agencies and local authorities indicated that Corridor 1 Option 1A was considered by them to be the least environmentally constrained corridor. The RCS concluded that the relatively wide corridor available for much of this route would allow a variety of alignments to be considered that would enable the effects on the environment to be minimised. Corridor 1 Option 1A would also minimise the scale of change on the landscape and would be less intrusive than the alternative options of a parallel line (Corridor 1 Option 1B) or an entirely new route (Corridor 2).

3.13 Some respondents, including the Environment Agency, also asked National Grid to consider the feasibility of an overhead line route corridor that follows the route of the M5 motorway as closely as possible. To avoid the large settlements of Burnham-on-Sea, Weston-super-Mare and Clevedon any potential corridor would have to lie on the eastern side of the M5 motorway. However, to the east of the M5 motorway, a number of environmental constraints (such as ancient woodland at Tickenham) and the presence of a number of smaller settlements (East Huntspill, Hackness, Walrow, Rooks Bridge, Edingworth, Kenn and Tickenham) close to the motorway would prevent the establishment of a closely parallel corridor for much of the distance between Bridgwater and Seabank. This suggestion, therefore, had to be discounted.

3.14 Other suggestions raised by respondents included following the coastline and following the main line railway. The former would be impractical because of the environmental sensitivity of the coastal zone, reflected by a number of national and international environmental designations. Development on both sides of the railway, particularly in the Weston-super-Mare area, would prevent establishment of a route parallel to the railway.

3.15 Respondents queried whether the choice had to be between the two corridors or whether a "mix and match" approach could be adopted in order to avoid particular environmental constraints. The RCS noted that there may be the possibility of combining elements of Corridors 1 and 2 which could offer advantages in areas of particular constraint. This approach is addressed in Chapter 17.

4 FACTORS EMPLOYED IN EVALUATING ROUTE CORRIDOR OPTIONS

Introduction

4.1 This section of the report explains why certain factors have been taken into account in evaluating the route corridor preferences for a connection between Bridgwater and Seabank. The selection of these factors has been influenced by:

- the requirements of the Planning Act 2008 and associated Regulations;
- National Grid's statutory duties;
- planning policy;
- National Grid's own policies.

4.2 A number of other factors were considered in preparing for the evaluation (including some put forward by respondents to the Stage 1 Consultation), but were scoped out for various reasons. These factors are discussed in Chapter 5.

Planning Act 2008

4.3 It is relevant to consider the issues to which the IPC and the Secretary of State must have regard in determining an application for development consent by virtue of Sections 104 and 105 of the Planning Act 2008[18]. In summary, these are :

- any relevant national policy statement;
- any local impact report;
- any matters prescribed by regulations;
- any other matters which the decision maker considers to be "*both important and relevant to the decision*".

4.4 National policy statements were adopted in July 2011 and are discussed further in Chapter 7). Local impact reports have not yet been produced by the local authorities through whose areas a route corridor may pass. Their planning policies are a matter of record and the authorities have also made their views known through the Stage 1 Consultation process.

[18] Planning Act : 2008 Ch 29

4.5 The Infrastructure Planning (Decisions) Regulations 2010[19] sets out additional regulations regarding issues which must be taken into account by decision makers in certain circumstances. Relevant to the current proposal are Regulations 3 and 7. Regulation 3 states that the decision maker shall have regard to the desirability of:

- preserving Listed Buildings or their setting or any features of special architectural or historic interest which they possess;
- preserving or enhancing the character or appearance of Conservation Areas; and
- preserving Scheduled Monuments or their settings.

4.6 Regulation 7 states that the decision maker shall have regard to the United Nations Environment Programme Convention on Biological Diversity[20], one of whose objectives is the conservation of biological diversity.

4.7 No other matters had been prescribed by Regulations at the time of the production of this report.

4.8 The Planning Act 2008 requires applicants to undertake public consultation with people living in the vicinity of proposed works in advance of any Development Consent Order application and to explain how relevant representations from the consultations have influenced the proposal that goes forward for determination. The responses to the Stage 1 Consultation are referenced in the following chapters of the report, with key issues discussed further in Chapter 9.

Statutory Duties

4.9 Section 9 of the Electricity Act places an obligation on National Grid to develop and maintain an efficient, co-ordinated and economical system of electricity transmission. In addition, Section 38 and Schedule 9 of the Act requires National Grid to give consideration to the impact of its works on amenity by having regard to "*the desirability of preserving natural beauty, of conserving flora, fauna, and geological or physiographical features of special interest and of*

[19] Infrastructure Planning (Decisions) Regulations 2010 : SI 2010 No.305
[20] United Nations Environment Programme : Convention on Biological Diversity : December 1993

protecting sites, buildings and objects of architectural, historic or archaeological interest".

4.10 These legal duties provide an important framework within which the preferred connection is to be selected. They are addressed in Chapter 6 (efficiency/co-ordination and economy) and in Chapters 10 to 13 (impacts on amenity). Deliverability is fundamental to the timely provision of necessary infrastructure in furtherance of statutory responsibilities and is dealt with in Chapter 14.

Planning Policy

4.11 As noted above, the IPC is obliged to determine applications in accordance with the prevailing National Policy Statements.

4.12 The overarching NPS for energy[21] notes that "*Other matters that the IPC may consider both important and relevant to its decision making may include Development Plan Documents or other documents in the Local Development Framework. In the event of a conflict between these or any other documents and an NPS, the NPS prevails for purposes of IPC decision making given the national significance of the infrastructure*."

4.13 Planning Policy Guidance notes and Planning Policy Statements published by the Government, and development plans adopted by local authorities are therefore considered to be material considerations. Planning policy is addressed in Chapter 7 of this report.

4.14 The overarching NPS for energy requires the IPC to take account of adverse impacts - environmental, social and economic - and weigh these against the benefits of the proposal (which for the Hinkley Point C Connection Project are set out in the Need Case and Strategic Optioneering Report (August 2011)). It identifies the generic issues which should be taken into account in assessing applications for development consent, recognising that these are the issues which are likely to arise most frequently but that they are not equally applicable to all projects. Where generic issues have been scoped out in the current exercise, this is noted in the list below and further information is provided in

[21] Department for Energy and Climate Change : Overarching Energy National Policy Statement : July 2011

Chapter 5. The NPS for electricity networks[22] identifies a number of issues specific to proposals for network development. The generic issues include :

- air quality and emissions (scoped out at this stage, see Chapter 5);
- biodiversity and geological conservation, noting particularly the effects on designated sites. The NPS for electricity networks seeks information on the impacts on birds and their flight paths;
- civil and military aviation and defence interests;
- coastal change (scoped out at this stage, see Chapter 5);
- dust, odour, artificial light, smoke, steam and insect infestation (scoped out at this stage, see Chapter 5);
- flood risk and climate change resilience;
- historic environment, noting particularly the effects on designated sites;
- landscape and visual impacts, noting particularly the effects on nationally designated landscapes. The NPS for electricity networks promotes the use of the Holford Rules and outlines the IPC's approach to the consideration of undergrounding;
- land use, including open space, green infrastructure and Green Belt;
- noise and vibration. The NPS for electricity networks notes that noise from overhead lines is unlikely to lead the IPC to refuse an application (scoped out at this stage, see Chapter 5);
- socio-economic impacts;
- traffic and transport impacts (scoped out at this stage, see Chapter 5);
- waste management (scoped out at this stage, see Chapter 5);
- water quality and resources (scoped out at this stage, see Chapter 5).

4.15 In addition, the NPS for electricity networks notes that with regard to electric and magnetic fields (EMF), the IPC will need to satisfy itself that ICNIRP guidelines are met (scoped out at this stage, see Chapter 5).

[22] Department for Energy and Climate Change : National Policy Statement for Electricity Networks Infrastructure : July 2011

National Grid policies and industry guidelines

4.16 National Grid has a suite of its own policies and guidance which are applied in developing its infrastructure projects. The Stakeholder, Community and Amenity policy incorporates its Schedule 9 statement[23]. The Holford and Horlock Rules, covering the siting of overhead lines and substations respectively, are regarded as industry standards and have been tested in public inquiry situations. For this reason, these documents are an important consideration in route corridor selection. They are addressed in Chapters 8 and 10 of this report.

Conclusions

4.17 For the reasons set out above, it is appropriate to assess the relative merits of the alternative route corridors taking the following factors into account :

- National Grid's statutory duties (Chapter 6);
- compliance with planning policies (Chapter 7);
- compliance with National Grid policies (Chapter 8);
- consultation representations (Chapter 9);
- landscape and visual impacts (Chapter 10);
- effects on the historic environment (Chapter 11);
- effects on biodiversity and geological conservation (Chapter 12);
- effects on land use and socio-economic factors (Chapter 13);
- engineering - deliverability (Chapter 14);
- effects on civil and military aviation and defence interests (Chapter 15);
- effects on flood risk and climate change resilience (Chapter 16).

4.18 These and other factors, including those which have been considered to be of little relevance in distinguishing between corridors, may be relevant for the environmental impact assessment of the detailed connection design within the preferred corridor. These will be established as part of a scoping exercise to be undertaken in consultation with the IPC (and its successor) and statutory bodies.

[23] This statement sets out how National Grid will meet the duty placed on it by s38 and schedule 9 of the Electricity Act 1989, which relates to the preservation of amenity

5 OTHER FACTORS CONSIDERED IN THE EVALUATION OF ROUTE CORRIDORS

Introduction

5.1 A wide range of factors were considered in preparing for the evaluation of route corridor options. Some of these appear in the generic list of issues included in the overarching NPS for energy, while others were put forward by respondents to the Stage 1 Consultation or by the project team. Those factors which were scoped out of the evaluation, because they could not assist in comparing the merits of different corridors, are discussed in the following paragraphs.

Air Quality and Emissions

5.2 Although air quality and emissions is a generic impact included in the overarching NPS for energy, it would not be a material consideration in selecting a preferred connection because the only effect which the scheme would have on air quality would be temporary, related to construction traffic. It is not possible to quantify such effects at this stage. However, experience suggests that there would be no significant difference between the corridors in terms of effects on air quality and emissions arising from the construction works.

Coastal Change

5.3 This generic impact, included in the overarching NPS for energy, would not be a material consideration in selecting a preferred connection because none of the route corridors has the potential to affect, or be affected by, coastal processes.

Dust, Odour, Artificial Light, Smoke, Steam and Insect Infestation

5.4 This generic impact, included in the overarching NPS for energy, would not be a material consideration in selecting a preferred connection because the scheme would only have the potential to affect dust, odour and artificial light and, even then, such effects would be temporary, related to the construction phase. It is not possible to quantify such effects at this stage, however experience suggests that there would be no significant difference between the corridors with regard to these effects.

Noise and Vibration

5.5 This generic impact, included in the overarching NPS for energy, would not be a material consideration in selecting a preferred connection because the effect of operational noise can only be assessed once detailed alignments are identified at the planning stage. The NPS for electricity networks notes that noise from overhead lines is unlikely to lead the IPC to refuse an application as a variety of mitigation measures are possible, such as the positioning of lines and the design and maintenance of conductors. It can be assumed that these measures can be applied equally to a connection in any of the corridors.

Traffic and Transport Impacts

5.6 This generic impact, included in the overarching NPS for energy, would not be a material consideration in selecting a preferred connection because the only impact which the scheme would have on traffic and transport would be temporary, related to construction traffic and other construction activities. While it is not possible to quantify such impacts at this stage, there is no reason to suppose that the traffic and transport impacts of developing one corridor would be any worse than those associated with another corridor. There would be little to distinguish between the corridors on this criterion.

Waste Management

5.7 This generic impact, included in the overarching NPS for energy, would not be a material consideration in selecting a preferred connection because waste would only arise in very small quantities from construction operations and would not be distinctly different for a connection in any of the corridors.

Water Quality and Resources

5.8 This generic impact, included in the overarching NPS for energy, would not be a material consideration in selecting a preferred connection because the scope for affecting water quality would be limited and restricted to temporary effects during the construction phase and would be similar for a connection in any of the corridors.

Electric and Magnetic Fields

5.9 Representations to Stage 1 Consultation from members of the public expressed concern about the potential impact of electric and magnetic fields on a range of health issues. In addition, this is an impact which the NPS for electricity networks proposes should be evaluated. However, this would not be a material consideration in selecting a preferred connection because National Grid designs all of its system to be compliant with ICNIRP guidelines[24] on exposure to electric and magnetic fields, and the detailed connection design will will take these guidelines fully into account, whichever corridor is selected. An assessment of the potential impact of electric and magnetic fields will be included as a topic in the environmental impact assessment of the preferred alignment.

5.10 The NPS for electricity networks notes only that the IPC will need to satisfy itself that ICNIRP guidelines are met.

Land Ownership

5.11 In general, land ownership would not affect route corridor selection. This is because access to land and easements will be sought at the detailed connection design stage and there is no reason to suppose that agreements would be easier to reach on one corridor than another. In any event, land ownership issues would not prevent National Grid pursuing an otherwise optimal corridor.

5.12 The National Trust manages inalienable land on behalf of the nation. Land declared inalienable by the National Trust is afforded special protection by Parliament, as reflected in Section 18 of the Acquisition of Land Act 1981[25]. It can act as a significant constraint on development by third parties. While the National Trust owns extensive areas on the Mendip Hills in the Compton Bishop area, these areas lie to the east of Webbington where both corridors would enter the AONB. In terms of land ownership, this would therefore have no influence on corridor selection.

[24] International Commission on Non-Ionising Radiation Protection : Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields : 1998
[25] Acquisition of Land Act 1981 c67

Effect on Residential Amenity

5.13 A large number of individual respondents were concerned about the proximity of an overhead line to residential properties. The route corridors were defined, in part, by reference to Supplementary Note A to the Holford Rules which states that overhead line routes should avoid passing close to residential areas on the grounds of general amenity. The identification of route corridors, therefore, sought to avoid as far as possible the main built-up areas and areas where there are groups of residential properties with only small gaps between them. In some cases, proximity to properties is unavoidable. The RCS identified the fact that the existing overhead line in Corridor 1 passes close to dwellings in the small settlements of Knowle, Mark, Tarnock, Stone Edge Batch and Avonmouth and runs close to the western edge of Nailsea. Corridor 2 passes close to Mark, Biddisham, Sandford, North End/Yatton, the southern and eastern edges of Nailsea, then Wraxall and Avonmouth. Chapter 10 provides a further evaluation of the route corridors in terms of compliance with the Holford Rules.

5.14 It is accepted that effects on residential amenity can take various forms, including visual effects, noise, construction disturbance etc. All these types of impact were mentioned by respondents. These are considered in the Stage 1 Feedback Report and in Chapter 9 of this report. The degree to which these effects are experienced by individual properties will be heavily influenced by the detailed design of the alignment and pylon positions which it is not possible to determine at this stage in the development process. Environmental impact assessments, undertaken as the detailed connection design is developed, will address such issues in detail.

House Prices and Land Values

5.15 The impact on house prices and land values, both in general terms and in respect of specific properties, has not been adopted as a factor in route corridor selection. This is because any potential impact is difficult to quantify and will vary from one case to another depending on a number of factors including the local property market, the nature of the property, its orientation and setting relative to the overhead line and the distance between the overhead line and the property. Land ownership and liability for compensation payments, in line with statutory provisions, will be addressed through discussions with individual landowners once a detailed connection design is available. As noted above, the

approach to overhead line routeing seeks to maximise distance from residential properties and it will usually be possible to identify route alignments which avoid specific uses within the more broadly defined route corridors.

Different Pylon Designs

5.16 Different pylon designs would apply equally to all options and their applicability and adoption will be considered at the detailed connection design stage.

6 ELECTRICITY ACT - SECTION 9 OBLIGATIONS

Introduction

6.1 As noted previously, Section 9 of the Electricity Act places an obligation on National Grid to develop and maintain "*an efficient, co-ordinated and economical*" system of electricity transmission.

6.2 In order to meet this statutory obligation, National Grid seeks to make the most efficient use of its existing infrastructure by measures such as managing power flows and investing in upgrading existing connections and substations, before considering investment in new connections. It then considers the implications for efficiency, co-ordination and cost effectiveness in evaluating a range of options in its strategic decision making. Cost comparison is a tool commonly used as a proxy in such situations. The lowest cost solutions are not always adopted, as other considerations, such as environmental impacts, may favour alternative solutions - a balance needs to be struck.

6.3 Compliance with statutory duties relating to preservation of amenity (Section 38 Electricity Act) are of no less importance and are considered elsewhere in this report.

6.4 Both of the route corridors could accommodate a scheme which would be system compliant and efficient both in terms of individual scheme performance and the operation of the wider electricity transmission network (taking National Grid and WPD operations into account). All would be deliverable within the timescale dictated by the connection agreements. Effective co-ordination can be achieved with both the generators and WPD.

Capital cost assumptions

6.5 Estimating the capital cost of the route corridor options has taken the following assumptions into account :

- cost estimates based on generalised unit costs for the key elements of each option, reflecting recent contract values, but excluding the cost of land purchase or easements which will be subject to negotiation with landowners at a later stage in the development process;
- cost estimates based on an indicative alignment based on the centre line of each route corridor. Some cost variation should therefore be anticipated depending on the eventual alignment adopted;
- overhead line costs inclusive of pylon construction (materials, foundations and steel erection), conductors, associated equipment, and provisional sums for access and scaffolding;
- Corridor 1 Option 1A may require, in addition to the above, provision of a 2 SGT 400kV/132kV substation in the Churchill/Sandford area to act as a grid supply point for WPD. This may also require an overhead line connection approximately 4km in length to the proposed Bridgwater to Seabank line and a 132kV connection to the WPD network about 4km in length (subject to further evaluation and consultation);
- Corridor 1 Option 1A costs include the dismantling of the existing 132kV overhead line between Bridgwater and Seabank (subject to further evaluation and consultation).

6.6 All route corridors require the following provision in terms of substations and other works to achieve the necessary system reinforcement:

- Reconductoring the existing transmission circuits from:
  - Melksham to Bramley;
  - Hinkley Point to Melksham;
  - Aust to Melksham;
  - Cowley to Walham;
  - Cowley to Minety; and
  - Seabank to Aust.
- Upgrading Hinkley Point to Bridgwater from 275kV to 400kV;

- New 400kV connections Aust - Oldbury and Oldbury - Melksham;
- New 400kV substations at :
  - Oldbury-on-Severn;
  - Aust;
  - Hinkley Point; and
  - Bridgwater.
- Installation of Quadrature Boosters at Nursling;
- Minor works at Melksham 400kV substation; and
- Extension of the 400kV substation at Seabank.

Capital cost estimates

6.7 Based on the level of information available at this stage, the relative capital costs of the route corridor options (assuming an overhead connection and additional system enhancements) are shown in Table 6.1. These costs will be refined in the course of project development.

6.8 Until such time as the scheme has been designed in detail and the involvement of contractors, suppliers and landowners sought, it is not possible to provide more detailed scheme costs.

Table 6.1 : Estimated cost of Bridgwater-Seabank corridor options

Generator Connection Assets		
Hinkley Point C	New Hinkley Point C 400kV substation	£201.6m
Oldbury-on-Severn	New Oldbury-on-Severn 400kV substation	
	New Aust-Oldbury and Oldbury-Melksham 400kV transmission circuits	
Seabank Stage 3	Seabank 400kV substation extension	
System Upgrades		
Reconductoring Melksham-Bramley circuits		£289.8m
Reconductoring Hinkley Point –Melksham circuits		
Reconductoring Aust – Melksham circuits		
Melksham 400kV substation line entries		
New Quadrature Boosters at Nursling 400kV substation		
New Aust 400kV substation		
Upgrade the Cowley-Minety / Cowley-Walham Cables		
Transmission Reinforcement Assets		
Resolves the South West Boundary, South Wales and Gloucestershire and loss of power infeed at Seabank.	Hinkley Point – Bridgwater 275kV – 400kV upgrade	£9.7m
	New Bridgwater 400kV Substation	£12.2m
	New Bridgwater – Seabank 400kV circuit	£91.2m
*Additional Works required for Corridor 1 Option 1A only	Additional 4km of overhead line to Churchill substation Additional 4km of overhead line to Churchill Substation	*£6.4m
	New Churchill 400kV substation	*£23.5m
	Estimated Costs for Dismantling of WPD circuits	*£10m
Contingent Transmission Works		
Reconductor Seabank – Aust 400kV circuit		£8.4m
Summary		
Corridor 1 Option 1A		£652.8m
Corridor 1 Option 1B and Corridor 2		£612.9m

** Costs for additional works required for Corridor 1 Option 1A are indicative and will be confirmed following further study and evaluation.*

Lifetime Costs

6.9 National Grid has determined, over many years of experience, that the use of "capital cost", which comprises cost of equipment and installation costs, is a reliable basis on which to make investment decisions. Experience shows that there is not a sufficient difference in operation, maintenance, decommissioning

and disposal costs between technology options to alter materially a decision based on capital costs alone. However, in response to queries from respondents during recent consultations on major projects, National Grid has undertaken a review of lifetime costs and will now take these into account in investment decisions.

6.10 The calculation of lifetime costs takes into account :

- the capital cost of the equipment delivered, installed and commissioned;
- the net present value of the cost of transmission losses over the life time (40 years) of the assets;
- the net present value of the typical cost of operation and maintenance over the life time (40 years) of the assets;
- a discount rate of 3.5% as recommended in the Treasury Green Book[26].

6.11 It is unusual for a part of the transmission system to be decommissioned and the site reinstated. Typically, transmission assets will be decommissioned and removed only as part of an upgrade or replacement by different assets. Hence, decommissioning and reinstatement costs are not included in the lifetime costs.

6.12 Based on the level of information available at this stage, the relative lifetime costs associated with an overhead line between Bridgwater and Seabank for each corridor option are shown in Table 6.2.

Table 6.2 : Estimated cost of route corridor options

Item	**Corridor 1A[27] £m**	**Corridors 1B/2 £m**
Capital cost	97.6	91.2
Lifetime cost	147.6	137.8

6.13 As discussed above, National Grid's approach and individual project proposals are subject to regular scrutiny and review by the energy regulator Ofgem. Ofgem employs independent technical consultants to undertake a robust formal

[26] HM Treasury : The Green Book - appraisal and evaluation in central government : undated
[27] includes overhead line elements only. A substation near Churchill would add a further £23.5m capital cost.

review of the project details, and the overarching business processes and policies adopted by National Grid. Detailed reports are made to Ofgem and these are publicly available.

Cost Benefit Analysis

6.14 Some respondents queried whether a cost benefit analysis had been undertaken. Cost benefit analysis (CBA) is defined on page 4 of HM Treasury's Green Book as "*analysis which quantifies in monetary terms as many of the costs and benefits of a proposal as feasible, including items for which the market does not provide a satisfactory measure of economic value*."

6.15 National Grid does not consider that effects on the environment from its proposals can be properly given a monetary value. Decisions on the balance to be struck between National Grid's statutory and licence duties are matters of judgement for itself and ultimately the IPC and/or Secretary of State in determining whether development consent should be granted for any proposal that is brought forward. This is consistent with other planning judgements that are made in determining applications for planning permission or consents under other legislation. The effects on the environment from the proposed development will be assessed in accordance with the relevant Environmental Impact Assessment Regulations and associated Guidance.

6.16 Issues of the willingness of the public to pay to avoid the effects of transmission lines are matters for the Secretary of State and Ofgem. These are matters that are currently being considered and have been the subject of consultation by Ofgem. National Grid will review its decision-making process in the light of any advice from the Secretary of State or Ofgem on the matter of willingness to pay.

6.17 National Grid has recently commenced a high level survey to assess the public's attitude towards willingness to pay and the increases in their electricity bills that they would be prepared to pay to put new and/or existing electricity transmission lines underground. The results of this survey will inform National Grid's submission to Ofgem. If appropriate, National Grid will carry out a more detailed assessment of the public's willingness to pay following this RIIO submission.

Stage 1 Consultation Representations

6.18 During the Stage 1 Consultation, a common query raised by respondents was the cost of undergrounding and how this compared to the cost of constructing an overhead line connection.

6.19 As noted earlier in this section of the report, the costs of undergrounding are significantly higher than those associated with constructing an overhead line. A major element of this cost differential is accounted for by the cable itself. The underground conductor has to be bigger than its overhead counterpart to reduce its electrical resistance and hence the heat produced. The requirement to properly insulate whilst at the same time maintaining the cable's rating (its ability to transmit the required current) means that special insulation is needed. This results in a large conductor, using expensive materials and manufacturing techniques. At either end of the underground section, sealing end pylons/compounds are required which are substantial structures in their own right.

6.20 There are also more substantial costs associated with burying the cables in the ground, both in terms of construction and subsequent maintenance costs. When cable circuit faults develop, it can be a long and expensive task to locate a fault, excavate the cable and undertake the necessary repairs. Apart from the cost of the repair itself, there is an additional operational cost relating to the period of time for which a circuit is out of service.

6.21 The costs of underground cable systems can vary widely even for the same voltage, depending on the amount of electrical power they can carry (i.e. rating), the number of cables required to meet the rating, and their length, making it difficult to generalise about costs. The IPC has suggested that an independent authoritative report on costs of underground and subsea transmission would be useful. KEMA, with IET (Institution of Engineering and Technology) acting in a quality assurance role, were commissioned to do this work, assessing the alternative and comparative costs of placing high voltage electricity lines underground or in the seabed including, cable prices, costs of the different civil engineering methods which could be used, and the costs of any necessary infrastructure required to support underground or undersea cables. In June 2011, the IET announced that insufficient data had been submitted to enable this authoritative report to be completed. Arrangements are

being put in place for further stages of the work to be taken forward. It is expected that a final analysis will be published later this year. Following publication, National Grid will look very carefully at the final analysis and review its conclusions in light of any new findings.

Conclusions

6.22 If capital cost, or lifetime cost, alone were considered, Corridor 1 Option 1B or Corridor 2 as an overhead line would be the preferred solution. However, National Grid must balance cost against other factors, including impact on amenity.

7 NATIONAL AND LOCAL POLICY CONTEXT

Energy and climate change policy

7.1 The 2007 White Paper[28]: "Meeting the Energy Challenge" sets out the Government's international and domestic energy strategy to address the two key long term energy challenges faced by the UK :

- tackling climate change by reducing carbon dioxide emissions both within the UK and abroad; and
- ensuring secure, clean and affordable energy as the UK becomes increasingly dependent on imported fuel.

7.2 The strategy is based around the need to :

- save energy;
- develop cleaner energy supplies; and
- secure reliable energy supplies at prices set in competitive markets.

7.3 It is based on the principle that independently regulated, competitive energy markets, are the most cost-effective and efficient way of delivering the Government's objectives.

[28] HM Government : Meeting the Energy Challenge - A White Paper on Energy : May 2007

7.4 Section 5.2 of the White Paper states that "*a secure and reliable electricity system requires timely investment in the power stations used to generate electricity. We also need investment in transmission and distribution networks to transport the electricity from the point of generation to the point of use*."

7.5 Paragraph 5.2.9 notes that "*much of the new transmission investment is driven by the needs of the generation companies that use (or plan in the future to use) the network. The plans for additional investment in the transmission system recognise that there is a large volume of primarily wind electricity generation that will connect to the transmission system over the coming years. However, the exact volume and timing are uncertain and, as a result, connection of these renewable generation stations presents new challenges*."

7.6 The Climate Change Act 2008[29] has two key aims :

- to improve carbon management, helping the transition towards a low-carbon economy in the UK; and
- to demonstrate UK leadership internationally, signalling that the UK is committed to taking its share of responsibility for reducing global emissions.

7.7 Among its key measures are :

- a legally binding target of at least an 80 percent cut in greenhouse gas emissions by 2050, to be achieved through action in the UK and abroad. Also a reduction in emissions of at least 34 percent by 2020. Both these targets are against a 1990 baseline; and
- a carbon budgeting system which caps emissions over five-year periods, with three budgets set at a time, to help us stay on track for our 2050 target.

7.8 Stemming from the Climate Change Act, the UK Low Carbon Transition Plan[30] details the actions to be taken to cut carbon emissions by 34% by 2020, based on 1990 levels. It sets out proposals for transforming the power sector, homes and workplaces, transport, farming and the management of land and waste, to

[29] Climate Change Act 2008 : 2008 c27
[30] HM Government : The UK Low Carbon Transition Plan - National Strategy for Climate and Energy : July 2009

meet these carbon budgets, secure energy supplies, maximise economic opportunities and protect the most vulnerable.

7.9 To deliver these goals the Government pledged to secure energy supplies by ensuring a supportive climate for the substantial new investment needed to bring forward low carbon infrastructure. It also endorsed industry plans to increase grid capacity and to speed up connection of renewable electricity to the grid and the development of new technologies which could enable the grid to work better in the future.

National Policy Statements

7.10 The National Policy Statements, adopted in July 2011, set out the most recent proposals for Government policy for the delivery of major energy infrastructure and are material considerations.

7.11 The Overarching National Policy Statement for Energy (EN-1) [31] is part of this suite of National Policy Statements (NPS) published by the Secretary of State for Energy and Climate Change.

7.12 The overarching NPS for energy notes that it is critical that the UK continues to have secure and reliable supplies of electricity as we make the transition to a low carbon economy. This means ensuring that :

- there is sufficient capacity (including a greater proportion of low carbon generation) to meet demand at all times, including a safety margin of spare capacity to accommodate fluctuations in supply or demand;
- this capacity is reliable enough to meet demand as it arises;
- there is a diverse mix of technologies and fuels, (including primary fuels imported from a wide range of countries); and
- there are effective price signals, so that the market can react in a timely way to minimise imbalances between supply and demand.

7.13 The Government's objectives for energy and climate change will require further diversification of the UK's energy sources and much greater use of renewable

[31] Department for Energy and Climate Change : Overarching Energy National Policy Statement : July 2011

and other low carbon forms of generation. It is estimated that there will be a need for about 59GW net of new capacity by 2025, of which 33GW would need to come from renewable sources (mainly offshore wind) to meet renewable energy commitments. The government considers that a significant proportion of new non-renewable capacity should be met by nuclear power. The NPS notes that "*construction of new lines of 132kV and above will be needed to meet the significant national need for expansion and reinforcement of the UK's transmission and distribution networks*". However it also notes that the costs and benefits of alternative technological approaches should be considered before any overhead line proposal is consented.

7.14 The NPS states that a 'smarter' electricity grid will be needed to support a more complex system of electricity supply and demand with generation occurring in a greater diversity of locations. It notes that "*new lines will have to be built, and the location of renewable energy sources and designated sites for new nuclear power stations makes it inevitable that a significant proportion of those new lines will have to cross areas where there is little or no transmission infrastructure at present, or which it may be claimed should be protected from such intrusions*".

7.15 The NPS notes that the Electricity Networks Strategy Group has identified areas for infrastructure enhancement and believes that this work[32] "*represents the best available overview of where the electricity networks will need to be reinforced and augmented in order to achieve the UK's renewable energy and security of supply targets, and will therefore be relevant to the IPC's consideration of electricity network proposals*".

7.16 The ENSG report identifies the need for a new double circuit overhead line between Hinkley and Seabank. The NPS does not rule out additional schemes developed in response to other generation proposals.

7.17 The Government is confident that the need for new energy infrastructure has been established and this should not be challenged further by the IPC.

7.18 The NPS sets out how the IPC should frame its consideration of alternatives. In particular, it notes that the IPC should be guided in considering alternative

[32] Electricity Networks Strategy Group : Our Electricity Transmission Network : A Vision for 2020 : March 2009

proposals by whether there is a realistic prospect of the alternative delivering the same infrastructure capacity (including energy security and climate change benefits) in the same timescale as the proposed development. It advises that the consideration of alternatives should be carried out in a proportionate manner.

7.19 The NPS also discusses how projects should be assessed and the potential for mitigating adverse effects.

7.20 The National Policy Statement for Electricity Networks Infrastructure (EN-5)[33] highlights that the new electricity generating infrastructure that the UK needs to move to a low carbon economy, while maintaining security of supply, will be heavily dependent on the availability of a fit for purpose and robust electricity network. That network will need to be able to support a more complex system of supply and demand and cope with generation occurring in locations of greater diversity. It indicates that the IPC should start its assessment of applications for infrastructure covered by the NPS on the basis that need has been demonstrated.

7.21 The NPS does not seek to direct applicants to particular sites or routes for electricity networks infrastructure. It notes that the general location of electricity network projects is often determined by the location, or anticipated location, of a particular generating station in relation to the existing network. In other cases the requirement for a line may be the result of the need for more strategic reinforcement of the network. The NPS accepts that the most direct route for a new connection may not be the most appropriate given engineering and environmental considerations.

7.22 Part 2 of the NPS sets out the basis for assessing proposals. It advises for a variety of topic areas (including many of those normally covered in an Environmental Impact Assessment): what the applicant's own assessment should address; and what key principles the IPC should adopt in its decision making. It also advises on the weight to be given to certain issues and on the treatment of mitigation measures, particularly how these may be enforced

[33] Department for Energy and Climate Change : National Policy Statement for Electricity Networks Infrastructure : July 2011

through conditions or obligations. Any assessment will also need to cover those issues raised in the Overarching NPS for Energy (EN-1).

7.23 The NPS notes that the IPC should expect applicants to demonstrate good design in respect of landscape and visual amenity and in the design of the project to mitigate impacts such as noise and electric and magnetic fields.

7.24 Resilience to climate change is highlighted as a key issue and the NPS advises that applicants should in particular set out how the proposal would be resilient to:

- flooding, particularly for substations that are vital for the electricity transmission and distribution network;
- effects of wind and storms on overhead lines;
- higher average temperatures leading to increased transmission losses; and
- earth movement or subsidence caused by flooding and drought for underground cables.

7.25 Resilience to climate change is discussed in Chapter 16 of this report.

7.26 The NPS supports the continued application of the Holford Rules to guide the selection of routes for overhead lines. It states that the IPC should bear them and any updates in mind as they examine applications for overhead lines

7.27 In discussing the undergrounding of lines, the NPS states that "*where there are serious concerns about the potential landscape and visual effects of a proposed overhead line, the IPC will have to balance these against other relevant factors, including the need for the proposed infrastructure, the availability and cost of alternative sites and routes and methods of installation (including undergrounding)* ". It states that the IPC should only refuse consent for overhead line proposals in favour of an underground or subsea line if it is satisfied that the benefits of the non-overhead line alternative clearly outweigh any extra economic, social and environmental costs and that technical difficulties are surmountable. Undergrounding of a line solely to further reduce the level of EMF exposure is unlikely to be justified. The landscape implications of the route corridors are discussed in Chapter 10 of this report.

7.28 In respect of noise from overhead lines, the NPS notes that this is unlikely to lead to the IPC refusing an application but it may need to consider the use of appropriate conditions to ensure noise is minimised as far as possible. It is therefore considered that noise would not influence route corridor selection, but may influence the selection of the eventual route alignment.

7.29 The NPS notes that the balance of scientific evidence over several decades of research has not proven a causal link between EMFs and cancer or any other disease. Furthermore, the Department of Health's Medicines and Healthcare Products Regulatory Agency does not consider that transmission line EMFs constitute a significant hazard to the operation of pacemakers. There is little evidence that exposure of crops, farm animals and natural ecosystems to transmission line EMFs would have any agriculturally significant consequences.

7.30 The NPS notes that the International Commission on Non-Ionising Radiation Protection (ICNIRP) has developed health protection guidelines[34] for both public and occupational exposure. Regulations governing the minimum height, position, insulation and protection specifications of conductors to ensure clearance of objects mean that power lines at or below 132kV will comply with the ICNIRP guidelines. Where applications for new 275kV and 400kV overhead lines or underground cables are involved, the IPC will need to be satisfied that the ICNIRP basic restrictions for public exposure will not be reached or exceeded for any residential accommodation along the route of the line.

Planning Policy Statements

7.31 Planning policy guidance notes (PPGs) and their replacements Planning Policy Statements (PPSs) are prepared by the government after public consultation to explain statutory provisions and provide guidance to local authorities and others on planning policy and the operation of the planning system. They are material considerations in determining applications for development. In considering these documents, the emphasis is on identifying those sections which may influence route corridor selection and/or indicate the weight which should be placed on certain factors used to guide the selection.

[34] International Commission on Non-Ionising Radiation Protection : Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields : 1998

7.32 Planning Policy Statement 1: Delivering Sustainable Development[35] states that "*the Government is committed to protecting and enhancing the quality of the natural and historic environment, in both rural and urban areas. Planning policies should seek to protect and enhance the quality, character and amenity value of the countryside and urban areas as a whole. A high level of protection should be given to most valued townscapes and landscapes, wildlife habitats and natural resources. Those with national and international designations should receive the highest level of protection*."

7.33 Planning and Climate Change: Supplement to Planning Policy Statement 1[36] states that tackling climate change is a key Government priority for the planning system and sets out how planning should contribute to reducing emissions and stabilising climate change and take into account its unavoidable consequences. It notes that planning authorities should adopt policies which are designed to promote and not restrict renewable and low-carbon energy and supporting infrastructure. In particular, it states that "*planning authorities should not require applicants for energy development to demonstrate either the overall need for renewable energy and its distribution, nor question the energy justification for why a proposal for such development must be sited in a particular location*."

7.34 Planning Policy Statement 5: Planning for the Historic Environment[37] states that "*there should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be.....Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, including scheduled monuments, protected wreck sites, battlefields, grade I and II* listed buildings and grade I and II* registered parks and gardens, World Heritage Sites, should be wholly exceptional*." It goes on to state that where developments might adversely affect the setting of a heritage asset, local authorities should weigh any such harm against the wider benefits of

[35] Planning Policy Statement 1: Delivering Sustainable Development : Office of the Deputy Prime Minister : January 2005
[36] Planning and Climate Change: Supplement to Planning Policy Statement 1 : Department for Communities and Local Government : December 2007
[37] Planning Policy Statement 5: Planning for the Historic Environment : Department for Communities and Local Government : March 2010

the application. The greater the negative impact on the significance of the heritage asset, the greater the benefits that will be needed to justify approval.

7.35 Planning Policy Statement 7: Sustainable Development in Rural Areas[38] states that planning authorities should continue to ensure that the quality and character of the wider countryside is protected and, where possible, enhanced. They should have particular regard to any areas that have been statutorily designated for their landscape, wildlife or historic qualities where greater priority should be given to restraint of potentially damaging development.

7.36 PPS7 notes that nationally designated areas, including Areas of Outstanding Natural Beauty (AONB), have been confirmed by the Government as having the highest status of protection in relation to landscape and scenic beauty. The conservation of the natural beauty of the landscape and countryside should therefore be given great weight in planning policies and development control decisions in these areas. The conservation of wildlife and cultural heritage are important considerations in all these areas. It goes on to state that "*major developments should not take place in these designated areas, except in exceptional circumstances. This policy includes major development proposals that raise issues of national significance. Because of the serious impact that major developments may have on these areas of natural beauty, and taking account of the recreational opportunities that they provide, applications for all such developments should be subject to the most rigorous examination. Major development proposals should be demonstrated to be in the public interest before being allowed to proceed*."

7.37 In considering applications for major development in nationally designated areas, PPS7 requires rigorous examination of:

- the need for the development, including in terms of any national considerations, and the impact of permitting it, or refusing it, upon the local economy;
- the cost of, and scope for, developing elsewhere outside the designated area, or meeting the need for it in some other way; and

[38] Planning Policy Statement 7: Sustainable Development in Rural Areas : Office of the Deputy Prime Minister : August 2004

- any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated.

7.38 The Government recognises and accepts that there are areas of landscape outside nationally designated areas that are particularly highly valued locally, but considers that criteria-based policies in LDDs should provide sufficient protection for these areas.

7.39 PPS7 states that the presence of best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification), should be taken into account alongside other sustainability considerations. Little weight in agricultural terms should be given to the loss of agricultural land in grades 3b, 4 and 5.

7.40 PPS7 recognises that tourism and leisure activities are "*vital to many rural economies. As well as sustaining many rural businesses, these industries are a significant source of employment and help to support the prosperity of country towns and villages, and sustain historic country houses, local heritage and culture.*"

7.41 Planning Policy Statement 9: Biodiversity and Geological Conservation[39] makes it clear that nationally and internationally designated sites should be given a high degree of protection under the planning system. Proposals affecting sites of regional and local biodiversity and geological interest, should be judged against criteria-based policies in local development documents Ancient woodland should be protected unless the need for, and benefits of, the development in that location outweigh the loss of the woodland habitat. Through policies in plans, local authorities should also conserve other important natural habitat types that have been identified in the Countryside and Rights of Way Act 2000[40] Section 74 list, as being of principal importance for the conservation of biodiversity in England. The maintenance of networks of natural habitats is also promoted by PPS9.

[39] Planning Policy Statement 9: Biodiversity and Geological Conservation : Office of the Deputy Prime Minister : August 2005
[40] Countryside and Rights of Way Act 2000 c37

7.42 Planning Policy Statement 22 Renewable Energy[41] promotes renewable energy projects in line with the Government's wider energy policy, but does not give guidance on the development of the electricity transmission infrastructure which will be required to support it. In line with other Planning Policy Statements, it reiterates the need to protect nationally and internationally designated sites.

7.43 Planning Policy Guidance Note 24 Planning and Noise[42] states that the impact of noise can be a material consideration in the determination of planning applications. It recognises that much of the development which is necessary for the creation of jobs and the construction and improvement of essential infrastructure will generate noise. It states that, while local authorities must ensure that development does not cause an unacceptable degree of disturbance, the planning system should not place unjustifiable obstacles in the way of such development.

7.44 PPG24 notes that a number of measures can be introduced to control the source of, or limit exposure to, noise, including maintaining a degree of separation between the noise source and noise-sensitive properties. Special consideration is required where noisy development is proposed in or near Sites of Special Scientific Interest (SSSIs) and for development which would affect the quiet enjoyment of designated areas, including Areas of Outstanding Natural Beauty.

7.45 Planning Policy Statement 25 Development and Flood Risk[43] states that all forms of flooding and their impact on the natural and built environment are material planning considerations. The aims of planning policy on development and flood risk are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall. PPS25 applies a sequential test such that new development should be directed to sites at the lowest probability of flooding from all sources. It recognises that grid substations may need to be located in flood risk areas for

[41] Planning Policy Statement 22 Renewable Energy : Office of the Deputy Prime Minister : August 2004
[42] Planning Policy Guidance Note 24 Planning and Noise : Office of the Deputy Prime Minister : September 1994
[43] Planning Policy Statement 25 Development and Flood Risk : Department for Communities and Local Government : March 2010

operational reasons, in which case they should be designed and constructed to remain operational and safe for users in times of flood.

Regional Planning Policies

7.46 Regional planning policies are contained in the draft Regional Spatial Strategy for the South West[44]. The Coalition Government has announced its intention to revoke Regional Spatial Strategies as provided for in clause 89 of the Localism Bill.

7.47 Policy ENV1 aims to protect and enhance the region's natural and historic Environment. Priority will be given to preserving and enhancing sites of international or national landscape, nature conservation, geological, archaeological or historic importance.

7.48 Policy ENV2 considers the use of landscape character areas in seeking to protect the characteristic landscapes of the South West from inappropriate development.

7.49 Policy ENV3 provides specific protection for designated landscapes, including AONBs and states that "*natural beauty, wildlife and cultural heritage will be given priority over other considerations in the determination of development proposals*". Other policies seek to protect the natural and historic environments and the woodland resource.

7.50 Policy RE1 encourages local development documents to include positive policies to support the achievement of renewable energy targets in the region, while Policy RE2 asks local authorities to identify opportunities for offshore energy, and landfalls, and to facilitate connections to the national grid.

Development Plan Policies

7.51 Development plan policies are contained within various Structure and Local Plans. These will eventually be superceded by Local Development Frameworks, although, at the time of writing, no Core Strategies have yet been adopted in

[44] South West Regional Assembly : draft Regional Spatial Strategy for the South West : April 2006

the study area and less weight can be attached to draft policies in those Core Strategies which have been submitted for consultation or examination.

7.52 Policy 63 of the Somerset Structure Plan[45] covers development by the utilities and states that :

"*Provision should be made for utility developments where they respect the environment in which they are located in terms of their scale, location and design*".

7.53 The Structure Plan includes a raft of strategic-level policies directed at the protection of the environment and resources of the county. In particular, Policy 3 outlines the type of development which may be acceptable in the Mendip Hills AONB :

"In Areas of Outstanding Natural Beauty the conservation of the natural beauty of the landscape should be given priority over other planning considerations. Regard should also be had to fostering the economic or social well being of the locality. Provision should only be made for major industrial or commercial development where it is in the national interest and there is a lack of alternative sites. Particular care should be taken to ensure that any development proposed does not damage the landscape character of the area."

7.54 Policy 4 states that "*the biodiversity and unique character of the Somerset Levels and Moors should be maintained and enhanced*".

7.55 The Somerset Minerals Plan[46], adopted in 2004 identifies Mineral Consultation Areas whose principal function is to protect mineral reserves from sterilisation. Neither corridor passes through the designated areas. The potential for working minerals in the AONB would also be severely restricted by planning policy.

7.56 At a strategic level, the area to the north of the Mendips, including the districts of North Somerset and South Gloucestershire, is covered by the Joint Replacement Structure Plan[47]. Policies 14 and 15 promotes further employment and port-related development in the Avonmouth/Severnside and Portbury areas

[45] Somerset County Council and Exmoor National Park Authority : Somerset and Exmoor National Park Joint Structure Plan Review 1991 - 2011 : April 2000
[46] Somerset County Council : Somerset Minerals Local Plan : April 2004
[47] Bath and North East Somerset, Bristol, North Somerset, South Gloucestershire Councils : Joint Replacement Structure Plan : September 2002

respectively (however, see paragraph 7.49 below). The need to maintain a viable Green Belt between Portishead and Portbury is identified.

7.57 Within the various environmental protection policies, the conservation and enhancement of landscape character is promoted by Policy 17 which makes specific reference to the Mendip Hills AONB where :

"*the priority will be the conservation of their particular landscape character and distinctiveness, with due regard to the continued economic and social well-being of the area. Major industrial or commercial development within an AONB or which would adversely affect it by virtue of proximity, will not be permitted unless an exception is justified by proven national need and a lack of alternative sites*".

7.58 Local planning policies for Sedgemoor District (covering the corridors between Bridgwater and the southern edge of the Mendip Hills, are contained in the Sedgemoor District Local Plan[48]. Those policies which have been "saved" include Policy PCS2 :

"The erection of overhead electricity lines, particularly in the Quantock and Mendip Hills Areas of Outstanding Natural Beauty, will be resisted unless there is no reasonable alternative. Where no reasonable alternative exists, the lines should not intrude upon open skylines and be located parallel and adjacent to field boundaries or other physical features".

7.59 The Local Plan recognises that "*there are significant practical, technical and cost disadvantages associated with the undergrounding of high voltage power lines, those over 275Kv and over. Undergrounding will therefore only be sought in exceptional circumstances. Careful line routing will usually be the most appropriate way to minimise their visual impact*."

7.60 Policy CNE2 seeks to protect local landscape character (as defined in Landscape Assessments) and policy CNE17 the distinctive features of the Sedgemoor landscape. The Local Plan also recognises the value of the wetlands both in terms of their drainage function and habitats and the heritage of the area. Important nature conservation resources and the Mendip Hills AONB are protected by national policies.

[48] Sedgemoor District Council : Sedgemoor District Local Plan 1991-2011 : September 2004

7.61 The Proposals Map identifies numerous heritage features and sites of nature conservation interest to the west of Burtle, close to Corridor 2.

7.62 The Sedgemoor Core Strategy[49] was submitted for examination in March 2011. Draft Policy MIP1 sets out the Council's approach to the consideration of major infrastructure projects. This includes requiring promoters to consider alternatives; demonstrate how proposals avoid or minimise adverse impacts or harm to local places, communities and businesses; and contribute towards the implementation of the spatial strategy.

7.63 In relation to impact on the landscape, draft Policy D14 states that "*development proposals within the Mendip Hills AONB or the Quantock Hills AONB will only be supported where they enhance or conserve the natural beauty, or the exceptional character or quality of the landscape in these areas*." It goes on to state that "*in exceptional circumstances, where development is necessary and could result in significant impact on the landscape, appropriate mitigation and compensation measures should be provided*." The submitted Core Strategy also seeks to protect nature conservation, the historic environment and residential amenity. It promotes the transformation of Bridgwater through a range of regeneration and development initiatives, including growth to the North East of Bridgwater and at the former Royal Ordnance Depot at Puriton.

7.64 The North Somerset Replacement Local Plan[50] covers the corridors between the southern edge of the Mendip Hills and the River Avon. The Local Plan does not contain any policies which relate directly to the provision of electricity infrastructure. The Environment and Cultural Heritage policies are designed to protect the environment and cultural heritage of North Somerset. These include policies to conserve and enhance the built, historic and natural environment, including landscape, and to promote biodiversity.

7.65 Policy ECH7 protects the landscape character of areas defined in the Landscape Character Assessment Supplementary Planning Document. Policy ECH8 governs development in the Mendip Hills AONB. This states that "*Major development*

[49] Sedgemoor District Council : Local Development Framework Core Strategy Proposed Submission : March 2011
[50] North Somerset District Council : North Somerset Replacement Local Plan : March 2007

which would affect the environment and landscape of the Mendip Hills AONB will only be permitted where:

i. there is a need for the development in terms of national considerations; and

ii. there is no adverse effect on the local economy; and

iii. there is a lack of an alternative site outside the area, having regard to the cost or means of meeting the need for it in some other way; and

iv. any harm to the environment and natural beauty of the landscape of the AONB can be kept to a minimum and the development is carried out to high environmental standards".

7.66 The Proposals Map highlights the range of environmental constraints affecting both corridors passing through the Mendip Hills AONB. On Corridor 1, it identifies sites of nature conservation interest, including protected rhynes, at Puxton Moor and to the west of Yatton (also affecting Corridor 2C), between Yatton and Clevedon and to the north of Nailsea. North of Nailsea the corridor lies in the Green Belt as it passes round the eastern side of Portishead, as far as the Portbury Docks.

7.67 Corridor 2 enters the Green Belt as it passes around the south and east of Nailsea and remains within this designation as far as Portbury Docks.

7.68 The North Somerset Core Strategy[51] was published for consultation in February 2011. The document contains a number of environmental protection policies and draws attention to the particular characteristics of the North Somerset environment. In respect of development in the Mendip Hills AONB, draft Policy CS5 states that it "*will be protected by ensuring that development proposals conserve and enhance its natural beauty and respect its character, taking into account the economic and social well-being of the area*". Draft Policy CS6 confirms that the boundaries of the Green Belt will remain unchanged for the plan period. Draft Policy CS9 seeks to safeguard and enhance areas of green infrastructure and, in this context, draws attention to a number of specific areas including the north slopes of the Mendip Hills AONB, the North Somerset Levels and Moors and the Wraxall/Failand ridge. The protection of "strategic gaps" is promoted by draft Policy CS19, the supporting text for which identifies the Nailsea/Backwell area as potentially falling into this category.

[51] North Somerset District Council : Core Strategy : Publication Version : January 2011

7.69 North of the River Avon the "saved" policies of the Bristol Local Plan[52] apply. Policy ME14 states that :

"In determining planning applications for public utility developments, account will be taken of the technical and locational needs of operators and the benefits of minimising visual impact and obtrusiveness, with particular regard to the following:–

(i) The efficient use of existing equipment and services (including, where appropriate, the sharing of masts etc).

(ii) The use of appropriate materials and colours, and the sympathetic use of screening.

(iii) The character and appearance of the locality in which it is proposed."

7.70 The adopted version of the Local Plan included several policies promoting development and regeneration at Avonmouth. These policies were not saved by the Secretary of State as this strategic approach is no longer being pursued. The changes to policy are reflected in the submitted Core Strategy[53] and indicate that, while regeneration will be encouraged and development consolidated, no new allocations of green field employment land are proposed.

7.71 Policy E2 of the South Gloucestershire Local Plan[54] promotes the development of a strategic employment site at Severnside, immediately north of Seabank. This allows for the balancing of the employment potential of the area with the protection and enhancement of the coastal zone landscape and ecology. This stance is maintained in the Core Strategy[55] submitted to the Secretary of State in March 2011.

AONB Management Plan

7.72 The Mendip Hills AONB Management Plan 2009-2014[56] was prepared by the Mendip Hills AONB Partnership Committee. As required by Section 85 of the Countryside and Rights of Way Act 2000, the plan sets out policy for AONB local

[52] Bristol City Council : Bristol Local Plan : December 1997
[53] Bristol City Council : Bristol Development Framework Core Strategy : November 2009
[54] South Gloucestershire Council : South Gloucestershire Local Plan : January 2006
[55] South Gloucestershire Council : South Gloucestershire Core Strategy Proposed Changes Version : December 2010
[56] Mendip Hills AONB Partnership : Mendip Hills AONB Management Plan 20090-2014 : January 2009

authorities relating to the management of the Mendip Hills AONB. The emphasis of the plan is on maintaining and enhancing the distinctive landscape of the AONB, its heritage and biodiversity and promoting public access for quiet recreation.

7.73 The document sets out a number of criteria to be adopted in considering applications for development in the AONB. These include :

"Avoid damaging visual intrusions in to the landscape (such as radio masts, overhead power lines and wind turbines in unsympathetic locations)."

Stage 1 Consultation Representations

7.74 While the representations from the local authorities and AONB Partnership will have been made in the context of their local planning policies, there were few other comments which referred to the relationship between the proposal and the planning policy background. The exception was the concern expressed by both statutory bodies and the public regarding the potential impact of the scheme on the Mendip Hills AONB. Many of these comments stressed the statutory protection given to the AONB and the emphasis of policies governing development within it.

7.75 Any decision taken on the preferred route corridor will give appropriate weight to the national, regional and local planning policies relating to development in AONBs. It should also be noted that none of these policies categorically rules out development in AONBs, rather the policies adopt a strict precautionary approach. The potential impact on the AONB of the different route corridors is considered further in Chapter 10.

Comparison of Impacts of Route Corridors

7.76 National energy policy is generally supportive of the connection proposal and national and regional planning policies and guidance form the context for, and lend weight to, local planning policies. An important consideration is the degree to which the route corridors would affect areas which are designated in national and local planning policies

7.77 In planning policy terms, great weight is placed on the potential impact of the scheme on the Mendip Hills AONB.

7.78 In so far as the proposal is considered to comprise major development for this purpose, the extent to which the corridors may be considered to be justified in terms of the national policy to conserve the natural beauty of the landscape and countryside is dependent on the tests set out in PPS7 (see paragraph 7.16 above) including:

- Whether the proposal is demonstrated to be in the public interest - see below;
- the need for the development - the overarching NPS for energy states that, in general terms, the need for new energy infrastructure has been established. In this particular case, the need for the development is set out in the Need Case, which clearly demonstrates that failure to implement the connection would have serious implications for national energy supply and distribution;
- the cost of, and scope for, alternatives outside the designated area - the Strategic Optioneering Report (August 2011) has considered a range of options and concluded that a Bridgwater to Seabank connection would be the most appropriate in terms of National Grid's statutory duties;
- detrimental effects on the environment, the landscape and recreational opportunities - this is discussed below;
- the scope for moderating detrimental effects - consideration has already been given to the potential for mitigating both corridors by undergrounding, as described in Chapter 17. This is a matter which would be addressed further in the detailed connection design.

7.79 Corridor 1 Option 1A would have least impact on the AONB as it would not involve any increase in the number of overhead lines crossing the designated area, albeit the scale of infrastructure would increase. Corridor 1 Option 1B and the central and eastern spurs of Corridor 2 would result in parallel overhead lines of different scales crossing the AONB, which would have a significant visual impact. The western spur of Corridor 2 would introduce an additional section of overhead line into the AONB.

7.80 Impact on landscape character is an important feature of local planning policies. In presenting the least degree of change, Corridor 1 Option 1A would be preferred. Impacts on landscape character are considered further in Chapter 10. In addition to the AONB, the biodiversity and character of the Somerset Levels is protected in local planning policies. For the aforementioned reason, Corridor 1

Option 1A would also have the least impact on this area, while Corridor 2, which introduces an overhead line through an area of the Levels currently free of such infrastructure would have the greatest impact. The effect on nationally designated sites, also protected at a local level, is considered in Chapters 11 and 12.

Conclusions

7.81 The principal messages which can be derived from an analysis of policy at national, regional and local level are :

- at the national level, the need for new energy infrastructure has been established;
- the Holford Rules are supported as the basis for planning new routes for overhead lines;
- national and local policies emphasise that the greatest weight should be placed on the protection of areas statutorily designated for landscape, wildlife or historic value; and
- where schemes affect such areas, the need to do so must be established and alternatives properly considered.

7.82 The principal policy issue is the impact on the statutorily designated AONB. As noted above, the need for new energy infrastructure is supported at the national level. A further review of strategic options, considering the use of different technologies and connections, their capital and lifetime costs and their environmental and socio-economic implications, has confirmed that the favoured solution would be an overhead line between Bridgwater and Seabank which means that impacts on the AONB would be unavoidable. Corridor 1 Option 1A would have the least impact on this feature and, taking other policy impacts into account, it is considered that this option would comply most closely with national and local planning policies.

8 NATIONAL GRID POLICIES

Stakeholder, Community and Amenity Policy

8.1 National Grid's Stakeholder, Community and Amenity policy[57] includes ten commitments linked to its environmental obligations under Schedule 9 of the Electricity Act. Of particular relevance to the corridor selection stage of the development process are :

- establishing need;
- involving stakeholders and communities;
- routeing of networks and site selection - seeking to avoid areas which are nationally or internationally designated for their landscape, wildlife or cultural significance;
- minimising the effects of works and new infrastructure on communities, by having particular regard to safety, noise and construction traffic, and on areas which are nationally or internationally designated for their landscape, wildlife or cultural significance and other sites valued for their amenity such as Listed Buildings, Conservation Areas, areas of archaeological interest, local wildlife sites, historic parks and gardens and historic battlefields (taking into account the significance of these and other areas through consultation with local authorities and other stakeholders with particular interests in such sites); and
- mitigating adverse effects of works – through the application of environmental assessment techniques.

8.2 As noted earlier in this report, the need for the proposed connection is set out in the Project Need Case and the preferred approach to system reinforcement in the region has been established by means of strategic optioneering. The route corridors were defined, following an assessment of the main environmental constraints, such that they comprised the least environmentally constrained parts of the study area, together with an opportunity corridor based on an

[57] National Grid plc : National Grid's commitments when undertaking works in the UK - our Stakeholder, Community and Amenity policy : February 2010

existing overhead line route. Extensive consultation has been undertaken to obtain views about the Project as a whole and the potential route corridors.

Holford Rules

8.3 Broad principles for overhead transmission line routeing were formulated by the late Lord Holford and published in 1959 by the Royal Society of Arts. These rules, known as the 'Holford Rules'[58], were reviewed by National Grid in 1992 and have become accepted within the electricity transmission industry as the basis for overhead transmission line routeing. Their use is supported in the National Policy Statements. While these rules are intended to inform decisions on detailed alignments, rather than corridors, several are relevant in the latter case :

- Rule 1 - Avoid altogether, if possible, the major areas of highest amenity value, by so planning the route of the line in the first place, even if the total mileage is somewhat increased in consequence;
- Rule 3 - Other things being equal, choose the most direct line, with no sharp changes of direction and thus fewer angle pylons;
- Rule 6 - In country which is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables so as to avoid a concatenation or wirescape;
- Rule 7 - Approach urban areas through industrial zones where they exist (noting that where a line needs to pass through a development area, it should be routed so as to minimise as far as possible the effect on development and that alignments should be chosen after consideration of the effects on the amenity of existing development and on proposals for new development);
- Supplementary note A - Avoid routeing close to residential areas as far as possible on grounds of general amenity; and
- Supplementary note B - Where possible choose routes which minimise the effect on Special Landscape Areas, Areas of Great Landscape and other similar designations of County, district or local value.

[58] National Grid plc : The National Grid Company plc and new high voltage transmission lines - guidelines for line routeing (the Holford Rules) and undergrounding : March 2003

8.4 The Holford Rules were applied in the route corridor study process to guide the definition of potential route corridors. Situations where route corridors or alignments meet all of the Rules simultaneously are rare. While it is not possible to avoid the AONB, minimising the impact on the AONB would be within the spirit of Rule 1 and Corridor 1 Option 1A would be most consistent. Corridor 1 Option 1A would also perform best against Rule 3. By not adding to the amount of wirescape Corridor 1 Option 1A would be consistent with Rule 6. Consideration against Supplementary Note A suggests that Corridor 1 Option 1A should be preferred as Corridor 2 would involve placing overhead lines closer to settlements where none presently exist. All corridors would satisfy equally Rule 7.

Horlock Rules

8.5 The Horlock Rules[59] set out National Grid's approach to substation siting and design in the context of the company's duties under Schedule 9 of the Electricity Act. Of most relevance to the route corridor stage are :

- Guideline 2 - The siting of new substations, sealing end compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections.
- Guideline 3 - Areas of local amenity value, important existing habitats and landscape features, including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable.

8.6 Corridor 1 Option 1A would require additional works to the WPD distribution network to maintain supplies. This may require the construction of a new GSP substation. A preliminary siting study has been undertaken based on the Horlock Rules and identified two potential sites - close to the Churchill substation and to the north of Sandford - taking these guidelines into account.

[59] National Grid plc : NGC substations and the environment - guidelines on siting and design : March 2003

Undergrounding

8.7 National Grid has an established approach to undergrounding. In view of the number of new connections which will need to be developed in the near future and the often-held public views that underground connections would be preferred, National Grid considers that it would be appropriate to reach a new consensus on the approach to be taken to undergrounding. National Grid is therefore currently seeking views from industry, government, non-governmental and environmental stakeholders as well as from the public on the approach it should take in the future. Following consultation, a revised approach will be adopted, which will be used in determining whether there is a case for undergrounding part of the connection between Bridgwater and Seabank.

8.8 Although National Grid's current approach to undergrounding states that every case for using underground cables for amenity reasons will be considered on its merits, its guidelines[60] identify those "exceptionally constrained areas" where physical or amenity factors related to landscape, land use and development weigh most heavily against the use of overhead lines and, therefore, where consideration of underground cables may be most appropriate.

8.9 "Exceptionally Constrained Rural Areas" comprise those locations within or immediately alongside nationally or internationally designated areas of amenity value (National Parks, Areas of Outstanding Natural Beauty, Heritage Coasts and World Heritage Sites) where the scale of new high voltage transmission pylons and conductors would dominate unspoilt landscape and cause serious damage to major open views of spectacular panoramas, crests of prominent rides and skylines or attractive small scale valleys seen from important locations within or immediately alongside the designated areas.

8.10 Both corridors pass through the Mendip Hills AONB. A 132kV overhead line already runs through this part of the AONB.

8.11 "Exceptionally Constrained Urban Areas" are those locations where the density of residential, community and associated development and public open space is such that a reasonable direct overhead route is impracticable.

[60] National Grid plc : Undergrounding policy - approach to new connections : August 2009

8.12 The current approach requires that the potential use of underground cable in, or close to, exceptionally constrained areas is shown to be the most cost effective means of avoiding the need for high voltage overhead lines which would seriously harm the amenity of these areas. Consideration would also have to be given to the adverse effects on amenity of underground cables, sealing end compounds, terminal pylons and ancillary equipment and to technical considerations that apply.

Stage 1 Consultation Representations

8.13 Respondents queried the application of the Holford Rules. The assessment of each route corridor against the Holford Rules is dealt with in Chapter 10. The Holford Rules are a set of guidelines which are used as a tool in designing and assessing potential overhead line routes. They are not prescriptive and conflicts will inevitably arise with the Rules in particular circumstances.

8.14 Undergrounding was viewed by some respondents as a way of circumventing the Holford Rules. While many had strong views on the potential for undergrounding there was little challenge to National Grid's policy and guidelines. Indeed the application of the policy and guidelines was seen as justifying undergrounding through the AONB (if not other parts of the study area).

8.15 Undergrounding, including the scope of National Grid's policy, was raised as an issue by a large number of respondents and is discussed further in Chapters 9, 10 and 18.

Conclusions

8.16 On the basis of National Grid policy, particularly the Holford Rules, alone, Corridor 1 Option 1A would be preferred. National Grid's current approach to undergrounding would suggest that the Mendip Hills AONB could be considered an "exceptionally constrained rural area" and Avonmouth an "exceptionally constrained urban area". However, this will be reviewed at Stage 2 in the light of an updated undergrounding approach which will then be available, following consultation with the relevant statutory bodies. The potential for undergrounding is common to both corridors and cannot be used to distinguish between them.

9 CONSULTATION REPRESENTATIONS

Introduction

9.1 The extensive Stage 1 Consultation exercise sought inputs from the main stakeholders and the wider public. This chapter of the report summarises the response from different parties, focussing on the main issues raised and their views on particular route corridors. Further information can be found in the Stage 1 Consultation Feedback Report. The Feedback Report reviews in detail the issues raised by respondents, how these have been taken into account to date and how they will influence project development. The way in which specific issues have been taken into account is also addressed in the topic chapters of the present report (for example, landscape issues are dealt with in Chapter 10).

Local authorities

9.2 The route corridor preferences stated by local authorities is summarised in Table 9.1. It should be noted that the overall preference was for the use of sub sea or underground connections.

Table 9.1 : Route corridor preferences - local authorities

Local Authority	Route Corridor Preference
Somerset County Council	None stated
North Somerset District Council	1A/none stated*
Sedgemoor District Council	None stated
South Gloucestershire Council	1A
West Somerset District Council	No response
Bristol City Council	1A

* Stage 1B response

9.3 The Somerset County Council area extends to the southern sections of the route corridors, south of the Mendip Hills.

9.4 The County Council raised concerns[61] over "*the potentially damaging impact of an overhead power line on the unique environment of Somerset and in particular the special character of the designated Mendip Hills AONB landscape*". The County Council considered that an overhead line along any of the proposed route corridors would have a significant impact on the landscape and that even where there is an existing 132kV line, the change in scale which a 400kV overhead line would bring would inevitably lead to a great increase in visual impact. It did not state a preference for a particular corridor.

9.5 It was the County Council's view that consideration should be given to undergrounding the proposed power lines over a wider area (not just the AONB) to protect the visual amenity of Somerset. It also wanted further consideration to be given to the use of subsea cables in the Severn Estuary. Issues relating to flood risk were also identified for further consideration and further information was sought on the potential for securing mitigation and community benefits.

9.6 Following this response, National Grid provided more information to the local authorities and the general public and held additional consultation events with a particular focus on alternatives including subsea routes and undergrounding.

9.7 A subsequent response[62] from the County Council indicated uncertainties about the likely extent of undergrounding and hence the visual impacts of each corridor if undergrounding is considered. A socio-economic assessment of the proposal was sought, encompassing potential impacts on Somerset's tourism industry. This is considered in Chapter 13. The need to consider undergrounding over a wider area to protect the environment was again stressed.

9.8 The Sedgemoor District Council area extends to the southern sections of the route corridors, south of the Mendip Hills.

9.9 The Council considered[63] that more information should have been provided on alternatives and that the consultation process had been flawed. It did not state a preference for a particular corridor. In particular, it sought more information on :

[61] Somerset County Council : Response to Stage 1 consultation : 15th January 2010
[62] Somerset County Council : Response to Stage 1 consultation : 5th August 2010
[63] Sedgemoor District Council : Response to Stage 1 consultation : 15th January 2010

- all the options for energy transmission from Hinkley, including sea routes and undergrounding through the Mendip Hills;
- the factors that have influenced the choice of route corridor options, including environmental and socio-economic assessment and justification;
- substation design and location;
- pylon design and location;
- assessment of potential health impacts;
- the mitigation and community benefit proposed to address the impact of new transmission; and
- removal of redundant infrastructure.

9.10 Following the provision of more information, as part of the Stage 1B Consultation, a subsequent response[64] indicated that the Council considered that a more detailed assessment of the route corridors should be undertaken before selecting a preferred route corridor and that the subsea and "other strategic alternatives" should remain open as options. National Grid therefore revisited its strategic optioneering, taking account of the most recent technical, socio-economic and environmental information, and the results of this exercise are presented in the Strategic Optioneering Report (August 2011).

9.11 The Council also maintained that detailed studies may reveal that a "mix and match" approach is the best option, rather than selecting a single corridor for the whole length of the route.

9.12 The North Somerset Council area covers the northern part of the route corridors between the Mendip Hills and the River Avon. In its initial response[65], the Council indicated that National Grid should investigate fully the option of a subsea route along the Severn estuary and should give consideration to routeing cables along the M5 motorway. Subject to these considerations, the Council indicated that its preferred option would be Corridor 1 Option 1A with undergrounding through the Mendip Hills AONB. However in a later response[66], the Planning and Regulatory Committee resolved that it could not support any of

[64] Sedgemoor District Council : Further response to Stage 1 consultation : 26 July 2010
[65] North Somerset Council : Response to Stage 1 consultation : 22 December 2009
[66] North Somerset Council : Planning and Regulatory Committee Resolution 21 July 2010

the corridors as "*they would have an unacceptable impact on the countryside, natural environment and residents of North Somerset*". The Committee also requested that National Grid continue to investigate ways of overcoming the technical obstacles difficulties of subsea connections.

9.13 A short section of the route corridors through Avonmouth lies within the area of Bristol City Council. The Council has indicated[67] that it prefers Corridor 1 Option 1A in its area, on the grounds that the replacement of the existing 132kV overhead line through Avonmouth with a 400kV overhead line "*is likely to have the lowest environmental impact*".

9.14 South Gloucestershire Council is concerned with only the northernmost part of the route in the vicinity of Seabank substation and with the proposed substation at Aust. It considered[68] that Corridor 1 Option 1A would be preferable as this could result in improved amenity for residents if the overhead line was routed through the industrial area. The need to consider the ecological implications of the development was stressed, including potential impacts on the Severn Estuary SPA, SAC and Ramsar sites.

9.15 The Mendip Hills AONB Unit works on behalf of the Mendip Hills AONB Partnership, comprising a range of largely public sector organisations, to implement the Management Plan for the Mendip Hills AONB.

9.16 In its response[69], it concluded that it could not support any of the route corridor options proposed by National Grid. It was concerned about "*the potentially damaging impact of an overhead power line on the natural beauty and special character of the designated AONB landscape*" and that visitors to the area could be deterred which would have an adverse impact on the local economy. It noted that the existing 132kV overhead line between Loxton and Webbington already detracts from the AONB landscape. It therefore urged National Grid to give further consideration to the use of subsea cables in the Severn Estuary or to undergrounding the new line within the AONB and where it would adversely affect views from the AONB to the surrounding countryside.

[67] Bristol City Council : Response to draft Route Corridor Study: 3 August 2009
[68] South Gloucestershire Council : Response to Stage 1 Consultation : 22 January 2010
[69] Mendip Hills AONB Unit : Response to Stage 1 Consultation: 20 July 2010

Statutory Bodies

English Heritage

9.17 As the Government's adviser on heritage issues, English Heritage concluded[70] , based on an initial appraisal, that Corridor 1 Option 1A would potentially have the least impact on the historic environment. Corridor 1 Option 1B was considered to be the most environmentally constrained corridor and the cumulative visual impact of the existing and proposed overhead lines would be very damaging. Corridor 2 was considered to have potentially the most damaging impact upon the historic assets that are located either within the corridor identified or close by it. English Heritage reserved the right to review its findings once more information becomes available.

9.18 English Heritage stressed the need to treat all elements of the historic environment on an holistic basis. It also highlighted key sites, the impact upon which would required detailed consideration. These included Tyntesfield, Blaise Castle and the battlefield at Sedgmoor. Particular attention was drawn to the impact of the scheme on Brent Knoll, where concern was expressed that higher pylons could affect the setting of the Scheduled Monument, and to the Somerset Levels and Moors which have a high potential for survival of sub-surface remains.

Environment Agency

9.19 The Environment Agency favoured[71] Corridor 1 Option 1A as the least constrained route and one which would have least impact on biodiversity. The latter would be a particular consideration where the corridor crosses the AONB or wildlife sites. The need to take account of migratory bird routes (notably between the Severn estuary and the Somerset Levels), was noted.

[70] English Heritage : Response to Stage 1 Consultation : 8 January 2010
[71] Environment Agency : Response to Stage 1 Consultation : 15 January 2010

Natural England

9.20 As the Government's adviser on landscape and nature conservation issues, Natural England indicated[72] that it would provisionally favour Corridor 1 Option 1A "*which would appear to cause least additional impact upon ecology, landscape, access and land management*". It sought further information on why the subsea option was not considered to be feasible and requested that serious consideration be given to undergrounding through the Mendip Hills AONB.

9.21 Of the other 23 statutory consultees who responded, only Network Rail expressed a route corridor preference - this was for Corridor 1.

Parish Councils

9.22 Representations were received from 36 parish councils within the consultation zone and a further 8 parish councils outside it. Many of the issues raised in their consultation representations understandably related to specific concerns about the impact of one or other of the corridors on their local landscape, views, heritage or nature conservation assets. In most cases such impacts can only be properly assessed when detailed alignments are under consideration - it should be possible to design alignments in such a way as to avoid, or limit the impact upon, particular features or views. In these cases the issue would not affect route corridor selection. There are, however, some examples where such an approach would be unlikely to resolve the issue and which could affect route corridor selection. Such issues are dealt with in other chapters of this report.

9.23 A number of issues were common to several of the parish council representations, including :

- inadequacy of the consultation exercise;
- limited options available for consultation;
- lack of information on alternatives, including technologies and costs;
- subsea option along the Bristol Channel should be considered in more detail as preferable;
- commitment needed to removal of surplus pylons within Corridor 1 Option 1A;
- health effects for residents living close to overhead lines;

[72] Natural England : Response to Stage 1 Consultation : 22 January 2010

- impacts on tourism and economic development;
- visual impact of 46m pylons on landscape of Somerset;
- impact on ecology and designated sites;
- impact on the sensitive and unique Somerset Levels and Moors;
- consideration should be given to a route parallel to the M5 motorway corridor, including an underground cable route;
- undergrounding should be considered in Mendip Hills AONB/Lox Yeo Valley and elsewhere;
- undergrounding costs unclear;
- the precautionary principle should be applied to maximise distance from settlement boundaries and settlement clusters;
- concerns about devaluation of property and compensation/property blight; and
- compensation via Section 106 agreements should be available for communities.

9.24 28 of the 44 parish councils responding did not express a route corridor preference. Of the 16 parish councils that did express a route corridor preference, 13 preferred Corridor 1 of which 10 expressed a preference for Corridor 1 Option 1A. Two parish councils preferred Corridor 2 and one preferred a 'mix and match' of Corridors 1 and 2. In the main, however, the parish councils preferred subsea or underground options and most statements of corridor preference were subject to this caveat.

Non-statutory Bodies

9.25 Representations were received from 15 non-statutory consultees. For many, the preferred option was for a subsea route between Hinkley and Seabank, with the second preference being a total or partial underground route, particularly through the Mendip Hills AONB. Where a preference for a route corridor and option was made it was on the basis that the other options could not technically be achieved. Six of these consultees expressed a route corridor preference for Corridor 1 Option 1A. The five were the Avon and Somerset Wildlife Trusts, CPRE South West Regional Group and CPRE Somerset, the Mendip Society and the Stone Allerton Environmental Group.

General Public

Overall Response

9.26 The Stage 1A Consultation with the general public took place between October 2009 and January 2010. The consultation programme was then extended, on the basis of additional information provided by National Grid, to July 2010. This is referred to as the Stage 1B Consultation. During Stage 1A Consultation, information was made available to members of the public via a number of different means, including direct mailings to over 37,000 properties within 1km of the proposed route corridors. 17 public exhibitions were held. A further 24 public information events were held during Stage 1B.

9.27 The proposal elicited significant interest from the local communities in the study area. Over 6,100 people attended at least one of the public consultation events. Over 8,300 representations were received through different response mechanisms from over 7,400 individuals.

9.28 The representations that were received from the public varied significantly, in both the format and the range of issues that were raised. Some people were concerned with one particular issue, some set out a wide range of comments, and others provided comprehensive and technical submissions. All representations were logged, analysed and acknowledged.

9.29 In Stage 1A, 1,246 respondents indicated that they were opposed to both corridors, or more generally, to a new overhead connection between Bridgwater and Seabank.

9.30 Of the 1,481 respondents who expressed a preference for one or other of the proposed route corridors in Stage 1A, 1,327 were in favour of Corridor 1. This included people who indicated a preference for either of the options within Corridor 1 (Corridor 1 Option 1A or Corridor 1 Option 1B) and people who supported Corridor 1 under specific conditions, such as the undergrounding of cables for part, or all, of the route. Corridor 2 was preferred by 154 respondents, subject to conditions in some cases. While few respondents specifically objected to Corridor 1, around 950 respondents specifically objected to Corridor 2, although the consultation form did not ask which corridor was opposed.

9.31 Of those respondents supporting Corridor 1, 727 supported it without any caveats, predominately arguing that it would be better to follow an existing corridor. 600 supported it with reservations, many stating that they would only support Corridor 1 if it were not possible to use an alternative such as a subsea connection or undergrounding.

9.32 Of 332 expressing a preference for one of the options within Corridor 1, 169 respondents expressed a preference for Corridor 1 Option 1A and 143 for Corridor 1 Option 1A with caveats. Only 20 favoured Corridor 1 Option 1B with or without caveats.

9.33 In Stage 1B, the majority of the respondents who responded to the consultation question asking them to state a preference for one of the proposed corridors chose to abstain from expressing a preference for either Corridor 1 or Corridor 2. 455 of the 1,228 respondents at Stage 1B stated that they were opposed to both corridors, or more generally to a new overhead connection between Bridgwater and Seabank. Of the 216 respondents who expressed a preference for Corridor 1, 164 were in favour of Corridor 1 Option 1A. 31 respondents preferred Corridor 2.

9.34 While only limited weight can be attached to the absolute numbers responding in a particular way, because this may have been influenced by specific campaigns, it is worth noting that the publicly expressed view corresponds closely with that of the statutory bodies and other stakeholders i.e. that Corridor 1 Option 1A, possibly with partial undergrounding, should be the preferred option. Of particular interest to the decision making process are the issues raised by the public in relation to each corridor. As with the parish councils, a large number of location-specific issues were raised, which in the main would be more appropriately addressed at the detailed connection design stage. They have, however, been reviewed to determine whether any may have a bearing on corridor selection.

Representations relating to Corridors 1 and 2

9.35 Many respondents disagreed with the proposition that a new overhead line should be built between Bridgwater and Seabank. The main concern was the potential effect on the Somerset landscape, in particular on the Mendip Hills AONB and the Somerset Levels. In addition, concerns were expressed about the impact of new infrastructure on local residents, notably the proximity of the

infrastructure to people's homes and villages, and the potential impact on the value and saleability of property. Many locations were specifically mentioned as places that would be adversely affected by a new connection. Some respondents referred to the cumulative impact of a concentration of overhead lines in specific locations. A further concern related specifically to health risks for local residents, particularly in respect of children's health and the proximity of overhead lines to schools.

Representations relating to Corridor 1

9.36 The primary reason given for preferring Corridor 1 was that it follows an existing route. Respondents considered that it would be better to utilise an area where there are already pylons in situ, rather than affecting areas of the countryside where there are currently no overhead lines. There would be less disruption and the smallest amount of change if the existing route was used. A few respondents were of the view that the presence of overhead lines has already been accepted along the existing corridor, stating that this would reduce the level of objections. Because the corridor already hosts overhead lines, it was perceived that land values and properties should not be affected greatly.

9.37 Some respondents argued that Corridor 1 would cause less disruption to the countryside and wildlife as it follows an established route. Others commented that the scenery along Corridor 1 has already been blighted and that, therefore, there would be less visual impact than if a new corridor was created.

9.38 To some extent, respondents' preference for Corridor 1 was also fuelled by their opposition to Corridor 2. Many referred to specific locations that they believed would be impacted less by Corridor 1 than by Corridor 2, with Nailsea, Backwell and Wraxall being mentioned most frequently. Some respondents estimated that Corridor 1 would be further away from built-up areas than Corridor 2 and believed fewer people would be affected by Corridor 1.

9.39 The main argument put forward by those in favour of Corridor 1 Option 1A was that an existing overhead line would be replaced and, therefore, the total number of pylons and cables would be restricted, making the infrastructure as a whole less intrusive. A few respondents added that Corridor 1 Option 1A in their view would have less impact on the landscape and environment in general terms than Corridor 1 Option 1B.

9.40 Of the few respondents who expressed a preference for Corridor 1 Option 1B a small number related their preference to the fact that this would avoid the need for a new substation at Churchill.

9.41 Many who supported Corridor 1 with caveats would prefer the use of HVDC subsea cables or for cables to be placed underground. Some respondents state that their preference for Corridor 1 was subject to the condition that the cables be buried along sections of the corridor, for example under the Mendip Hills AONB or near residential areas like Nailsea. Others preference was conditional on moving existing overhead lines away from residential areas. Some respondents would only prefer Corridor 1 if it were partially or completely aligned with the M5 motorway.

9.42 Only around 70 respondents explicitly expressed their opposition to Corridor 1. Some commented on the proximity of the route to their property. There were also concerns about health, the impact on property values, the proximity to schools and the cumulative impact of further development along the existing route. A few respondents commented on the visual impact of larger pylons or a second line of pylons. Respondents who articulate their opposition to Corridor 1 Option B explicitly generally rejected the idea of having two parallel sets of pylons and overhead lines.

Representations relating to Corridor 2

9.43 154 respondents supported Corridor 2, 91 without any caveats, while around 950 respondents expressed their objection to Corridor 2 specifically.

9.44 The main reason respondents expressed a preference for Corridor 2 related to its distance from people and property. Some respondents commented that Corridor 2 passes further away from their property, or were concerned about how close to them Corridor 1 would be. Respondents noted that Corridor 2 passes through areas with less population and suggested that it would be less intrusive to the countryside. A few respondents preferred Corridor 2 because they were concerned about the cumulative impact of Corridor 1 Option 1A, stating that it is unfair to inflict further pylons on the same people.

9.45 A few respondents mentioned locations that would be avoided if Corridor 2 were selected. They indicated, for example, that it would be further away from Portishead and that it would prevent a build-up of pylons around Tickenham and

West Nailsea. Some respondents expressed a preference for Corridor 2 because it aligns with the M5 motorway, at least partially - between Loxton and Yatton.

9.46 Those preferring Corridor 2 with caveats tended to identify the same caveats as for Corridor 1.

9.47 Many of the reasons for respondents opposing Corridor 2 are similar to those given by respondents who oppose both corridors (i.e. impact on the landscape and on the amenity of local communities). A large number commented on the negative impact it would have on the landscape and countryside, often describing the area as 'beautiful'. A few respondents commented that the pylons would be a particular problem on the Somerset Levels and Moors, where the landscape is very flat. Some commented on the size of the pylons, which they felt would interrupt the views and be a blot on the landscape.

9.48 Some of those who objected to Corridor 2 mentioned specific locations where they were concerned that the environment would be damaged and wildlife could be harmed. In particular, respondents were concerned about the effect of Corridor 2 on Backwell Lake, which is a popular recreational amenity with local people, a nature reserve site and has an abundance of wildlife.

9.49 Other locations where respondents were concerned that overhead lines would disturb wildlife include Strawberry Line, Prior's Wood, Allerton Moor, Banwell Caves and the lowlands near Badgworth. Respondents were more generally concerned about the impact on the Mendip Hills AONB, local nature reserves and SSSIs. A few respondents raised issues around the impact of Corridor 2 on cultural heritage. Specific locations mentioned include the National Trust's Tyntesfield Estate and All Saints Church in Wraxall

9.50 The location mentioned most frequently in respondents' opposition to Corridor 2 was Nailsea, with around half of those who object expressing concerns about the impact on the town. Backwell, Tickenham and Wraxall were also mentioned numerous times. A few commented that Corridor 2 is narrow in places, which would result in pylons being close to properties, for example between Backwell and Nailsea.

9.51 Respondents were also concerned about possible health effects of overhead lines and noted the proximity of Corridor 2 to schools at Backwell and Wraxall.

General Themes

9.52 Far more comments were made challenging both Corridors 1 and 2 than for any of the corridors specifically. As mentioned above, many respondents disagreed with the proposal to build a new overhead line between Bridgwater and Seabank. Their main concerns were environmental, with respondents across the consultation stages arguing that a new connection involving pylons and overhead lines would cause unacceptable blight to the Somerset landscape. Many praised the unique character of the countryside in its existing state and insist that this needs to be preserved for future generations. They argued that both of the proposed corridors would scar the Mendip Hills AONB as well as the Somerset Levels, a landscape which was being considered for nomination to become a UNESCO World Heritage Site at the time of the Stage 1 Consultation. In addition, there were numerous comments about the detrimental impact new overhead lines and pylons could have on the wildlife in the area.

9.53 A second theme strongly emerging from respondents' reasons to oppose both corridors is around the impact of the new infrastructure on local residents. In part, these comments are about the proximity of the infrastructure to people's homes and villages, notably having an impact on the value and saleability of property. Many locations were specifically mentioned as places that would bear the burden of the new overhead connection. There was particular concern about places where power lines are already considered to be affecting local residents, with respondents arguing that the new infrastructure would contribute to a cumulative impact on specific localities. An example that many offered is that Corridor 2, together with the existing lines, would encircle the town of Nailsea with power lines.

9.54 One specific type of concern in relation to the impact of the overhead lines on local residents relates to health risks. In many representations people expressed worries about the potential effect that high-voltage power lines have on people's health. A number of respondents believed there are particular reasons to be concerned about children's health and they go on to specify several schools that could be in the direct vicinity of the new power lines. A less frequently mentioned concern that also addresses the impact on local residents was the potentially detrimental impact pylons could have on the local economy, as they are seen to discourage tourists from enjoying the unspoilt landscapes of Somerset.

9.55 A number of respondents, both to the Stage 1A Consultation and the Stage 1B Consultation, suggested hybrid solutions, in which the pylons would follow part of Corridor 1 and part of Corridor 2, switching at places where the proposed corridors meet.

9.56 The issues raised during the Stage 1 Consultation, and National Grid's response to them, are covered in detail in the Stage 1 Consultation Feedback Report.

Local interest groups

9.57 A number of local interest groups responded to the proposals by National Grid. All claimed that the consultation process had been flawed. Their other views may be summarised as follows :

9.58 Save Nailsea West[73] raised concerns about the proximity of corridors to housing, citing the effect this could have on property values because of perceptions regarding potential health effects. It also considered that more information should have been provided on alternative options, including subsea connections, undergrounding and a route along the motorway. The group concluded that Corridor 2 would be an unsupportable option for Nailsea, nor could it support Corridor 1 Option 1B. It was prepared to support Corridor 1 Option 1A "*if National Grid and Western Power agree to move all the existing power lines and pylons far away from our homes*."

9.59 No Moor Pylons[74] also stated that there had been a failure to consider alternatives, including subsea cables, undergrounding and a route along the motorway and that National Grid had neglected its Schedule 9 duties. It queried the Need Case and some of the cost information which had been provided. It also drew attention to issues of safety and security and to plans for a World Heritage Site on the Somerset levels (subsequently withdrawn). No corridor was favoured. Health issues were a major concern and a precautionary approach was advocated.

9.60 Yatton Against Pylons[75] considered that the community would be affected by both corridors. No corridor was favoured, but the group was particularly

[73] Save Nailsea West : Response to Stage 1 Consultation: undated
[74] No Moor Pylons : Response to Stage 1 Consultation: 22 July 2010
[75] Yatton Against Pylons : Response to Stage 1 Consultation: 21 January 2010

concerned about the impact of Corridor 2 (including potential impacts on Biddle Street SSSI and local nature reserve and on the Strawberry Line cycle path). It considered that National Grid had concentrated on overhead solutions rather than looking in detail at other alternatives. The costs of alternatives had not been substantiated. The group felt that the height of pylons and landscape impact had not been made clear. There were concerns about potential impact on property values, the economy and health of the local population.

9.61 Save Our Valley was concerned[76] about risks to public health and safety and about the potential damage to the natural environment, wildlife and the North Somerset landscape. It felt that, if a land based connection is to be implemented, all options (including running alongside the M5 motorway) should be considered. However. National Grid should undertake a full investigation of the undersea option and financial cost should not be the determining factor. Save Our Valley rejected Corridor 2 to the south and east of Nailsea and across to Wraxall as this would encircle Nailsea with overhead lines and have a severe impact on dwellings and Blackwell Lake. It stated that if Corridor 1 has to be used, then National Grid, in conjunction with Western Power, must realign all the existing cables and pylons well away from existing houses and National Grid must underground cables as determined appropriate in consultation with local residents and environmental advisers. Corridor 1 Option 1B was not supported.

9.62 Pylon Moor Pressure considered[77] neither corridor to be acceptable because of concerns about the potential impact on the settlement of Mark and the way in which underground or undersea connections had been discounted in favour of overhead solutions. More information was sought on alternative solutions and related lifetime costs, potential health impacts and on mitigation measures. There was uncertainty about whether the WPD pylons would be removed. The particular characteristics of the Somerset Levels were highlighted, including heritage and landscape value and the risk of flooding.

9.63 Nailsea Town Football Club was concerned[78] about the potential impact of Corridor 1 on its ability to fund its own development plans.

[76] Save our Valley : Response to Stage 1 Consultation : 4 January 2010
[77] Pylon Moor Pressure : Response to Stage 1 Consultation: 19 July 2010
[78] Hoddell Associates on behalf of Nailsea Town Football Club : Response to Stage 1 Consultation: 5 January 2010

Conclusions

9.64 The representations from the majority of the respondents accepted the need for additional transmission reinforcement to connect the proposed new generation at Hinkley Point C but questioned the strategic options considered and discounted by National Grid in putting forward only overhead line route corridors between Bridgwater and Seabank for consultation. Many respondents objected to the principle of an overhead line itself rather than the specific route corridors put forward for consultation. The use of an subsea connection between Hinkley Point and Seabank substation was favoured by many respondents. In response, National Grid extended the Stage 1 Consultation and in the Stage 1B Consultation provided additional technical information and undertook further public exhibitions on the Project. It also reviewed strategic options and, as outlined in Chapter 2, the Strategic Optioneering Report (August 2011) confirms the original assessment that an overhead transmission line connection between Bridgwater and Seabank should be taken forward.

9.65 A number of respondents did comment on the route corridor preference and this indicated that there were clearly greater objections to Corridor 2 than Corridor 1. Corridor 1 Option 1A – which would involve the replacement of a lower voltage overhead line - was favoured over Corridor 1 Option 1B that involved a new 400kV overhead line running in parallel with the existing lower voltage line. There was also a significant level of support for the notion that more consideration should be given to undergrounding all or part of the route corridor, whether Corridor 1 or Corridor 2.

9.66 The main themes that arose from the consultation were:

- adequacy of consultation process due to the limited scope of the proposed options;
- respondents favour the use of alternative technologies such as sub-sea HVDC cables and undergrounding power lines. Request for further consideration of and information and consultation on subsea and undergrounding options, including costs;
- suggestions for partial undergrounding in sensitive areas (e.g. the Mendip Hills AONB and areas where the corridor passes near towns and villages);
- the effect on the visual amenity of the area from 46m pylons;
- concerns that both of the proposed corridors would scar the Mendip Hills AONB as well as the Somerset Levels;

- the proximity of the infrastructure to people's homes and villages, notably having an impact on the value and saleability of property;
- the effect on the health of the local population within the selected route corridor;
- potential impact on wildlife, biodiversity and cultural heritage;
- the effect of the proposals on tourism and the local economy; and
- the provision of further community benefits to the areas concerned.

10 LANDSCAPE AND VIEWS

Introduction

10.1 This chapter considers the potential effects of a new overhead line in each of the route corridors on the landscape, with particular reference to the statutorily designated Mendip Hills Area of Outstanding Natural Beauty (AONB) and on views.

Context

Landform

10.2 The study area shows some marked variations between low-lying moors and higher limestone hills.

10.3 In the south of the study area, the landscape is generally low lying moorland (approximately 6m AOD) forming part of a wider area known as the Somerset Levels and Moors. Isolated areas of higher ground such as Brent Knoll, to the north east of Burnham-on-Sea and the Mid Somerset Hills to the east of Bridgwater provide some distinctive variation.

10.4 The Mendip Hills AONB lies in the centre of the study area. The hills rise sharply out of the Somerset Levels and Moors forming a wooded backdrop to views across the Levels. The AONB comprises a series of limestone hills with the only significant break in the hills being the valley of the Lox Yeo River.

10.5 To the north of the Mendip Hills the land is more varied and includes flat open moorland, a prominent ridge at Tickenham and a series of hills to the east of Yatton, Congresbury and Nailsea.

Landscape Character

10.6 The study area falls within six of the former Countryside Agency (now Natural England) national landscape character areas[79]. These are primarily vales to the south of the study area at Vale of Taunton and Quantock Fringes and to the north the Severn and Avon Vales. The Somerset Levels and Moors is a large area of low-lying farmland and wetland surrounded and divided by low hills and ridges (the Mid Somerset Hills) and covers the largest part of the study area. In contrast to this low lying farmland, the Mendip Hills and Bristol, Avon Valleys and Ridges provide a dramatic backdrop to low lying farmland.

10.7 The study area includes land in the administrative districts of five local authorities. Sedgemoor District Council, North Somerset District Council, West Somerset Council and South Gloucestershire Council have published landscape character assessments. Bristol City Council does not presently have an equivalent document. The landscape character types identified are: Moors; Lowland Hills; River Floodplains; Farmed Coal Measures; Inter-tidal bays; Sandstone Uplands; Settled Limestone Plateau; Rolling Valley Farmland; Settled Coastal Edge; Limestone Ridges and Combes.

10.8 The majority of the study area outside of the settlements, rivers and coastal edges comprises Moors, Lowland Hills, Limestone Ridges and Combes and Settled Limestone Plateau. This landscape comprises extensive low lying moors divided by a network of rhynes and ditches. This area is characterised as a rural landscape framed by intermittent hedgerows and the distinctive skyline of wooded limestone ridges.

10.9 The remainder of the study area comprises a series of hills and prominent limestone ridges rising out of the Levels and Moors. In the south of the study area higher ground is characterised by a series of lowland hills and isolated knolls, often occupied by the remains of early prehistoric settlements. Further to the north, and intersecting the central part of the study area, are the Mendip

[79] Natural England : National Character Areas : 2005

Hills. These limestone hills rise abruptly from the flat landscape of the Levels and provide a distinctive and prominent backdrop to views from much of the lowland areas.

10.10 There are also a number of elevated limestone ridges to the south of Bristol. These ridges run roughly east west and create a backdrop to the low lying areas. The most prominent is Tickenham Ridge which extends east from Clevedon and is characterised by extensive blocks of woodland some of which is designated ancient woodland.

Mendip Hills AONB

10.11 The Mendip Hills AONB covers an area of approximately 200km^2 and is an extensive range of limestone hills to the south of Bristol. The original AONB designation was made in 1972 with a boundary variation in 1989. The hills run in a west to east direction between the coast at Weston-super-Mare and Frome. They overlook the Somerset Levels to the south and the Avon Valley to the north.

10.12 The hills form prominent landmarks within the surrounding low lying moorland. The designation relates to the landscape and scenic importance although the Mendip Hills are also valued for the many industrial archaeological sites reflecting the lead, coal and cloth industries. The AONB is also characterised by an open largely treeless limestone plateau surrounded by gorges, cliffs and escarpment slopes. There is extensive woodland on higher ground.

10.13 An existing 132kV overhead line operated by Western Power Distribution (WPD) passes through the AONB for approximately 6km. The line enters the AONB to the east of Loxton, passes over lower lying land to the east of the Lox Yeo River and exits between the settlements of Sandford and Banwell.

10.14 The primary purpose of AONB designation, as stated in the National Parks and Access to the Countryside Act 1949[80], is to '*conserve and enhance the natural beauty*' of the area.

[80] National Parks and Access to the Countryside Act 1949 c97

10.15 The Countryside and Rights of Way Act 2000[81] places emphasis on public bodies having due regard for the purpose of the AONB when undertaking their work.

10.16 The Overarching National Policy Statement for Energy states that the conservation of the natural beauty of the landscape and countryside should be given substantial weight by the IPC in deciding on applications for development consent in areas such as AONBs. However it goes on to note that the IPC may, exceptionally, grant consent to development in these areas, if the development is demonstrated to be in the public interest, subject to various assessments being carried out on the national need, cost and scope for developing outside the designated area and effects on the environment, landscape and recreational opportunities. It states that development in such circumstances should demonstrate that high environmental design standards are adopted.

10.17 Local planning policies note that, where a major development is proposed in the AONB, proposals must demonstrate that there is a proven need for the development and that high standards to minimise their impact on the AONB have been adopted.

10.18 The Holford Rules (Rule 1) states that overhead transmission lines should be planned to avoid areas of highest amenity value such as AONBs, even if the total mileage is somewhat increased as a consequence. The rules do not preclude consideration of routes in an AONB. To avoid the Mendip Hills AONB, any route would need to extend 11km to the west, which would involve passing through the built-up area at Weston-super-Mare, or 61km to the east, where a route would have to pass close to Wells and various small settlements along the northern boundary of the AONB.

10.19 The guidelines currently used by National Grid in giving consideration to undergrounding, identify locations within or immediately alongside AONBs as 'exceptionally constrained areas' where consideration of underground cables may be warranted instead of an overhead line where "*the scale of new high voltage transmission pylons and conductors would dominate unspoilt landscape and cause serious damage to major open views of spectacular panoramas, crests of prominent ridges and skylines or attractive small scale valleys seen from important locations within or immediately alongside the designated area*."

[81] Countryside and Rights of Way Act 2000 c37

Settlements

10.20 The main settlements in the study area are sited along or close to the banks of the Severn Estuary and include Bridgwater, Burnham-on-Sea, Weston-super-Mare, Clevedon and Portishead. The City of Bristol extends east as a band of continuous development from the mouth of the River Avon.

10.21 Other smaller settlements including Nailsea, Congresbury and Yatton are located on slightly higher ground than the surrounding land in the eastern part of the study area, north of the Mendip Hills.

10.22 There are numerous other villages dispersed throughout the study area, the larger of which are along classified roads. Smaller villages and hamlets are linked by the minor road system.

Views

10.23 Views within the study area vary depending on the location and orientation of the receptor, landform and the presence of vegetation including woodlands, tree belts and hedgerows. In general there are more views to and from the higher open plateau areas, whereas views to and from the lower lying moorland and farmland are more restricted by land form and vegetation.

Stage 1 Consultation Representations

10.24 Comments from local authorities, parish councils and other statutory organisations and non-statutory consultees have been reviewed to identify aspects which relate to landscape and views and to help inform the selection of a preferred route corridor.

10.25 South Gloucestershire Council considered Corridor 1 Option 1A to offer potential amenity improvements for local residents in Avonmouth through the removal of the existing 132kV line. It expressed concerns about visual impacts of the proposed substation at Aust on views from the Severn Valley Footpath.

10.26 North Somerset District Council was of the opinion that none of the options presented were suitable in the rural landscape. It expressed a strong preference for a subsea connection. It noted that if an overhead connection was

taken forward then Corridor 1 Option 1A would be preferable although underground cables should be employed through the Mendip Hills AONB.

10.27 Somerset County Council noted its concern regarding the visual impact of an overhead line on the landscape of Somerset and in particular the Mendip Hills AONB. It stated that National Grid should give greater consideration to a subsea connection. It stated that if an overhead line connection was taken forward then consideration should be given to undergrounding within the AONB and in the surrounding countryside to reduce effects on the setting of the AONB. In its representations it considered that the Holford Rules would be difficult to apply in non-designated landscapes which are of considerable local value to residents and tourism.

10.28 Bristol City Council considered Corridor 1 Option 1A to have the lowest environmental impact but did not make any specific comments relating to landscape effects or visual amenity.

10.29 Sedgemoor District Council considered that insufficient information had been provided relating to the provision of subsea or underground connections, the latter in relation to the Mendip Hills AONB. The representation placed emphasis on considering undergrounding the route where it would minimise effects on the natural and historic environment. It stated that both corridors should be considered within the detailed connection design stage and that a mix and match option may have the least adverse effects if an overhead connection were to be taken forward.

10.30 The Government's adviser with statutory responsibility for landscape in general, and AONBs in particular, is Natural England. Natural England was of the opinion that there was not sufficient information to be able to offer a confident response on a preferred route. However, it provisionally favoured Corridor 1 Option 1A considering it to have the least effect on ecology, landscape, access and land use. It stressed that consideration should be given to undergrounding through the Mendip Hills AONB if Corridor 1 Option 1A were to be used for the connection.

10.31 The Government's adviser with statutory responsibility for archaeology and cultural heritage is English Heritage. Its remit extends to the historic landscape and the landscape setting of heritage features. English Heritage concluded that Corridor 1 Option 1B would be the most environmentally constrained in relation

to the historic environment although Corridor 2 would also have adverse effects on historic assets close to it. It stated that it was unable to carry out sufficient analysis to determine a preferred route through lack of sufficiently detailed information. However, English Heritage notionally supported Corridor 1 Option 1A which it considers to have the least adverse effect on historic assets. The representation specifically noted the need for detailed visual impact assessment and photomontages and consideration of adverse effects on the setting of the important archaeological site at Brent Knoll.

10.32 The Mendip Hills AONB Unit is a partnership between local authorities, government agencies and national organisations with the aim of conserving and enhancing the special qualities of the area. It is responsible for preparing a Management Plan for the AONB. The organisation expressed concerns over the potentially damaging impact of an overhead line on the AONB. It considered that a subsea connection should not have been discounted as this comprises an option that would avoid the AONB. If an overhead line connection were to be taken forward, the Unit was of the view that undergrounding through the AONB should be considered where it would avoid or greatly reduce adverse effects on the AONB and on views from the AONB to the surrounding countryside.

10.33 The Quantock Hills AONB Service is also a partnership between local authorities, government agencies and national organisations. It was concerned about the potentially damaging impact of an overhead line on the Quantock Hills AONB. As a connection between Hinkley and Bridgwater could be achieved by uprating the existing 275kV overhead line between Hinkley Point and Bridgwater there would be no change to the numbers and position of pylons in the landscape apart from the reconfiguration of line entries close to the power station.

10.34 Representations were received from 44 parish councils. The majority of representations highlighted concern regarding the visual impact of an overhead line on the landscape and stated a preference for a subsea or underground connection. Where a preference for a corridor was stated, Corridor 1 Option 1A was generally preferred with Corridor 2 typically described as having the greatest visual impact. However, some representations felt that Corridor 2 would be of greater benefit to residents within their parish. Portbury Parish Council felt that a 'mix and match' approach utilising Corridor 1 Option 1A and Corridor 2 would be preferable if an overhead connection were to be taken forward.

10.35 Consultation representations from Parish Councils included specific references relating to the visual impact of an overhead line for residents and on valued features such as the Somerset Levels, Mendip Hills AONB, Middlemoor Water Park, Loxton Valley, Loxton Gap, Backwell Lake and Wraxall Valley. Villages specifically mentioned include: Mark, properties around Webbington Hall, Biddisham, Woolavington, Tarnock, Badgworth, Kingston Seymour, Nailsea, Stone Edge Batch and East Huntspill.

10.36 A number of interest groups presented representations to consultation and a summary of the main points raised is presented for each below.

10.37 Campaign for Protection of Rural England (CPRE) is a charity which campaigns for the sustainable future of the English countryside. CPRE South West Regional Group stated a preference for a subsea connection or undergrounding particularly through designated landscapes, other special areas and the countryside visible from these areas. CPRE Somerset referred in its response to the visually intrusive nature of overhead lines which affect the tranquillity of the landscape. It stated that if an overhead connection were to be taken forward then Corridor 1 Option 1A would be preferable, with the existing 132kV line removed.

10.38 The Mendip Society is a local body working to conserve and enhance the Mendip Hills AONB. Its preference was for a subsea connection. A strong preference for undergrounding was also stated in the representation. It considered Corridor 2 to be unacceptable as an overhead connection although acceptable if the connection was underground. If an overhead connection were taken forward, it considered that Corridor 1 Option 1A would be preferable although consideration of the impacts on the AONB and its setting would be required, particularly in relation to the Lox Yeo Valley. It also noted that an alternative pylon design, such as Wintrack, should be used.

10.39 The National Trust is an organisation which manages historic buildings, gardens and landscapes throughout England, Wales and Northern Ireland. Its representation considered that the proposals would have a detrimental effect on its properties, particularly Tyntesfield and Crook Peak. Tyntesfield is approximately 680m to the east of Corridor 2 and the National Trust considers that views from the Grade II* listed landscape are important - particular reference was made to views to the south west towards the Bristol Channel. It

considered that a new overhead line would have adverse effects on such views. Crook Peak experiences panoramic views across the Somerset Levels and the Trust's representation considered that new 400kV pylons close to the peak would have an adverse visual impact. The visual impact on the setting of Brent Knoll was also highlighted. The National Trust had a preference for a subsea connection or for underground connections, particularly through designated landscapes and where an overhead line would have an effect on designated landscapes, important Listed Buildings or historic parks and gardens.

10.40 The local interest group Save Nailsea West did not state a preference for a route corridor but expressed concern regarding the visual impact of overhead lines wherever they are sited.

10.41 The No Moor Pylons group was of the opinion that there was not enough consultation on other options other than overhead lines, such as a subsea or underground connection. It did not express an opinion about landscape and views.

10.42 Yatton against Pylons expressed concerns that an overhead line along Corridor 1 Option 1A or 1B would give rise to adverse visual effects on the Strawberry Line Cycle Path. It also referred to visual impact on the wider environment and, in particular, the moors at Yatton.

10.43 Save our Valley is a local interest group set up to protect the Nailsea, Backwell and Wraxall Valley. Its representations highlighted the potential visual impact on the landscape of North Somerset through a 400kV overhead line. It took the view that if an overhead line were taken forward rather than a subsea connection then all options including a route along the M5 motorway should be considered in greater detail. It objected to Corridor 2 and stated that Corridor 1 Option 1A was more favourable but that pylons should be sited away from existing houses.

10.44 Pylon Moor Pressure considered there to be a general lack of choice in routes and not enough consideration given to a subsea or underground connection. It also raised concerns about the effect on Mark.

10.45 The themes and issues raised by statutory consultees and local interest groups also featured in representations from members of potentially affected communities. A summary of these representations is contained in the Stage 1

Consultation Feedback Report, with a summary of the key themes and issues provided below.

10.46 The visual impacts on the Mendip Hills AONB (including Crook Peak and Lox Yeo Valley) and on the Somerset Levels and Moors were raised as an issue. It is not possible to avoid either the AONB or the Somerset Levels and Moors in a reasonably direct route between Bridgwater and Seabank and both corridors travel through these landscapes. Corridor 1 Option 1A would represent the lowest scale of change, as Corridor 1 Option 1B and Corridor 2 would result in an additional overhead line through the landscape.

10.47 Effects on views from the Polden Hills in the Somerset Levels and Moors were also raised. Both corridors cross the Polden Hills in close proximity to Knowle. Corridor 2 is further from Knowle although an overhead line in this Corridor or Corridor 1 Option 1B would introduce an additional overhead line into the landscape. Consideration of effects on views from the Polden Hills would be carried out as part of detailed connection studies for the chosen route corridor.

10.48 The visual impact of an overhead line on other landscapes and vantage points was noted. For features such as Glastonbury Tor and the Quantock Hills AONB an overhead line in either corridor may be visible, but would be distant and not prominent in views. From Cheddar Gorge there would be no views of an overhead line in either corridor. However, from higher ground adjacent to the Gorge an overhead line in either corridor would be visible but would appear distant in views. Effects on views from these receptors would be reduced for Corridor 1 Option 1A as a new overhead line would replace the existing line whereas the other two options would result in an additional overhead line.

10.49 Vantage points and high ground such as Cadbury Hill (Iron Age Fort), Morgan's Hill and Cleve Hill were noted in representations. An overhead line in either corridor would be visible from these sites. However, Corridor 1 Option 1A would introduce the lowest scale of change, particularly from Morgan's Hill where it would appear more distant in views.

10.50 Visual effects on particular footpaths such as the Severn Valley Path and Strawberry Line were highlighted. Representations relating to the Severn Valley Path were mainly related to effects from substation works in the vicinity of Aust which would be required for any connection option taken forward. An overhead line in either corridor would be visible from parts of the Strawberry Line,

however, the eastern spur of Corridor 2 would introduce an overhead line immediately adjacent to it. The western spur of Corridor 2 lies the furthest from the Strawberry Line but would introduce an additional overhead line through the landscape which may be visible from the footpath. Corridor 1 Option 1A would represent the lowest scale of change as no additional line would be introduced.

10.51 Representations on the visual effects of an overhead line on properties and settlements have been received along the whole length of the route between Bridgwater and Seabank. Overall, Corridor 1 Option 1A would introduce the lowest scale of change as it would replace an existing 132kV overhead line. There are some locations noted where Corridor 2 would have less visual impact, however, this corridor or Corridor 1 Option 1B would introduce an additional overhead line into the landscape. The effects of an overhead line on public and private receptors would be considered as part of the environmental assessment and detailed connection design would seek to minimise effects wherever possible.

Summary of Consultation Representations

10.52 Statutory consultees expressed a strong preference for a subsea connection or alternatively undergrounding with many respondents referring to the preference for the connection between Hinkley to Seabank to be made in whole or in part by underground cables. Where reference was made to a specific corridor, Corridor 1 Option 1A was considered to be the most preferable for an overhead line although representations emphasised the need for undergrounding through the Mendip Hills AONB. Alternative overhead line options proposed by consultees were focussed on providing an overhead connection along the M5 motorway or using a combination of corridors. Sections where undergrounding was highlighted as potentially having most benefit include the Mendip Hills AONB and its immediate setting; Brent Knoll; Somerset Levels; and land around Nailsea and Yatton.

10.53 In consultation representations from communities, issues were raised relating to visual impact from settlements and specific landscapes and vantage points. All of the places highlighted in consultation representations will be reviewed in more detail at the next stage of the Project with careful consideration given to the effects of an overhead line on public and private views.

Comparison of Impacts of Route Corridors

Route length and directness

10.54 A shorter length of proposed overhead line would typically be expected to give rise to fewer effects on the landscape and in views if other factors are broadly equal. The three corridor options are almost identical in length.

10.55 There is not sufficient difference between lengths of corridors for this to be a strong influence on route selection. Consideration of the likely effects of an overhead line in each corridor is required in the context of the local landform, landscape character (including its capacity and sensitivity) and visual receptors.

10.56 Each deviation of an overhead line requires the use of angle pylons which are of thicker gauge steel and considered to be more visually intrusive than a standard pylon. All corridors need to deviate to avoid settlement and other constraints. The corridors are up to 2km wide in places which will enable detailed alignment studies scope to limit the number of angle pylons required and to site them appropriately to minimise effects. Directness of a route is not considered to be a strong influence on route corridor preference

Additional works

10.57 Additional works are required for Corridor 1 Option 1A which may include a new GSP substation in the vicinity of Churchill. The extent and location of these works will be the subject of further studies by WPD and National Grid and will be the subject of consultation during the next stage of the Project. Corridor 1 Option 1B and Corridor 2 do not require these additional works. The additional works to the WPD network would have landscape and visual effects although generally experienced over a localised area. These effects would be balanced by the lower scale of change associated with the removal of the existing 132kV overhead line and replacement with a new 400kV connection associated with Corridor 1 Option 1A. It is considered that, even with these additional works, the effects of Corridor 1 Option 1A would be less than for Corridor 1 Option 1B or Corridor 2 as these options would introduce a significant length of additional overhead line into the landscape and the extent and scale of effects for the entire connection would be greater.

Landform

10.58 The landform in the study area is defined by the contrast between low lying moors and farmland and the higher ground of the Mendip Hills, Brent Knoll, Mid Somerset Hills and Tickenham Ridge.

10.59 It is considered good practice (in accordance with Holford Rules 4 and 5) to use landform where possible to screen/background overhead lines and to avoid skylines and ridges.

10.60 An overhead line on land with a higher elevation is likely to result in views being possible over a wider area. The view of an overhead line running across relatively uniform land may be less visually discordant than views of a line running across land with more undulations and changes in elevation. The location, orientation and number of visual receptors are important in determining the effects of landform, together with the localised benefit of woodland and hedgerow vegetation for filtering and backgrounding views. These local features will be considered in full detail at the detailed connection design stage. The highest peaks in the landform in a corridor would also be avoided in the identification of alignments where possible.

10.61 All corridors utilise generally lower ground across the Somerset Levels and Moors and Avon Valley. Through the Mendip Hills AONB, Corridor 1 Options 1A and 1B and the central and eastern spurs of Corridor 2 would traverse low ground within the Lox Yeo Valley. To the north of the AONB, both corridors cross onto slightly higher ground between two peaks. The western spur of Corridor 2 runs along the M5 motorway and would cross higher ground on the northern edge of the Mendip Hills AONB, potentially giving rise to greater visual effects. In the remainder of the study area the corridors are on low ground of comparable elevation and cross higher ground at Tickenham Ridge in a similar area.

10.62 On balance it is considered that landform does not particularly assist in distinguishing preference between route corridors although the western spur of Corridor 2 would be slightly less preferable as it crosses higher ground in the Mendip Hills AONB.

Landscape Character

10.63 The corridors run through areas of similar landscape character and are not differentiated by the character areas affected.

10.64 The size and scale of the landscape varies with open panoramic views from higher ground with more enclosed river valleys along Lox Yeo Valley and Wraxall Valley. The Somerset Levels and Avon Valley are open, allowing longer views across low lying farmland and moors towards higher ground. The scale of this landscape potentially offers greater capacity to accommodate a 400kV overhead line in combination with careful siting to maximise the opportunities for backgrounding from adjacent higher ground. However, consultation representations stated that these landscapes are locally valued and the lack of tree and vegetation cover limits the ability to mitigate the presence of 400kV pylons in the landscape.

10.65 The Holford Rules advise careful consideration of paralleling, particularly when considering overhead lines in open and sparsely vegetated landscapes. This is relevant to the Somerset Levels and the presence of existing 275kV (Hinkley to Bridgwater), 400kV (Hinkley to Melksham) and 132kV overhead lines in this landscape.

10.66 Corridor 1 Option 1A proposes to replace the existing 132kV overhead line which would minimise the scale of change in the landscape. At Nailsea and Tickenham Ridge, the new 400kV line would run parallel to another existing 132kV line, although in a landscape more characterised by varied topography and woodland where opportunities for backgrounding exist and two 132kV lines are already present in the landscape.

10.67 Corridor 1 Option 1B proposes closely aligned paralleling along the route of the existing 132kV overhead line to the east or west of the existing line. This may be difficult to achieve for the full length of the route due to other environmental constraints. West of Nailsea and at Tickenham Ridge, the 400kV line would parallel two existing 132kV routes introducing a third closely aligned structure into the landscape. This would give rise to adverse landscape and visual effects and an increased scale of change.

10.68 Corridor 2 seeks to achieve separation from the existing 132kV lines along its length. However, various environmental constraints along the route force the corridor close to the existing 132kV overhead line (particularly around Woolavington, the Mendip Hills, Yatton and Tickenham Ridge). As with Corridor 1 Option 1B at Tickenham Ridge, the 400kV line would parallel two existing

132kV overhead lines, increasing the scale of change to views and the landscape through the introduction of a third structure closely aligned to existing lines.

10.69 Corridor 1 Option 1A would lead to a scale of change in the landscape as the new pylons would be taller than those of the existing 132kV line, though there would be fewer of them. Corridor 1 Option 1B would lead to an additional 400kV overhead line adjacent to existing lines and Corridor 2 would introduce an overhead line into an area where there are presently no overhead lines - there would also be intervisibility in places between the existing 132kV and new 400kV lines. The scale of change on landscape character is considered to be lower for Corridor 1 Option 1A than the other two options.

10.70 Particular concern regarding landscape effects was raised by respondents in relation to the Mendip Hills AONB and Somerset Levels. Where statutory consultees indicated a preference for a route corridor, Corridor 1 Option 1A was considered to have a lower scale of change than the other options as it would not result in an additional overhead line.

Mendip Hills AONB

10.71 The existing 132kV overhead line passes through the AONB for approximately 6km along the Lox Yeo Valley. All corridors cross the AONB to achieve a connection between Bridgwater and Seabank.

10.72 Corridor 1 Option 1A proposes using the route of the existing 132kV overhead line and would not result in any additional overhead lines in the landscape. The new line would have taller pylons (approximately 47m) compared to the existing 132kV line (approximately 26.5m) and larger conductors. There would be a clearly perceptible scale of change in views in the AONB, however, the change would be on lower ground where adjacent hills could offer some backgrounding. New pylons would be located in an area which already has overhead lines.

10.73 Corridor 1 Option 1B and the central and eastern spurs of Corridor 2 would result in an additional line running parallel with the 132kV line. This would increase the landscape and visual effects on the AONB.

10.74 The western spur of Corridor 2 would also result in an additional line through the AONB, following the M5 motorway. This would cross a shorter section of AONB at 4km, however, it would cross higher ground on its northern edge. This would

potentially make a connection more visible in views to the AONB from countryside to the north and would result in a new line close to Loxton, Christon and Banwell. An additional line would increase the landscape and visual effects on the AONB.

10.75 The corridor likely to have the least effect on the AONB would be Corridor 1 Option 1A as it comprises the replacement of the existing 132kV line. Corridor 1 Option 1B or the central and eastern spurs of Corridor 2 would be marginally preferable to the western spur of Corridor 2 although both would result in the introduction of a new line in the AONB. Whilst Corridor 1 Option 1B and the eastern spur of Corridor 2 would make the connection 2km longer through the AONB than for the western spur, an overhead line would be on lower ground where it would be less visible and would be further away from settlements than for the western spur of Corridor 2.

10.76 Consultees' representations have indicated a strong preference for using underground cables through the AONB and some respondents also stated that this should continue beyond the AONB boundary to reduce any effects on the setting of the designated landscape. This issue has been addressed in Chapter 18.

Proximity to Settlements and Conservation Areas

10.77 The definition of potential route corridors sought to avoid all settlements and sites allocated for housing, maximising the distance between corridors and settlements where other constraints allow.

10.78 Corridor 1 Options 1A and 1B propose to site the overhead line along or adjacent to the existing 132kV overhead line alignment. The existing line runs close to several settlements including Woolavington, Mark, Rooks Bridge, Biddisham, Loxton. Christon, Sandford, Yatton, Nailsea, Tickenham, Portishead, Avonmouth and Bristol.

10.79 Corridor 2 proposes to site an overhead line to maximise separation from other existing overhead lines. It runs close to Woolavington, Blackford, Mark, Stone Allerton, Chapel Allerton, Badgworth, Biddisham, Loxton, Christon, Banwell, northern edge of Weston-super-Mare, Congresbury, Yatton, Nailsea, Blackwell, Wraxhall, Portishead, Avonmouth and Bristol.

10.80 The settlements are concentrated either on slightly higher ground close to the edge of the lower lying moors or on the slopes of hills such as the Mendip Hills.

10.81 Views from many of the villages in the Somerset Levels and Moors are across low lying farmland and moorland towards higher ground. The exact nature and extent of such views are limited by buildings, landform, hedges and trees. There are some exceptions to this where villages are on higher ground or where the topography is less steep with more open views particularly on the edge of the Mendip Hills and at Tickenham Ridge.

10.82 The majority of settlements contain historic cores, many of which are designated as Conservation Areas, and some of these designations extend beyond the extent of the built form into the surrounding landscape. Whilst corridors have avoided Conservation Areas, in places they are close to the edge of these designations. Corridor 1 Options 1A and 1B pass close to Loxton and Christon. Corridor 2 passes close to Stone Allerton, Loxton, Christon and Chelvey.

10.83 The effects on Conservation Areas are considered further in Chapter 11. Detailed consideration of the effect on the setting of the Conservation Areas and the effect on views from the settlements will be undertaken when identifying an alignment within a route corridor, as the effect from a new overhead line has the potential to vary considerably due to the width of the corridor identified. For example an alignment to the eastern extent of Corridor 2 would have a greater effect on Stone Allerton than an alignment to the west which could be a further 1.25km from the settlement allowing filtering by intervening hedgerows and trees to lessen effects.

10.84 There is a distinction between the corridors in respect of settings of settlements and Conservation Areas. Corridor 2 is closer to a larger number of settlements and the scale of change would potentially be greater from the introduction of a new overhead line compared with the replacement of an existing 132kV line with taller pylons of a 400kV line in Corridor 1 Option 1A.

Individual Dwellings

10.85 As all corridors include scattered dwellings there is little to distinguish route preference related to landscape and visual effects on individual dwellings.

10.86 Detailed connection design will seek to maximise the distance of an overhead line from properties. Along Corridor 1 Options 1A and 1B, the existing overhead line is already present in the vicinity of properties potentially giving rise to a lower scale of effect than in Corridor 2 where a new line would be introduced where none currently exists.

The Holford Rules

10.87 The Holford Rules are the guidelines National Grid uses for the routeing of new high voltage overhead lines. They are a valuable tool in identifying and assessing potential route options and the accompanying notes provide useful guidance particularly for where exceptions to the rules arise and how these should be best addressed. These rules have been taken into consideration in the routeing study and selection of preferred route corridor. Table 10.1 below considers the corridors in relation to these rules.

10.88 The summary Table 10.1 indicates that none of the route corridors fully adheres with the guidance expressed in the Holford Rules. However, it would not be anticipated that a proposal would be identified that would do so, which is why the discussion and Supplementary Notes to the Rules address exceptions. Judgement needs to be applied with regard to the scale and nature of the effect that would arise in each case. As described elsewhere in this chapter, the effect on the AONB (Rule 1) arising from the use of Corridor 1 Option 1B or Corridor 2 would be greater than Corridor 1 Option 1A as they would result in an additional overhead line through the AONB. The effects are similar for Rule 6, as Corridor 1 Option 1B, and in places Corridor 2, would result in closely parallel overhead lines or intervisibility between two lines whereas Corridor 1 Option 1A would have lesser effects resulting from the replacement of an existing overhead line. Overall, the corridors perform similarly in terms of the Holford Rules, however, Corridor 1 Option 1A is considered preferable as it would not result in the introduction of an additional overhead line.

Table 10.1 : Corridors and the Holford Rules

Rule	Corridor 1 Option 1A	Corridor 1 Option 1B	Corridor 2
Rule 1: Avoid areas of the highest Amenity Value	Corridor passes through 6km of AONB, replacing an existing line	Additional line would pass through 6km AONB	Additional line would pass through 4-6km AONB
Rule 2: Avoid smaller areas of amenity value	Direct effect on SSSI, close to setting of SM	Direct effect on SSSI, close to setting of SM	Direct effect on smaller area of SSSI, close to setting of SM
Rule 3: Choose most direct line	Most direct corridor	Most direct corridor	Longer by 0.5km
Rule 4: Choose tree or hill backgrounds avoiding ridges	Crosses Tickenham Ridge between woodlands	Additional line would cross Tickenham Ridge between woodlands	Additional line would cross high ground to west of Banwell in AONB Crosses Tickenham Ridge between woodlands
Rule 5: Prefer moderately open valleys	Generally lower ground and along River Valley through AONB	Generally lower ground and along River Valley through AONB	Generally lower ground and along River Valley although crosses higher ground through AONB
Rule 6: Keep lines independent to avoid 'wirescape'	Replacement of existing 132kV line with a new 400kV line	Will result in 2 closely paralleled lines.	Will result in an additional line with some intervisibility between lines

Visual Assessment

10.89 The zone over which Corridor 1 Options 1A or 1B would be seen would increase from the present situation as would the perceived prominence of the existing features in views due to the scale of the new structures. This increased visibility would be greater along Corridor 1 Option 1B where two lines would be parallel. However, the visual effects would be concentrated over a smaller geographic area than Corridor 2 where there may be intervisibility between the two lines at distances of under 2km, potentially affecting more receptors than a route along Corridor 1 Options 1A or 1B.

10.90 During the Stage 1 Consultation, respondents referred to specific views within the study area which they felt should be carefully considered. The main locally valued views include those associated with recreational footpaths such as the

Strawberry Line and Severn Valley Footpath, and with the Mendip Hills AONB, Somerset Levels, Brent Knoll, Tyntesfield and Crook Peak, as well as views from specific properties. All corridors are close to long distance footpaths, go through the Somerset Levels and Mendip Hills and run close to properties. There is little to distinguish between corridors, although Corridor 1 Option 1A would result in a smaller scale of change than the other two options. All locally important views identified during the consultation process will be carefully taken into consideration at the detailed connection design stage to minimise effects on these views. No corridors appear to have materially lesser or greater ability to address these issues. Detailed visual impact assessment would be undertaken during the detailed connection design stage and associated EIA of the preferred route to ensure that the visual effects of the proposed overhead line are fully considered and minimised where possible.

Conclusions

10.91 The corridors have been reviewed in relation to effects on landscape and views with regard to : landform; landscape policy; published landscape character assessments; historic landscape character; and relevant representations to consultation.

10.92 Corridor 1 Option 1A proposes to use the route of the existing 132kV overhead line between Bridgwater and Seabank and would not result in any additional overhead lines in the landscape. The 132kV overhead line would be replaced by a higher voltage 400kV overhead line with fewer but taller pylons. This would not add to the number of overhead lines passing through the Mendip Hills AONB, though the landscape and visual effects of the larger structures would be greater than those of the existing overhead line. A new overhead line in this corridor would have adverse effects on landscape and views but of a lower scale than the other two corridors.

10.93 Although additional works associated with maintaining supplies on the WPD 132kV distribution network would also have landscape and visual effects, these are not so great as to change the conclusion that that the overall scale of change in replacing the existing 132kV line connection with a new 400kV connection would be less intrusive on the landscape than the alternative options of a parallel line or an entirely new route. Corridor 1 Option 1A would therefore be preferred in terms of effects on landscape and views.

10.94 Corridor 1 Option 1B would parallel the existing 132kV overhead line and result in a new 400kV overhead line closely aligned to the existing 132kV overhead line from north of Bridgwater to Seabank. This would introduce an additional overhead line in the Mendip Hills AONB which would give rise to adverse effects on landscape and views. A new 400kV line parallel to the existing 132kV line would incur additional effects on landscape and views as it would emphasise the presence of both structures cumulatively in the landscape. This would occur throughout, but the effect would be most pronounced where the new 400kV line would parallel two existing 132kV lines around Nailsea and at Tickenham Ridge. Corridor 1 Option 1B is considered to be the least preferred in terms of landscape and views.

10.95 Corridor 2 would also introduce a new overhead line into the landscape. Although it seeks as far as possible to be separate from other overhead lines, it would parallel the existing 132kV overhead line in some places resulting in two closely aligned overhead lines, including within the Mendip Hills AONB. In some parts of the corridor there would be three closely aligned overhead lines particularly around Nailsea and Tickenham Ridge emphasising the scale of change. This corridor would also result in greater visual effects on residential dwellings and settlements at Yatton and Nailsea through the concentration of overhead lines at Yatton and overhead lines being to the north and south of Nailsea.

10.96 Consultation has indicated, subject to caveats relating to confirmation of need and consideration of subsea and undergrounding, that, in terms of landscape and visual effects, Corridor 1 Option 1A is the preferred corridor if an overhead line connection between Bridgwater and Seabank is to be built.

10.97 The consultation also highlighted the need for further consideration of undergrounding particularly through the AONB where landscape and views are considered to be the most sensitive.

11 HERITAGE

Introduction

11.1 This chapter of the report considers the potential effect of the two corridors on heritage assets and their settings. Data has been assessed for both corridors, including a 1km buffer. The buffer of 1km either side of the broad Corridors was allowed to include designated assets whose setting could be affected by the introduction of infrastructure in local views, a factor which could influence route corridor preference.

Context

11.2 Within the study area used in the RCS there are no World Heritage Sites, but there are the following designated assets:

- 48 Scheduled Monuments (SM);
- 3 Registered Parks and Gardens (RPG):
  - Tyntesfield, Grade II*;
  - Clevedon Court, Grade II*; and
  - Barley Wood, Grade II.

  (Blaise Castle and Hamlet (II*)/ Kings Weston House (II) at Shirehampton lie immediately adjacent to the study area.)
- One Registered Battlefield:
  - Battle of Sedgemoor, 1685
- 49 Conservation Areas; and
- 18 Grade I, 62 Grade II* and 817 Grade II Listed Buildings.

11.3 From 2007, Somerset County Council worked with partners and stakeholders to develop a potential application for World Heritage Site status in respect of the area known as the Somerset Levels and Moors. However, in 2010, a decision was taken by the Council not to pursue the application. The Levels are, nevertheless, an area of great archaeological interest and contain a cluster of Scheduled Monuments.

11.4 There are a large number of non-designated heritage assets (predominantly relating to buried archaeological remains from the late prehistoric, medieval and post medieval periods) within the route corridors.

11.5 Listed Buildings and Conservation Areas are protected under the Planning (Listed Buildings and Conservation Areas) Act 1990[82]. This Act requires local authorities to have special regard to the desirability of preserving the setting of a Listed Building or Conservation Area. It also requires planning proposals to meet the test of determining the extent to which a development affects view to and from a Listed Building or Conservation Area.

11.6 Scheduled Monuments are protected under the Ancient Monuments and Areas of Archaeological Importance Act 1979[83]. The setting of a Scheduled Monument is not defined within the Act and is typically taken to refer to the immediate area around a protected site, for example the curtilage of a building, but may be extended to the wider landscape as stated in Planning for the Historic Environment (PPS5) Annex 2 Terminology, which describes setting as *"the surroundings in which a heritage asset is experienced*."

11.7 Registered Parks and Gardens and Registered Battlefields are termed as "designated assets" within PPS5 and are afforded a similar level of protection within the planning and development control framework as other nationally important designations such as Conservation Areas and Scheduled Monuments. The landscape setting of these sites can be integral to the special interest for which they were designated and protection of the setting is provided in planning policy statements including PPS5.

11.8 PPS5, Policy HE10, identifies that enhancing or protecting the setting of a heritage asset is a material consideration to the planning process. The benefits need to be weighed against the wider benefits of the development and the greater the negative impact, the greater the benefits will need to be to justify approval. Setting is defined in PPS5 as *"the surroundings in which a heritage asset is experienced"*. Its extent is not fixed and may change as the asset and its surroundings evolve. English Heritage issued a consultation document in

[82] Planning (Listed Buildings and Conservation Areas) Act 1990 : 1990 Ch 9
[83] Ancient Monuments and Areas of Archaeological Importance Act 1979 : 1979 Ch 46

August 2010 "The Setting of Heritage Assets"[84]. The document had not been finalised at the time of writing but the draft suggests that English Heritage will expect planning decisions to determine the essential setting of important sites, how important that setting is to the special interest for which the site was designated and the likely impact on that special interest of the development proposal.

11.9 Notwithstanding this guidance, the degree to which any individual site is affected by a particular route corridor cannot be assessed accurately until such time as potential connection designs (and therefore possible pylon positions) have been identified. However, the data on known constraints will be used to guide the connection design. The aim will be to minimise visual impacts on Registered Parks and Gardens, Registered Battlefields, Conservation Areas and Listed Buildings and any Scheduled Monuments that are sensitive to visual impacts and their settings, whichever route corridor is selected. The risk of harm to settings is a material factor in determining route corridors.

11.10 Many Scheduled Monuments have a very limited or no above ground signature and are not visited by the public. Many were never intended to have prominence in the landscape in which they were built and were not built with deliberate vistas, sight lines or inter-visibility intended. Such sites are not considered highly sensitive to visual impacts. However, pylons can be sited to avoid the immediate area around any Scheduled Monument so that in terms of scale the development, particularly when viewed from a distance, would not be a significant detractor from the heritage asset.

11.11 Historic Landscape Characterisation has been undertaken for the majority of the route corridors, the results of which can be used to help locate pylons in less historically intact parts of the local landscape. It can also be used to indicate areas of greater or lesser potential for the survival of buried archaeological remains and of greater historic landscape character value, so that these areas can be taken into account when considering detailed connection design. Consequently, while the introduction of a new overhead line to a landscape with historic character and value is likely to be intrusive, mitigation through routeing

[84] English Heritage : The Setting of Heritage Assets : English Heritage Guidance Consultation Draft : August 2010

studies aimed at achieving the most sympathetic route possible can be achieved.

11.12 The relative historic landscape character of the study area was considered when defining potential route corridors and has been taken into account when making a comparison between route corridors. The M5 motorway corridor is notable as a modern element of the landscape of the proposed route corridors and the outskirts of Portishead and Avonmouth are of modern, urban character. The remainder of the route predominantly comprises a post-medieval enclosed agricultural landscape.

Stage 1 Consultation Representations

11.13 Comments from local authorities, parish councils and other statutory organisations and non-statutory consultees have been reviewed to identify aspects which relate to archaeology and cultural heritage and to help inform the selection of a preferred route corridor.

11.14 Compton Bishop Parish Council, Badgworth Parish Council and Chapel Allerton Parish Council all commented that Corridor 2 would have an impact on the Somerset Levels proposed World Heritage Site.

11.15 English Heritage has commented[85] that

"For Corridor 1 Option 1A we will seek visual impact assessment techniques such as photomontages on the following provisional list of major historic assets along this route: Tyntesfield House and Historic Park, North Somerset Brent Knoll Scheduled Monument, Sedgemoor Battlefield and Westonzoyland Conservation Area and Blaise Castle Registered Park and Conservation Area".

11.16 English Heritage also commented that *"Corridor 1 Option 1B is considered to be the most environmentally constrained corridor as it would result in a new 400kV overhead line closely aligned to the existing 132kV line for the entirety of the route. The cumulative visual impact of both of these overhead routes on the historic landscape is likely to be very damaging".* Furthermore it indicated that "*Corridor Option 2 has potentially the most damaging impact upon the historic assets that are located either within the corridor identified or close by it. Some*

[85] English Heritage : Response to Stage 1 consultation : 8 January 2010

individual assets such as Horsey Medieval Settlement, Cadbury Hill, Ashton Windmill, St John the Baptist, Biddisham and Holy Trinity, Blackford to name but a few of the scheduled and more highly significant listed buildings that may be affected." It added that "*We have been unable to conduct sufficient analysis to determine a preferred route corridor as we have not received sufficient information at this stage to be confident about which approach is the least damaging to the historic environment. However, we are able to notionally support the Corridor 1 Option 1A route as the one that will potentially have the least harmful impact on the historic environment of the three options tabled"*.

11.17 English Heritage also requested that they be consulted on the EIA Scoping and added that "*The environmental impact assessment should include an historic analysis of the landscape in and around the route/routes it is vital that any EIA should be evaluated against the impact on the historic (as well as natural) landscape. Key aspects include: all designated historic assets, including Grade II listed buildings; World Heritage Sites (including proposed), Conservation Areas, Historic Parks and Gardens, Battlefields and Marine Archaeology (where applicable); as well as non designated features of local historic and archaeological interest; the character of the wider landscape and townscape; and the potential for as yet unrecorded archaeological interest - this is a particularly important matter in terms of the Somerset Levels where there are known to be nationally significant peat deposits that preserve fragile and irreplaceable evidence for human activity and environment*".

11.18 The National Trust has commented[86] that Tyntesfield mansion and chapel are Grade I Listed Buildings, the landscape is Grade II* Listed and the series of picturesque views within and out of the estate is of high significance to this designed landscape. It considers that "*locating power lines of the proposed size through the valley will cause detrimental harm to the character and appearance of the historic wider landscape in which Tyntesfield sits and the designed views from within it. The protection of these historic views is integral to the National Trust's work to conserve the space for current and future generations*." It goes on to note that " *views from the formal gardens or elevated woodland, across to farmland and the valley beyond are integral to the significance of this listed landscape and have been created both by historic planting/design and by natural topography. The most significant of which, south west out over the Bristol*

[86] National Trust : Response to Stage 1 consultation : 7 January 2010

Channel, creates a powerful vista, crucial to the experience within the estate, which would be ruined by the installation of power lines." It considers that "*the importance of the wider landscape is such that the Grade II* listing encompasses areas well outside the National Trust boundary. The woods of the ridge behind the house and Belmont, in particular, act as a vital element on the northern side of the Land Yeo Valley. Views to these from across the valley would also be impacted by the proposed pylon route''*. It also noted that Tyntesfield is a significant visitor attraction.

11.19 The National Trust also commented that consideration was required with regard to:

- Crook Peak - a prominent landscape feature within the Mendip Hills AONB;
- Brent Knoll - a small yet prominent landmark on the Somerset Levels with panoramic views in all directions. The hill fort is a Scheduled Monument;
- Clevedon Court - Fourteenth-century manor house and eighteenth-century terraced garden;
- Cadbury Camp - Iron Age hill fort (Scheduled Ancient Monument);
- Shirehampton Park - 40ha overlooking River Avon, part used as a golf course;
- Blaise Hamlet - an early example of a planned settlement, designed by John Nash and built in 1810; and
- agricultural land at Failand and Woolavington.

11.20 In summary, the National Trust concluded : *"The Trust objects to overhead options in the vicinity of Tyntesfield [and Crooks Peak]. National Grid should underground through designated landscapes or where overhead cables would have an impact on designated landscapes or important listed buildings or historic parks and gardens*".

Comparison of Impacts of Route Corridors

11.21 There are no Registered Parks and Gardens (RPG) within either route corridor, Tyntesfield, Blaise Castle and Hamlet/Kings Weston House and Clevedon Court are the nearest. The potential effect on these heritage assets is discussed below.

11.22 Tyntesfield Registered Park and Garden (Grade II*) is approximately 1km from Corridor 2. Corridor 1 is more than 3km away and passes to the far side of Nailsea. In terms of comparable impact, Corridor 2 is less preferred in terms of proximity to the Historic Park and Garden at Tyntesfield. Nonetheless, it would be possible to achieve minimal visual impacts, even within this route corridor, through careful positioning of individual pylons, maximising the use of screening from the natural topography and existing planting and avoiding pylon positions that align with designed views from the park towards the Bristol Channel.

11.23 Blaise Castle and Hamlet (Grade II* RPG), Shirehampton Park and Kings Weston House (Grade II RPG) lie to the east of the M5 motorway, approximately 1 – 3 km from both route corridors. The RPGs are surrounded on all sides by an urban landscape and separated from both route corridors by urban conurbation and the M5 motorway corridor, but are elevated so long views will require assessment. Nonetheless, it would be possible to achieve minimal visual impacts, within either route corridor, through careful positioning of individual pylons, maximising the use of screening from the natural topography and existing planting and avoiding pylon positions that align with designed views from the RPGs.

11.24 Clevedon Court (Grade II*RPG) is approximately 3km from Corridor 1 and over 6km from Corridor 2. At that distance, an overhead line within either corridor will appear distant and it will be possible to position pylons to minimise any minor adverse effects on long views from within the RPG. However, in terms of comparable impact Corridor 1 is marginally less preferred when considered in the context of impacts on Clevedon Court.

11.25 There are twelve Scheduled Monuments within Corridor 1 and thirteen within Corridor 2, including the 1km buffer and overlap between corridors. All of these features lie within the buffer zone, rather than the corridor itself, with the exception of Mere Bank, a linear monument at Avonmouth which lies within both corridors. At the connection design stage it should be possible for pylon positions to be sited to avoid all of these Scheduled Monuments. Oversailing of Scheduled Monuments will be avoided as much as possible. This may not be possible at Mere Bank. However, it is noted that the location of this monument is modern urban/industrial in appearance and has existing low voltage overhead lines oversailing it. The monument does not command any strong landscape

prominence or have associated sightlines or designed views from or to and is not, therefore, considered particularly sensitive to visual impacts.

11.26 In contrast to Mere Bank, Brent Knoll and Cadbury Camp are prominent hill top sites, built to have inter-visibility and command long-views. These sites are considered to be particularly sensitive to visual impacts, as indicated by the representations received from English Heritage and the National Trust. Cadbury Camp is approximately 1km from Corridor 1 and 4km from Corridor 2. In terms of comparable impact, Corridor 1 is less preferred, although it would be possible to identify a detailed connection design and position pylons within the corridor to minimise the significance of any adverse impacts.

11.27 Brent Knoll is approximately 2km from Corridor 1 and 5km from Corridor 2, Corridor 1 is therefore marginally less preferred in the context of comparable impact on Brent Knoll, although the distance from both routes is such that pylons will appear distant in views from the top of the monument and careful positioning of pylons will minimise the significance of any adverse effects. Within Corridor 1, Corridor 1 Option 1A is preferred to Corridor 1 Option 1B, as it would replace an existing 132kV overhead line rather than introducing an additional line into the landscape.

11.28 Another hill fort, Banwell Camp, lies within 1km of both route corridors. The hilltop is, however, surrounded by mature woodland that restricts views from it and provides screening of new, and existing, pylons. Glastonbury Tor is more than 10km from both corridors. Long views are a significant feature of Glastonbury Tor, but given the distance of the proposed corridors from the Tor, no significant visual effects on the monument are expected from the construction of an overhead line in either corridor.

11.29 Horsey Medieval Settlement Scheduled Monument is approximately 600m from the edge of Corridor 1 and 300m from the edge of Corridor 2. This site is preserved as earthworks and predominantly below ground. It is not prominent in the landscape and the setting is truncated by the M5 motorway which passes immediately to the south west of the Scheduled Monument. It would be possible to position pylons within either corridor to maximise distance and minimise effects on the Scheduled Monument. However, the effects of an overhead line on views to and from the Scheduled Monument would be assessed as part of detailed connection design and environmental impact assessment. No physical

impacts on the monument will occur, as it can be avoided by pylon positions within either corridor.

11.30 There are approximately 79 Listed Buildings within Corridor 1 and 96 within Corridor 2 (including the 1km buffer and overlap between corridors). Individual pylon positions would require assessment in terms of views to and from Listed Buildings of all grades. Both corridors have been defined so that they avoid Listed Buildings as much as is reasonably possible. The corridors all allow flexibility for positioning of individual pylons, so that historic buildings are not significantly affected by the proposed overhead line.

11.31 There is little difference between corridors with respect to effects on Listed Buildings. At Mark Causeway, Corridor 1 is less preferred, as it oversails the causeway, where a number of Listed Buildings follow the main east – west road (B3139). However, Corridor 1 Option 1A proposes the replacement of an existing overhead line, and would be less intrusive, and gaps between Listed Buildings could be used for routeing, following detailed assessment. Both corridors have a 'pinch point' between Loxton and Webbington, with both the M5 motorway and an existing overheard line already utilising this gap. Where the corridors avoid Nailsea, Corridor 1 comes within close proximity to Listed Buildings at Tickenham and Corridor 2 to Listed Buildings at Wraxall. Again, the effects on Listed Buildings are likely to be reduced if Corridor 1 Option 1A is selected, as the replacement of an existing overhead line is proposed.

11.32 A number of Conservation Areas were identified within the RCS area of search - all of these were avoided in defining the route corridors. However Loxton and Christon Conservation Areas are both within relatively close proximity of Corridors 1 and 2 (albeit on the western side of the M5 motorway) and Stone Allerton and Chelvey Conservation Areas are also adjacent to Corridor 2. In this respect, Corridor 1 Option 1A is again preferred, although with all options detailed connection design studies would aim to reduce any visual impacts on these Conservation Areas as far as possible.

11.33 Sedgemoor Registered Battlefield occupies an area of regular, rectangular enclosed agricultural land (suggesting post-conflict enclosure and an altered landscape setting), which is flat and low lying, more than 2km from Corridor 1. As such, adverse impacts on the setting of the Battlefield are not expected to be

significant and careful positioning of pylons will minimise any minor adverse effects on long views from the Battlefield.

11.34 There are no World Heritage Sites within or in close proximity to either route corridor, although the Somerset Levels was formerly considered as a potential candidate site. While that has not been pursued, it is worth noting that the Levels contain a high number of Scheduled Monuments and have a considerable archaeological potential. Neither route impinges on the area of the Somerset Levels containing these remains or directly impacts any of the Scheduled Monuments within it.

Conclusions

11.35 Neither of the potential route corridors, assuming that they are constructed overhead and not underground, carries any over-riding archaeological or cultural heritage concerns, given that none pass directly through or over any designated sites. Alignments within the preferred route corridor could be identified to avoid all of the designated sites.

11.36 Both corridors carry a low to moderate risk of impacting on both known (non-designated) or unknown buried archaeological remains and all options could potentially have an indirect (visual) impact in terms of views to and from local Conservation Areas, Listed Buildings and Registered Parks and Gardens.

11.37 Corridor 1 Option 1A is preferred in terms of physical and visual impacts as it replaces an existing overhead line, Corridor 1 Option 1B and 2 are of similar potential impact, in terms of introducing a new overhead line and pylons.

11.38 Corridor 1 Option 1B carries specific concerns with regard to potential adverse effects on Brent Knoll and Cadbury Camp, although any adverse effects are not expected to be significant, when pylons have been carefully positioned, and the degree by which the corridor is less preferred over Corridor 2 is limited.

11.39 Corridor 2 carries specific concerns with regard to potential adverse effects on Tyntesfield Registered Park and Garden, although mitigation through careful detailed connection design is possible and the difference between the two route corridors is limited. Corridor 2 may also have a greater impact on Conservation Areas.

11.40 The greatest number of specific concerns raised in the consultation representations related to Corridor 2. Corridor 2 includes a greater number of known archaeological sites and would therefore pose a greater challenge in terms of positioning pylons to have the least possible impact on buried archaeological remains. Corridor 1 Option 1B, however, has greater proximity to a number of the sites where concerns over visual impacts have been raised. However, in all of these cases, the route corridors have avoided designated sites and individual pylons can be positioned within the preferred corridor to minimise adverse effects on views to and from the assets in question.

12 ECOLOGY/BIODIVERSITY

Introduction

12.1 This chapter considers the effects of a new overhead line in each of the route corridors on the ecological resource, including sites designated for their ecological value.

Context

12.2 The study area is predominately in agricultural use and the features of greatest ecological and biodiversity potential are the aquatic and rare grassland habitats and the species they support. Additional interest in the area is provided by wintering birds and Annex 1 bat species.

12.3 National Grid's guidance advises that it should seek to avoid internationally and nationally designated sites when siting infrastructure and the RCS sought to avoid these features when identifying route corridors. Where avoidance is not possible, it is appropriate when investigating alignments within a corridor to consider in detail the effects of the overhead line on the interest of the internationally or nationally designated site.

12.4 Internationally or nationally designated wildlife sites include Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR).

12.5 Ramsar sites, SPAs and SACs are afforded protection under the EC Birds Directive[87] and the EC Habitats Directive[88]. In England and Wales the Directives have been transposed into national law by the Habitats Regulations[89]. Article 4 of the Birds Directive requires the identification and classification of SPAs for rare or vulnerable species listed in Annex 1 of the Directive. Article 4 focuses on wetlands of international importance for regularly occurring migratory species. Article 3 of the Habitats Directive requires the establishment of SACs that will make a significant contribution to conserving the habitats and species identified in Annexes I and II of the Directive. Together these three designations form a network of European protected areas known as Natura 2000 sites. In the UK these sites are also designated as Sites of Special Scientific Interest (SSSIs).

12.6 The Regulations only permit development in the first instance on such sites where it is directly connected with or necessary to site management for nature conservation; or where the proposal would not be likely to have a significant effect on the conservation objectives of the site, alone or in combination with other plans and projects.

12.7 Where there are likely to be significant effects, consent for development can only be granted where it would not adversely affect the integrity of the site taking into account the manner in which the development will be carried out and any conditions that might be imposed on the consent or there are no alternative solutions and the development must be carried out for imperative reasons of overriding public interest relating to human health, public safety or benefits of primary importance to the environment.

12.8 SSSIs are sites designated for their biodiversity or geological interest and are protected under the Wildlife and Countryside Act 1981[90] as amended by the CROW Act 2004[91]. SSSIs are protected from development and operations which are likely to damage their special interest. Consultation with Natural England is required before consent can be granted for any development operations likely to damage the SSSI interest.

[87] Directive 2009/147/EC on the conservation of wild birds
[88] Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora
[89] Conservation of Habitats and Species Regulations 2010
[90] Wildlife and Countryside Act 1981 (as amended)
[91] Countryside and Rights of Way Act 2004

12.9 NNRs are designated under the National Parks and Access to the Countryside Act 1949 and are primarily SSSIs. Where avoidance is not possible, (in addition to the legislation covering SSSI features of an NNR) it would be appropriate when investigating alignments within a corridor to consider the nature of effects on the interests of the site.

12.10 There are a number of internationally and nationally important sites within the study area. The most significant of these sites and their reasons for designation are summarised in Appendix 1.

12.11 Locally designated sites are features on which National Grid seeks to minimise effects. There are numerous County Wildlife Sites present in the study area and although these sites have not been taken into consideration in identifying route corridors, they will be considered in detail in defining detailed connection design.

12.12 Holford Rules 4 and 5 refer to woodlands and their value in providing background to views and advise to avoid cutting extensive swathes through woodland blocks where possible.

12.13 Any form of woodland generally has landscape value whereas ecological value can vary greatly between different types of woodland. Woodland with relatively low ecological value may perform the same screening or background function in the landscape as one with very high ecological value. However, ancient woodland is an irreplaceable nature conservation asset. Much ancient woodland is SSSI and is protected by that designation.

12.14 Woodland has been considered in the identification of route corridors and corridors have been identified which seek to avoid woodland.

12.15 There are numerous woodlands interspersed throughout the study area and these tend to be present in discrete blocks rather than large swathes. Woodland close to the route corridors includes the edges of Priors Wood, Mogg's Wood and Chummock Wood on Tickenham Ridge to the north of Nailsea. Where woodland is included in an identified route corridor, it is where there is a high degree of confidence that at least one alignment could be found within the corridor which would avoid the woodland. Ancient woodland will be identified separately when considering alignments, so that if route corridors include woodland that cannot be avoided, a distinction can be made between ancient and other woodland.

Stage 1 Consultation Representations

12.16 Representations from local authorities and other statutory organisations have been reviewed to identify aspects which relate to ecology and help inform the selection of a proposed route corridor.

12.17 Natural England has expressed the view that the current level of information is not sufficient to provide a confident recommendation, but states that Corridor 1 Option 1A would appear to provide the least additional impact upon ecology. It also requested additional information on why the subsea option has been ruled out.

12.18 On the basis of ecological and flood risk issues, the Environment Agency stated that Corridor 1 Option 1A is currently their preferred option. The Agency provided specific comment on the need to map important bat areas and bird migration routes where these fall outside designated areas. This work has been undertaken by National Grid across both route corridors and has shown no adverse impact on the integrity of European sites.

12.19 South Gloucestershire Council and Bristol City Council expressed a preference for Corridor 1 Option 1A. The former also requested account is taken of the impact on the Severn Estuary at the River Avon crossing point and potential impact on wildfowl using adjacent areas. National Grid has considered this issue and has undertaken extensive bird surveys across both route corridors which indicate that the crossing would not affect the integrity of the SPA/SAC/Ramsar site.

12.20 North Somerset Council, Somerset County Council and Sedgemoor Council all expressed a preference for the undergrounding and/or subsea options to be revisited and requested more information on the financial and environmental impacts of these options. Sedgemoor District Council also suggested that there was no need for National Grid to commit to a preferred route corridor when moving onto Stage 2. Instead they would like to see a broad environmental analysis of both corridors rather than only an EIA of the preferred corridor.

12.21 A number of representations were received from parish councils in relation to ecology and biodiversity. In summary these covered potential effects of an overhead line on:

- nationally and internationally designated wildlife sites;
- local wildlife sites;
- bat colonies associated with designated sites;
- wildlife outside designated areas; and
- swans and other migratory birds.

12.22 Both the Avon Wildlife Trust[92] (AWT) and the Somerset Wildlife Trust[93] (SWT) expressed objections to parts of both corridors because of threats to key sites or species. However, on balance both Wildlife Trusts concluded that Corridor 1 Option 1A was the "least-worst" choice. AWT provided specific comments on a number of designated sites (e.g. Portbury Ashlands and Puxton Moor) outlining options that would minimise effects on the designations. Comment was also made on the need to consider construction phase impacts on the ditches and rhynes. Both AWT and SWT outlined the need for bird surveys and the importance of bird flight paths when considering alignments. Similarly they identified the need to consider bat commuting and foraging grounds when selecting the preferred route corridor. SWT also highlighted the need to consider non-statutory sites and biodiversity action plan species and habitats during detailed connection design.

12.23 The National Trust highlighted the importance of the area to the north of the Mendip Hills for bats, particularly lesser and greater horseshoe bats associated with SSSI and SAC designations. The Trust stated that any disturbance to habitat used by bats roosting at Tyntesfield is likely to be detrimental to the bats. The Trust also outlined the value of the Crook Peak SSSI/SAC and Cadbury Camp limestone grasslands.

12.24 The Mendip Society and the Banwell Caves Heritage Group both raised concerns over effects on the Banwell Caves SSSI/SAC which could be associated with the western spur of Corridor 2.

12.25 Representations were also received from members of the public which focussed largely on the issues outlined at paragraph 12.21. Specific reference was made

[92] Avon Wildlife Trust : Response to Stage 1 Consultation : 7 January 2010
[93] Somerset Wildlife Trust: Response to Stage 1 Consultation : 4 January 2010

to potential impacts of Corridor 2 on Backwell Lake which is locally valued for its wildlife.

Comparison of Impacts of Route Corridors

Internationally and nationally designated sites

12.26 The only international or European nature conservation site within the route corridors is the Severn Estuary SAC/SPA/Ramsar. All route corridors oversail the designation at the mouth of the River Avon and are adjacent to the M5 motorway crossing of the river. In siting new electricity infrastructure, particular regard will be had to the avoidance of significant impacts on the designated area. For example, it should be possible, when identifying detailed alignments, to locate pylons outside the designation with only the conductors (wires) oversailing the river, as is the case with existing low voltage overhead lines at this point.

12.27 Although the majority of international or European sites within the study area are outside the route corridors, indirect impacts on these sites must also be considered. Notable potential indirect impacts are possible on SPA bird species and SAC bat species. Due to the potential for significant impacts on European sites, impacts on bird and bat species associated with these designations have been subject to detailed study prior to the preferred route corridor decision.

12.28 The potential impacts on SPA species arising from an overhead line are associated with collision risk, experienced during migratory flights and/or daily foraging flights. It is also possible that some species may experience displacement from winter feeding or summer breeding as a result of a new overhead line. National Grid commissioned studies between 2009 and 2011 to investigate the potential for these impacts to occur across the corridors. The studies[94] conclude that bird species listed as an SPA qualifying feature will not experience significant population impacts as a result of the construction of an overhead line within Corridor 1. For Corridor 2 it is not yet possible to draw a conclusion of 'no likelihood of significant effects' on the Somerset Levels and Moors SPA due to the proximity of the corridor to the SPA and potential collision effects on lapwing making local flights during the winter.

[94] TEP : Proposed 400kV Overhead line Connection – Hinkley C Ornithological Assessment 2009 – 2011 : July 2011.

12.29 Although not considered to be significant, the potential collision effects associated with Corridor 1 could be reduced by :

- selecting Corridor 1 Option 1A over Corridor 1 Option 1B overall, as it would involve the removal and replacement of an existing overhead line rather than the addition of a new line parallel to the existing line; and
- selecting Corridor 2 between Horsey and Woolavington, as the area around Bawdrip within Corridor 1 was identified by the ornithological studies as of importance for lapwing making local flights.

12.30 None of the remaining SPA species associated with either the Somerset Levels SPA or the Severn Estuary SPA were assessed as having risks posed which would imply a specific route corridor preference.

12.31 The potential impacts on bat species (greater and lesser horseshoes) associated with the North Somerset and Mendip Bats SAC and the Mendip Limestone Grassland SAC, arising from an overhead line, would primarily relate to loss of habitat resulting in fragmentation and degradation of foraging grounds. Until a detailed connection design is identified, it is not possible to determine specific effects associated with habitat loss as pylon positions have not been identified. However, in the detailed connection design, consideration will be given to routes that minimise local effects on SAC species. Bat surveys were commissioned by National Grid in 2010. These surveys sought to identify any significant differences in the use of the corridors by SAC bat species.

12.32 There is an indication from the surveys that parts of the western spur of Corridor 2 (parallel to the M5 motorway) have lower levels of use by SAC bat species. However, surveys recorded SAC bat species on all survey transects across the Corridors (including the western spur of Corridor 2) and do not indicate any difference between the route corridors in relation to their importance for the SAC or SAC bat species. Furthermore, as only small scale habitat losses are predicted from the proposals, impacts on SAC bat species can be minimised at the detailed connection design stage.

12.33 Although there are multiple SSSIs within the study area, the identification of route corridors has avoided all except the Tickenham, Nailsea and Kenn Moors SSSI, Biddle Street SSSI and Puxton Moor SSSI. All of these sites form part of the Avon Levels and Moors and are networks of ditches and rhynes noted for their diversity of aquatic plants and invertebrates.

12.34 Puxton Moor is only crossed by Corridor 1 and only along the far eastern edge of the designation. The existing 132kV Western Power Distribution overhead line is outside the SSSI and the width of the corridor provides opportunities for the identification of alignments which would also avoid the SSSI. Tickenham, Nailsea and Kenn Moors SSSI and Biddle Street SSSI are crossed by both route corridors. Opportunities to avoid the sites completely are limited by existing development at Yatton, Nailsea and Tickenham. Corridor 1 passes through the Tickenham, Nailsea and Kenn Moors SSSI for a greater distance than Corridor 2. However, as only the field boundaries (i.e. the ditches and rhynes) fall within the SSSI designation and the approximate span between pylons is 360m, it would be possible to oversail these areas of interest through carefully considered pylon locations. Therefore, a route through this site could be achieved without long-term adverse effects on the features of the SSSI. Consultation with Natural England will ensure appropriate working methods and mitigation is employed to ensure long-term adverse impacts are avoided.

Locally designated sites

12.35 Both route corridors pass through locally designated sites. These will be considered as part of the detailed connection design. The scale of the effects will be dependent on the final alignment and the nature conservation interest of the site, although these effects will be minimised through the siting of pylons, sensitive working methods and appropriate mitigation.

Woodlands

12.36 Most woodlands have been avoided in selecting the route corridors. Both corridors include some woodland habitat on Tickenham Ridge to the north of Nailsea. Scope for avoiding woodland in this area is restricted as scattered woodland blocks extend across much of the ridge from Clevedon in the west to Bristol in the east. Even if woodlands cannot be avoided completely, losses would be minimised as part of detailed connection design.

Conclusions

12.37 The corridors have been reviewed in relation to their potential effects on designated ecological sites. Consideration has also been given to the numerous consultation representations raised in relation to the potential effect on the ecological resource.

12.38 The construction of an overhead line in Corridor 1 is not likely to affect the integrity of an international or European site (SAC/SPA/Ramsar). For Corridor 2 it is not yet possible to draw this conclusion due to the proximity of the corridor to the Somerset Levels and Moors SPA. The Severn Estuary site falls within all route corridors where they cross the River Avon. As with the existing low voltage overhead line crossings, it should be possible when identifying detailed alignments to locate the pylons outside the designation with only the conductors (wires) oversailing the river.

12.39 Selecting Corridor 1 Option 1A over Option 1B further minimise effects on SPA bird species as it would involve the removal and replacement of an existing overhead line rather than the addition of a new line parallel to the existing line.

12.40 All route corridors cross the network of ditches that form the Tickenham, Nailsea and Kenn Moors SSSI and the Biddle Street SSSI. Corridor 2 crosses these sites for the shortest distance. However, it should be possible with sensitive pylon siting and appropriate mitigation to avoid long term adverse affects on these sites whichever corridor is chosen.

12.41 Most woodlands have been avoided in selecting the route corridors. Corridors 1 and 2 both include some woodland habitat on Tickenham Ridge in the area to the north of Nailsea. Opportunities to avoid woodland are similar for both corridors, although Corridor 1 Option 1A has a slightly greater potential to avoid loss as it would use the route of an existing 132kV overhead line.

12.42 On balance, current information suggests that Corridor 1 Option 1A or 1B would result in a lower impact on the nature conservation interest of the area. It is also acknowledged that (based on currently available information) Natural England, the Environment Agency, South Gloucestershire Council and Bristol City Council favour Corridor 1 Option 1A. Other planning authorities expressed a desire to re-visit undergrounding and subsea options.

13 LAND USE AND SOCIO-ECONOMIC FACTORS

Introduction

13.1 This chapter considers the potential effects of the route corridors on land use and socio-economic factors in the study area. In accordance with the overarching Policy Statement on Energy, this includes consideration of potential

effects on open space, green infrastructure and Green Belt. Agriculture and mineral extraction are important uses in the study area which is predominantly rural.

Context

Agriculture

13.2 The Agricultural Land Classification (ALC) provides information on agricultural land and its quality. There are five classifications of agricultural land (six with a subsequent subdivision of Grade 3) with Grade 1, 2 and 3A land defined as "best and most versatile". Much of the land in the study area is classified as Grade 3 under the Agricultural Land Classification. The Mendip Hills includes pockets of Grade 2 land and small areas of Grade 1 land are to be found on the edges of the Mendip Hills. Further north, land between Yatton and Nailsea is largely Grade 2, with an area of Grade 1 land to the south of the railway and also to the east of Nailsea between the built up area and Wraxall/Tyntesfield. Grade 1 land is also to be found near Clapton-in-Gordano. PPS7: Sustainable Development in Rural Areas advocates that lower quality agricultural land is used for development before "best and most versatile" areas. Much of the land is low-lying, bordered by networks of ditches and rhynes, used for sheep and cattle grazing with some areas of arable crop production. There are areas of orchard, particularly within and to the north of the Mendip Hills in the centre of the study area.

Mineral Sites

13.3 Within the Mendip Hills AONB there are three sites designated in the adopted Somerset Minerals Local Plan (2004) as areas of current or future mineral working. These sites lie on high ground and comprise existing crushed rock aggregate quarries (Callow Rock Quarry, Shipham Hill Quarry and Battscombe Quarry) which lie within a wider mineral consultation area.

13.4 There are also a number of sites designated as areas of current or future mineral working in the adopted Mineral Working in Avon Local Plan (1993). The largest of these sites is Crooks Marsh a clay extraction site in the vicinity of Seabank substation, to the north of Avonmouth. This extraction site and its associated buffer zone lie within the Severnside works.

13.5 There are a number of carboniferous limestone quarries to the west and south west of Bristol. These include Durnford Quarry on Failand Ridge and Stancombe Quarry between Backwell Hill and Barrow Hill.

Built development

13.6 The key settlements within the study area are sited along or in close proximity to the banks of the Severn Estuary and include Bridgwater, Burnham-on-Sea, Weston-super-Mare, Clevedon and Portishead. Immediately east of the study area is the City of Bristol which forms part of a continuous band of development that extends to the mouth of the River Avon at the Severn Estuary. An extensive area of industrial and port-related development lies between the River Avon and Seabank substation.

13.7 Other smaller settlements including Nailsea, Congresbury and Yatton are in the eastern part of the study area, north of the Mendip Hills, with numerous other villages dispersed throughout the area, the larger of which are located along classified roads. Smaller villages and hamlets are linked by the minor road systems. Individual properties outside settlements are dispersed throughout the study area.

Development planning policy

13.8 In Sedgemoor, key rural settlements are identified as a focus for local growth, including Woolavington, Mark and East Huntspill. Elsewhere development is to be strictly controlled. Priority sites for employment use include the former Royal Ordnance site at Puriton as a potential site for B2 and B8 uses.

13.9 In North Somerset, the focus for development is to be Weston-super-Mare, with urban extension areas combining employment and housing proposals on land to the east of the town. Nailsea and Portishead are identified as "market and coastal towns" where development is intended to support self containment, improve their role as service centres and ensure jobs and services are available for the town and hinterland. Portishead has large housing allocations on its eastern edge while the development strategy for Nailsea seeks to maximise the use of brownfield land. In Rural Service Villages, such as Winscombe, Banwell, Churchill, Congresbury, Yatton and Backwell, development to support their role as local hubs is likely to take place within village development boundaries. A large employment land allocation is safeguarded south-west of Yatton. In

smaller "Infill villages" such as Kenn and Kingston Seymour, development is to be limited to infill only.

13.10 In Bristol, the Avonmouth area is recognised as a regionally important industrial and warehousing business location. In South Gloucestershire, Severnside is also identified as a strategically important employment location, with policy safeguarding and developing its uses for distribution and other extensive employment land uses. This industrial area is immediately north of Seabank, with two main developed areas (Astrazeneca and GPark) and significant areas of undeveloped land with planning permission for employment use.

13.11 The route corridors were defined to avoid the built up areas of the main settlements and areas of land allocated for growth in development plans.

Airfields

13.12 There are two airports within the study area: Bristol International Airport (BIA); and Bristol Filton Airport, together with a number of smaller airfields. The potential impact of each of the route corridors on airfields and their operations is considered in Chapter 15.

Open space and green infrastructure

13.13 The development plans covering the study area identify areas of land which are to be protected or developed for open space and green infrastructure purposes, including strategic and structural open space and uses such as playing fields and allotments. These areas tend to be within the built up areas of the larger settlements or on the edge of settlements. As such they will not influence route corridor selection. Furthermore, in defining the detailed connection design, pylons and overhead lines can be sited to avoid important areas of open space and green infrastructure.

Green Belt

13.14 In North Somerset, the designated Green Belt extends from the River Avon as far south as the northern edge of Nailsea and Clevedon. Land to the east of Nailsea, around the settlement of Backwell, and to the east of Yatton, is also included in the Green Belt. North of the River Avon, undeveloped land along the M5 motorway corridor to the east of Avonmouth is designated as Green Belt.

Tourism

13.15 The Mendip Hills AONB attracts large numbers of tourists. The majority of tourists visit the central areas of Mendip Hills[95] (e.g. Cheddar Gorge and the heathlands of Black Down), which will not be directly affected. Tourism-related businesses, including accommodation providers, tend to be concentrated in the main settlements with smaller numbers scattered across the rural parts of the route corridors. Specific attractions in the study area include : Noah's Ark Zoo Farm (located between Portishead and Nailsea); Banwell Castle; Banwell Caves; Ashton Windmill near Chapel Allerton; North Somerset Showground near Wraxall; and a number of National Trust properties, such as Tyntesfield.

Deprivation

13.16 In general, the study area is relatively affluent. The levels of deprivation in East Huntspill area and Banwell, while relatively higher than elsewhere, are not severe. The main pockets of deprivation are to be found in the Avonmouth area. The extent of effects on deprivation cannot be assessed at this stage. The potential for indirect effects is likely to be greatest at Avonmouth which would be common to both route corridors.

Stage 1 Consultation Representations

13.17 Respondents queried the likely effects on agricultural land and operations. This would apply to all of the route corridors.

13.18 The Bristol Port Authority was concerned about the potential constraint which an overhead line or underground cables could impose on port-related activities and future development. In other parts of the study area, general comments were made about the proximity of the proposed corridors to developed areas.

13.19 In the Nailsea area, concerns were raised by Nailsea Town Football Club about the potential impact upon its facilities and development plans, while other individuals and groups were concerned about the potential effects of Corridor 2 on a well used recreation area at Backwell Lake.

[95] Mendip Hills AONB : State of the AONB report 2009-2014 : 2009

13.20 A number of individual respondents and several of the bodies consulted have stressed the value of tourism to the local economy and have expressed concerns about the adverse impact which an overhead line could have upon it and upon the rural economy in general. The Mendip Hills AONB Partnership is particularly concerned about attracting visitors to its area and the unique qualities of the Somerset Levels and Moors are also promoted as a specialist tourist destination. However, the impact on Somerset as a tourist destination would be likely to be similar for all overhead line route options.

Comparison of Impacts of Route Corridors

Agriculture

13.21 Overhead line construction causes temporary disturbance to land and can temporarily restrict access to other areas depending on working areas required. The footprints of overhead line pylons affect agricultural operations by introducing an obstacle to machinery. Operations such as water jet irrigation or use of very high vehicles and attachments are restricted beneath conductors (wires) to ensure that safety clearances are maintained. These restrictions apply equally across both corridors and landowners are compensated for temporary disturbance during construction and for the presence of the infrastructure on their land..

13.22 A longer route would be anticipated to have greater effects on land use than a shorter route, although this can vary with numbers and types of pylons used and field pattern which influences how pylon positions can be accommodated to minimise constraints. While the actual land-take associated with an overhead line would be limited, the distribution of agricultural land grades means that Corridor 2 may have a slightly greater impact on "best and most versatile agricultural land" as it passes to the south and east of Nailsea where more of this land is to be found. Even so, there are considered to be no significant agricultural land constraints associated with either corridor.

Mineral sites

13.23 A number of mineral extraction sites have been identified in the study area. Both route corridors avoid these sites with the exception of the Crooks Marsh clay extraction site which lies adjacent to Seabank substation. An overhead line in either corridor would need to cross this site to achieve a connection into

National Grid's existing Seabank substation and detailed connection design would seek, wherever possible, to minimise the effect on this site.

13.24 Corridor 1 Option 1A would replace an existing 132kV WPD overhead line which travels through this site. Corridor 1 Option 1B and Corridor 2 would both require the construction of an additional overhead line through this site which has the potential to result in effects over a greater area of the site.

Built development

13.25 In common with most overhead line routes throughout the UK, the route corridors all pass through areas whose population is dispersed in small villages, hamlets and isolated houses. National Grid's guidance states that overhead line routes should avoid residential areas and that developed areas should be treated as areas of exceptional constraint. The identification of route corridors, therefore, sought to avoid areas where there are groups of residential properties with only small gaps between them. To the south of the Mendip Hills AONB, Corridor 2 passes through a less populated area.

13.26 Both corridors are wide enough to allow a significant degree of flexibility in detailed connection design. With Corridor 1 Option 1B, however, the need to achieve close paralleling between the existing and proposed overhead lines might make it more difficult to avoid productive land uses when siting towers, access tracks, etc. Effects on individual properties will be considered in the identification of a detailed connection design within the preferred route corridor.

13.27 In the Avonmouth area, Corridor 1B and Corridor 2 would both introduce an additional connection through this densely developed area. The impact of Corridor 1 Option 1A would be less, but the operational requirements of the Distribution Network Operator WPD will determine the extent to which existing 132kV overhead lines can be removed in this area. In any event, National Grid will work with local businesses and the Port Authority to minimise the impact on its operations.

Development planning policy

13.28 The generally restrictive policies governing development outside existing settlements means that there is only limited scope for a proposed connection in either corridor to impact directly on proposed development land. In the

Avonmouth area, the provision of an additional overhead line would need to be carefully planned to minimise adverse impacts on future development. The selection of Corridor 1 Option 1A would provide an opportunity, in the Nailsea area, to increase the separation between the overhead line and development areas.

Open space and green infrastructure

13.29 As such elements tend to be found within, or on the edge of, settlements they will not influence route corridor selection because the corridors have been designed to avoid such areas. In defining the detailed connection design, pylons and overhead lines can be sited to avoid important areas of open space, such as the Nailsea Town Football Club facilities and green infrastructure. At Nailsea, Corridor 2 would cross the recreational area around Backwell Lake.

Green Belt

13.30 The purposes of Green Belt mean that the designated land will always be around centres of population which represent areas of demand for transmission supplies. National Grid has many kilometres of overhead lines through Green Belt land and this includes some overhead lines which have been granted consent in Green Belt and some land crossed by overhead lines which has subsequently been designated Green Belt. National Grid considers that overhead lines are not inappropriate development in the Green Belt. Green Belt has not been considered a constraint to the identification of potential overhead line route corridors. Both corridors would have a similar effect on the Green Belt between Nailsea and the River Avon and would run along the edge of the Green Belt north of Bristol.

Tourism

13.31 As most businesses lie within settlements, the effect of a proposed connection in either corridor would be limited. The extent of the wider impact of an overhead line on visitor numbers and any effect on footfall is not possible to assess at this stage. Qualitatively it can be assumed that Corridor 1 Option 1A may have fewer impacts relative to Corridor 1 Option 1B or Corridor 2 as it will replace the existing overhead line. Corridor 2 passes close to Noah's Ark Zoo and the important National Trust property at Tyntesfield.

13.32 It is recognised that landscape and scenic qualities are part of the attraction of some tourist destinations and that any new development could have an effect on these qualities, such effects are considered in Chapter 10. However, there are many kilometres of overhead lines in National Parks and AONBs which are designated for their landscape and scenic qualities and which attract large numbers of tourists. There are already overhead lines crossing both the Mendip Hills AONB and the Levels and Moors, so it is not necessarily the case that overhead lines and areas attractive to tourists are mutually incompatible.

13.33 At this stage, it is not possible to assess the extent of the wider impact of an overhead line on visitor numbers or any related footfall impacts businesses may experience. For many businesses, the visibility of an overhead line may not generate direct impacts. While it may be argued that the potential effects on perceptions of the wider area and visitor attitudes toward it need to be considered, there is no direct evidence, that overhead lines elsewhere have had a clearly negative impact on visitors' attitudes or have led to a reduction in visitor numbers to a particular area. Care will be taken in identifying the detailed connection design to minimise adverse effects on those features which are valued for tourism. However there is no material distinction identified between the corridors with regard to possible effects on tourism.

Cumulative Impacts

13.34 Cumulative impacts may arise when, for example, one major development is to be progressed in close proximity to another or which could affect the same general area to a similar programme; where the impacts of developments may individually be insignificant but which could combine to produce a significant impact; or where a development may have a number of different impacts which could, when considered together, be deemed to be significant.

13.35 The most significant development planned in the study area during the implementation period for the overhead line is the Hinkley Point C nuclear power station. The principal site for this proposal lies approximately 15km north west of Bridgwater substation and associated development, such as the Cannington bypass and Combwich port improvements, all lies to the west of the M5 motorway. This being the case, the scope for cumulative impacts is considered to be limited and would, in any event, be similar for each corridor.

13.36 There are proposals for wind farm developments at Puriton, north of the former ROF depot, and on a number of sites at Avonmouth. The former would, if approved, lie immediately to the west of Corridor 1 and would add to the number of large scale structures in the landscape. Additional pylons and overhead lines associated with Corridor 1 Option 1B or Corridor 2 would further increase the visual clutter in this area. Plans for the latter would affect equally the route corridors which run in common through Avonmouth.

Conclusions

13.37 The assessment has shown that it is difficult to determine the effect of the scheme on local social and economic conditions until a detailed connection design has been prepared. For example, any effect on tourism will be dependent upon the spatial relationship between the overhead line and a particular attraction or facility which cannot be established at the corridor selection stage. At this stage, tourism impacts are assessed as broadly neutral in both corridors.

13.38 The corridors have been reviewed in relation to existing and future land use and consideration has also been given to the consultation representations raised in relation to the potential effect on land use. It is considered that the impacts on development policy objectives and important allocations are considered to be broadly neutral for both corridors.

13.39 Both route corridors pass through areas of similar agricultural land. National Grid considers that there is little distinction between the route corridors in terms of potential impact on agricultural land use, though Corridor 2 would involve a slightly greater loss of the best quality agricultural land.

13.40 The route corridors have sought to avoid mineral reserves and active mineral extraction sites. Both corridors avoid these sites with the exception of the Crooks Marsh clay extraction site at Seabank substation. An overhead line in either corridor would need to cross this site to achieve a connection into Seabank substation.

13.41 The greater risk of impacting on existing land uses would be associated with Corridor 1 Option 1B because of the narrower corridor width and limited flexibility in tower positioning. The other corridors are wide enough to permit

flexibility to mitigate potential impacts on particular land uses and will be considered in detail as part of the detailed connection design.

14 ENGINEERING - BUILDABILITY/DELIVERABILITY

Introduction

14.1 This section of the report considers the relative deliverability of the route corridors. The Strategic Optioneering Report (August 2011) considered that a new connection between Bridgwater and Seabank is capable of being delivered in accordance with contractual obligations and projected demands for future connections.

Context

14.2 The construction of a new overhead line can be broken down into a number of phases, following which the operation of the new infrastructure would need to be integrated into the national transmission system :

- Detailed surveys;
- Pylon siting and design;
- Access and accommodation works;
- Pylon foundations;
- Pylon erection; and
- Installation of conductors.

14.3 It is anticipated that it would take around four years to construct and integrate Corridor 1 Option 1A into the transmission network. This allows for the construction of additional distribution assets in the Churchill/Sandford area. Corridor 1 Option 1B and Corridor 2 would both take about a year less than this, because these additional assets would not be required.

Stage 1 Consultation Representations

14.4 Issues relating to construction were in the main raised by statutory consultees and were directed at ensuring that National Grid's works would not unduly interfere with the operations of bodies such as Network Rail, the Environment Agency, statutory undertakers and Internal Drainage Boards. Local communities also raised concerns about the potential level of disturbance during construction.

The access and foundation construction methods for building overhead lines in sensitive areas such as the Levels and Mendip Hills AONB were also raised. It was pointed out that the Nailsea area had been subject to mining in the past which could affect ground stability.

14.5 All these issues raised in this section all relate to the issues associated with construction of an overhead line and would be common to both route corridors. At detailed connection design stage, consideration will be given to how the impact of construction activities can be mitigated.

Comparison of Impacts of Route Corridors

14.6 At the route corridor stage it is possible to draw comparisons between route corridor options based on a number of criteria which can affect project delivery :

- geotechnical issues;
- access for construction;
- presence of other utilities;
- requirements for motorway and rail crossings.

14.7 Although the geotechnical conditions do vary across the study area, these variations occur in bands running east-west and would not assist in selecting a preferred corridor. Geotechnical conditions will determine the type of foundation that will be installed to support the pylons, rather than their location. There is no indication that geotechnical conditions on any of the route corridors would act as a constraint on the engineering of the connection.

14.8 Construction activity benefits if there is good access to the principal highway network, as this makes delivery of materials much easier. It reduces the scope for congestion and potential damage to local roads. It also reduces the potential impact of construction traffic on local residents. At the local level, consideration also needs to be given to the potential extent of temporary road construction which may be needed and any other constraints on access, such as river crossings.

14.9 South of the Mendip Hills, Corridor 1 has some advantages from an access point of view because it runs close to B3141, B3139 and the network of lanes north of Mark for much of its length. The presence of overhead lines on Corridor 1 also means that access issues have been overcome in the past and it may be

possible to take advantage of existing access rights or established arrangements with existing grantors to reach potential pylon construction sites should this option be selected. On Corridor 2, the section north of Mark passes through an area which is devoid of lanes and would be more difficult to access.

14.10 North of the Mendip Hills, the extensive network of lanes means that in practice there is little to differentiate between the corridors, though sections of the eastern spur of Corridor 2 are remote from metalled roads.

14.11 The location of the substation, overhead line and construction compounds is yet to be determined. Substation construction compounds are likely to be adjacent to, or within the boundary of, the substation construction sites at Hinkley Point, Bridgwater, Seabank and Aust. If Corridor 1 Option 1A is chosen as the preferred route corridor, there may need to be a further compound in the Churchill/Sandford area.

14.12 Other compounds will be established to deliver the works to establish the connection between Bridgwater and Seabank, in the vicinity of Bridgwater, Weston-super-Mare and Portishead.

14.13 There is insufficient differentiation between the route corridors in relation to construction access for this to be a significant consideration in selecting a route corridor.

14.14 The potential impact of the scheme on third parties (in this case the Distribution Network Operator WPD) and the need to provide ancillary works to deal with such impact could involve cost, programme, engineering and environmental issues. As these factors could affect the statutory obligations relating to the transmission and supply of electricity, they must be considered material. The involvement of third parties may also provide the opportunity for more optimal development of both transmission and distribution systems and the factors associated with this need also to be taken into account. The presence of other utilities such as low voltage overhead lines and underground pipelines can be accommodated in any detailed alignment design and would not be a constraint on route corridor selection.

14.15 The Distribution Network Operator WPD owns and operates a number of 132kV overhead lines within the route corridors. These include several 132kV single circuit lines :

- between Bridgwater and Churchill;
- between Bridgwater and Weston-super-Mare;
- between Weston-super-Mare and Seabank via Avonmouth; and
- between Churchill and Seabank via Avonmouth.

14.16 The Churchill – Seabank and Weston-super-Mare – Seabank circuits converge north of Sandford and run north as a double circuit route to Seabank, via Avonmouth.

14.17 A 132kV double circuit line from Radstock 132kV substation to Portishead runs west from Radstock to by-pass Churchill and head north to converge with the Churchill - Seabank and Weston-super-Mare - Seabank circuits west of Nailsea. It then runs roughly parallel to these lines, via Portishead and Avonmouth, for the remainder of the route to Seabank. WPD has indicated that it wishes to retain a 132kV connection between Avonmouth and Seabank in the longer term.

14.18 In addition, there are a number of lower voltage line routes operating at 33kV and below, which would not pose a constraint to routeing a 400kV overhead line.

14.19 If Corridor 1 Option 1A were adopted, the 132kV circuits between Bridgwater and Avonmouth would have to be dismantled. If the 132kV line is removed, WPD has indicated that it would need to undertake works to the 132kV network to maintain supplies. The extent and location of these works will be the subject of further studies by WPD and National Grid and will be the subject of consultation during the next stage of the Project.

14.20 Should Corridor 1 Option 1A be selected as the preferred route corridor, further local consultation would be undertaken. Detailed environmental impact assessment of each of these sites and any overhead lines connecting them to both the 400kV and 132kV networks would be undertaken to determine which one should be included in the Development Consent Order application.

14.21 The adoption of Corridor 2 would include several locations where the 400kV line would cross existing 132kV circuits, which would have to be undergrounded at the crossing points.

14.22 At the southern end of the route corridor, the adoption of a route in Corridor 2 between Bridgwater and the Hinkley Point - Melksham line, as part of a Corridor 1 Option 1A solution, would allow the 132kV line to be removed where it passes close to Bawdrip and Woolavington which would deliver some benefits to the amenity of these areas.

14.23 Given the need to maintain local electricity supplies, the adoption of Corridor 1 Option 1A would introduce programming constraints in that modifications to the WPD network, which could include a new Grid Supply Point, would have to be commissioned before work could commence on dismantling the 132kV line between Bridgwater and Seabank. However, the impact of such works on the operation of two networks (National Grid's and WPD's) can be managed within the available timescales, and in terms of build sequence and WPD distribution system outages, to ensure that security of supply is maintained to the satisfaction of the Distribution Network Operator.

14.24 Both corridors would require a single crossing of the M5 motorway near Portishead. There are well rehearsed methods of achieving motorway crossings without significant traffic disruption. Temporary gantries put in place to remove the 132kV line for Corridor 1 Option 1A could remain in place for the erection of the new line. This would be no different to deploying gantries for a Corridor 2 crossing.

14.25 Both Corridors would involve crossing the Great Western main line railway between Weston and Yatton. The western and central spurs of Corridor 2 would involve oblique crossings whereas Corridor 1 and the eastern spur of Corridor 2 would cross at approximately right angles which would be the optimum arrangement. Crossings of railways in the Portishead and Avonmouth area would be common to both corridors.

14.26 South of the Mendip Hills, the Levels and Moors consist of an extensive area of drained wetland and both corridors would have to secure crossings of numerous watercourses, including the Huntspill River and the River Axe. The Environment Agency and Internal Drainage Boards have indicated that these can be managed. Similar wetlands are present to the south of Yatton (affecting particularly Corridor 1 and the central and eastern spurs of Corridor 2) and west of Nailsea (Corridor 1). The crossing of the River Avon affects both corridors equally.

14.27 The RCS identified a number of physical constraints to line routeing within each of the corridors. In particular, it identified a number of locations where close paralleling of the existing 132kV overhead line, as proposed by Corridor 1 Option 1B, may be difficult to achieve. This is discussed further in Chapter 17.

14.28 The RCS defined potential corridors on the basis that, within each corridor, it would be possible to define at least one viable route alignment taking into account the proposed specification of the connection and appropriate clearances for 400kV operation.

Conclusions

14.29 While each route presents different challenges from a construction point of view, there is no significant difference between the corridors in terms of key construction constraints or risk.

15 AVIATION/DEFENCE INTERESTS

Introduction

15.1 The overarching NPS for energy (EN-1) notes that "*UK airspace is important for both civilian and military aviation interests. It is essential that the safety of UK aerodromes, aircraft and airspace is not adversely affected by new energy infrastructure*".

Context

15.2 Certain civil aerodromes, and aviation technical sites, selected on the basis of their importance to the national air transport system, are officially safeguarded in order to ensure that their operation is not inhibited by new development. A similar official safeguarding system applies to certain military aerodromes and defence assets, selected on the basis of their strategic importance. The RCS took these into account in defining potential corridors.

15.3 There are a number of airfields in the general vicinity of the scheme, including Bristol International Airport, Bristol Filton Airport, helicopter landing sites at

Weston-super-Mare and Avonmouth and a microlight aerodrome at Hewish to the east of Yatton.

Stage 1 Consultation Representations

15.4 A number of representations received raised concerns regarding the potential effects of an overhead line on aircraft and helicopter flight paths in the Bristol and Somerset area. Specific concerns were raised with regard to the height of pylons and low flying helicopters and potential impacts on the Bristol Balloon Festival. The proposed pylons will be of a standard height and are used elsewhere in the country without any specific aviation issues arising. To ensure aviation safety, National Grid has liaised with the Civil Aviation Authority, the National Air Traffic Service, the Ministry of Defence, Bristol International Airport and Bristol Filton Airport.

15.5 Some representations queried whether National Grid would be fitting navigation lights to the tops of pylons. If so, concerns were raised about the impact such lighting could have on the AONB. Any decision about such lighting will be taken in consultation with the above organisations once a detailed connection design has been developed.

15.6 The Civil Aviation Authority has not identified[96] any corridor-specific aerodrome safety issues and has not therefore expressed a preference for a particular corridor. It drew attention to the need to consult aerodrome operators and the Ministry of Defence.

15.7 The Ministry of Defence has advised[97] that all corridors are outside their safeguarding zones and that it would not object to any of the corridors. It has indicated that navigation lights may be required but that this can only be determined once a detailed connection design and pylon positions are known.

15.8 No representations were received from the other aviation consultees.

[96] Civil Aviation Authority : Consultation Response: 22 December 2009

[97] Defence Estates : Consultation Response: 8 January 2010

15.9 A representation was also received from the Woodsprings Wood Hotel Aircraft Club regarding the effects of an overhead line in Corridor 2 on model aircraft flying activities.

Comparison of Impacts of Route Corridors

15.10 The Bristol International Airport public safety zones, which are identified under Policy T/13 of the North Somerset Replacement Local Plan (2007), were considered and mapped in the RCS. They, therefore, influenced the definition of the route corridors at an early stage in project development. None of the route corridors infringes these safety zones.

15.11 Bristol International Airport lies approximately 6km east of the eastern spur of Corridor 2 and 7km east of Corridor 1. The other spurs of Corridor 2 pass further away from the airport

15.12 The Avonmouth helicopter landing site is within Filton Airfield which lies approximately 3km east of both route corridors.

15.13 The Weston helicopter landing site is within Weston-super-Mare and lies in excess of 2km from the western spur of Corridor 2 and approximately 5km from Corridor 1 and the central and eastern spurs of Corridor 2.

15.14 Hewish microlight aerodrome and the Woodsprings Wood Hotel Aircraft Club are both within Corridor 2 and an overhead line in this corridor would need to pass close to these sites. Detailed connection design would seek, wherever possible, to minimise the effect on these sites. Corridor 1 does not pass close to these sites and is unlikely to affect them

15.15 The Royal Naval Air Station at Yeovilton is in excess of 20km from both route corridors

15.16 None of the statutory consultees raised objections to any of the route corridors. Nevertheless, National Grid will continue to liaise with the owners and operators of airstrips close to the route corridors, and with the organisers of the Bristol Balloon Festival, to ensure that all parties have a clear understanding of the potential effect of overhead lines on their operations.

Conclusions

15.17 Based on the above, it is concluded that one cannot differentiate between the route corridors on the basis of aviation/defence interests, other than considering the potential impact of the western spur of Corridor 2 on the microlight airfield at East Hewish and the Woodsprings Model Aircraft Club.

16 CLIMATE CHANGE RESILIENCE/FLOOD RISK

Introduction

16.1 The NPS on Electricity Networks Infrastructure requires promoters to consider the potential impact of climate change on electricity networks infrastructure. In particular, consideration needs to be given to how the proposal would be resilient to:

- flooding, particularly for substations that are vital for the electricity transmission and distribution network;
- effects of wind and storms on overhead lines;
- higher average temperatures leading to increased transmission losses; and
- earth movement or subsidence caused by flooding and drought for underground cables.

Context

16.2 National Grid's design standards take account recommendations regarding climate change made following a collaborative project led by the Meteorological Office[98]. Current projections around the impact of climate change in the UK forecast extremes of wet and dry (heavy rain and drought) and more occurrences of high wind. Overhead line design for climatic loads is driven by wind, ice and wind-on-ice loadings.

[98] Meteorological Office : Project EP2 Climate Change Impacts on the UK Energy Industry : 2006

16.3 The risk of simultaneous occurrence of ice on the conductor and intense wind gusts was, therefore, investigated by the collaborative project. The project found that a reduction in the intensity of the most frequent extreme meteorological conditions likely to cause conductor damage is a possibility. However, the ability of climate models to simulate changes in extreme winds is not high. It is recognised that, at this stage, a marked increase in the intensity of the most extreme cases cannot be ruled out. However, in the absence of robust evidence to the contrary, the EP2 Project recommended that the industry should continue to use design criteria based on present day risk. The same criteria will apply to all route corridors.

16.4 Higher average temperatures leading to increased transmission losses would not differ significantly from one corridor to another, given the relatively small differences in route corridor length.

16.5 No information has been obtained which suggests that any particular parts of the study area would be affected by earth movement or subsidence.

16.6 Much of the area between Bridgwater and the southern edge of the Mendip Hills is identified by the Environment Agency as being at risk of flooding. North of Sandford the area at risk of flooding extends as far as Yatton and includes the eastern fringes of Weston-super-Mare. North of Yatton the flood risk area encompasses Kenn and the area to the west of Nailsea. Other flood risk areas lie to the west of Portishead and include Avonmouth.

Stage 1 Consultation Representations

16.7 Respondents considered that National Grid should consider flood risk in determining the preferred route corridor and the siting of substations, in accordance with PPS25. It should also have regard to the Pitt Review, that essential infrastructure should be made more flood resilient so that it can continue to operate safely during flood events. The presence of overhead lines in areas of flood risk has a negligible effect on their operation or on the displacement or obstruction of flood waters. Where it is not possible to avoid building pylons in flood plains, this can be taken into account in their design and construction. The requirement for flood defence works at existing substations such as Bridgwater and Seabank is assessed on a national basis and investment in flood defences is made, taking into account potential risk and system criticality. The siting of new substations is determined in accordance with PPS25.

16.8 The Environment Agency indicated that it preferred Corridor 1 Option 1A (replacement of the existing overhead line) taking account of both flood risk and ecological issues. It also drew attention to the need to consider new infrastructure (particularly new substations and sealing end compounds) against the criteria in PPS25. It commented that retaining the existing alignment would lead to fewer operational constraints in relation to the management of watercourses.

16.9 The various Internal Drainage Boards did not express any preference for a particular route corridor but were more concerned about the detailed alignment and arrangements for construction to ensure that their interests are protected.

16.10 Respondents also pointed out that the Somerset Levels is an area of flood risk and expressed concerns about the threat to pylon foundations and other infrastructure.

Comparison of Impacts of Route Corridors

16.11 In the low-lying area of the Somerset Levels, flood risk, drainage and climate change are significant issues which must be taken into account.

16.12 With the exception of the Mendip Hills and higher ground to the north of Nailsea, much of both of the route corridors cross land which is susceptible to flooding. There is little to choose between the corridors in terms of flood risk, with the exception of that part of Corridor 2 which passes to the east of Nailsea on generally higher ground. Even in this area, however, there are pockets of flood risk associated with the local watercourses. On all corridors, alignments can be selected and pylons and other infrastructure positioned such that this does not pose a constraint.

16.13 It is relatively straightforward to build flood resilience into overhead lines by addressing safety clearances from anticipated flood levels in line design. The presence of overhead line pylons in areas of flood risk has negligible effect on the displacement of flood water as the lattice steel construction poses no material changes to water flow. Where building within a flood plain cannot be avoided, consideration would be given to encasing steelwork in concrete or waterproof coatings to above the potential flood line.

16.14 National Grid has considered flood risk at all those sites where substation works will be undertaken. Equipment to be installed at Bridgwater will be designed to operate safely during flood events. The works proposed at Seabank have been reassessed and no substation extension is now proposed. Should Corridor 1 Option 1A be adopted and a new substation be required in the Churchill/Sandford area, this will be sited outside flood risk areas.

Conclusions

16.15 Given the above, it is not possible to determine the preferred route corridor on the basis of resilience to climate change or flood risk, as the potential risk is similar for all options and can be managed.

17 COMPARISON OF ROUTE CORRIDORS

Statutory obligations

17.1 National Grid is bound by its statutory obligations "*to develop and maintain an efficient, co-ordinated and economical system of electricity transmission*". These statutory obligations are there to protect the consumer and the actions of National Grid are monitored by Ofgem to ensure that they are met. This report has concluded that all of the route corridors are capable of providing an efficient transmission connection which can be effectively co-ordinated with the actions of generators and the distribution company to meet the needs of all parties. All of the route corridors could accommodate a scheme which would be system compliant and deliverable within the timescale dictated by the connection agreements.

17.2 Corridor 1 Option 1B and Corridor 2 would offer the lowest cost solutions. Corridor 1 Option 1A would accrue additional costs associated with the removal of the 132kV overhead line and works to the 132kV distribution network to maintain supplies. .

17.3 National Grid recognises, however, that it should consider whether the additional costs associated with other options can be justified in terms of reducing the impact of the scheme on amenity and taking into account the concerns of statutory bodies.

17.4 Furthermore, the cost of the overall enhancement to the transmission system which is required also consists of a number of other elements, including upgrading existing overhead lines and implementing substation improvements, and the cost differentials of the Bridgwater to Seabank route corridors are not significant in this context. It is, therefore, considered that cost alone does not materially distinguish between the route corridors under consideration.

17.5 The RCS concluded that, on the basis of environmental considerations alone, Corridor 1 Option 1A was considered to be the least constrained corridor and Corridor 1 Option 1B the most constrained, with the key indicators being the effect on the designated status of the AONB and on the landscape outside the AONB. In Corridor 1 Option 1A, the presence of the existing 132kV overhead lines presents an opportunity to reduce the scale of change which a new overhead line would bring and avoid incursions into areas unaffected by overhead lines. Corridor 2 was not preferred because it would result in closely aligned overhead lines in some areas, including in the AONB, and greater effects on the settlements of Yatton and Nailsea. The RCS noted that there may be opportunities to adopt Corridor 1 on some sections, and Corridor 2 elsewhere, if this offered advantages in areas of constraint.

17.6 Corridor 1 Option 1B (constructing an overhead line parallel to the existing 132kv overhead line) was included in the Route Corrridor Study and subsequent Stage 1 Consultation because at that stage no agreement had been reached with WPD regarding the potential for removing the existing 132kV overhead line. However, such an agreement is now in place and the case for pursuing Corridor 1 Option 1B should, therefore, be re-examined before proceeding further.

Corridor 1 Option 1B

17.7 Corridor 1 Option 1B considers the construction of a new 400kV overhead line approximately 57km long parallel to the existing 132kV line. The 132kV overhead line would not be removed. The default position would be to establish a closely aligned corridor to the east or west of the existing line. The closest technically achievable distance for paralleling is 75m from the existing 132kV overhead line. This close alignment may be difficult to achieve along the full length of the route due to the proximity of environmental constraints, requiring the 400kV line to be offset from a close parallel route in several places.

17.8 Particular areas of constraint include :

- Knowle - blocks of woodland around Knowle Hall and properties in Knowle village may force potential alignments closer to Bawdrip and Woolavington;
- Woolavington - scattered properties to the west of Woolavington;
- East Huntspill - scattered properties to the east of East Huntspill;
- Mark - few gaps in the frontage to B3139 Mark Causeway;
- Tarnock - few gaps in the frontage to A38;
- Webbington - narrow corridor between Webbington and M5 motorway/Loxton;
- North West of Yatton - effects on SSSI;
- Stone Edge Batch - highly constrained by properties and woodland blocks;
- Avonmouth - highly constrained by built development; and
- North of Avonmouth - effect on Mere Bank Scheduled Monument.

17.9 The RCS identified the Mendip Hills AONB as the key environmental constraint in the study area and one which cannot be avoided. National planning policies accord AONBs a high level of protection in relation to landscape and scenic beauty. While neither national nor local planning policies nor National Grid's own duties or policies, including the Holford Rules, preclude consideration of routes through an AONB, in determining whether a route through an AONB would be acceptable, it is necessary to consider the impact which it would have (in particular whether the degree of change to the landscape would be so significant as to affect the purposes of AONB designation). The scope for mitigating adverse impacts should be considered and the views of the statutory consultees must be taken into account.

17.10 Corridor 1 Option 1B would result in a 6km section of parallel overhead lines of different scale and design, passing along the Lox Yeo Valley. This would result in an increased impact on landscape and local views. This would be contrary to policies in the AONB Management Plan and the relevant Development Plans, which seek to resist development in AONBs which may have an adverse impact on the landscape character and where other alternatives may exist.

17.11 The statutory bodies have, with the exception of English Heritage, not commented specifically on the acceptability of Corridor 1 Option 1B, but have all

expressed concern about the potential impact of the proposal on the landscape character of the AONB. English Heritage commented that Corridor 1 Option 1B is considered to be the most environmentally constrained corridor as it would result in a new 400kV overhead line closely aligned to the existing 132kV line for the entirety of the route. The cumulative visual impact of both of these overhead routes on the historic landscape is considered by English Heritage as likely to be very damaging.

17.12 The impact of Corridor 1 Option 1B on the AONB would clearly be greater than Corridor 1 Option 1A, where only a single - albeit larger scale - overhead line would be present in the landscape. Corridor 2 would also result in an additional line passing through the AONB, with the western spur running through a different part of the AONB to that affected by the existing WPD overhead line, which would also remain.

17.13 The Holford Rules encourage high voltage lines to be routed away from lower voltage lines to avoid a concatenation or wirescape. With Corridor 1 Option 1B, this would apply along the whole route and would be a particular issue between Nailsea and Seabank, where two 132kV overhead lines are already present. The difference in scale and design of the existing and proposed lines, and the difficulties (noted above) of achieving consistency in close paralleling, would emphasise the wirescape. This would be a particular concern in the AONB and in sensitive locations close to existing settlements. This issue could only be properly mitigated by the extensive use of undergrounding which could not be justified in terms of National Grid's statutory duties.

17.14 While under National Grid's current approach to undergrounding, the Mendip Hills AONB would be considered an "exceptionally constrained area" and, therefore worthy of consideration for undergrounding, selective undergrounding in this area would not overcome the wider impacts on the landscape.

17.15 Corridor 1 Option 1B was not preferred by any of the statutory bodies who responded to the Stage 1 Consultation.

17.16 In a situation where other, less intrusive, options are available, practical considerations, policy constraints and National Grid's own routeing rules leads to **a conclusion that Corridor 1 Option 1B should be discounted**.

Sectional Analysis of Corridor 1 Option 1A and Corridor 2

17.17 The remainder of this chapter considers the relative merits of Corridor 1 Option 1A and Corridor 2 for discrete sections of the route :

- Bridgwater to the Huntspill River;
- Huntspill River to Webbington;
- Webbington to Yatton;
- Yatton to Portishead; and
- Portishead to Seabank.

17.18 In taking a balanced view of the impact of each route corridor on a range of factors (discussed in previous chapters of this report), National Grid has placed great weight on the outcome of the Stage 1 Consultation in general and on the views of the statutory bodies in particular.

Bridgwater to the Huntspill River

17.19 This part of the proposal would involve creating a link between Bridgwater substation and the Huntspill River north of Woolavington. The existing 132kV overhead line between these points passes through a narrow gap between The Knowle Inn public house and Knowle Manor (a Grade II Listed Building) before traversing the steep gradient of Knowle Hill. Corridor 1 Option 1A would lead to an increase in the scale of overhead lines in the constrained setting of Knowle.

17.20 Adopting Corridor 2 in the vicinity of Knowle, and removing the existing 132kV overhead line, would allow the identification of a detailed connection design which maximises the distance from properties in this area and utilises land with a more gradual sloping gradient which may offer opportunities for backgrounding. Adopting Corridor 2 would also minimise collision effects associated with an area of importance for local lapwing flights within Corridor 1 in the vicinity of Bawdrip.

17.21 In the Corridor 2 scenario, the existing National Grid 275kV overhead line between Bridgwater and Horsey could be retained with a new connection provided from Horsey to the Hinkley to Melksham line. The proposed line would run further away from Bawdrip (and from much of Woolavington) than the existing 132kV overhead line. However, at the northern end of this section,

Corridor 2 would run closer to the northern residential edge of Woolavington than the existing overhead line and could have a direct effect on Middle Moor Water Park. These were identified as concerns by Woolavington Parish Council.

17.22 Corridor 1 Option 1A would lead to an increase in the scale, but not the number, of overhead lines in the vicinity of Woolavington and Bawdrip and this change in scale could also affect the setting of the proposed redevelopment of the Royal Ordnance factory at Puriton, a concern raised by Sedgmoor District Council. However, this redevelopment is to be employment led and partly focussed on the energy sector. It may, therefore, be less sensitive to overhead lines than a residential area, though consideration should be given to potential cumulative effects on the landscape and views should wind turbines be approved at this location.

17.23 There would be an opportunity to secure the benefits associated with Corridor 2 by providing a connection from the 275kV line at Horsey to the route of the 132kV line at Woolavington and removing the section of 132kV line which runs close to Knowle, Bawdrip and Woolavington. Adopting Corridor 1 Option 1A to the north of Woolavington would minimise impacts on the Water Park and residential areas. English Heritage has identified potential impacts on Horsey Medieval settlement as a concern and the design of any tee point at Horsey would need to respect this feature and its setting in views from the M5 motorway.

17.24 **It is concluded that Corridor 2 should be adopted between Horsey and Woolavington and Corridor 1 Option 1A between Woolavington and the Huntspill River**.

<u>Huntspill River to Webbington</u>

17.25 The key issues to be addressed on this section of the route are the potential impacts which the proposal would have on landscape, the archaeology and ecology of the Somerset Levels and the proximity to settlements.

17.26 On Corridor 2, the scale of change to the landscape would be significant as it would involve introducing a new line into a relatively undeveloped area of the Somerset Levels and Moors. This new line would pass close to the villages of Blackford, Chapel Allerton, Stone Allerton and Badgworth which are currently at least 3km from the existing 132kV overhead line. Residents would have close

views of the new overhead line as well as distant views of the existing line. An overhead line in this corridor would be highly visible from the Mendip Hills AONB, particularly as it approaches the Loxton Gap. The villages of Mark and Biddisham would have overhead lines to both east and west. Compton Bishop Parish Council was concerned about the impact of Corridor 1 Option 1B and Corridor 2 on the AONB, Biddisham and Webbington which it considered to be unacceptable.

17.27 Corridor 2 would pass closer to the Somerset Levels and Moors SPA between Burtle and Blackford, which was of concern to Natural England, the Environment Agency, Somerset Wildlife Trust and Burtle Parish Council because of the potential impact on flight paths for migrating birds. Ornithological surveys identified that the potential for significant effects on bird species associated with the Somerset Levels and Moors SPA as a result of an overhead line in Corridor 2 could not be ruled out at this stage due to the proximity of the corridor to the SPA and potential impacts on lapwing. This is addressed in Chapter 12. Other parish councils also raised concerns about the potential impact of the scheme on the wildlife of the Levels. Corridor 2 crosses an area where there is a high potential for archaeological deposits to be found in the peat. English Heritage raised concerns about the potential impact on the setting of historic buildings close to Corridor 2.

17.28 In landscape and visual terms Corridor 1 Option 1A is preferred, as it replaces an existing line which already has an impact on the area through which it passes. There would be a change in scale and the visual impact of the new line would be particularly significant where the line crosses through the settlements of Mark and Tarnock. In these settlements, the existing 132kV line goes through a narrow gap in the linear form of the settlements. There is significant public concern in the Mark locality about the impact of the scheme on the village and on Mark First School, which lies close to the point where the existing line crosses the B3139. The potential impact of electric and magnetic fields is a particular concern in this settlement but this will be fully addressed at the connection design stage to ensure that the design meets the relevant standards under ICNIRP in common with the approach adopted on the rest of the National Grid network. Issues relating to EMFs have been reported in Chapter 5.

17.29 In considering whether a "mix and match" approach to the selection of route corridor might be appropriate, it is accepted that the removal of the existing

overhead line and its replacement along Corridor 2, rather than Corridor 1, would yield a number of benefits. East Huntspill and Rooks Bridge would no longer have overhead lines in their immediate vicinity and the settlement of Mark would no longer be bisected by an overhead line. Set against this, a line in Corridor 2 would pass close to the villages of Blackford, Chapel Allerton, Stone Allerton and Badgworth. Stone Allerton is a Conservation Area and English Heritage referred to the potential impact of Corridor 2 on heritage assets in Blackford and Biddisham. Corridor 2 passes to the east of Biddisham and would impose on views of the Mendip Hills from this settlement. Corridor 2 would also bring overhead lines closer to the Somerset Levels and Moors SPA between Burtle and Blackford, which was of concern to a number of statutory and non-statutory bodies as outlined in paragraph 17.27. Corridor 2 would be almost 3km longer than Corridor 1 on this section of the route which would increase the number of pylons and the cost of construction.

17.30 On balance, therefore, it is concluded that there would be no significant advantage in adopting Corridor 2 as the route for a replacement overhead line.

17.31 **It is concluded that Corridor 1 Option 1A should be adopted between the Huntspill River and Webbington**.

Webbington to Yatton

17.32 The southern part of this section of the route passes through the Mendip Hills AONB. As noted earlier in this chapter, national and local planning policies dictate that where development affects a designated area such as an AONB, it should be designed such that impacts are minimised. On this basis, Corridor 1 Option 1A should be preferred as it would result in the replacement of an existing line, albeit at larger scale, rather than the construction of an additional line. The only reason for not pursuing this option would be if the potential impacts on the remainder of Corridor 1 Option 1A were so significant that they outweighed the reduced impacts which could be achieved with a single line through the AONB.

17.33 North of the AONB boundary, Corridor 1 Option 1A passes close to the village of Sandford before entering the low lying area between Puxton and Congresbury. The ditches and rhynes in this area are designated as SSSI. As the interest lies in the rhynes themselves rather than the surrounding land, it should be possible to site pylons and access routes such that the values of the SSSI are not

compromised. That being the case, there is no reason not to select a corridor which passes across this area.

17.34 The central and eastern spurs of Corridor 2 pass to the west and east of Corridor 1 Option 1A respectively and it would be possible to select either of these routes for a new connection, removing the 132kV infrastructure on Corridor 1 Option 1A. It is considered that there would be little advantage in so doing. The eastern spur of Corridor 2 would have to cross more of the Biddle Street SSSI designated area than Corridor 1 Option 1A and would pass much closer to the Cheddar Valley Walk LNR and the village of Yatton. The central spur of Corridor 2 would introduce overhead lines into the area west of Puxton which would add to the impact of the existing 132kV line to Weston, at variance with Holford Rule 6.

17.35 As a result of public consultation representations, a review has also been undertaken of the potential impacts associated with the western spur of Corridor 2 which runs adjacent to the M5 motorway between Banwell and Yatton. Several consultees suggested that a route corridor following the M5 motorway would be preferable and the western spur to Corridor 2 would provide this approach. However, it would bring overhead lines close to the proposed development areas at Locking on the east side of Weston-super-Mare. Nor is this corridor unconstrained. The limited corridor width available at Banwell, because of the topography and presence of the motorway, means that the corridor passes in close proximity to Banwell Caves SSSI, which is part of the North Somerset and Mendip Bats SAC. There is a significant amount of archaeological evidence along this route corridor. An overhead line in the western spur of Corridor 2 would be more visible in views from and to the Mendip Hills AONB as it travels across higher ground rather than utilizing the low lying land of the Lox Yeo Valley, as do Corridor 1 and the central and eastern spurs of Corridor 2. These issues support the preference for Corridor 1 Option 1A expressed by Banwell Parish Council and the Mendip Society and would be equally applicable whether or not the existing 132kV overhead line is retained.

17.36 North of Sandford, the central and eastern spurs of Corridor 2 diverge from Corridor 1. The eastern spur would convey no advantage as the route for a replacement overhead line under a "mix and match" approach because it would bring the line closer to the edge of Yatton than Corridor 1 and lead to an increase in visual impact. It would also cross more of the area designated as

Biddle Street SSSI. The central spur would pass to the west of Puxton and Nye into an area with more settlement than the area to the east of Puxton through which the existing overhead line passes. As more people could potentially be affected by this corridor, and there would be no particular benefit in not replacing the overhead line in Corridor 1, the latter would be preferred.

17.37 **It is concluded that Corridor 1 Option 1A should be adopted between Webbington and Yatton**.

Yatton to Portishead

17.38 The issues on this section of the route relate principally to impacts on the landscape, ecology and heritage of the area and to the relationship between the route corridors and Nailsea.

17.39 Corridor 1 Option 1A would result in the replacement of an existing line, albeit at larger scale, rather than the construction of an additional line. This issue is particularly important in the context of Nailsea. Corridor 2 would rise to follow a valley alongside the Bristol-Weston railway and would introduce new electricity infrastructure into an area where none exists at present. An overhead line would be prominent in views from the southern and eastern edges of Nailsea. In order to pass through an existing gap in development between Nailsea and Backwell, the corridor must stay close to the edge of Nailsea and the impacts on the settlement are perceived as substantial by local residents and campaign groups. Nailsea Town Council rejected Corridor 2 because it would result in Nailsea being surrounded by overhead lines and because of the impact on the visual amenity of the area and the effect on the popular recreational area of Backwell Lake.

17.40 The National Trust expressed concern about the potential impact of Corridor 2 on the setting of the Grade I listed Tyntesfield House and the views from its Grade II* listed grounds, particularly views to the south and south west across the Lox Yeo valley which would form part of Corridor 2. Corridor 2 would also pass close to residential properties, school and Listed Buildings at Wraxall.

17.41 Corridor 1 Option 1A is constrained in three principal areas. North of Yatton, the corridor passes across Tickenham, Nailsea and Kenn Moors SSSI. As noted earlier, the interest in this site lies in the rhynes themselves rather than the surrounding land and it should be possible to site pylons and access routes such

that the values of the SSSI are not compromised. The existing 132kV overhead line then runs close to the north western edge of Nailsea where it parallels a second 132kV line from Churchill. Due to the width of the corridor, further separation may be achieved between existing and proposed lines in this area. At Stone Edge Batch, the gap between the properties on the B3130 means that, in order to accommodate a 400kV overhead line, both WPD lines would need to be undergrounded at this point. These constraints can all be overcome and, in so doing, the selection of Corridor 1 Option 1A may deliver some environmental benefits for local residents. Corridor 1 Option 1A is to be preferred in the Nailsea area.

17.42 From the top of Tickenham Ridge, two 132kV lines descend to Portishead substation. At the northern end of the route, Corridor 1 Option 1A passes very close to the edge of Clapton-in-Gordano and the recently developed Port Marine residential area south of Portishead Dock. The line between Churchill and Portishead, followed by Corridor 2, maintains a degree of separation between it and residential properties and is, therefore, to be preferred for this section of the route. This approach was also suggested by Portbury Parish Council. Adopting Corridor 2 may provide an opportunity to rationalise the 132kV network in this area.

17.43 **It is concluded that Corridor 1 Option 1A should be adopted between Yatton and the Tickenham Ridge and Corridor 2 between the top of Tickenham Ridge and Portishead.**

Portishead to Seabank

17.44 Between Portishead and Seabank, the presence of a continuous band of development which extends from Avonmouth to Bristol constrains routes and development and means that there is effectively only one route corridor. Further technical studies will be required, at detailed connection design stage, to determine whether an overhead line or undergrounding would be the most appropriate solution in this constrained urban area.

17.45 Bristol City Council and South Gloucestershire Council favoured Corridor 1 Option 1A but raised the issue of the undergrounding of the 132kV line through Avonmouth. WPD has indicated that it wishes to retain a 132kV connection between Avonmouth and Seabank.

17.46 It is concluded that Corridor 1 Option 1A should be adopted between Portishead and Avonmouth Substation and that between Avonmouth Substation and Seabank Substation Corridor 1 Option 1B/Corridor 2 should be adopted. Further studies are required to determine the WPD requirements for supplies to Avonmouth substation and the potential for undergrounding existing or proposed overhead lines.

18 MITIGATION

18.1 During the Stage 1 Consultation, representations were made concerning how National Grid would seek to mitigate the potential impacts associated with an overhead line. In particular, the use of undergrounding was advocated by various parties, including some of the statutory bodies.

18.2 The overall approach to mitigation is set out in National Grid's Stakeholder Community and Amenity Policy. Commitment 5 confirms that National Grid "*will use best practice environmental impact assessment techniques to assess possible effects of our works and identify opportunities for mitigation measures. In the course of this we will consult with relevant stakeholders and affected landowners. Where works are likely to have an adverse effect on amenity, we will carry out mitigation measures to reduce those effects as far as reasonably practicable*".

18.3 Discussions on mitigation will, therefore, form an important element of the next stage of consultation when specific effects have been identified as part of the development of the detailed connection design.

18.4 In representations, reference was made to undergrounding the entire connection between Bridgwater and Seabank or to undergrounding specific sections of the connection, notably within and adjacent to the Mendip Hills AONB and at Avonmouth. Undergrounding the entire connection was considered in the Strategic Optioneering Report (August 2011) but rejected on grounds of excessive cost. In workshops with the statutory consultees and local authorities, further consideration has, therefore, been given to the extent to which undergrounding might be used in each of the corridors.

18.5 The National Policy Statement for Electricity Networks Infrastructure states that the IPC will need to weigh the benefits associated with undergrounding against

any extra impacts (economic, environmental and social) and technical challenges of undergrounding.

18.6 It further states that the IPC should consider :

- the landscape in which the proposed line will be set (in particular, the proximity to residential areas and those of natural beauty or historic importance);
- the additional cost of undergrounding; and
- the environmental and archaeological consequences of undergrounding.

18.7 In respect of the first of these considerations, both corridors pass through the nationally designated Mendip Hills AONB. On Corridor 1 and the central and eastern spurs of Corridor 2, the section between Webbington and Sandford passes through the AONB, while the western spur of Corridor 2 between Webbington and Banwell passes through the AONB.

18.8 With Corridor 1 Option 1A, the greater scale of the 400kV overhead line compared to the existing 132kV overhead line could mean that the electricity infrastructure becomes more prominent in certain views associated with the AONB. Corridor 1 Option 1B would introduce additional infrastructure into the designated landscape and would inevitably be more intrusive. Corridor 2 would also introduce an additional overhead line into the AONB, which would either run parallel to the existing overhead line or, in the case of the western spur, parallel to the M5 motorway.

18.9 The second consideration is whether undergrounding would be cost effective. As discussed in Chapter 6, the costs associated with undergrounding are significant.

18.10 The third consideration is the degree to which undergrounding would have adverse effects on the environment and archaeology of the area, while delivering visual benefits. The Mendip Hills are rich in archaeological interest and undergrounding could impact upon this and upon the intricate ancient field systems of the Lox Yeo valley. In addition, the Somerset Levels are rich in archaeological remains which could be affected by the excavation of trenches to accommodate underground cables.

18.11 No particular technical challenges have yet been identified which would outweigh amenity arguments for undergrounding. Both route corridors pass through the

Avonmouth area. Due to the built up nature of the area and on grounds of amenity an option to use underground cables may be considered, as well as overhead line routeing options. Whichever option is selected, the design will comply with the EMF and contact current guidelines which have been adopted in the UK.

18.12 In relation to the potential landscape and visual benefits of undergrounding, National Grid has sought to take account of the views of a range of professional authoritative advisors, statutory environmental bodies and other organisations as appropriate. Accordingly, a workshop was convened in December 2010 to discuss where, on each of the route corridor options, stakeholders considered there to be particularly sensitive or constrained sections; and where National Grid should focus attention in evaluating and considering the costs and benefits of potential use of underground cables compared to overhead lines. It also considered whether other mitigation measures, or alternative overhead line technology, might be worthy of further evaluation.

18.13 The workshop was attended by National Grid staff and officers from the relevant local authorities (with the exception of Bristol City Council), English Nature, the Environment Agency and English Heritage. A separate workshop was held in March 2011 with officers from Bristol City Council. Whilst other bodies and members of the public had expressed specific views about undergrounding, the attendees were statutory bodies which, it was felt, represented an appropriate range of expertise in the relevant disciplines. Wider public consultation on potential locations for undergrounding will be undertaken more appropriately as part of the detailed connection design stage.

18.14 Undergrounding was considered to offer landscape benefits in certain sensitive areas, notably the Mendip Hills AONB and the Somerset Levels. In considering undergrounding, it was agreed that any assessment should acknowledge the ecological and archaeological values which may be adversely affected by undergrounding. The potential effects of overhead lines on the setting and views to and from Scheduled Monuments, Conservation Areas, Listed Buildings and other known heritage assets, and how this could be avoided, was considered to be important.

18.15 For the area between Bridgwater and the Mendip Hills, the workshop highlighted the following issues for consideration :

- views across the Somerset Levels from the tors, Polden Hills, Brent Knoll and Crook Peak, as well as effects on proposed development at Puriton;
- alignments should run with the grain of the landscape, with the natural ridge lines and drainage dykes being characteristic features;
- rationalisation of existing low voltage overhead lines should be considered;
- potential effects of overhead lines on bird migration;
- undergrounding within the Somerset Levels to avoid effects on villages and the setting of heritage assets;
- high archaeological potential on Corridor 2; and
- Mark Causeway as an area for undergrounding on Corridor 1.

18.16 In the area of the Mendip Hills AONB, the workshop highlighted the following issues for consideration :

- any connection through the AONB should be via underground cables as the whole of this designated landscape is extremely sensitive;
- soil depths suggest that a connection on lower ground along Corridor 1 or the eastern spur of Corridor 2 may be preferable;
- undergrounding should extend beyond the AONB boundary, respecting its setting and views from and to the AONB;
- importance of not affecting heritage features related to former lead mines;
- particularly important to consider impacts on the northern edge of the AONB where views are experienced by more people, and along the M5 motorway corridor; and
- potential effects of western spur of Corridor 2 on bats, particularly near Banwell Caves.

18.17 Between the Mendip Hills and Tickenham, the workshop highlighted the following issues for consideration :

- use of underground cables in this area could have adverse effects on the SSSIs - importance of rhynes and ditches for invertebrates and plants;
- rationalisation of existing low voltage overhead lines should be considered, particularly around Nailsea;
- the view to Clevedon from Tickenham Ridge - an important approach into Somerset;

- potential effects on Tyntesfield Registered Park and Garden and views from it.

18.18 Between Tickenham and Seabank, the workshop with Bristol City Council highlighted the following issues for consideration :

- opportunities to site overhead lines against a backdrop of industrial/port buildings;
- potential effects of a new overhead line and wind farms in Avonmouth;
- potential effects of a new overhead line on bird migration;
- relationship between overhead lines/cable routes and open space;
- height of structures required to cross the estuary and railway;
- setting of Mere Bank Scheduled Monument and Listed Buildings;
- disruption during construction of cable connections;
- sterilisation of development land by cable connections; and
- visual intrusion of sealing end compounds.

18.19 Undergrounding was considered by the workshops to offer a clear benefit in the high value landscape of the Mendip Hills AONB. If it is concluded, following further investigations, that undergrounding in this area would indeed be justified, then similar considerations would be likely to apply to both corridors. The extent of undergrounding in the area would be similar. In that case, the cost differential of the two corridors would remain approximately the same. As noted in paragraph 18.16 above, constraints to undergrounding in the AONB would require further investigation to determine whether the benefits of undergrounding to the local economy and environment would outweigh the costs. As the scope for mitigation is similar in both cases, the output of the workshop suggested that the scope for undergrounding would not favour either corridor over the other.

18.20 While there was some support for undergrounding at specific locations in the Somerset Levels, it was considered that the potential effects on below ground archaeology could be significant and that a balance would need to be struck between the benefits of undergrounding and the potential effects on buried/unknown archaeology.

18.21 Representations to the Stage 1B Consultation highlighted concerns about the presence of existing and proposed overhead lines, operated by both National Grid and WPD, in the vicinity of Nailsea and Yatton. Respondents expressed the view that a new 400kV overhead line would only be acceptable if the existing lower voltage WPD network could be rationalised and placed underground. Further studies should, therefore, be undertaken to evaluate options for undergrounding in this area which involve both future National Grid and existing WPD overhead lines.

18.22 Putting cables underground is only one way in which the effects of the connection could be mitigated. The detailed connection design will take account of the Holford Rules in developing the alignment of sections of overhead line and the position of pylons and will be informed by the results of an environmental impact assessment and local consultation. Some representations referred to the use of different pylon designs. National Grid is currently engaged in reviewing designs, including those used overseas that could be appropriate for use on National Grid's transmission network and will consider, and consult upon, alternative tower designs as part of the development and assessment of the detailed connection design. This will include consideration of the use of low-height towers in appropriate locations. There may also be scope to rationalise the lower voltage network in the area.

19 CONCLUSIONS

19.1 On the basis of the evidence presented in this report and supporting documentation, it is concluded that :

- **the option of constructing an overhead transmission line between Bridgwater and Seabank should be confirmed as the basis for the Hinkley Point C Connection and to meet the need to enhance the electricity transmission network in the South West and South Wales and Gloucestershire region for all identified future generation and demand requirements;**
- **Corridor 1 Option 1A should be selected as the basis for developing a scheme for an overhead line connection between Bridgwater and Seabank with the following exceptions :**
  - **Horsey to Woolavington (Corridor 2);**
  - **Tickenham Ridge to Portishead (Corridor 2);**

- **Avonmouth Substation to Seabank Substation (Corridor 1 Option 1B/ Corridor 2).**

- **further studies should be undertaken to evaluate where the undergrounding of sections of the proposed 400kV or existing WPD overhead lines may be appropriate to mitigate the potential impacts of the connection on sensitive locations, and be subjected to further consultation at Stage 2;**
- **further studies should be undertaken to determine the extent and location of works required to maintain supplies on the 132kV distribution network, and be subjected to further consultation at Stage 2.**

20 NEXT STEPS

20.1 Following the adoption of a preferred route corridor, detailed consideration will be given to possible alignments for overhead lines, and pylon locations, within the preferred corridor. The potential justification for certain sections of transmission line to be undergrounded will also be considered, in accordance with National Grid's revised approach, when a detailed connection design is being developed. The detailed connection design will be subject to environmental impact assessment and further public consultation. The Consultation Strategy for Stage 2 will include the establishment of Community Forums and Thematic Groups to inform the development of a preferred connection option alongside the EIA survey work. It is anticipated that these groups will meet regularly throughout the project life cycle. The refinement of a proposed connection design will emerge as part of the ongoing consultation process.

20.2 National Grid’s public consultation on the preferred connection option will be undertaken in autumn 2012. The proposal will then be finalised and it is anticipated that a submission will be made to the IPC (or its successor) in 2013, seeking consent for the connection and associated development. Timescales and activities may be subject to alteration as the project progresses.

Appendix 1 : International and National Wildlife Sites in the Study Area

Site Name	Location/ Grid Ref	Reason for Designation
Severn Estuary SAC/SPA/ Ramsar/SSSI	ST 321748	The Severn Estuary is a large estuary with an extensive intertidal zone. Saltmarsh fringes the coast backed by grazing marsh. It is of importance during the spring and autumn migration periods for waders moving up the west coast of Britain, as well as in winter for large numbers of waterbirds. SAC - Annex I habitats: coastal and estuarine habitats. Annex II species: sea lamprey, river lamprey and twaite shad. SPA - Article 4.1 (supporting bird populations of European importance that are listed on Annex I). Article 4.2 (supporting at least 20,000 waterfowl). Ramsar – Internationally important wetland including coastal and estuarine habitats and invertebrate and fish communities. SSSI – There are several SSSIs within the Severn Estuary SAC/SPA (Bridgwater Bay SSSI; Severn Estuary SSSI; Berrow Dunes SSSI)
Somerset Levels and Moors SPA and Ramsar Site	ST 387360	The Somerset Levels and Moors are one of the largest and richest areas of traditionally managed wet grassland and fen habitats in lowland UK. SPA - Article 4.1 (supporting bird populations of European importance that are listed on Annex I). Article 4.2 (supporting at least 20,000 waterfowl). Ramsar – Internationally important wetland including rare invertebrate communities. SSSI – There are several SSSIs within the Somerset Levels and Moors SPA (Kings Sedgemoor SSSI; Moorlinch SSSI; Catcott Edington and Chilton Moors SSSI; Tealham and Tadham Moors SSSI).
Mendip Limestone Grassland SAC	ST 401557	This site comprises coastal and inland sections of the carboniferous limestone outcrops of the Mendips. The coastal headland and inland hills support the largest area of CG1 *Festuca ovina – Carlina vulgaris* grassland in England, including two sub-types known from no other site in the UK. Annex 1 habitats: semi-natural dry grassland and scrubland facies on calcareous substrates; European dry heaths; caves not open to the public and slopes, screes and ravines. Annex II species: greater horseshoe bat. SSSI – There are several SSSIs within the Mendip Limestone Grassland SAC (Brean Down SSSI; Uphill Cliff SSSI; Crook Peak to Shute Shelve SSSI).

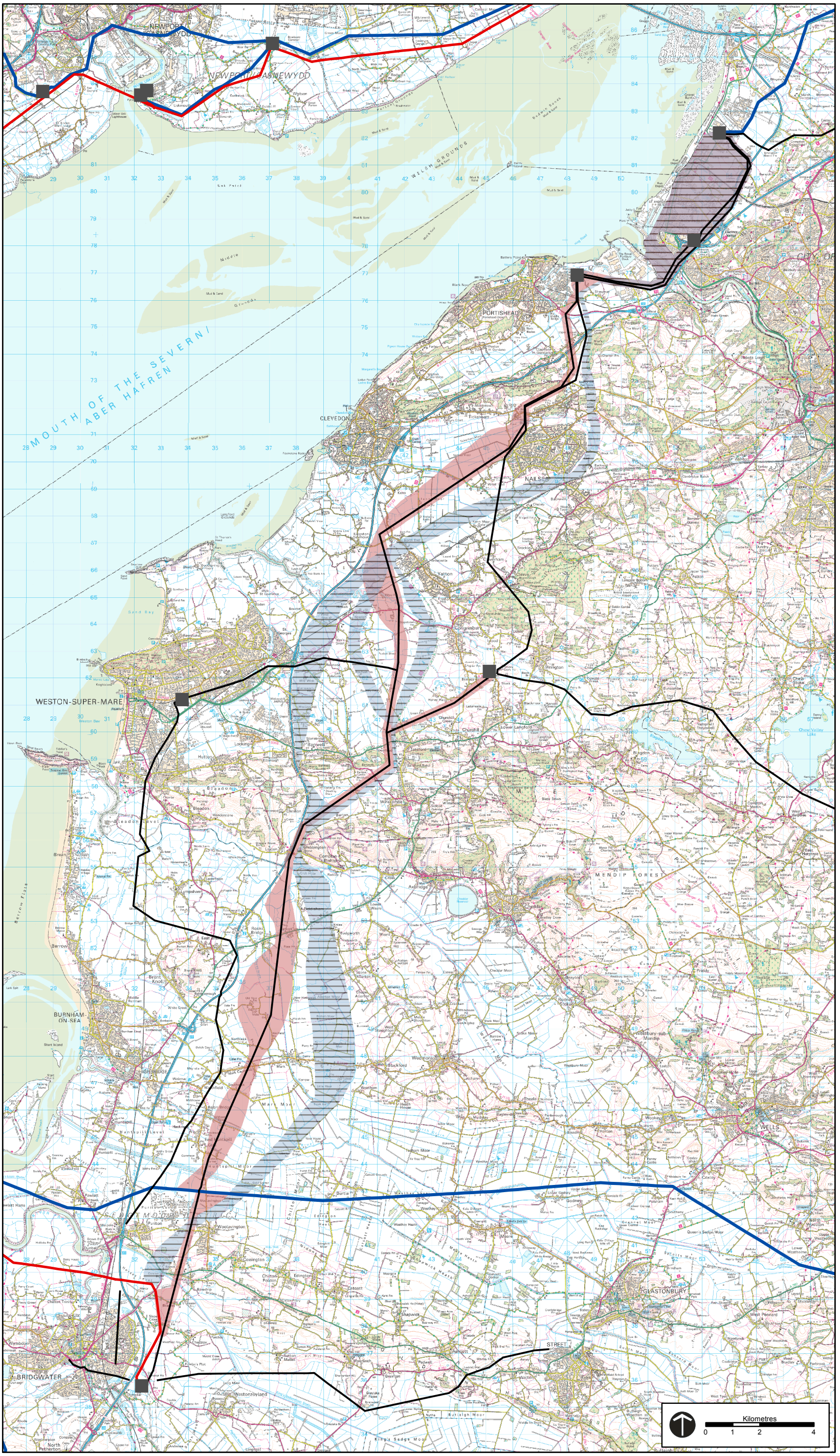
Site Name	Location/ Grid Ref	Reason for Designation
North Somerset and Mendip Bats SAC	ST 480544	The limestone caves of the Mendips provide a range of important hibernation and maternity sites for lesser and greater horseshoe bat. Annex 1 habitats: semi-natural dry grassland and scrubland facies on calcareous substrates; caves not open to the public and slopes, screes and ravines. Annex II species: lesser horseshoe bat; and greater horseshoe bat. SSSI – There are several SSSI within the North Somerset and Mendip Bat SAC (Banwell Caves SSSI; Banwell Ochre Caves SSSI; Brockley Hall Stables SSSI; Kings Wood and Urchin Wood SSSI)
Huntspill River NNR	ST 320443	The Huntspill River NNR contains open water (the river has retention sluices creating an elongated reservoir), lowland grassland and woodland. At its western end the Huntspill enters the Bridgwater Bay SSSI. Otters and barn owl use the site.
Bridgwater Bay NNR/SSSI	ST 290480	Bridgwater Bay NNR is contained within Bridgwater Bay SSSI which is part of the Severn Estuary SAC/ SPA/Ramsar.
Purn Hill SSSI	ST 332573	It is of interest for its diverse unimproved calcareous grassland.
Shiplate Slait SSSI	ST 364567	It is of interest primarily for its unimproved calcicolous grassland, which forms mosaics with areas of scrub and woodland.
Max Bog SSSI	ST 406574	The site is a calcicolous lowland mire with adjacent wet neutral grassland.
King's Wood and Urchin Wood SSSI	ST 454645	It is one of the largest areas of ancient woodland remaining in Avon and supports nationally important populations of greater horseshoe bat and dormouse.
Yanal Bog SSSI	ST 424607	It is a calcicolus lowland mire. The plant communities associated with the peat surface are nationally rare.
Puxton Moor SSSI	ST440700	The site forms part of the Avon Levels and Moors. Drained by a network of rhynes and ditches, the area supports a wide diversity of aquatic plants and invertebrates.
Biddle Street, Yatton SSSI	ST 423648	The site forms part of the Avon Levels and Moors. Drained by a network of rhynes and ditches, the area supports a wide diversity of aquatic plants and invertebrates.
Tickenham, Nailsea and Kenn Moors SSSI	ST 440700	The site forms part of the Avon Levels and Moors. Drained by a network of rhynes and ditches, the area supports a wide diversity of aquatic plants and invertebrates.
Goblin Combe SSSI	ST 473652	The site contains ancient woodland, unimproved calcareous grassland and limestone heath. There are nationally rare plants present on site and also a rich invertebrate fauna. The site supports a dormouse population and provides foraging habitat for greater horseshoe bats.

Site Name	Location/ Grid Ref	Reason for Designation
Gordano Valley SSSI	ST 435730	The site is an extensive, low-lying and poorly drained peat moor. It supports a wide variety of wet-meadow, reedbed and carr communities. The valley is of botanical, ornithological, entomological and geological interest.
Walton Common SSSI	ST 428738	The site supports a complex mosaic of grassland, scrub and woodland and is of high botanical and entomological interest.
Weston Big Wood SSSI	ST 455750	The site comprises mixed deciduous woodland with a rich variety of plant species.

Appendix 2 : Abbreviations

AC	Alternating Current
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AWT	Avon Wildlife Trust
CBA	Cost Benefit Analysis
DC	Direct Current
DNO	Distribution Network Operator
EC	European Commission
EDF	Electricité de France
EIA	Environmental Impact Assessment
EMF	Electric and Magnetic Fields
ENSG	Electricity Networks Strategy Group
EWEA	European Wind Energy Association
GIL	Gas-Insulated Lines
GIS	Gas-Insulated Switchgear
GSP	Grid Supply Point
GW	Gigawatt
HVDC	High Voltage Direct Current
ICM	Interim Connect and Manage
ICNIRP	International Commission for Non Ionising Radiation Protection
IET	Institution of Engineering and Technology
IPC	Infrastructure Planning Commission
km	Kilometre
kV	Kilovolt
LDD	Local Development Document
LDF	Local Development Framework
LNR	Local Nature Reserve
m	Metre
MVA	Megavolt Ampere
MW	Megawatt
NETS SQSS	National Electricity Transmission System Security and Quality of Supply Standard
NNR	National Nature Reserve
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OFGEM	Office of Gas and Electricity Markets
PPG	Planning Policy Guidance Note
PPS	Planning Policy Statement
RPG	Registered Park and Garden
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SGT	Super Grid Transformer
SLA	Special Landscape Area
SM	Scheduled Monument
SOCC	Statement of Community Consultation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SWT	Somerset Wildlife Trust
TEP	The Environment Partnership
UK	United Kingdom
WPD	Western Power Distribution

FIGURE A : ROUTE CORRIDOR OPTIONS



Key

Existing Infrastructure

- Existing Substation
- Existing 400kV Overhead Line
- Existing 275kV Overhead Line
- Existing 132kV Overhead Line

Proposed

- Route Corridor 1
- Route Corridor 2
- Shared Corridor

TEP
Genesis Centre
Birchwood Science Park
Warrington WA3 7BH
Tel 01925 844004
Fax 01925 844002
email tep@tep.uk.com

Project: Hinkley C Connection

Title: Route Corridors

Drawing No: G1979.247

Date:	TEP Ref No:
17-03-11	G1979.247

Drawn	Checked	Approved
CB	CC	CC

FIGURE B : PREFERRED ROUTE CORRIDOR

Key

Existing Infrastructure

- Existing Substation
- Existing 400kV Overhead Line
- Existing 275kV Overhead Line
- Existing 132kV Overhead Line

Proposed

- Preferred Route Corridor
- WPD 132kV Overhead Line to be removed

TEP
Genesis Centre
Birchwood Science Park
Warrington WA3 7BH
Tel 01925 844004
Fax 01925 844002
email tep@tep.uk.com

Project: Hinkley Point C Connection

Title: Preferred Route Corridor Final

Drawing No: G1979.160h

Date:	TEP Ref No:
August 2011	G1979.160h

Drawn	Checked	Approved
CB	CC	CC

nationalgrid

National Grid
National Grid Electricity Transmission plc
National Grid House
Gallows Hill
Warwick
CV34 6DA
www.nationalgrid.com