Document 5.2.2.7

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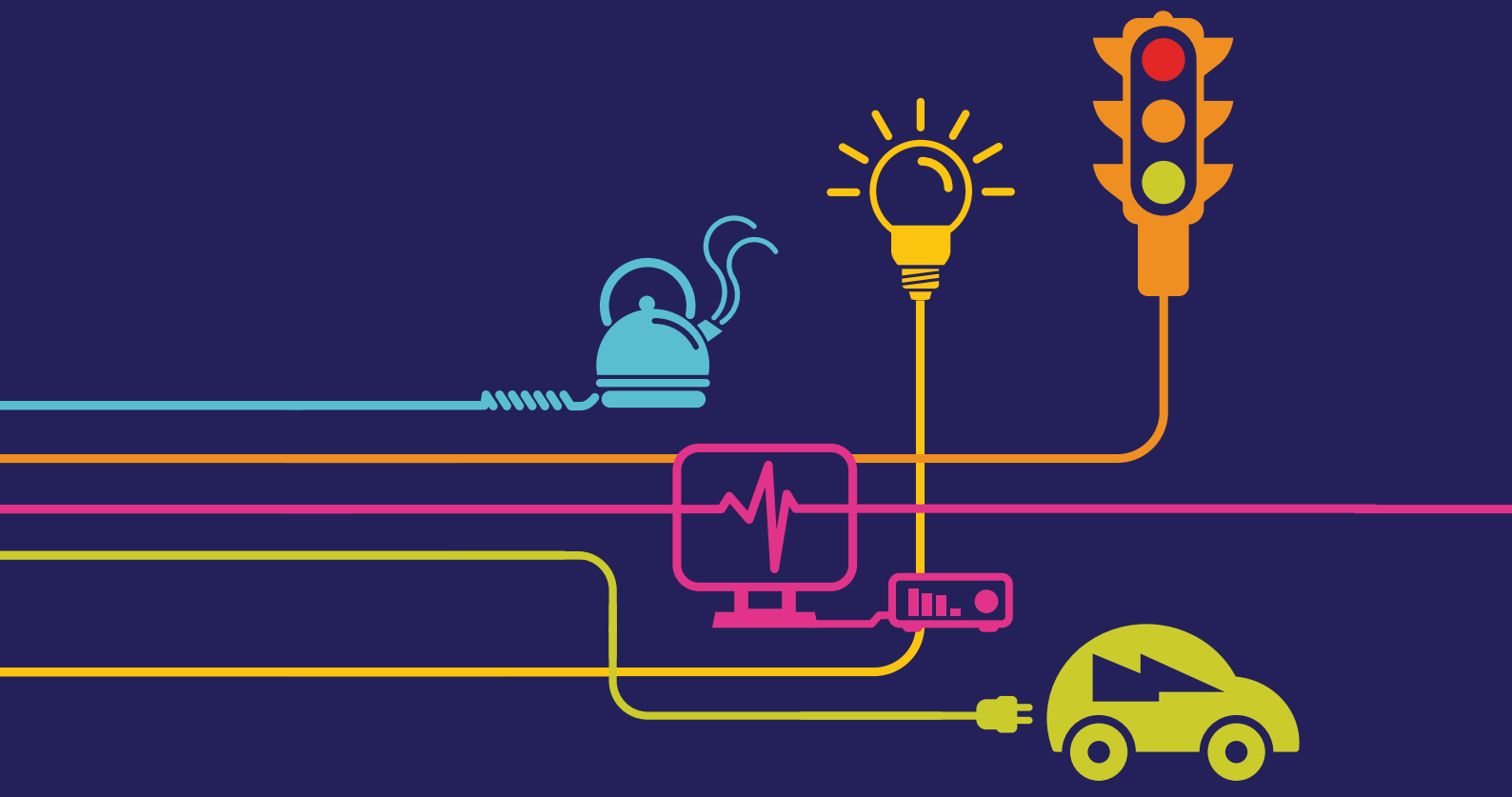
Environmental Statement Project Need and Alternatives Appendix 12

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

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Environmental Statement

Hinkley Point C Connection Project

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

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2Q	Western Power Distribution Connection between the Proposed Sandford Substation and the Existing AT Route Connection Options Report (2013)
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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)

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Appendix 2L – Distribution Systems Options Report (2012)

MAY 2012

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Hinkley Point C Connection Project

Distribution System Options Report

Hinkley C Connection Project:

Distribution System Options Report

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BS2 0TB

National Grid
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CV34 6DA

April, 2012

1 Introduction

1.1 On September 29th, 2011 National Grid Electricity Transmission Limited ("National Grid") announced its intention to proceed with the next phase of consultation on its proposed transmission connection between Bridgwater in Somerset, and Seabank substation near Avonmouth (the Hinkley Point C Connection project). For most of the new connection National Grid is proposing to use the route corridor currently occupied by an existing 132kV overhead line which runs between Bridgwater and Seabank. This is owned and operated by Western Power Distribution (South West) Limited (WPD).

1.2 National Grid is undertaking further environmental studies, design and consultation to determine the detailed connection design of the new 400kV connection and whether this will be underground, overhead or a combination of both. The existing WPD circuit will be dismantled and removed between Bridgwater and Avonmouth substations for whichever 400kV technology option is taken forward.

1.3 The removal of WPD's 132kV double circuit overhead line between Bridgwater and Avonmouth substation disconnects the electricity supply to consumers in the Weston and Churchill area. As a result National Grid and WPD must restore supplies to the electricity distribution system in these areas.

1.4 The purpose of this Distribution System Options Report (the "Report") is to inform statutory consultees and other stakeholders of the range of options considered by WPD and National Grid for restoring supplies to the Weston and Churchill BSPs, whilst at the same time maintaining the local distribution system's security of supply for customers at existing levels.

1.5 This Report provides:

(a) An analysis of the technical options;

(b) An overview of the options appraisal approach;

(c) An assessment of each option taking into account technical, economic, environmental and socio-economic issues, and

(d) Summary and identification of the preliminary preferred option

Statutory Consultees and Local Planning Authorities Consultation

1.6 Following production of the Draft Distribution System Options Report (December 2011) National Grid and WPD consulted with the local planning authorities and key stakeholder agencies to obtain technical feedback and guidance on the draft report. The following organisations were consulted:

- North Somerset Council;
- Natural England;
- English Heritage; and
- Environment Agency.

1.7 Officers from the above organisations were invited to attend a workshop event during January 2012 at which the need for the development and the method and findings of the draft report were presented and key issues discussed. Attendees and those that were invited but were unable to attend were provided with copies of the draft report and asked to provide technical feedback and officer opinions on the work done to date. The specific items raised and responses to these are set out in a table presented at Appendix 5 of this report. The comments received are officers' technical and initial responses and do not form an official response or view of any of the organisations or planning authorities on the options considered.

1.8 WPD and National Grid will continue to regularly review the proposed solution in light of changes of circumstances that could materially affect the analysis. These include but are not limited to, decisions regarding the routeing and technology of National Grid's 400kV connection, wider technology developments, cost updates and changes to the connection dates of new generators in the region.

1.9 Comments on the content and analysis included in this Report are welcome and will be taken into account in the on-going development of the project and future reviews.

2 Technical Overview

2.1 The electricity system is made up of networks which operate at different voltage levels. Transmission networks, which in England and Wales operate at voltages of 400kV and 275kV, are used for the bulk transfer of power from generation to distribution networks. This is primarily to facilitate higher power transfers and to reduce the amount of power lost during the transportation process because losses are reduced at higher voltages.

2.2 Distribution networks, in contrast, are mainly concerned with the delivery of power to consumers at lower voltages, 132kV, 66kV, 33kV and below. Distribution networks typically provide electricity to major conurbations through a radial network of circuits operating at reducing voltage levels and power carrying capacity.

2.3 The connection of transmission and distribution networks occurs at Grid Supply Points (GSP). These are typically substations where power is transformed from 400kV or 275kV to 132kV, 66kV or 33kV for onward distribution to consumers.

2.4 Bulk Supply Point (BSP) substations operate at 132kV and 66kV and provide a distribution hub where power is transformed to voltages ranging from 66-33kV and below for onward distribution to local towns, villages, farms and industry.

2.5 Churchill BSP generally provides electricity to communities to the east of the M5 in North Somerset and to Bristol Airport, while Weston BSP generally provides supplies to Weston-Super-Mare and communities to the west of the M5.

2.6 The removal of the existing WPD 132kV double circuit overhead line which runs between Bridgwater and Avonmouth substations would remove the connection that provides electricity to the Churchill and Weston Bulk Supply Points. These BSPs provide the electricity supply to the local towns and villages as well as Bristol Airport. Peak electricity demand at these BSPs is approximately 140MVA and is forecast to rise to 150MVA by 2018.

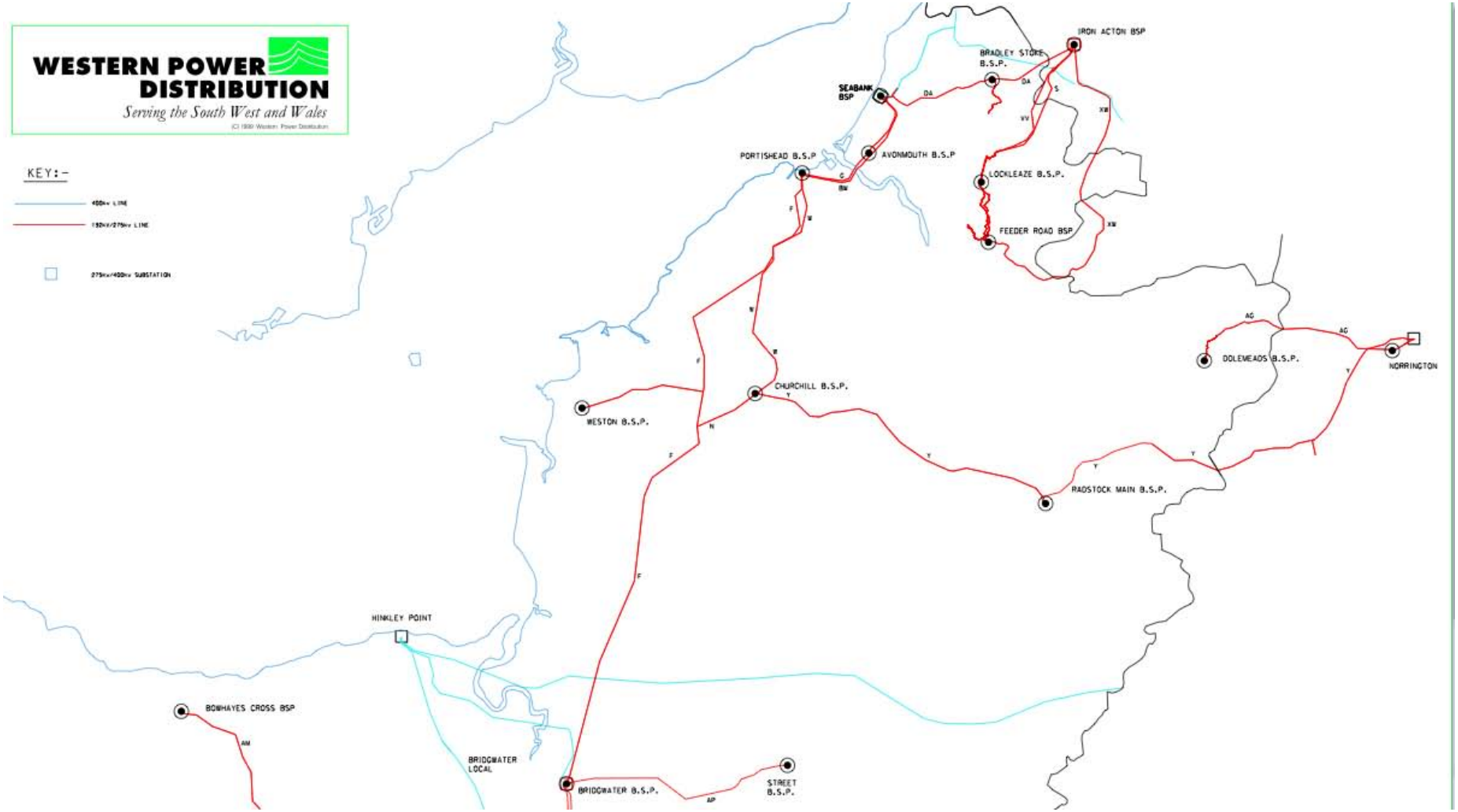
2.7 Churchill BSP substation and Weston BSP substation are supplied via the F and G 132kV overhead line routes. These 132kV overhead lines connect to GSPs at Bridgwater and Seabank which are the closest points on the existing transmission system. With the removal of the F and G routes new GSP connections must be established.

2.8 The section of the 132kV circuit which connects Bridgwater to Portishead is known as the “F-route” and the section from Portishead to Seabank, via Avonmouth, is known as the “G-route”. Figure 2.1 below shows the current geographic configuration of the WPD network and highlights the F and G routes.

2.9 The following sections of this report present the assessment of a number of technical options that were considered to provide the necessary connections to maintain current levels of distribution network security and reliability to customers served by the Weston and Churchill areas of the WPD network.

2.10 The current network in the Weston and Churchill area has sufficient capacity to meet forecast demand growth for the foreseeable (beyond 2020) and at the same time provides operational resilience and flexibility. It is essential that no reduction in capacity or network resilience results from the removal of the F-route and that neither WPD nor its customers are left disadvantaged.

Figure 2.1: Map of the 132kV Distribution Network



3 Review of Technical Options

3.1 As explained in Section 2, Churchill BSP substation and Weston BSP substation are supplied via the F and G routes from GSPs at Bridgwater and Seabank which are the closest points on the existing transmission system. With the removal of the F and G routes new GSP connections must be established.

3.2 New connections can be established either by reconfiguring the WPD network to provide new connections to the existing GSPs or by providing a new GSP with new connections to the 132kV network. The technical alternatives were therefore assessed in two groups:

- 132kV solutions which restore supplies to Churchill and Weston from existing GSPs by the reconfiguration and upgrading of the existing WPD and the neighbouring SSE network in combination with new 132kV infrastructure.

- GSP solutions which establish a new 400/132kV GSP in the vicinity of Churchill and Weston with new connections to the WPD network.

3.3 These two groups of technical options are discussed further below but first the existing distribution system is described.

The Existing Network

3.4 A schematic diagram of the existing electricity network is shown in Figure 3.1 which highlights the route names of the existing circuits.

3.5 WPD's existing 132kV network in the area is designed around the Grid Supply Points (GSPs) at Bridgwater and Seabank.

3.6 Bridgwater GSP substation is supplied at 275kV from Hinkley Point substation, by two 240MVA 275/132kV supergrid transformers (SGTs). Bridgwater GSP supplies two bulk supply points (BSPs), namely Bridgwater Grid and Street. Bridgwater Grid BSP has three 60MVA 132/33kV transformers, and Street has one 60MVA 132/33kV transformer.

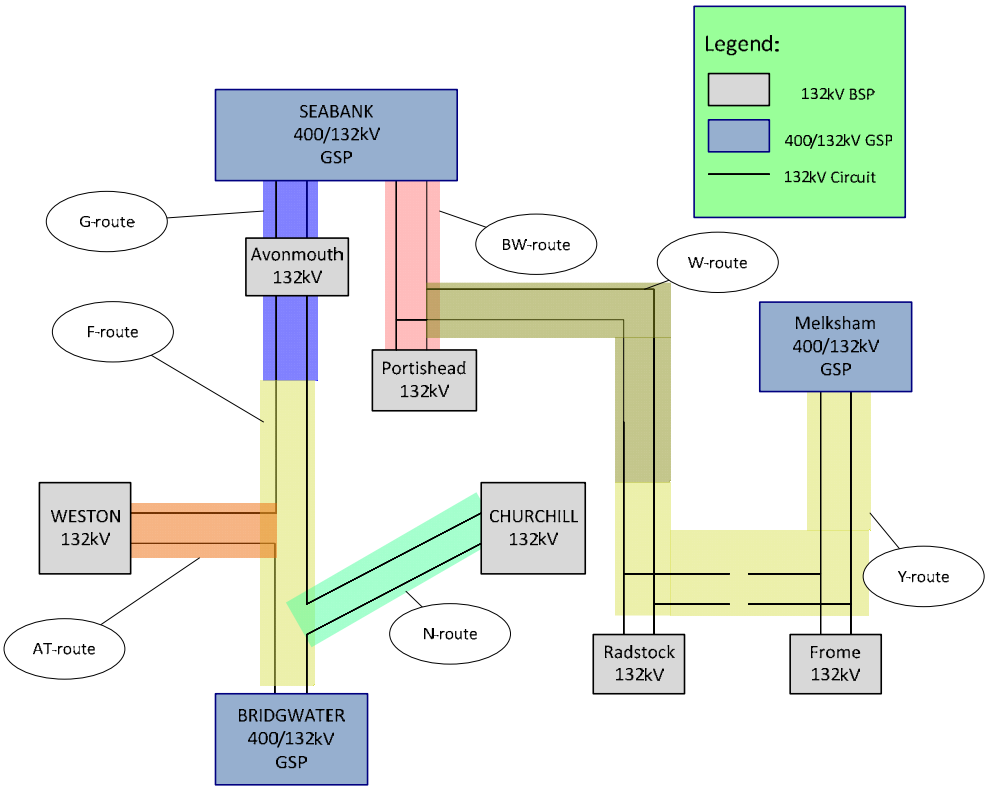


Figure 3.1: The existing 132kV network route names

3.7 From Bridgwater GSP, there is a double circuit 132kV overhead line that exits the substation in a northerly direction (the F-route) starting at tower F-180. At tower F-77, there is a connection to the N-route 132kV double circuit overhead line, which travels north east to provide a supply to Churchill BSP substation. Churchill BSP substation has one 60MVA 132/33kV transformer and one 90MVA 132/33kV transformer.

3.8 At tower F-69, there is a connection to the AT-route 132kV double circuit overhead line which runs west to supply Weston BSP. The AT-route has a combination of 275kV and 132kV lattice construction towers. Weston BSP has two 60MVA 132/33kV transformers.

3.9 From tower F-69 the F-route continues north to tower F-35, where the F-route runs parallel with the W-route 132kV double circuit overhead line around the west side of Nailsea, over Tickenham Ridge and on towards Portishead BSP substation. At Portishead substation, the F-route finishes at tower F-6. The F-route provides no connection into Portishead substation, but continues unbroken (now renamed as the G-route) towards Avonmouth, starting at tower G-5A.

3.10 The G-route continues northwards and crosses over the River Avon on very tall towers (approximately 92m tall). At tower G-23A, the G-route supplies Avonmouth BSP, with one 90MVA transformer teed off each circuit.

3.11 From G-23A, the G-route continues overhead into Seabank GSP, terminating at tower G43, with a short cable section into the substation.

3.12 Out of Seabank GSP substation there are three 132kV double-circuit overhead lines. One is G-route (as described above). The other two comprise the BW-route and DA-route. The DA-route, which is not considered further in this report, starts at DA-1 and continues in a north-easterly direction to DA-52 at Iron Acton GSP substation. The DA-route supplies BSPs at Seabank, Severnside and Bradley Stoke.

3.13 The BW-route starts at Seabank with a short cable section required for exiting the substation that connects to terminal tower BW-1. It continues in a southerly direction and passes close by Avonmouth BSP at tower BW-20.

3.14 The BW-route continues over the River Avon on tall towers (approximately 52m tall) terminating at tower BW-39. At BW-39 the BW-route supplies Portishead BSP, with one 60MVA 132/33kV transformer teed off each circuit.

3.15 From Portishead, the BW-route continues as the W-route, starting at tower W-3. The W-route continues southwards to tower W-69, a position approximately 250m east of Churchill BSP. From W-69, the W-route continues unbroken as the Y-route, starting at Y-1. The W-route and Y-route provide no connection to Churchill BSP.

3.16 From Y-1, the Y-route continues in a south-easterly direction to Y-73 at Radstock BSP, where there is a 132kV substation, supplying two 90MVA transformers.

3.17 From Y-74, there is a 132kV double circuit overhead line link to Melksham BSP (normally disconnected at tower Y-93). One circuit is normally utilised at 33kV to provide electricity to the City of Bath however the remaining circuit may be used as a back-up connection during outages into Radstock and Frome.

3.18 The section of the Y-route from Radstock to Frome Tee is partly owned by Scottish & Southern Energy (SSE). SSE proposes to remove approximately

12km of this overhead line (from tower Y-102 to the Frome Tee) in 2012 since it is rarely used, and in poor condition. WPD intend to retain the towers between tower Y-74 (Radstock) and tower Y-102 to continue to provide 33kV supplies to the City of Bath.

132kV Options

Re-establishing the F & G Route by underground 132kV cable (Option TO1)

3.19 Re-establishing a connection back to the GSPs at Bridgwater and Seabank by new 132kV double circuit underground cables was considered. This option (TO1) is shown in Figure 3.2 below. The proposed 400kV line from Bridgwater to Seabank is shown in blue which forms part of the Hinkley Point C connection.

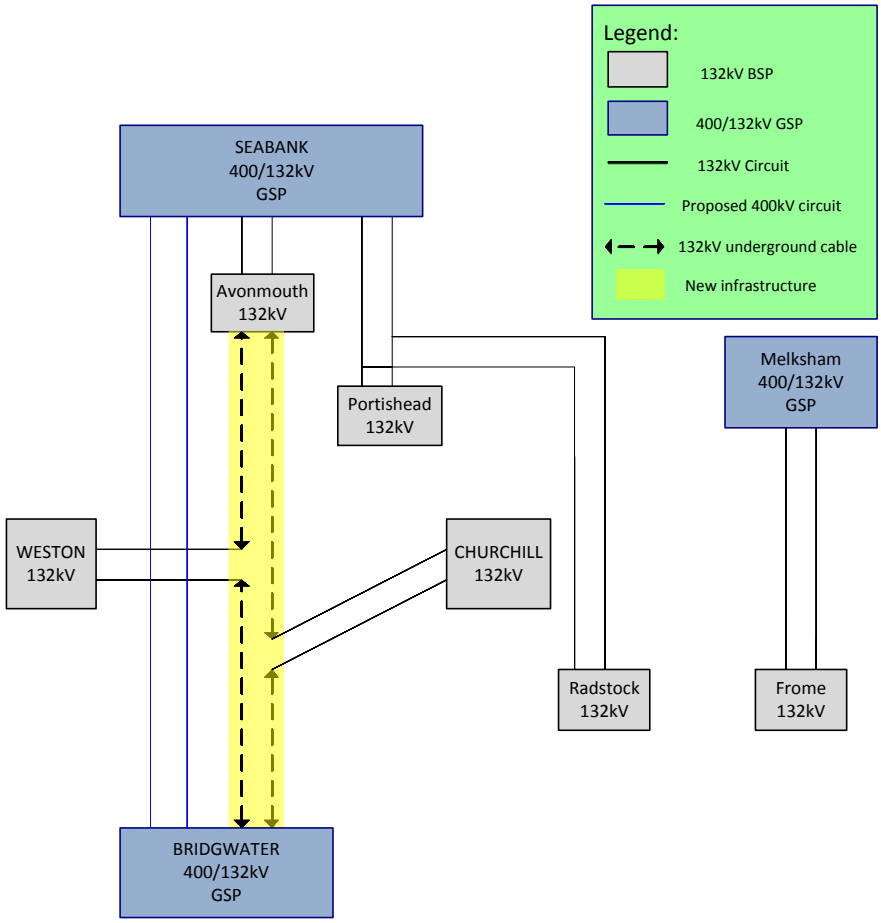


Figure 3.2: Option TO1 (not to scale)

3.20 This option would restore the current configuration and level of security of supply.

3.21 Option TO1 is considered in detail in Section 5.

Connections to Seabank & Melksham GSPs by the W & Y route (Option TO2)

3.22 This option establishes connections to Seabank and Melksham GSPs by reconfiguring and upgrading the W & Y route circuits between Churchill and Melksham. This option, TO2, is illustrated in Figure 3.3. This option also requires a new connection between Churchill and Weston which is assumed to be established by connecting the N-route to the AT-route as shown in Figure 3.3. The proposed 400kV line from Bridgwater to Seabank is shown in blue which forms part of the Hinkley Point C connection.

3.23 As explained in paragraph 3.18, SSE has proposed to remove the 12km section of overhead line between Radstock and the Frome Tee. This option would require the retention of that circuit to provide a connection to Melksham GSP.

3.24 Option TO2 is considered in detail in Section 6.

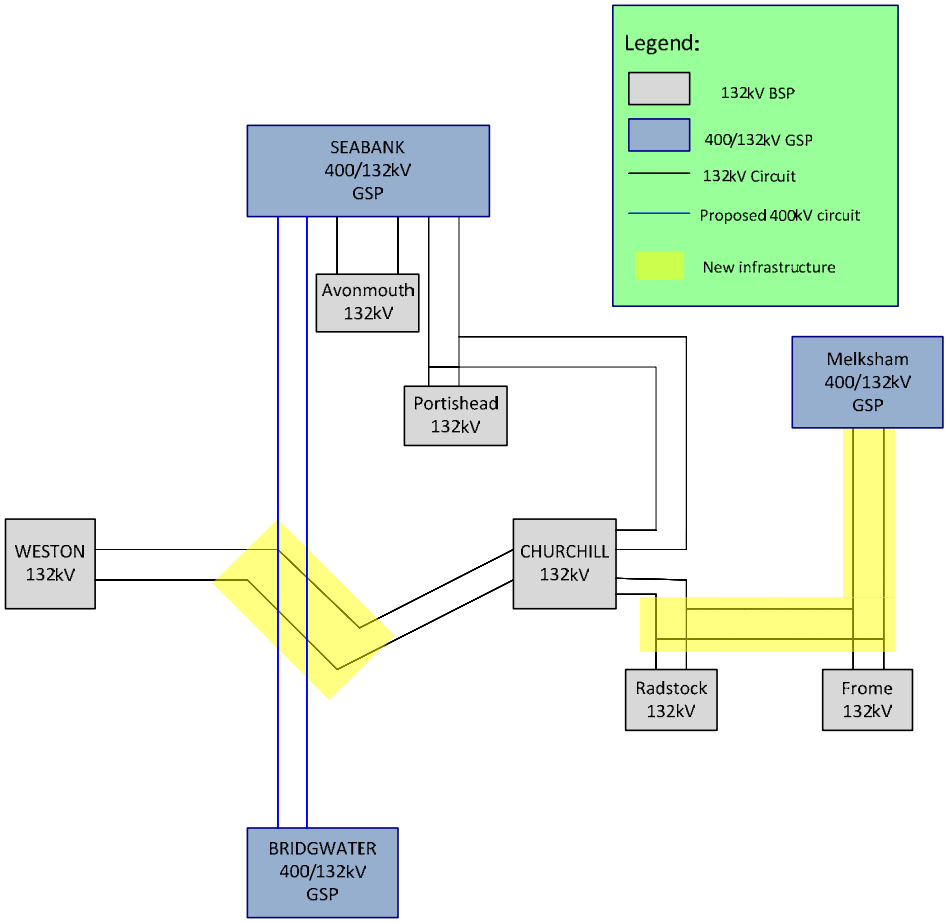


Figure 3.3: Option TO2 (not to scale)

Connections to Seabank & Bridgwater GSPs by the W & new F' route (Option TO3)

3.25 This option establishes connection to Seabank GSP by reconfiguring the W route so that it turns into Churchill substation. A connection is also established to Bridgwater GSP by a new F' route which would connect Bridgwater GSP to both Churchill and Weston. A connection between Churchill and Weston BSPs is also required. The new F' circuit could be a new route or may possibly use the route of existing 33kV circuits. This option is considered in more detail in Section 7 and illustrated in Figure 3.4. The proposed 400kV line from Bridgwater to Seabank is shown in blue which forms part of the Hinkley Point C connection.

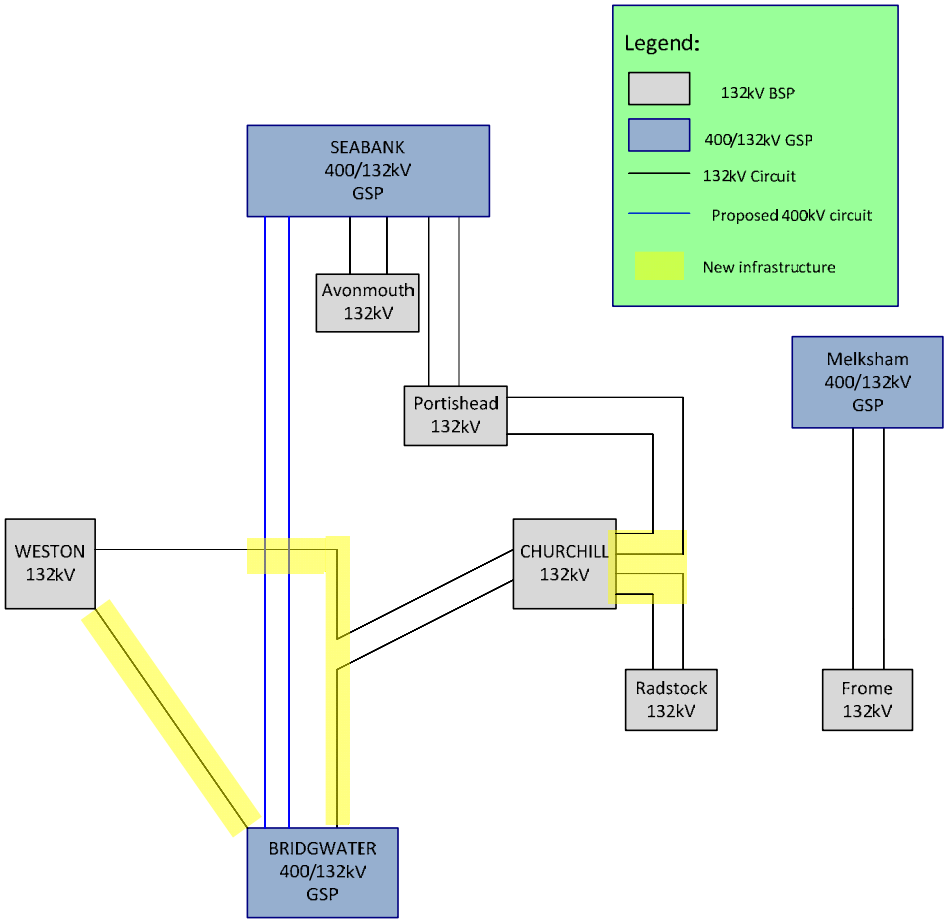


Figure 3.4: Option TO3 (W & New F'-route) (not to scale)

GSP Connection Options

3.26 The alternative to establishing new 132kV connections back to the existing GSPs is to establish a new Grid Supply Point (GSP) substation closer to Churchill and Weston. The GSP substation would connect directly to the proposed National Grid 400kV circuits between Bridgwater and Seabank, and be sited so as to minimise the new connections required.

3.27 Two variants of this option are considered, the first establishes the GSP substation in close proximity to the existing Churchill 132kV substation (TO4) and the second establishes the GSP close to the new 400kV circuits between the N Route and AT Route 132kV overhead lines (TO5) to the north of the village of Sandford. The former would require the establishment of a 400kV connection between the GSP and the proposed Bridgwater to Seabank 400kV circuit. This could be established by utilising the route of the existing 132kV N-route by overhead line or underground cable. Option TO5 would require a

132kV connection to Churchill which could potentially utilise the existing N-route.

3.28 In both options a connection to Seabank GSP would also be established by turning in the W route at Churchill 132kV substation. This ensures that the options provide adequate security of supply for the area.

3.29 As well as the substation and W-route turn in, connections would also be required between the GSP substation and Weston (AT-route) and these are highlighted in Figures 3.5 and 3.6. The proposed 400kV line from Bridgwater to Seabank is shown in blue which forms part of the Hinkley Point C connection.

3.30 Option TO4 is discussed in further detail in Section 8 and TO5 in Section 9.

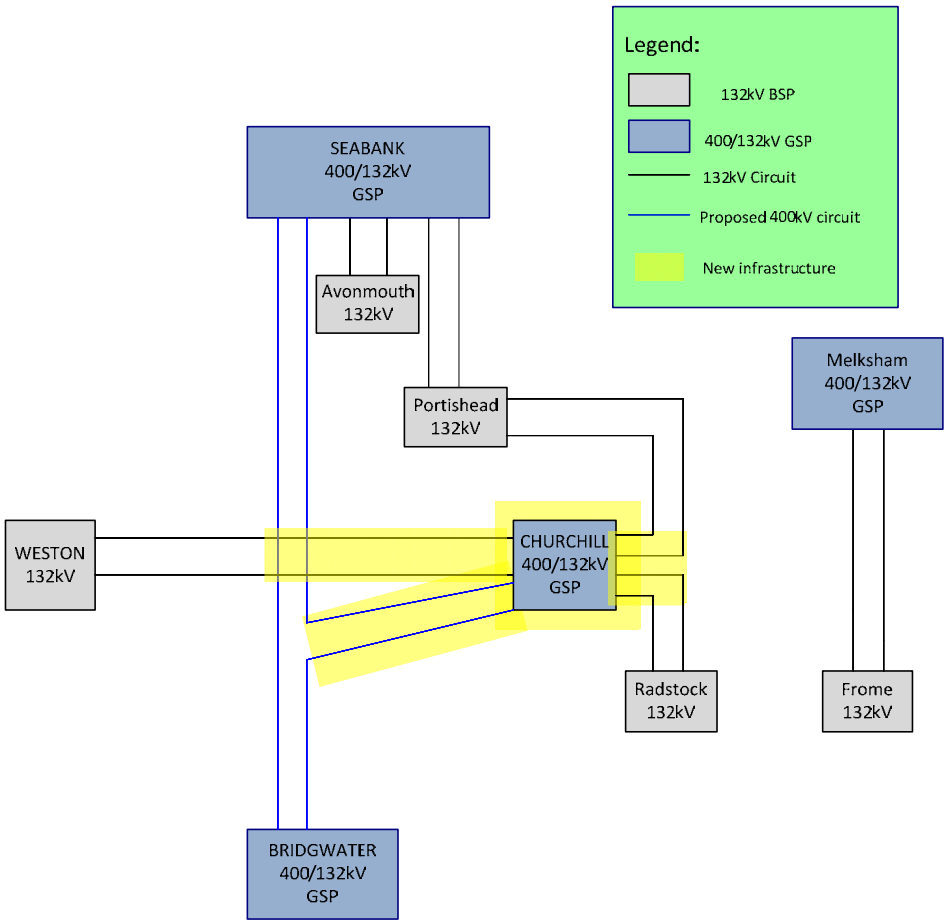


Figure 3.5: Option TO4 (not to scale)

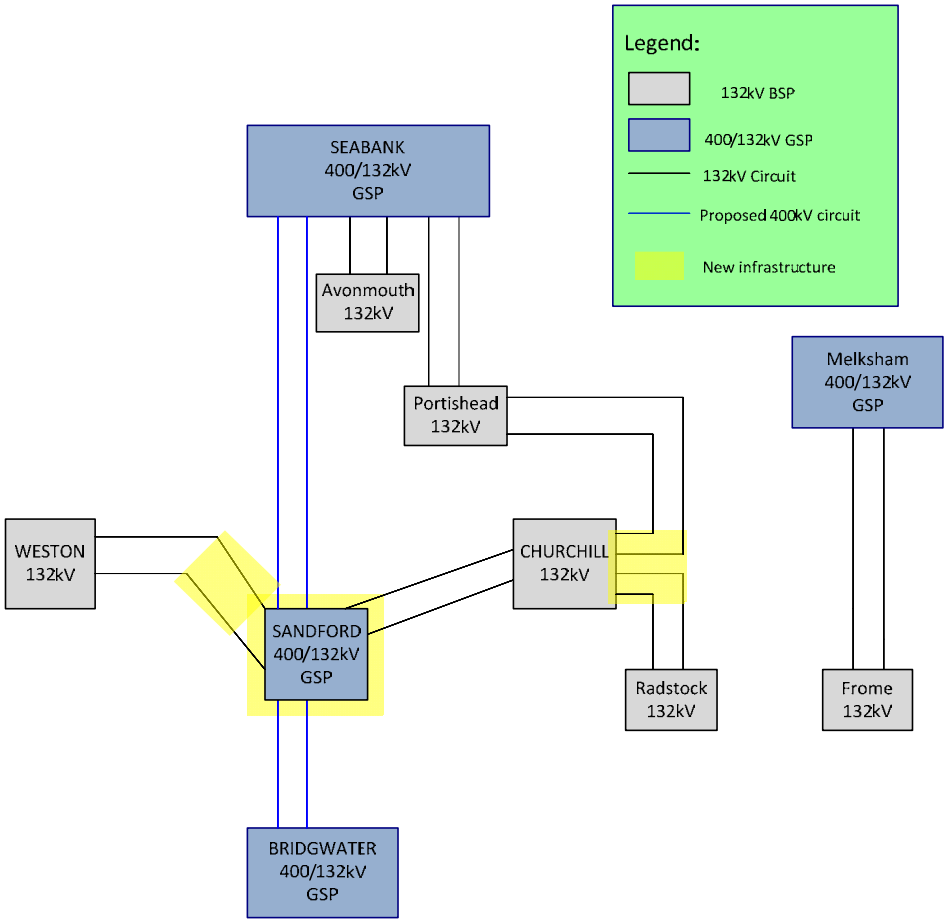


Figure 3.6: Option TO5 (not to scale)

Summary of Technical Options Reviewed in this Report

3.31 The technical options for restoring electricity supplies to consumers in the Churchill and Weston areas have been considered and are documented in subsequent sections of this Report.

3.32 The options that were reviewed are:

(a) TO1: New 132kV double circuit underground cables between Bridgwater & Avonmouth.

(b) TO2: 132kV Connections to Seabank and Melksham via the W & Y routes

(c) TO3: 132kV Connections to Seabank & Bridgwater via the W & new F' route

(d) TO4: New 400/132kV GSP substation at Churchill and associated 400kV connections to the transmission system and 132kV connections to the distribution network.

(e) TO5: New 400/132kV GSP substation in close proximity to the proposed 400kV transmission circuit and associated 132kV connections to the distribution network.

3.33 Detailed explanations of the configuration, estimated costs and environmental appraisal of each of the above options can be found in Sections 5-9.

Appraisal of Technology Suitability for Technical Options

3.34 Three technology categories considered applicable to these options:

(a) AC underground cables;

(b) Gas insulated lines (GIL); and

(c) AC overhead lines.

3.35 TO1 is only considered as 132kV AC underground cables. GIL is not considered at 132kV because the capacity required is not sufficient for a GIL solution to offer any advantage over AC underground cable. GIL solutions are significantly more expensive for the required electrical capacity. An overhead line solution is not considered because the existing 132kV line is taken down as part of the Hinkley Point C connection and to replace it would be to go back to the rejected parallel lines connection[1].

3.36 TO2 and TO3 only require new 132kV circuits and both AC underground cables and overhead lines are considered.

3.37 TO4 considers the use of GIL, AC underground cables and overhead lines for the 400kV elements of the option. For the 132kV elements both AC underground cables and overhead line are considered.

[1] Hinkley C Connection Project Statement of preferred Route Corridor August 2011

3.38 TO5 only requires new 132kV circuits and both AC underground cables and overhead lines are considered.

3.39 Table 3.1 provides a summary of the technology options that WPD and National Grid considered should be assessed as part of its review of options analysis of the technical options.

Technology	TO1 Bridgwater – Avonmouth	TO2 W & Y Routes	TO3 W & F' Routes	TO4 New GSP at Churchill	TO5 New GSP near to the 400kV circuits
AC Underground Cables	Yes (132kV cables)	Yes (132kV cables)	Yes (132kV cables)	Yes (both 132kV and 400kV)	Yes (132kV only)
Gas Insulated Line (GIL)	No	No	No	Yes (400kV only)	No
AC Overhead Line	No	Yes	Yes	Yes (both 132kV and 400kV)	Yes (132kV only)

Table 3.1: Technologies considered for each technical option

3.40 The next section provides an overview of the options appraisal methodology.

4 Overview of Options Appraisal Methodology

4.1 Options appraisal is a multi-criteria analysis which considers relevant technical, environmental and socio-economic issues and the costs associated with each technical option. Analysis of these factors allows WPD and National Grid to assess which options best meet their various statutory and licence obligations.

4.2 In accordance with both the Statement[2] and Policy[3], WPD and National Grid will only propose to build new infrastructure where existing infrastructure cannot be technically or economically upgraded to meet system security standards and regulatory obligations. Where there is no viable existing upgrade option, WPD and National Grid will develop a solution (e.g. the installation or construction of a new infrastructure) that seeks to achieve the best integration of their various duties and obligations as set out in Appendix 1.

Technical Appraisal

4.3 Section 3 explains that each technical option has been assessed initially to ensure that it meets the need to restore consumer supplies and that the resultant transmission and distribution systems would comply with the standards set out in P2/6 and NETS SQSS. This means that the implications of each option on both the local and wider transmission and distribution systems are fully assessed before it is appraised further. Technical options which do not meet the standards set out in P2/6 or NETS SQSS have not been identified for further analysis.

4.4 In some cases wider transmission or distribution works are required to resolve overload or other technical issues arising from a technical option. This is because the nature of each identified technical option has a different effect on resolving the need for additional system capacity. The infrastructure works, including wider works, for each technical option also take into account any construction deliverability and operational issues associated with that option.

[2] WPD Schedule 9 Statement: http://www.westernpower.co.uk/getdoc/c4856406-1794-4e34-81a0-9f2b593cdd4a/schedule9.aspx

[3] Stakeholder Community and Amenity Policy: http://www.nationalgrid.com/NR/rdonlyres/21448661-909B-428D-86F0-2C4B9554C30E/39991/SCADocument6_2_Final_24_2_10.pdf

Economic Appraisal

4.5 Once the full scope of works associated with each option is identified, an estimate of the capital cost of that scope of works is made. For the specific new overhead line, underground AC cable, GIL, substations and transformers (SGTs) associated with each option, operational lifetime costs are then estimated.

4.6 Capital cost is an estimate of the cost of equipment and installation costs. These costs are provided in current financial year prices applicable at the time of publication of this Report. For the purposes of reviewing technical options, the cost estimates are based on generalised unit costs for the key elements of the option, reflecting recent contract values or manufacturers' or consultants' budget estimates. This is sufficient to allow a broad order of consistent costs to be established for the options, as necessary at the strategic level, and is not intended to provide a detailed cost for each option which can only be obtained at the detailed design stage.

4.7 The lifetime cost is an estimate of the transmission and distribution losses, and maintenance costs for the new infrastructure which includes overhead line, underground AC cable (including shunt reactors), GIL, substations and supergrid transformers over a 40 year lifetime. The costs for operation, maintenance and losses are calculated based on a net present value (NPV) discount rate of 3.5%. The 3.5% value is that recommended by Her Majesty's Treasury Green Book[4]. The lifetime cost estimate methodology is explained in Appendix 2.

Environmental Appraisal

4.8 The environmental appraisal for each of the technical options, (see Appendix 3), has considered environmental constraints of international and national importance. Features considered as potential environmental constraints to each technical option are presented in Table 1.2, Appendix 3. Table 1.2 also summarises the legislation under which protection is conferred, the reference to the guidance which identifies the features and the data sources from which

[4] HM Treasury Green Book; Appraisal and Evaluation in Central Government; Guidance from HM Treasury to public bodies on how proposals should be appraised prior to significant commitment of funds. Reference Section on Discounting; 5.49; http://www.hm-treasury.gov.uk/d/green_book_complete.pdf;

information (where applicable) was taken. There are some environmental factors that have not influenced the high-level strategic appraisal. The factors scoped out of the appraisal at this stage are also outlined in Appendix 3.

Socio-Economic Appraisal

4.9 For the reasons set out below, socio-economic factors (with the exception of potential effects on strategic land use and economic planning) have been scoped out of the appraisal at this technical options stage.

Tourism and Recreation

4.10 It has been suggested in some representations made to consultation on National Grid's Route Corridor Study that there may be some impacts at a local scale on tourism based on the proximity of the proposed infrastructure to important landscape and views. However, there is no evidence or studies that demonstrate a measurable economic effect from overhead lines. WPD and National Grid acknowledge that tourism is important to some parts of the economy in the part of the Somerset region where the need for new infrastructure has been identified. WPD and National Grid have assumed that there may be potential effects on tourism from any of the technical options. However, it is not considered that potential effects on tourism comprise a significant factor in choosing between different options at the strategic level.

Agricultural Assessment

4.11 At the technical options stage it is neither necessary nor appropriate to assess potential impacts on individual agricultural businesses. The permanent land take from an overhead line would be very unlikely to result in a significant impact on the agricultural land resource. Underground technologies would potentially involve a greater impact on agricultural land quality but this would be anticipated to be temporary and of relatively short duration. Effects on agriculture are not anticipated to differentiate between options at this strategic level.

Transport

4.12 Construction works will involve transport of materials and workforce to sites. The effects will be temporary and will be subject to management to ensure that

effects are not unacceptable. This will be the case for any option and transport is not a material factor in distinguishing between options.

Wider Economic Benefits

4.13 Wider economic benefits to the local community from a connection are likely to relate to the additional economic activity in the locality during construction. This is anticipated to be positive, although it will be temporary and relatively short-term. It is unlikely to give rise to any issues that would distinguish between options at the technical options stage and is not considered in the appraisal.

Deprivation

4.14 The Index of Multiple Deprivation is generally acknowledged to be the main tool for examining impacts on deprived areas. The Index is a combined index derived from 37 different indicators, which cover specific aspects or dimensions of deprivation: income, access to employment, housing, education, skills and training, health and disability, living environment, and crime. These are weighted and combined to create the overall Index of Multiple Deprivation. It is not considered that any of these factors are likely to be affected by the connection options and the Index is not therefore considered in the appraisal of technical options.

People and Communities

4.15 In investigating technical options, WPD and National Grid seek to avoid or minimise impacts upon settlements (or as route alignments/substation siting becomes more certain in the later stages of detailed design, maximise the distance from individual homes) for reasons of general amenity. Analysis of the potential effects of different technical options on factors such as agricultural land, residential property and commercial property values is not therefore considered in the appraisal of technical options at this stage. Those whose property will have WPD or National Grid equipment sited on or across it (e.g. if the conductors/ wires – oversail a landholding) are entitled to compensation

under property law and these factors may be the subject of compensation assessment once the final route alignment is decided[5].

4.16 Potential effects on property prices are, therefore, scoped out of the appraisal at this stage.

Aviation and Defence

4.17 There are a number of airfields in the study area, including Bristol International Airport, Bristol Filton Airport, helicopter landing sites at Weston-super-Mare and Avonmouth, a microlight aerodrome at Hewish to the east of Yatton and a number of other small private airstrips. These facilities are not a material factor in distinguishing between options as they are either too distant from the options to be affected by them or are in locations where intervening overhead lines would pose a greater potential constraint on operations than would the options being appraised. Accordingly the topic has been scoped out of the appraisal.

Socio-Economic Planning Policy

4.18 A high level planning policy analysis has been undertaken to identify the main areas of economic importance in policy terms. The status of particular areas in employment terms is largely reflected in Development Plans and any supporting Economic Development Strategies, prepared by local authorities or regional bodies. Such documents have been considered in the appraisal.

4.19 The following planning policy areas relevant to socio-economic issues have been considered where development implications might affect/be affected by technical options:

- Spatial settlement policies;
- Employment policies, including tourism;
- Recreation/leisure policies including green infrastructure;

[5] The degree to which impact in terms of injurious affection of property and entitlement to compensation is something which can only really be assessed and agreed once a connection is in place and the actual impact evaluated.

- Areas of current/potential mineral workings, and

- Other significant development proposals with impacts relevant to technical options.

4.20 Socio-economic effects have been assessed to determine the extent to which they assist in meeting policy objectives.

5 TO1: New 132kV Underground Cables replacing the F-route

5.1 Option TO1 restores supplies in the Churchill / Weston region by establishing a replacement 132kV double circuit underground cable connection between Bridgwater and Avonmouth as shown in Figure 5.1.

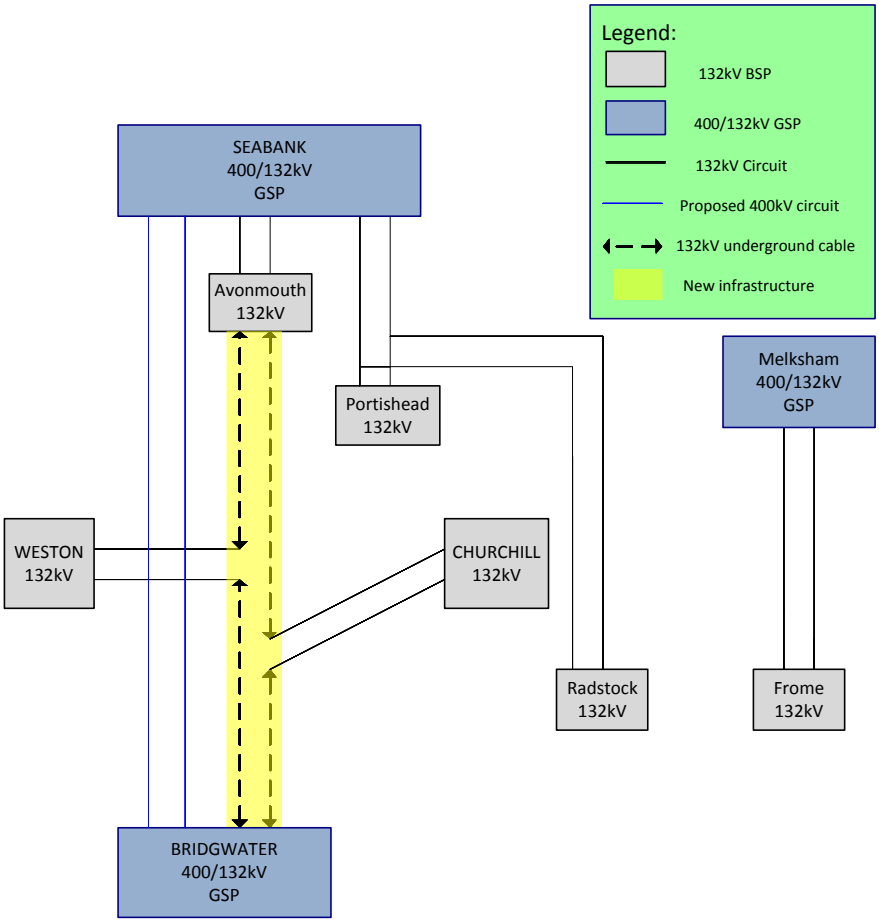


Figure 5.1: TO1 – Schematic

5.2 The option requires a double circuit underground cable from Bridgwater to the Sandford area where the circuits would connect to the existing overhead line to Churchill (N-route). The cables would continue to the Puxton area where a connection would be made to the existing overhead line to Weston (AT-route). The cables would then continue on to Avonmouth. The total circuit length would be approximately 54km.

5.3 Cable sealing ends would be required to connect the underground cables in the substations at both Avonmouth and Bridgwater, and to make connections to the AT route and N route overhead lines.

5.4 These long sections of 132kV cable would also require reactive compensation to control the system voltage and ensure it remains within statutory limits. Further studies would be required to identify how much and where reactive compensation was likely to be required were this option be taken forward.

TO1 Capital Costs

5.5 The cost estimates associated with TO1 are summarised in Table 5.1 below.

400kV Works		
GSP	None required	
400kV Circuits		
	None Required	
132kV Works		
132kV Substation Works	None Required	
New 132kV Circuits	U/G	
Bridgwater – Avonmouth connections (54km x 2 x 132kV underground cables)	£108m	
4 x Cable Sealing Ends (for connection of cables to existing Weston & Churchill 132kV circuits)	-	£0.6m
TOTAL		**£108.6m**

Table 5.1 - TO1 (132kV Underground Cables) Capital Cost Summary

TO1 Lifetime Cost

5.6 The lifetime cost methodology is explained in Appendix 2. The lifetime costs assessed for option TO1 are shown in Table 5.2 below:

	TO1 **AC Underground Cable**
Capital Cost	£108.6m
Distribution Loss Cost	£3.6m
Maintenance Cost	£1.89m
Lifetime Cost	**£114.09m**

Table 5.2: TO1 Lifetime Cost

TO1 Environmental Appraisal

5.7 The study area for the Bridgwater to Avonmouth underground connection extends from the eastern edge of Bridgwater, Somerset to the existing WPD 132kV substation at Avonmouth, Bristol (see Figure G1979.03.037b). The study area includes the main settlements of Bridgwater and Burnham-on-Sea in Somerset, Weston-super-Mare, Clevedon, Portishead in North Somerset and Avonmouth, Bristol.

5.8 The extent of settlement would constrain an underground route to the west of the M5 motorway. As a result this study has focussed on an underground connection to the east of the M5. In order to connect to the existing AT and N overhead lines in the most direct and efficient manner, a connection would need to follow a similar corridor to the existing 132kV overhead line (F Route) between Bridgwater and Portishead.

5.9 A new underground 132kV connection between Bridgwater and Avonmouth could be achieved and would offer benefits in terms of landscape and views over an equivalent length of overhead line. However, the construction of underground connections is more invasive than for an overhead line and would have a greater scale of effect on sites important for their ecology or archaeology. Construction results in disturbance to ground vegetation which could affect the integrity of a designation or its qualifying features and detailed study would be required to determine appropriate routeing, working methods and mitigation. Underground connections routed through heritage assets may cause permanent loss due to the intrusive nature of the construction.

5.10 A direct connection between Bridgwater and Avonmouth would need to travel through the Mendip Hills AONB. The connection would need to be routed on lower ground within the Lox Yeo Valley to avoid constraints such as SSSIs, SACs and woodland. The connection would give rise to temporary effects on landscape and views within the AONB during construction. However, once the land had re-established, these effects would be minimal. The connection would need to avoid areas of woodland and other features which are important to the scenic character of the AONB. The Mendip Hills AONB is also noted for its ecological and archaeological importance and these factors would require further consideration if this option was taken forward.

5.11 To avoid the designated part of the Huntspill River NNR an underground connection would need to travel along the eastern edge of the study area between the NNR and sites within the Somerset Levels Special Protection Area (SPA) and Ramsar site, where a SM also forms a constraint. The connection would still need to cross beneath the Huntspill River. Further detailed study would be required to determine any potential effects arising from a connection beneath or close to the NNR if this option was taken forward.

5.12 Component sites of the North Somerset and Mendip Bats SAC lie within the study area but could be avoided. The connection would pass through the North Somerset and Mendip Bats SAC 5km consultation zone which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. The potential effects on SAC bat species arising from an underground cables connection would be associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. An assessment of the potential effects on the integrity of the SAC and its qualifying features would be required as part of the next stage of assessment if this technical option was taken forward.

5.13 The study area contains large areas of land that are afforded protection under ecological designations. These include areas of ditches and rhynes designated as SSSIs (e.g. Puxton Moor and Nailsea, Tickenham and Kenn Moors SSSI). In combination with settlements, woodland and SMs, a potential route would be constrained to narrow areas of land to the east of the M5, west of Yatton and between Tickenham and Nailsea. Whilst an underground connection could be achieved which largely avoided these sites, they would have an influence on the directness of any route and further detailed assessment would be required to determine the potential for direct and indirect effects on these sites and their

features of special interest if this technical option was identified as the most suitable and taken forward.

5.14 The connection would need to cross the River Avon, a component part of the Severn Estuary SSSI, SAC, SPA and Ramsar site. The use of a tunnel under the River would be less invasive than direct bury techniques but would require the construction of tunnel headhouses on either side of the channel. Further detailed study would be required in accordance with the Conservation of Habitats and Species Regulations 2010 to identify any direct or indirect effects which may arise on the integrity of the designation if this technical option was taken forward.

5.15 Compared to other options comprising substations and overhead lines, an underground connection between Bridgwater and Avonmouth would be preferred in terms of landscape and visual effects, particularly relating to the AONB and settlements. It would also be preferred in terms of visual effects on the setting of designated historic sites, but this would need to be balanced with potential negative effects on ecology or buried archaeology which may be lost through the construction of an underground connection. Whilst it would be possible to avoid the SMs within the study area, there are other known non-designated assets and unknown assets which could be affected.

5.16 Further detailed study along any underground connection route would be required to identify the potential for archaeological remains and any direct and indirect effects resulting from construction and installation. PTO5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*. Underground connections routed through heritage assets may cause permanent loss due to the intrusive nature of the construction.

5.17 The majority of the study area lies within Flood Zones 2 and 3. A platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cables to overhead line at the N Route tee and the Weston tee (AT Route). CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of potential

CSE compounds would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25.

TO1 Socio-economic appraisal

5.18 In Sedgemoor, key rural settlements including Woolavington, Mark and East Huntspill are identified in development plans as a focus for local growth. Outside of these settlements 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 (General Industrial) and B8 (Storage and Distribution) uses. A 132kV underground cable could be routed to avoid this priority site and the built up areas of settlements. It would not therefore act as a constraint on potential development or economic activity.

5.19 In North Somerset, the focus for development is to be Weston-super-Mare, with urban extension areas combining employment and housing proposed on land to the east of the town. Nailsea and Portishead are identified in development plans 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 major housing allocations on its eastern edge (largely already committed) 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, planning policy is to support their role as local hubs through development within existing village development boundaries. A large employment land allocation is safeguarded south-west of Yatton. In smaller "infill villages" such as Sandford, Kenn and Kingston Seymour, development is to be limited to infill only. A 132kV underground cable could be routed outside the built up areas of settlements and would not act as a constraint to development in these areas.

5.20 In Bristol, the Avonmouth area is recognised as a regionally important industrial and warehousing business location. The area between the River Avon and Avonmouth substation is already intensively developed and, if this option is taken forward, further detailed investigations will be required to determine whether an underground cable route can be established which would not affect

current land uses (during construction) or constrain future development and operations. Both must be considered a risk at this technical options stage.

5.21 In that part of the study area within Bath and North-East Somerset, economic-led revitalisation is to be supported in the larger settlements of the Somer Valley - Midsomer Norton, Radstock, Paulton and Peasedown St John, recognising the need to restructure the local economy. New employment and residential development (largely already committed) is proposed for those communities. The Action Plan in the Council's Economic Strategy includes the promotion of a masterplan for employment land at Paulton Old Mills – a 13.5ha site for B1/B2/B8 uses was identified in the Local Plan. The technical option would facilitate the removal of the existing overhead line that runs east from Radstock substation to Frome Tee near Westwood, which could provide greater flexibility in planning the development of this site.

5.22 Additional new housing is expected to take place within the existing settlement boundaries. Small scale development may be permissible in certain designated villages, including Temple Cloud, Bishop Sutton and Timsbury. To the east of Peasedown St John, and in the area around Chew Valley and Blagdon Lakes, the land is designated Green Belt where development will be severely restricted. The removal of the overhead line which runs east from Radstock would be consistent with Green Belt policy.

6 TO2: Reconfiguration of the existing W & Y routes

6.1 Option TO2 restores supplies to the Churchill and Weston area by reconfiguring the existing W and Y route overhead line circuits by turning both circuits in to Churchill 132kV substation. Connections would therefore be established between Churchill and the GSPs at Seabank and Melksham.

6.2 A connection between Churchill and Weston is also required to reinstate an existing spur off the Bridgwater-Avonmouth 132kV overhead line which is to be decommissioned as part of the National Grid Hinkley Point C Connection project. This connection could be made by a new overhead line or underground cable between the existing N route and the AT route tees or by an overhead line/ underground cables connection between Churchill substation and the AT route tee. For the purposes of this technical optioneering exercise it has been assumed that it would take the form of a new connection between the N Route tee and the AT Route overhead lines as this would be the shortest and most direct connection.

6.5 However, in order for this option to be fully compliant with the requirements of the security of supply standards (P2/6) and to provide a like-for-like level of distribution system performance, some further infrastructure is required.

6.6 This is because if there is a fault on one of the circuits which runs from Churchill to Seabank (W–route) then the remaining circuit overloads. There are two ways this could be resolved:

(a) Add series reactors to the Seabank-Churchill circuits which would need to automatically switch in to reduce the flow on the remaining circuit, or

(b) Split the demand such that Portishead is fed from Seabank and Churchill, Weston, Radstock & Frome are supplied from Melksham.

6.7 Option (a) introduces a dependence on automatic switching equipment to maintain security of supply to Portishead, Churchill, Weston, Radstock and Frome. If the switching equipment failed to operate then customers in the region would lose electricity supply until it was manually restored. This option is discounted as it does not provide like-for-like system security, performance or resilience.

6.8 Option (b) provides a potential solution however P2/6 requirements specify that the level of demand being fed from Melksham must remain connected in the event of a second fault outage. If the second fault was on one of the remaining Y-route circuits then Churchill, Weston, Radstock and Frome would be at risk of losing its electricity supply. This means that additional infrastructure is required to ensure this option is fully compliant with the requirements of P2/6 and maintain security of supply for customers at existing levels.

6.9 Firstly in order to manage the power flows between Melksham, Frome, Radstock, Churchill and Weston a new substation compound is required. New connections would be required from the substation compound to the point where the circuits to Frome split from the circuits which continue on towards Radstock (the “Frome Tee”). To minimise the amount of new and additional infrastructure required for this technical option the optimal location for this compound would be in the vicinity of Frome Tee.

6.10 This substation compound allows the upgrading and construction of specific sections of line which are explained below whilst also enabling the operational interactions between WPD and SSE to be managed and coordinated efficiently.

6.11 When the electricity demand at Weston, Churchill, Radstock and Frome is all fed from Melksham, then the section of circuit between Melksham and Radstock would become overloaded. Upgrading of these sections would provide sufficient capacity in this case but would not do so in circumstances where one of the Melksham-Frome-Radstock circuits has a fault. This is because the remaining circuit has insufficient capacity and overloads.

6.12 Therefore, as well as the upgrades described above, a new additional single circuit is required from Melksham to the new substation compound at Frome Tee compound (c10.5km) in order to provide sufficient capacity and ensure security of supply.

6.13 In addition, voltage support equipment would be required at Churchill 132kV substation to ensure that voltage does not fall outside statutory limits.

6.14 In order to facilitate the extra circuits and equipment Churchill 132kV substation would also need to be modified although this could occur on land currently owned by WPD.

6.15 The circuit requirements for TO2 are therefore:

(a) A new 132kV substation compound located between Frome Tee and Radstock (if sited distant from Frome Tee additional 132kV connections would be required);

(b) A new 132kV single circuit between Melksham and the new 132kV substation compound (c10.5 km if located at Frome Tee);

(c) W & Y route turned in at Churchill 132kV substation;

(d) New 132kV connection between N route and the AT route (c2.4km), and

(e) Upgrading the existing 132kV circuits between Radstock and Melksham.

6.16 The full extent of TO2 is shown in Figure 6.1 below.

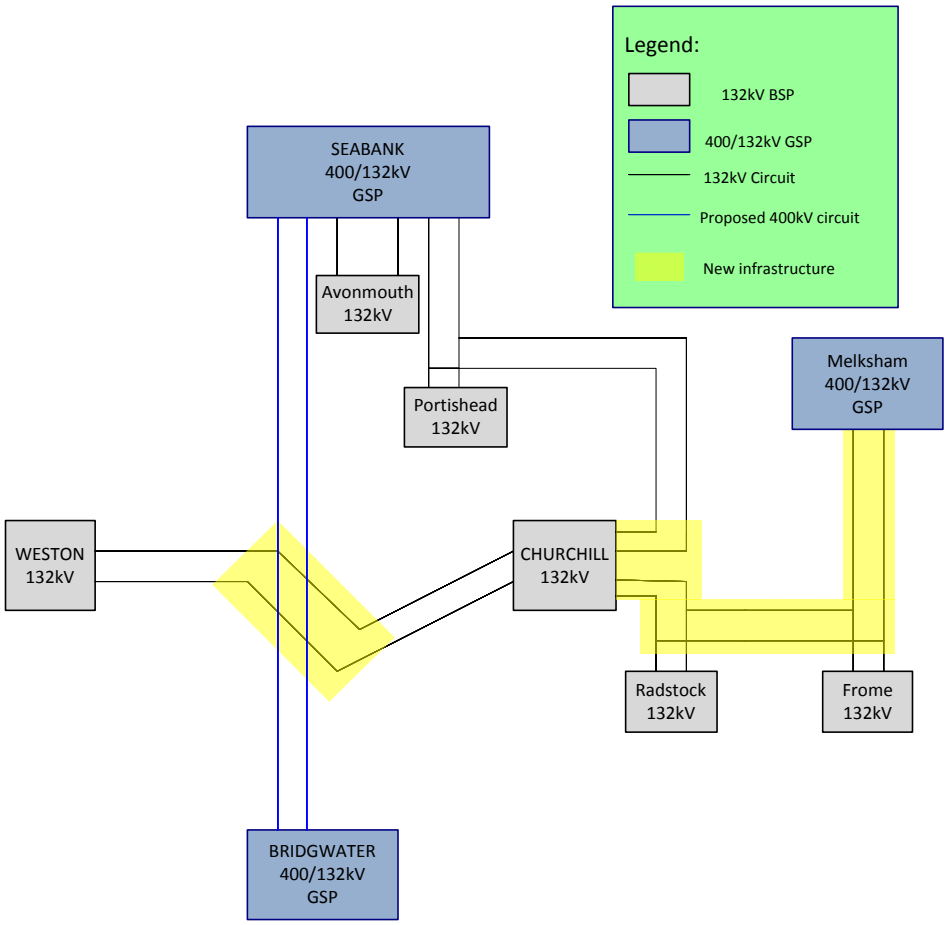


Figure 6.1: TO2 – Schematic showing scope of works (not to scale)

TO2 Technology options considered

6.17 This option requires no additional 400kV circuits. As explained in paragraph 3.36, for the 132kV connections, only two technology options were considered - AC underground cables and overhead line.

TO2 Capital Costs

6.18 The cost estimates associated with TO2 are summarised in Table 6.1 below.

132kV Works		
132kV Substation Works		
At Churchill 132kV Substation: 8 Bay 132kV substation extension	£2.0m	
At Frome Tee: (Optimal location to minimise additional connections) A new 8 bay substation compound	£1.23m	
132kV Circuit Upgrades		
Turn in of W & Y route	£0.35m	
Upgrade of existing Melksham-Frome Tee 132kV Circuits (2 x 10km overhead line and 2 x 0.5km underground cable)	£2.0m	
Upgrade of existing Frome Tee - Radstock 132kV Circuits (2 x 12km)	£1.2m	
New 132kV Circuits	OHL	U/G
2 x new 132kV circuits to existing Weston circuits between the N route tee and the AT route (2 x 2.5km)	£0.4m	£5m
1 x new 132kV circuit between Melksham and Frome Tee (10.5km)	£0.84m	£10.5m
Voltage Compensation Equipment		
90MVAr SVC at Churchill 132kV	£3m	
TOTAL (Range between minimum and maximum cost)		**£11.1m - £25.28m**

Table 6.1 - TO2 (W & Y) Capital Cost Summary

TO2 Lifetime Cost

6.19 The lifetime cost methodology is explained in Appendix 2. The lifetime costs assessed for option TO2 are shown in Table 6.2 below:

AC Underground Cable	AC Overhead Line	AC Underground Cable
Capital Cost	£11.1m	£25.28m
Distribution Loss Cost	£7.8m	£7.7m
Maintenance Cost	£0.93m	£0.95m
Lifetime Cost	**£19.83m**	**£33.93m**

Table 6.2: TO2 Lifetime Cost

6.20 The analysis shows that taking account of the lifetime costs of transmission and distribution losses and maintenance, that overhead lines in this case are more economical than underground cables.

TO2 Environmental Appraisal

6.21 There are 5 components of this option which require assessment:

(a) New 132kV substation compound between Radstock Substation & Frome Tee;

(b) New 132kV single circuit connection between Melksham and the new 132kV substation compound;

(c) Turn in of the W and Y routes at Churchill 132kV;

(d) New 132kV connection between the N route and AT route, and

(e) Upgrading the existing 132kV circuits between Radstock and Melksham.

New 132kV substation compound between Radstock Substation & Frome Tee

6.22 As outlined above if this technical option was taken forward, a new 132kV substation compound would be required along the Y Route 132kV overhead line (Y Route) between Radstock 132kV Bulk Supply Point (BSP) substation and the Frome Tee. The Frome Tee is a point on the Y Route between Trowbridge and Bradford-on-Avon from which the 132kV overhead line travels south to Frome.

6.23 The substation compound would include 132kV equipment including circuit breakers, line insulators, metering equipment and protection housing. It would occupy a footprint of approximately 80m by 50m and would be enclosed by a palisade security fence. Additional land may also be required on a temporary basis for construction laydown and compound areas.

For the purpose of making a cost estimate this technical option study assumed a substation compound in the vicinity of Frome Tee. However, the environmental appraisal considers environmental constraints that would influence the location of a compound between Radstock BSP and the Frome tee as siting in this area would be feasible and would meet the system requirements of this technical option. WPD would seek to locate the substation compound adjacent or close to the Y Route overhead line. A 500m corridor has therefore been identified either side of the Y Route on Figures G1979.03.58a, G1979.03.059a and G1979.03.060a, as the study area. It would be possible to site the new substation compound away from the overhead line if no suitable site could be found closer. However, this would require new connections (by overhead line or underground cables) which could introduce additional environmental and amenity effects that may outweigh the perceived benefits of a site remote from the existing network. For sites remote from Frome Tee, new connections would also be required to connect the substation compound to Frome Tee. This would be an additional consideration when comparing the potential environmental effects of specific sites. The study area has been extended slightly wider around Frome Tee as a substation compound in this location would minimise the requirement for additional connections.

6.24 At this stage the precise location and design of the substation compound has not been determined. The siting and design of the substation compound would be subject to further detailed study in accordance with WPD's Schedule 9 Statement.

6.25 There are several sites in the area of search for a substation compound that are protected at the highest level by national or international nature conservation, historic environment or landscape designations. These include the Cotswolds Area of Outstanding Natural Beauty (AONB), Cleaves Wood, Hinton Charterhouse and Hinton Charterhouse Field Sites of Special Scientific Interest (SSSI), Ston Easton and Ilford Manor Registered Park and Gardens, several Scheduled Monuments, Conservation Areas and listed buildings. Bath World Heritage site lies approximately 3km north of the existing Y Route

overhead line and is not anticipated to be adversely affected by this technical option.

6.26 The following factors are likely to be most relevant to the siting of the potential substation compound and would require detailed consideration as part of the next stage of assessment if this option was taken forward:

- The Y Route overhead line runs through the southern tip of the Cotswolds AONB at Wellow. East of Wellow it also runs within a kilometre of the AONB through the majority of the study area. Although the substation compound could be sited outside the AONB to avoid any direct impacts, the potential for effects on its setting would require consideration in this area. If new overhead line connections are required to connect the substation compound to the Frome Tee, wood poles would have less effect on landscape and views in comparison with steel lattice pylons.

- The Y Route overhead line runs adjacent to Cleaves Wood SSSI at the southern edge of the Cotswolds AONB which is ancient semi-natural deciduous woodland on Oolitic limestone. It supports a high diversity of tree and shrub species, a large population of the nationally scarce plant *Ornithogalum pyrenaicum* and several other features of interest including nationally rare insects. Hinton Charterhouse Field SSSI is also adjacent to the Y Route in this area and supports the nationally rare plant *Eryngium campestre* (Field Eryngo). Approximately 350m north of the Y Route is the Hinton Charterhouse SSSI which is an important site for the study of lateral facies variations. These sites could be avoided but an environmental assessment may be required to ensure that the integrity of the sites or their reasons for designation would not be adversely affected if the substation compound was constructed in close proximity.

- Potential effects on the setting of Ston Easton Registered Park and Garden (approximately 1.5km west of Radstock BSP) and Ilford Manor Registered Park and Garden (approximately 350m north of the Y Route at Westwood).

- There are several Scheduled Monuments in the area of search for the substation compound which could indicate potential for unknown archaeological interest. These include Camerton Romano British Town with prehistoric and early medieval monuments covering an area of 26ha approximately 1.2km south of the Y Route at Camerton. To the south and west of Wellow there are two

Scheduled Monuments within 500m of the Y Route, the closest of which is a Roman Villa approximately 150m to the south.

- Potential effects on the setting of several Conservation Areas and numerous listed buildings either side of the Y Route in the area of search.

- The majority of land between Carlingcott in the west of the area of search and Frome Tee in the east is designated as Green Belt, where there is a presumption against development except in very special circumstances. Consent may be granted for a new substation compound in the Green Belt provided that it can be demonstrate that no other site is available or practical, and that the development would not conflict with the purposes of including the land in the Green Belt.

- To avoid the Green Belt the substation compound would need to be sited in the west of the study area between Radstock BSP and Carlingcott. New connections to the Frome Tee would be required for a substation in this area which could introduce additional environmental and amenity effects that may outweigh the perceived benefits of a site outside of the Green Belt.

- Potential effects on landscape and views including those from individual residential properties and numerous settlements close to the Y Route (e.g. Midsomer Norton, Paulton, Radford, Camerton, Carlingcott, Dunkerton, Wellow, Peasedown St John, Hinton Charterhouse, Westwood, Farleigh Hingerford, Trowbridge and Bradford-on-Avon).

- Woodland cover in the area of search includes hillside woods, linear strips and scattered blocks. Woodland would form a constraint to siting but could potentially assist in screening or 'backgrounding' the substation compound. The majority of the Y Route overhead line does not lie within areas at high risk of flooding, although it crosses the floodplains of several watercourses. The principles of Planning Policy Statement (PPS) 25 Development and Flood Risk would be considered as part of detailed siting studies at the next stage of assessment if this option was taken forward.

New 132kV single circuit connection between Melksham and the new 132kV substation compound

6.27 The study area extends from the Frome Tee (between Bradford-on-Avon and Trowbridge, Wiltshire) in the west to Melksham substation, Wiltshire in the east. The western extent is defined by the settlements of Bradford Leigh and Atworth and the eastern extent by the settlements of Hilperton, Whaddon and Melksham. The study area is illustrated at Figure G1979.03.051a.

6.28 A new overhead line or underground cables connection between the Frome Tee and Melksham substation could be achieved but would pass close to, and be constrained by several environmental constraints.

6.29 One of the main environmental constraints within the study area that would constrain a direct route is Great Chalfield Manor Registered Park and Garden. Other constraints close to Great Chalfield Manor include blocks of woodland, Listed Buildings and the settlements of Broughton Gifford (and its Conservation Area) to the east and the settlement of Little Chalfield to the west which would all further constrain a direct route through this area.

6.30 Other areas of woodland which could influence the routeing and directness of a connection are Great Bradford Wood and linear woodlands along the Kennett and Avon Canal and River Avon.

6.31 The connection would need to negotiate several other settlements and smaller hamlets in the study area such as Holt, Staverton and Shaw. Properties would have an influence on the route and directness of any connection and the potential cumulative effects of an additional overhead line close to some settlements/properties would require careful consideration during routeing.

6.32 There is one Scheduled Monument, numerous Listed Buildings, two Conservation Areas and another Registered Park and Garden (The Courts, Holt) in the study area. An additional SM lies 100m east of the study area boundary. These sites could be avoided by a connection but an assessment would be required to identify any indirect effects on the features and their setting if the connection was to be routed in close proximity.

6.33 The connection would not pass through the Cotswolds AONB; however the potential effects on its setting to the south of Bradford-on-Avon would require

further consideration. Significant effects on the setting of the AONB are not anticipated as only a relatively short section of the overhead line would be visible from the AONB and the setting is already influenced by the existing Y Route 132kV overhead line. Permanent effects on the AONB would be avoided by using an underground connection. An underground connection could have temporary effects associated with construction on the landscape which may be visible from the AONB, but once the land has re-established, the effects on the setting of the AONB would be negligible.

6.34 The construction of a new overhead line close to or parallel with the existing Y Route 132kV overhead line, would result in cumulative visual effects but would limit effects on landscape and views to a localised area. Siting the lines further apart would introduce effects over a greater area and could introduce a new line where no overhead line currently exists.

6.35 The Y Route overhead line runs approximately 500m west of Great Chalfield Manor Registered Park and Garden. The cumulative effects of an additional line would require further consideration in accordance with the Holford Rules if an overhead line connection parallel, or close to, to the Y Route was taken forward.

6.36 The majority of the study area does not fall within Flood Zones 2 or 3 (land with a medium or high probability of flooding) other than where it crosses the floodplains of watercourses, predominantly the River Avon and its tributaries. If an underground cables connection was taken forward a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the Frome Tee. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

6.37 A new underground connection would offer benefits in terms of landscape and views particularly relating to settlements and the setting of the Cotswolds AONB, Registered Parks and Gardens, Listed Buildings, Conservation Areas and Scheduled Monuments, compared with an equivalent length of overhead line. An underground connection would give rise to temporary effects on landscape and views during construction. Once the land has re-established, effects would be lower than an equivalent length of overhead line. However, the installation

of underground cables is more invasive and would have a greater scale of effects on areas of ecological or archaeological value.

Turn in of the W and Y routes at Churchill 132kV

6.38 As outlined above, if this technical option was taken forward it would require the connection (turning in) of the W Route (that runs north from Churchill 132kV substation to Portishead 132kV substation, near Bristol) and the Y Route (that runs east from Churchill substation to Radstock 132kV substation, near Bath) to Churchill substation (see Figure G1979.03.061a).

6.39 The W & Y routes pass approximately 250m east of Churchill substation and would need to be connected into the substation using a double circuit overhead line. The W Route would then form a link between Churchill substation and Portishead substation, and the Y Route between Churchill substation and Radstock substation.

6.40 There are no environmental constraints between Churchill substation and the point from which the W and Y Routes would 'turn in'. The closest environmental constraint is a Listed Building at Brinsea, approximately 750m west of Churchill substation. The setting of this feature is unlikely to be affected due to its distance and the presence of intervening properties, vegetation and the existing Churchill substation.

6.41 No flood risk impacts are anticipated from the section of overhead line required to turn in the W and Y Routes. The area does not fall within Flood Zones 2 or 3 and it would be relatively straightforward to build flood resilience into the overhead line by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the lattice steel construction poses no material changes to surface water flow.

6.42 The environmental effects of connecting the W and Y Routes to the existing Churchill substation would require further consideration and assessment as part of the next stage of the project should this technical option be taken forward.

New 132kV connection between the N route and AT route

6.43 The study area is illustrated at Figure G1979.03.028c and extends west from WPD's existing 132kV overhead line network (including the AT Route, F Route and N Route) for approximately 4km to the M5 motorway. It includes parts of Sandford, Banwell and Locking as well as smaller settlements such as Puxton, Stonebridge, Woolvershill, Woolvershill Batch, Rolestone, East Rolestone, Nye and Way Wick. Weston-super-Mare lies beyond the study area and extends from the M5 motorway to the Severn Estuary.

6.44 The main constraints identified in the study area include Scheduled Monuments, Listed Buildings, scattered settlements, Puxton Moor SSSI (through which the AT Route currently runs) and an SAC consultation zone.

6.45 There are two Scheduled Monuments and five Listed Buildings within the study area. These sites could be avoided with a connection but an assessment would be required to identify any indirect effects on the features and their setting if the connection was to be routed close to these features.

6.46 The SSSI designation for Puxton Moor covers ditches and rhynes in low lying farmland. A connection could avoid Puxton Moor SSSI by routeing to the west of the site. This would avoid direct impacts on the SSSI and would also allow the section of the AT Route that currently runs through the SSSI to be removed, which may provide some environmental benefit and could potentially improve views from the few nearby properties.

6.47 Routeing to the west of Puxton Moor SSSI would also allow separation to be achieved between the new connection and National Grid's proposed 400kV overhead line, which could otherwise contribute to a wirescape effect from some receptors due to the height difference between a 132kV and a 400kV overhead line.

6.48 An overhead line would be able to oversail the ditches and rhynes to which the SSSI designation applies, however further detailed study would be required to determine the potential for direct and indirect effects on this site and its qualifying features if this connection was taken forward.

6.49 Constructing an underground connection through the SSSI would cause disturbance during construction and may have effects on the site's special interest. Detailed environmental surveys would be required to ensure that the integrity of the site or its qualifying features would not be adversely affected by

the construction of underground cables either through or in close proximity to this site.

6.50 The small settlements, hamlets and farmsteads spread across the study area provide a constraint to routeing. This is particularly noticeable in the area immediately south of the AT Route around East Rolstone, Rolstone, and Way Wick although it would be possible to avoid these settlements through careful routeing.

6.51 Although the connection would not pass through the Mendip Hills AONB, the potential effects on its setting would require consideration. The connection also falls within the North Somerset and Mendip Bats SAC 5km 'consultation zone' which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. Further assessment would be required to ensure there would be no adverse effects on bat activity, the integrity of the designation or its qualifying features.

6.52 The majority of land within the study area is in Flood Zone 3, with smaller areas in Flood Zone 2. There are two areas of land that fall outside these Flood Zones of medium and high probability, to the north of Banwell and north of Sandford. The entire length of the AT Route within the study area crosses Flood Zone 3. It is relatively straightforward to build flood resilience into overhead lines by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the supports pose no material changes to surface water flow.

6.53 The presence of an underground cable circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow. However, if an underground cables connection was taken forward, a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at both the N Route and AT Route. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

6.54 An underground connection would offer benefits over an overhead line in terms of landscape and views, particularly relating to the setting of the Mendip Hills AONB, Listed Buildings, Scheduled Monuments and settlements. However, the installation of underground cables is more invasive and would have a greater scale of effect on ecology and buried archaeology.

Upgrading the existing 132kV circuits between Radstock and Melksham

6.55 As outlined above if this technical option was taken forward the conductors (wires) along the existing Y Route 132kV overhead line between Radstock substation and Melksham substation would need to be replaced and upgraded to carry more power.

6.56 The work required to replace the conductors would be temporary and would not involve any ground disturbance other than where this may be necessary to gain access to the overhead line. This appraisal therefore considers any sites protected at the highest level by national or international nature conservation, historic environment or landscape designations that are oversailed or close to the existing overhead line and could be affected during construction works.

6.57 Between Radstock BSP and Melksham BSP the overhead line travels within 1km of the southern boundary of the Cotswolds AONB and passes through it for approximately 450m.

6.58 AONBs are designated under the National Parks and Countryside Act 1949 (as amended) for the purpose of conserving and enhancing the natural beauty of the area. Due to the nature of work required (i.e. temporary works to refurbish existing infrastructure) it is not anticipated that there would be any adverse effects on the landscape which could affect the objective to conserve and enhance natural beauty, unless tree removal was required to access or ensure safety clearances to the overhead line.

6.59 Tree removal is not anticipated within the AONB. The overhead line does oversail or pass through several blocks of woodland in the study area where working methods associated with accessing the overhead line and carrying out the work would need to be carefully considered to prevent potential disturbance to woodland and tree removal where possible. Potential effects and mitigation would be considered at the next stage of assessment, including the requirement for any replanting if required.

6.60 The Y Route overhead line runs very close to several SSSIs. These include Cleaves Wood SSSI (adjacent), Hinton Charterhouse Field SSSI (adjacent), Hinton Charterhouse SSSI (approximately 350m north) and Ilford Manor SSSI (approximately 300m north).

6.61 No direct impacts on the SSSIs are anticipated. Gaining access to the overhead line close to these sites would need to be carefully considered in the assessment of environmental effects, to prevent disturbance and potential effects on the sites special interests. This would be particularly important at Cleaves Wood SSSI which is an ancient semi-natural deciduous woodland and supports a high diversity of tree and shrub species, a large population of the nationally scarce plant *Ornithogalum pyrenaicum* and several other features of interest including nationally rare insects. Hinton Charterhouse Field SSSI is also adjacent to the Y Route in this area and supports the nationally rare plant *Eryngium campestre* (Field Eryngo). This site would require consideration during the temporary siting of any equipment or construction compounds to ensure its features of special interest are not adversely affected.

6.62 No significant adverse effects on the setting of Scheduled Monuments, Registered Parks and Gardens, Conservation Areas and Listed Buildings are anticipated. There are two Scheduled Monuments in the study area. The replacement of conductors does not necessitate any ground intrusion. However the potential for ground disturbance in the area of a Scheduled Monument (Roman Villa) approximately 150m south of the overhead line (west of Wellow) would require consideration during the temporary siting of any equipment or construction compounds.

6.63 No flood risk impacts are anticipated as a result of these works. The proposed work to replace the conductors is temporary and would not pose any material changes to water flow along the Y Route or in the surrounding area.

TO2 Socio-economic appraisal

6.64 Technical option TO2 would involve new electricity infrastructure in the area between Weston-super-Mare and Churchill and the retention of the existing 132kV overhead line between Radstock and Frome Tee, together with the provision of an additional substation in the vicinity of Frome Tee and a new additional single circuit from Melksham to the Frome Tee substation compound (10.5km).

6.65 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. These areas do not extend east of the M5 motorway and would not be affected by works associated with Technical Option TO2. In Rural Service Villages, such as Winscombe, Banwell, Churchill, Congresbury and Yatton, development to support their role as local hubs is likely to take place within village development boundaries. In smaller "infill villages" such as Sandford, development is to be limited to infill only. A 132kV connection could be routed outside the built up areas of settlements and would not act as a constraint to potential development

6.66 In that part of the study area within Bath and North-East Somerset, economic-led revitalisation is to be supported in the larger settlements of the Somer Valley - Midsomer Norton, Radstock, Paulton and Peasedown St John, recognising the need to restructure the local economy. New employment and residential development (largely already committed) is proposed for those communities. The Action Plan in the Council's Economic Strategy includes the promotion of a masterplan for employment land at Paulton Old Mills – a 13.5ha site for B1/B2/B8 uses was identified in the Local Plan. The existing 132kV overhead line (Y route) crosses this site and would need to be taken into account in planning any development at this site.

6.67 Additional new housing is expected to take place within the existing settlement boundaries. Small scale development may be permissible in certain designated villages, including Temple Cloud, Bishop Sutton and Timsbury. To the east of Peasedown St John the land is designated Green Belt where development is restricted. Technical Option TO2 may require a substation compound containing switching infrastructure to be located in this area which would be inconsistent with Green Belt policy. A new section of single circuit overhead line would also be required in this area.

7 TO3: W-route and replacement F-route (F')

7.1 Option TO3 restores supplies in the Churchill / Weston region by establishing:

(a) a connection between Seabank and Churchill by turning the W-route into Churchill substation, and

(b) establishing a connection between Churchill / Weston to Bridgwater by building new 132kV connections.

7.2 There are a number of sub-options associated with TO3 and in particular how the connection to Bridgwater from Weston/Churchill can be made. Options include:

(a) A double circuit underground cables connection from Bridgwater to the existing 132kV N route overhead line near Sandford, which would also require a double circuit connection from Churchill 132kV substation to the AT route to complete a connection between Bridgwater and Weston;

(b) A double circuit connection from Bridgwater to Weston, which would also require a double circuit connection from the existing 132kV AT route overhead line directly to Churchill or to the existing 132kV N route overhead line in the Sandford/Puxton area to complete a connection between Bridgwater and Churchill, or

(c) A single circuit connection from Bridgwater to Weston and a single circuit connection from Bridgwater to the existing 132kV N route overhead line near Sandford. This would also require a single circuit connection between the existing AT route tee and N route tee overhead lines in the Sandford/Puxton area to complete a connection between Weston and Churchill.

7.3 As option (c) provides the same system security as the other sub-options but involves less new circuits (three rather than four) it has been taken forward for assessment.

7.4 The circuit requirements for sub-option (c) are therefore:

(a) A new Bridgwater – N route tee 132kV single circuit (26.5 km);

(b) A new Bridgwater – Weston 132kV single circuit (29 km);

(c) A new AT – N route tee 132kV single circuit (2.5 km), and

(d) W & Y route turned in at Churchill 132kV.

7.5 The new Bridgwater to N route tee single circuit is only considered as an underground connection. This broad route corridor will be used for the new National Grid 400kV Hinkley Point C Connection. Progressing a new 132kV overhead line connection in this area would not be consistent with National Grid's commitment to remove the existing 132kV overhead line (F Route) in that corridor.

7.6 Under TO3 the proposed dismantling of the 12km section of 132kV overhead line between Radstock and the Frome Tee would still be possible and this option does not conflict with future proposals to dismantle the overhead line. It also facilitates the potential replacing of a section of the existing double circuit AT route with a single circuit wood pole circuit

7.7 TO3 is shown in Figure 7.1.

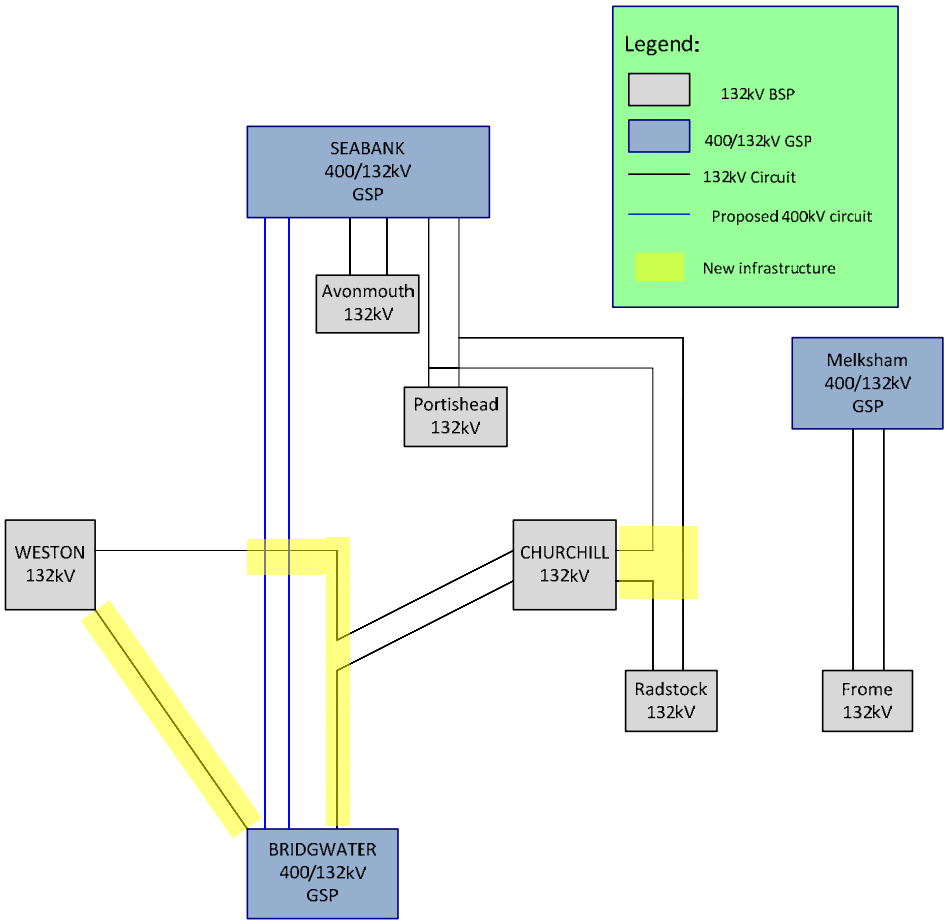


Figure 7.1: TO3 – Schematic

TO3 Capital Costs

7.8 The cost estimates associated with TO3 are summarised in Table 7.1 below.

132kV Substation Works		
Churchill 132kV	**£5.5m**	
132kV Works		
132kV Circuit Upgrades		
Turn in of W & Y route	£0.35m	
New 132kV Circuits		
Bridgwater – N route tee 132kV single circuit (26.5 km underground cables)	£26.5m	
	OHL	U/G
A new Bridgwater – Weston 132kV single circuit (29 km)	£2.32m	£29m
A new AT tee – N route tee 132kV single circuit (2.5 km)	£0.2m	£2.5m
TOTAL		**£34.83m - £63.81m**

Table 7.1 – TO3 Capital Cost Summary

TO3 Lifetime Cost

7.9 The lifetime cost methodology is explained in Appendix 2. The lifetime costs assessed for the new assets for options TO3 are shown in Table 7.2 below:

	TO3 AC OHL	**TO3 AC Underground Cable**
Capital Cost	£34.83m	£63.81m
Distribution Loss Cost	£1.3m	£1.7m
Maintenance Cost	£0.12m	£0.91m
Lifetime Cost	**£36.25m**	**£66.42m**

Table 7.2: TO3 Lifetime Cost

7.10 TO3 Environmental Appraisal

7.11 There are 4 components of this option which require assessment:

(a) A new Bridgwater – N route 132kV single circuit (26.5 km);

(b) A new Bridgwater – Weston 132kV single circuit (29 km);

(c) A new AT – N route 132kV single circuit (2.5 km), and

(d) W & Y route turned in at Churchill 132kV.

A new Bridgwater – N route Underground 132kV single circuit (26.5 km)

7.12 The study area extends north from Bridgwater substation on the eastern edge of Bridgwater, Somerset to the N Route tee. The N Route tee is the point on the existing F Route 132kV overhead line (between Banwell and Sandford, North Somerset) where it connects to the existing N Route 132kV overhead line which runs north west to Churchill 132kV substation.

7.13 To the south of the Mendip Hills Area of Outstanding Natural Beauty (AONB) the western extent of the study area is defined by the M5 motorway and the eastern extent by the settlements of Chilton Polden, Blackford, Stone Allerton, Compton Bishop and Winscombe. Due to the topography of the land and other environmental constraints, the study area within the AONB has been limited to a relatively narrow corridor which avoids constraints and follows the only break in the hills in the valley of the Lox Yeo River.

7.14 The key environmental constraints within the study area include the Mendip Hills AONB, the Huntspill River National Nature Reserve (NNR), the 5km consultation zone of the North Somerset and Mendip Bats Special Area of Conservation (SAC), Scheduled Monuments (SM), Listed Buildings, woodland and settlements.

7.15 The N Route tee is approximately 400m north of the Mendip Hills AONB. To achieve a direct connection between Bridgwater substation and the N Route tee the connection would need to be established through the Mendip Hills AONB. An underground connection through the AONB would have temporary effects associated with construction on the landscape, affecting the objective to

conserve and enhance natural beauty. However, once the land had re-established the effects on the AONB would be reduced. The connection would need to avoid areas of woodland and other features which are important to the scenic character of the AONB. The Mendip Hills AONB is also noted for its ecological and archaeological importance and these factors would require further consideration if this option was taken forward.

7.16 To avoid the AONB the connection would have to extend west over a considerable distance where the settlement of Weston-super-Mare, woodlands and the topography of the landscape would constrain routeing. This would increase the length of the connection, introduce additional constraints to routeing and result in potentially adverse environmental effects over a much greater area. It has therefore not been considered further.

7.17 To avoid the designated part of the Huntspill River NNR an underground connection would need to travel along the eastern edge of the study area between the NNR and sites within the Somerset Levels Special Protection Area (SPA), and Ramsar site, where a SM also forms a constraint. The connection would still need to cross beneath the Huntspill River. Further detailed study would be required to determine any potential effects arising from a connection beneath or close to the NNR if this option was taken forward.

7.18 Component sites of the North Somerset and Mendip Bats SAC lie approximately 200m west of the study area (Banwell Ochre Caves SSSI) and approximately 1.1km north of the study area (Banwell Caves SSSI). The connection would pass through the North Somerset and Mendip Bats SAC 5km consultation zone which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. The potential effects on SAC bat species arising from an underground cables connection would be associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. An assessment of the potential effects on the integrity of the SAC and its qualifying features would be required as part of the next stage of assessment if this technical option was taken forward.

7.19 There are several other sites close to the study area that are afforded protection under ecological designations. These include Crook Peak and Shute Shelve SSSI (a component site of the Mendip Limestone Grasslands SAC), Max Bog SSSI, the Somerset Levels and Moors SPA/Ramsar, and the Catcott,

Edington and Chilton Moors, Tealham and Tadham Moors and Westhay Moors SSSI. Further detailed study would be required to ensure there would be no indirect adverse effects on the integrity of these designations or their qualifying features. Potential indirect effects as a result of the underground connection could include disturbance to bird movements or foraging habitat.

7.20 Two SMs (one north of Bridgwater and one south of the Huntspill River) would form a constraint to routeing in the south of the study area, but could be avoided by a potential underground connection. Routes could also be achieved which avoid Listed Buildings. Whilst it would be possible to avoid the SMs there are other known non-designated archaeological assets and unknown assets which could be affected. Underground connections routed through heritage assets may cause permanent loss due to the intrusive nature of the construction.

7.21 Further detailed study along any underground connection route would be required to identify the potential for archaeological remains and any direct and indirect effects resulting from construction and installation. PTO5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*.

7.22 An underground connection between Bridgwater and the N Route tee would offer environmental benefits on landscape and views particularly relating to settlements, the Mendip Hills AONB, and the setting of Listed Buildings, and Scheduled Monuments, compared with an equivalent length of overhead line. However, the installation of underground cables is more invasive than for an overhead line and would have a greater scale of effects on areas of ecological or archaeological value. Construction results in disturbance to ground vegetation which could affect the integrity of a designation or its qualifying features and detailed study would be required to determine appropriate working methods and mitigation.

7.23 Settlements could be largely avoided by careful routeing. A new connection would be constrained by several settlements, particularly in the south of the study area around Bawdrip, Puriton, Woolavington and Cossington where woodland blocks, listed buildings, a SM and topography also form a constraint.

Individual properties such as scattered farms would have an influence on the routeing and directness of a connection.

7.24 Apart from the Mid Somerset Hills and Mendip Hills, the majority of the study area is low lying and flat, which would be beneficial for an underground cable connection due to the ease of construction. However, as part of detailed routeing studies consideration would need to be given to the high water table and hydrological regime in the low lying parts of the study area.

7.25 Large areas of the study area fall within Flood Zones 2 and 3. A platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line in the vicinity of the N Route tee. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of the CSE compound would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25.

A new Bridgwater – Weston 132kV single circuit (29 km)

7.26 A new single circuit 132kV connection by overhead line or underground cables could be achieved between Bridgwater substation and Weston substation, either along the alignment of an existing 33kV overhead line which would be removed, or along an improved route where further studies showed potential to optimise the existing alignment. If an overhead line connection was taken forward the use of 132kV wood pole supports could have less effect on landscape and views compared with the existing 33kV steel lattice pylons, as wood poles are generally smaller with a less visually prominent support.

7.27 The study area extends north from Bridgwater substation on the eastern edge of Bridgwater, Somerset to Weston substation, Weston-Super-Mare, North Somerset (See Figure G1979.03.052a). The western extent of the study area is defined by the settlements of Puriton, Highbridge, Middle Burnham and Brean, and the eastern extent by the settlements of Cossington, Mark, Rooks Bridge, Loxton and Locking.

7.28 The key environmental constraints within the study area include the Mendip Hills AONB, the Huntspill River NNR, three SSSIs, the North Somerset and Mendip Bats SAC 5km consultation zone, Scheduled Monuments, Listed Buildings, Conservation Areas, woodland and settlements.

7.29 Potential routes within the Mendip Hills AONB would be constrained by SSSIs, woodlands, settlements and topography with the limestone hills posing a significant constraint to overhead line routeing. To avoid the Mendip Hills AONB the connection would need to follow a route similar to the existing 33kV overhead line through residential areas to the west of this designation.

7.30 The existing 33kV overhead line oversails areas of residential settlement to the south of Weston-super-Mare between Oldmixon and Weston substation. This area is also constrained by topography, woodlands and Listed Buildings. If an overhead line connection was taken forward the potential effects on the setting of the AONB would require consideration, taking into account the scale of change between the existing 33kV overhead line and a replacement 132kV overhead line. Using the existing 33kV route would minimise potential effects on landscape and views through this area, but it would not be possible to route along the existing alignment without oversailing properties. Underground cables may need to be given particular consideration for this part of the route. This would have beneficial effects on landscape and views from the AONB and for those properties that are currently oversailed by the existing overhead line.

7.31 A new 132kV overhead line or underground cables connection along the current alignment, or a similar alignment, to the existing 33kV overhead line would cross the Huntspill River NNR. Further detailed study would be required to determine the potential for any adverse effects on the NNR if this option was taken forward.

7.32 Routes could be achieved which avoid direct impacts on three SSSIs in the north of the study area. The connection is likely to follow a similar alignment to the existing 33kV overhead line between Bridgwater and Weston, which runs approximately 800m west of Purn Hill SSSI and approximately 500m east of Uphill Cliff SSSI. Beyond the study area boundary there are several large sites afforded protection under ecological designations. To the west these include the Severn Estuary Ramsar, SPA, SAC, SSSI and the Bridgwater Bay SSSI and NNR. East of the study area sites include the Somerset Levels and Moors SPA, Ramsar and SSSI, and the Catcott, Edington and Chilton Moors, Tealham and Tadham Moors and Westhay Moors SSSIs.

7.33 Further assessment would be required to ensure there would be no indirect adverse effects on the integrity of these designations (e.g. disturbance to bird movements or foraging habitat) or their qualifying features from a new 132kV

connection along the existing 33kV route or an alternative route through the study area.

7.34 The study area falls within the North Somerset and Mendip Bats SAC 5km 'consultation zone' which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. The existing 33kV overhead line between Bridgwater and Weston does not fall within the 5km consultation zone. If alternative options within the consultation zone were taken forward an assessment of the effects on bat activity, the integrity of the SAC and its qualifying features would be required.

7.35 There are three Scheduled Monuments, numerous Listed Buildings and several Conservation Areas in the study area. These sites could all be avoided by a connection but an assessment would be required to identify any indirect adverse effects on the features and their setting if an overhead line connection is proposed close to these features. Potential effects on the setting of these features from a new 132kV overhead line along the existing 33kV overhead line route are anticipated to be less than for a new 132kV overhead line travelling in an area without existing electrical infrastructure, due to the potential scale of change. This would also depend on other factors and would be confirmed by further study at a later more detailed stage of assessment. If an overhead line connection was taken forward using 132kV wood poles could have less effect on the setting of features compared with the existing 33kV steel lattice pylons as wood poles are generally smaller with a less visually prominent support. Improvements to the existing 33kV overhead line alignment in relation to the setting of Listed Buildings and Scheduled Monuments may be identified.

7.36 PPS5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*. Whilst it would be possible to avoid the SMs within the study area there are other known non-designated assets and unknown assets which could potentially be affected. Underground connections routed through heritage assets could cause permanent loss due to the intrusive nature of the construction. Further detailed study along any underground connection route would be required to identify the potential for archaeological remains and any direct and indirect effects from construction and installation.

7.37 The connection is likely to follow a similar alignment to the existing 33kV overhead line between Bridgwater and Weston. The scale of change in views from settlements towards a new 132kV overhead line along this route is anticipated to be less in comparison with views towards a new 132kV overhead line in an area without existing electrical infrastructure. If an overhead line connection was taken forward the use of 132kV wood poles could have less effect on landscape and views compared with the existing 33kV steel lattice pylons, as wood poles are generally smaller with a less visually prominent support. Areas where settlements form a particular constraint are north of Bridgwater (with several settlements close together), and between the Mendip Hills AONB and the Severn Estuary where the connection would need to route through settlements such as Uphill and Oldmixon. It may not be possible to route a new overhead line through this area without oversailing properties and underground cables may need to be given particular consideration for this part of the route.

7.38 Large areas of the study area fall within Flood Zones 2 and 3 (land with a medium of high probability of flooding). The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the supports pose no material changes to surface water flow. The presence of an underground cable circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow. However if an overhead line connection with sections of underground cable was taken forward (for example at Puriton or in the residential areas to the south of Weston substation), a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from overhead line to underground cable. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

7.39 An underground connection between Bridgwater and Weston would offer environmental benefits on landscape and views particularly relating to settlements and the setting of the Mendip Hills AONB, Listed Buildings, Conservation Areas and Scheduled Monuments, compared with an equivalent length of overhead line. However, the installation of underground cables is more invasive than for an overhead line and would have a greater scale of effects on areas of ecological or archaeological value. Construction results in disturbance to ground vegetation which could affect the integrity of a

designation or its qualifying features and detailed study would be required to determine appropriate working methods and mitigation.

A new AT – N route 132kV single circuit (2.5 km)

7.40 The study area is illustrated at Figure G1979.03.028c and extends west from WPD's existing 132kV overhead line network (including the Weston 'tee', F Route and N Route) for approximately 4km to the M5 motorway. It includes parts of Sandford, Banwell and Locking as well as smaller settlements such as Puxton, Stonebridge, Woolvershill, Woolvershill Batch, Rolestone, East Rolestone, Nye and Way Wick. Weston-super-Mare lies beyond the study area and extends from the M5 motorway to the Severn Estuary.

7.41 The main constraints identified in the study area include Scheduled Monuments, Listed Buildings, scattered settlements, Puxton Moor SSSI which the AT Route currently runs through and an SAC consultation zone.

7.42 There are two Scheduled Monuments and five Listed Buildings within the study area. These sites could be avoided with a connection but an assessment would be required to identify any indirect effects on the features and their setting if the connection was to be routed close to these features.

7.43 The SSSI designation for Puxton Moor covers ditches and rhynes in low lying farmland. A connection could avoid Puxton Moor SSSI by routeing to the west of the site. This would avoid direct impacts on the SSSI and would also allow the section of the AT Route that currently runs through the SSSI to be removed, which may provide some environmental benefit and could potentially improve views from the few nearby properties.

7.44 Routeing to the west of Puxton Moor SSSI would also allow separation to be achieved between the new connection and National Grid's proposed 400kV overhead line, which could otherwise contribute to a wirescape effect experienced by some receptors due to the height difference between a 132kV and a 400kV overhead line.

7.45 An overhead line would be able to oversail the ditches and rhynes to which the SSSI designation applies, however further detailed study would be required to determine the potential for direct and indirect effects on this site and its qualifying features if this connection was taken forward.

7.46 Constructing an underground connection through the SSSI would cause disturbance during construction and may have effects on the sites special interest. Detailed environmental surveys would be required to ensure that the integrity of the site or its qualifying features would not be adversely affected by the construction of underground cables either through or in close proximity to this site.

7.47 The small settlements, hamlets and farmsteads spread across the study area provide a constraint to routeing. This is particularly noticeable in the area immediately south of the AT Route around East Rolstone, Rolstone, and Way Wick although it would be possible to avoid these settlements through careful routeing.

7.48 Although the connection would not pass through the Mendip Hills AONB, the potential effects on its setting would require consideration. The connection also falls within the North Somerset and Mendip Bats SAC 5km 'consultation zone' which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. Further assessment would be required to ensure there would be no adverse effects on bat activity, the integrity of the designation or its qualifying features.

7.49 The majority of land within the study area is in Flood Zone 3, with smaller areas in Flood Zone 2. There are two areas of land that fall outside these Flood Zones of medium and high probability, to the north of Banwell and north of Sandford. The entire length of the AT Route within the study area crosses Flood Zone 3. It is relatively straightforward to build flood resilience into overhead lines by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the supports pose no material changes to surface water flow.

7.50 The presence of an underground cable circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow. However, if an underground cables connection was taken forward, a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the AT Route. CSE compounds should ideally be located outside areas at risk of

flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

7.51 An underground connection would offer benefits over an overhead line in terms of landscape and views, particularly relating to the setting of the Mendip Hills AONB, Listed Buildings, SM's and settlements. However, the installation of underground cables is more invasive and would have a greater scale of effects on ecology and buried archaeology.

W & Y route turned in at Churchill 132kV

7.52 As outlined at paragraph 7.1(a), if this technical option was taken forward it would require the connection (turning in) of the W Route (that runs north from Churchill 132kV substation to Portishead 132kV substation, near Bristol) and the Y Route (that runs east from Churchill substation to Radstock 132kV substation, near Bath) to Churchill substation (see Figure G1979.03.061a). These routes merge approximately 250m east of Churchill substation and would need to be connected into the substation using a double circuit overhead line. The W Route would then form a link between Churchill substation and Portishead substation, and the Y Route between Churchill substation and Radstock substation.

7.53 There are no environmental constraints between Churchill substation and the point where the W and Y Routes merge and from which they would 'turn in'. The closest environmental constraint is a Listed Building at Brinsea, approximately 750m west of Churchill substation. The setting of this feature is unlikely to be affected due to its distance and the presence of intervening properties, vegetation and the existing Churchill substation.

7.54 No flood risk impacts are anticipated from the section of overhead line required to turn in the W and Y Routes. The area does not fall within Flood Zones 2 or 3 and it would be relatively straightforward to build flood resilience into the overhead line by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the lattice steel construction poses no material changes to surface water flow.

7.55 The environmental effects of connecting the W and Y Routes to the existing Churchill substation would require further consideration and assessment as part of the next stage of the project should this technical option be taken forward.

TO3 Socio-economic appraisal

7.56 Technical option TO3 would permit the removal of the existing overhead line between Radstock substation and Frome Tee. As noted under option TO1, this could provide greater flexibility in planning the development of an employment development site at Old Mills, Paulton area and would also be consistent with Green Belt policy in Bath and North East Somerset.

7.57 A single circuit underground cable connection between Bridgwater and the existing N-route overhead line near Sandford could be routed to avoid the priority site for employment use at the former Royal Ordnance site at Puriton (see Option TO1) and the built up areas of settlements within which local planning policy seeks to focus new development. It would not therefore act as a constraint on potential development or economic activity.

7.58 Similarly, a connection between the AT route and the N route in the Sandford/Puxton area could be routed outside the built up areas of settlements (to which local planning policy directs new development) and would not therefore act as a constraint to development, whether the connection is made overhead or underground.

7.59 In North Somerset, local planning policy states that the focus for development is to be Weston-super-Mare. Providing a single circuit connection between Bridgwater and Weston, whether overhead or underground has the potential to affect existing land uses in the built up area of Weston and to constrain future development to varying degrees. Further detailed investigations will be required to determine whether a connection route can be established through the built-up area of Weston which would not have a large effect on current land uses (during construction) or constrain future development and operations.

7.60 In Sedgemoor, key rural settlements including Woolavington, Mark and East Huntspill are identified in development plans as a focus for local growth. Outside of these settlements 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 (General Industrial) and B8 (Storage and Distribution) uses. At the southern end of the connection corridor, the single circuit connection (overhead or underground) could be routed to avoid this priority site and the built up areas of settlements. It would not therefore act as a constraint on potential development or economic activity.

8 TO4: A New Grid Supply Point in the vicinity of Churchill

8.1 Option TO4 restores supplies to the Churchill / Weston area by establishing a new 400/132kV Grid Supply Point (GSP) substation in the vicinity of the existing Churchill 132kV substation.

8.2 The new Churchill GSP substation would include two 400/132kV supergrid transformers (SGTs), each of 240MVA capacity. Two SGTs are required to provide similar capacity to that provided by the 132kV Bridgwater-Avonmouth F and G routes which are to be decommissioned as part of the Hinkley Point C Connection project. However, two SGTs alone make the network less flexible than the 4 circuits they replace.

8.3 To maintain a similar level of flexibility, it is also proposed that a single circuit of the W-route / Y-route is "turned-in" to Churchill 132kV substation. This establishes a connection back to Seabank 132kV substation and ensures that in a "second circuit outage[6]" condition the Churchill / Weston group maintains supplies.

8.4 The GSP would be connected to the proposed 400kV double circuit overhead line between Bridgwater and Seabank by a double circuit 400kV transmission route, of approximately 4.5km in length. This could adopt the route of the existing 132kV N-route which would be rendered redundant by the decommissioning of the F-route.

8.5 Connections to the existing 132kV overhead line circuits which supply Weston (the AT-Route) must also be re-established. For this Technical Option the connections are proposed to run from Churchill 132kV substation back to the existing circuits at the AT route 'tee', a distance of approximately 3.4km.

8.6 The W-route and Y–route meet approximately 250m east of the boundary of Churchill 132kV substation and the turn in would involve very minor works. Given the minor nature of the works consideration may be given to turning in both circuits, so as to provide greater network flexibility.

[6] This is for the case where one supergrid transformer is out-of-service for maintenance and a fault occurs on the second supergrid transformer at the new Churchill GSP. There is a statutory requirement to maintain minimum levels of supply for this combination of events.

8.7 Modifications are also required at the existing Churchill 132kV substation in order to accommodate the new configuration of connections.

8.8 Under TO4 the proposed dismantling of the 12km section of 132kV overhead line between Radstock and the Frome Tee would still be possible and this option does not conflict with future proposals to dismantle the overhead line.

8.9 TO4 is shown in Figure 8.1.

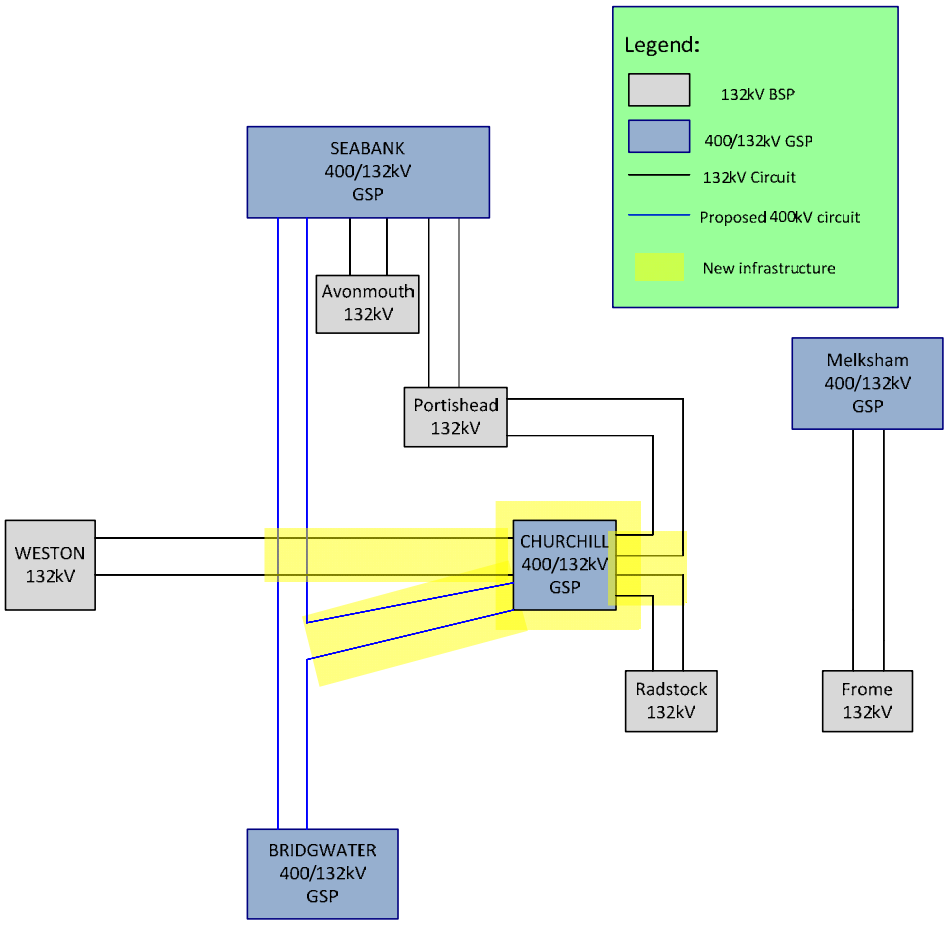


Figure 8.1: TO4 - Schematic

TO4 Technology options considered

8.10 Three 400kV technology options were considered, GIL, AC underground cables and overhead lines. Two 132kV technology options were considered AC underground cables and overhead line.

TO4 Capital Costs

8.11 The cost estimates associated with TO4 are summarised in Table 8.1 below.

400kV Works			
New 400kV Grid Supply Point substation			
2 Feeder circuits, Bus Section, 2 x SGT (400/132kV 240MVA) & 2 Low Voltage SGT bays	£23.5m		
400kV Circuits	OHL	GIL	U/G
2 x 400kV circuits (4.5km)	£7.2m	£68.4m	£81m
132kV Works			
132kV Substation Modification Works			
8 Bay 132kV substation (2 x SGT circuits, 4 Feeder circuits, Bus Section and Bus Coupler)	£1.54m		
132kV Circuits	OHL	U/G	
2 x 3.4km of 132kV circuit to existing Weston circuits	£0.54m	£6.8m	
2 x Cable Sealing Ends	-	£0.3m	
Turn-in of the W-route / Y-route circuit	£0.35m		
TOTAL (Range between minimum and maximum cost)		**£33.13m - £113.49m**	

Table 8.1 - TO4 (New GSP at Churchill) Capital Cost Summary

TO4 Lifetime Cost

8.12 The lifetime cost methodology is explained in Appendix 2. The lifetime costs assessed for the new circuits for options TO4 are shown in Table 8.2 below:

	400kV & 132kV AC Overhead Line	**400kV overhead line & 132kV cable**	**400kV GIL & 132kV overhead line**	**400kV GIL & 132kV cable**	**400kV Cable & 132kV overhead line**	**400kV Cable & 132kV cable**
Capital Cost	£33.13m	£39.39m	£94.33m	£100.59m	£113.19m	£113.49m
Transmission Circuit Loss Cost	£0.0m	£0.0m	£0.0m	£0.0m	£0.0m	£0.0m
SGT and Substation Loss Cost	£2.0m	£2.0m	£2.0m	£2.0m	£2.0m	£2.0m
Distribution Loss Cost	£0.3m	£0.2m	£0.3m	£0.2m	£0.3m	£0.2m
Transmission Maintenance Cost	£0.14m	£0.14m	£0.2m	£0.2m	£0.55m	£0.55m
SGT and Substation Maintenance Cost	£1.05m	£1.05m	£1.05m	£1.05m	£1.05m	£1.05m
Distribution Maintenance Cost	£0.16m	£0.20m	£0.16m	£0.20m	£0.16m	£0.20m
Lifetime Cost	**£36.78m**	**£42.98m**	**£98.04m**	**£104.24m**	**£117.29m**	**£117.49m**

Table 8.2: TO4 Lifetime Cost

8.13 The analysis shows that taking account of the lifetime costs that an overhead line based solution is in this case more economical than either GIL or AC underground cable.

TO4 Environmental Appraisal

8.14 There are 4 components of this option which require assessment:

(a) New Churchill GSP;

(b) New 400kV connection between the Churchill GSP and the new Bridgwater – Seabank 400kV circuit;

(c) New 132kV connection between Churchill GSP and the AT route tee, and

(d) Turn in of the W and Y routes at Churchill 132kV.

New Churchill GSP

8.15 The new Churchill GSP substation would include both National Grid and WPD equipment and would occupy a footprint of approximately 250m by 250m. Additional land may also be required on a temporary basis for temporary construction laydown and compound area. The area of search for the potential GSP substation is shown in Figure G1979.03.047a.

8.16 At this stage neither the precise location nor detailed design of the GSP substation has been determined. The siting and design of the GSP substation would be subject to further detailed study in accordance with National Grid's Stakeholder and Amenity Policy and the guidelines presented by the Horlock Rules[7].

8.17 There are no sites in the vicinity of the existing Churchill substation protected at the highest level by national or international nature conservation, historic environment or landscape designations. However, the following factors would require detailed consideration as part of the next stage of assessment if this option was taken forward:

(a) The existing Churchill substation lies within the 5km consultation zone of the North Somerset and Mendip Bats Special Area of Conservation. The potential effects on SAC bat species arising from a proposed

[7] National Grid Substations and the Environment: Guidelines on Siting and Design.

substation are associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. If this option was taken forward further assessment of the effects on the integrity of the SAC and its qualifying features would be required.

(b) Potential effects on the setting of the Mendip Hills AONB which lies approximately 2.5km south of the existing Churchill substation.

(c) Land surrounding the existing Churchill substation is designated as 'open countryside' where there is policy presumption (in Planning Policy Statement 7 and the North Somerset Replacement Local Plan 2007) against development of any kind, and a requirement for sensitive and high-quality designs, wherever development is permitted. However, new development close to the existing substation and energy-related infrastructure development would be broadly consistent with the existing localised character.

(d) Effects on landscape and views (including those from residential properties in the vicinity of the existing substation).

(e) National Grid and WPD consider the siting of installations such as substations very carefully in relation to flood risk. Substations should ideally be located outside areas at risk of flooding. The location of the new substation would require further consideration and assessment in accordance with PPS 25[8]. The existing Churchill substation is sited outside areas at high risk of flooding. However, land approximately 250m north of the substation (associated with the River Yeo), and approximately 900m west of Brinsea lies within Flood Zones 2 and 3. A Flood Risk Assessment (FRA) is anticipated to be required to demonstrate that a substation in this location could operate safely and effectively in the event of a flood and would not increase flood risk elsewhere.

[8] Planning Policy Statement 25: Development and Flood Risk (PTO25) 2010

New 400kV connection between the Churchill GSP and the new Bridgwater – Seabank 400kV circuit

8.18 As outlined at paragraph 8.4, if this technical option was taken forward, a new double circuit 400kV connection (by overhead line or underground cable) would be required from the proposed Bridgwater to Seabank 400kV connection (which would replace the existing 132kV overhead line F Route) to the potential GSP substation at Churchill. The existing 132kV N Route which runs for approximately 4.5km between the existing F Route and the existing Churchill substation would become redundant, and its corridor could be utilised for the new 400kV connection.

8.19 The replacement of the N Route with a new 400kV connection was considered as part of the Hinkley C Connection Route Corridor Study (TEP report 1979.016r01 June 2009) although at this stage the precise route of the 400kV connection has not been determined. The routeing of the connection would be subject to further detailed study in accordance with National Grid's Stakeholder and Amenity Policy, approach to the design and routeing of new electricity transmission lines and the guidelines presented by the Holford Rules[9].

8.20 There is one SSSI (Yanal Bog SSSI) in the area between the existing F Route overhead line and Churchill substation. This site is a calcicolous lowland mire which supports a diverse range of plant species. The construction of a 400kV connection (particularly an underground connection) through this site would cause disturbance and may have effects on the sites special interest. However, this site could be avoided by careful routeing.

8.21 There are no other sites close to the N Route overhead line protected at the highest level by national or international nature conservation or landscape designations. However, the following factors would require detailed consideration as part of the next stage of assessment if this option was taken forward:

(a) The connection lies within the within the 5km consultation zone of the North Somerset and Mendip Bats Special Area of Conservation (SAC).

[9] 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

The potential effects on SAC bat species arising from a new 400kV connection are associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. If this option was taken forward further assessment of the effects on the integrity of the SAC and its qualifying features would be required.

(b) The Mendip Hills AONB forms a constraint to siting infrastructure in this area. Its northern boundary is approximately 500m south of the existing N Route overhead line and the effects of a new 400kV connection (particularly an overhead line) on its setting would require further consideration assessment as part of routeing studies if this option was taken forward. An underground connection could have temporary effects from elevated views to the south, but these would be associated with construction, and any potential effects on the setting of the AONB would be reduced to negligible once the land had re-established.

(c) There are a number of listed buildings in the vicinity of the existing N Route overhead line including: the Grade I listed Church of St John the Baptist at Churchill Green; and the Grade II listed buildings of Brinsea Batch Farmhouse and Honey Hall. These listed buildings could be avoided through careful routeing of the connection however effects on their setting would require assessment on a case by case basis in accordance with Planning Policy Statement 5 and its accompanying practice guide. Effects on these features would be avoided by using an underground connection.

(d) Effects on landscape and views (including those from residential properties at Churchill Green and Brinsea). A landscape and visual assessment would be required to assess potential effects on settlements, individual farms and properties.

(e) A number of woodland blocks associated with commercial orchards owned by Thatchers Cider Company Ltd and the Mendip Spring Golf Club.

(f) North of the N Route overhead line there is a large area of land within Flood Zone 3, and smaller areas in Flood Zone 2. An area of Flood Zone 2 and 3 that corresponds with the floodplain of the River Yeo is

approximately 250m north of Churchill substation. It would be relatively straightforward to build flood resilience into an overhead line by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the lattice steel construction poses no material changes to surface water flow. If an underground cables connection was taken forward a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to the proposed Bridgwater to Seabank 400kV overhead line. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

8.22 An underground connection would offer benefits over an overhead line in terms of landscape and views, amenity and the setting of the Mendip Hills AONB. However, the installation of underground cables is more invasive and would potentially have a greater scale of effects on ecology and buried archaeology.

New 132kV connection between Churchill GSP substation and the AT route

8.23 The study area is illustrated at Figure G1979.03.047a and extends from Puxton Moor and Nye in the west, to the existing Churchill substation (South of Congresbury) in the east. The northern extent is defined by the southern edge of Congresbury and the southern extent by the northern edges of the settlements of Churchill and Sandford.

8.24 The main environmental constraints identified in the study area include two SSSIs, a SAC consultation zone, a Scheduled Monument, Listed Buildings, woodland and scattered settlements.

8.25 The connection would not pass through the Mendip Hills AONB; however the potential effects on its setting would require further consideration. Further assessment would also be required to ensure there would be no adverse effects on the North Somerset and Mendip Bats SAC. The study area falls within the SACs 5km consultation zone which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. Any effects on

bat activity and the integrity of the designation or its qualifying features would be assessed at a later and more detailed stage of assessment should this technical option be taken forward.

8.26 In the north-west corner of the study area, Puxton Moor SSSI covers ditches and rhynes in low lying farmland. A connection could avoid the SSSI if it connected to the AT Route at the Weston 'tee' immediately east of the designated site. The effects of the connection on the integrity of the SSSI and its qualifying features would be subject to further detailed consideration at a later and more detailed stage of assessment.

8.27 Yanal Bog SSSI in the southern part of the study area could be avoided by the connection.

8.28 The connection would need to negotiate smaller settlements and hamlets in the study area such as Brinsea, which comprises properties and farmsteads on Stock Lane, Brinsea Lane, Brinsea Batch and Brinsea Road. Properties would have an influence on the route and directness of any connection.

8.29 There is one Scheduled Monument, a moated site at Nye Farm in the western part of the study area, and two Grade II Listed Buildings in the central part of the study area: Brinsea Batch Farmhouse and Honey Hall. These sites could be avoided by a connection but an assessment would be required to identify any indirect effects on the features and their setting if the connection was to be routed in close proximity.

8.30 A new underground connection would offer benefits in terms of landscape and views particularly relating to settlements and the setting of the Mendip Hills AONB, Listed Buildings and Scheduled Monuments, compared with an equivalent length of overhead line. An underground connection would give rise to temporary effects on landscape and views during construction. Once the land has re-established, effects would be lower than an equivalent length of overhead line. However, the installation of underground cables is more invasive and would have a greater scale of effects on sites important for their ecology or archaeology.

8.31 It is relatively straightforward to build flood resilience into overhead lines by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a

negligible effect on the risk of displacement of water as the supports pose no material changes to surface water flow.

8.32 The presence of an underground cable circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow. However, if an underground cables connection was taken forward, a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the AT Route. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25.

8.33 An overhead connection could follow a similar route to the redundant 33kV overhead line, that runs across the study area from the existing Churchill substation to the AT route. The scale of change in views towards a new overhead line along the route of the redundant 33kV line (with wood poles still in place) is anticipated to be less, in comparison with views towards a new overhead line in an area without any existing electrical infrastructure. This would also depend on other factors such as proximity to settlements and would need to be confirmed by further study at a later and more detailed stage of assessment.

Turn in of the W and Y routes at Churchill 132kV

8.34 As outlined at paragraph 8.3 if this technical option was taken forward it would require the connection (turning in) of the W Route (that runs north from Churchill 132kV substation to Portishead 132kV substation, near Bristol) and the Y Route (that runs east from Churchill substation to Radstock 132kV substation, near Bath) to Churchill substation (see Figure G1979.03.061a).

8.35 The W & Y routes pass approximately 250m east of Churchill substation and would need to be connected into the substation using a double circuit overhead line. The W Route would then form a link between Churchill substation and Portishead substation, and the Y Route between Churchill substation and Radstock substation.

8.36 There are no environmental constraints between Churchill substation and the point from which the W and Y Routes would 'turn in'. The closest environmental constraint is a Listed Building at Brinsea, approximately 750m west of Churchill substation. The setting of this feature is unlikely to be affected due to its distance and the presence of intervening properties, vegetation and the existing Churchill substation.

8.37 No flood risk impacts are anticipated from the section of overhead line required to turn in the W and Y Routes. The area does not fall within Flood Zones 2 or 3 and it would be relatively straightforward to build flood resilience into the overhead line by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the lattice steel construction poses no material changes to surface water flow.

8.38 The environmental effects of connecting the W and Y Routes to the existing Churchill substation would require further consideration and assessment as part of the next stage of the project should this technical option be taken forward.

TO4 Socio-economic appraisal

8.39 Technical option TO4 would involve new electricity infrastructure in the area between Weston-super-Mare and Churchill substation. In Rural Service Villages, such as Winscombe, Banwell, Churchill, Congresbury, Yatton and Backwell, local planning policy states that development to support their role as local hubs should take place within village development boundaries. In smaller "Infill villages" such as Sandford, local planning policy limits development to small scale infill only. A 400kV connection to Churchill substation from the proposed Bridgwater to Seabank overhead line and a 132kV connection to the AT-route to Weston could be routed outside the built up areas of settlements and would not act as a constraint to potential development. The siting of a GSP substation in close proximity to the existing 132kV Churchill substation would not be consistent with planning policy for the rural areas of North Somerset which seeks to restrict development outside settlement boundaries. However, the presence, and related function, of the existing substation would be a material consideration in any planning decision.

8.40 Technical option TO4 would permit the removal of the existing overhead line between Radstock substation and Frome Tee. As noted under option TO1, this

could provide greater flexibility in planning the development of an employment development site at Old Mills, Paulton area and would also be consistent with Green Belt policy in Bath and North East Somerset.

9 TO5: A New Grid Supply Point located near to the 400kV Circuit

9.1 Option TO5 would restore supplies to the Churchill / Weston area by establishing a new 400/132kV Grid Supply Point (GSP) substation near to the proposed Bridgwater – Seabank 400kV connection. In order to minimise the length of new connections required TO5 establishes the GSP close to the new 400kV circuits between the N Route and AT Route 132kV overhead lines to the north of the village of Sandford.

9.2 The new Sandford GSP substation would include two 400/132kV supergrid transformers (SGTs), each of 240MVA capacity. Two SGTs are required to meet the requirements of P2/6 and to provide similar capacity to that provided by the 132kV Bridgwater-Avonmouth substation F and G routes which are to be decommissioned as part of the Hinkley Point C Connection project. However, two SGTs alone make the network less flexible than the 4 circuits they replace.

9.3 To maintain similar levels of flexibility, it is also proposed that a single circuit of the W-route / Y-route is “turned-in” to the Churchill 132kV substation. This establishes a connection back to Seabank 132kV substation and ensures that in a “second circuit outage[10]” condition the Churchill / Weston group maintains supplies.

9.4 Connections from the new Sandford GSP would need to be established to the existing Churchill 132kV substation in order to provide the supply to the distribution network. It is assumed that this could be done by utilising the existing 132kV double circuit N-route overhead line. A 132kV connection would be required between the new GSP substation and the N-route overhead line.

9.5 To facilitate the new connections from the GSP substation, a 132kV substation will be constructed as part of the GSP.

9.6 Connections to the circuits which supply Weston (the AT route) must also be re-established. In this option the connections are proposed to run from the new Sandford GSP substation to the existing AT route tee - a distance of approximately 2.5km has been assumed.

[10] T his is for the case where one supergrid transformer is out-of-service for maintenance and a fault occurs on the second supergrid transformer at the new Churchill GSP. There is a statutory requirement to maintain minimum levels of supply for this combination of events.

9.7 The W-route and Y-route meet approximately 250m east of the boundary of Churchill 132kV substation and the turn in would involve very minor works. Given the minor nature of the works consideration may be given to turning in both circuits, so as to provide greater network flexibility.

9.8 In order to facilitate the extra circuits and equipment Churchill 132kV substation would also need to be modified although this would occur on land currently owned by WPD.

9.9 In contrast to TO4 (New Churchill GSP), TO5 would not require a new 4.5km section of 400kV transmission circuits. For both TO4 and TO5 the proposed dismantling of the 12km section of 132kV overhead line between Radstock and the Frome Tee would still be possible and neither option conflicts with future proposals to dismantle the overhead line.

9.10 TO5 is shown in Figure 9.1.

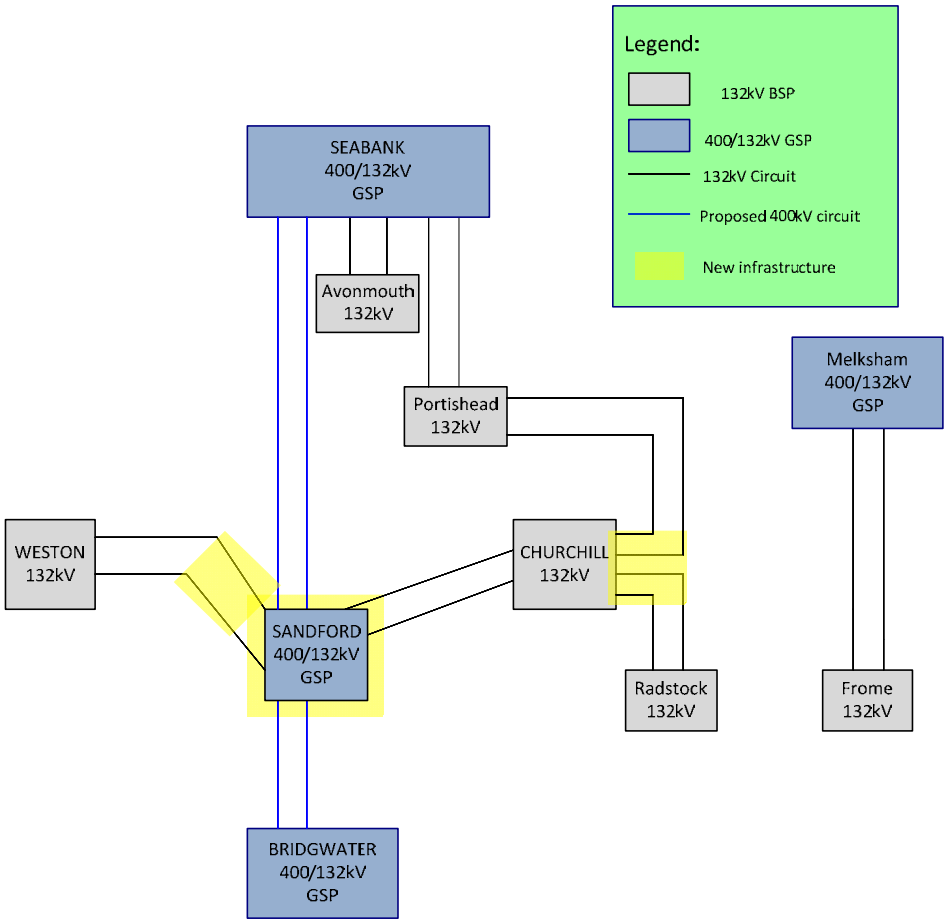


Figure 9.1: TO5 - Schematic

TO5 Technology options considered

9.11 As this option requires no additional 400kV circuits only two 132kV technology options were considered - AC underground cables and overhead line – for the connections to the N-route and AT-route.

TO5 Capital Costs

9.12 The cost estimates associated with TO5 are summarised in Table 9.1 below.

400kV Works			
New 400kV Grid Supply Point			
4 Feeder circuits, Bus Section, 2 x SGT (400/132kV 240MVA) & 2 Low Voltage SGT bays	£23.5m		
400kV Circuits	GIL	U/G	OHL
None required	-	-	-
132kV Works			
132kV Substation Works			
At Sandford, Bay 132kV substation (2 x SGT circuits, 2 Feeder circuits, Bus Section and Bus Coupler)	£1.54m		
At Churchill, modification of existing substation to add 2 extra bays	£0.6m		
132kV Circuits	OHL	U/G	
2 x 2.5km of 132kV circuit to existing Weston circuits	£0.4m	£5m	
4 x Cable Sealing Ends (132kV)	-	£0.6m	
Turn-in of the W-route / Y-route circuit	£0.35m		
TOTAL (Range between minimum and maximum cost)			**£25.79m-£30.99m**

Table 9.1 - TO5 (New GSP at the 400kV circuit) Capital Cost Summary

TO5 Lifetime Cost

9.13 The lifetime cost methodology is explained in Appendix 2. The lifetime costs assessed for the new assets for options TO5 are shown in Table 9.2 below:

	132kV AC Overhead Line	**132kV AC cable**
Capital Cost	£25.79m	£30.99m
SGT and Substation Loss Cost	£2.0m	£2.0m
Distribution Loss Cost	£0.2m	£0.1m
SGT and Substation Maintenance Cost	£1.05m	£1.05m
Distribution Maintenance Cost	£0.09m	£0.11m
Lifetime Cost	**£29.13m**	**£34.25m**

Table 9.2: TO5 Lifetime Cost

9.14 The analysis shows that taking account of the lifetime costs that a solution involving overhead line connections between the GSP and the distribution network would be more economical than an underground cable.

TO5 Environmental Appraisal

9.15 There are 3 components of this option which require assessment:

(a) New Sandford GSP;

(b) New 132kV connection between Sandford GSP and the AT route, and

(c) Turn in of the W and Y routes at Churchill 132kV.

New Sandford GSP Substation

9.16 As outlined at paragraph 9.1, if this technical option was taken forward, a new 400/132kV Grid Supply Point (GSP) substation would be required in the vicinity of Sandford, North Somerset in the area between the existing WPD 132kV N Route and AT Route overhead lines. The GSP substation would include both National Grid and WPD equipment and would occupy a footprint of approximately 250m by 250m. Additional land may also be required on a temporary basis for temporary construction laydown and compound areas.

9.17 At this stage the precise location and design of the GSP substation has not been determined. The siting and design of the GSP substation would be subject to further detailed study in accordance with National Grid's Stakeholder and Amenity Policy and the guidelines presented by the Horlock Rules[11].

9.18 There is one Scheduled Monument (a moated site at Nye Farm) and one SSSI (Puxton Moor SSSI) in the area between the existing N Route and AT Route overhead lines. There are no other sites in this area protected at the highest level by national or international nature conservation, historic environment or landscape designations. However, the following factors would require detailed consideration as part of the next stage of assessment if this option was taken forward:

(a) The area of search for a GSP substation lies within the 5km consultation zone of the North Somerset and Mendip Bats Special Area of Conservation (within 1km of one of the SAC's composite sites the Banwell Ochre Caves SSSI). The potential effects on SAC bat species arising from a proposed substation are associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. If this option was taken forward further assessment of the effects on the integrity of the SAC and its qualifying features would be required.

(b) Potential effects on the setting of the Mendip Hills AONB which lies approximately 500m south of the area of search for the GSP substation.

(c) The majority of land between the 132kV N Route and AT Route overhead lines lies within Flood Zone 3, where the development of 'essential infrastructure' is strictly controlled. The siting and design of

[11] National Grid Substations and the Environment: Guidelines on Siting and Design.

the new substation would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25 if this option was taken forward.

(d) Land within the area of search for the potential GSP substation is designated as 'open countryside' where there is policy presumption (in Planning Policy Statement 7: Sustainable Development in Rural Areas and the North Somerset Replacement Local Plan 2007) against development of any kind, and a requirement for sensitive and high-quality designs, wherever development is permitted.

(e) Effects on landscape and views (including those from residential properties on Nye Road and Mead Lane).

(f) Effects on the Cheddar Valley Railway Walk (Strawberry Line) Local Nature Reserve and strategic cycle route.

New 132kV connection between the Sandford GSP and the AT route

9.19 The study area is illustrated at Figure G1979.03.028c and extends west from WPD's existing 132kV overhead line network (including the Weston 'tee', F Route and N Route) for approximately 4km to the M5 motorway. It includes parts of Sandford, Banwell and Locking as well as smaller settlements such as Puxton, Stonebridge, Woolvershill, Woolvershill Batch, Rolestone, East Rolestone, Nye and Way Wick. Weston-super-Mare lies beyond the study area and extends from the M5 motorway to the Severn Estuary.

9.20 The main constraints identified in the study area include Scheduled Monuments, Listed Buildings, scattered settlements, Puxton Moor SSSI which the AT Route currently runs through and an SAC consultation zone.

9.21 There are two Scheduled Monuments and five Listed Buildings within the study area. These sites could be avoided with a connection but an assessment would be required to identify any indirect effects on the features and their setting if the connection was to be routed close to these features.

9.22 The SSSI designation for Puxton Moor covers ditches and rhynes in low lying farmland. A connection could avoid Puxton Moor SSSI by routeing to the west of the site. This would avoid direct impacts on the SSSI and would also allow

the section of the AT Route that currently runs through the SSSI to be removed, which may provide some environmental benefit and could potentially improve views from the few nearby properties.

9.23 Routeing to the west of Puxton Moor SSSI would also allow separation to be achieved between the new connection and National Grid's proposed 400kV overhead line, which could otherwise contribute to a wirescape effect from some receptors due to the height difference between a 132kV and a 400kV overhead line.

9.24 An overhead line would be able to oversail the ditches and rhynes to which the SSSI designation applies, however further detailed study would be required to determine the potential for direct and indirect effects on this site and its qualifying features if this connection was taken forward.

9.25 Constructing an underground connection through the SSSI would cause disturbance during construction and may have effects on the sites special interest. Detailed environmental surveys would be required to ensure that the integrity of the site or its qualifying features would not be adversely affected by the construction of underground cables either through or in close proximity to this site.

9.26 The small settlements, hamlets and farmsteads spread across the study area provide a constraint to routeing. This is particularly noticeable in the area immediately south of the AT Route around East Rolstone, Rolstone, and Way Wick although it would be possible to avoid these settlements through careful routeing.

9.27 Although the connection would not pass through the Mendip Hills AONB, the potential effects on its setting would require consideration. The connection also falls within the North Somerset and Mendip Bats SAC 5km 'consultation zone' which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. Further assessment would be required to ensure there would be no adverse effects on bat activity, the integrity of the designation or its qualifying features.

9.28 The majority of land within the study area is in Flood Zone 3, with smaller areas in Flood Zone 2. There are two areas of land that fall outside these Flood

Zones of medium and high probability, to the north of Banwell and north of Sandford. The entire length of the AT Route within the study area crosses Flood Zone 3. It is relatively straightforward to build flood resilience into overhead lines by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the supports pose no material changes to surface water flow.

9.29 The presence of an underground cable circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow. However, if an underground cables connection was taken forward, a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the AT Route. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

9.30 An underground connection would offer benefits over an overhead line in terms of landscape and views, particularly relating to the setting of the Mendip Hills AONB, Listed Buildings, SM's and settlements. However, the installation of underground cables is more invasive and would have a greater scale of effects on ecology and buried archaeology.

Turn in of the W and Y routes at Churchill 132kV

9.31 As outlined above if this technical option was taken forward it would require the connection (turning in) of the W Route (that runs north from Churchill 132kV substation to Portishead 132kV substation, near Bristol) and the Y Route (that runs east from Churchill substation to Radstock 132kV substation, near Bath) to Churchill substation (see Figure G1979.03.061a).

9.32 The W & Y routes pass approximately 250m east of Churchill substation and would need to be connected into the substation using a double circuit overhead line. The W Route would then form a link between Churchill substation and Portishead substation, and the Y Route between Churchill substation and Radstock substation.

9.33 There are no environmental constraints between Churchill substation and the point from which the W and Y Routes would 'turn in'. The closest environmental constraint is a Listed Building at Brinsea, approximately 750m west of Churchill substation. . The setting of this feature is unlikely to be affected due to its distance and the presence of intervening properties, vegetation and the existing Churchill substation.

9.34 No flood risk impacts are anticipated from the section of overhead line required to turn in the W and Y Routes. The area does not fall within Flood Zones 2 or 3 and it would be relatively straightforward to build flood resilience into the overhead line by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the lattice steel construction poses no material changes to surface water flow.

9.35 The environmental effects of connecting the W and Y Routes to the existing Churchill substation would require further consideration and assessment as part of the next stage of the project should this technical option be taken forward.

TO5 Socio-economic appraisal

9.36 At the technical level, the potential effects of option TO5 on development policy would be similar to those of technical option TO4. Option TO5, involving the construction of a substation to the north of Sandford and connections between it and the AT route to Weston and the N route to Churchill, would not constrain development in that area, which is restricted by planning policy to sites within existing settlement boundaries. However, as an isolated site within the open countryside, the location of a GSP to the north of Sandford would not be consistent with planning policies governing development in the rural areas of North Somerset and would need to be justified on an exceptional basis.

9.37 Technical option TO5 would permit the removal of the existing overhead line between Radstock substation and Frome Tee. As noted under option TO1, this could provide greater flexibility in planning the development of an employment development site at Old Mills, Paulton area and would also be consistent with Green Belt policy in Bath and North East Somerset.

10 Conclusions

10.1 This Report describes the appraisal that WPD and National Grid have conducted of technical options to maintain the reliability and resilience of electricity supplies in the Churchill and Weston area of WPD's distribution network and, at the same time, continue to ensure that both WPD and National Grid comply with their statutory obligations and licence standards. This analysis is summarised in Table 10.1.

10.2 This Report:

- Reviews the connection options available to meet the identified need for system reinforcement, including the use of AC underground cables and overhead lines and gas insulated lines;
- Assesses the lifetime costs of each technology option as well as the initial capital cost, and
- Assesses the environmental and socio-economic effects of each option.

10.3 The technical options considered were:

- TO1: New 132kV double circuit underground cables between Bridgwater & Avonmouth
- TO2: 132kV Connections to Seabank GSP and Melksham GSP via the W & Y routes
- TO3: 132kV Connections to Seabank GSP & Bridgwater GSP via the W & a new F' route
- TO4: New 400/132kV GSP substation at Churchill and associated 400kV connections to the transmission system and 132kV connections to the distribution network.
- TO5: New 400/132kV GSP substation in close proximity to the proposed 400kV transmission circuit and associated 132kV connections to the distribution network.

10.4 There are a number of different technologies by which the required connections can be made:

- Alternating Current (AC) overhead transmission lines;
- AC Underground cable circuits, and
- AC Gas Insulated lines (GIL).

Table 10.1: Options Summary

	Route Length & Infrastructure	Environmental	Technical	Economic	
				Capital Cost[12]	Lifetime Cost[13]
TO1: Bridgwater – Avonmouth 132kV underground connection	132kV underground connection Bridgwater to Avonmouth	Least visual impact of all Technical Options as no overhead lines or substations are required. Sealing End Compounds (if required) would have localised environmental effects. A new 132kV underground connection between Bridgwater and Seabank would be constrained by a number of national and international nature conservation and landscape designations including large areas of land (including ditches and rhynes) designated as SSSIs, settlements, Scheduled Monuments, Listed Buildings and woodlands. A crossing of the River Avon Special Area of Conservation (SAC)/Special Protection Area (SPA)/Ramsar/Site of Special Scientific Interest (SSSI) would be necessary, and an assessment under the Conservation of Habitat and Species Regulations (2010) would be required to determine the potential for significant adverse effects.	Long AC cables will require operational restrictions for management of both voltage and charging current issues. Scope of civil works are significant and would introduce a construction challenge. In low-lying and wetland areas such as the Puxton Moors, there would be significant technical challenges associated with the installation of cables.	£108.6m	£114.09

[12] Capital Cost includes the capital cost of system upgrades, generator connection assets and contingent transmission works.

[13] Lifetime Cost of the proposed new connection assets (substations, supergrid transformers, overhead lines, underground cables and GIL).

	Route Length & Infrastructure	Environmental	Technical	Economic	
				Capital Cost[12]	Lifetime Cost[13]
		The connection would need to cross beneath the Huntspill River, the majority of which is designated as a National Nature Reserve (NNR) in the study area. To avoid the designated part of the NNR a connection would need to route along the eastern edge of the study area between the NNR and sites within the Somerset Levels SPA and Ramsar site. It would not be feasible to avoid the Mendip Hills Area of Outstanding Natural Beauty (AONB) with a reasonably direct route. The connection would need to travel through the AONB for approximately 6km, on lower ground in the Lox Yeo Valley to avoid constraints such as SACs, SSSIs and woodland. The connection would pass through the North Somerset and Mendip Bats SAC 5km consultation zone. Visual effects would be reduced by using an underground connection, but would have a greater potential for effects on buried archaeology and biodiversity resources during construction.			
TO2: W and Y	New 132kV substation compound	<u>New 132kV substation compound</u> Land take, visual and environmental effects associated with a new substation occupying a	Parallel operation of SSE & WPD networks requiring increased operational	£11.1m-	£19.83m

	Route Length & Infrastructure	Environmental	Technical	Economic	
				Capital Cost[12]	Lifetime Cost[13]
Route Turn in to Churchill	between Radstock and Frome Tee 132kV connection Melksham to Frome Tee (10.5km) 132kV connection Sandford to AT route Tee (2.5km) W and Y Route turn in to Churchill substation Extensions to Churchill substation Upgrading Y Route	footprint of approximately 80m by 50m. New connections between the substation compound and Frome Tee are also likely to be required. Potential for effects on the Cotswolds AONB, three SSSIs, two Registered Park and Gardens, Scheduled Monuments, Conservation Areas, Listed Buildings and woodland would require consideration in substation siting. Key considerations would be effects on landscape and views and the Green Belt. <u>132kV Connection Melksham – Frome Tee</u> A direct connection would be constrained by several environmental constraints including two Registered Parks and Gardens, Conservation Areas, a Scheduled Monument, Listed Buildings, woodland and settlements. The cumulative visual effects of an additional overhead line close or parallel to the Y Route overhead line or National Grid's 400kV Hinkley Point to Melksham overhead line would require consideration. Siting the lines further apart would introduce effects on landscape and views over a greater area. <u>132kV Connection Sandford – AT Route Tee</u> The main environmental constraints identified include Scheduled Monuments, Listed Buildings, Puxton Moor SSSI, woodland and	liaison. Dependence on an automatic intertripping system required following first fault outage on either Churchill-Seabank circuits (a measure normally reserved for excessive demand on a network). Failure or maloperation of this system will interrupt supply to Portishead, Churchill, Weston, Frome and Radstock. Voltage compensation equipment required at Churchill (a measure normally reserved for excessive demand on a network). WPD system has more risk and reliance on automatic MVAr support. Limited headroom for local demand growth which would require further infrastructure.	£25.28m	- £33.93m

	Route Length & Infrastructure	Environmental	Technical	Economic	
				Capital Cost[12]	Lifetime Cost[13]
		scattered settlements. Key considerations for the 132kV connection would be effects on landscape and views, the setting of the Mendip Hills AONB and effects on the North Somerset and Mendip Bats SAC. Routes to the west of the Puxton Moor SSSI would avoid direct impacts on the designation and may also provide potential benefits as a section of the AT Route running through the SSSI could be removed. Visual effects would be reduced by using underground connections but this would have a greater potential for effects on buried archaeology and biodiversity resources during construction.			
TO3: W and F route	132kV underground connection Bridgwater to N Route Tee (26km) 132kV connection Bridgwater to Weston (29km) W and Y Route turn in to Churchill	<u>132kV Connection Bridgwater - N Route</u> A new 132kV connection between Bridgwater and the N Route would be constrained by a number of national and international nature conservation and landscape designations, settlements, Scheduled Monuments, Listed Buildings and woodlands. The connection would need to cross the Huntspill River NNR and the Mendip Hills AONB (for approximately 6km) and would pass through the North Somerset and Mendip Bats SAC 5km consultation zone. A direct	Provides GSP interconnection to Bridgwater and Seabank. Less demand margin than GSP alternatives. Voltage compensation equipment required at Churchill (a measure normally reserved for excessive demand on a network).	£34.83m - £63.81m	£36.25m - £66.42m

	Route Length & Infrastructure	Environmental	Technical	Economic	
				Capital Cost[12]	Lifetime Cost[13]
	substation Extension of Churchill substation to accommodate compensation equipment 132kV connection N Route to AT Route Tee (2.5km)	connection would also be constrained by settlements within the Somerset Levels and Moors and the Mendip Hills. Visual effects would be reduced by using an underground connection, but this would have a greater potential for effects on buried archaeology and biodiversity resources during construction. Sealing End Compounds (if required) would have localised environmental effects. <u>132kV connection Bridgwater to Weston</u> A new 132kV connection between Bridgwater and Weston could follow the alignment of an existing 33kV overhead line which would be removed. New 132kV wood poles could have less effect on landscape and views compared with the existing 33kV steel lattice pylons. The key environmental constraints within the study area include the Mendip Hills AONB, the Huntspill River NNR, three SSSIs, the North Somerset and Mendip Bats SAC 5km consultation zone, Scheduled Monuments, Listed Buildings, Conservation Areas, woodland and settlements. The connection would need to cross the Huntspill River NNR and would pass through the North Somerset and Mendip Bats SAC 5km consultation zone. Beyond the study area			

	Route Length & Infrastructure	Environmental	Technical	Economic	
				Capital Cost[12]	Lifetime Cost[13]
		boundary there are several large sites afforded protection under ecological designations. To avoid the Mendip Hills AONB the connection would need to route through residential areas to the west of this designation. It may not be possible to route a new overhead line through this area without oversailing properties and underground cables may require particular consideration for this section. Landscape and visual effects would be reduced by using underground connections but this would have a greater potential for effects on buried archaeology and biodiversity resources during construction. Sealing End Compounds (if required) would have localised environmental effects. <u>132kV Connection N Route - AT Route Tee</u> Relatively few environmental constraints would influence 132kV connections from the N Route to the Weston Tee. The main environmental constraints identified include Puxton Moor SSSI, Yanal Bog SSSI, Scheduled Monuments, Listed Buildings, woodland and scattered settlements. The 132kV connection between the N Route and the AT Route could run to the west of			

	Route Length & Infrastructure	Environmental	Technical	Economic	
				Capital Cost[12]	Lifetime Cost[13]
		Puxton Moor SSSI, which would avoid direct impacts on the designation and may also provide potential benefits as a section of the AT Route running through the SSSI could be removed. Key considerations for an overhead line connection would be effects on landscape and views from residential properties, effects on the setting of the Mendip Hills AONB to and effects on the North Somerset and Mendip Bats SAC. Visual effects would be reduced by using underground connections but this would have a greater potential for effects on buried archaeology and biodiversity resources during construction.			
TO4: Churchill 400/132kV GSP	New GSP Substation at Churchill 132kV connection Churchill to AT Route Tee (3.4km) 400kV connection F Route to Churchill substation (4.5km)	This is the only technical option that requires a new 400kV connection. <u>Churchill Substation</u> Land take, visual and environmental effects associated with a new GSP substation close to the existing WPD substation at Churchill (occupying a footprint of approximately 250m by 250m). No sites in the immediate vicinity of Churchill substation are protected at the highest level by national or international designations.	Provision of good demand margin and voltage step change control. Neither AC overhead lines, GIL nor underground cables introduce any technical issues and are each able to provide the necessary connections.	£33.13m - £113.49m	£36.78m-£117.49m

	Route Length & Infrastructure	Environmental	Technical	Economic	
				Capital Cost[12]	Lifetime Cost[13]
	W and Y Route turn in to Churchill substation Extension to Churchill BSP substation	Key considerations would be effects on landscape and views from nearby residential properties, effects on the setting of the Mendip Hills AONB (approximately 2.5km south) and effects on the North Somerset and Mendip Bats SAC. This site lies in 'open countryside' where there is a policy presumption against development. However a new substation close to the existing substation would be broadly consistent with the existing localised character. <u>132kV Connection Churchill - Weston Tee</u> There are few environmental constraints that would influence a 132kV connection from Churchill substation to the Weston Tee. The main environmental constraints identified include Puxton Moor SSSI, Listed Buildings at Brinsea Batch and Honey Hall, woodland and scattered residential properties. Key considerations would be effects on landscape and views from residential properties, the setting of the Mendip Hills AONB and effects on the North Somerset and Mendip Bats SAC. Visual effects would be reduced by using underground connections but this would have a			

	Route Length & Infrastructure	Environmental	Technical	Economic	
				Capital Cost[12]	Lifetime Cost[13]
		greater potential for effects on buried archaeology and biodiversity resources during construction. <u>400kV Connection F Route - Churchill</u> The new 400kV connection would utilise the corridor of the existing N Route overhead line which would be removed. Key considerations would be effects on landscape and views from residential properties at Sandford, Churchill Green and Brinsea, the setting of the Mendip Hills AONB and effects on the North Somerset and Mendip Bats SAC.			
TO5: Sandford 400/132kV GSP	New Sandford GSP Substation (incorporating new 132kV substation) 132kV connection Sandford to AT Route Tee (2.5km) W and Y Route turn in to Churchill substation	This option minimises the amount and/or length of new connections required. <u>Sandford GSP Substation</u> Land take, visual and environmental effects associated with a new substation to the north of Sandford, North Somerset (occupying a footprint of approximately 250m by 250m). There is one Scheduled Monument and a SSSI (Puxton Moor SSSI) near to the substation area of search. Key considerations would be effects on landscape and views from nearby residential properties, effects on the Cheddar Valley Railway Walk LNR (the Strawberry Line), effects on the setting of the Mendip Hills AONB (approximately 500m south) and effects on the	Requires only 132kV connections, so no additional 400kV circuits are required in the area. Neither AC overhead line or underground cable introduce any technical issues and are each able to provide the necessary connections. Provision of good demand margin and voltage step change.	£25.79m- £30.99m	£29.13m - £34.25m

	Route Length & Infrastructure	Environmental	Technical	Economic	
				Capital Cost[12]	Lifetime Cost[13]
		North Somerset and Mendip Bats SAC. The substation would be in 'open countryside' where there is a policy presumption against development. The majority of land north and west of the substation area of search (and some within) is in Flood Zone 3 where the development of infrastructure is strictly controlled. <u>132kV Connection Sandford - Weston Tee</u> Relatively few environmental constraints would influence a 132kV connection from the new substation to the Weston Tee. The main environmental constraints identified include Scheduled Monuments, Listed Buildings, Puxton Moor SSSI, woodland and scattered settlements. Key considerations would be effects on landscape and views from residential properties, the setting of the Mendip Hills AONB and effects on the North Somerset and Mendip Bats SAC. Routes to the west of the Puxton Moor SSSI would avoid direct impacts on the designation and may also provide potential benefits as a section of the AT Route running through the SSSI could be removed.			

	Route Length & Infrastructure	Environmental	Technical	Economic	
				Capital Cost[12]	Lifetime Cost[13]
		Visual effects would be reduced by using an underground connection but this would have a greater potential for effects on buried archaeology and biodiversity resources during construction.			

10.5 The economic review showed that where new transmission or distribution connections are required AC overhead line technology would be the most economic of the options. AC underground cables and, in the case of 400kV, 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.

10.6 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. It concluded that it was not possible to discriminate between options on the basis of the socio-economic evaluation.

10.7 The significant cost of the Bridgwater-Seabank (TO1) option leads to the conclusion that this option should only be pursued if there were no other acceptable options.

10.8 Both TO2 and TO3 have shorter connection lengths, lower capital and lifetime costs than TO1 and therefore would be preferred for further development.

10.9 However, although TO2 and TO3 are compliant with the minimum standards set out in P2/6 they reduce the flexibility, resilience and headroom for demand growth on the WPD network and as such do not provide a like for like replacement of the current network. This would disadvantage WPD and its customers in the Weston and Churchill areas and therefore neither TO2 nor TO3 are taken forward.

10.10 Both TO4 and TO5 provide sufficient resilience, flexibility and headroom for demand growth but require construction of a new GSP substation. Both TO4 and TO5 require new 132kV connections of similar lengths between the GSP and the AT route which supplies Weston-Super-Mare. However, TO4 also requires a 4.5km 400kV connection while TO5 does not. Differences in capital and lifetime costs show that option TO5 is therefore the most economic as it does not require a double circuit 400kV connection.

10.11 The conclusion of this Report is that an option which incorporates a new GSP best meets a range of technical, economic and environmental criteria and should, therefore, be taken forward for further investigation. Our preliminary preferred option is TO5 as it offers economic benefits and would remove the requirement for a 400kV connection to Churchill. However, this is dependent on

the availability of a suitable site. Therefore, as part of the next stage of the project we will be undertaking detailed studies to identify potential locations for a new GSP in the area between Sandford and Churchill but focussed close to the proposed 400kV connection so as to minimise the amount of new 400kV infrastructure.

Glossary

AC	Alternating current
AONB	Area of Outstanding Natural Beauty
DNO	Distribution Network Operator
GIL	Gas Insulated Line
Grid Code	A document produced by National Grid Electricity Transmission (NGET) that details the operating procedures and principles governing NGET's relationship with all users of the national electricity transmission system. The Grid Code specifies day-to-day procedures for both planning and operational purposes and covers both normal and exceptional circumstances. The Grid Code is designed to permit the development, maintenance and operation of an efficient, co-ordinated and economical national electricity transmission system, to facilitate competition in the generation and supply of electricity and is conceived as a statement of what is optimal (particularly from a technical point of view) for all users and NGET itself in relation to the planning, operation and use of the national electricity transmission system.
GW	Gigawatt (one thousand Megawatts)
HV	High Voltage
km	Kilometre
kV	Kilovolt

MAGIC	Multi-Agency Geographic Information for the Countryside
MW	Mega watt – 1,000,000 watts
NETS SQSS	National Electricity Transmission System Security and Quality of Supply Standard The NETS SQSS is a document that defines a set of criterion that specifies the robustness of the transmission system, in terms of the transmission faults and combinations of faults that it must be able to withstand without any interruption of electrical supplies, and the maximum interruption to supplies which is permitted under certain more onerous combination of faults. The NETS SQSS is subject updates through industry and regulatory working groups, this periodic review and consultation changes to the NETS SQSS are implemented by changes to the electricity transmission licence Standard Conditions approved by the industry regulator, Ofgem. The NETS SQSS requires that National Grid must plan for all demand and generation conditions (or "backgrounds") "which ought reasonably to be foreseen to arise in the course of a year of operation … [and] shall include forecast demand cycles, typical power station operating regimes and typical planned outage patterns."
OFGEM	Office of Gas and Electricity Markets The regulatory body that is responsible for electricity and gas supply markets and networks.
OHL	Overhead Line
Ramsar	Covers all aspects of wetland conservation and wise use, recognising wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities.

SAC	Special Area of Conservation
SF6	Sulphur Hexafluoride Gas
SGT	Supergrid transformer
SPA	Special Protection Area Gives protection under the Birds Directive to rare and vulnerable birds, and for regularly occurring migratory species.
SSSI	Site of Special Scientific Interest Protect the country's best wildlife and geological sites.
XLPE	Cross-linked polyethylene cable

Appendix 1 Western Power Distribution and National Grid Role and Obligations

A1.1 Both the distribution and transmission of electricity in Great Britain requires permission by a licence granted under Section 6(1)(b) and (c) of the Electricity Act 1989 ("the Electricity Act").

A1.2 The legislative and regulatory framework is designed to ensure coordination and efficient investment by the distribution and transmission companies. These principles are central to the respective licences and industry codes.

WPD Role & Obligations

A1.3 WPD has been granted a distribution licence and is therefore bound by the legal obligations set out in the Electricity Act and their distribution licence.

A1.4 WPD owns and operates the distribution system in the South West, South Wales and the Midlands.

A1.5 WPD has statutory duties to develop and maintain an efficient, coordinated and economical system of electricity distribution under Section 9 of the Electricity Act. These duties, which are documented in Standard Licence Conditions[14], are summarised in the following paragraphs.

A1.6 Standard Condition C24 (Distribution System planning standard and quality of performance reporting) of WPD's distribution licence requires WPD to plan and develop its distribution system in accordance with standards set out in Engineering Recommendation P2/6[15].

A1.7 P2/6 is a document that defines the minimum standards that WPD must apply when planning and operating the distribution system. The criteria include the type of faults (or breakdowns) and combinations of faults that the distribution system must be able to withstand, the impact on customers in terms of maximum level of supply interruptions, and the impacts on supply quality that are permissible.

[14] http://epr.ofgem.gov.uk/document_fetch.php?documentid=15184

[15] P2/6 can be purchased from www.energynetworks.org

A1.8 P2/6 is open to industry and public scrutiny, is subject to periodic review and consultation and any changes are implemented by a change to the licence Standard Conditions and approved by the industry regulator, Ofgem[16].

A1.9 As well as the technical standards described above, Section 38 and Schedule 9 of the Electricity Act 1989 requires WPD, 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*".[17]

A1.10 WPD's Schedule 9 statement[18] (the "Statement") sets out how the company will meet the duty to the environment placed upon it. These commitments include:

- minimise the impact of its activities on communities and the historic and natural environment;
- only seeking to build new lines along new routes, or substations in new locations where the existing distribution system infrastructure cannot be economically upgraded to meet distribution security standards;
- where new infrastructure is required seek to avoid, where reasonably practicable, areas which are nationally or internationally designated for their landscape, wildlife or cultural significance;
- site overhead lines with care and consider both the visual impact and the impact on nature conservation as far as possible; and

[16] **http://www.ofgem.gov.uk/Pages/OfgemHome.aspx**

[17] Schedule 9 of the Electricity Act (**http://www.legislation.gov.uk/ukpga/1989/29/contents**).

[18] **WPD Schedule 9 Statement:** http://www.westernpower.co.uk/getdoc/c4856406-1794-4e34-81a0-9f2b593cdd4a/schedule9.aspx

- continually work with partners to selectively underground lines in appropriate sensitive locations to improve the appearance of countryside, towns or villages, whilst taking account of sites of particular archaeological or nature conservation interest.

A1.11 Effective consultation with stakeholders and the public is also promoted by the Statement.

National Grid Role & Obligations

A1.12 National Grid has been granted a transmission licence and is therefore bound by the legal obligations primarily set out in the Electricity Act and their transmission licence.

A1.13 National Grid owns and operates the transmission system in England and Wales[19] and is also responsible for operation of parts of the transmission system that are owned by other transmission licensees (SP Transmission Limited and Scottish Hydro Electricity Transmission Limited).

A1.14 National Grid has a statutory duty to develop and maintain an efficient, coordinated and economical system of electricity transmission under Section 9 of the Electricity Act. These duties, which are documented in Standard Licence Conditions[20], are summarised in the following paragraphs.

A1.15 Standard Condition C8 (Requirement to offer terms) of the transmission licence sets out obligations on National Grid regarding provision of offers to provide connections to the transmission system. In summary, where a party applies for a connection National Grid shall offer to enter into an agreement(s)[21] to connect, or to modify an existing connection, to the transmission system and the offer shall make detailed provision regarding:

[19] National Grid also operates, but does not own, the transmission systems in Great Britain's offshore waters and in Scotland.

[20] http://epr.ofgem.gov.uk/document_fetch.php?documentid=15184

[21] 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.

- 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.

A1.16 Standard Condition C10 (Connection and Use of System Code) requires National Grid to prepare a connection and use of system code ("CUSC") which sets out, among other things, the terms of the arrangements for connection to and use of the transmission system.

A1.17 Standard Condition C14 (Grid Code) requires National Grid to "prepare and at all times have in force and shall implement and comply with the Grid Code". This document (among other things), sets out the technical performance and data provision requirements that need to be met by users connected to or seeking to connect to the transmission system. The document also sets out the process by which demand data from Network Operators and other users of the transmission system should be presented on an annual basis to allow National Grid to plan and operate the transmission system.

A1.18 Standard Condition C17 (Transmission system security standard and quality of service) requires National Grid to at all times plan, develop and operate the transmission system in accordance with the National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS).

A1.19 The NETS SQSS is a document that defines criteria which specify the robustness of the transmission system, in terms of the faults (or breakdowns) and combinations of faults that it must be able to withstand without any interruption of supplies, and the maximum interruption to supplies which is permitted under certain more onerous combination of faults.

A1.20 The NETS SQSS is open to industry and public scrutiny, is subject to periodic review and consultation and any changes are implemented by a change to the licence Standard Conditions and approved by the industry regulator, Ofgem.

A1.21 The NETS SQSS requires that National Grid must plan for all demand and generation conditions (or "backgrounds") "*which ought reasonably to be*

foreseen to arise in the course of a year of operation … [and] shall include forecast demand cycles, typical power station operating regimes and typical planned outage patterns."

A1.22 Application of the NETS SQSS achieves minimum performance requirements for the transmission system. These minimum performance requirements underpin the performance of the transmission system in terms of reliability of service delivered and availability of the system for use by generators, demand customers and other users of the transmission system.

A1.23 As well as the technical standards described above, Section 38 and Schedule 9 of the Electricity Act 1989[22] require 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*".

A1.24 National Grid's Stakeholder, Community and Amenity Policy[23] sets out how the company will meet the duty to the environment placed upon it. These commitments include:

- only seeking to build new lines and substations where the existing transmission infrastructure cannot be upgraded technically or economically to meet transmission security standards;
- where new infrastructure is required seek to avoid areas nationally or internationally designated for their landscape, wildlife or cultural significance; and
- minimising the effects of new infrastructure on other sites valued for their amenity.

[22] Electricity Act 1989 c29 (**http://www.legislation.gov.uk/ukpga/1989/29/contents**).

[23] http://www.nationalgrid.com/uk/LandandDevelopment/SC/Responsibilities/sched9/schedule+9.htm

A1.25 The statement also refers to the application of best practice methods to assess the environmental impacts of proposals and identify appropriate mitigation and/or offsetting measures. Effective consultation with stakeholders and the public is also promoted by the statement.

A1.26 In compliance with these legal duties and obligations, WPD and National Grid have conducted a technical, economic, environmental and socio-economic appraisal of options to resolve the distribution system needs in the Churchill and Weston areas.

Appendix 2

LIFETIME COSTS

A1.1 The lifetime valuation for each of the connection options and applicable technology includes the lifetime cost of energy losses and lifetime operation and maintenance costs.

A1.2 The following formula was used to assess the lifetime cost of each type of connection.

Total Cost, CTot = CDC + CL + COM

Where

CDC = The capital cost of the equipment, delivered, installed and commissioned

CL = The net present value of the cost of losses over the lifetime (40years) of the assets

COM = "The net present value of the typical cost of operation and maintenance over the lifetime (40 years) of the assets

A1.3 The discount rate used in the net present value calculations, 3.5%, being the figure recommended in Her Majesty's Treasury's Green Book for discounting future benefits and costs in project appraisal.

A1.4 For the purposes of the losses calculations the average load of circuits and SGTs has been assumed to be 65% of the peak group demand of 149MVA.

Costs

A1.5 The cost used to assess losses on the system is the price of £60 per MWh as assumed by Ofgem in the Project Discovery documents.

A1.6 The available transmission technologies, as explained in Section 3 are:

a. Overhead Lines;

b. AC Underground Cables, and

c. Gas Insulated Lines.

A1.7 For each technology, costs comprise:

a. the capital cost of procuring, installing and commissioning the transmission or distribution lines, or substation assets;

b. the on-going costs of the electrical energy lost in overcoming the electrical resistance in the conductors; and

c. the on-going other costs of operations and maintenance.

A1.8 Decommissioning and reinstatement costs are not included in the lifetime costs.

Overhead Lines

A1.9 Overhead line designs vary by the number and cross-sectional area of the conductors used for each phase of each circuit. The requirements for 400kV and 132kV lines in this case are:

b. 400kV double-circuit 2 x 850mm^2 (resistance = 0.0184Ω/km), and

c. 132kV double-circuit 1 x 300mm^2 (resistance = 0.1Ω/km).

A1.10 Operations and maintenance costs consist principally of the cost of repainting the transmission pylons, which is scheduled to happen every 18 years, and the costs of regular inspection both from the ground and by helicopter. The annual costs are estimated to £0.80k/km at both 400kV and 132kV.

AC Underground Cables

A1.11 AC underground cables installations vary principally by how the cables are laid. The principal methods employed by National Grid are direct burial and deep bore tunnels.

a. The Cable requirement for a Bridgwater – Seabank connection is for two cores per phase 2500mm^2 cables, 12 cables in total for two circuits (resistance = 0.0065Ω/km).

b. However with each circuit generating 20MVAr per km of capacitive gain, each circuit would require 2 x 200MVAr reactors (4 in total for two circuits). Each Reactor has 0.4MW of losses associated with it (1.6MW for 4 reactors).

c. At 132kV, 650mm2 cables are required (resistance = 0.05Ω/km)

A1.12 O&M costs have an approximate annual cost of £2.80 k/km for 400kV and £1.5 k/km at 132kV.

Gas Insulated Lines

A1.13 Like underground cables, gas insulated lines may be direct-buried or installed in tunnels. As with cables, tunnel installation is used where direct burial is impracticable.

a. The GIL requirement for the Bridgwater - Seabank connection is for 4000A, 2400MVA rated equipment (resistance = 0.0086Ω/km).

A1.14 The annual maintenance costs for gas insulated lines are estimated to be £1k per km.

Supergrid Transformers

A1.15 Losses in transformers are split into two types:

a. No load losses which are fixed and due to magnetic losses in the transformer core, and

b. Load related losses which are variable with current and due to the resistance of the copper and effect of eddy currents.

A1.16 The annual maintenance costs for transformers are estimated to be £5k per transformer.

Substations (GSP)

A1.17 Substations form the hubs at which transmission circuits and supergrid transformers meet. They are installations which are generally compact. Transmission losses in substations are assumed to be negligible but annual maintenance costs are estimated to be £50k per GSP.

Calculation of the Cost of Transmission Circuit Losses

A1.18 The cost of transmission losses are calculated as follows:

Step 1: Calculate the Average Circuit Loading

- Peak Circuit Power Flow * Average Circuit Utilisation (34%)

Generic Example: 3100MW x 0.34% peak load would be 1054MW Average Loading

Step 2: Calculate the Average Loading per Circuit in KW:

- Average Loading per Circuit kW =

  (Average Loading (MW) / number of circuits) * 1000 (to convert to kW)

  There are 2 circuits in most cases.

  Example: (1054MW / 2) x 1000 = 527,000 kW

Step 3: Calculate the Average Current per Circuit in Amps:

- I = Average Loading Per Circuit kW / ($\sqrt{3}$ X Operating Voltage in kV)

  Operating Voltage 400kV or 275kV

  Example: 527,000/ ($\sqrt{3}$ x 400) = 760.7 Amps

Step 4: Calculate the Resistance per Circuit:

- R = resistance/km * circuit length kms

Example: 2 x 850mm Overhead Line = 0.0184Ω/km x 60km = 1.104 Ω

Step 5: Calculate the Three Phase Lost Power per Circuit in MW:

- Three Phase Lost Power per circuit = 3 x I^2 x R

  Example: 3 x 760.7^2 x 1.104 = 1.9MW

Step 6: Calculate the Lost Power in a 2 Circuit Route:

- This is multiplied by 2 to get the losses in a two circuit route

  Example: 1.9 x 2 = 3.8MW

Step 7: Calculate the Annual Cost of Losses:

- Annual Loss Cost = Lost Power x Cost per MWh x 24hrs x 365 days a year

  Example: 3.8 x £60 per MWh x 24hrs x 365 days a year = £2m per annum

Step 8: Calculate the Average Loading per Circuit in KW:

- The net present value of transmission losses is then derived by applying a discount rate of 3.5% to the annual cost over 40 years.

APPENDIX 3: ENVIRONMENTAL APPRAISALS

1.0 INTRODUCTION

1.1 The following planning and environmental appraisals have been produced by TEP for Western Power Distribution (WPD) and National Grid Electricity Transmission plc (National Grid). The appraisals consider the planning and environmental constraints associated with a number of technical options being considered by both WPD and National Grid. The options proposed are potential solutions to ensure that WPD's existing electricity network in the Churchill and Weston areas will be maintained if National Grid removes an existing 132kV double circuit overhead line between Bridgwater and Avonmouth substations (F and G Routes) as part of the Hinkley Point C Connection Project. Detailed technical information on the options is set out in chapters 5 to 9 of this report.

1.2 Table 1.1 outlines the technical options being considered and the environmental appraisals relevant to each one. Some environmental appraisals are relevant to more than one option.

Table 1.1 - Environmental appraisals relevant to each technical option

Technical Option	Relevant Environmental Appraisals	Chapter reference (within this appendix)
TO1: New 132kV Underground Cables replacing the F-route	Bridgwater to Avonmouth 132kV underground connection	2
TO2: Reconfiguration of the existing W & Y routes	N Route – AT Route 132kV connection	3
	Switching compound at Frome tee	4
	Melksham to Frome Tee connection	5
	Y Route upgrade (Radstock to Melksham)	6
	Turn in of W & Y Routes	7
TO3: W-route and replacement F-route (F')	Bridgwater to N Route 132kV underground connection	8
	Bridgwater to Weston 132kV connection	9
	N Route – AT Route 132kV connection	3
	Turn in of W & Y Routes	7
TO4: A New Grid Supply Point substation in the vicinity of Churchill	New 400kV GSP at Churchill	10
	Sandford to Churchill 400kV connection	11
	Churchill to Weston (AT Route) 132kV connection	12
	Turn in of W & Y Routes	7
TO5: A New Grid Supply Point substation located near to the 400kV Circuit	New 400kV Sandford GSP	13
	Sandford to AT Route 132kV connection	14
	Turn in of W & Y Routes	7

Assumptions

1.3 For the purpose of this Study it has been assumed that the new 400kV connection would be made via either alternating current (AC) overhead lines, underground cables or AC gas insulated line (GIL) underground cables. A brief summary of the points relevant to this study is summarised below.

AC Overhead Lines

1.4 For the purpose of this study it has been assumed that the for options involving a 400kV overhead lines these would be supported on steel lattice pylons approximately 47m high as these are the appropriate size to safely support a 400kV double circuit overhead line. Each pylon would have three cross arms on both sides, with up to three sets of conductors (wires) suspended from each of the cross arms.

1.5 132kV double circuits are also assumed to be supported on steel lattice pylons approximately 26m high.

1.6 Options involving a single 132kV circuit are assumed to be supported on a wooden pole construction (trident line) approximately 14m high.

AC Underground Cables

1.7 For a 400kV AC underground connection up to 12 cables would be required. Each cable would be installed in a trench approximately 1m wide and spaced approximately 3m apart (at 4m centres), with a typical depth of cover to the top of cables of 1.2m. The combined construction area incorporating the cable trenches and associated haul road, would be approximately 35m wide.

1.8 Cables would be installed in lengths according to the quantity of cable on each drum (up to 800m). A joint bay approximately 30m to 40m long and 5m wide would be constructed where each section of cable connects with another.

1.9 Typical cable installation methods involve excavating cable trenches and storing removed topsoil at the side of trenches for later reinstatement. The profile of soil would be carefully maintained during the storage process, with topsoil separated from subsoil so that reinstatement closely matches the profile of excavated soil.

1.10 Granular fill to protect the cables and assist in heat dissipation will be laid in the bottom of the trench. The cables would be surrounded by cement-bound sand or similar material to an approximate depth of 100mm. Above this, the stored soil would be used to reinstate the trench, with subsoil and topsoil replaced to ensure the restored profile has the same depth of topsoil as excavated.

1.11 To construct the trench all surface vegetation would be removed including trees, shrubs and hedgerows. Ditches would need to be temporarily blocked to allow construction but would be reinstated. Crossing streams and rivers would be via directional drilling.

1.12 Maintenance access along the route is required for the lifetime of the cables to allow monitoring and any rectification of faults that may arise. There are also restrictions placed on land use operations. National Grid places restrictions on the types of shrubs that can be planted within 3m of an underground cable. No trees can be planted within 3m where their

roots could affect the thermal conductivity of land through penetration into backfill and cables which could lead to failure of the system.

1.13 For 132kV cables it has been assumed that three cables would be required per circuit. That means for double circuits six cables would be required. Although many of the issues described in 1.9 to 1.11 also apply to 132kV cables there are some differences. For example, the cables are typically only 0.3m apart and buried to a depth of 1m.

400kV AC Gas Insulated Line (GIL)

1.14 GIL uses a mixture of Nitrogen and SF6 gas for electrical insulation. For a 400kV AC GIL underground connection up to 6 cables/phases would be required (this equates to 3 cables/phases per circuit). For the Potential Connection two different construction methods could be used: direct burial or 'cut and cover' tunnel.

1.15 For direct burial, cables would be laid in two trenches approximately 4m wide, at a depth of 1.8m with a typical depth of cover to the top of cables of 0.9m. The combined construction area incorporating the cable trenches and associated haul road, would be approximately 35m wide.

1.16 For 'cut and cover' construction a precast concrete tunnel is laid in a trench typically 3m deep (with an ultimate cover depth of 300mm) and dependant on the method to construct the trench, between 6m and 20m in width. The total construction area would be between 30m and 55m wide.

1.17 The construction method for the GIL would be similar to that described in paragraphs 1.9 to 1.11 above.

Environmental Constraints

1.18 The environmental appraisals for each of the potential technical options has considered environmental constraints of international and national importance. Features considered as potential environmental constraints to each technical option are presented in Table 1.2 below. The table also summarises the legislation under which protection is conferred, the reference to the guidance which identifies the features and the data sources from which information (where applicable) was taken.

1.19 In accordance with National Policy Statement EN5[1], when siting new overhead lines, the principles of the Holford Rules should be taken into account. Although some environmental appraisals do not require an overhead line (e.g. underground connections or line upgrading) the environmental designations and constraints referred to in the Holford Rules are still appropriate to consider.

1.20 The siting and design of the substations required for TO2, TO4 and TO5 would also be subject to further detailed study in accordance with the guidelines presented by the Horlock Rules[2].

Table 1.2 - Environmental constraints and data sources

Feature	Legislation	Routeing Response (and Reference)	Data Sources

[1] Paragraph 2.8.7, National Policy Statement for Electricity Networks Infrastructure (EN-5), July 2011

[2] National Grid Substations and the Environment: Guidelines on Siting and Design.

Feature	Legislation	Routeing Response (and Reference)	Data Sources
National Parks	National Parks and Access to the Countryside Act 1949	Seek to avoid (Schedule 9/ Holford Rule 1)	magic.gov.uk
Areas of Outstanding Natural Beauty	National Parks and Access to the Countryside Act 1949/ Countryside and Rights of Way Act 2000	Seek to avoid (Schedule 9/ Holford Rule 1)	magic.gov.uk
Heritage Coasts	n/a	Seek to avoid (Schedule 9/ Holford Rule 1)	magic.gov.uk
World Heritage Sites	1972 World Heritage Convention	Seek to avoid (Schedule 9/ Holford Rule 1)	english-heritage.org.uk
Sites of Special Scientific Interest	Wildlife and Countryside Act 1981 Countryside and Rights of Way Act 2000	Seek to avoid (Schedule 9/Note to Holford Rule 2)	gis.naturalengland.org.uk
Special Protection Areas	The Conservation of Habitats and Species Regulations 2010	Seek to avoid (birds interest) (Schedule 9/Note to Holford Rule 2)	gis.naturalengland.org.uk
Special Areas of Conservation	The Conservation of Habitats and Species Regulations 2010	Seek to avoid (Note to Holford Rule 2)	gis.naturalengland.org.uk
Ramsar sites	The Conservation of Habitats and Species Regulations 2010	Seek to avoid (birds interest) (Schedule 9/Note to Holford Rule 2)	gis.naturalengland.org.uk
National Nature Reserves	National Parks and Access to the Countryside Act 1949	Seek to avoid (Schedule 9/Note to Holford Rule 2)	gis.naturalengland.org.uk
Scheduled Monuments	Ancient Monuments and Archaeological Areas Act 1979	Seek to avoid (Schedule 9/Note to Holford Rule 2)	english-heritage.org.uk
Settlements	n/a	Seek to avoid (Supplementary Note on Residential Areas)	Digitised from Ordnance Survey
Historic buildings (Listed I, II and II*)	Planning (Listed Buildings and Conservation Areas) Act 1990	Seek to minimise effects (Schedule 9/Note to Holford Rule 2)	english-heritage.org.uk
Conservation Areas	Planning (Listed Buildings and	Seek to minimise effects	Development plans

Feature	Legislation	Routeing Response (and Reference)	Data Sources
	Conservation Areas) Act 1990	(Schedule 9/Note to Holford Rule 2)	
Registered Parks and Gardens	n/a	Seek to minimise effects (Schedule 9/Note to Holford Rule 1)	magic.gov.uk
Registered Battlefields	n/a	Seek to minimise effects (Schedule 9/Note to Holford Rule 2)	english-heritage.org.uk
Woodlands	n/a	Seek to minimise effects (Note to Holford Rules 4 and 5)	National Inventory of Woodlands
Landform	n/a	-	OS Open Data
Flood Risk	n/a	-	www.environment-agency.gov.uk

Environmental issues scoped out of the appraisal at this stage

1.21 There are some environmental factors that do not influence this high-level appraisal. The factors scoped out of the appraisal at this stage are outlined in the following paragraphs of this section.

1.22 Although these factors have been scoped out of the options appraisal process at this stage, they may require consideration as part of routeing studies, detailed design and environmental assessment whichever technical option is taken forward.

Noise

1.23 Noise during construction will be temporary and managed by procedures and controls to ensure that it is not unacceptable. Where applicable to any of the technical options noise during operation will be controlled primarily by separation of sources of noise from noise-sensitive receptors and also by noise-suppression measures as appropriate. The noise sources and measures taken will be applied as required for any option and noise is not a material factor in distinguishing between options.

Air quality

1.24 New transmission infrastructure will not give rise to any material effects on air quality. Temporary construction works can give rise to dust affecting air quality locally. This will be managed by procedures and controls to ensure that it is not unacceptable. These measures will be applied as required for any option and air quality is not a material factor in distinguishing between options.

Transport

1.25 Construction works will involve transport of materials and workforce to sites. The effects will be temporary and will be subject to management to ensure that effects are not unacceptable. This will be the case for any option and transport is not a material factor in distinguishing between options.

2.0 BRIDGWATER TO AVONMOUTH 132KV UNDERGROUND CONNECTION ENVIRONMENTAL APPRAISAL

Introduction

2.1 This appraisal considers the planning and environmental constraints associated with a 132,000 volt (132kV) double circuit underground connection (of approximately 54km) between WPD's existing 132kV substations at Bridgwater, Somerset and Avonmouth, Bristol (See Drawing G1979.03.037b).

2.2 Platform towers or cable sealing end (CSE) compounds would be required to facilitate connections to existing WPD 132kV overhead lines at both the N Route tee (to Churchill 132kV substation) and the Weston tee (AT Route) to Weston 132kV substation.

Study Area

2.3 The study area is illustrated at Drawing G1979.03.037b and extends from the existing Bridgwater 132kV substation in Somerset to the existing Avonmouth 132kV substation, Bristol. The study area includes the main settlements of Bridgwater and Burnham-on-Sea in Somerset, Weston-super-Mare, Clevedon, Nailsea and Portishead in North Somerset and Avonmouth, Bristol.

2.4 Many of these settlements constrain a direct underground connection route to the west of the M5 motorway. As a result this study has focussed on a connection to the east of the M5. In order to connect to the existing AT and N overhead lines in the most direct and efficient manner, such a connection would need to follow a similar corridor to the existing 132kV overhead line (F Route) between Bridgwater and Portishead

2.5 The existing 132kV network within the study area comprises:

- the F Route 132kV double circuit overhead line which runs in a north south alignment from Bridgwater to Portishead (proposed for removal by National Grid);
- the N Route 132kV double circuit overhead line which runs from the F Route up to the existing Churchill 132/33kV BSP substation;
- the AT Route 132kV double circuit overhead line which runs from the Weston tee to Weston-super-Mare;
- the W Route 132kV double circuit overhead line which runs from Portishead BSP substation to a point approximately 250m east of Churchill BSP substation;
- the Y Route 132kV double circuit overhead line which meets the W Route east of Churchill substation and runs east to Radstock, Bath;
- the G Route 132kV double circuit overhead line between Portishead and Seabank (the section between Portishead and Avonmouth substation is proposed for removal by National Grid); and
- the BW 132kV double circuit overhead line between Portishead and Seabank.

Environmental Constraints

2.6 A description of the study area in relation to the environmental constraints outlined in Table 1.2 is presented below and illustrated at Drawing G1979.03.037b.

2.7 The following are not present within the study area:

- National Parks;
- Heritage Coasts; and
- World Heritage Sites.

Areas of Outstanding Natural Beauty (AONB)

Mendip Hills AONB

2.8 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 hills run in an east to west direction between the coast at Weston-super-Mare and Frome, and overlook the Somerset Levels to the south and Avon Valley to the north.

2.9 The hills of the AONB form prominent landmarks. The designation relates to 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.

Implications for Underground Cables Routeing

2.10 AONBs are designated under the National Parks and Access to the Countryside Act 1949 (as amended) for the purpose of conserving and enhancing the natural beauty of the area. The importance of these sites and the protection afforded to them is further highlighted in Planning Policy Statement (PPS) 7. Paragraph 22 of PPS7 states that major developments should not take place in these designated areas except in exceptional circumstances, and that such applications will be subject to rigorous examination and should include an assessment of the national need, cost and scope of developing outside the designated area and the effects on the environment, landscape and recreational opportunities. An underground connection would have temporary effects associated with construction on the landscape of the AONB affecting the objective to conserve and enhance natural beauty. However, once the land has re-established effects would be reduced.

2.11 To avoid the Mendips Hills AONB the connection would have to extend to the west where the settlement of Weston-super-Mare, blocks of ancient woodland and the topography of the landscape would constrain routeing. To the east, the AONB extends for approximately 22km and a route would be constrained by woodland, settlements and Scheduled Monuments. To achieve a direct connection between Bridgwater and Avonmouth the connection would need to be established through the AONB.

2.12 Any underground connection would need to avoid areas of woodland and other features which are important to the scenic character of the AONB. The Mendip Hills AONB is also noted for its ecological and archaeological importance. These factors would require further consideration as part of detailed routeing studies if this technical option was taken forward.

2.13 As outlined at paragraph 1.3, a CSE compound or platform tower (pylon) would be required to facilitate the transition from underground cable to the existing N Route 132kV overhead line. The N Route tee is approximately 400m north of the Mendip Hills AONB and the potential effects of a CSE compound or platform tower in this area on the setting of the AONB would need to be considered as part of detailed siting studies if this technical option was taken forward.

Sites of Special Scientific Interest (SSSI)

2.14 SSSIs are designated for their biodiversity or geological interest and are protected from development and operations likely to damage their special interest. There are numerous SSSIs dispersed throughout the study area. The most significant of these sites in the areas surrounding the existing F Route and the reasons for their designation are summarised in Table 2.1.

Table 2.1 – Summary of SSSIs

SSSI	Location / Grid Ref	Reason for Designation
The Catcott, Edington and Chilton Moors, Tealham and Tadham Moors, Shapwick Heath and Westhay Moors	North east of Bridgwater (ST 390420)	The Catcott, Edington and Chilton Moors, Tealham and Tadham Moors, Shapwick Heath and Westhay Moors SSSIs are a collection of adjoining moors which form part of the Somerset Levels and Moors SSSI, SPA, Ramsar site to the north east of Bridgwater. These sites comprise diverse habitats which provide feeding and nesting sites for a wide range of birds such as Golden Plover and Lapwing.
Shiplate Slait	(ST 364567)	This site lies towards the western end of the Mendip Hills AONB on the south and west facing slopes. It is important for its unimproved calcicolous grassland, some is mixed with dwarf shrub, mosaics of calcicolous grassland, scrub and woodland.
Crook Peak and Shute Shelve	East of Loxton (ST 385555)	This site is in the Mendip Hills AONB covering high ground of Crook Peak and Shute Shelve Hill. The designation covers a range of habitats including ancient and semi-natural broadleaved woodland and unimproved calcareous grassland.
Max Bog	West of Winscombe (ST 406 574)	This SSSI is in the Mendip Hills AONB and is a calcicolous lowland mire with adjacent wet neutral grassland. Both vegetation types are nationally rare.
Banwell Ochre Caves SSSI	East of Banwell (ST 407593)	This SSSI lies within the Mendip Hills AONB and forms part of the North Somerset and Mendip Bats SAC. The SSSI comprises five caves which contain the most extensive and accessible yellow ochre workings in the Mendip Hills.

SSSI	Location / Grid Ref	Reason for Designation
Banwell Caves	South of Banwell (ST 383588)	This SSSI lies within the Mendip Hills AONB and forms part of the North Somerset and Mendips Bats SAC. It is a Geological Review Site and is used as a hibernation site by Greater Horseshoe Bats.
Puxton Moor, Biddle Street, Tickenham, Nailsea and Kenn Moors	North of the Mendip Hills AONB Crossed by the F Route (ST 440700)	These wildlife sites form part of the Avon Levels and Moors, an extensive area of low lying agricultural land north of the Mendip Hills. The Avon Levels and Moors is drained by a network of rhynes and ditches which act as 'wet fences' providing water for livestock. The combination of management practices and the variation in the soils has resulted in watercourses which support a wide range of aquatic plant communities, many of which are of considerable nature conservation interest.
Severn Estuary	South west coast, covers Mouth of the Avon in study area	The Severn Estuary, also a SPA, SAC and Ramsar site, lies on the south west coast of Britain at the mouth of four major rivers (the Severn, Wye, Usk and Avon). It is an internationally important site for birds and wildlife habitats and is one of the most important sites in the UK for wintering wildfowl and waders.
Gordano Valley	North east of Clevedon (ST 435730)	The Gordano Valley covers an area of approximately 161ha and is an extensive low-lying and poorly drained peat moor situated between Carboniferous Limestone ridges. The area is designated for its national ornithological, entomological and stratigraphic interest.
Weston Big Wood	South east of Portishead (ST 455750)	Weston Big Wood is an area of mixed deciduous woodland covering approximately 37ha. The wood lies on the plateau of a narrow ridge of Carboniferous Limestone and various factors suggest the site is the remnant of an ancient forest.

Implications for Underground Cables Routeing

2.15 The potential effect of an underground connection on a SSSI will depend on the nature of the effect caused and the special interest of the site. Underground connections are more invasive than an equivalent length of overhead line as the land disturbance is greater during construction and there are permanent restrictions on tree planting and land use during operation. Consultation with Natural England would be required before consent could be granted for any development or operations likely to damage the SSSI interest.

2.16 Whilst many SSSIs within the study area could be avoided by the connection there are a number which would influence routeing due to their size or proximity to each other.

2.17 Within the Mendip Hills AONB Crooke Peak and Shute Shelve SSSI and Shiplaite Slait SSSI are both on higher ground. To avoid these sites an underground connection would need to utilise lower ground along the Lox Yeo Valley to the east of Loxton. Through the Mendip Hills a connection adjacent to the east of the M5 could be achieved but would be constrained by the topography of the landscape, Banwell Caves SSSI and SAC and woodland.

2.18 The SSSI designation for Puxton Moor, Biddle Street, Tickenham, Nailsea and Kenn Moors covers ditches and rhynes in low lying farmland. The construction of an underground connection through these sites would cause disturbance during construction and may have effects on their special interest. To avoid these sites the connection would need to travel to the east or west of the SSSIs. To the west of the SSSIs a route could be achieved but would be constrained by the Kenn Church, Kenn Pier and Yew Tree Farm SSSI, settlement at Kenn and Tickenham, woodland on Tickenham Ridge and a Scheduled Monument. To the east, a direct connection would be constrained by the settlements of Yatton, Congresbury and Nailsea.

2.19 Any underground connection to Avonmouth substation would need to cross the River Avon which is a component site of the Severn Estuary SSSI (also a SAC, SPA and Ramsar). The use of a tunnel under the River would be less invasive than direct bury techniques but would require the construction of tunnel headhouses on either side of the channel. Further detailed study would be required to assess the effects of an underground connection on the integrity of the site and its qualifying features if this technical option was taken forward.

Special Protection Areas (SPA) and Ramsar sites

Severn Estuary SPA and Ramsar

2.20 The Severn Estuary SPA lies along the western boundary of the study area and the full extent of the designation covers an area of approximately 24,000ha. The Estuary is the largest coastal plain estuary in the UK with extensive mudflats and sandflats, rocky shore platforms, shingle and islands. The Estuary's unique funnel shape means it has a high tidal range which results in a variety of plant and animal communities typical of liquid mud and tide-swept sand and rock.

2.21 The site qualifies as an SPA under Article 4.1 of the Birds Directive (79/409/EEC) by supporting bird populations of European importance that are listed on Annex I of the Directive and under Article 4.2 by regularly supporting at least 20,000 waterfowl.

2.22 The Ramsar designation also extends to cover fish populations of the estuarine and river system which is one of the most diverse in Britain with over 110 species recorded.

Somerset Levels and Moors SPA and Ramsar

2.23 The Somerset Levels and Moors are one of the largest areas of traditionally managed wet grassland and fen habitats in lowland UK. The SPA and Ramsar sites cover the same geographical area as each other (approximately 35,000ha) and include the floodplains of the Rivers Axe, Brue, Parrett, Tone and their tributaries. The internationally important bird populations and the habitats on which they depend are reasons for both the SPA and Ramsar designations; the Ramsar designation also extends to cover rare invertebrate populations.

Implications for Underground Cables Routeing

2.24 SPAs and Ramsar sites are afforded protection under the Conservation of Habitats and Species Regulations 2010. 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.

2.25 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.

2.26 To avoid the Severn Estuary and Somerset Levels and Moors the connection would need to be established in land between the two SPA and Ramsar sites. An underground connection close to either designated site would give rise to greater effects and detailed study would be required to consider the potential for disturbance to bird movements or foraging habitat as a result of the connection.

2.27 In the north of the study area the Severn Estuary SPA includes the mouth of the River Avon. An underground connection across this part of the SPA would be unavoidable as land is constrained by built development at Bristol and Avonmouth. The use of a tunnel under the River would be less invasive than direct bury techniques, but would require the construction of tunnel headhouses on either side of the channel. A detailed study would be required in accordance with the Conservation of Habitats and Species Regulations 2010 to identify any direct or indirect effects on the integrity of the designation which may arise from the connection.

Special Areas of Conservation (SAC)

Severn Estuary SAC

2.28 The Severn Estuary SAC lies along the western boundary of the study area and covers an area of approximately 73,000ha. The SAC was confirmed in 1995 and further amended in 2000. The site is designated for the important populations of fish and natural habitats present within the Estuary.

Mendip Limestone Grasslands SAC

2.29 The Mendip Limestone Grasslands SAC comprises three separate SSSIs totalling approximately 417ha. Brean Down SSSI and Uphill Cliff SSSI are south of Weston-super-Mare, contiguous with the Severn Estuary SAC. Crook Peak to Shute Shelve SSSI is approximately 10km inland from the Estuary, in the Mendip Hills.

North Somerset and Mendip Bats SAC

2.30 The North Somerset and Mendip Bats SAC is centred on the Mendip Hills. The SAC comprises caves, grassland and woodland and is a composite site spread across a wide area. The component sites include the Banwell Caves SSSI and Banwell Ochre Caves SSSI on the north side of the Mendip Hills with Brockley Hall Stables SSSI and King's Wood and Urchin Wood SSSI to the north east of Congresbury.

2.31 These sites are considered of international importance for their semi-natural dry grasslands, significant blocks of *Tilio-Acerion* forest and the limestone caves of the Mendips which provide a range of important hibernation sites for greater and lesser horseshoe bats. Natural England and North Somerset Council have identified a 5km 'consultation zone' which covers important bat feeding grounds surrounding the SAC and in which development proposals are subject to particular scrutiny for potential effects on the designated sites.

Implications for Underground Cables Routeing

2.32 Like SPAs and Ramsar sites, SACs are afforded protection under the Conservation of Habitats and Species Regulations 2010 and development is strictly controlled.

2.33 An underground connection could be established which avoids the SACs in the study area but would pass through the North Somerset and Mendip Bats SAC 5km consultation zone. The potential effects on SAC bat species arising from an underground connection are associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. If this technical option was taken forward further assessment of the effects on the integrity of the SAC and its qualifying features would be required.

2.34 In the northern part of the study area an underground connection would need to cross the River Avon a component site of the Severn Estuary SAC. The use of a tunnel under the River would be less invasive than direct bury techniques but would require the construction of tunnel headhouses on either side of the channel. A detailed study would be required in accordance with the Conservation of Habitats and Species Regulations 2010 to identify any direct or indirect effects which may arise on the integrity of the designation from the connection.

National Nature Reserves (NNRs)

2.35 There are several wildlife sites in the study area designated as NNRs. The majority of these form part of larger sites afforded protection under other ecological designations. The most significant of these sites in the areas surrounding the existing F Route are listed in Table 2.2.

Table 2.2 - Summary of NNRs

NNR	Grid Ref/Location	Reason for Designation
Huntspill River	ST 320443	This is an artificial river within the Somerset Levels managed by the Environment Agency. The area is of interest to various birds and otters. The river crosses the study area running from Bridgwater Bay in the west to the boundary of the Catcott Edington and Chilton Moors SSSI in the east. The area is also of archaeological interest.
Somerset Levels	ST 387360	This NNR to the east of Bridgwater is important for its open water and lowland grasslands. It is currently closed to the public.

NNR	Grid Ref/Location	Reason for Designation
Westhay Moor	ST 453440	This NNR to the west of Wells is owned and managed by Somerset Wildlife Trust. It comprises restored peat fields and water-filled compartments with islands of reeds and bulrushes. The land also includes poor fen and a fragment of acid moor which is currently being restored.
Shapwick Heath	ST 430400	This NNR to the west of Glastonbury is a wetland reserve managed by Natural England covering over 500ha. It is important for its reed beds, fens, meadows and wet woodland. The NNR also includes a Neolithic 'Sweet Track', the oldest routeway in Britain.
Ham Wall	ST 458402	This NNR is owned and managed by the RSPB. It is an area of former commercial peat extraction and is currently being restored to wetland habitats.
Gordano Valley	ST 435731	This NNR is in the north of the study area between Clevedon and Portishead. It is important for its peatland habitats and is currently closed to the public.

Implications for Underground Cables Routeing

2.36 A number of sites to the north east of Bridgwater form part of larger sites afforded protection under other ecological designations such as SSSI, SPA and Ramsar site known as the Somerset Levels and Moors. These sites could be avoided by the connection.

2.37 To avoid the designated part of the Huntspill River an underground connection would need to travel to the east of Gold Corner between the Huntspill River NNR and sites within the Somerset Levels SPA and Ramsar. The connection would still need to cross the Huntspill River. Further detailed study would be required to determine the effects on the integrity of the NNR arising from the connection if this techincal option was taken forward.

Scheduled Monuments (SMs)

2.38 The south west of England is a region of high archaeological and historical importance containing over a third of all SMs in England. There are SMs interspersed throughout the study area. The majority of these sites are on higher ground within the Mendip Hills AONB and close to or within settlements.

Implications for Underground Cables Routeing

2.39 SMs are nationally important monuments and archaeological remains which are protected under the provisions of the Ancient Monuments and Archaeological Areas Act 1979. Consent is required from English Heritage, the statutory advisor on the

historic environment, under the 1979 Act for works for works directly affecting an SM may be carried out.

2.40 SMs could be avoided by the connection. An underground connection would have less adverse effects on the setting of SMs than an overhead line as impacts are largely temporary during construction. However, if an underground connection could not avoid a SM it may be permanently damaged or destroyed.

2.41 North of Bridgwater, a medieval settlement and hill fort would constrain routeing adjacent to the M5. To avoid this designation and the settlement of Puriton, which abuts the motorway, an underground connection would need to be routed to the east of the settlement.

2.42 There is a cluster of SMs in the Mendip Hills AONB comprising hill forts, camps and roman settlements. These SMs are typically on high ground where woodland and SSSIs would further constrain a connection. To avoid these designations a route would need to be established on lower ground in the Lox Yeo Valley.

2.43 The study area includes parts of the Somerset Levels and Moors which was a candidate site for World Heritage Site (WHS) status (although this is no longer being promoted by Somerset County Council). The WHS bid was based on the area's unique palaeo-environmental records that include a 10,000 year record of climate, sea level and landscape change. Features include prehistoric trackways, lake villages, relic roman wetland landscapes, medieval reclamations and river canalisations.

2.44 Whilst it would be possible for an underground connection to avoid SMs within the Somerset Levels there are other known non-designated assets and unknown assets which could be affected and which would need to be subject to more detailed assessment. Planning Policy Statement (PPS) 5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*. An assessment of the potential for archaeological remains and any direct and indirect effects from construction and installation would be required for any underground connection route.

Historic Buildings

2.45 There are numerous listed buildings within the study area. Whilst these are distributed across the study area they are often clustered within the larger settlements. Some isolated buildings are in more rural areas and are generally farmsteads and country houses. Particular clusters of historic buildings are found within the settlements of Bridgwater, Banwell and Clevedon.

Implications for Underground Cables Routeing

2.46 Buildings of special architectural or historic interest are added to a list of buildings protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Planning authorities are required to consult with English Heritage on planning applications which may affect a Grade I and Grade II* listed building outside Greater London and listed building consent is required for any works likely to affect a listed building.

2.47 Routes could be achieved for the connection which avoid listed buildings.

Conservation Areas

2.48 Within the study area there are 48 Conservation Areas. They are generally focused in towns and village centres and include Loxton, Christon, Banwell, Congresbury, Yatton, Nailsea, Chelvey and Avonmouth.

Implications for Underground Cables Routeing

2.49 Conservation Areas are areas designated by local authorities because of special architectural or historic interest and are protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Conservation Area consent is required from the local planning authority for any development within the area.

2.50 Routes could be achieved for the connection which avoid Conservation Areas.

Registered Parks and Gardens

2.51 There are several sites within the study area designated as Registered Parks and Gardens. The most significant of these sites likely to influence routeing are summarised in Table 2.3.

Table 2.3 – Summary of Registered Parks and Gardens

Registered Park and Garden	Grid Ref/Location	Reason for Designation
Clevedon Court (80 ha)	ST 423715	Grade II* listed 18th century terraced gardens which are set within parkland. The site on the north eastern edge of Clevedon includes a 13th century crenulated wall, medieval barn, octagonal summerhouse, and 19th century ornamental woodlands. The site is owned by the National Trust.
Tyntesfield (57 ha)	ST 505715	This site lies to the south of Bristol and is an extensive 19th century estate owned by the National Trust. The house and grounds are currently being restored.

Implications for Underground Cables Routeing

2.52 The English Heritage 'Register of Historic Parks and Gardens of special historic interest in England' (compiled under powers contained in Historic Buildings and Ancient Monuments Act 1953) identifies sites assessed to be of national importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the landscapes' special character.

2.53 To avoid these sites a connection would need to be routed through land to the east of Clevedon, south of Tickenham and west of Tyntesfield. Other constraints such as woodland, SMs, SSSIs and settlements further constrain routing although a route could be achieved which avoided these constraints.

Registered Battlefields

2.54 There is one registered battlefield within the study area which is the site of the battle of Sedgemoor in 1685. The site lies north of Westonzoyland approximately 1km east of Bridgwater substation and does not pose a constraint to the connection.

Woodland

2.55 There are numerous blocks of woodland, some of which are ancient woodland, interspersed throughout the study area. Several woodlands are also designated as SSSIs.

Implications for Underground Cables Routeing

2.56 Installing an underground connection through woodland would result in the permanent loss of woodland along the length of the connection. Permanent restrictions on what may be planted above and adjacent to the connection would prevent the re-establishment of land following the completion of construction work.

2.57 There is a cluster of woodland to the south of Puriton. The presence of woodland and built form at Puriton would constrain routeing next to the M5 in this area. To avoid these constraints a connection would need to be routed on the raised ground between woodland blocks to the east of Puriton and west of Knowle.

2.58 There are numerous blocks of woodland within the Mendip Hills AONB. However, this woodland is primarily on higher ground and could be avoided with an underground connection using lower ground within the Lox Yeo valley.

2.59 A further cluster of woodland is present on Tickenham Ridge, some of which is ancient woodland. To avoid the woodland, an underground connection would need to pass through a gap in settlements at Stone Edge Batch before traversing Tickenham Ridge in a north easterly direction along a similar route to existing WPD 132kV overhead lines.

2.60 On the northern side of Tickenham Ridge a route to the east of the M5 would be constrained by Priors Wood and settlement at Portbury and Gordano. To avoid these constraints an underground connection would need to utilise land on the other side of the motorway.

Settlements

2.61 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.

2.62 There are numerous other towns and 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.

Implications for Underground Cables Routeing

2.63 Settlements within the study area could be largely avoided through careful routeing. However, in the northern part of the study area Avonmouth and the City of Bristol form a continuous band of development that extends to the mouth of the River Avon

at the Severn Estuary. The connection would need to negotiate this area to achieve the connection into Avonmouth substation and further detailed study would be required to identify appropriate routes through this area.

Landform

2.64 Landform in the study area shows some variations and is illustrated at Drawing G1979.066a.

Implications for Underground Cables Routeing

2.65 In the south of the study area the landscape generally comprises low lying moorland (approximately 6m AOD) which forms part of a wider area known as the Somerset Levels and Moors. The Mendip Hills AONB lies in the centre of the study area and rises sharply from the Somerset Levels. In the north the topography is more varied and comprises large areas of flat open moorland and a prominent ridge at Tickenham.

2.66 Landform does not pose a constraint to a connection although lower ground may be preferable for underground routes due to ease of construction.

Flood Risk

2.67 The Environment Agency uses the following flood zones in England:

- Flood Zone 1: Land which has a low probability of flooding;
- Flood Zone 2: Land which has a medium probability of flooding; and
- Flood Zone 3: Divided into 3A (land which has a high probability of flooding) and 3B (the functional floodplain).

2.68 The majority of the study area lies within Flood Zones 2 and 3, with the exception of several areas of higher ground. These include land around Chedzoy, Puriton, Woolavington and Cossington in the south of the study area, Brent Knoll and most of the Mendip Hills AONB in the centre of the study area, Clevedon, Walton-in-Gordano and Portishead in the north west of the study area and land around Yatton, Claverham, Cleeve and Stone-edge-Batch in the north east of the study area.

Implications for Underground Cables Routeing

2.69 The presence of an underground cable circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow.

2.70 Platform towers or cable sealing end (CSE) compounds would be required to facilitate the transition from underground cable to overhead line at the N Route tee and the Weston tee (AT Route). CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

2.71 PPS25 states that authorities should steer new development to Flood Zone 1, in which the chance of flooding each year is 0.1% (1 in 1000) or less. WPD would seek to identify sites for the CSE compounds outside of Flood Zones 2 and 3. However where there are no reasonably alternative sites in Flood Zone 1, WPD may consider

the suitability of sites in Flood Zone 2 and then Flood Zone 3. A Flood Risk Assessment (FRA) would be necessary to demonstrate that any proposed development within Flood Zones 2 and 3 could operate safely and effectively in the event of a flood and would not increase flood risk elsewhere.

Assessment

2.72 The study area for the Bridgwater to Avonmouth underground connection extends from the eastern edge of Bridgwater, Somerset to the existing WPD 132kV substation at Avonmouth, Bristol (See Drawing G1979.03.037b). The study area includes the main settlements of Bridgwater and Burnham-on-Sea in Somerset, Weston-super-Mare, Clevedon, Portishead in North Somerset and Avonmouth, Bristol.

2.73 The extent of settlement in the Weston area in particular would constrain an underground route to the west of the M5 motorway. As a result this study has focussed on an underground connection to the east of the M5. In order to connect to the AT and N Routes in the most direct and efficient manner, such a connection would follow a similar corridor to the existing 132kV overhead line (F Route) between Bridgwater and Portishead.

2.74 A new underground 132kV connection between Bridgwater and Avonmouth could be achieved and would offer benefits in terms of landscape and views over an equivalent length of overhead line. However, the construction of underground connections is more invasive than for an overhead line and would have a greater scale of effect on sites important for their ecology or archaeology. Construction results in disturbance to ground vegetation which could affect the integrity of a designation or its qualifying features and detailed study would be required to determine appropriate routeing, working methods and mitigation. Underground connections routed through heritage assets may cause permanent loss due to the intrusive nature of the construction.

2.75 A direct connection between Bridgwater and Avonmouth would need to travel through the Mendip Hills AONB. The connection would need to be routed on lower ground within the Lox Yeo Valley to avoid constraints such as SSSIs, SACs and woodland. The connection would give rise to temporary effects on landscape and views within the AONB during construction. However, once the land has re-established, these effects would be minimal. The connection would need to avoid areas of woodland and other features which are important to the scenic character of the AONB. The Mendip Hills AONB is also noted for its ecological and archaeological importance and these factors would require further consideration if this option was taken forward.

2.76 To avoid the designated part of the Huntspill River NNR an underground connection would need to travel along the eastern edge of the study area between the NNR and sites within the Somerset Levels Special Protection Area (SPA) and Ramsar site, where a SM also forms a constraint. The connection would still need to cross beneath the Huntspill River. Further detailed study would be required to determine any potential effects arising from a connection beneath or close to the NNR if this option was taken forward.

2.77 Component sites of the North Somerset and Mendip Bats SAC lie within the study area but could be avoided. The connection would pass through the North Somerset

and Mendip Bats SAC 5km consultation zone which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. The potential effects on SAC bat species arising from an underground cables connection would be associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. An assessment of the potential effects on the integrity of the SAC and its qualifying features would be required as part of the next stage of assessment if this technical option was taken forward.

2.78 The study area contains large areas of land that are afforded protection under ecological designations. These include areas of ditches and rhynes designated as SSSIs (e.g. Puxton Moor and Mailsea, Tickenham and Kenn Moors SSSI). In combination with settlements, woodland and SMs, a potential route would be constrained to narrow areas of land to the east of the M5, west of Yatton and between Tickenham and Nailsea. Whilst an underground connection could be achieved which largely avoided these sites, they would have an influence on the directness of any route and further detailed assessment would be required to determine the potential for direct and indirect effects on these sites and their features of special interest if this technical option was identified as the most suitable and taken forward.

2.79 The connection would need to cross the River Avon, a component part of the Severn Estuary SSSI, SAC, SPA and Ramsar site. The use of a tunnel under the River would be less invasive than direct bury techniques but would require the construction of tunnel headhouses on either side of the channel. Further detailed study would be required in accordance with the Conservation of Habitats and Species Regulations 2010 to identify any direct or indirect effects which may arise on the integrity of the designation if this connection was identified as the most suitable technical option and taken forward.

2.80 Compared to other options comprising substations and overhead lines, an underground connection between Bridgwater and Avonmouth would be preferred in terms of landscape and visual effects, particularly relating to the AONB and settlements. It would also be preferred in terms of visual effects on the setting of designated historic sites, but this would need to be balanced with potential negative effects on ecology or buried archaeology which may be lost through the construction of an underground connection. Whilst it would be possible to avoid the SMs within the study area, there are other known non-designated assets and unknown assets which could be affected.

2.81 Further detailed study along any underground connection route would be required to identify the potential for archaeological remains and any direct and indirect effects resulting from construction and installation. PPS5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*. Underground connections routed through heritage assets may cause permanent loss due to the intrusive nature of the construction.

2.82 The majority of the study area lies within Flood Zones 2 and 3. Platform towers or cable sealing end (CSE) compounds would be required to facilitate the transition from underground cable to overhead line at the N Route tee and the Weston tee (AT

Route). CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of potential CSE compounds would require further consideration and assessment in accordance with PPS 25.

3.0 N ROUTE TEE TO THE AT ROUTE 132KV CONNECTION ENVIRONMENTAL APPRAISAL

Introduction

3.1 This appraisal considers the planning and environmental constraints associated with a new 132,000 volt (132kV) single circuit connection (of approximately 2.5km) between the N Route tee and an existing WPD 132kV overhead line known as the AT Route (See drawing G1979.03.028).

3.2 The N Route tee is the point on the existing F Route 132kV overhead line (between Banwell and Sandford, North Somerset) where it connects with the existing N Route 132kV overhead line which runs north west to Churchill 132kV substation. The AT Route connects with the F Route at a point known as the Weston 'tee' and travels west to Weston-super-Mare. The connection could be made by overhead line (using steel lattice pylons or wood pole supports) or underground cables.

3.3 If an underground cable connection was taken forward, a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the AT Route.

Study Area

3.4 The study area is illustrated at Drawing G1979.03.028. WPD has advised that the connection could be made at any point on the AT Route between the Weston 'tee' and the existing 132kV substation at Weston-super-Mare.

3.5 The study area extends west from WPD's existing 132kV overhead line network (including the Weston 'tee', F Route and N Route) for approximately 4km to the M5 motorway. Although crossing the M5 would be technically feasible, this connection would involve a longer connection which could increase the overall scale of environmental effects. It would also introduce additional constraints, particularly in terms of engineering and safety that would limit the options available and would not offer any environmental benefits compared with connection options to the east of the M5. The northern extent of the study area is defined by the AT Route and the southern extent by the A368 which forms the boundary to the Mendip Hills AONB.

3.6 The section of the AT Route between the Weston 'tee' and its connection point with the new overhead line or underground cables would be removed as part of the scheme. This could provide some environmental benefit by removing the line from within Puxton Moor Site of Special Scientific Interest (SSSI) and potentially improving views from the few nearby properties.

3.7 The existing 132kV network within the study area comprises:

- the AT Route 132kV double circuit overhead line which is supported on steel lattice pylons and runs west from the Weston 'tee' to Weston-super-Mare;

- the F Route 132kV double circuit overhead line which is supported on steel lattice pylons and runs from Bridgwater to Portishead (proposed for removal by National Grid); and
- the N Route 132kV double circuit overhead line which is supported on steel lattice pylons and runs from the F Route north of Sandford, up to the existing Churchill substation.

3.8 Churchill substation is approximately 4.5km north east of the N Route tee.. It lies adjacent to the B3133 near to the villages of Brinsea and Congresbury.

3.9 WPD's W and Y Routes (referred to in paragraph 1.2) meet at a point approximately 250m east of the existing Churchill substation. The W Route runs up to Portishead, near Bristol and the Y Route runs east to Radstock, near Bath.

3.10 Two existing 33kV overhead lines (on wood poles) cross the centre of the study area in an east to west direction. Another 33kV overhead line travels through the south east corner of the study area before travelling up to the existing Churchill substation. There is also a 33kV overhead line between Churchill and the Weston 'tee'. This line is currently redundant but the supporting wood poles remain in place on its former route.

3.11 The study area includes parts of Sandford, Banwell and Locking as well as smaller settlements such as Puxton, Stonebridge, Woolvershill, Woolvershill Batch, Rolestone, East Rolestone, Nye and Way Wick. Weston-super-Mare extends from the M5 to the Severn Estuary.

Environmental Constraints

3.12 A description of the study area in relation to the environmental constraints outlined in Table 1.2 is presented below and illustrated at Drawing G1979.03.028.

3.13 The following are not present within the study area:

- National Parks;
- Heritage Coasts;
- World Heritage Sites;
- Areas of Outstanding Natural Beauty (AONB);
- Special Areas of Conservation (SAC);
- Conservation Areas;
- Special Protection Areas (SPA);
- Ramsar Sites;
- National Nature Reserves (NNR);
- Registered Parks and Gardens; and
- Registered Battlefields.

<u>Areas of Outstanding Natural Beauty (AONB)</u>

Mendip Hills

3.14 There are no AONB's within the study area. However the Mendip Hills AONB lies on the edge of the study area approximately 400m south of the N Route tee.

3.15 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 hills run in an east to west direction between the coast at Weston-super-Mare and Frome in Somerset, and border the northern edge of the Somerset Levels.

3.16 The hills of the AONB form prominent landmarks. The designation relates to 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.

Implications for Overhead Line/Underground Cables Routeing

3.17 AONBs are designated under the National Parks and Access to the Countryside Act 1949 (as amended) for the purpose of conserving and enhancing the natural beauty of the area. The importance of these sites and the protection afforded to them is further highlighted in Planning Policy Statement (PPS) 7 and Rule 1 of the Holford Rules which place strict restrictions on developments within these sites.

3.18 Paragraph 22 of PPS7 states that major developments should not take place in these designated areas except in exceptional circumstances. Applications for such development within an AONB will be subject to rigorous examination and should include an assessment of the national need, cost and scope of developing outside the designated area and effects on the environment, landscape and recreational opportunities. A new overhead line through an AONB would have an effect on the landscape which would affect the objective to conserve and enhance natural beauty.

3.19 The setting of the AONB needs to be considered when siting overhead lines in close proximity to an AONB designation. Information relating to the setting is reviewed from published landscape character assessments at a later and more detailed stage of assessment as part of the process of identifying route corridors.

3.20 An overhead line between the N Route teeand the AT route would not pass through the Mendip Hills AONB, although the potential effects on the setting of the AONB would require consideration if this option was taken forward. The route would commence approximately 400m away from the AONB, and travel in a north/north westerly direction away from the AONB towards the AT Route. If a new overhead line connection was taken forward wood poles would have less effect on landscape and views in comparison with steel lattice towers as wood poles are generally smaller with a less visually prominent support

3.21 An underground connection would have temporary effects associated with construction on the landscape which would be visible from the AONB. However, once the land had re-established the effects on the AONB's setting would be reduced to negligible.

Sites of Scientific Interest (SSSI)

3.22 SSSIs are sites designated for their biodiversity or geological interest and are protected from development and operations which are likely to damage their special interest. There is one SSSI within the study area and two just outside. The sites and the reasons for their designation are summarised in Table 3.1.

Table 3.1 – Summary of SSSIs in the Study Area

SSSI	Location / Grid Ref	Reason for Designation
Puxton Moor	North of the Mendip Hills AONB (ST 440700)	This wildlife site is designated as a SSSI for its ditches and rhynes. It forms part of the Avon Levels and Moors, an extensive area of low lying agricultural land north of the Mendip Hills. The Avon Levels and Moors is drained by a network of ditches and rhynes which act as 'wet fences' providing water for livestock. The combination of management practices and variation in soils has resulted in watercourses which support a wide range of aquatic plant communities, many of which are of considerable nature conservation interest. The F Route 132kV overhead line travels along the eastern edge of the SSSI and a connecting 132kV overhead line (the AT Route) runs east to west across the SSSI.
Outside but close to the Study Area		
Banwell Caves	South of Banwell (ST 383588)	This SSSI lies within the Mendip Hills AONB and forms part of the North Somerset and Mendips Bats SAC. It is a Geological Review Site and is used as a hibernation site by Greater Horseshoe Bats.
Banwell Ochre Caves SSSI	East of Banwell (ST 407593)	This SSSI lies within the Mendip Hills AONB and forms part of the North Somerset and Mendip Bats SAC. The SSSI comprises five caves which contain the most extensive and accessible yellow ochre workings in the Mendip Hills.

Implications for Overhead Line/Underground Cables Routeing

3.23 The potential effect of a connection on a SSSI would vary depending on the nature of the effect caused and the special interest of the site. Underground connections are more invasive than an equivalent length of overhead line as the land disturbance is greater during construction and there are permanent restrictions on tree planting and land use during operation. Consultation with Natural England would be required before consent could be granted for any development or operations likely to damage the SSSI interest.

3.24 The Puxton Moor SSSI lies in the north east corner of the study area. The F Route travels along the eastern edge of this site and the AT Route runs in an east to west direction straight across it.

3.25 The SSSI designation for Puxton Moor covers ditches and rhynes in low lying farmland. A connection between the N Route teeand the AT Route could avoid this

SSSI by routeing to the west. This would avoid any direct impacts on the SSSI and would not pose any significant limitations in identifying route corridors for further assessment. This would also allow the section of the AT Route that currently runs through the SSSI to be removed.

3.26 An overhead line would be able to oversail the ditches and rhynes to which the SSSI designation applies, however further detailed study would be required to determine the potential for direct and indirect effects on this site and its qualifying features if this connection was taken forward.

3.27 The construction of an underground connection through this site would cause disturbance during construction and may have effects on the sites special interest. An environmental assessment would be required to ensure that the integrity of the site or its qualifying features would not be adversely affected by the construction of an underground cables either through or in close proximity to this site.

Special Areas of Conservation (SAC)

North Somerset and Mendip Bats SAC

3.28 There are no SACs within the study area. However component sites of the North Somerset and Mendip Bats SAC lie approximately 3km north east of the study area (King's Wood/Urchin Wood) and approximately 250m south of the study area (Banwell Ochre Caves SSSI). The North Somerset and Mendip Bats SAC is a composite site centred on the Mendip Hills and comprises caves, grassland and woodland.

3.29 These sites are considered of international importance for their semi-natural dry grasslands, significant blocks of *Tilio-Acerion* forest and the limestone caves of the Mendips which provide a range of important hibernation sites for greater and lesser horseshoe bats. Natural England and North Somerset Council have identified a 5km 'consultation zone' which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. The 5km 'consultation zone' covers the study area.

Implications for Overhead Line/Underground Cables Routeing

3.30 SACs are afforded protection under the Conservation of Habitats and Species Regulations 2010 and development is strictly controlled. 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.

3.31 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.

3.32 Although the component sites of the North Somerset and Mendip Bats SAC lie outside the study area, any connection within the study area would pass through the Natural England and North Somerset Council 5km 'consultation zone'. The potential

effects on SAC bat species arising from an overhead line or underground connection would be associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. Further assessment would be required to ensure there would be no adverse effects on bat activity, the integrity of the designation or its qualifying features.

Scheduled Monuments (SMs)

3.33 The south west of England is a region of high archaeological and historical importance and contains over a third of all Scheduled Monuments (SMs) in England. There are two SMs in the study area: a moated site at Nye Farm to the north of the N Route tee anda deserted farmstead approximately 420m south of Gout House Farm in the centre of the study area. There are a number of SMs in the Mendip Hills AONB to the south of the study area.

Implications for Overhead Line/Underground Cables Routeing

3.34 SMs are nationally important monuments and archaeological remains which are protected under the provisions of the Ancient Monuments and Archaeological Areas Act 1979. Consent is required from English Heritage, the statutory advisor on the historic environment, under the 1979 Act before works directly affecting an SM may be carried out.

3.35 An underground connection would have less adverse effects on the settings of a SM than an overhead line as impacts are largely temporary during construction. However if an underground connection could not avoid a SM it may be permanently damaged or destroyed.

3.36 Both SMs in the study area could be avoided by the connection. There is sufficient separation between the SMs and other constraints such as settlements to ensure direct impacts could be avoided on these features. Although both SMs are avoidable an assessment to identify any indirect effects on the monuments and their setting would be required if the connection was to be routed close to these features.

3.37 An assessment of the potential for archaeological remains and any direct and indirect effects from construction and installation would be required for any underground connection route. PPS5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*.

Settlements

3.38 There are several settlements within the study area. The larger settlements of Banwell and Locking are on higher ground on the southern boundary of the study area and Weston-super-Mare extends from the M5 to the Severn Estuary. Smaller settlements and hamlets include Stonebridge, Woolvershill Batch, Rolestone, East Rolestone, Nye and Way Wick, most of which comprise clusters of properties and farmsteads. There are also some individual farms across the study area which are linked by minor roads.

Implications for Overhead Line/Underground Cables Routeing

3.39 The small settlements, hamlets and farmsteads within the study area provide a constraint to routeing. This is particularly noticeable in the area immediately south of the AT Route around East Rolstone, Rolstone, and Way Wick although it would be possible to avoid these settlements through careful routeing.

Historic Buildings (Grade I, II and II*)

3.40 Buildings of special architectural or historic interest are added to a list of buildings protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Planning authorities are required to consult with English Heritage on planning applications which may affect a Grade I and Grade II* Listed Building outside Greater London and Listed Building consent is required for any works likely to affect a Listed Building.

3.41 There are five Listed Buildings in the study area: one at Stonebridge in the south west; one at Rolstone close to the AT Route; one to the west of Puxton Moor SSSI; and two at Sandford. There are also a number of other Listed Buildings within the settlements of Banwell and Sandford to the south of the study area.

Implications for Overhead Line/Underground Cables Routeing

3.42 Routes could be achieved for the connection that would avoid Listed Buildings, however the effects on their setting would require consideration as part of detailed routeing studies. Effects on these features would be reduced by using an underground connection.

Conservation Areas

3.43 There is one Conservation Area immediately south of the study area at Banwell.

Implications for Overhead Line/Underground Cables Routeing

3.44 Conservation Areas are areas designated by local authorities because of special architectural or historic interest and are protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Conservation Area consent is required from the local authority for any development within the area.

3.45 It is unlikely that there would be any adverse effects on the setting of the Conservation Area at Banwell from the connection, due to its distance (approximately 1.5km) from the N Route tee.. However, this would be confirmed by further study at a later and more detailed stage of assessment. Any effects on the Conservation Area would be reduced by using an underground connection.

Woodland

3.46 There are few blocks of woodland within the study area and none designated as ancient woodland. The land is typically flat and where woodland occurs it is in the form of small copses, shelterbelts and some lines of trees as part of hedgerows. A commercial orchard, woodland and scrub along the Strawberry Line (a disused railway line) are to the east of theN Route tee. A number of small woodlands lie either side of the AT Route in the north of the study area.

3.47 Broadleaved woodlands on the rising ground of the Mendip Hills and Cleeve Ridge are prominent within the wider landscape but fall outside of the study area and would not be affected by the connection.

Implications for Overhead Line/Underground Cables Routeing

3.48 Installing a 132kV connection through woodland would result in its permanent loss. Permanent restrictions on what may be planted above an underground cables and below an overhead line would apply. 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 wherever possible.

3.49 The only woodland areas that would influence the routeing of a connection are two blocks to the south of the AT Route at Rolstone and a block to the south west of Puxton Moor SSSI. Due to their size, these woodlands would not pose any significant constraints to routeing and would be avoidable.

Landform

3.50 The landform of the study area shows subtle variations and is illustrated at Drawing G1979.03.066a.

3.51 In the northern and central parts of the study area the land is generally low-lying, flat and associated with moors. Fields are drained by a series of ditches and rhynes at around 5 to 10m above ordnance datum (AOD). There is little variation within the landform. Towards the south of the study area the land gradually rises and becomes slightly more undulating around Banwell, Locking and Woolvers Hill rising up to 30m AOD.

3.52 The Mendip Hills AONB to the south of the study area comprises a series of limestone hills which form a prominent landmark and provide a backdrop in southerly views throughout the study area.

Implications for Overhead Line/Underground Cables Routeing

3.53 The Holford Rules refer to aspects of topography and physiography such as hills, ridges, dips, open valleys and flat land in considering overhead line routeing. The Rules advise on exploiting the 'backgrounding' effect of high land and seeking to avoid ridges.

3.54 Landform does not pose a constraint to the connection. The majority of the study area is low-lying and flat which would be beneficial for laying underground cables. The only area where the land rises and there could be opportunities for utilising landform to background an overhead line is in the south west of the study area. However, the benefits of routeing through this area in terms of landscape and visual effects would need to be assessed against the potential impacts on other constraints. These constraints include proximity to settlements and the AONB, and the overall environmental effect of a route that would be longer and less direct than other options that could connect closer to the 'tee'.

Flood Risk

3.55 The Environment Agency uses the following flood zones in England:

- Flood Zone 1: Land which has a low probability of flooding;
- Flood Zone 2: Land which has a medium probability of flooding; and

- Flood Zone 3: Divided into 3A (land which has a high probability of flooding) and 3B (the functional floodplain).

3.56 The majority of land in the study area is in Flood Zone 3, with smaller areas in Flood Zone 2. There are two areas of land that fall outside these Flood Zones of medium and high probability. These are north of Banwell (in the south western corner of the study area) and north of Sandford (in the south eastern corner of the study area. The entire length of the AT Route within the study area lies within Flood Zone 3.

Implications for Overhead Line Routeing/Underground Cables Routeing

3.57 It is relatively straightforward to build flood resilience into overhead lines by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the supports pose no material changes to surface water flow.

3.58 The presence of an underground cables circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow.

3.59 If an underground cable connection was taken forward, a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the AT Route. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25 – Development and Flood Risk.

3.60 PPS25 states that authorities should steer new development to Flood Zone 1, in which the chance of flooding each year is 0.1% (1 in 1000) or less. WPD would seek to identify sites for the CSE compound outside of Flood Zones 2 and 3. However where there are no reasonably alternative sites in Flood Zone 1, WPD may consider the suitability of sites in Flood Zone 2 and then Flood Zone 3. A Flood Risk Assessment (FRA) would be necessary to demonstrate that any proposed development within Flood Zones 2 and 3 could operate safely and effectively in the event of a flood and would not increase flood risk elsewhere.

Assessment

3.61 The study area is illustrated at Drawing G1979.03.028, and extends west from WPD's existing 132kV overhead line network (including the Weston 'tee', F Route and N Route) for approximately 4km to the M5 motorway. It includes parts of Sandford, Banwell and Locking as well as smaller settlements such as Puxton, Stonebridge, Woolvershill, Woolvershill Batch, Rolestone, East Rolestone, Nye and Way Wick. Weston-super-Mare lies beyond the study area and extends from the M5 motorway to the Severn Estuary.

3.62 There are relatively few environmental constraints within the study area. The main constraints identified include Scheduled Monuments, Listed Buildings, scattered settlements, Puxton Moor SSSI (which the AT Route currently runs through) and a SAC consultation zone.

3.63 There are five Listed Buildings within the study area and two Scheduled Monuments. One of the Scheduled Monuments is in the centre of the study area and the other is a moated site at Nye Farm in the east. These sites could be avoided with a connection, but an assessment would be required to identify any indirect effects on the features and their setting if the connection was to be routed close to these features.

3.64 The SSSI designation for Puxton Moor covers ditches and rhynes in low lying farmland. A connection could avoid Puxton Moor SSSI by routeing to the west of the site. This would avoid direct impacts on the SSSI and would also allow the section of the AT Route that currently runs through the SSSI to be removed, which may provide some environmental benefit and could potentially improve views from the few nearby properties.

3.65 Routeing to the west of Puxton Moor SSSI would also allow separation to be achieved between the new connection and National Grid's proposed 400kV overhead line, which could otherwise contribute to the perception of a 'wirescape' in views from some receptors due to the height difference between two lines of different voltages. The construction of a new overhead line close to or parallel with National Grid's 400kV overhead line would result in cumulative visual effects but would limit effects on landscape and views to a localised area. Siting the lines further apart would introduce effects over a greater area and would introduce a new line where no overhead line currently exists.

3.66 An overhead line would be able to oversail the ditches and rhynes to which the SSSI designation applies. However, further detailed study would be required to determine the potential for direct and indirect effects on this site and its qualifying features if this connection was taken forward, particularly during construction.

3.67 Constructing an underground connection through the SSSI would cause disturbance during construction and may have effects on the sites special interest. Detailed environmental surveys would be required to ensure that the integrity of the site or its qualifying features would not be adversely affected by the construction of underground cables either through or in close proximity to this site.

3.68 The small settlements, hamlets and farmsteads spread across the study area provide a constraint to routeing. This is particularly noticeable in the area immediately south of the AT Route around East Rolstone, Rolstone, and Way Wick although it would be possible to avoid these settlements through careful routeing.

3.69 Although the connection would not pass through the Mendip Hills AONB, the potential effects on its setting would require consideration. The connection also falls within the North Somerset and Mendip Bats SAC 5km 'consultation zone' which covers important bat feeding grounds surrounding the SAC, and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. Further assessment would be required to ensure there would be no adverse effects on bat activity, the integrity of the designation or its qualifying features.

3.70 The majority of land within the study area is in Flood Zone 3, with smaller areas in Flood Zone 2. There are two areas of land that fall outside these Flood Zones of medium and high probability, to the north of Banwell and north of Sandford. The entire length of the AT Route overhead line within the study area lies within Flood Zone 3. If an underground cables connection was taken forward a platform tower or

cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the AT Route. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

3.71 An underground connection would offer benefits over an overhead line in terms of landscape and views, particularly relating to the setting of the Mendip Hills AONB, Listed Buildings, SM's and settlements. However, the installation of underground cables is more invasive and would have a greater scale of effects on ecology and buried archaeology

4.0 NEW 132KV SUBSTATION COMPOUND ON THE Y ROUTE BETWEEN RADSTOCK SUBSTATION AND THE FROME TEE ENVIRONMENTAL APPRAISAL

Introduction

4.1 This environmental appraisal considers a new 132kV substation compound along the Y Route 132kV overhead line (Y Route) between Radstock 132kV substation and the Frome Tee. The Frome Tee is a point on the existing 132kV Y Route overhead line between Trowbridge and Bradford-on-Avon from which a 132kV overhead line travels south to Frome.

4.2 The substation compound would include WPD equipment including circuit breakers, line insulators, metering equipment and protection housing. It would occupy a footprint of approximately 80m by 50m and would be enclosed by a palisade security fence. Additional land may also be required on a temporary basis for construction laydown and compound areas.

Study Area

4.3 WPD would seek to locate the substation compound adjacent or close to the Y Route overhead line. A 500m corridor has therefore been identified either side of the Y Route as the study area (see Drawings G1979.03.058a, G1979.03.059a and G1979.03.060a). It would be possible to site the new substation compound away from the overhead line if no suitable site could be found closer. However, this would require new connections (by overhead line or underground cables) which could introduce additional environmental and amenity effects that may outweigh the perceived benefits of choosing a site remote from the existing network. New connections are also likely to be required to connect the substation compound to Frome Tee. This would be an additional consideration when comparing the potential environmental effects of specific sites. The study area has been extended slightly wider than 500m around Frome Tee as a substation compound in this location would minimise the requirement for additional connections.

4.4 At this stage the precise location and design of the substation compound has not been determined. The siting and design of the substation compound would be subject to further detailed study in accordance with WPD's Schedule 9 Statement, and taking into consideration the principles of the Horlock Rules.

Environmental Constraints and Assessment

4.5 There are several sites in the area of search for the substation compound that are protected at the highest level by national or international nature conservation, historic environment or landscape designations. These include the Cotswolds Area of Outstanding Natural Beauty (AONB), Cleaves Wood, Hinton Charterhouse and Hinton Charterhouse Field Sites of Special Scientific Interest (SSSI), Ston Easton and Ilford Manor Registered Park and Gardens, several Scheduled Monuments, Conservation Areas and listed buildings. In addition Bath World Heritage Site lies approximately 3km north of the existing Y Route overhead line but due to its distance is not anticipated to be adversely affected by this technical option.

4.6 The following factors are likely to be most relevant to the siting of the potential substation compound and would require detailed consideration as part of the next stage of assessment if this option was taken forward:

- The Y Route overhead line runs through the southern tip of the Cotswolds AONB at Wellow. East of Wellow it also runs within a kilometre of the AONB through the majority of the study area. Although the substation compound could be sited outside the AONB to avoid any direct impacts, the potential for any indirect effects on its setting would require careful consideration in this area. If new overhead line connections are required to connect the substation compound to the Frome Tee, the use of wood poles would have less effect on landscape and views in comparison with steel lattice pylons.

- The Y Route overhead line runs adjacent to Cleaves Wood SSSI at the southern edge of the Cotswolds AONB. It is an ancient semi-natural deciduous woodland on Oolitic limestone. It supports a high diversity of tree and shrub species, a large population of the nationally scarce plant *Ornithogalum pyrenaicum* and several other features of interest including nationally rare insects. Hinton Charterhouse Field SSSI is also adjacent to the Y Route in this area and supports the nationally rare plant *Eryngium campestre* (Field Eryngo).

- Approximately 350m north of the Y Route is the Hinton Charterhouse SSSI which is an important site for the study of lateral facies variations. These sites could be avoided but an environmental assessment may be required to ensure that the integrity of the sites and their reasons for designation would not be adversely affected if the substation compound was constructed in close proximity.

- Potential effects on the setting of Ston Easton Registered Park and Garden (approximately 1.5km west of Radstock substation) and Ilford Manor Registered Park and Garden (approximately 350m north of the Y Route at Westwood).

- There are several Scheduled Monuments in the area of search for the substation compound which could indicate the potential for unknown archaeological interest. These include Camerton Romano British Town with prehistoric and early medieval monuments covering an area of 26ha approximately 1.2km south of the Y Route at Camerton. To the south and west of Wellow there are two Scheduled Monuments within 500m of the Y Route, the closest of which is a Roman Villa approximately 150m south.

- Potential effects on the setting of several Conservation Areas and numerous listed buildings either side of the Y Route in the area of search.

- The majority of land between Carlingcott in the west of the area of search and Frome Tee in the east is designated as Green Belt, where there is a presumption against inappropriate development except in very special circumstances. Consent may be granted for a new substation compound in the Green Belt where no other site outside of the Green Belt is available or practical, and robust justification could be demonstrated to prove that openness could be maintained and the development would not conflict with the purposes of including the land in the Green Belt. If the construction of a substation compound was considered to be inappropriate development, consideration would need to be given as to whether the harm by reason of inappropriateness was outweighed by other considerations, including the need

for the substation compound, its environmental effects and the availability of alternative options.

- To avoid the Green Belt the substation compound would need to be sited in the west of the study area between Radstock substation and Carlingcott. New connections to the Frome Tee are likely to be required for a substation in this area, which could introduce additional environmental and amenity effects that may outweigh the perceived benefits of the site outside of the Green Belt.

- Potential effects on landscape and views including those from settlements and individual residential properties close to the existing Y Route overhead line (e.g. Midsomer Norton, Paulton, Radford, Camerton, Carlingcott, Dunkerton, Wellow, Peasedown St John, Hinton Charterhouse, Westwood, Farleigh Hingerford, Trowbridge and Bradford-on-Avon).

- Woodland cover in the area of search includes hillside woods, linear strips and scattered blocks. Woodland would form a constraint to siting, but could potentially assist in screening or 'backgrounding' the substation compound.

- The majority of the Y Route overhead line does not cross land with a medium or high probability of flooding (Flood Zones 2 or 3), other than where it crosses the floodplains of several watercourses. WPD considers the siting of installations such as substations very carefully in relation to flood risk. Substations should ideally be located outside areas at risk of flooding. The location of the new substation compound would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25: Development and Flood Risk. PPS25 states that authorities should steer new development to Flood Zone 1, in which the chance of flooding each year is 0.1% (1 in 1000) or less. WPD would seek to identify sites for the substation outside of Flood Zones 2 and 3. However if there were no reasonably alternative sites in Flood Zone 1, they may consider the suitability of sites in Flood Zone 2 and then Flood Zone 3. A Flood Risk Assessment (FRA) would be necessary to demonstrate that any proposed development within Flood Zones 2 and 3 could operate safely and effectively in the event of a flood and would not increase flood risk elsewhere.

- To minimise potential effects from a substation compound on the Cotswolds AONB, the Green Belt and SSSI's, an area of search would be least constrained in the west of the study area between Radstock substation and Carlingcott. A substation compound close to the existing Radstock substation should be considered as this would be consistent with the existing character and is unlikely to have significant adverse impacts on any sites protected at the highest level by national or international nature conservation, historic environment or landscape designations. However, new connections are likely to be required to connect a substation compound in this area to the Frome Tee, which would be an additional consideration when assessing the potential environmental and amenity effects.

- Siting a substation compound in the area of Frome Tee could have adverse environmental effects in terms of landscape and views on the Green Belt and the setting of the AONB, but is unlikely to require the additional connections of other options sited remote from the Tee (e.g. close to Radstock substation).

5.0 FROME TEE TO MELKSHAM ENVIRONMENTAL APPRAISAL

Introduction

5.1 This appraisal considers the planning and environmental constraints associated with a new single circuit 132kV connection (of approximately 8 - 10km) between Melksham substation, Wiltshire and the Frome Tee, south of Bradford-on-Avon, Wiltshire (See Drawing G1979.03.051a). The Frome Tee is a point on the existing Y Route 132kV overhead line between Trowbridge and Bradford-on-Avon from which a 132kV overhead line travels south to Frome. The connection could be made by overhead line (using steel lattice pylons or wood poles) or underground cables.

Study Area

5.2 The study area extends from the Frome Tee, between Bradford-on-Avon and Trowbridge in the west, to Melksham substation, east of Whitley in the east. The western extent of the study area is defined by the settlements of Bradford Leigh and Atworth and the eastern extent by the settlements of Hilperton, Whaddon and Melksham. The study area is illustrated at Drawing G1979.03.051a.

5.3 Melksham substation lies to the north of Melksham between Whitley and Beanacre. WPD's existing Y Route 132kV overhead line runs between the substation and Frome Tee. A 400kV overhead line owned and operated by National Grid runs south from Melksham substation through the north eastern extent of the study area to Hinkley Point, West Somerset.

5.4 The settlements of Trowbridge and Melksham lie immediately east of the study area. The southern end of Bradford-on-Avon extends into the study area, which also includes numerous smaller settlements including Wildbrook, Staverton, Holt, Great Chalfield, Little Chalfield, Broughton Gifford, Norrington Common, Shaw and Whitley.

Environmental Constraints

5.5 A description of the study area in relation to the environmental constraints outlined in Table 1.2 is presented below and illustrated at (See Drawing G1979.03.051a).

5.6 The following are not present within the study area:

- National Parks;
- Areas of Outstanding Natural Beauty (AONB);
- Heritage Coasts;
- World Heritage Sites;
- Sites of Special Scientific Interest (SSSI);
- Special Protection Areas (SPA);
- Special Areas of Conservation (SAC);
- Ramsar Sites;
- National Nature Reserves (NNR); and
- Registered Battlefields.

<u>Areas of Outstanding Natural Beauty (AONB)</u>

The Cotswolds AONB

5.7 There are no AONBs within the study area. The Cotswolds AONB is approximately 1.2km north of Frome Tee.

5.8 The Cotswolds AONB, at 2,038km^2, is the largest AONB in England and Wales and is the third largest designated landscape in the UK after the Lake District and Snowdonia. It extends from Bath and Wiltshire in the south through Gloucestershire and Oxfordshire to Warwickshire and Worcestershire in the north. Jurassic limestone gives the AONB its distinctive character. The limestone lies in a sloping plateau with a steep scarp slope in the west drained by short streams in deep cut wooded valleys, and a gentle dip slope which forms the headwaters of the River Thames.

5.9 The AONB is nationally important for rare limestone grassland and ancient beech woodlands. The land also includes a number of ecologically and archaeologically important sites which are protected through a range of designations.

Implications for Overhead Line/Underground Cables Routeing

5.10 AONBs are designated under the National Parks and Access to the Countryside Act 1949 (as amended) for the purpose of conserving and enhancing the natural beauty of the area. The importance of these sites and the protection afforded to them is further highlighted in Planning Policy Statement (PPS) 7 and Rule 1 of the Holford Rules, which place strict restrictions on development.

5.11 Paragraph 22 of PPS7 states that major developments should not take place in these designated areas except in exceptional circumstances. Applications for such development within an AONB will be subject to rigorous examination and should include an assessment of the national need, cost and scope of developing outside the designated area and effects on the environment, landscape and recreational opportunities.

5.12 The setting of the AONB needs to be considered when siting overhead lines in close proximity to an AONB designation. Information relating to the setting is reviewed from published landscape character assessments at a later, more detailed stage of assessment as part of the process of identifying route corridors.

5.13 A connection between Melksham substation and the Frome Tee would not directly affect the Cotswolds AONB. The proximity and effects of an additional overhead line on the setting of the AONB in the area south of Bradford-on-Avon would require further consideration if a new overhead line connection was taken forward. Significant effects on the setting of the AONB are not anticipated as only a relatively short section of the overhead line would be visible from the AONB and the setting is already influenced by the existing Y Route 132kV overhead line. If a new overhead line connection was taken forward wood poles would have less effect on landscape and views in comparison with steel lattice towers, as wood poles are generally smaller with a less visually prominent support.

5.14 An underground connection could have temporary effects associated with construction on the landscape which may be visible from the AONB. However, once the land had re-established the effects on the AONB's setting would be reduced to negligible.

Scheduled Monuments (SMs)

5.15 There is one SM in the study area: an earthwork enclosure in Great Bradford Wood, approximately 350m east of the Y Route 132kV overhead line. Another SM (a medieval settlement) is approximately 100m east of the study area at Whaddon.

Implications for Overhead Line/Underground Cables Routeing

5.16 SMs are nationally important monuments and archaeological remains which are protected under the provisions of the Ancient Monuments and Archaeological Areas Act 1979. Consent is required from English Heritage, the statutory advisor on the historic environment, under the 1979 Act before works directly affecting an SM may be carried out.

5.17 A potential connection between Melksham substation and the Frome Tee could avoid the SMs within and just outside the study area. An assessment would be required to identify any indirect effects on the monuments and their setting if the connection was to be routed close to these features. It is not anticipated that a connection would affect the setting of the earthwork enclosure which is surrounded by trees at Great Bradford Wood.

5.18 An underground connection would have less adverse effects on the setting of a SM than an overhead line as impacts are largely temporary during construction. However, if an underground connection could not avoid a SM it may be permanently damaged or destroyed.

5.19 An assessment of the potential for archaeological remains and any direct and indirect effects from construction and installation would be required for any underground connection route. PPS5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*.

Settlements

5.20 There are several settlements within or close to the study area. The largest include Bradford-on-Avon, Trowbridge and Melksham. Other smaller settlements include Westwood, Wildbrook, Hilperton, Staverton, Wooley Green, Bradford Leigh, Whaddon, Holt, Great Chalfield, Little Chalfield, Broughton Gifford, Norrington Common, Atworth, Shaw, Beanacre, and Whitley.

Implications for Overhead Line/Underground Cables Routeing

5.21 Settlements could be avoided but would form a constraint to routeing within the study area.

Historic Buildings (Listed I, II and II*)

5.22 Buildings of special architectural or historic interest are added to a list of buildings protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Planning authorities are required to consult with English Heritage on planning applications which may affect a Grade I and Grade II* Listed Building outside Greater London and Listed Building consent is required for any works likely to affect a Listed Building.

5.23 There are numerous Grade I or II* Listed Buildings within or adjacent to the study area. Most of the Listed Buildings are clustered within settlements such as Holt, Broughton Gifford, Great Chalfield, Shaw and Whitley, although some are isolated buildings in more rural areas. There are also clusters of Listed Buildings in the centres of Bradford-on-Avon and Trowbridge, Atworth and Melksham on the edge of the study area.

Implications for Overhead Line/Underground Cables Routeing

5.24 Routes could be achieved for the connection which avoid Listed Buildings. However, further detailed study would be required to identify any adverse effects on their setting for an overhead line connection. Effects on these features would be reduced by using an underground connection.

Conservation Areas

5.25 Within the study area there are Conservation Areas at Holt and Broughton Gifford. Just outside the study area other settlements with Conservation Areas include Bradford-on-Avon, Trowbridge, Hilperton, Melksham and Atworth.

Implications for Overhead Line/Underground Cables Routeing

5.26 Conservation Areas are areas designated by local authorities because of special architectural or historic interest and are protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Conservation Area consent is required from the local planning authority for any development within the area. Routes could be achieved which avoid Conservation Areas. However, further detailed study would be required to identify any adverse effects on their setting for an overhead line connection.

Registered Parks and Gardens

5.27 There are two Registered Parks and Gardens within the Study area and two others within 1km of the study area in the adjacent settlements of Bradford-on-Avon and Trowbridge. These are summarised in Table 5.1 below.

Table 5.1 – Summary of Registered Parks and Gardens

Registered Park and Garden	Grid Ref/Location	Reason for Designation
Registered Parks and Gardens in the study area		
The Courts, Holt (2.8 ha)	ST 861618	Grade II listed early 20th century garden including an arboretum. The site is owned by the National Trust.
Great Chalfield Manor (8 ha)	ST 860631	Grade II listed early 20th century garden in the grounds of a moated manor house. Site is owned by the National Trust.
Registered Parks and Gardens just outside the study area		
Trowbridge General Cemetery (3.8 ha)	ST 862590 Approximately 800m east of the study area	A Grade II listed mid 19th century burial cemetery designed by C E Davis of Bath. The site was laid out with a broad central avenue dividing the consecrated and unconsecrated land. The cemetery includes two chapels, a

Registered Park and Garden	Grid Ref/Location	Reason for Designation
		lodge and serpentine outer walks.
The Hall, Bradford-on-Avon (3.5ha)	ST829609 Approximately 350m west of the study area	The Hall is a 19th century walled garden surrounding a house of 1610. The Hall is situated within the town of Bradford-on-Avon from which it is separated by a wall.

Implications for Overhead Line Routeing/Underground Cables Routeing

5.28 The English Heritage 'Register of Historic Parks and Gardens of special historic interest in England' (compiled under powers contained in Historic Buildings and Ancient Monuments Act 1953) identifies sites assessed to be of national importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the landscapes' special character.

5.29 Three of the Registered Parks and Gardens identified in Table 2.1 are within settlements and would not present a constraint to routeing the connection.

5.30 Great Chalfield Manor would present a constraint to routeing. Other constraints close to Great Chalfield Manor such as woodlands, Listed Buildings and the settlements of Broughton Gifford (and its Conservation Area) to the east and Little Chalfield to the west would further constrain a direct route through this area.

5.31 The existing Y Route 132kV overhead line runs approximately 500m west of Great Chalfield Manor. A new overhead line route could be achieved through this area, although, the cumulative effects of an additional line would require further consideration in accordance with the Holford Rules if an overhead line connection was taken forward. Effects on this feature would be reduced by using an underground connection.

Woodland

5.32 There are several areas of woodland within the study area. These include a cluster of woodlands around Great Chalfield Manor in the centre of the study area, Great Bradford Wood west of Staverton and linear woodlands along the Kennet and Avon Canal and River Avon between Bradford-on-Avon and Trowbridge.

Implications for Overhead Line/Underground Cables Routeing

5.33 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 wherever possible.

5.34 Installing a connection through woodland would result in its permanent loss. Permanent restrictions on what may be planted above an underground cable or below an overhead line would apply. The main concentrations of woodland which would influence the routeing and the directness of a connection are Great Bradford Wood, linear woodlands along the Kennett and Avon Canal and woodlands close to Great Chalfield Manor.

Landform

5.35 The landform of the study area is undulating with levels generally ranging between 30-60m AOD and rising up to 80m AOD in the north (See Drawing 1979.03.066a). In the Cotswolds AONB, approximately 1.2km west of the study area the land rises up to 120m AOD.

Implications for Overhead Line/Underground Cables Routeing

5.36 The Holford Rules refer to aspects of topography and physiography such as hills, ridges, dips, open valleys and flat land in considering overhead line routeing. For example, the Rules advise on exploiting the 'backgrounding' effect of high land and seeking to avoid ridges.

5.37 Landform would not pose a significant constraint to routeing a connection within the study area. The majority of the study area is undulating (30 – 60m AOD) rising gradually in the west up to 60m AOD and up to 80m AOD in the north. There may be opportunities to utilise the undulating landform to background an overhead line.

Flood Risk

5.38 The Environment Agency uses the following flood zones in England:

- Flood Zone 1: Land which has a low probability of flooding;
- Flood Zone 2: Land which has a medium probability of flooding; and
- Flood Zone 3: Divided into 3A (land which has a high probability of flooding) and 3B (the functional floodplain).

5.39 The majority of the study area does not fall within Flood Zones 2 or 3 (land with a medium or high probability of flooding) other than where it crosses the floodplains of watercourses, predominantly the River Avon and its tributaries.

Implications for Overhead Line Routeing/Underground Cables Routeing

5.40 It is relatively straightforward to build flood resilience into overhead lines by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has negligible effect on the risk of displacement of water as the lattice steel construction poses no material changes to surface water flow.

5.41 The presence of an underground cable circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow.

5.42 If an underground cable connection was taken forward, a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the Frome tee. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25 – Development and Flood Risk.

5.43 PPS25 states that authorities should steer new development to Flood Zone 1, in which the chance of flooding each year is 0.1% (1 in 1000) or less. WPD would seek to identify sites for the CSE compound outside of Flood Zones 2 and 3. However where there are no reasonably alternative sites in Flood Zone 1, WPD may consider

the suitability of sites in Flood Zone 2 and then Flood Zone 3. A Flood Risk Assessment (FRA) would be necessary to demonstrate that any proposed development within Flood Zones 2 and 3 could operate safely and effectively in the event of a flood and would not increase flood risk elsewhere.

Assessment

5.44 The study area extends from the Frome Tee (between Bradford-on-Avon and Trowbridge, Wiltshire) in the west to Melksham substation, Wiltshire in the east. The western extent is defined by the settlements of Bradford Leigh and Atworth and the eastern extent by the settlements of Hilperton, Whaddon and Melksham. The study area is illustrated at Drawing G1979.03.051a.

5.45 A new overhead line or underground cables connection between the Frome Tee and Melksham substation could be achieved, but would pass close to, and be constrained by several environmental constraints.

5.46 One of the main environmental constraints within the study area that would influence the directness of a connection is Great Chalfield Manor Registered Park and Garden. Other constraints close to Great Chalfield Manor such as blocks of woodland, Listed Buildings and the settlements of Broughton Gifford (and its Conservation Area) to the east and the settlement of Little Chalfield to the west, would also influence the directness of a route through this area.

5.47 Other areas of woodland which could influence the routeing of a connection are Great Bradford Wood and the linear woodlands along the Kennett and Avon Canal and River Avon.

5.48 The connection would need to negotiate several other settlements and smaller hamlets in the study area such as Holt, Staverton and Shaw. Properties would have an influence on the route and directness of any connection and the potential cumulative effects of an additional overhead line close to some settlements/properties would require careful consideration during routeing.

5.49 There is one Scheduled Monument, numerous Listed Buildings, two Conservation Areas and another Registered Park and Garden (The Courts, Holt) in the study area. An additional SM lies 100m east of the study area boundary. These sites could be avoided by a connection, but an assessment would be required to identify any indirect effects on the features and their setting if the connection was to be routed in close proximity.

5.50 The connection would not pass through the Cotswolds AONB; however the potential effects on its setting to the south of Bradford-on-Avon would require further consideration. Significant effects on the setting of the AONB are not anticipated as only a relatively short section of the overhead line would be visible from the AONB and the setting is already influenced by the Y Route 132kV overhead line. Potential effects on the AONB would be reduced by using an underground connection. An underground connection could have temporary effects associated with construction on the landscape which may be visible from the AONB, but once the land had re-established the effects on the AONB's setting would be reduced to negligible.

5.51 The construction of a new overhead line close to or parallel with the existing Y Route 132kV overhead line would result in cumulative visual effects but would limit effects

on landscape and views to a localised area. Siting the lines further apart would introduce effects over a greater area and could introduce a new line where no overhead line currently exists.

5.52 The Y Route overhead line runs approximately 500m west of Great Chalfield Manor Registered Park and Garden. The cumulative effects of an additional line would require further consideration in accordance with the Holford Rules if an overhead line connection parallel to the Y Route was taken forward.

5.53 A new underground connection would offer benefits in terms of landscape and views particularly relating to settlements and the setting of the Cotswolds AONB, Registered Parks and Gardens, Listed Buildings, Conservation Areas and Scheduled Monuments, compared with an equivalent length of overhead line. An underground connection would give rise to temporary effects on landscape and views during construction. Once the land has re-established, effects would be lower than an equivalent length of overhead line. However, the installation of underground cables is more invasive and would have a greater scale of effects on areas of ecological or archaeological value.

5.54 The majority of the study area does not fall within Flood Zones 2 or 3 (land with a medium or high probability of flooding) other than where it crosses the floodplains of watercourses, predominantly the River Avon and its tributaries. If an underground cables connection was taken forward a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the Frome tee. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

6.0 UPGRADING OF Y ROUTE (BETWEEN RADSTOCK AND MELKSHAM) ENVIRONMENTAL APPRAISAL

Introduction

6.1 This appraisal considers the planning and environmental constraints associated with replacing and upgrading the conductors (wires) along the existing Y Route 132kV overhead line between Radstock substation and Melksham substation to carry more power (See Drawings G1979.03.067, and G1979.03.068). The Y Route overhead line connects Churchill 132kV substation with Radstock substation and Melksham substation.

6.2 The work required to replace the conductors would be temporary and would not involve any ground disturbance other than where this may be necessary to gain access to the overhead line (e.g. if tree removal was required).

Study Area

6.3 This appraisal considers sites protected at the highest level by national or international nature conservation, historic environment or landscape designations that are oversailed or close to (within 500m of) the existing overhead line and therefore could be affected during construction works.

Environmental Constraints and Assessment

6.4 Between Radstock substation and Melksham substation the overhead line travels within 1km of the southern boundary of the Cotswolds AONB and passes through it for approximately 450m.

6.5 AONBs are designated under the National Parks and Countryside Act 1949 (as amended) for the purpose of conserving and enhancing the natural beauty of the area. Due to the nature of work required (i.e. temporary works to refurbish existing infrastructure) it is not anticipated that there would be any adverse effects on the landscape which could affect the objective to conserve and enhance natural beauty, unless tree removal was required to access or ensure safety clearances to the overhead line. Tree removal is not anticipated within the AONBs.

6.6 The overhead line does oversail or pass through several blocks of woodland in the study area where working methods associated with accessing the overhead line and carrying out the work would need to be carefully considered to prevent potential disturbance to woodland and tree removal where possible. Potential effects and mitigation would be considered at the next stage of assessment, including the requirement for any replanting if required.

6.7 The Y Route overhead line runs very close to several SSSIs. These include Cleaves Wood SSSI (adjacent), Hinton Charterhouse Field SSSI (adjacent), Hinton Charterhouse SSSI (approximately 350m north) and Ilford Manor SSSI (approximately 300m north).

6.8 No direct impacts on the above SSSI's are anticipated. However gaining access to the overhead line close to these sites would need to be carefully considered in the

assessment of environmental effects, to prevent disturbance and potential effects on the sites special interests and qualifying features. This would be particularly important at Cleaves Wood SSSI which is an ancient semi-natural deciduous woodland and supports a high diversity of tree and shrub species, a large population of the nationally scarce plant *Ornithogalum pyrenaicum,* and several other features of interest including nationally rare insects. Hinton Charterhouse Field SSSI is also adjacent to the Y Route in this area and supports the nationally rare plant *Eryngium campestre* (Field Eryngo). These sites would require particular consideration during the temporary siting of any equipment or construction compounds close to the overhead line to ensure their features of special interest are not adversely affected.

6.9 No significant adverse effects on the setting of Scheduled Monuments, Registered Parks and Gardens, Conservation Areas and Listed Buildings are anticipated. There are two Scheduled Monuments in the study area. The replacement of conductors does not necessitate any ground intrusion. However, the potential for ground disturbance in the area of a Scheduled Monument (Roman Villa) approximately 150m south of the overhead line (west of Wellow) would require consideration during the temporary siting of any equipment or construction compounds.

6.10 No flood risk impacts are anticipated. The proposed work to replace the conductors is temporary and would not pose any material changes to water flow along the Y Route or in the surrounding area.

7.0 TURNING IN THE W AND Y ROUTES TO CHURCHILL SUBSTATION ENVIRONMENTAL APPRAISAL

Introduction

7.1 This appraisal considers the planning and environmental constraints associated with the connection (turning in) of the W Route (that runs north from Churchill 132kV substation to Portishead 132kV substation, near Bristol) and the Y Route (that runs east from Churchill substation to Radstock 132kV substation, near Bath) to Churchill substation (see Drawing G1979.03.047a). These routes merge approximately 250m east of Churchill substation and would need to be connected into the substation using a double circuit overhead line. The W Route would then form a link between Churchill substation and Portishead substation, and the Y Route between Churchill substation and Radstock substation.

Environmental Constraints and Assessment

7.2 There are no environmental constraints between Churchill substation and the point where the W and Y Routes merge and would 'turn in' from. The closest environmental constraint is a Listed Building at Brinsea, approximately 750m west of Churchill substation. The setting of this feature is unlikely to be affected due to its distance from the potential connection and the presence of intervening properties, vegetation and the existing Churchill substation.

7.3 The environmental effects of connecting the W and Y Routes to the existing Churchill substation would require further consideration and assessment as part of the next stage of the project should this technical option be taken forward.

7.4 No flood risk impacts are anticipated from the section of overhead line required to turn in the W and Y Routes. The area does not fall within Flood Zones 2 or 3 and it would be relatively straightforward to build flood resilience into the overhead line by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the lattice steel construction poses no material changes to surface water flow.

8.0 BRIDGWATER TO N ROUTE TEE ENVIRONMENTAL APPRAISAL

Introduction

8.1 This appraisal considers the planning and environmental constraints associated with a new single circuit 132kV underground cable connection (of approximately 27km) between Bridgwater 132kV substation, Somerset and the N Route tee (See Drawing G1979.03.057a). The N Route tee is the point on the existing F Route 132kV overhead line (between Banwell and Sandford, North Somerset) where it connects with the existing N Route 132kV overhead line which runs north west to Churchill 132kV substation.

8.2 A platform tower or cable sealing end (CSE) compound would also be required to facilitate the transition from underground cable to overhead line at the N Route tee.

Study Area

8.3 The study area extends north from Bridgwater substation on the eastern edge of Bridgwater, Somerset to the N Route tee, North Somerset. The N Route tee is the point on the existing F Route 132kV overhead line (between Banwell and Sandford, North Somerset) where it connects to the existing N Route 132kV overhead line which runs north west to Churchill 132kV substation. To the south of the Mendip Hills Area of Outstanding Natural Beauty (AONB) the western extent of the study area is defined by the M5 motorway and the eastern extern by the settlements of Chilton Polden, Blackford, Stone Allerton, Compton Bishop and Winscombe.

8.4 Within the Mendip Hills AONB routes would be constrained by Special Areas of Conservation (SAC), Sites of Special Scientific Interest (SSSI), Scheduled Monuments, woodlands (including ancient woodland), topography, and settlements. The study area within the AONB has therefore been limited to a relatively narrow corridor which avoids constraints and follows the only break in the hills in the valley of the Lox Yeo River. The study area is illustrated at Drawing G1979.03.057a.

8.5 The main settlements within the study area include Chedzoy, Bawdrip, Puriton, Woolavington, Cossington, East Huntspill, Mark, Rooks Bridge and Biddisham. Just outside the study area are the larger settlements of Bridgwater and Highbridge in the south, and Banwell, Sandford and Winscombe in the north.

Environmental Constraints

8.6 A description of the study area in relation to the environmental constraints outlined in Table 1.2 is presented below and illustrated at Drawing G1979.03.057a.

8.7 The following are not present within the study area:

- National Parks;
- Heritage Coasts;
- World Heritage Sites;
- Sites of Special Scientific Interest (SSSI);
- Special Protection Areas (SPA);
- Special Areas of Conservation (SAC);
- Ramsar Sites;
- Conservation Areas;

- Registered Parks and Gardens; and
- Registered Battlefields.

Areas of Outstanding Natural Beauty (AONB)

Mendip Hills AONB

8.8 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 hills run in an east to west direction between the coast at Weston-super-Mare and Frome and overlook the Somerset Levels to the south and the Avon Valley to the north. The hills of the AONB form prominent landmarks. The designation relates to 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.

8.9 The existing F Route 132kV overhead line passes through the Mendip Hills AONB for approximately 6km in the north of the study area, travelling through the Lox Yeo Valley.

Implications for Underground Cables Routeing

8.10 AONBs are designated under the National Parks and Access to the Countryside Act 1949 (as amended) for the purpose of conserving and enhancing the natural beauty of the area. The importance of these sites and the protection afforded to them is further highlighted in Planning Policy Statement (PPS) 7 and Rule 1 of the Holford Rules, which place strict restrictions on development.

8.11 Paragraph 22 of PPS7 states that major developments should not take place in these designated areas except in exceptional circumstances. Applications for such development within an AONB will be subject to rigorous examination and should include an assessment of the national need, cost and scope of developing outside the designated area and effects on the environment, landscape and recreational opportunities.

8.12 An underground connection would have temporary effects associated with construction on the landscape of the AONB, affecting the objective to conserve and enhance natural beauty. However, once the land had re-established the effects on the AONB would be reduced.

8.13 As outlined at paragraph 1.2, a CSE compound or platform tower (pylon) would be required to facilitate the transition from underground cable to the existing N Route 132kV overhead line. The N Route tee is approximately 400m north of the Mendip Hills AONB and the potential effects of a CSE compound or platform tower in this area on the setting of the AONB would need to be considered as part of detailed siting studies if this technical option was taken forward.

8.14 To achieve a direct connection between Bridgwater and the N Route tee the connection would need to be established through the Mendip Hills AONB. To avoid the AONB the connection would have to extend west where the settlement of Weston-super-Mare, blocks of woodland and the topography of the landscape would constrain routeing. This would increase the length of the connection, introduce additional constraints to routeing and potentially result in adverse environmental effects over a much greater area.

8.15 Within the Mendip Hills AONB routes would be constrained by Special Areas of Conservation (SAC), Sites of Special Scientific Interest (SSSI), Scheduled Monuments (SM), Listed Buildings, Conservation Areas, blocks of woodland (including ancient woodland), topography, and settlements. The study area within the AONB has therefore been limited to a relatively narrow corridor which avoids these constraints and follows the only break in the hills in the valley of the Lox Yeo River.

8.16 Any underground connection would need to avoid areas of woodland and other features which are important to the scenic character of the AONB. The Mendip Hills AONB is also noted for its ecological and archaeological importance, which would be need to be considered further if this technical option was taken forward.

Sites of Special Scientific Interest (SSSI)

8.17 SSSIs are designated for their biodiversity or geological interest and are protected from development and operations likely to damage their special interest.

8.18 There are no SSSIs within the study area. Several SSSIs lie adjacent to or close to the study area boundary. The most significant of these sites and the reasons for their designation are summarised in Table 8.1.

Table 8.1 – Summary of SSSIs

SSSI	Location / Grid Ref	Reason for Designation
Outside but close to the Study Area		
Severn Estuary	South west coast, covers Mouth of the Avon	The Severn Estuary, also a SPA, SAC and Ramsar site, lies on the south west coast of Britain at the mouth of four major rivers (the Severn, Wye, Usk and Avon). It is an internationally important site for birds and wildlife habitats and is one of the most important sites in the UK for wintering wildfowl and waders. The Estuary area comprises several other SSSI's including Berrow Dunes, Bridgwater Bay and Brean Down SSSIs.
The Catcott, Edington and Chilton Moors, Tealham and Tadham Moors and Westhay Moors	North east of Bridgwater (ST 390420)	The Catcott, Edington and Chilton Moors, Tealham and Tadham Moors and Westhay Moors SSSIs are a collection of adjoining moors which form part of the Somerset Levels and Moors SSSI, SPA and Ramsar site to the north east of Bridgwater. These sites comprise diverse habitats which provide feeding and nesting sites for a wide range of birds such as Golden Plover and Lapwing.
Shiplate Slait	West of Loxton (ST 364567)	This site lies towards the western end of the Mendip Hills AONB on the south and west facing slopes. It is important for its unimproved calcicolous grassland, some is mixed with dwarf shrub, mosaics of calcicolous grassland, scrub and woodland.

SSSI	Location / Grid Ref	Reason for Designation
Crook Peak and Shute Shelve	East of Loxton (ST 385555)	This site is in the Mendip Hills AONB covering high ground of Crook Peak and Shute Shelve Hill. The designation covers a range of habitats including ancient and semi-natural broadleaved woodland and unimproved calcareous grassland.
Max Bog	West of Winscombe (ST 406 574)	This SSSI is in the Mendip Hills AONB and is a calcicolous lowland mire with adjacent wet neutral grassland. Both vegetation types are nationally rare.
Banwell Caves	South of Banwell (ST 383588)	This SSSI lies within the Mendip Hills AONB and forms part of the North Somerset and Mendips Bats SAC. It is a Geological Review Site and is used as a hibernation site by Greater Horseshoe Bats.
Banwell Ochre Caves SSSI	East of Banwell (ST 407593)	This SSSI lies within the Mendip Hills AONB and forms part of the North Somerset and Mendip Bats SAC. The SSSI comprises five caves which contain the most extensive and accessible yellow ochre workings in the Mendip Hills.

Implications for Underground Cables Routeing

8.19 The potential effect of a connection on a SSSI will depend on the nature of the effect caused and the special interest of the site. Underground connections are more invasive than an equivalent length of overhead line as the land disturbance is greater during construction and there are permanent restrictions on tree planting and land use during operation. Consultation with Natural England would be required before consent could be granted for any development or operations likely to damage the SSSI interest.

8.20 There are no SSSIs within the study area so direct impacts on these sites would be avoided. However, four of the SSSIs lie adjacent to the study area boundary (Crook Peak and Shute Shelve SSSI, Max Bog SSSI the Catcott, Edington and Chilton Moors SSSI and the Tealham and Tadham Moors SSSI) and further assessment would be required at a later, more detailed stage of assessment, to ensure there would be no indirect adverse effects on the integrity of these designations or their qualifying features if this technical option is taken forward.

Special Protection Areas (SPA) and Ramsar sites

Severn Estuary SPA and Ramsar

8.21 The Severn Estuary SPA is approximately 1.6km west of the study area with the full extent of the designation covering an area of approximately 24,000ha. The Estuary is the largest coastal plain estuary in the UK with extensive mudflats and sandflats, rocky shore platforms, shingle and islands. The Estuary's unique funnel shape means it has a high tidal range which results in a variety of plant and animal communities typical of liquid mud and tide-swept sand and rock.

8.22 The site qualifies as an SPA under Article 4.1 of the Birds Directive (79/409/EEC) by supporting bird populations of European importance that are listed on Annex I of the Directive and under Article 4.2 by regularly supporting at least 20,000 waterfowl.

8.23 The Ramsar designation also extends to cover fish populations of the estuarine and river system which is one of the most diverse in Britain with over 110 species recorded.

Somerset Levels and Moors SPA and Ramsar

8.24 The Somerset Levels and Moors are one of the largest areas of traditionally managed wet grassland and fen habitats in lowland UK. The SPA and Ramsar sites (adjacent to the eastern boundary of the study area) cover the same geographical area as each other (approximately 35,000ha) and include the floodplains of the Rivers Axe, Brue, Parrett, Tone and their tributaries. The internationally important bird populations and the habitats on which they depend are reasons for both the SPA and Ramsar designations; the Ramsar designation also extends to cover rare invertebrate populations.

Implications for Underground Cables Routeing

8.25 SPAs and Ramsar sites are afforded protection under the Conservation of Habitats and Species Regulations 2010. 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.

8.26 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.

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8.27 Routes could be achieved which avoid direct impacts on the SPA and Ramsar sites. The Somerset Levels and Moors SPA and Ramsar site is beyond the eastern boundary of the study area and an underground connection close to this site could give rise to adverse effects. Further detailed study would be required at a later, more detailed stage of assessment, to ensure there would be no indirect adverse effects on the integrity of either of the SPA/Ramsar sites or their qualifying features from the construction of an underground cables connection. Potential indirect effects as a result of the underground connection could include disturbance to bird movements or foraging habitat.

Special Areas of Conservation (SAC)

Severn Estuary SAC

8.28 The Severn Estuary SAC lies approximately 1.6km west of the study area and covers an area of approximately 73,000ha. The SAC was confirmed in 1995 and further amended in 2000. The site is designated for important populations of fish and the natural habitats present within the Estuary.

Mendip Limestone Grasslands SAC

8.29 The Mendip Limestone Grasslands SAC comprises three separate SSSIs totalling approximately 417ha. Brean Down SSSI and Uphill Cliff SSSI are south of Weston-super-Mare, contiguous with the Severn Estuary SAC. The Crook Peak to Shute

Shelve SSSI is adjacent to the eastern boundary of the study area within the Mendip Hills.

North Somerset and Mendip Bats SAC

8.30 The North Somerset and Mendip Bats SAC is centred on the Mendip Hills. The SAC comprises caves, grassland and woodland and is a composite site spread across a wide area. The component sites include the Banwell Caves SSSI and Banwell Ochre Caves SSSI on the northern side of the Mendip Hills with Brockley Hall Stables SSSI and King's Wood and Urchin Wood SSSI to the north east of Congresbury.

8.31 These sites are considered of international importance for their semi-natural dry grasslands, significant blocks of *Tilio-Acerion* forest and the limestone caves of the Mendips which provide a range of important hibernation sites for greater and lesser horseshoe bats. Natural England and North Somerset Council have identified a 5km 'consultation zone' which covers important feeding grounds surrounding the SAC and in which development proposals are subject to particular scrutiny for potential effects on the designated sites. The 5km 'consultation zone' falls within the study area.

Implications for Underground Cables Routeing

8.32 Like SPAs and Ramsar sites, SACs are afforded protection under the Conservation of Habitats and Species Regulations 2010 and development is strictly controlled (see paragraphs 2.19 and 2.20).

8.33 There are no SACs within the study area. A component site of the Mendip Limestone Grasslands SAC (the Crook Peak to Shute Shelve SSSI) is adjacent to the eastern boundary of the study area within the Mendip Hills. This is the narrowest section of the study area and the potential connection would be within 300m of the SAC site in the Lox Yeo Valley. However, no significant adverse effects are anticipated on the site, which is designated for its grassland and lies on the higher ground of Crook Peak.

8.34 Component sites of the North Somerset and Mendip Bats SAC lie approximately 200m west of the study area (Banwell Ochre Caves SSSI) and approximately 1.1km north of the study area (Banwell Caves SSSI). An underground connection between Bridgwater and the N Route tee would pass through the 5km consultation zone associated with the SAC and an assessment of the potential effects on the integrity of the SAC and its qualifying features would be required. The potential effects on SAC bat species arising from an underground cables connection would be associated with loss of habitat resulting in fragmentation and degradation of foraging grounds.

National Nature Reserves (NNRs)

8.35 The Huntspill River National Nature Reserve (NNR) is an artificial river within the Somerset Levels managed by the Environment Agency. The river travels east to west through the south of the study area, stretching for approximately 5 miles from Bridgwater Bay to the western boundary of the Catcott, Edington and Chilton Moors SSSI. The area is of interest to various birds and otters and is also of archaeological interest.

8.36 A number of wildlife sites just outside the study area are designated as NNRs. The majority of these form part of larger sites afforded protection under other ecological designations such as SSSI, SPA and Ramsar. These include Bridgwater Bay NNR,

the Somerset Levels NNR, Westhay Moor NNR and Shapwick Heath NNR. These sites could be avoided by the connection.

Implications for Underground Cables Routeing

8.37 The Huntspill River NNR stretches east to west across the study area and would form a constraint to routeing. To avoid the designated part of the River an underground connection would need to travel along the eastern edge of the study area between the NNR and sites within the Somerset Levels SPA, and Ramsar site, where a SM also forms a constraint. The connection would still need to cross beneath the Huntspill River. Further detailed study would be required to determine the potential effects of a connection beneath or close to the NNR if this technical option was taken forward.

Scheduled Monuments (SMs)

8.38 The south west of England is a region of high archaeological and historical importance, and contains over a third of Scheduled Monuments (SMs) in England. There are two SM's in the study area.

Implications for Underground Cables Routeing

8.39 SMs are nationally important monuments and archaeological remains which are protected under the provisions of the Ancient Monuments and Archaeological Areas Act 1979. Consent is required from English Heritage, the statutory advisor on the historic environment, under the 1979 Act before works directly affecting an SM may be carried out.

8.40 A connection between Bridgwater substation and the N Route tee could avoid SMs within the study area. An underground connection would have less adverse effects on the setting of a SM than an overhead line as impacts are largely temporary during construction. However, if an underground connection could not avoid a SM it may be permanently damaged or destroyed.

8.41 North of Bridgwater, a medieval settlement and hill fort SM at Manor Farm (Horsey Medieval Settlement SM) would constrain a new underground connection adjacent to the M5. To avoid this designation and the settlement of Puriton, which abuts the motorway, an underground connection would need to be routed to the east of the settlement across Puriton Hill.

8.42 A second SM lies to the south of the Huntspill River and would form a constraint to routeing between the Huntspill River NNR and the Catcott, Edington and Chilton Moors, Tealham and Tadham Moors and Westhay Moors SSSI (also a SPA and Ramsar site).

8.43 The study area lies within the Somerset Levels and Moors parts of which were a candidate site for World Heritage Site (WHS) status (although this is no longer being promoted by Somerset County Council). The WHS bid was based on the area's unique palaeo-environmental records that include a 10,000 year record of climate, sea level and landscape change. Features include prehistoric trackways, lake villages, relic roman wetland landscapes, medieval reclamations and river canalisations.

8.44 Whilst it would be possible for an underground connection to avoid SMs within the Somerset Levels there are other known non-designated assets and unknown assets which could be affected and which would need to be subject to more detailed assessment. PPS5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*. An assessment of the potential for archaeological remains and any direct and indirect effects from construction and installation would be required for the underground connection route.

Settlements

8.45 The main settlements within the study area include Chedzoy, Bawdrip, Puriton, Woolavington, Cossington, East Huntspill, Watchfield, Mark, Rooks Bridge and Biddisham. The larger settlements of Bridgwater and Highbridge lie on the western boundary of the study area. There are also numerous smaller hamlets, scattered farms and individual properties.

Implications for Underground Cables Routeing

8.46 Settlements could be largely avoided by careful routeing. If avoidance was not possible underground cables could be routed within the public highway. A new connection would be constrained by several settlements, particularly in the south of the study area around Bawdrip, Puriton, Woolavington and Cossington where woodlands, listed buildings, a SM and topography also form a constraint. Individual properties such as scattered farms would have an influence on the routeing and directness of a connection.

Historic Buildings (Listed I, II, and II*)

8.47 Buildings of special architectural or historic interest are added to a list of buildings protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Planning authorities are required to consult with English Heritage on planning applications which may affect a Grade I and Grade II* Listed Building outside Greater London and Listed Building consent is required for any works likely to affect a Listed Building.

8.48 There are numerous Listed Buildings scattered throughout the study area. Most of the Listed Buildings are clustered within settlements such as Chedzoy, Bawdrip, Puriton, Woolavington, Cossington, Mark, Rooks Bridge and Biddisham, although some are individual buildings in more rural areas.

Implications for Underground Cables Routeing

8.49 Routes could be achieved for the connection which avoid Listed Buildings.

Registered Battlefields

8.50 There is one registered battlefield just outside the study area which is the site of the battle of Sedgemoor in 1685. The site lies north of Westonzoyland approximately 1km east of Bridgwater substation and does not pose a constraint to the connection.

Woodland

8.51 Woodland cover in the study area mainly comprises woodland blocks in the south at Pendon Hill, Cossington and clusters either side of the A39 at Puriton. There are numerous woodlands within the Mendip Hills AONB, some of which are also designated as SSSI's. Several of these woodlands are adjacent to the study area but none fall within its boundary.

Implications for Underground Cables Routeing

8.52 Installing an underground connection through woodland would result in its permanent loss along the length of the connection. Permanent restrictions on what may be planted above and adjacent to the connection would apply.

8.53 There is a cluster of woodland to the south of Puriton. The presence of woodland and built development at Puriton would constrain routeing next to the M5 in this area. To avoid these constraints a connection in the south west of the study area would need to be routed on raised ground between woodland blocks to the east of Puriton and west of Knowle. A connection in the south east of the study area would be constrained by woodland at Pendon Hill and Cossington.

Landform

8.54 The landform of the study area is illustrated at Drawing G1979.03.066a. The majority of the study area is low-lying and relatively flat and forms part of a wider area known as the Somerset Levels and Moors. It includes the Huntspill, Horsey, Puriton, Bawdrip and Woolavington Levels and Mark, Binham and Allerton Moors.

8.55 Within this predominantly flat landscape areas of higher ground are mainly limited to the mid Somerset Hills (to the north east of Bridgwater) and the Mendip Hills which rise sharply from the Somerset Levels in the north of the study area.

Implications for Underground Cables Routeing

8.56 The majority of the study area is low lying and flat and would not pose a constraint to the connection. Lower lying ground would be beneficial for an underground cables connection due to the ease of construction.

8.57 The Mendip Hills AONB comprises a series of limestone hills which would pose a constraint to routeing. For that reason the study area within the AONB has been limited to the Lox Yeo River valley. This is the only break in the hills through which the M5 motorway and the existing WPD 132kV overhead line currently travel.

Flood Risk

8.58 The Environment Agency uses the following flood zones in England:

- Flood Zone 1: Land which has a low probability of flooding;
- Flood Zone 2: Land which has a medium probability of flooding; and
- Flood Zone 3: Divided into 3A (land which has a high probability of flooding) and 3B (the functional floodplain).

8.59 The majority of the study area lies within Flood Zones 2 and 3, with the exception of a few areas including Chedzoy, elevated land around Puriton, Woolavington and Cossington and parts of the Mendip Hills AONB.

Implications for Underground Cables Routeing

8.60 The presence of an underground cable circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow.

8.61 A platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the N Route tee. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25 – Development and Flood Risk.

8.62 PPS25 states that authorities should steer new development to Flood Zone 1, in which the chance of flooding each year is 0.1% (1 in 1000) or less. WPD would seek to identify sites for the CSE compound outside of Flood Zones 2 and 3. However where there are no reasonably alternative sites in Flood Zone 1, WPD may consider the suitability of sites in Flood Zone 2 and then Flood Zone 3. A Flood Risk Assessment (FRA) would be necessary to demonstrate that any proposed development within Flood Zones 2 and 3 could operate safely and effectively in the event of a flood and would not increase flood risk elsewhere.

Assessment

8.63 The study area extends north from Bridgwater substation on the eastern edge of Bridgwater, Somerset to the N Route tee (See Drawing G1979.03.057a). The N Route tee is the point on the existing F Route 132kV overhead line (between Banwell and Sandford, North Somerset) where it connects to the existing N Route 132kV overhead line which runs north west to Churchill 132kV substation.

8.64 To the south of the Mendip Hills Area of Outstanding Natural Beauty (AONB) the western extent of the study area is defined by the M5 motorway and the eastern extent by the settlements of Chilton Polden, Blackford, Stone Allerton, Compton Bishop and Winscombe. Due to the topography of the land and other environmental constraints, the study area within the AONB has been limited to a relatively narrow corridor which avoids constraints and follows the only break in the hills in the valley of the Lox Yeo River.

8.65 The N Route tee is approximately 400m north of the Mendip Hills AONB. To achieve a direct connection between Bridgwater substation and the N Route tee the 132kV single circuit connection would need to be established through the Mendip Hills AONB. An underground connection through the AONB would have temporary effects associated with construction on the landscape, affecting the objective to conserve and enhance natural beauty. However, once the land had re-established the effects on the AONB would be minimal. The connection would need to avoid areas of woodland and other features which are important to the scenic character of the AONB. The Mendip Hills AONB is also noted for its ecological and archaeological importance and these factors would require further consideration if this option was taken forward.

8.66 To avoid the AONB the connection would have to extend west over a considerable distance where the settlement of Weston-super-Mare, woodlands and the

topography of the landscape would constrain routeing. This would increase the length of the connection, introducing additional constraints to routeing and could result in potentially adverse environmental effects over a much greater area.

8.67 Other key environmental constraints within the study area include the Huntspill River National Nature Reserve (NNR), the 5km consultation zone of the North Somerset and Mendip Bats Special Area of Conservation (SAC), Scheduled Monuments (SM), Listed Buildings, woodland and settlements.

8.68 To avoid the designated part of the Huntspill River NNR an underground connection would need to travel along the eastern edge of the study area between the NNR and sites within the Somerset Levels and Moors Special Protection Area (SPA) and Ramsar site, where a SM also forms a constraint. The connection would still need to cross beneath the Huntspill River. Further detailed study would be required to determine any potential effects arising from a connection beneath or close to the NNR if this option was taken forward.

8.69 Component sites of the North Somerset and Mendip Bats SAC lie approximately 200m west of the study area (Banwell Ochre Caves SSSI) and approximately 1.1km north of the study area (Banwell Caves SSSI). The connection would pass through the North Somerset and Mendip Bats SAC 5km consultation zone which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. The potential effects on SAC bat species arising from an underground cables connection would be associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. An assessment of the potential effects on the integrity of the SAC and its qualifying features would be required as part of the next stage of assessment if this technical option was taken forward.

8.70 There are several other sites close to the study area that are afforded protection under ecological designations. These include Crook Peak and Shute Shelve SSSI (a component site of the Mendip Limestone Grasslands SAC), Max Bog SSSI, the Somerset Levels and Moors SPA/Ramsar, and the Catcott, Edington and Chilton Moors, Tealham and Tadham Moors and Westhay Moors SSSI. Further detailed study would be required to ensure there would be no indirect adverse effects on the integrity of these designations or their qualifying features. The potential indirect effects as a result of the underground connection could include disturbance to bird movements or foraging habitat.

8.71 Routes could be achieved which avoid Listed Buildings. Two SMs (one north of Bridgwater and one south of the Huntspill River) would form a constraint to routeing in the south of the study area, but could be avoided by the potential underground connection. Whilst it would be possible to avoid the SMs there are other known non-designated archaeological assets and unknown assets which could be affected. Underground connections routed through heritage assets may cause permanent loss due to the intrusive nature of the construction.

8.72 Further detailed study along any underground connection route would be required to identify the potential for archaeological remains and any direct and indirect effects resulting from construction and installation. PPS5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and*

decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'.

8.73 An underground connection between Bridgwater and the N Route tee would offer environmental benefits on landscape and views particularly relating to settlements, the Mendip Hills AONB, and the setting of Listed Buildings, and Scheduled Monuments compared with an equivalent length of overhead line. However, the installation of underground cables is more invasive than for an overhead line and would have a greater scale of effects on areas of ecological or archaeological value. The works carried out during the construction phase would result in disturbance to ground vegetation, which could affect the integrity of a designation or its qualifying features. Detailed study would be required to determine appropriate working methods and mitigation.

8.74 Settlements could be largely avoided by careful routeing. A new connection would be constrained by several settlements, particularly in the south of the study area around Bawdrip, Puriton, Woolavington and Cossington where woodland blocks, listed buildings, a SM and topography also form a constraint. Individual properties such as scattered farms would have an influence on the routeing and directness of a connection.

8.75 Apart from the Mid Somerset Hills and Mendip Hills, the majority of the study area is low lying and flat, which would be beneficial for an underground cables connection due to the ease of construction. However, as part of detailed routeing studies consideration would need to be given to the high water table and hydrological regime in the low lying parts of the study area.

8.76 Large areas of the study area fall within Flood Zones 2 and 3. A platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line in the vicinity of the N Route tee. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of the CSE compound would require further consideration and assessment in accordance with PPS 25.

9.0 BRIDGWATER TO WESTON ENVIRONMENTAL APPRAISAL

Introduction

9.1 This appraisal considers the planning and environmental constraints associated with a new single circuit 132kV connection (of approximately 26km) between Bridgwater 132kV substation, Somerset and Weston 132kV substation, North Somerset (See Drawing G1979.03.052a). The connection could be made by overhead line (using steel lattice pylons or wood poles) or underground cables.

9.2 An existing 33kV overhead line on steel lattice pylons runs between Bridgwater substation and Weston substation. For the purposes of this study it has been assumed that the existing 33kV overhead line would be removed and its route (or a similar route) utilised for the new 132kV connection, with the possibility of making improvements to the alignment where identified through further studies. The 33kV overhead line travels underground for a section of approximately 2.5km north of Bridgwater, where it passes beneath the M5.

Study Area

9.3 The study area extends north from Bridgwater substation on the eastern edge of Bridgwater, Somerset up to Weston substation, Weston-Super-Mare, North Somerset. The western extent of the study area is defined by the settlements of Puriton, Highbridge, Middle Burnham and Brean, and the eastern extent by the settlements of Cossington, Mark, Rooks Bridge, Loxton and Locking. The study area is illustrated on Drawing G1979.03.052a.

9.4 WPD's existing F Route 132kV overhead line route runs through the study area from Bridgwater substation up to Portishead 132kV BSP substation. The existing 33kV overhead line between Bridgwater substation and Weston substation runs underground for a short stretch of approximately 2.5km beneath the M5, north of Bridgwater. For the purposes of this study it has been assumed that it would be possible to remove the 33kV overhead line and utilise its route (or a similar route) for the new 132kV connection, with the possibility of making improvements to the alignment where identified through further studies.

9.5 The main settlements within or close to the study area are sited along or near to the Severn Estuary including Bridgwater, Highbridge, Burnham-on-Sea, Berrow, Brean and Weston-Super-Mare. There are numerous smaller settlements within the study area including Chedzoy, Puriton, Woolavington, Cossington, East Huntspill, Brent Knoll, Rooks Bridge, Eastertown, Lympsham, Bleadon and Hutton.

Environmental Constraints

9.6 A description of the study area in relation to the environmental constraints outlined in Table 1.2 is presented below and illustrated at Drawing G1979.03.052a.

9.7 The following are not present within the study area:

- National Parks;
- Heritage Coasts;
- World Heritage Sites;
- Special Protection Areas (SPA);
- Special Areas of Conservation (SAC);

- Registered Parks and Gardens;
- Ramsar Sites; and
- Registered Battlefields.

Areas of Outstanding Natural Beauty (AONB)

Mendip Hills AONB

9.8 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 hills run in an east to west direction between the coast at Weston-super-Mare and Frome and overlook the Somerset Levels to the south and Avon Valley to the north. The hills of the AONB form prominent landmarks. The designation relates to 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.

9.9 The existing F Route 132kV overhead line passes through the Mendip Hills AONB for approximately 6km to the east of the study area, travelling through the Lox Yeo Valley.

Implications for Overhead Line/Underground Cables Routeing

9.10 AONBs are designated under the National Parks and Access to the Countryside Act 1949 (as amended) for the purpose of conserving and enhancing the natural beauty of the area. The importance of these sites and the protection afforded to them is further highlighted in Planning Policy Statement (PPS) 7 and Rule 1 of the Holford Rules, which place strict restrictions on development.

9.11 Paragraph 22 of PPS7 states that major developments should not take place in these designated areas except in exceptional circumstances. Applications for such development within an AONB will be subject to rigorous examination and should include an assessment of the national need, cost and scope of developing outside the designated area and effects on the environment, landscape and recreational opportunities.

9.12 The setting of the AONB needs to be considered when siting overhead lines in close proximity to an AONB designation. Information relating to the setting is reviewed from published landscape character assessments at a later, more detailed stage of assessment as part of the process of identifying route corridors.

9.13 Within the AONB routes would be constrained by Sites of Special Scientific Interest (SSSI), woodlands (including ancient woodland), topography, and settlements. The Mendip Hills AONB is also noted for its ecological and archaeological importance, which would be particularly important to consider for an underground connection.

9.14 To avoid the Mendip Hills AONB the connection would need to follow a route similar to the existing 33kV overhead line to the west of this designation. The existing 33kV overhead line oversails areas of residential settlement in the south of Weston-super-Mare for approximately 3km between Oldmixon and Weston substation. This area is also constrained by topography, blocks of woodland and Listed Buildings. It may not be possible to route a new overhead line through this area without oversailing properties, and underground cables may need to be given particular consideration for this part of the route. An underground connection could be installed within the

road network through these areas of residential settlement. This would have benefits on landscape and views from the AONB and for those properties that are currently oversailed by the existing 33kV overhead line.

9.15 If an overhead line connection was taken forward with sections of underground cable (in the residential areas to the south of Weston substation) a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from overhead line to an underground cable. The potential effects of a cable sealing end compound in this area would need to be considered in relation to the setting of the AONB.

9.16 If an overhead line connection was taken forward careful consideration of the potential effects on the setting of the AONB particularly around Bleadon Hill would be required, taking into account the scale of change between a 33kV overhead line (already utilising steel lattice pylons) and a single circuit 132kV overhead line. Using the existing 33kV route for an overhead line is likely to minimise potential effects on landscape and views through this area. The use of 132kV wood poles could have less effect on landscape and views compared with the existing 33kV steel lattice pylons, as wood poles are generally smaller with a less visually prominent support.

9.17 An underground connection between Bridgwater substation and Weston substation could have temporary effects associated with construction on the landscape which may be visible from the AONB, depending on the exact alignment. However, once the land had re-established the effects on the AONB's setting would be reduced to negligible.

Sites of Special Scientific Interest (SSSI)

9.18 SSSIs are designated for their biodiversity or geological interest and are protected from development and operations likely to damage their special interest.

9.19 There are several SSSIs within the study area or close to the study area boundary. The most significant of these sites and the reasons for their designation are summarised in Table 9.1.

Table 9.1 – Summary of SSSIs

SSSI	Location / Grid Ref	Reason for Designation
SSSI's within the Study Area		
Purn Hill	(ST 332573)	This site lies west of the Mendip Hills AONB and south of Weston-super-Mare. Purn Hill SSSI is of interest for its diverse unimproved calcareous grassland flora which includes three nationally rare species.
Bleadon Hill	(ST 351574)	This Geological Conservation Review Site (a site identified as of national and international importance during the Geological Conservation Review) is a low ridge of calcite-cemented Pleistocene sand and gravel on the southern side of Bleadon Hill within the Mendip Hills AONB. The site is important for delineating the southern margins of the Quaternary glaciation.

SSSI	Location / Grid Ref	Reason for Designation
Shiplate Slait	(ST 364567)	This site lies towards the western end of the Mendip Hills AONB on the south and west facing slopes. It is important for its unimproved calcicolous grassland, some is mixed with dwarf shrub, mosaics of calcicolous grassland, scrub and woodland.
Outside but close to the Study Area		
Severn Estuary	South west coast, covers Mouth of the Avon	The Severn Estuary, also a SPA, SAC and Ramsar site, lies on the south west coast of Britain at the mouth of four major rivers (the Severn, Wye, Usk and Avon). It is an internationally important site for birds and wildlife habitats and is one of the most important sites in the UK for wintering wildfowl and waders. The Estuary area comprises several other SSSI's (e.g. Berrow Dunes, Bridgwater Bay and Brean Down SSSIs that extend close to the study area.
The Catcott, Edington and Chilton Moors, Tealham and Tadham Moors and Westhay Moors	North east of Bridgwater (ST 390420)	The Catcott, Edington and Chilton Moors, Tealham and Tadham Moors and Westhay Moors SSSIs are a collection of adjoining moors which form part of the Somerset Levels and Moors SSSI, SPA and Ramsar site to the north east of Bridgwater. These sites comprise diverse habitats which provide feeding and nesting sites for a wide range of birds such as Golden Plover and Lapwing.
Uphill Cliff SSSI	Uphill, south of Weston-super-Mare (ST 318583)	This site is adjacent to the study area at Uphill. It consists of species-rich calcareous grassland and rock-face situated on Carboniferous Limestone. Uphill Cliff is an outstanding locality for rare plants and also of considerable interest for insects.
Banwell Caves	South of Banwell (ST 383588)	This SSSI lies within the Mendip Hills AONB and forms part of the North Somerset and Mendips Bats SAC. It is a Geological Review Site and is used as a hibernation site by Greater Horseshoe Bats.

Implications for Overhead Line/Underground Cables Routeing

9.20 The potential effect of a connection on a SSSI would vary depending on the nature of the effect caused and the special interest of the site. Underground connections are more invasive than an equivalent length of overhead line as the land disturbance is greater during construction and there are permanent restrictions on tree planting and land use during operation. Consultation with Natural England would be required before consent could be granted for any development or operations likely to damage the SSSI interest.

9.21 Routes could be achieved to avoid direct impacts on the three SSSIs in the north of the study area. Bleadon Hill SSSI and Shiplate Slate SSSI would only influence routeing of a connection on higher ground through the Mendip Hills AONB. The connection is likely to follow a similar alignment to the existing 33kV overhead line

between Bridgwater and Weston, which runs approximately 800m west of Purn Hill SSSI and approximately 500m east of Uphill Cliff SSSI.

9.22 The Severn Estuary Ramsar, SPA, SAC, SSSI and Bridgwater Bay SSSI and NNR lie close to the western boundary of the study area. The Estuary area comprises several other SSSIs (e.g. Brean Down and Berrow Dunes SSSIs) that also extend close to the study area. The Catcott, Edington and Chilton Moors, Tealham and Tadham Moors and Westhay Moors SSSI is beyond the eastern boundary of the study area.

9.23 Further assessment would be required at a later, more detailed stage of assessment, to ensure there would be no indirect adverse effects on the integrity of these designations or their qualifying features from a new 132kV connection along the existing 33kV route or an alternative route through the study area.

Special Protection Areas (SPA) and Ramsar sites

Severn Estuary SPA and Ramsar

9.24 The Severn Estuary SPA is approximately 1.75km west of the study area with the full extent of the designation covering an area of approximately 24,000ha. The Estuary is the largest coastal plain estuary in the UK with extensive mudflats and sandflats, rocky shore platforms, shingle and islands. The Estuary's unique funnel shape means it has a high tidal range which results in a variety of plant and animal communities typical of liquid mud and tide-swept sand and rock.

9.25 The site qualifies as an SPA under Article 4.1 of the Birds Directive (79/409/EEC) by supporting bird populations of European importance that are listed on Annex I of the Directive and under Article 4.2 by regularly supporting at least 20,000 waterfowl.

9.26 The Ramsar designation also extends to cover fish populations of the estuarine and river system which is one of the most diverse in Britain with over 110 species recorded.

Somerset Levels and Moors SPA and Ramsar

9.27 The Somerset Levels and Moors are one of the largest areas of traditionally managed wet grassland and fen habitats in lowland UK. The SPA and Ramsar sites (adjacent to the eastern boundary of the study area) cover the same geographical area as each other (approximately 35,000ha) and include the floodplains of the Rivers Axe, Brue, Parrett, Tone and their tributaries. The internationally important bird populations and the habitats on which they depend are reasons for both the SPA and Ramsar designations; the Ramsar designation also extends to cover rare invertebrate populations.

Implications for Overhead Line/Underground Cables Routeing

9.28 SPAs and Ramsar sites are afforded protection under the Conservation of Habitats and Species Regulations 2010. 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.

9.29 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.

9.30 Routes could be achieved to avoid direct impacts on the SPA and Ramsar sites. The connection is likely to follow a similar alignment to the existing 33kV overhead line which runs between the two designated sites. Further assessment would be required at a later, more detailed stage of assessment, to ensure there would be no indirect adverse effects on the integrity of these designations or their qualifying features, particularly if a new alignment brought the connection close to either of the sites. This could give rise to the potential for adverse effects and detailed study would be required to consider the potential for disturbance to bird movements or foraging habitat.

Special Areas of Conservation (SAC)

Severn Estuary SAC

9.31 The Severn Estuary SAC lies west of the study area and covers an area of approximately 73,000ha. The SAC was confirmed in 1995 and further amended in 2000. The site is designated for important populations of fish and the natural habitats present within the Estuary.

Mendip Limestone Grasslands SAC

9.32 The Mendip Limestone Grasslands SAC comprises three separate SSSIs totalling approximately 417ha. Brean Down SSSI and Uphill Cliff SSSI are south of Weston-super-Mare, contiguous with the Severn Estuary SAC. The Crook Peak to Shute Shelve SSSI is approximately 10km inland from the Estuary within the Mendip Hills.

North Somerset and Mendip Bats SAC

9.33 The North Somerset and Mendip Bats SAC is centred on the Mendip Hills. The SAC comprises caves, grassland and woodland and is a composite site spread across a wide area. The component sites include the Banwell Caves SSSI and Banwell Ochre Caves SSSI on the northern side of the Mendip Hills with Brockley Hall Stables SSSI and King's Wood and Urchin Wood SSSI to the north east of Congresbury.

9.34 These sites are considered of international importance for their semi-natural dry grasslands, significant blocks of *Tilio-Acerion* forest and the limestone caves of the Mendips which provide a range of important hibernation sites for greater and lesser horseshoe bats. Natural England and North Somerset Council have identified a 5km 'consultation zone' which covers important feeding grounds surrounding the SAC and in which development proposals are subject to particular scrutiny for potential effects on the designated sites. The 5km 'consultation zone' falls within the study area.

Implications for Overhead Line/Underground Cables Routeing

9.35 Like SPAs and Ramsar sites, SACs are afforded protection under the Conservation of Habitats and Species Regulations 2010 and development is strictly controlled (see paragraphs 2.24 and 2.25).

9.36 There are no SACs within the study area. However component sites of the North Somerset and Mendip Bats SAC lie approximately 1.25km and 3.5km east of the study area (Banwell Caves SSSI and Banwell Ochre Caves SSSI). A new 132kV

connection along the alignment of the existing 33kV overhead line between Bridgwater and Weston would not fall within the 5km consultation zone.

9.37 If alternative options further east in the study area (within the consultation zone) were considered and taken forward an assessment of the effects on the integrity of the SAC and its qualifying features would be required. The potential effects on SAC bat species arising from an overhead line or underground cables connection would be associated with loss of habitat resulting in fragmentation and degradation of foraging grounds.

National Nature Reserves (NNRs)

9.38 The Huntspill River National Nature Reserve (NNR) is an artificial river within the Somerset Levels managed by the Environment Agency. The river travels east to west through the south of the study area, stretching for 5 miles from Bridgwater Bay to the western boundary of the Catcott, Edington and Chilton Moors SSSI. The area is of interest to various birds and otters and is also of archaeological interest.

9.39 There are several wildlife sites just outside the study area designated as NNRs. The majority of these form part of larger sites afforded protection under other ecological designations such as SSSI, SPA and Ramsar. These include Bridgwater Bay NNR, the Somerset Levels NNR, Westhay Moor NNR and Shapwick Heath NNR. These sites would be avoided by the connection.

Implications for Overhead Line/Underground Cables Routeing

9.40 A new 132kV connection along the alignment of the existing 33kV overhead line between Bridgwater and Weston would need to cross the Huntspill River NNR. Further detailed study would be required to determine any potential effects on the NNR, arising from the replacement of the 33kV overhead line with a new 132kV overhead line, or from a new underground cables connection beneath it if this option was taken forward.. To avoid crossing the designated part of the Huntspill River a connection would need to take a significant diversion east from the existing 33kV overhead line alignment, and would need to cross the river adjacent to the Somerset Levels and Moors SPA and Ramsar site.

Scheduled Monuments (SMs)

9.41 The south west of England is a region of high archaeological and historical importance, and contains over a third of Scheduled Monuments (SMs) in England. There are three SM's in the study area.

Implications for Overhead Line/Underground Cables Routeing

9.42 SMs are nationally important monuments and archaeological remains which are protected under the provisions of the Ancient Monuments and Archaeological Areas Act 1979. Consent is required from English Heritage, the statutory advisor on the historic environment, under the 1979 Act before works directly affecting an SM may be carried out.

9.43 A connection between Bridgwater substation and Weston substation could avoid the SMs within the study area. An assessment would be required to identify any indirect effects on the monuments and their setting if the connection was to be routed close to these features.

9.44 A medieval settlement and hill fort SM at Manor Farm (Horsey Medieval Settlement SM), north of Bridgwater would constrain a new route adjacent to the M5. The 33kV connection travels underground for a section of approximately 2.5km north of Bridgwater, where it crosses beneath the M5 west of this SM. A 132kV underground connection following the same alignment (where the ground has been previously disturbed) could minimise potential effects on the SM or unknown buried archaeology associated with it.

9.45 Brent Knoll SM is an Iron Age Hill Fort within the Somerset Levels and Moors to the south of the Mendip Hills AONB. The SM is a prominent feature within the landscape and has panoramic views across the surrounding Somerset Levels and Moors. Whilst the SM could be avoided with a new connection the effects on its setting and views from the feature would require further consideration and assessment as part of detailed routeing studies.

9.46 The connection is likely to follow a similar alignment to the existing 33kV overhead line between Bridgwater and Weston, which runs approximately 1.25km north and east of Brent Knoll SM on lower ground. Potential effects on the SMs setting from a new 132kV overhead line along this existing route are anticipated to be less than for a new 132kV overhead line travelling west of the SM in an area without existing electrical infrastructure. This would also depend on other factors and would be confirmed by further study at a later more detailed stage of assessment. The potential for improvements to the existing 33kV overhead line alignment in relation to the setting of the SM would be considered during further studies.

9.47 It is unlikely that the SM in the south east of the study area (south of the Huntspill River) would form a constraint, as routeing in this area would require a significant diversion away from the existing 33kV overhead line alignment.

9.48 An underground connection would have less adverse effects on the setting of a SM than an overhead line as impacts are largely temporary during construction. However, if an underground connection could not avoid a SM it may be permanently damaged or destroyed.

9.49 The study area includes a large part of the Somerset Levels and Moors which was a candidate site for World Heritage Site (WHS) status (although this is no longer being promoted by Somerset County Council). The WHS bid was based on the area's unique palaeo-environmental records that include a 10,000 year record of climate, sea level and landscape change. Features include prehistoric trackways, lake villages, relic roman wetland landscapes, medieval reclamations and river canalisations.

9.50 Whilst it would be possible for a connection to avoid SMs within the Somerset Levels there are other known non-designated assets and unknown assets which could potentially be affected and which would need to be subject to more detailed assessment. PPS5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*. An assessment to consider the potential for archaeological remains and any potential direct and indirect effects from the construction and installation of the connection would be required as part of detailed routeing studies.

Settlements

9.51 The main settlements within or close to the study area are sited along or close to the Severn Estuary and include Bridgwater, Highbridge, Burnham-on-Sea, Berrow, Brean and Weston-super-Mare. A connection would need to negotiate numerous smaller settlements within the study area including Chedzoy, Puriton, Woolavington, Cossington, East Huntspill, Brent Knoll, Rooks Bridge, Eastertown, Lympsham, Bleadon and Hutton.

Implications for Overhead Line/Underground Cables Routeing

9.52 The connection is likely to follow a similar alignment to the existing 33kV overhead line between Bridgwater and Weston. The scale of change in views towards a new 132kV overhead line along this existing route is anticipated to be less in comparison with views towards a new 132kV overhead line in an area without existing electrical infrastructure. This would also depend on other factors such as proximity to settlements and would be confirmed by further study at a later more detailed stage of assessment. The use of 132kV wood poles could have less effect on landscape and views compared with the existing 33kV steel lattice pylons, as wood poles are generally smaller with a less visually prominent support.

9.53 Settlements could be largely avoided by careful routeing. Areas where settlements form a particular constraint are north of Bridgwater (with several settlements close together), and between the Mendip Hills AONB and the Severn Estuary where the connection would need to route through settlements such as Uphill and Oldmixon, south of Weston-super-Mare. It may not be possible to route a new overhead line through this area without oversailing properties. Underground cables may require particular consideration for this part of the route.

9.54 In the south below Highbridge and Puriton, the study area is focussed to the east of the M5 due to the proximity of settlements to the western edge of the motorway. Individual properties would also have an influence on the routeing and directness of a connection.

Historic Buildings (Listed I ll, and II*)

9.55 Buildings of special architectural or historic interest are added to a list of buildings protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Planning authorities are required to consult with English Heritage on planning applications which may affect a Grade I and Grade II* Listed Building outside Greater London and Listed Building consent is required for any works likely to affect a Listed Building.

9.56 There are numerous Listed Buildings scattered throughout the study area. Most of the Listed Buildings are clustered within settlements although some are isolated buildings in more rural areas.

Implications for Overhead Line/Underground Cables Routeing

9.57 Routes could be achieved for the connection which avoid Listed Buildings. The connection is likely to follow a similar alignment to the existing 33kV overhead line which runs very close to several Listed Buildings. Further detailed study would be required to identify any adverse effects on the setting of Listed Buildings for an overhead line connection. Improvements to the existing 33kV overhead line

alignment in relation to the setting of the Listed Buildings could be identified during further studies. Effects on these features could be reduced by using wood poles or an underground connection.

Conservation Areas

9.58 In the north of the study area there are conservation areas at Lympsham and Hutton which could be avoided by a connection. Conservation Areas at Uphill, Loxton, Christon and Weston-super-Mare are adjacent to the study area boundary.

Implications for Overhead Line/Underground Cables Routeing

9.59 Conservation Areas are areas designated by local authorities because of special architectural or historic interest and are protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Conservation Area consent is required from the local planning authority for any development within the area.

9.60 Routes could be achieved for the connection which avoid Conservation Areas. The settings of Loxton, Hutton and Christon conservation areas would require consideration for an overhead line connection through the AONB. The setting of Uphill and Weston-super-Mare Conservation Areas are unlikely to be adversely affected by an overhead line connection, due to intervening buildings and the presence of existing electrical infrastructure through this area. This would be confirmed by further study at a later and more detailed stage of assessment. Effects on Lympsham conservation area (which lies approximately 1km north of the existing 33kV overhead line) would also require consideration. Effects on the setting of Conservation Areas could be reduced by using wood poles or an underground connection.

Registered Battlefields

9.61 There is one registered battlefield just outside the study area which is the site of the battle of Sedgemoor in 1685. The site lies north of Westonzoyland approximately 1km east of Bridgwater substation and does not pose a constraint to the connection.

Woodland

9.62 Woodland cover in the south of the study area mainly comprises woodland blocks at Pendon Hill, Cossington and clusters either side of the A39 at Puriton. In the north of the study area there are numerous woodlands within the Mendip Hills AONB, some of which are also designated as SSSI's. There are also several woodlands to the south of the existing 33kV overhead line near Wick and Brent Knoll, and either side of and beneath the overhead line between Uphill and Oldmixon.

Implications for Overhead Line/Underground Cables Routeing

9.63 Installing a connection through woodland would result in its permanent loss along the length of the connection. Permanent restrictions on what may be planted above underground cables or below an overhead line would apply. 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 wherever possible.

9.64 Clusters of woodland and built development at Puriton would constrain routeing next to the M5. To avoid these constraints a connection would need to be routed on

raised ground between woodland east of Puriton and west of Knowle. There are woodlands within the Mendip Hills AONB that would further constrain a connection through this designated area. Woodland either side of and beneath the existing 33kV overhead line between Uphill and Oldmixon would require consideration if a new connection was routed along a similar alignment to the existing 33kV overhead line.

Landform

9.65 The landform of the study area is illustrated at Drawing G1979.03.066a. The majority of the study area is low-lying and relatively flat and forms part of a wider area known as the Somerset Levels and Moors. It includes the Horsey and Puriton Levels in the south of the study area and the Bleadon Level in the north. Within this predominantly flat landscape areas of higher ground are limited to Brent Knoll Hill, the mid Somerset Hills to the east of Bridgwater and the Mendip Hills which rise sharply from the Somerset Levels.

Implications for Overhead Line/Underground Cables Routeing

9.66 The Holford Rules refer to aspects of topography and physiography such as hills, ridges, dips, open valleys and flat land in considering overhead line routeing. For example, the Rules advise on exploiting the 'backgrounding' effect of high land and seeking to avoid ridges.

9.67 Landform does not pose a constraint to a connection. The majority of the study area is generally low lying and flat. To the east of Puriton in the south of the study area there may be opportunities for utilising landform to background a new overhead line. The existing 33kV overhead line does not route through the Mendip Hills AONB where the limestone hills would pose a significant constraint to routeing. The only break in the hills is the valley of the Lox Yeo River (east of the study area) through which the M5 motorway and the WPD F Route 132kV overhead line currently travel.

Flood Risk

9.68 The Environment Agency uses the following flood zones in England:

- Flood Zone 1: Land which has a low probability of flooding;
- Flood Zone 2: Land which has a medium probability of flooding; and
- Flood Zone 3: Divided into 3A (land which has a high probability of flooding) and 3B (the functional floodplain).

9.69 The majority of the study area lies within Flood Zones 2 and 3, with the exception of parts of the Mendip Hills AONB, Brent Knoll and elevated land around Puriton, Woolavington and Cossington.

Implications for Overhead Line/Underground Cables Routeing

9.70 It is relatively straightforward to build flood resilience into overhead lines by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the pylon construction poses no material changes to surface water flow.

9.71 The presence of an underground cable circuit in areas of flood risk would not affect the circuit's operation and has a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow.

9.72 If an overhead line connection was taken forward with sections of underground cable (for example at Puriton or in the residential areas to the south of Weston substation) a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from overhead line to underground cable. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25 – Development and Flood Risk.

9.73 PPS25 states that authorities should steer new development to Flood Zone 1, in which the chance of flooding each year is 0.1% (1 in 1000) or less. WPD would seek to identify sites for the CSE compound outside of Flood Zones 2 and 3. However where there are no reasonably alternative sites in Flood Zone 1, WPD may consider the suitability of sites in Flood Zone 2 and then Flood Zone 3. A Flood Risk Assessment (FRA) would be necessary to demonstrate that any proposed development within Flood Zones 2 and 3 could operate safely and effectively in the event of a flood and would not increase flood risk elsewhere.

Assessment

9.74 A new single circuit 132kV connection by overhead line or underground cable could be achieved between Bridgwater substation and Weston substation, either along the alignment of an existing 33kV overhead line which would be removed, or along an improved route where further studies showed potential to optimise the existing alignment. If an overhead line connection was taken forward the use of 132kV wood poles could have less effect on landscape and views compared with the existing 33kV steel lattice pylons, as wood poles are generally smaller with a less visually prominent support.

9.75 The study area extends north from Bridgwater substation on the eastern edge of Bridgwater, Somerset to Weston substation, Weston-Super-Mare, North Somerset (See Drawing G1979.03.052a). The western extent of the study area is defined by the settlements of Puriton, Highbridge, Middle Burnham and Brean, and the eastern extent by the settlements of Cossington, Mark, Rooks Bridge, Loxton and Locking.

9.76 The key environmental constraints within the study area include the Mendip Hills AONB, the Huntspill River NNR, three SSSIs, the North Somerset and Mendip Bats SAC 5km consultation zone, Scheduled Monuments, Listed Buildings, Conservation Areas, woodland and settlements.

9.77 Potential routes within the Mendip Hills AONB would be constrained by SSSIs, woodlands, settlements and topography with the limestone hills posing a significant constraint to overhead line routeing. To avoid the Mendip Hills AONB the connection would need to follow a route similar to the existing 33kV overhead line through residential areas to the west of this designation.

9.78 The existing 33kV overhead line oversails areas of residential settlement to the south of Weston-super-Mare between Oldmixon and Weston substation. This area is also constrained by topography, woodlands and Listed Buildings. If an overhead line

connection was taken forward the potential effects on the setting of the AONB would require particular consideration, taking into account the scale of change between the existing 33kV overhead line and a replacement 132kV overhead line. Using the existing 33kV route would minimise potential effects on landscape and views through this area, but it would not be possible to route along the existing alignment without oversailing properties. Underground cables may need to be given particular consideration for this part of the route. This would have beneficial effects on landscape and views from the AONB and for those properties that are currently oversailed by the existing overhead line.

9.79 A new 132kV overhead line or underground cables connection along the current alignment, or a similar alignment, to the existing 33kV overhead line would cross the Huntspill River NNR. Further detailed study would be required to determine the potential for any adverse effects on the NNR if this option was taken forward.

9.80 Routes could be achieved which avoid direct impacts on three SSSIs in the north of the study area. The connection is likely to follow a similar alignment to the existing 33kV overhead line between Bridgwater and Weston, which runs approximately 800m west of Purn Hill SSSI and approximately 500m east of Uphill Cliff SSSI. Beyond the study area boundary there are several large sites afforded protection under ecological designations. To the west these include the Severn Estuary Ramsar, SPA, SAC, SSSI and the Bridgwater Bay SSSI and NNR. East of the study area sites include the Somerset Levels and Moors SPA, Ramsar and SSSI, and the Catcott, Edington and Chilton Moors, Tealham and Tadham Moors and Westhay Moors SSSIs.

9.81 Further assessment would be required to ensure there would be no indirect adverse effects on the integrity of these designations (e.g. disturbance to bird movements or foraging habitat) or their qualifying features from a new 132kV connection along the existing 33kV route or an alternative route through the study area.

9.82 The study area falls within the North Somerset and Mendip Bats SAC 5km 'consultation zone' which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. The existing 33kV overhead line between Bridgwater and Weston does not fall within the 5km consultation zone. If alternative options within the consultation zone were taken forward an assessment of the effects on bat activity, the integrity of the SAC and its qualifying features would be required.

9.83 There are three Scheduled Monuments, numerous Listed Buildings and several Conservation Areas in the study area. These sites could all be avoided by a connection but an assessment would be required to identify any indirect adverse effects on the features and their setting if an overhead line connection is proposed close to these features. Potential effects on the setting of these features from a new 132kV overhead line along the existing 33kV overhead line route are anticipated to be less than for a new 132kV overhead line travelling in an area without existing electrical infrastructure, due to the potential scale of change. This would also depend on other factors and would be confirmed by further study at a later more detailed stage of assessment. If an overhead line connection was taken forward using 132kV wood poles could have less effect on the setting of features compared with the existing 33kV steel lattice pylons as wood poles are generally smaller with a less visually prominent support. Improvements to the existing 33kV overhead line alignment in relation to the setting of Listed Buildings and Scheduled Monuments may be identified.

9.84 PPS5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*. Whilst it would be possible to avoid the SMs within the study area there are other known non-designated assets and unknown assets which could potentially be affected. Underground connections routed through heritage assets could cause permanent loss due to the intrusive nature of the construction. Further detailed study along any underground connection route would be required to identify the potential for archaeological remains and any direct and indirect effects from construction and installation.

9.85 The connection is likely to follow a similar alignment to the existing 33kV overhead line between Bridgwater and Weston. The scale of change in views from settlements towards a new 132kV overhead line along this route is anticipated to be less in comparison with views towards a new 132kV overhead line in an area without existing electrical infrastructure. If an overhead line connection was taken forward, the use of 132kV wood poles could have less effect on landscape and views compared with the existing 33kV steel lattice pylons, as wood poles are generally smaller with a less visually prominent support. Areas where settlements form a particular constraint are north of Bridgwater (with several settlements close together), and between the Mendip Hills AONB and the Severn Estuary where the connection would need to route through settlements such as Uphill and Oldmixon. It may not be possible to route a new overhead line through this area without oversailing properties and underground cables may need to be given particular consideration for this part of the route.

9.86 Large areas of the study area fall within Flood Zones 2 and 3. If an overhead line connection with sections of underground cable was taken forward (for example at Puriton or in the residential areas to the south of Weston substation) a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from overhead line to an underground cable. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

9.87 An underground connection between Bridgwater and Weston would offer environmental benefits on landscape and views particularly relating to settlements and the setting of the Mendip Hills AONB, Listed Buildings, Conservation Areas and Scheduled Monuments, compared with an equivalent length of overhead line. However, the installation of underground cables is more invasive than for an overhead line and would have a greater scale of effects on areas of ecological or archaeological value.

10.0 CHURCHILL 400/132kV GSP ENVIRONMENTAL APPRAISAL

Introduction

10.1 This appraisal considers the planning and environmental constraints associated with a new 400/132kV Grid Supply Point (GSP) substation in the vicinity of the existing WPD 132kV substation at Churchill. The GSP substation would include both National Grid and WPD equipment and would occupy a footprint of approximately 150m by 150m. Additional land may also be required on a temporary basis for temporary construction laydown and compound area.

Area of Search

10.2 The area of search for the potential GSP substation is shown at Drawing G1979.03.047a. At this stage the precise location and design of the GSP substation has not been determined. The siting and design of the GSP substation would be subject to further detailed study in accordance with National Grid's Stakeholder and Amenity Policy and the guidelines presented by the Horlock Rules[3].

Environmental Constraints and Assessment

10.3 There are no sites in the vicinity of the existing Churchill substation protected at the highest level by national or international nature conservation, historic environment or landscape designations. However, the following factors would require detailed consideration as part of the next stage of assessment if this option was taken forward:

- The existing Churchill substation lies within the 5km consultation zone of the North Somerset and Mendip Bats Special Area of Conservation. The potential effects on the SAC bat species arising from the construction of a substation are associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. If this option was taken forward further assessment of the effects on bat activity, the integrity of the SAC and its qualifying features would be required.

- Potential effects on the setting of the Mendip Hills AONB which lies approximately 2.5km south of the existing Churchill substation.

- Land surrounding the existing Churchill substation is designated as 'open countryside' where there is policy presumption (in Planning Policy Statement 7[4] and the North Somerset Replacement Local Plan 2007) against development of any kind, and a requirement for sensitive and high-quality designs, wherever development is permitted. However, new development close to the existing substation and energy-related infrastructure development would be broadly consistent with the existing localised character.

- Effects on landscape and views (including those from residential properties in the vicinity of the existing substation).

[3] National Grid Substations and the Environment: Guidelines on Siting and Design.
[4] Planning Policy Statement 7: Sustainable Development in Rural Areas (PPS7) 2004

10.4 National Grid and WPD consider the siting of installations such as substations very carefully in relation to flood risk. Substations should ideally be located outside areas at risk of flooding. The location of the new substation would require further consideration and assessment in accordance with PPS 25[5]. The existing Churchill substation is sited outside areas at high risk of flooding. However, land approximately 250m north of the substation (associated with the River Yeo), and approximately 900m west of Brinsea lies within Flood Zones 2 and 3. A Flood Risk Assessment (FRA) is anticipated to be required to demonstrate that a substation in this location could operate safely and effectively in the event of a flood and would not increase flood risk elsewhere.

[5] Planning Policy Statement 25: Development and Flood Risk (PPS25) 2010

11.0 400kV DOUBLE CIRCUIT CONNECTION BETWEEN SANDFORD AND CHURCHILL ENVIRONMENTAL APPRAISAL

Introduction

11.1 This appraisal considers the planning and environmental constraints associated with a new double circuit 400kV connection (by overhead line or underground cable) from the proposed Bridgwater to Seabank 400kV overhead line in the area of Sandford (which would replace the existing 132kV overhead line F Route) to the potential 400kV Grid Supply Point (GSP) substation at Churchill. The potential 400kV GSP substation would be required in the vicinity of the existing WPD 132kV substation at Churchill.

Study Area

11.2 The existing 132kV N Route which runs for approximately 4.5km between the existing F Route and the existing Churchill substation would become redundant, and its corridor could be utilised for the new 400kV connection. The study area is illustrated on Drawing G1979.03.065a.

11.3 The replacement of the N Route with a new 400kV connection was considered as part of the Hinkley C Connection Route Corridor Study (TEP report 1979.016r01 June 2009), although at this stage the precise route of the connection has not been determined. The routeing of the connection would be subject to further detailed study in accordance with National Grid's Stakeholder and Amenity Policy and the guidelines presented by the Holford Rules[6].

Environmental Constraints and Assessment

11.4 There is one SSSI (Yanal Bog SSSI) in the area between the existing F Route overhead line and Churchill substation. This site is a calcicolous lowland mire which supports a diverse range of plant species. The construction of a 400kV connection (particularly an underground connection) through this site would cause disturbance and may have effects on the sites special interest and qualifying features. However, this site could be avoided by careful routeing.

11.5 There are no other sites close to the N Route overhead line that are protected at the highest level by national or international nature conservation or landscape designations. However, the following factors would require detailed consideration as part of the next stage of assessment if this option was taken forward:

- The connection lies within the within the 5km consultation zone of the North Somerset and Mendip Bats Special Area of Conservation (SAC). The potential effects on the SAC bat species arising from a new 400kV connection are associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. If this option was taken forward further assessment of the effects on bat activity, the integrity of the SAC and its qualifying features would be required.

[6] 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

- The Mendip Hills AONB forms a high constraint to siting infrastructure in this area. Its northern boundary is outside of the study area approximately 500m south of the existing N Route overhead line. The effects of a new 400kV overhead line connection on its setting would require further assessment as part of routeing studies if this option was taken forward. An underground connection could have temporary effects from elevated views to the south, but these would be associated with construction, and any potential effects on the setting of the AONB would be reduced to negligible once the land had re-established.

- There are a number of listed buildings in the vicinity of the existing N Route overhead line including: the Grade I listed Church of St John the Baptist at Churchill Green; and the Grade II listed buildings of Brinsea Batch Farmhouse and Honey Hall. These listed buildings could be avoided through careful routeing of the connection however effects on their setting would require assessment on a case by case basis in accordance with Planning Policy Statement 5[7] and its accompanying practice guide. Effects on the setting of these features would be reduced by using an underground connection.

- Effects on landscape and views (including those from residential properties at Churchill Green and Brinsea). A landscape and visual assessment would be required to assess the potential effects on settlements, individual farms and properties close to the existing N Route overhead line.

- A number of woodland blocks associated with commercial orchards owned by Thatchers Cider Company Ltd (south of the N Route, in the west of the study area) and the Mendip Spring Golf Club (north of the N Route, in the centre of the study area).

- North of the N Route overhead line there is a large area of land within Flood Zone 3, and smaller areas in Flood Zone 2. An area of Flood Zone 2 and 3 that corresponds with the floodplain of the River Yeo is approximately 250m north of Churchill substation. It would be relatively straightforward to build flood resilience into an overhead line by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the lattice steel construction poses no material changes to surface water flow. If an underground cable connection was taken forward a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to the proposed Bridgwater to Seabank 400kV overhead line. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

11.6 An underground connection would offer benefits over an overhead line in terms of landscape and views, amenity and the setting of the Mendip Hills AONB. However, the installation of underground cables is more invasive and would potentially have a greater scale of effects on ecology and buried archaeology.

[7] Planning Policy Statement 5: Planning for the Historic Environment (PPS5) 2010

12.0 CHURCHILL SUBSTATION TO WESTON TEE (AT ROUTE) 132KV CONNECTION ENVIRONMENTAL APPRAISAL

Introduction

12.1 This appraisal considers the planning and environmental constraints associated with a new 132kV double circuit connection (of approximately 3.4km) between a potential National Grid 400/132kV Grid Supply Point (GSP) substation, near to the existing Churchill 132/33kV Bulk Supply Point (BSP) substation in North Somerset, and an existing WPD 132kV double circuit overhead line known as the AT Route (See Drawing G1979.03.047a). The AT Route connects with WPD's existing 132kV overhead line F Route at a point known as the Weston 'tee' and travels west to Weston-super-Mare. The connection could be made by overhead line (using steel lattice pylons or wood pole supports) or underground cables.

Study Area

12.2 The study area extends from Puxton Moor and the settlement of Nye in the west to Churchill substation, south of Congresbury in the east. The northern extent is defined by the southern edge of Congesbury and the southern extent by the settlements of Churchill and Sandford. The study area is illustrated on (See Drawing G1979.03.047a).

12.3 Churchill substation is adjacent to the B3133 near to the villages of Stock, Brinsea and Congresbury. WPDs existing W and Y overhead line routes (referred to at paragraph 1.4) meet at a point approximately 250m east of the substation. The W Route runs up to Portishead, near Bristol, and the Y Route runs east to Radstock, near Bath.

12.4 The existing 132kV network within the study area comprises:

- the AT Route double circuit overhead line which is supported on steel lattice pylons and runs west from the Weston 'tee' to Weston-super-Mare;
- the F Route double circuit overhead line which is supported on steel lattice pylons and runs from Bridgwater to Portishead (proposed for removal by National Grid); and
- the N Route double circuit overhead line which is supported on steel lattice pylons and runs from the existing Churchill substation to the F Route.

12.5 Several 33kV overhead lines (on wood poles) exit Churchill substation in various directions (See Drawing G1979.03.047a). There is also a 33kV overhead line between Churchill and the Weston 'tee'. This line is currently redundant but the supporting wood poles remain in place on its former route.

12.6 The study area includes the northern part of Churchill and Sandford, Langford and Stock in the east, Brinsea and the southern part of Congresbury in the north, and Nye in the west.

Environmental Constraints

12.7 A description of the study area in relation to the environmental constraints outlined in Table 1.2 is presented below and illustrated at Drawing G1979.03.047a .

12.8 The following are not present within the study area:

- National Parks;
- Heritage Coasts;
- World Heritage Sites;
- National Nature Reserves (NNR);
- Special Protection Areas (SPA);
- Ramsar Sites;
- Areas of Outstanding Natural Beauty (AONB);
- Special Areas of Conservation (SAC);
- Conservation Areas;
- Registered Parks and Gardens; and
- Registered Battlefields.

Areas of Outstanding Natural Beauty (AONB)

Mendip Hills AONB

12.9 There are no AONBs within the study area. The Mendip Hills AONB is approximately 260m south of the study area. The designation covers an area of approximately 200km^2 and is an extensive range of limestone hills south of Bristol. The hills run in an east to west direction between the coast at Weston-super-Mare and Frome and overlook the Somerset Levels to the south and Avon Valley to the north.

12.10 The hills of the AONB form prominent landmarks. The designation relates to 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.

Implications for Overhead Line/Underground Cables Routeing

12.11 AONBs are designated under the National Parks and Access to the Countryside Act 1949 (as amended) for the purpose of conserving and enhancing the natural beauty of the area. The importance of these sites and the protection afforded to them is further highlighted in Planning Policy Statement (PPS) 7 and Rule 1 of the Holford Rules, which place strict restrictions on development.

12.12 Paragraph 22 of PPS7 states that major developments should not take place in these designated areas except in exceptional circumstances. Applications for such development within an AONB will be subject to rigorous examination and should include an assessment of the national need, cost and scope of developing outside the designated area and effects on the environment, landscape and recreational opportunities.

12.13 The setting of the AONB needs to be considered when siting overhead lines in close proximity to an AONB designation. Information relating to the setting is reviewed from published landscape character assessments at a later, more detailed stage of assessment as part of the process of identifying route corridors.

12.14 A connection between the potential GSP substation at Churchill and the AT Route would not directly affect the Mendip Hills AONB. The connection would commence at the potential substation (at least 2.3km away from the AONB) and could maintain a similar distance by routeing in a westerly direction across to the AT Route. If an overhead line connection was taken forward, further consideration should be given to

the effects of the connection on the setting of the Mendip Hills AONB. If a new overhead line connection was taken forward wood poles would have less effect on landscape and views in comparison with steel lattice towers as wood poles are generally smaller with a less visually prominent support.

12.15 An underground connection could have temporary effects associated with construction on the landscape which may be visible from the AONB, depending on its route. However, once the land had re-established the effects on the AONB's setting would be reduced to negligible.

Sites of Special Scientific Interest (SSSI)

12.16 SSSIs are designated for their biodiversity or geological interest and are protected from development and operations likely to damage their special interest. There are two SSSIs within the Study area. The sites and the reasons for their designation are summarised in Table 12.1 overleaf.

Table 12.1 – Summary of SSSIs in the Study Area

SSSI	Location / Grid Ref	Reason for Designation
Puxton Moor	North of the Mendip Hills AONB (ST 440700)	This wildlife site is designated as a SSSI for its ditches and rhynes. It forms part of the Avon Levels and Moors, an extensive area of low lying agricultural land north of the Mendip Hills. The Avon Levels and Moors area is drained by a network of ditches and rhynes which act as 'wet fences' providing water for livestock. The combination of management practices and variation in soils has resulted in watercourses which support a wide range of aquatic plant communities, many of which are of considerable nature conservation interest. The existing F Route travels along the eastern edge of the Puxton Moor SSSI and a connecting 132kV overhead line (the AT Route) runs east to west across the SSSI.

SSSI	Location / Grid Ref	Reason for Designation
Yanal Bog	North of the Mendip Hills AONB and Sandford (ST 424607)	This site is a calcicolous lowland mire and designated as a remnant of the Somerset Levels. The plants associated with the peat are nationally rare. It comprises a raised dome with a high water table which supports a diverse range of plant species. The only other comparable site in Avon is Max Bog to the south west.
Outside but close to the Study Area		
Banwell Ochre Caves SSSI	East of Banwell (ST 407593)	This SSSI lies within the Mendip Hills AONB and forms part of the North Somerset and Mendip Bats SAC. The SSSI comprises 5 caves which contain the most extensive and accessible yellow ochre workings in the Mendip Hills.
Dolebury Warren	South of Churchill (ST 455588)	Dolebury Warren is a Carboniferous Limestone hill supporting a range of plant communities from species-rich calcareous grassland and acid grassland to limestone heathland and bracken, with large areas of mixed scrub.

Implications for Overhead Line/Underground Cables Routeing

12.17 The potential effect of a connection on a SSSI would vary depending on the nature of the effect caused and the special interest of the site. Underground connections are more invasive than an equivalent length of overhead line as the land disturbance is greater during construction and there are permanent restrictions on tree planting and land use during operation. Consultation with Natural England would be required before consent could be granted for any development or operations likely to damage the SSSI interest.

12.18 The Puxton Moor SSSI lies in the north-west corner of the study area and its designation covers ditches and rhynes in low lying farmland. The F Route travels along the eastern edge of this designated site and the AT Route runs in an east to west direction straight across it.

12.19 The construction of an underground connection through this site would cause disturbance during construction and may have effects on the sites special interest. An overhead line would be able to oversail the ditches and rhynes to which the SSSI designation applies.

12.20 A connection between the potential GSP substation site at Churchill and the AT Route could follow a route similar to the redundant 33kV overhead line, between the existing Churchill substation and the AT Route within Puxton Moor SSSI. The

connection could avoid Puxton Moor SSSI if it connected to the AT Route at the Weston 'tee', which lies immediately east of the designated site.

12.21 An environmental assessment would be required to determine the potential for direct and indirect effects on the SSSI and its qualifying features if this connection was taken forward.

12.22 Yanal Bog SSSI is in the southern part of the study area, approximately 250m north of the existing 132kV N Route overhead line. The connection is likely to avoid this SSSI by routeing north of the site. Routeing south of the designation would involve a greater length of connection, which could increase the overall scale of environmental effects.

Special Areas of Conservation (SAC)

12.23 There are no SACs within the study area. However component sites of the North Somerset and Mendip Bats SAC lie approximately 700m north of the study area (Kings Wood/Urchin Wood) and approximately 700m south of the study area (Banwell Ochre Caves SSSI).

12.24 The North Somerset and Mendip Bats SAC is centred on the Mendip Hills. The SAC comprises caves, grassland and woodland and is a composite site spread across a wide area. The component sites include the Banwell Caves SSSI and Banwell Ochre Caves SSSI on the north side of the Mendip Hills with Brockley Hall Stables SSSI and King's Wood and Urchin Wood SSSI to the north east of Congresbury.

12.25 These sites are considered of international importance for their semi-natural dry grasslands, significant blocks of *Tilio-Acerion* forest and the limestone caves of the Mendips which provide a range of important hibernation sites for greater and lesser horseshoe bats. Natural England and North Somerset Council have identified a 5km 'consultation zone' which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. The 5km 'consultation zone' covers the study area.

Implications for Overhead Line/Underground Cables Routeing

12.26 SACs are afforded protection under the Conservation of Habitats and Species Regulations 2010 and development is strictly controlled. 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.

12.27 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.

12.28 Although the component sites of the North Somerset and Mendip Bats SAC sites lie outside the study area any connection within the study area would pass through the Natural England and North Somerset Council's 5km 'consultation zone'. The potential

effects on SAC bat species arising from an overhead line or underground cable connection would be associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. Further assessment would be required to ensure there would be no adverse effects from an overhead line on bat activity, the integrity of the designation or its qualifying features.

Scheduled Monuments (SMs)

12.29 The south west of England is a region of high archaeological and historical importance and contains over a third of all Scheduled Monuments (SMs) in England. There is only one SM within the study area: a moated site at Nye Farm in the western part of the study area, west of the F Route and the Weston 'tee'. There are a number of SMs in the Mendip Hills AONB immediately south of the study area.

Implications for Overhead Line/Underground Cables Routeing

12.30 SMs are nationally important monuments and archaeological remains which are protected under the provisions of the Ancient Monuments and Archaeological Areas Act 1979. Consent is required from English Heritage, the statutory advisor on the historic environment, under the 1979 Act before works directly affecting an SM may be carried out.

12.31 The only SM identified in the study area is at Nye Farm, approximately 780m south-west of the Weston 'tee' and approximately 170m west of the existing 132kV F Route overhead line. A connection could avoid this SM. An assessment would be required to identify any indirect effects on the monument and its setting if the connection was to be routed close to this feature.

12.32 An underground connection would have less adverse effects on the setting of a SM than an overhead line as impacts are largely temporary during construction. However, if an underground connection could not avoid a SM it may be permanently damaged or destroyed.

12.33 An assessment of the potential for archaeological remains and any direct and indirect effects from construction and installation would be required for any underground connection route. PPS5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*.

Settlements

12.34 There are few settlements in the study area. The majority of the land is low-lying with frequent ditches to aid drainage. Settlements are on slightly higher ground on the fringes of the study area, the largest being Congresbury on the northern boundary and Lower Langford in the south east corner.

12.35 There are also smaller settlements in the study area including Brinsea which comprises a cluster of properties and farms south west of the existing Churchill substation. Nye and Puxton are partly within the study area at its western edge and also comprise small groups of properties and farmsteads.

Implications for Overhead Line/Underground Cables Routeing

12.36 Settlements within the study area could be largely avoided by a connection through careful routeing.

12.37 The connection could follow a similar route to the redundant 33kV overhead line, that runs across the study area from the existing Churchill substation to the AT route. The scale of change in views towards a new overhead line along the route of the redundant 33kV line (with wood poles still in place) is anticipated to be less, in comparison with views towards a new overhead line in an area without any existing electrical infrastructure. This would also depend on other factors such as proximity to settlements and would be confirmed by further study at a later and more detailed stage of assessment.

Historic Buildings (Listed I, ll, and II*)

12.38 Buildings of special architectural or historic interest are added to a list of buildings protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Planning authorities are required to consult with English Heritage on planning applications which may affect a Grade I and Grade II* Listed Building outside Greater London and Listed Building consent is required for any works likely to affect a Listed Building.

12.39 There are no Grade I or II* Listed Buildings within or adjacent to the study area. There are two Grade II buildings within the central part of the study area: Brinsea Batch Farmhouse and Honey Hall. There are several Grade II Listed Buildings towards the edges of the study area and just outside, at Churchill Green in the south; on the southern edge of Congresbury, at Lower Langford and at Puxton to the west of Puxton Moor SSSI.

Implications for Overhead Line/Underground Cables Routeing

12.40 Routes could be achieved for the connection that would avoid Listed Buildings, however effects on their setting would require consideration as part of detailed routeing studies. Effects on these features would be reduced by using an underground connection.

Conservation Areas

12.41 There are no Conservation Areas within the study area. Lower Langford Conservation Area lies close to the eastern boundary of the study area. Other Conservation Areas just beyond the study area include Banwell and Congresbury which are within or on the edge of built up areas.

Implications for Overhead Line/Underground Cables Routeing

12.42 Conservation Areas are areas designated by local authorities because of special architectural or historic interest and are protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Conservation Area consent is required from the local planning authority for any development within the area.

12.43 Conservation Areas identified at paragraph 2.35 above would be avoided by a connection. The setting of these Conservation Areas is unlikely to be adversely affected due to their distance from the study area and the presence of intervening built development and vegetation. This would be confirmed by further study at a later and more detailed stage of assessment.

Woodland

12.44 There are few woodlands within the study area, none of which are designated as ancient woodland. The land is typically flat and where woodland occurs it is in the form of two small copses in the Mendips Spring Golf Course, a small block of woodland at Nye, shelterbelts and some lines of trees as part of hedgerows. Hedgerow trees and a commercial orchard north of Sandford provide enclosure and a perceived wooded character to the landscape in the south of the study area. Woodland and scrub along the Strawberry Line (a disused railway line running across the study area) is also prominent within the landscape.

12.45 Broadleaved woodlands on the rising ground of the Mendip Hills and Cleeve Ridge are prominent within the wider landscape but fall outside the study area and would not be affected by the connection.

Implications for Overhead Line/Underground Cables Routeing

12.46 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 wherever possible.

12.47 Installing a connection through woodland would result in its permanent loss. Permanent restrictions on what may be planted above underground cables or below an overhead line would apply. The main concentrations of woodland which could influence any potential route corridors at a more detailed stage of assessment are small copses in the Mendips Spring Golf Course, commercial orchards north of Sandford and woodland along the Strawberry Line.

Landform

12.48 The landform of the study area shows some variations and is illustrated at Drawing G1979.03.066a. In the northern and central parts of the study area the land is generally low-lying, flat and associated with moors. Fields are drained by a series of ditches and rhynes. There is little variation within the landform. Towards the south-east of the study area the land gradually rises and becomes slightly more undulating around Churchill and Langford with levels varying between 10m and 50m above ordnance datum (AOD). These undulations are associated with the network of small river valleys through the land. North of Dinghurst the land rises to 60 AOD.

12.49 The Mendip Hills AONB is south of the study area and comprises a series of limestone hills which form a prominent landmark and provide a backdrop in views throughout the study area. The hills rise sharply to 125m AOD at Sandford Hill and 181m AOD at Dolebury Warren. The only significant break in the hills is the valley of the Lox Yeo River through which the M5 motorway and the existing WPD 132kV overhead line (F Route) currently travel.

Implications for Overhead Line/Underground Cables Routeing

12.50 The Holford Rules refer to aspects of topography and physiography such as hills, ridges, dips, open valleys and flat land in considering overhead line routeing. For example, the Rules advise on exploiting the 'backgrounding' effect of high land and seeking to avoid ridges.

12.51 Landform does not pose a constraint to a connection. The majority of the study area is generally low-lying and flat which would be beneficial for laying underground cables. Where the land rises in the south-east of the study area, there may be opportunities for utilising landform to background an overhead line. However the benefits of routeing through this area in terms of landscape and visual effects would need to be assessed against the potential effects on other constraints. These constraints include proximity to settlements and the AONB, and the overall environmental effect of a route that would be longer and less direct than other options.

Flood Risk

12.52 The Environment Agency uses the following flood zones in England:

- Flood Zone 1: Land which has a low probability of flooding;
- Flood Zone 2: Land which has a medium probability of flooding; and
- Flood Zone 3: Divided into 3A (land which has a high probability of flooding) and 3B (the functional floodplain).

12.53 A large area of land in the north and west of the study area (including the Weston tee and the AT Route) falls in Flood Zone 3, with smaller areas in Flood Zone 2. An area of Flood Zone 2 and 3 that corresponds with the floodplain of the River Yeo is approximately 250m north of Churchill substation

Implications for Overhead Line Routeing/Underground Cables Routeing

12.54 It is relatively straightforward to build flood resilience into overhead lines by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the lattice steel construction poses no material changes to surface water flow.

12.55 The presence of an underground cable circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow. However, if an underground cable connection was taken forward, a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the AT Route. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25 – Development and Flood Risk.

12.56 PPS25 states that authorities should steer new development to Flood Zone 1, in which the chance of flooding each year is 0.1% (1 in 1000) or less. WPD would seek to identify sites for the CSE compound outside of Flood Zones 2 and 3. Where there are no reasonably alternative sites in Flood Zone 1, WPD may consider the suitability of sites in Flood Zone 2 and then Flood Zone 3. A Flood Risk Assessment (FRA) would be necessary to demonstrate that any proposed development within Flood Zones 2 and 3 could operate safely and effectively in the event of a flood and would not increase flood risk elsewhere.

Assessment

12.57 The study area is illustrated at Drawing G1979.03.047a and extends from Puxton Moor and Nye in the west, to the existing Churchill substation (South of Congresbury) in the east. The northern extent is defined by the southern edge of Congesbury and the southern extent by the northern edges of the settlements of Churchill and Sandford.

12.58 There are relatively few environmental constraints within the study area. The main environmental constraints identified include two SSSIs, a SAC consultation zone, a Scheduled Monument, Listed Buildings, woodland and scattered settlements.

12.59 The connection would not pass through the Mendip Hills AONB; however the potential effects on its setting would require further consideration. Further assessment would also be required to ensure there would be no adverse effects on the North Somerset and Mendip Bats SAC. The study area falls within the SACs 5km consultation zone which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. Any effects on bat activity and the integrity of the designation or its qualifying features would be assessed at a later and more detailed stage of assessment should this technical option be taken forward.

12.60 In the north-west corner of the study area, Puxton Moor SSSI covers ditches and rhynes in low lying farmland. A connection could avoid the SSSI if it connected to the AT Route at the Weston 'tee' immediately east of the designated site (Puxton Moor SSSI). The effects of the connection on the integrity of the SSSI and its qualifying features would be subject to further detailed consideration at a later and more detailed stage of assessment.

12.61 Yanal Bog SSSI in the southern part of the study area could be avoided by the connection.

12.62 The connection would need to negotiate smaller settlements and hamlets in the study area such as Brinsea, which comprises properties and farmsteads on Stock Lane, Brinsea Lane, Brinsea Batch and Brinsea Road. Properties would have an influence on the route and directness of any connection.

12.63 There is one Scheduled Monument, a moated site at Nye Farm in the western part of the study area, and two Grade II Listed Buildings in the central part of the study area: Brinsea Batch Farmhouse and Honey Hall. These sites could be avoided by a connection but an assessment would be required to identify any indirect effects on the features and their setting if this technical option was taken forward and the connection was to be routed in close proximity.

12.64 A new underground connection would offer benefits in terms of landscape and views particularly relating to settlements and the setting of the Mendip Hills AONB, Listed Buildings and Scheduled Monuments, compared with an equivalent length of overhead line. An underground connection would give rise to temporary effects on landscape and views during construction. Once the land has re-established, effects would be lower than an equivalent length of overhead line. However, the installation of underground cables is more invasive and would have a greater scale of effects on sites important for their ecology or archaeology, for example Puxton Moor SSSI.

12.65 A large area of land in the north and west of the study area (including the Weston tee and the AT Route) falls within Flood Zone 3, with smaller areas of Flood Zone 2. An area of Flood Zone 2 and 3 that corresponds with the floodplain of the River Yeo is approximately 250m north of Churchill substation. It is relatively straightforward to build flood resilience into overhead lines by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the supports pose no material changes to surface water flow.

12.66 The presence of an underground cable circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow. However, if an underground cables connection was taken forward, a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the AT Route. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

12.67 The connection could follow a similar route to the redundant 33kV overhead line, that runs across the study area from the existing Churchill substation to the AT route. The scale of change in views towards a new overhead line along the route of the redundant 33kV line (with wood poles still in place) is anticipated to be less, in comparison with views towards a new overhead line in an area without any existing electrical infrastructure. This would also depend on other factors such as proximity to settlements and would need to be confirmed by further study at a later and more detailed stage of assessment, which may also identify potential opportunities to improve the alignment.

13.0 SANDFORD 400/132kV GSP ENVIRONMENTAL APPRAISAL

Introduction

13.1 This appraisal considers the planning and environmental constraints associated with a new 400/132kV Grid Supply Point (GSP) substation in the vicinity of Sandford, North Somerset in the area between the existing WPD 132kV N Route and AT Route overhead lines. The GSP substation would include both National Grid and WPD equipment and would occupy a footprint of approximately 150m by 150m. Additional land may also be required for a new access road to the substation site, and on a temporary basis for temporary construction laydown and compound areas.

Area of Search

13.2 The area of search for the potential GSP substation is shown at Drawing G1979.03.028c. At this stage the precise location and design of the GSP substation has not been determined. The siting and design of the substation would be subject to further detailed study in accordance with National Grid's Stakeholder and Amenity Policy and the guidelines presented by the Horlock Rules[8].

Environmental Constraints and Assessment

13.3 There is one Scheduled Monument (a moated site at Nye Farm) and one SSSI (Puxton Moor SSSI) in the area between the existing N Route and AT Route overhead lines. There are no other sites in this area protected at the highest level by national or international nature conservation, historic environment or landscape designations. However, the following factors would require detailed consideration as part of the next stage of assessment if this option was taken forward:

- The area of search for the GSP substation lies within the 5km consultation zone of the North Somerset and Mendip Bats Special Area of Conservation, and within 1km of one of the SAC's composite sites called the Banwell Ochre Caves SSSI. The potential effects on SAC bat species arising from the construction of a proposed substation are associated with loss of habitat resulting in fragmentation and degradation of foraging grounds. If this option was taken forward further assessment of the effects on bat activity, the integrity of the SAC and its qualifying features would be required.

- Potential effects on the setting of the Mendip Hills AONB which lies approximately 500m south of the area of search for the GSP substation.

- The majority of land between the 132kV N Route and AT Route overhead lines (north of Sandford) lies within Flood Zone 3, where the development of 'essential infrastructure' is strictly controlled. National Grid and WPD consider the siting of installations such as substations very carefully in relation to flood risk. Substations should ideally be located outside areas at risk of flooding. The siting and design of the new substation would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25: Development and Flood Risk if this option was taken forward.

[8] National Grid Substations and the Environment: Guidelines on Siting and Design.

- Land within the area of search for the potential GSP substation is designated as 'open countryside' where there is policy presumption (in Planning Policy Statement 7: Sustainable Development in Rural Areas and the North Somerset Replacement Local Plan 2007) against development of any kind, and a requirement for sensitive and high-quality designs, wherever development is permitted.

- Effects on landscape and views (including those from residential properties on Nye Road and Mead Lane).

- Effects on the Cheddar Valley Railway Walk (Strawberry Line) Local Nature Reserve and strategic cycle route.

14.0 SANDFORD TO THE AT ROUTE 132KV CONNECTION ENVIRONMENTAL APPRAISAL

Introduction

14.1 This appraisal considers the planning and environmental constraints associated with a new 132,000 volt (132kV) double circuit connection (of approximately 2.5km) between a potential National Grid 400/132kV Grid Supply Point (GSP) substation at Sandford, North Somerset and an existing WPD 132kV overhead line known as the AT Route (See drawing G1979.03.028). The AT Route connects with WPD's existing 132kV overhead line F Route at a point known as the Weston 'tee' and travels west to Weston-super-Mare. The connection could be made by overhead line (using steel lattice pylons or wood pole supports) or underground cables.

Study Area

14.2 The study area is illustrated at Drawing G1979.03.028. WPD has advised that the connection could be made at any point on the AT Route between the Weston 'tee' and the existing 132kV substation at Weston-super-Mare.

14.3 The study area extends west from WPD's existing 132kV overhead line network (including the Weston 'tee', F Route and N Route) for approximately 4km to the M5 motorway. Although crossing the M5 would be technically feasible, this connection would involve a longer connection which could increase the overall scale of environmental effects. It would also introduce additional constraints, particularly in terms of engineering and safety that would limit the options available and would not offer any environmental benefits compared with connection options to the east of the M5. The northern extent of the study area is defined by the AT Route and the southern extent by the A368 which forms the boundary to the Mendip Hills AONB.

14.4 The section of the AT Route between the Weston 'tee' and its connection point with the new overhead line or underground cables would be removed as part of the scheme. This could provide some environmental benefit by removing the line from within Puxton Moor Site of Special Scientific Interest (SSSI) and potentially improving views from the few nearby properties.

14.5 The existing 132kV network within the study area comprises:

- the AT Route 132kV double circuit overhead line which is supported on steel lattice pylons and runs west from the Weston 'tee' to Weston-super-Mare;
- the F Route 132kV double circuit overhead line which is supported on steel lattice pylons and runs from Bridgwater to Portishead (proposed for removal by National Grid); and
- the N Route 132kV double circuit overhead line which is supported on steel lattice pylons and runs from the F Route (in the vicinity of the area of search for the potential GSP substation at Sandford up to the existing Churchill substation.

14.6 Churchill substation is approximately 4.5km north east of the area of search for the potential GSP substation at Sandford. It lies adjacent to the B3133 near to the villages of Brinsea and Congresbury.

14.7 WPD's W and Y Routes (referred to in paragraph 1.2) meet at a point approximately 250m east of the existing Churchill substation. The W Route runs up to Portishead, near Bristol and the Y Route runs east to Radstock, near Bath.

14.8 Two existing 33kV overhead lines (on wood poles) cross the centre of the study area in an east to west direction. Another 33kV overhead line travels through the south east corner of the study area before travelling up to the existing Churchill substation. There is also a 33kV overhead line between Churchill and the Weston 'tee'. This line is currently redundant but the supporting wood poles remain in place on its former route.

14.9 The study area includes parts of Sandford, Banwell and Locking as well as smaller settlements such as Puxton, Stonebridge, Woolvershill, Woolvershill Batch, Rolestone, East Rolestone, Nye and Way Wick. Weston-super-Mare extends from the M5 to the Severn Estuary.

Environmental Constraints

14.10 A description of the study area in relation to the environmental constraints outlined in Table 1.2 is presented below and illustrated at Drawing G1979.03.028.

14.11 The following are not present within the study area:

- National Parks;
- Heritage Coasts;
- World Heritage Sites;
- Areas of Outstanding Natural Beauty (AONB);
- Special Areas of Conservation (SAC);
- Conservation Areas;
- Special Protection Areas (SPA);
- Ramsar Sites;
- National Nature Reserves (NNR);
- Registered Parks and Gardens; and
- Registered Battlefields.

<u>Areas of Outstanding Natural Beauty (AONB)</u>

Mendip Hills

14.12 There are no AONB's within the study area. However the Mendip Hills AONB lies on the edge of the study area approximately 450m south of the area of search for the 400/132kV GSP substation site at Sandford.

14.13 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 hills run in an east to west direction between the coast at Weston-super-Mare and Frome in Somerset, and border the northern edge of the Somerset Levels.

14.14 The hills of the AONB form prominent landmarks. The designation relates to 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.

Implications for Overhead Line/Underground Cables Routeing

14.15 AONBs are designated under the National Parks and Access to the Countryside Act 1949 (as amended) for the purpose of conserving and enhancing the natural beauty of the area. The importance of these sites and the protection afforded to them is further highlighted in Planning Policy Statement (PPS) 7 and Rule 1 of the Holford Rules which place strict restrictions on developments within these sites.

14.16 Paragraph 22 of PPS7 states that major developments should not take place in these designated areas except in exceptional circumstances. Applications for such development within an AONB will be subject to rigorous examination and should include an assessment of the national need, cost and scope of developing outside the designated area and effects on the environment, landscape and recreational opportunities. A new overhead line through an AONB would have an effect on the landscape which would affect the objective to conserve and enhance natural beauty.

14.17 The setting of the AONB needs to be considered when siting overhead lines in close proximity to an AONB designation. Information relating to the setting is reviewed from published landscape character assessments at a later and more detailed stage of assessment as part of the process of identifying route corridors.

14.18 An overhead line route between the area of search for the potential GSP substation at Sandford and the AT route would not pass through the Mendip Hills AONB, although the potential effects on the setting of the AONB would require consideration if this option was taken forward. The route would commence at the substation (at least 450m away from the AONB), and travel in a north/north westerly direction away from the AONB towards the AT Route. If a new overhead line connection was taken forward wood poles would have less effect on landscape and views in comparison with steel lattice towers as wood poles are generally smaller with a less visually prominent support.

14.19 An underground connection would have temporary effects associated with construction on the landscape which would be visible from the AONB. However, once the land had re-established the effects on the AONB's setting would be reduced to negligible.

Sites of Scientific Interest (SSSI)

14.20 SSSIs are sites designated for their biodiversity or geological interest and are protected from development and operations which are likely to damage their special interest. There is one SSSI within the study area and two just outside. The sites and the reasons for their designation are summarised in Table 14.1.

Table 14.1 – Summary of SSSIs in the Study Area

SSSI	Location / Grid Ref	Reason for Designation
Puxton Moor	North of the Mendip Hills AONB (ST 440700)	This wildlife site is designated as a SSSI for its ditches and rhynes. It forms part of the Avon Levels and Moors, an extensive area of low lying agricultural land north of the Mendip Hills. The Avon Levels and Moors is drained by a network of ditches and rhynes which act as 'wet fences' providing water for livestock. The combination of management practices and variation in soils has resulted in watercourses which support a wide range of aquatic plant communities, many of which are of considerable nature conservation interest. The F Route 132kV overhead line travels along the eastern edge of the SSSI and a connecting 132kV overhead line (the AT Route) runs east to west across the SSSI.
Outside but close to the Study Area		
Banwell Caves	South of Banwell (ST 383588)	This SSSI lies within the Mendip Hills AONB and forms part of the North Somerset and Mendips Bats SAC. It is a Geological Review Site and is used as a hibernation site by Greater Horseshoe Bats.
Banwell Ochre Caves SSSI	East of Banwell (ST 407593)	This SSSI lies within the Mendip Hills AONB and forms part of the North Somerset and Mendip Bats SAC. The SSSI comprises five caves which contain the most extensive and accessible yellow ochre workings in the Mendip Hills.

Implications for Overhead Line/Underground Cables Routeing

14.21 The potential effect of a connection on a SSSI would vary depending on the nature of the effect caused and the special interest of the site. Underground connections are more invasive than an equivalent length of overhead line as the land disturbance is greater during construction and there are permanent restrictions on tree planting and land use during operation. Consultation with Natural England would be required before consent could be granted for any development or operations likely to damage the SSSI interest.

14.22 The Puxton Moor SSSI lies in the north east corner of the study area. The F Route travels along the eastern edge of this site and the AT Route runs in an east to west direction straight across it.

14.23 The SSSI designation for Puxton Moor covers ditches and rhynes in low lying farmland. A connection between the potential GSP substation at Sandford and the AT Route could avoid this SSSI by routeing to the west. This would avoid any direct impacts on the SSSI and would not pose any significant limitations in identifying

route corridors for further assessment. This would also allow the section of the AT Route that currently runs through the SSSI to be removed.

14.24 An overhead line would be able to oversail the ditches and rhynes to which the SSSI designation applies, however further detailed study would be required to determine the potential for direct and indirect effects on this site and its qualifying features if this connection was taken forward.

14.25 The construction of an underground connection through this site would cause disturbance during construction and may have effects on the sites special interest. An environmental assessment would be required to ensure that the integrity of the site or its qualifying features would not be adversely affected by the construction of an underground cables either through or in close proximity to this site.

Special Areas of Conservation (SAC)

North Somerset and Mendip Bats SAC

14.26 There are no SACs within the study area. However component sites of the North Somerset and Mendip Bats SAC lie approximately 3km north east of the study area (King's Wood/Urchin Wood) and approximately 250m south of the study area (Banwell Ochre Caves SSSI). The North Somerset and Mendip Bats SAC is a composite site centred on the Mendip Hills and comprises caves, grassland and woodland.

14.27 These sites are considered of international importance for their semi-natural dry grasslands, significant blocks of *Tilio-Acerion* forest and the limestone caves of the Mendips which provide a range of important hibernation sites for greater and lesser horseshoe bats. Natural England and North Somerset Council have identified a 5km 'consultation zone' which covers important bat feeding grounds surrounding the SAC and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. The 5km 'consultation zone' covers the study area.

Implications for Overhead Line/Underground Cables Routeing

14.28 SACs are afforded protection under the Conservation of Habitats and Species Regulations 2010 and development is strictly controlled. 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.

14.29 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.

14.30 Although the component sites of the North Somerset and Mendip Bats SAC lie outside the study area, any connection within the study area would pass through the Natural England and North Somerset Council 5km 'consultation zone'. The potential effects on SAC bat species arising from an overhead line or underground connection would be associated with loss of habitat resulting in fragmentation and degradation

of foraging grounds. Further assessment would be required to ensure there would be no adverse effects on bat activity, the integrity of the designation or its qualifying features.

Scheduled Monuments (SMs)

14.31 The south west of England is a region of high archaeological and historical importance and contains over a third of all Scheduled Monuments (SMs) in England. There are two SMs in the study area: a moated site at Nye Farm to the north of the area of search for the potential GSP substation at Sandford and a deserted farmstead approximately 420m south of Gout House Farm in the centre of the study area. There are a number of SMs in the Mendip Hills AONB to the south of the study area.

Implications for Overhead Line/Underground Cables Routeing

14.32 SMs are nationally important monuments and archaeological remains which are protected under the provisions of the Ancient Monuments and Archaeological Areas Act 1979. Consent is required from English Heritage, the statutory advisor on the historic environment, under the 1979 Act before works directly affecting an SM may be carried out.

14.33 An underground connection would have less adverse effects on the settings of a SM than an overhead line as impacts are largely temporary during construction. However if an underground connection could not avoid a SM it may be permanently damaged or destroyed.

14.34 Both SMs in the study area could be avoided by the connection. There is sufficient separation between the SMs and other constraints such as settlements to ensure direct impacts could be avoided on these features. Although both SMs are avoidable an assessment to identify any indirect effects on the monuments and their setting would be required if the connection was to be routed close to these features.

14.35 An assessment of the potential for archaeological remains and any direct and indirect effects from construction and installation would be required for any underground connection route. PPS5 highlights the importance of the heritage resource stating *'The historic environment and its heritage assets should be conserved'*. To achieve this Government objectives for planning in the historic environment are *'to deliver sustainable development by ensuring policies and decisions concerning the historic environment recognise that heritage assets are a non-renewable resource'*.

Settlements

14.36 There are several settlements within the study area. The larger settlements of Banwell and Locking are on higher ground on the southern boundary of the study area and Weston-super-Mare extends from the M5 to the Severn Estuary. Smaller settlements and hamlets include Stonebridge, Woolvershill Batch, Rolestone, East Rolestone, Nye and Way Wick, most of which comprise clusters of properties and farmsteads. There are also some individual farms across the study area which are linked by minor roads.

Implications for Overhead Line/Underground Cables Routeing

14.37 The small settlements, hamlets and farmsteads within the study area provide a constraint to routeing. This is particularly noticeable in the area immediately south of the AT Route around East Rolstone, Rolstone, and Way Wick although it would be possible to avoid these settlements through careful routeing.

Historic Buildings (Grade I, II and II*)

14.38 Buildings of special architectural or historic interest are added to a list of buildings protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Planning authorities are required to consult with English Heritage on planning applications which may affect a Grade I and Grade II* Listed Building outside Greater London and Listed Building consent is required for any works likely to affect a Listed Building.

14.39 There are five Listed Buildings in the study area: one at Stonebridge in the south west; one at Rolstone close to the AT Route; one to the west of Puxton Moor SSSI; and two at Sandford. There are also a number of other Listed Buildings within the settlements of Banwell and Sandford to the south of the study area.

Implications for Overhead Line/Underground Cables Routeing

14.40 Routes could be achieved for the connection that would avoid Listed Buildings, however the effects on their setting would require consideration as part of detailed routeing studies. Effects on these features would be reduced by using an underground connection.

Conservation Areas

14.41 There is one Conservation Area immediately south of the study area at Banwell.

Implications for Overhead Line/Underground Cables Routeing

14.42 Conservation Areas are areas designated by local authorities because of special architectural or historic interest and are protected under the Planning (Listed Buildings and Conservation Areas) Act 1990. Conservation Area consent is required from the local authority for any development within the area.

14.43 It is unlikely that there would be any adverse effects on the setting of the Conservation Area at Banwell from the connection, due to its distance (approximately 1.2km) from the area of search for the potential GSP substation at Sandford. However, this would be confirmed by further study at a later and more detailed stage of assessment. Any effects on the Conservation Area would be reduced by using an underground connection.

Woodland

14.44 There are few blocks of woodland within the study area and none designated as ancient woodland. The land is typically flat and where woodland occurs it is in the form of small copses, shelterbelts and some lines of trees as part of hedgerows. A commercial orchard, woodland and scrub along the Strawberry Line (a disused railway line) are to the north of the area of search for the potential GSP substation. A number of small woodlands lie either side of the AT Route in the north of the study area.

14.45 Broadleaved woodlands on the rising ground of the Mendip Hills and Cleeve Ridge are prominent within the wider landscape but fall outside of the study area and would not be affected by the connection.

Implications for Overhead Line/Underground Cables Routeing

14.46 Installing a 132kV connection through woodland would result in its permanent loss. Permanent restrictions on what may be planted above an underground cables and below an overhead line would apply. 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 wherever possible.

14.47 The only woodland areas that would influence the routeing of a connection are two blocks to the south of the AT Route at Rolstone and a block to the south west of Puxton Moor SSSI. Due to their size, these woodlands would not pose any significant constraints to routeing and would be avoidable.

Landform

14.48 The landform of the study area shows subtle variations and is illustrated at Drawing G1979.03.066a.

14.49 In the northern and central parts of the study area the land is generally low-lying, flat and associated with moors. Fields are drained by a series of ditches and rhynes at around 5 to 10m above ordnance datum (AOD). There is little variation within the landform. Towards the south of the study area the land gradually rises and becomes slightly more undulating around Banwell, Locking and Woolvers Hill rising up to 30m AOD.

14.50 The Mendip Hills AONB to the south of the study area comprises a series of limestone hills which form a prominent landmark and provide a backdrop in southerly views throughout the study area.

Implications for Overhead Line/Underground Cables Routeing

14.51 The Holford Rules refer to aspects of topography and physiography such as hills, ridges, dips, open valleys and flat land in considering overhead line routeing. The Rules advise on exploiting the 'backgrounding' effect of high land and seeking to avoid ridges.

14.52 Landform does not pose a constraint to the connection. The majority of the study area is low-lying and flat which would be beneficial for laying underground cables. The only area where the land rises and there could be opportunities for utilising landform to background an overhead line is in the south west of the study area. However, the benefits of routeing through this area in terms of landscape and visual effects would need to be assessed against the potential impacts on other constraints. These constraints include proximity to settlements and the AONB, and the overall environmental effect of a route that would be longer and less direct than other options that could connect closer to the 'tee'.

Flood Risk

14.53 The Environment Agency uses the following flood zones in England:

- Flood Zone 1: Land which has a low probability of flooding;
- Flood Zone 2: Land which has a medium probability of flooding; and
- Flood Zone 3: Divided into 3A (land which has a high probability of flooding) and 3B (the functional floodplain).

14.54 The majority of land in the study area is in Flood Zone 3, with smaller areas in Flood Zone 2. There are two areas of land that fall outside these Flood Zones of medium and high probability. These are north of Banwell (in the south western corner of the study area) and north of Sandford (in the south eastern corner of the study area. The entire length of the AT Route within the study area lies within Flood Zone 3.

Implications for Overhead Line Routeing/Underground Cables Routeing

14.55 It is relatively straightforward to build flood resilience into overhead lines by addressing safety clearances from anticipated flood levels in the overhead line design. The presence of overhead line pylons in areas of flood risk has a negligible effect on the risk of displacement of water as the supports pose no material changes to surface water flow.

14.56 The presence of an underground cables circuit in areas of flood risk would not affect the circuit's operation and would have a negligible effect on the risk or displacement of water as underground circuits pose no material changes to water flow.

14.57 If an underground cable connection was taken forward, a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the AT Route. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with Planning Policy Statement (PPS) 25 – Development and Flood Risk.

14.58 PPS25 states that authorities should steer new development to Flood Zone 1, in which the chance of flooding each year is 0.1% (1 in 1000) or less. WPD would seek to identify sites for the CSE compound outside of Flood Zones 2 and 3. However where there are no reasonably alternative sites in Flood Zone 1, WPD may consider the suitability of sites in Flood Zone 2 and then Flood Zone 3. A Flood Risk Assessment (FRA) would be necessary to demonstrate that any proposed development within Flood Zones 2 and 3 could operate safely and effectively in the event of a flood and would not increase flood risk elsewhere.

Assessment

14.59 The study area is illustrated at Drawing G1979.03.028, and extends west from WPD's existing 132kV overhead line network (including the Weston 'tee', F Route and N Route) for approximately 4km to the M5 motorway. It includes parts of Sandford, Banwell and Locking as well as smaller settlements such as Puxton, Stonebridge, Woolvershill, Woolvershill Batch, Rolestone, East Rolestone, Nye and Way Wick. Weston-super-Mare lies beyond the study area and extends from the M5 motorway to the Severn Estuary.

14.60 There are relatively few environmental constraints within the study area. The main constraints identified include Scheduled Monuments, Listed Buildings, scattered

settlements, Puxton Moor SSSI (which the AT Route currently runs through) and a SAC consultation zone.

14.61 There are five Listed Buildings within the study area and two Scheduled Monuments. One of the Scheduled Monuments is in the centre of the study area and the other is a moated site at Nye Farm in the east. These sites could be avoided with a connection, but an assessment would be required to identify any indirect effects on the features and their setting if the connection was to be routed close to these features.

14.62 The SSSI designation for Puxton Moor covers ditches and rhynes in low lying farmland. A connection could avoid Puxton Moor SSSI by routeing to the west of the site. This would avoid direct impacts on the SSSI and would also allow the section of the AT Route that currently runs through the SSSI to be removed, which may provide some environmental benefit and could potentially improve views from the few nearby properties.

14.63 Routeing to the west of Puxton Moor SSSI would also allow separation to be achieved between the new connection and National Grid's proposed 400kV overhead line, which could otherwise contribute to the perception of a 'wirescape' in views from some receptors due to the height difference between two lines of different voltages. The construction of a new overhead line close to or parallel with National Grid's 400kV overhead line would result in cumulative visual effects but would limit effects on landscape and views to a localised area. Siting the lines further apart would introduce effects over a greater area and would introduce a new line where no overhead line currently exists.

14.64 An overhead line would be able to oversail the ditches and rhynes to which the SSSI designation applies. However, further detailed study would be required to determine the potential for direct and indirect effects on this site and its qualifying features if this connection was taken forward, particularly during construction.

14.65 Constructing an underground connection through the SSSI would cause disturbance during construction and may have effects on the sites special interest. Detailed environmental surveys would be required to ensure that the integrity of the site or its qualifying features would not be adversely affected by the construction of underground cables either through or in close proximity to this site.

14.66 The small settlements, hamlets and farmsteads spread across the study area provide a constraint to routeing. This is particularly noticeable in the area immediately south of the AT Route around East Rolstone, Rolstone, and Way Wick although it would be possible to avoid these settlements through careful routeing.

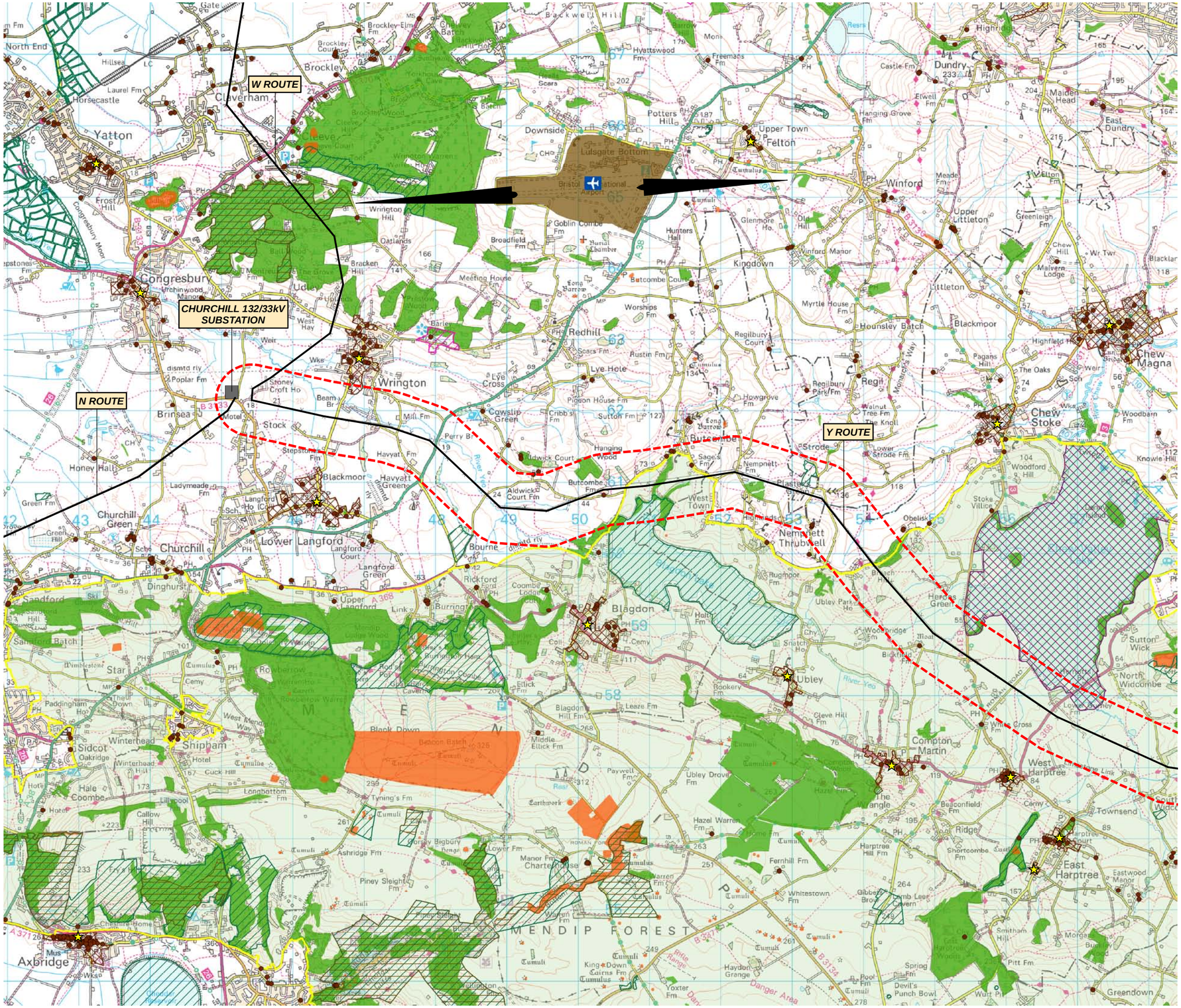
14.67 Although the connection would not pass through the Mendip Hills AONB, the potential effects on its setting would require consideration. The connection also falls within the North Somerset and Mendip Bats SAC 5km 'consultation zone' which covers important bat feeding grounds surrounding the SAC, and in which proposals for change are subject to particular scrutiny for potential effects on the designated sites. Further assessment would be required to ensure there would be no adverse effects on bat activity, the integrity of the designation or its qualifying features.

14.68 The majority of land within the study area is in Flood Zone 3, with smaller areas in Flood Zone 2. There are two areas of land that fall outside these Flood Zones of

medium and high probability, to the north of Banwell and north of Sandford. The entire length of the AT Route overhead line within the study area lies within Flood Zone 3. If an underground cables connection was taken forward a platform tower or cable sealing end (CSE) compound would be required to facilitate the transition from underground cable to overhead line at the AT Route. CSE compounds should ideally be located outside areas at risk of flooding and if this option was taken forward the location of a potential CSE compound would require further consideration and assessment in accordance with PPS 25.

14.69 An underground connection would offer benefits over an overhead line in terms of landscape and views, particularly relating to the setting of the Mendip Hills AONB, Listed Buildings, SM's and settlements. However, the installation of underground cables is more invasive and would have a greater scale of effects on ecology and buried archaeology.

Appendix 4 - Figures



Key

Study Area

Existing Infrastructure

- Existing Substation
- Existing Western Power Distribution 132kV Overhead Line

Environmental Constraints

- Area of Outstanding Natural Beauty
- Special Area of Conservation
- Special Protection Area
- Site of Special Scientific Interest
- Site of Special Scientific Interest (Ditches & Rhynes)
- Scheduled Monument
- Registered Parks and Gardens
- Historic Buildings (Listed I, II* & II)
- Conservation Areas
- Woodland
- Airfield/Airport
- Public Safety Zone

NOTE 1:
The following environmental constraints do not occur:
- World Heritage Sites
- National Parks
- Ramsar Sites
- National Nature Reserve
- Heritage Coasts
- Protected Wrecks
- Registered Battlefield

NOTE 2:
This map includes data from the following sources:
- Western Power
- National Grid
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- English Heritage
- Forestry Commission - © Crown Copyright. All rights reserved [2011]

Kilometers
0 0.5 1 2

Rev	Description	Dwn	Appvd	Date

TEP
Genesis Centre
Birchwood Science Park
Warrington WA3 7BH
Tel 01925 844004
Fax 01925 844002
email tep@tep.uk.com

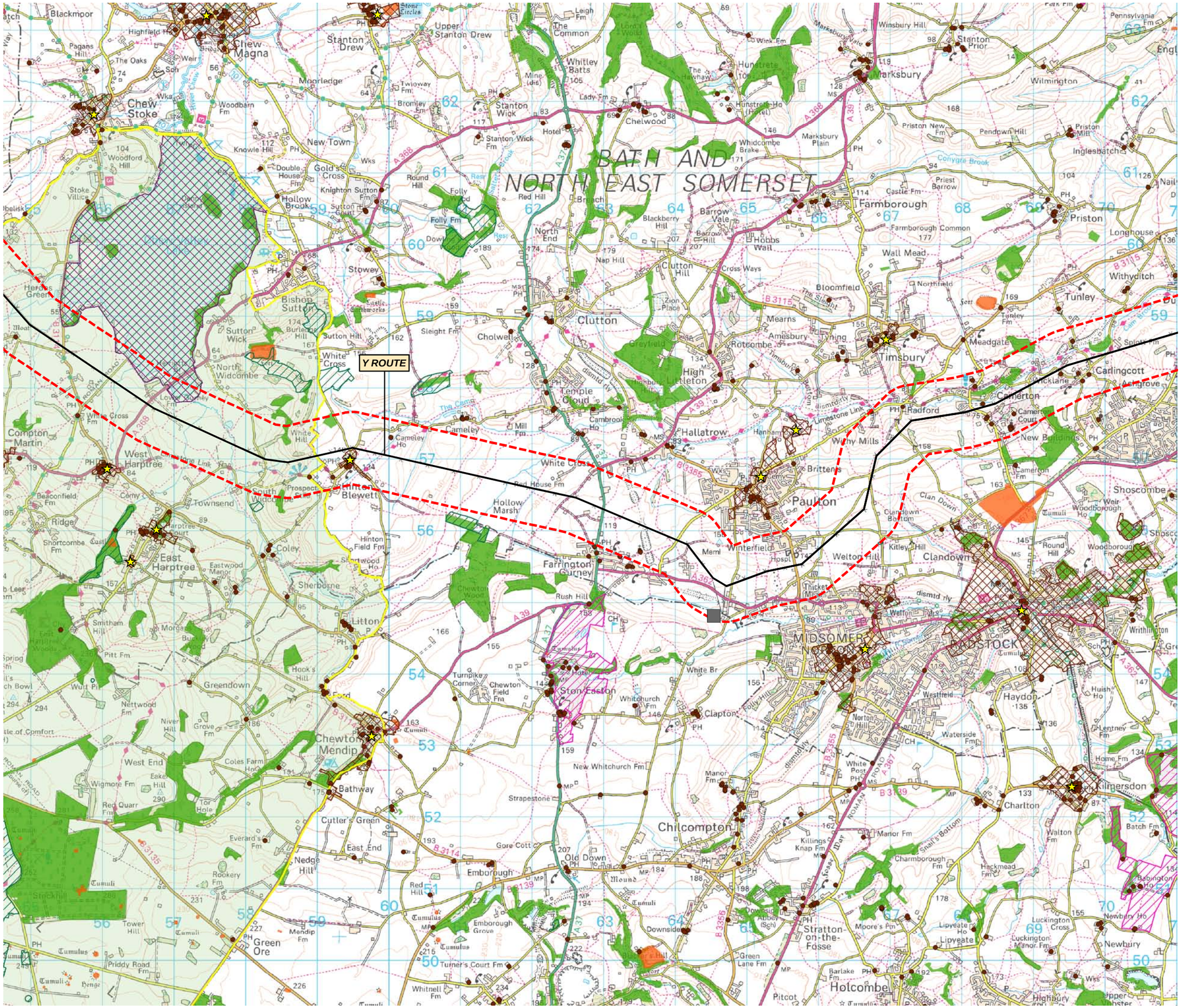
Project:
WPD Strategic Options Report

Title:
Y Route (Churchill to Melksham)
Environmental Constraints - Inset 1

Map No.
G1979.03.061a

Scale:	Date:
1:50,000 @ A3	Sept 2011

Drawn:	Checked:	Approved:
CB	LJ	CC



Key

- Study Area

Existing Infrastructure

- Existing Substation
- Existing Western Power Distribution 132kV Overhead Line

Environmental Constraints

- Area of Outstanding Natural Beauty
- Special Protection Area
- Site of Special Scientific Interest
- Scheduled Monument
- Registered Parks and Gardens
- Historic Buildings (Listed I, II* & II)
- Conservation Areas
- Woodland

NOTE 1:
The following environmental constraints do not occur:
- World Heritage Sites
- National Parks
- Ramsar Sites
- Special Area of Conservation
- National Nature Reserve
- Heritage Coasts
- Protected Wrecks
- Registered Battlefield
- Public Safety Zone
- Airport/Airfield

NOTE 2:
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Kilometers
0 0.5 1 2

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Project:
WPD Strategic Options Report

Title:
Y Route (Churchill to Melksham)
Environmental Constraints - Inset 2

Map No.
G1979.03.062a

Scale:	Date:
1:50,000 @ A3	Sept 2011

Drawn:	Checked:	Approved:
CB	LJ	CC

Key

Study Area

Existing Infrastructure

- Existing Substation
- Existing 400kV Overhead Line
- Existing Western Power Distribution 132kV Overhead Line

Environmental Constraints

- World Heritage Sites
- Area of Outstanding Natural Beauty
- Special Protection Area
- Site of Special Scientific Interest
- Scheduled Monument
- Registered Parks and Gardens
- Historic Buildings (Listed I, II* & II)
- Conservation Areas
- Woodland

NOTE 1:
The following environmental constraints do not occur:
- National Parks
- Ramsar Sites
- Special Area of Conservation
- National Nature Reserve
- Heritage Coasts
- Protected Wrecks
- Registered Battlefield
- Public Safety Zone
- Airport/Airfield

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Kilometers
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Project:
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Title:
Y Route (Churchill to Melksham)
Environmental Constraints - Inset 3

Map No.
G1979.03.063a

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1:50,000 @ A3	Sept 2011

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Key

Study Area

Existing Infrastructure

Existing Substation

Existing 400kV Overhead Line

Existing 275kV Overhead Line

Existing 132/33kV Overhead Line

Environmental Constraints

Area of Outstanding Natural Beauty

Special Protection Area

Site of Special Scientific Interest

Special Area of Conservation

Scheduled Monument

Registered Parks and Gardens

Historic Buildings (Listed I, II* & II)

Conservation Areas

Woodland

Airport/Airfield

NOTE 1:

The following environmental constraints do not occur:
- World Heritage Sites
- National Parks
- Ramsar Sites
- National Nature Reserve
- Heritage Coasts
- Protected Wrecks
- Registered Battlefield

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Project:

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Title:

Y Route (Churchill to Melksham)
Environmental Constraints - Inset 4

Map No.: G1979.03.064a

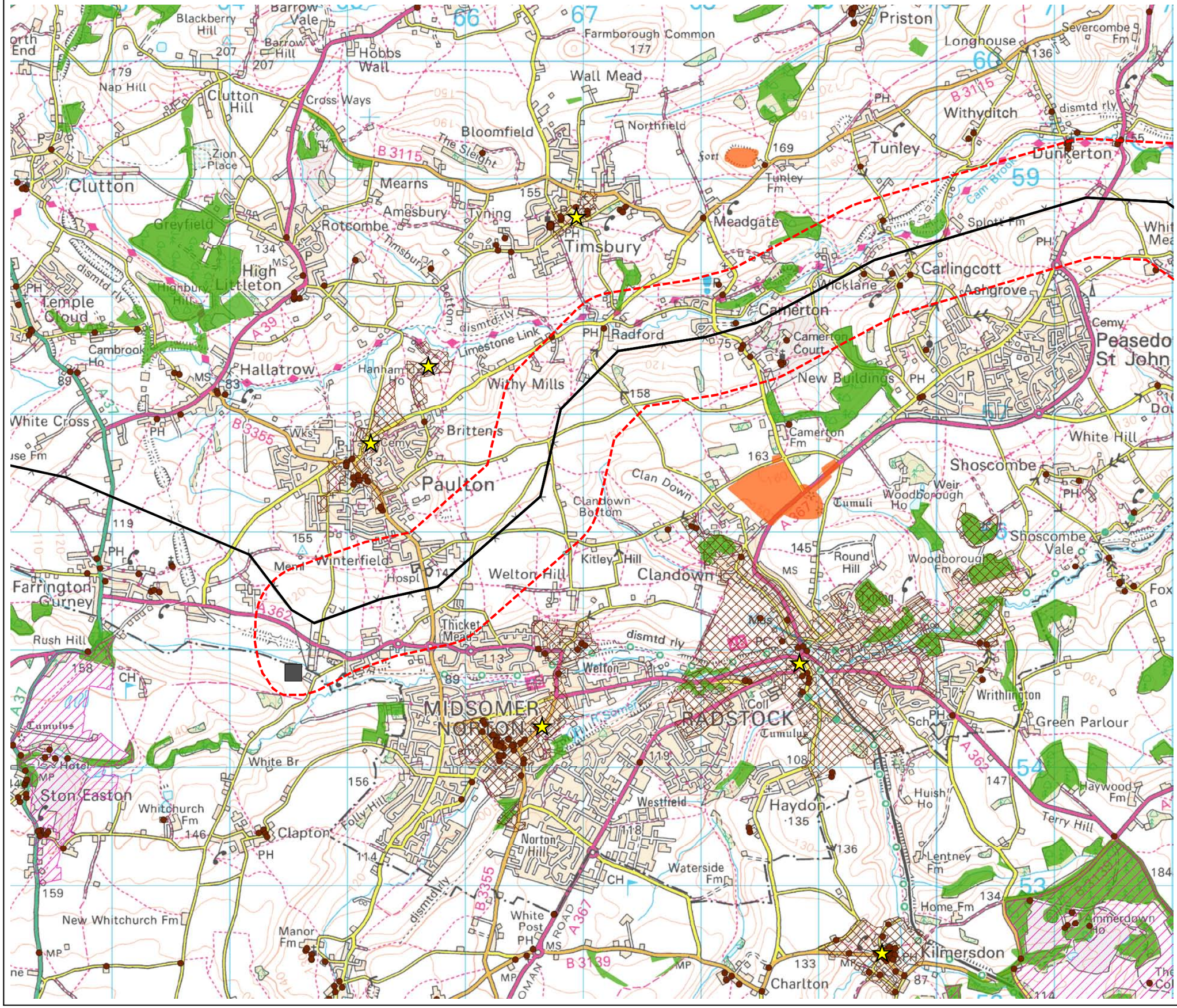
Scale: 1:50,000 @ A3

Date: Sept 2011

Drawn: CB

Checked: LJ

Approved: CC



Key

- Study Area

Existing Infrastructure

- Existing Substation
- Existing Western Power Distribution 132kV Overhead Line

Environmental Constraints

- Scheduled Monument
- Registered Parks and Gardens
- Historic Buildings (Listed I, II* & II)
- Conservation Areas
- Woodland

NOTE 1:

The following environmental constraints do not occur in this Inset:
- World Heritage Sites
- Area of Outstanding Natural Beauty
- National Park
- Ramsar Site
- Special Protection Area
- Special Area of Conservation
- Site of Special Scientific Interest
- National Nature Reserve
- Heritage Coast
- Protected Wreck
- Registered Battlefield
- Airport/Airfield
- Public Safety Zone

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Kilometers
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Project:

WPD Strategic Options Report

Title:

Frome Tee to Radstock
Environmental Constraints - Inset 1

Map No.: G1979.03.058a

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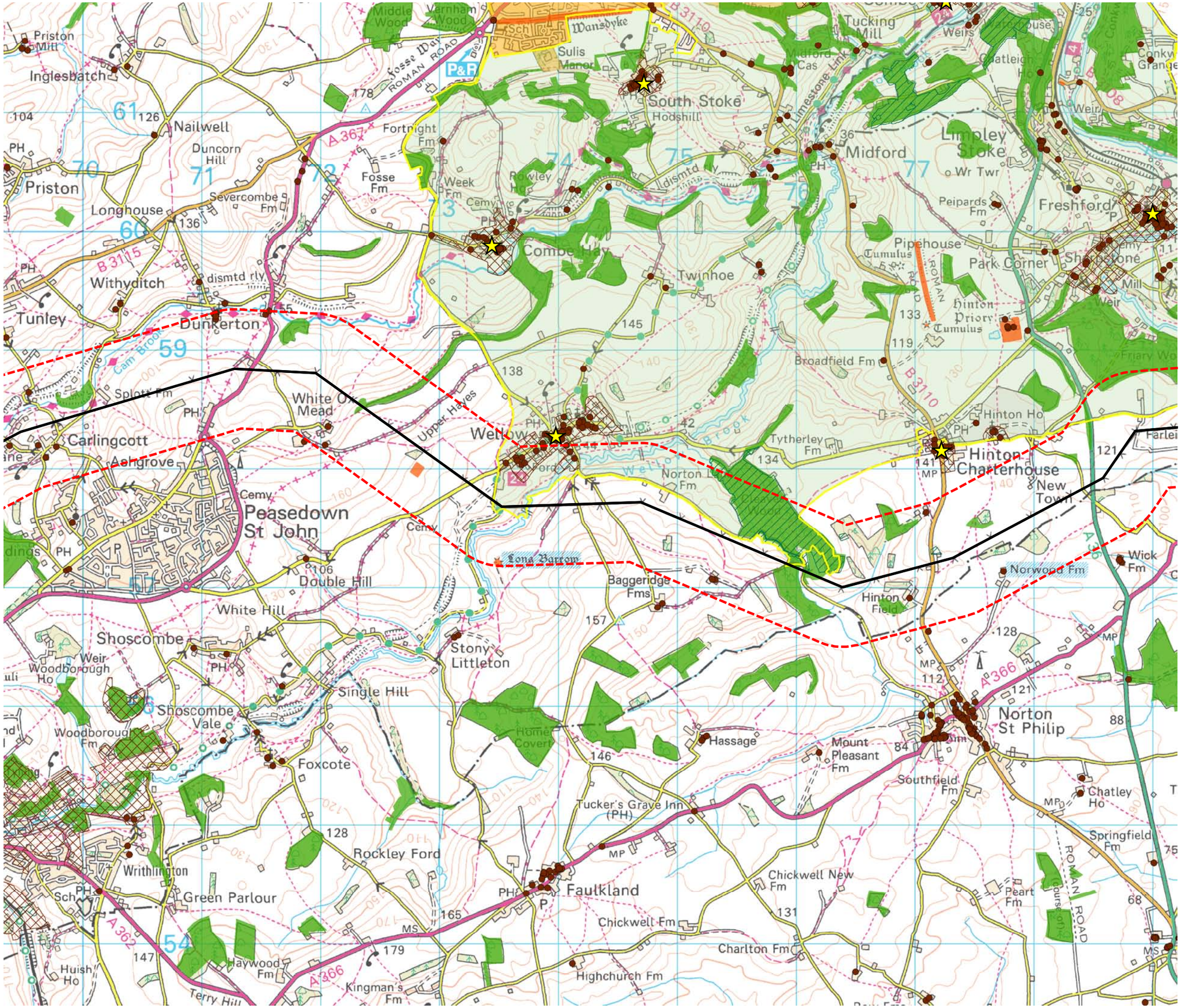

Key

- Study Area

Existing Infrastructure

- Existing Western Power Distribution 132kV Overhead Line

Environmental Constraints

- World Heritage Site
- Area of Outstanding Natural Beauty
- Site of Special Scientific Interest
- Scheduled Monument
- Historic Buildings (Listed I, II* & II)
- Conservation Areas
- Woodland

NOTE 1:

The following environmental constraints do not occur in this Inset:
- National Park
- Ramsar Site
- Special Protection Area
- Special Area of Conservation
- National Nature Reserve
- Heritage Coast
- Protected Wreck
- Registered Park and Garden
- Registered Battlefield
- Airport/Airfield
- Public Safety Zone

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Project:

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Title:

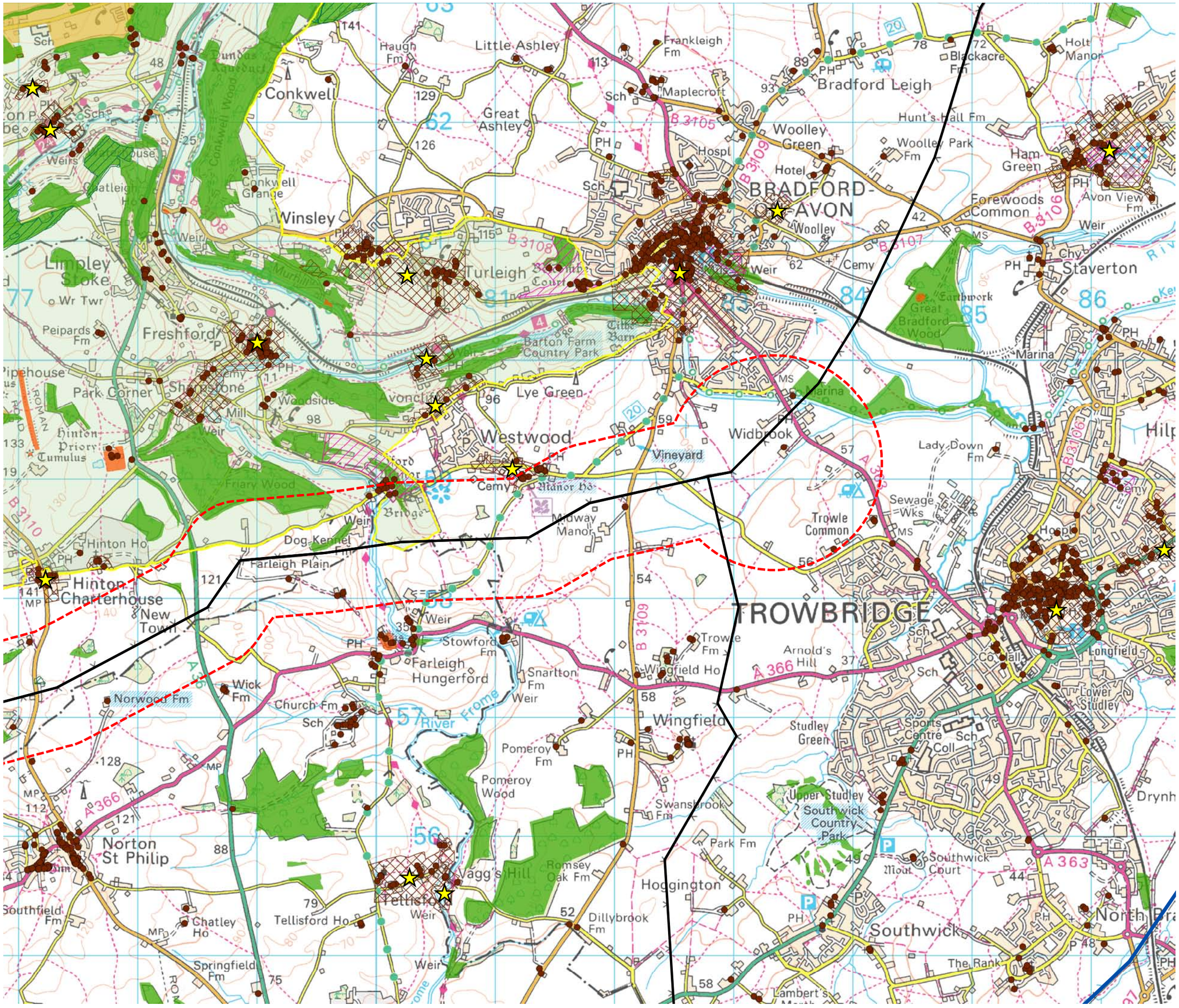
Frome Tee to Radstock
Environmental Constraints - Inset 2

Map No.: G1979.03.059a

Scale: 1:30,000 @ A3

Date: Sept 2011

Drawn:	Checked:	Approved:
CB	LJ	CC



Key

Study Area

Existing Infrastructure

Existing Western Power Distribution 132kV Overhead Line

Environmental Constraints

- World Heritage Site
- Area of Outstanding Natural Beauty
- Site of Special Scientific Interest
- Registered Park and Garden
- Scheduled Monument
- Historic Buildings (Listed I, II* & II)
- Conservation Areas
- Woodland

NOTE 1:

The following environmental constraints do not occur in this Inset:
- National Park
- Ramsar Site
- Special Protection Area
- Special Area of Conservation
- National Nature Reserve
- Heritage Coast
- Protected Wreck
- Registered Battlefield
- Airport/Airfield
- Public Safety Zone

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Project:

WPD Strategic Options Report

Title:

Frome Tee to Radstock
Environmental Constraints - Inset 3

Map No.		
G1979.03.060a		
Scale: 1:30,000 @ A3		Date: Sept 2011
Drawn: CB	Checked: LJ	Approved: CC

Key

Study Area

Existing Infrastructure

- Existing 132kV Overhead Line (On Lattice Steel Towers)
- Existing 33kV Overhead Line (On Wood Poles)
- Overhead Line (on wood poles) (not currently in use)
- Area of Search for Potential GSP Substation at Sandford

Environmental Constraints

- Area of Outstanding Natural Beauty
- Special Area of Conservation
- Site of Special Scientific Interest
- Site of Special Scientific Interest (Ditches and Rhynes)
- Scheduled Monuments
- Conservation Areas
- Listed Buildings (Grade I, II and II*)
- Woodland

NOTE 1:

The following environmental constraints considered do not occur:
- National Parks
- World Heritage Sites
- Ramsar
- Special Protection Area
- Heritage Coasts
- Registered Battlefields
- Registered Parks and Gardens
- Airport/Airfield
- Public Safety Zone

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Project:

WPD Strategic Options Report

Title:

Sandford to AT Route
Environmental Constraints

Map No.		
G1979.03.028c		
Scale: 1:16,000 @ A3		Date: Sept 2011
Drawn: CB	Checked: LJ	Approved: CC

Metres
0 125 250 500

Key

Study Area

Existing Infrastructure

- Existing Substation
- Existing 132kV Overhead Line (On Lattice Steel Towers)
- Existing 33kV Overhead Line (On Wood Poles)
- 33kV Overhead Line (On Wood Poles) (not currently in use)
- Area of Search for Potential GSP Substation at Churchill

Environmental Constraints

- Area of Outstanding Natural Beauty
- Special Area of Conservation
- Site of Special Scientific Interest
- Site of Special Scientific Interest (Ditches and Rhynes)
- Scheduled Monuments
- Conservation Areas
- Listed Buildings (Grade I, II* and II)
- Woodland

NOTE 1:

The following environmental constraints considered do not occur:
- World Heritage Sites
- National Parks
- Ramdar Site
- Special Protection Area
- Heritage Coasts
- Registered Park and Gardens
- Registered Battlefields
- National Nature Reserve
- Airport/Airfield
- Public Safety Zone

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Metres
0 125 250 500

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Project:
WPD Strategic Options Report

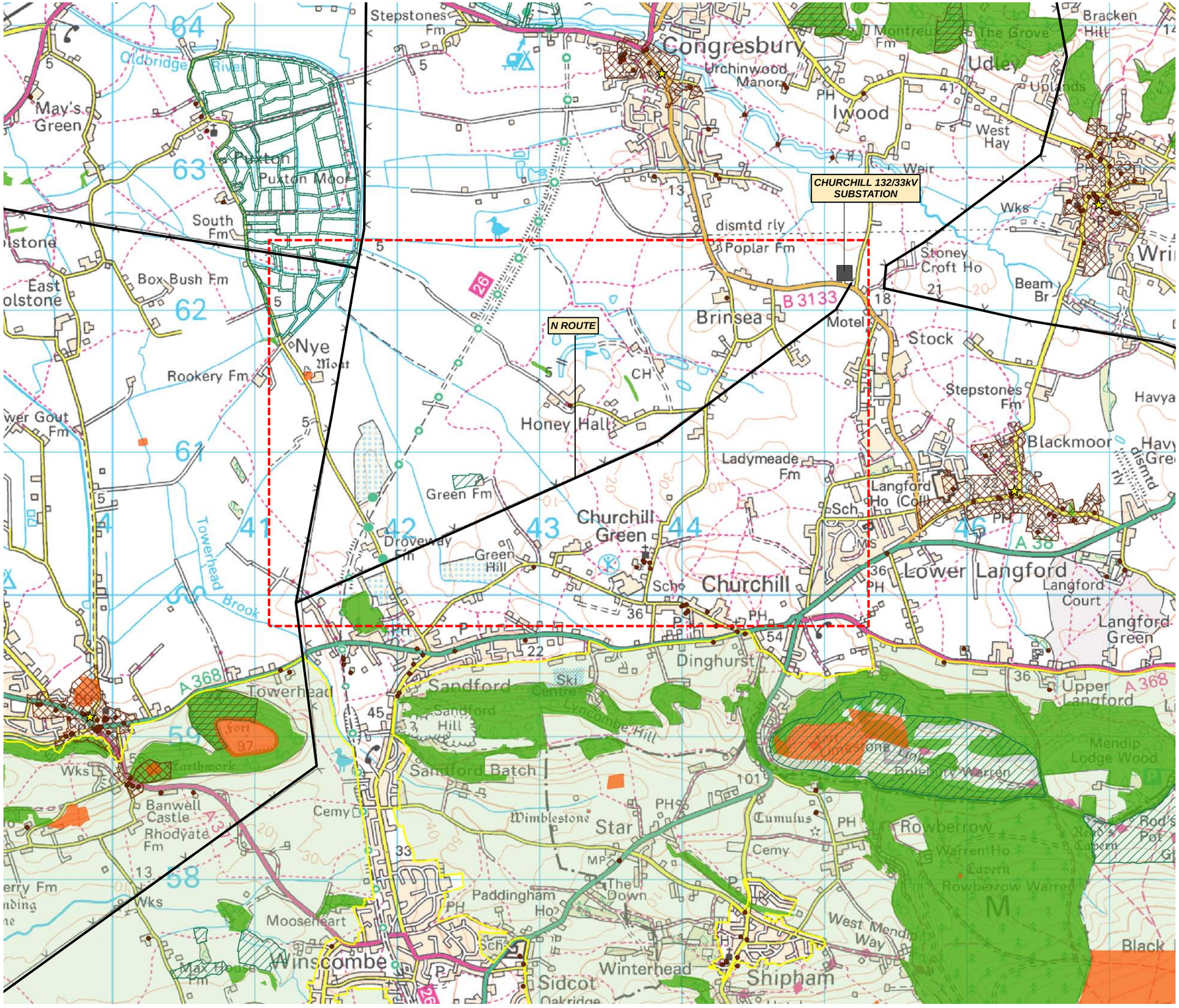
Title:
Churchill to AT Route
Environmental Constraints

Map No.
G1979.03.047a

Scale:
1:17,000 @ A3

Date:
Sept 2011

Drawn:	Checked:	Approved:
CB	LJ	CC



Key

Study Area

Existing Infrastructure

- Existing Substation
- Existing Western Power Distribution 132kV Overhead Line

Environmental Constraints

- Area of Outstanding Natural Beauty
- Special Area of Conservation
- Site of Special Scientific Interest
- Site of Special Scientific Interest (Ditches & Rhynes)
- Scheduled Monument
- Registered Parks and Gardens
- Historic Buildings (Listed I, II* & II)
- Conservation Areas
- Woodland

NOTE 1:
The following environmental constraints do not occur:
- World Heritage Sites
- National Parks
- Ramsar Sites
- Special Protection Areas
- National Nature Reserve
- Heritage Coasts
- Protected Wrecks
- Registered Battlefield
- Airport/Airfield
- Public Safety Zone

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Project:
WPD Strategic Options Report

Title:
N Route Replacement
Environmental Constraints

Map No.		
G1979.03.065a		
Scale: 1:25,000 @ A3		Date: Sept 2011
Drawn: CB	Checked: LJ	Approved: CC

Key

Study Area

Existing Infrastructure

- Existing Substation
- Existing 400kV Overhead Line
- Existing 275kV Overhead Line
- Existing 132/33kV Overhead Line

Environmental Constraints

- Area of Outstanding Natural Beauty
- Special Area of Conservation
- Site of Special Scientific Interest
- Scheduled Monument
- Registered Parks and Gardens
- Historic Buildings (Listed I, II* & II)
- Conservation Areas
- Woodland
- Airport/Airfield

NOTE 1:

The following environmental constraints do not occur:
- World Heritage Sites
- National Parks
- Ramsar Sites
- Special Protection Areas
- National Nature Reserve
- Heritage Coasts
- Protected Wrecks
- Registered Battlefield
- Public Safety Zone

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Kilometers
0 0.5 1 2

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Project:

WPD Strategic Options Report

Title:

Frome Tee to Melksham Environmental Constraints

Map No.: G1979.03.051a

Scale:	Date:
1:50,000 @ A3	Sept 2011

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WESTON 132/33kV BSP SUBSTATION

F ROUTE

BRIDGWATER 275kV SUBSTATION

Key

Study Area

Existing Infrastructure

- Existing Substation
- Existing 400kV Overhead Line
- Existing 275kV Overhead Line
- Existing Western Power Distribution Overhead Line

Environmental Constraints

- Area of Outstanding Natural Beauty
- Ramsar Site
- Special Protection Area
- Special Area of Conservation
- Site of Special Scientific Interest
- Scheduled Monument
- Registered Parks and Garden
- Historic Buildings (Listed I, II* & II)
- Conservation Areas
- National Nature Reserve
- Woodland
- Registered Battlefield

NOTE 1:
The following environmental constraints do not occur:
- World Heritage Sites
- National Parks
- Heritage Coasts
- Protected Wrecks
- Airport/Airfield
- Public Safety Zones

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0 1 2 4 Km

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Project:
WPD Strategic Options Report

Title:
Bridgwater to Weston
Environmental Constraints

Map No.
G1979.03.052a

Scale:	Date:
1:70,000 @ A3	Sept 2011

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WESTON 132/33kV BSP SUBSTATION

AT ROUTE

CHURCHILL 132/33kV SUBSTATION

N ROUTE TEE

F ROUTE

BRIDGWATER 275kV SUBSTATION

Key

Study Area

Existing Infrastructure

- Existing Substation
- Existing 400kV Overhead Line
- Existing 275kV Overhead Line
- Existing Western Power Distribution 132kV Overhead Line

Environmental Constraints

- Area of Outstanding Natural Beauty
- Ramsar Site
- Special Protection Area
- Special Area of Conservation
- Site of Special Scientific Interest
- Site of Special Scientific Interest (Ditches & Rhynes)
- Scheduled Monument
- Registered Parks and Garden
- Historic Buildings (Listed I, II* & II)
- Conservation Areas
- National Nature Reserve
- Woodland
- Registered Battlefield

NOTE 1:
The following environmental constraints do not occur:
- World Heritage Sites
- National Parks
- Heritage Coasts
- Protected Wrecks
- Airport/Airfield
- Public Safety Zone

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0 1 2 4 Km

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Project:
WPD Strategic Options Report

Title:
Bridgwater to N Route Tee
Environmental Constraints

Map No.		
G1979.03.057a		
Scale: 1:75,000 @ A3		Date: Sept 2011
Drawn: CB	Checked: LJ	Approved: CC

IRON ACTON 275kV SUBSTATION

SEABANK 400/132kV SUBSTATION

G ROUTE

AVONMOUTH 132/33kV SUBSTATION

PORTISHEAD 132/33kV SUBSTATION

BW ROUTE

W ROUTE

F ROUTE

AT ROUTE

N ROUTE

CHURCHILL 132/33kV SUBSTATION

WESTON 132/33kV SUBSTATION

Y ROUTE

F ROUTE

HINKLEY POINT 400/275kV SUBSTATION

BRIDGWATER 275/132kV SUBSTATION

Key

Study Area

Existing Infrastructure

- Existing Substation
- Existing 400kV Overhead Line
- Existing 275kV Overhead Line
- Existing Western Power Distribution 132kV Overhead Line
- Administrative Boundary

Environmental Constraints

- World Heritage Site
- Area of Outstanding Natural Beauty
- Ramsar Site
- Special Protection Areas
- Special Area of Conservation
- Site of Special Scientific Interest
- Site of Special Scientific Interest (Ditches & Rhynes)
- National Nature Reserves
- Scheduled Monument
- Registered Parks and Gardens
- Registered Battlefields
- Historic Buildings (Listed I & II*)
- Conservation Areas
- Woodland
- Airport/Airfield

NOTE 1:
Grade II listed buildings are not illustrated but have been considered in the appraisal

NOTE 2:

The following environmental constraints do not occur:
- National Parks
- Heritage Coasts
- Protected Wrecks

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0 2 4 8 Km

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Project:
WPD Strategic Options Appraisal

Title:
Bridgwater to Seabank
Environmental Constraints

Map No.
G1979.03.037b

Scale:	Date:
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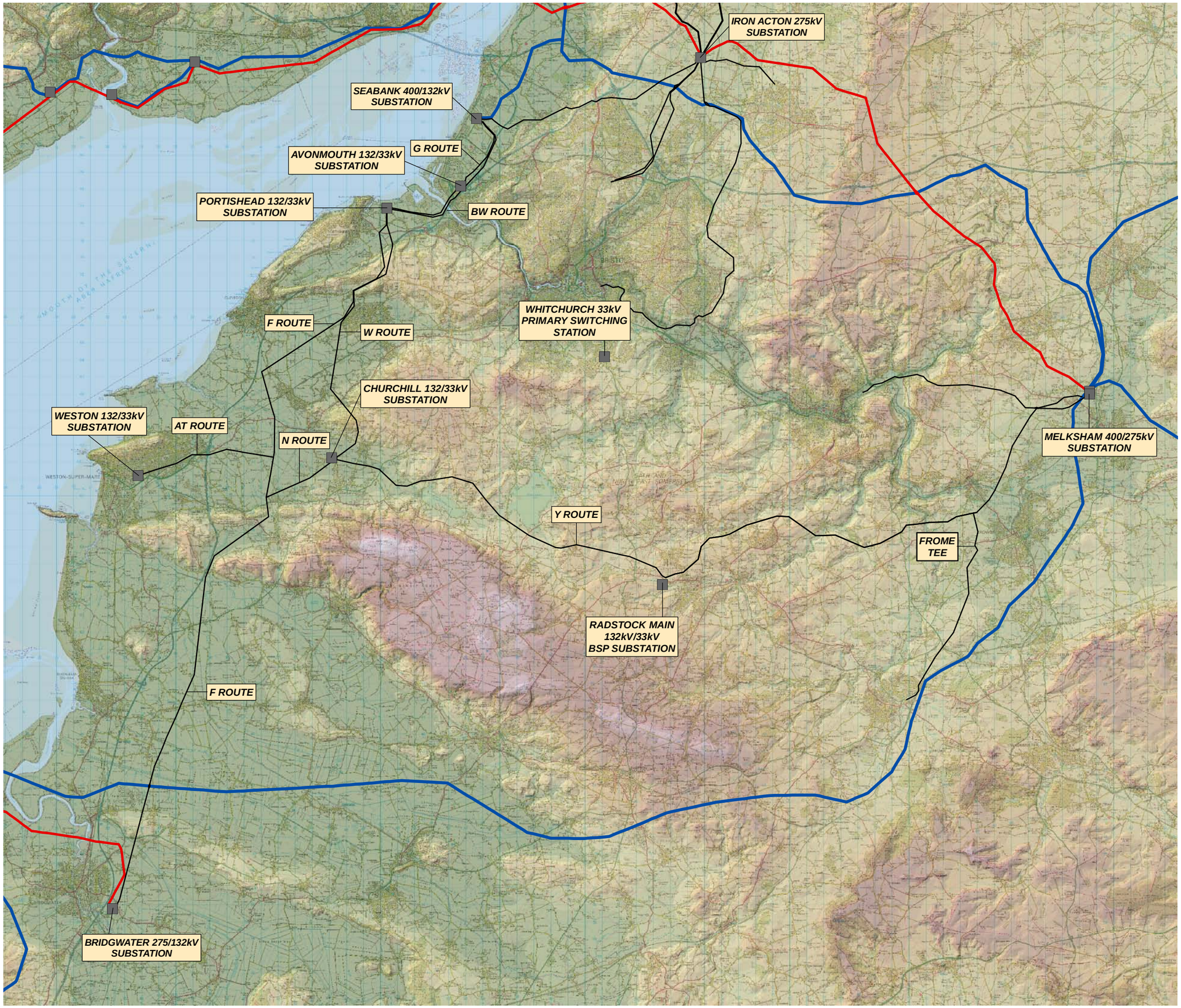

Key

Existing Infrastructure

- Existing Substation
- Existing 400kV Overhead Line
- Existing 275kV Overhead Line
- Existing Western Power Distribution 132kV Overhead Line

Elevation (In metres above Ordnance Survey Datum Newlyn)

- 320 - 339
- 300 - 319
- 280 - 299
- 260 - 279
- 240 - 259
- 220 - 239
- 200 - 219
- 180 - 199
- 160 - 179
- 140 - 159
- 120 - 139
- 100 - 119
- 80 - 99
- 60 - 79
- 40 - 59
- 20 - 39
- 0 - 19
- Watercourse

Kilometers
0 2.5 5 10

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Project:
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Title:
Landform

Map No.
G1979.03.066a

Scale:	Date:
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Drawn:	Checked:	Approved:
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Appendix 5

SCHEDULE OF CONSULTATION COMMENTS AND RESPONSES

A5.1 Following production of the Draft Distribution System Options Report (December 2011) National Grid and WPD consulted with the local planning authorities and key stakeholder agencies to obtain technical feedback and guidance on the draft report. The following organisations were consulted:

- North Somerset Council;
- Natural England;
- English Heritage; and
- Environment Agency.

A5.2 Officers from the above organisations were invited to attend a workshop event during January 2012 at which the need for the development and the method and findings of the draft report were presented and key issues discussed. Attendees and those that were invited but were unable to attend were provided with copies of the draft report and asked to provide technical feedback and officer opinions on the work done to date. The specific items raised and responses to these are set out in the table below. The comments received are officers' technical and initial responses and do not form an official response or view of any of the organisations or planning authorities on the options considered.

	Organisation	Issue Raised Date	Comments	Response
1	North Somerset Council	16/01/12	What weight does WPD have in determining the most appropriate solution?	National Grid and WPD will reach a commercial agreement. The distribution system option will provide the same standard and security of supply as the current network so that WPD will not have to undertake further work as a consequence in the near future.
2	North Somerset Council	16/01/12	What is the size of the new 400/132kV GSP substations being considered?	It was stated that the new GSP would be slightly bigger than the existing Churchill site and that depending on design could be 250mx250m approximately. This would be for an air-insulated design and subject to detailed assessment.

	Organisation	Issue Raised Date	Comments	Response
3	North Somerset Council	16/01/12	Will Grade II listed buildings be considered in options appraisal?	Grade II listed buildings have been considered in the options appraisal and will continue to be considered in subsequent siting and routeing studies.
4	North Somerset Council	16/01/12	Any new substation/Sealing End Compounds (SEC) should be located away from the component sites of the North Somerset and Mendip Bats SAC: Banwell Ochre Caves (south of Sandford) and Kings Wood and Urchin Wood (north of the existing Churchill substation) to minimise potential effects on bat feeding areas.	The component sites of the North Somerset and Mendip Bats SAC will be considered in substation siting and route corridor studies.
5	North Somerset Council	16/01/12	County wildlife sites should be avoided in siting infrastructure.	County wildlife sites will be considered in substation siting and route corridor studies.

	Organisation	Issue Raised Date	Comments	Response
6	North Somerset Council	16/01/12	How would two cable routes (400kV and 132kV) fit together through the Mendips if options TO1 or TO3 were taken forward? Concerns about the width of swathe and potential impact on archaeology.	If either of these options were taken forward the effects of two cable routes on buried archaeology would require careful consideration. The two routes would also require a degree of separation.
7	North Somerset Council	16/01/12	What are the size of 132kV Sealing End Compounds (SEC)?	132kV SECs comprise a fenced compound around the terminal tower of approx. 40m x 40m
8	Natural England	16/01/12	Potential effect on setting of AONB for SECs in the Sandford area is a concern.	In accordance with the Overarching National Policy Statement EN1 National Grid will aim to avoid compromising the purposes of the AONB designation when considering the location of new infrastructure in close proximity to the boundaries of the AONB designation.

	Organisation	Issue Raised Date	Comments	Response
9	North Somerset Council	16/01/12	Lighting would be a problem for bats if greater than 0.5 lux.	Substations are typically unmanned and only utilise emergency/security lighting. Detailed consideration would be given to the potential for effects to arise on bats as a result of any temporary or permanent lighting associated with new infrastructure within the 5km consultation zone of the North Somerset and Mendip Bats SAC.
10	Natural England	16/01/12	Has account been taken of Inheritance Tax exempt properties where owners sought IHT exemption on the grounds that their land was of “outstanding scenic, historic or scientific interest”.	Natural England agreed to check their records to see if there are any within the study area. [post meeting note - there are no Inheritance Tax exempt properties within the study area.]
11	North Somerset Council	16/01/12	Has National Grid been in contact with Bath and NE Somerset Council about options affecting their area?	North Somerset Council were consulted initially as all of the technical options would affect this District and the preliminary preferred option falls entirely within the administrative boundary of North Somerset Council.

	Organisation	Issue Raised Date	Comments	Response
12	Natural England	16/01/12	Need to consider the potential effects of removing OHL from Puxton Moor SSSI if the stretch of the AT Route within it became redundant due to a new connection between Sandford and the AT Route (Weston).	To be considered in route corridor studies and Environmental Impact Assessment.
13	Natural England	16/01/12	Neither Natural England nor NSC would want to see a new OHL passing through the Puxton Moor SSSI.	To be considered in route corridor studies
14	Natural England	16/01/12	Queried tower engineering options for foundations in peat.	WPD noted that wood pole lines could be employed which are lighter, have a smaller footprint and have less of an impact on the land.

	Organisation	Issue Raised Date	Comments	Response
15	North Somerset Council	16/01/12	How have the "areas of search" for the potential substation sites shown on the plans been derived?	It was noted that the 'areas of search' shown on the plans at the meeting were based on initial studies for the high level options appraisal undertaken. The substation siting study would consider a much wider study area to ensure that the optimum sites could be identified.
16	North Somerset Council	16/01/12	Could the height of substation equipment be reduced – noting visibility of existing equipment at Churchill.	WPD noted that National Grid's SGTs would be taller than the equipment in the existing Churchill substation but the WPD equipment would be approximately the same height.
17	North Somerset Council	16/01/12	Could the existing AT route (via the F Route) be used as an alternative to a new connection between a substation at Sandford and the AT Route to Weston.	This would conflict with the proposed Bridgwater-Seabank connection which will use the corridor of the F route overhead line that currently connects the AT Route.

	Organisation	Issue Raised Date	Comments	Response
18	North Somerset Council	16/01/12	Tower spacing was questioned	400kV overhead line towers are spaced at approximately 360m. 132kV towers are spaced at approximately 250m.
19	North Somerset Council	16/01/12	Need for particular bat surveys (2 surveys per month May to September) in the case of a substation in proximity to the SAC.	Bat surveys were undertaken in 2010 and further surveys will be undertaken following liaison with the Ecology and Biodiversity Thematic Group.
20	North Somerset Council	16/01/12	Likely need for a Habitat Regulations Assessment – to be undertaken.	Habitat Regulations Assessment (if required) would be carried out at a later stage of assessment as part of the EIA.
21	North Somerset Council	16/01/12	It would be better to use existing access tracks as far as possible.	To be considered in substation siting and route corridor studies

	Organisation	Issue Raised Date	Comments	Response
22	North Somerset Council	16/01/12	How close to substation boundary fences could landscaping be established?	Security requirements were identified - noted that 5m was generally the closest separation
23	North Somerset Council	16/01/12	Local consultation should be undertaken via the established Community Forum rather than by setting up a new group.	Noted
24	North Somerset Council	16/01/12	Need to involve the Strawberry Line community group via Katie Spencer (NSC).	Noted
25	North Somerset Council	16/01/12	Issues relating to the options and substation siting should be addressed via the thematic groups to avoid duplication of discussions on the same issues.	Noted

	Organisation	Issue Raised Date	Comments	Response
26	North Somerset Council	27/01/12	The larger study area is within the floodplain and the EA will need to be involved	The EA has been invited to comment on the options appraisal report and will be consulted on any subsequent substation siting study.
27	North Somerset Council	27/01/12	National Grid urged to consult on the sub station in parallel with the next stage of consultation on the preferred route alignment. This will avoid "consultation fatigue" for everybody concerned and enable local residents to view the overall scheme rather than elements.	Noted
28	North Somerset Council	27/01/12	Need to keep Cllr Ap Rees and Cllr Bob Garner informed about the project	Meeting arranged for 06/02/12

	Organisation	Issue Raised Date	Comments	Response
29	North Somerset Council	27/01/12	The proposal should avoid designated Wildlife Sites (as well as Sites of Special Scientific Interest), which are protected by Policy ECH/14 in the Local Plan. These include the Wildlife Sites Towerhead Brook (part of) and adjacent land and Fields and rhynes west of Moorland Farm.	To be considered in substation siting and route corridor studies
30	North Somerset Council	27/01/12	A buffer area of 5 metres should also be maintained around Wildlife Sites to retain their ecological value.	To be considered in substation siting studies

	Organisation	Issue Raised Date	Comments	Response
31	North Somerset Council	27/01/12	When the location of the substation has been finalised, an ecological survey is likely to be required. Because legally protected species are a material planning consideration it is essential that a protected species survey is carried out at this site as follows: A suitably qualified ecological consultant should be contracted to carry out a wildlife survey which includes evidence of any legally protected species. Section 41 species and habitats should also be included. The survey should include the results of a data search from the Bristol Regional Environmental Records Centre.	Ecological surveys will be undertaken as part of EIA process

	Organisation	Issue Raised Date	Comments	Response
32	North Somerset Council	27/01/12	Ecological mitigation should take account of the North Somerset and Mendip Bats Special Area of Conservation. It would be desirable if compensatory tree and hedge planting on site with native shrub and tree species of local provenance was carried out to provide no net decrease (and ideally an increase) in the number of trees or the length of hedgerows on site.	Ecological mitigation will be considered as part of detailed design and EIA process
33	North Somerset Council	27/01/12	Buffers of tall vegetation should be provided around relevant wildlife habitats. This accords with the guidance in Biodiversity and Trees, the Supplementary Planning Document for developments within North Somerset, section 8.4, page 13, which states that, 'At least a five metre strip and sometimes a 10 metre strip for all water courses, hedges and woodlands should be retained to allow for management. However, where the Internal Drainage Board maintains the rhynes, an eight metre maintenance strip must be included.'	To be considered as part of detailed design and EIA process

	Organisation	Issue Raised Date	Comments	Response
34	North Somerset Council	27/01/12	Ecological mitigation proposals should also take account of the guidance in Biodiversity and Trees, the Supplementary Planning Document for developments within North Somerset,	To be considered as part of detailed design and EIA process
35	North Somerset Council	27/01/12	Widening the area of search for the GSP substation to include land north of Thatcher's Cider (indicated as a patch of woodland on this constraints map, but it is mostly open land) is suggested. This area has a more 'industrial' character as a result of the cider works and other large sheds, with generally more tree cover (except to the west) than the more open levels to the northwest of the Strawberry line.	Consideration will be given to this area and to widening the area of search for a GSP substation as part of substation siting studies

	Organisation	Issue Raised Date	Comments	Response
36	North Somerset Council	27/01/12	Views from the Mendip Hills AONB and the Strawberry Line will be important considerations in site selection and screening. This should also extend to the impact of any 132kv line routes and where these can be undergrounded without detriment, this could assist in reducing the local impact and effect upon the setting of the AONB (by removing some transmission towers).	To be considered in substation siting and route corridor studies
37	North Somerset Council	27/01/12	Sufficient land would need to be obtained around any sub-station compound to ensure an adequate area for landscape mitigation works, which may include ground modelling and tree and shrub planting.	To be considered as part of detailed design and EIA process

	Organisation	Issue Raised Date	Comments	Response
38	North Somerset Council	27/01/12	Towerhead House is a Grade II listed building dating from the 19th century and incorporating much earlier elements from a previous building on the site. The impact of any new structure on the setting of this building will need to be assessed. This assessment should also take into account any historic relationship between Towerhead House and Towerhead Farm which may have existed.	To be considered in substation siting, route corridor studies and as part of EIA process if relevant to the site.
39	North Somerset Council	27/01/12	Drovehead Farm is an interesting complex consisting of a farmhouse and agricultural buildings which all look to be early to mid 19th century in date. These are buildings of local interest and undesignated heritage assets.	To be considered in substation siting and route corridor studies and as part of EIA process if relevant to the site.
40	North Somerset Council	27/01/12	Any scheme would need to assess the impact on the setting of these heritage assets using the steps set out in the English Heritage Guidance on the Setting of Heritage Assets.	The potential for effects to arise on the setting of heritage assets will be considered initially in substation siting and route corridor studies and in detail as part of EIA.

	Organisation	Issue Raised Date	Comments	Response
41	North Somerset Council	27/01/12	The study area will need to be the subject of a desk based archaeological study to attempt to identify areas which are unsuitable for development for heritage reasons.	A desk based assessment will be carried out as part of environmental surveys for the EIA at the preferred substation site.
42	North Somerset Council	27/01/12	When a more focussed and targeted area is available, it will need to be subject to geophysical survey in order to develop archaeological mitigation strategies.	To be considered as part of detailed design and EIA process
43	North Somerset Council	27/01/12	The local community archaeological group (WASP – Winscombe and Sandford Project) should be consulted, as they have carried out survey work in this area.	To be consulted during initial environmental surveys as part of the EIA process
44	Natural England	30/01/12	Potential significant impact on the Mendip Hills AONB (setting) through the construction of a new Sandford GSP substation and a 132kV line linking the substation to the circuits that supply Weston – approximately 2.5km (TO5).	To be considered in substation siting and route corridor studies

	Organisation	Issue Raised Date	Comments	Response
45	Natural England	30/01/12	Potential significant impact on the Mendip Hills AONB (setting) through upgrading to a new (larger) GSP substation at Churchill and a 400kV line linking the Bridgwater to Seabank 400kV circuit to the Churchill GSP – approximately 4.5km (TO4).	In accordance with the Overarching National Policy Statement EN1 National Grid will aim to avoid compromising the purposes of the AONB designation when considering the location of new infrastructure in close proximity to the boundaries of the AONB designation.
46	Natural England	30/01/12	The potential impact of each option (especially the GSP substations) on the commuting/foraging bats from the North Somerset and Mendips Bats SAC needs considering.	To be considered in substation siting and route corridor studies. Further assessment will be undertaken as part of the EIA process for the preferred option.
47	Natural England	30/01/12	Each preferred option to be more thoroughly assessed (especially landscape - LVIA) before a final choice is made	Potential landscape and visual effects will be considered in substation siting and route corridor studies. A landscape and visual assessment of the preferred option will be undertaken during the EIA process.

	Organisation	Issue Raised Date	Comments	Response
48	Environment Agency	30/01/12	Any proposals in flood zone 3a or 3b to be subject to the Exception Test.	To be considered in substation siting studies
49	Environment Agency	30/01/12	Wherever possible, the works should be located in flood zone 1 (low risk) or the lowest flood zone possible for the chosen option. This is particularly important for any new sub stations or GSPs.	To be considered in substation siting studies
50	Environment Agency	30/01/12	Would advise that the preferred route option is subject to a more detailed flood risk assessment than presented in the draft report, as the option and related details become more defined as a result of the consultation process.	Flood risk to be considered further in substation siting studies. A detailed FRA is likely to be required as part of the EIA.

	Organisation	Issue Raised Date	Comments	Response
51	Environment Agency	30/01/12	Where watercourse crossings are required, EA should be consulted to establish the need for a formal Flood Defence Consent, and to determine any specific operational constraints for access along the channel in the vicinity of the cable crossing point. This is of particular importance when a statutory main river is involved.	To be considered as part of detailed design and EIA process
52	Environment Agency	30/01/12	Whilst under crossings may appear to be preferable in the first instance, suitably designed overhead crossings with adequate lateral and vertical clearances, to allow for machine access under cables, may also be acceptable.	To be considered as part of detailed design and EIA process
53	Environment Agency	30/01/12	It would be useful if new (or amended) environmental constraint inset maps could be produced to show the watercourse network highlighted, with main river in bold, together with EA flood zones plotted onto the route option maps.	This will be considered as part of detailed design and the EIA process when access to land will allow accurate recording of watercourses. The substation siting study will include map illustrating the EA flood zones.

	Organisation	Issue Raised Date	Comments	Response
54	Environment Agency	30/01/12	For preferred option TO5, the location of any new GSP to the north of Sandford should be sequentially located within flood zone 1, to comply with the recommendations of the Pitt Review (resilience of critical infrastructure).	In accordance with the sequential approach detailed in PPS 25 the substation siting study will seek to identify potential substation sites that are outside of Environment Agency Flood Zones 2 and 3
55	Environment Agency	30/01/12	Need to consider groundwater Source Protection Zones	Groundwater source protection zones will be considered in substation siting.
56	Environment Agency	30/01/12	Any works in the Portishead, Avonmouth and Seabank areas must fully consider the potential for contaminated land and any related impacts.	This will be considered as part of the wider Hinkley Point C Connection Project.

	Organisation	Issue Raised Date	Comments	Response
57	English Heritage	06/02/12	Assessment to adopt a wide definition of setting of heritage assets as PPS5	Potential effects on the setting of heritage assets will be considered initially as part of substation siting and route corridor studies and in detail as part of the subsequent EIA. The method of historic environment assessment will be undertaken in accordance with the guidance provided by PPS5 and will be discussed with members of the Historic Landscape Thematic Group.

	Organisation	Issue Raised Date	Comments	Response
58	English Heritage	06/02/12	Full EIA evaluation for Tyntesfield and Cleeve Court to be undertaken, also what impact if any there may be on Bath's World Heritage Site and its setting. The landscape character and buffer area around this WHS should be fully considered and assessed accordingly.	National Grid and WPD's preliminary preferred option would involve the construction of a new GSP substation in the Churchill/Sandford area of North Somerset. This solution would remove the requirement for distribution system connections which pass in close proximity to the designated assets of Tyntesfield, Clevedon Court and Bath World Heritage Site. The potential for effects on designated heritage assets will be considered initially as part of substation siting and route corridor studies and in detail as part of the subsequent EIA.

	Organisation	Issue Raised Date	Comments	Response
59	English Heritage	06/02/12	Visual montages required of options where significant heritage assets may be affected and where pylons would be in close proximity to them.	Discussions will be held with the attendees of landscape and views and Historic Environment Thematic Groups the use and locations of photomontages as part of the EIA.
60	English Heritage	06/02/12	Further consultation with English Heritage required if the preferred route is located in proximity to any Scheduled Monuments.	The presence of Scheduled Monuments will be considered in substation siting and route corridor studies and these are features National Grid and WPD will 'seek to avoid'. Further consultation will be undertaken with English Heritage should the option to be taken forward be in proximity to such assets.