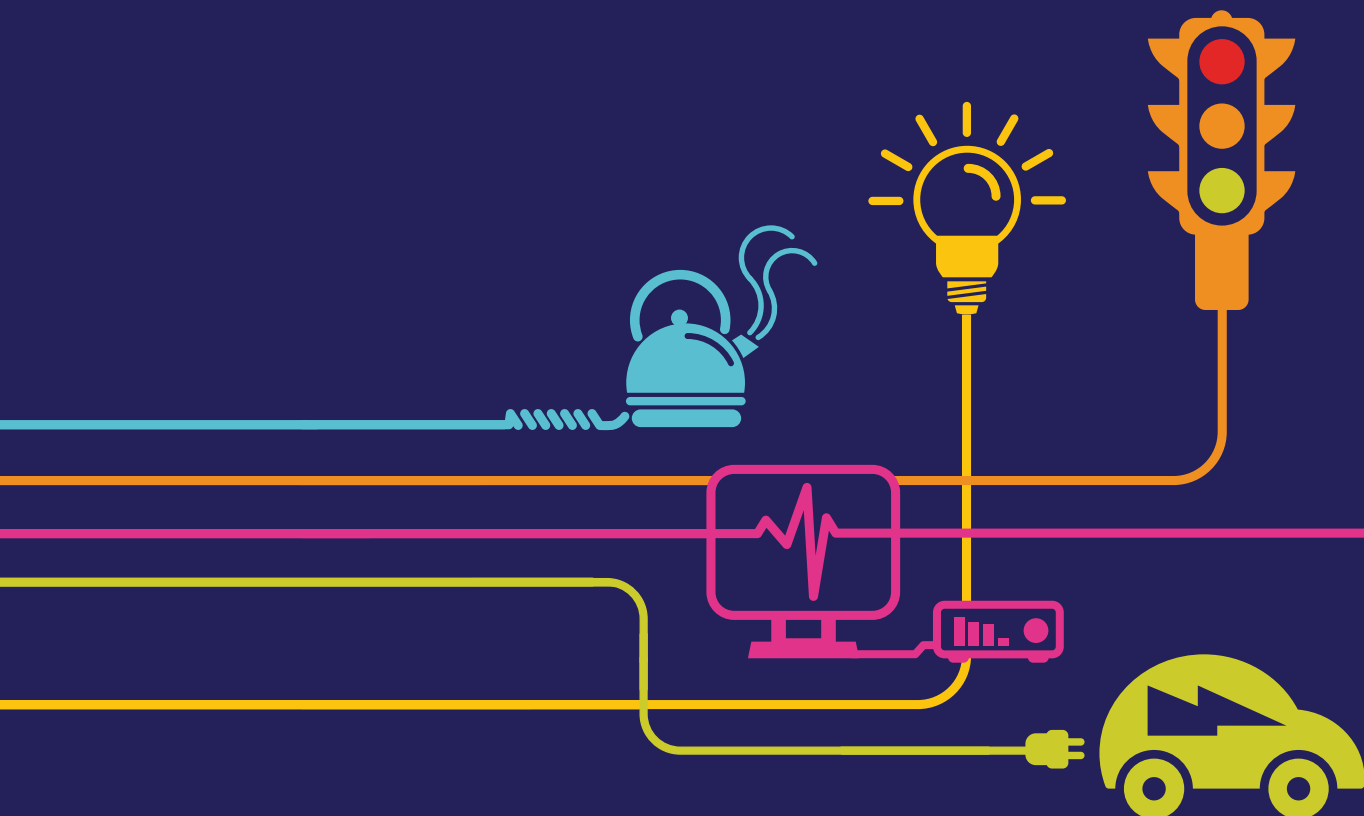


Environmental Statement Biodiversity and Nature Conservation

Hinkley Point C Connection Project

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



Hinkley Point C Connection Project

ENVIRONMENTAL STATEMENT – MAY 2014

VOLUME 5.8.1, CHAPTER 8 – BIODIVERSITY AND NATURE CONSERVATION

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8 BIODIVERSITY AND NATURE CONSERVATION

8.1 Introduction

- 8.1.1 This chapter sets out the assessment of potential effects of the construction, operation and decommissioning of the proposed Hinkley Point C connection on ecological receptors. This chapter is supported by **Volume 5.8.2, Appendices 8A to 8P** and **Volume 5.8.3, Figures 8.1 to 8.58** which assist in the understanding of the descriptions and assessments presented in the text.
- 8.1.2 Sections A to H of the Proposed Development (as described in **Volume 5.3.1, section 3.2**) were devised in consultation with the Landscape and Views Thematic Group to assist in the assessment process but do not relate to distinct ecological features or boundaries. This ecological chapter is structured to address each receptor in turn – sites, habitats and species. Relevant Sections are however referenced to aid cross-referencing between Environmental Statement (ES) chapters and aid the reader in identifying locations.
- 8.1.3 Ecological receptors are described under section 8.4: Baseline Environment, of this chapter, including designated wildlife sites, habitats and species. Potential effects of the Proposed Development on these receptors are set out for the construction, operational and decommissioning phases. In line with EU guidance, consideration is also given in this chapter to the effects of climate change on biodiversity and accordingly, the ability of each receptor to cope with such effects with the Proposed Development in place. Mitigation measures to prevent, reduce or offset potential adverse effects are set out, referencing key deliverable documents where appropriate. Ultimately, residual effects are concluded. **Volume 5.17.1** considers the potential for cumulative effects arising from other projects.
- 8.1.4 The spatial scope of this chapter reflects the ‘zone of influence’ of the Proposed Development. To identify this, consideration was given to potential direct and indirect effects that may occur during the lifespan of the project, as the scheme design evolved. The study area for each ecological receptor was determined accordingly; this is tabulated in **Volume 5.8.2, Appendix 8A**.
- 8.1.5 Ecological field surveys commenced in 2009 across two Route Corridor options, and the scope of surveys has subsequently been progressively refined to focus on the preferred corridor and ultimately the final Order Limits within which the selected route alignment and associated working areas (collectively referred to as the Proposed Development) fall. Surveys were scoped in consultation with relevant statutory bodies and the Biodiversity Thematic Group, taking into consideration the habitats present and the potential effects of the Proposed Development.
- 8.1.6 A standalone Habitat Regulations Assessment (HRA) Report (**Volume 5.20.1**), has been carried out, the key findings of which feed into this chapter and are cross-referenced where appropriate. The Applicant’s HRA Report specifically considers potential effects on the integrity of Natura 2000 sites (Ref. 8.1) within the influence of the development. The Applicant’s HRA Report focuses on the qualifying features of these sites that have the potential to be affected by the Proposed Development and is therefore primarily concerned with effects on birds and bats.

Project Engagement

EIA Scoping

- 8.1.7 As part of the scoping phase of the Environmental Impact Assessment (EIA), National Grid Electricity Transmission plc (National Grid) prepared a Scoping Report (April 2013) setting out the proposed approach to EIA in respect of the Proposed Development, including the identification of assessment methods for each of the EIA topics.
- 8.1.8 The Scoping Opinion is provided at **Volume 5.5.2, Appendix 5A**. A summary of the Scoping Opinion representations received (relevant to EIA) and National Grid's responses are summarised at **Volume 5.5.2, Appendix 5B**. A summary of the main Scoping Opinion representations received in relation to biodiversity and nature conservation is presented in the **Table 8.1**. The designated sites scoped in or out of the EIA in **Volume 5.8.2, Appendix 8A**.

Table 8.1 Summary of the Main Biodiversity Scoping Opinion Representations Received

Representation	Response
The potential impacts on international and nationally designated sites should be addressed as well as county level habitats. The Secretary of State (SoS) notes the possible need for an Appropriate Assessment in view of the development site's location in relation to various European sites including the Severn Estuary SAC SPA Ramsar, the North Somerset and Mendips Bat SAC and the Somerset Levels and Moors SPA Ramsar.	Potential effects on international and nationally designated sites are addressed herein. The standalone Applicant's HRA Report (Volume 5.20.1) has been prepared in consultation with Natural England (NE).
The SoS recommends that the proposals should address fully the needs of protecting and enhancing biodiversity. The assessment should cover habitats, species and processes within the sites and surroundings. The SoS draws attention in particular, but not exclusively, to the effects from habitat fragmentation on bat species and the potential loss of functional habitat beyond the boundaries of statutory wildlife sites for birds that are designated features of these sites. Effects for both construction and operational phases should be addressed in the ES.	The needs of protecting and enhancing biodiversity are addressed herein, which includes the consideration of the issues raised by SoS.

Representation	Response
There is concern that the project could cause bat habitat fragmentation along the length of the development. So a judgement of impact significance would have to be made by looking at levels of bat activity, main commuting routes and roost locations and proposals regarding removal of linear landscape features (hedgerows, etc.) in these areas. Clearly, the removal of large tracts of hedgerows in such areas would potentially have a detrimental effect on the 'favourable conservation status' of bat species in the area and would need to be mitigated for in some way, for example, through planting schemes re-directing bats to enable them to still access key foraging area and roosts. We are also concerned that the proposed power lines could potentially through Electro Magnetic Field (EMF) interference, prevent bat species accessing their foraging areas and their roost sites, though very little is known about the effect of EMF on bats.	Potential effects on bats as a result of hedgerow removal have been assessed herein. Detailed mitigation measures are provided in the Biodiversity Mitigation Strategy (BMS) (Volume 5.26.3, section 3.4). Potential effects on ecological receptors associated with EMF are addressed as part of the operational effects.
Typically, the predicted number of bird deaths is expressed as an increase against background mortality levels for the species' relevant population i.e. SPA, SSSI or regionally important. As early as possible in the assessment process, it would be useful to discuss the potential mitigation options available, and when these might be considered necessary.	Details of ornithological assessment and appropriate mitigation measures are provided herein.

Statutory Stage 4 Consultation

- 8.1.9 Statutory Stage 4 Consultation took place over a period of eight weeks between 03 September and 29 October 2013 in accordance with the Planning Act 2008. Statutory and non-statutory consultees and members of the public were included in the consultation. Various methods of consultation and engagement were used in accordance with the Statement of Community Consultation (SoCC) including letters, website, public exhibitions, publicity and advertising, inspection of documentation at selected locations and parish and town council briefings.
- 8.1.10 National Grid prepared a Preliminary Environmental Information Report (PEIR) which was publicised at this consultation stage. National Grid sought feedback on the environmental information presented in that report. Feedback received during Statutory Stage 4 Consultation was considered by National Grid and incorporated where relevant in the design of the project and its assessment and presentation in this ES.
- 8.1.11 A summary of the Statutory Stage 4 Consultation representations received (relevant to EIA) and National Grid's responses are summarised at **Volume 6.1** (Consultation Report). A summary of the main Statutory Stage 4 Consultation representations received in relation to biodiversity and nature conservation is presented in **Table 8.2**.

Table 8.2 Summary of the Main Biodiversity Statutory Stage 4 Consultation Representations Received

Representation	Response
Although a substantial amount of data has been collected concerning biodiversity there are still surveys that have yet to be completed. Much of the data that is presented in the PEIR has not been analysed in a rigorous fashion in order to assess the impacts of the options chosen and it is unclear from the document about how ecological considerations have influenced choices concerning cable routes and undergrounding vs. overhead options.	The information provided in the PEIR was preliminary and full baseline data has been provided herein and in the supporting Applicant's HRA Report (Volume 5.20.1). The selection of underground vs. overhead options is discussed in the supporting optioneering documents and is a decision by National Grid based on a balanced consideration of a range of environmental and engineering topics.
The assessment of the potential for death or injury of birds particularly from the Severn Estuary European Marine Site or the Somerset Levels and Moors SPA as being neutral does not appear to take into account the potential movement of birds between the two sites. In addition there are inconsistencies in the survey and radar data impacts	National Grid has undertaken full consultation with NE, RSPB and the authors of the radar study to resolve the discrepancies between the findings of the vantage point surveys undertaken for the Proposed Development that little bird movement takes place and those of the radar study report. The results of these consultations have been incorporated herein and in the supporting Applicant's HRA Report (Volume 5.20.1).
The potential impacts of the section of route crossing Hallen Marsh have not been fully assessed in relation to the Severn Estuary European Site. The route across the marsh should be changed to avoid if possible, or minimise impact on this area, which has been identified by Bristol City Council and SGC to provide compensation for impacts on the Severn Estuary European Site	This issue regarding impacts on Hallen Marsh has been subject to consultation with the Local Authorities and the outcome of these discussions with regards to in-combination impacts is discussed herein and in the supporting Applicant's HRA Report (Volume 5.20.1).
Detailed mitigation would be required in relation to the proposed undergrounding within the AONB and the effects on horseshoe bat species for which the SACs are designated.	Full survey and assessment has been undertaken in relation to the AONB and the effects upon horseshoe bats herein and the Applicant's HRA Report (Volume 5.20.1). Detailed mitigation is set out herein and in the BMS (Volume 5.26.3, section 4.2).

Representation	Response
With regards to the undergrounding of the route in the Mendip Hills, this is potentially the more damaging option with regards to potential impacts on hedgerows that form ecological networks in the AONB and wider landscape. They are considered particularly important for horseshoe bats that feed extensively and commute along hedgerows.	The use of the local network of hedges by bats for commuting (daily and seasonal movements) and foraging is considered in the Applicant's HRA Report (Volume 5.20.1). National Grid held meetings with NE to discuss such issues and the working methods (i) designed to minimise the effects on the hedgerow network and (ii) to mitigate the effects on bats during the construction and post-construction (habitat establishment) periods. These effects that relate to HRA, and to bats in general, are detailed herein and the supporting appendices and figures. The innate value of the hedgerows is also considered herein.
The route proposes a significant amount of vegetation/tree loss. However, the plans do not specifically indicate which trees and hedgerows would be lost and which are to be retained and protected. It is not therefore possible to fully assess the development's effects on the character of the landscape, visual environment or indeed many ecological receptors.	The Arboricultural Impact Assessment (Volume 5.21.1) identifies the tree and hedgerow losses resulting from the Proposed Development. The extent of works has been modified to retain trees, particularly those protected by TPO, within a designated site and/or supporting known bat roost. Retained trees protected during proposed construction works. Replacement planting has been identified at a 4:1 ratio delivered through the Site-Specific Replacement Planting Plan, Tree Replacement Plan and the Off-Site Planting and Enhancement Scheme (Volume 5.25.1). This information has informed the assessments undertaken in (but not limited to); Volume 5.6.1 (Landscape), Volume 5.7.1 (Visual Effects) and Volume 5.8.1 (Biodiversity and Nature Conservation).
There is a lack of quantified information regarding habitat loss (either permanent or temporary) that would be caused by the proposed development. The Councils consider that some form of biodiversity offsetting is likely to be necessary to compensate for residual impacts that cannot be mitigated adequately	Habitat loss calculations are provided herein. The Somerset County Council offsetting matrix was considered to quantify mitigation of residual effects. This chapter identifies residual impacts that cannot be mitigated fully through embedded measures, and puts forward additional measures, including off-site planting and enhancement and local sites offsetting to compensate.

- 8.1.12 Some representations related to the absence of full field survey data relating to bats and to the Portbury Wharf nature reserve from the PEIR. The surveys in question were on-going at the time but the data obtained informs the assessment and proposals for mitigation outlined in this chapter and accompanying appendices.

Draft ES and Supporting Documents

- 8.1.13 The Draft ES and a large number of the ES supporting documents were provided to a number of statutory and non-statutory bodies over a period of two weeks between 3 February and 17 February 2014. This process of engagement (over and above that required by the statutory consultation process) was undertaken to provide an opportunity for these bodies to influence the assessment documents prior to their finalisation to accompany the Development Consent Order (DCO) application.
- 8.1.14 A summary of the Draft ES representations received (relevant to EIA) and National Grid's responses are summarised at **Volume 5.5.2, Appendix 5C**. A summary of the main Draft ES representations received in relation to the Biodiversity and Nature Conservation are presented in the table below.

Table 8.3 Summary of the Main Biodiversity and Nature Conservation Draft ES Representations Received

Representation	Response
The specific detail sought in the mitigation table has not been provided in particular with regard to the impacts on Local Wildlife Sites and s106 funding to allow Local Authority monitoring of compliance with requirements.	The Local Sites Offsetting Strategy is provided as 'Additional Mitigation' in Ch8 of the ES, reflecting its status as a s106 deliverable. Volume 5.8.2, Appendix 80 provides a detailed breakdown of impacts for each local wildlife site. The BMS describes specific construction working methods.
The assessment should reference the Site Allocation and Development Management Policy and relevant context relating to a review of these allocations in 2016 in the Enterprise Area.	The HRA assesses the plans and policies relating to the Avonmouth/Severnside area. This has been presented to Natural England to review and has been discussed with Bristol City Council. The ecology section of Volume 5.17.1 also includes an assessment of these plans/policies.
There is no baseline assessment section in relation to the structure/management of hedgerows. The height (and width) of hedgerows is significant in terms of the assessment of the ecological value of the hedgerow as a feature for bats.	The calculation of hedgerow losses shows those that are over 3m in height. Consideration has been given to the extended period which these hedgerows would need to re-establish ecological functionality. Hedgerows >3m high have also been considered in the provision of bat flyways.
Toads are widespread. In N. Somerset there are a number of toad migration routes across the district e.g. Winscombe Hill Road, Mendip Road, Yatton, the Gordano Valley, and Portishead.	Migrations identified in the consultee response include areas >2.5km from the Order Limits. Toad crossings have also been identified from the Froglife database. Volumes 5.8.1 and 5.8.3 have been amended accordingly.

Representation	Response
Horseshoe bats recorded in excess of 4km from the Mendip SACs have only been valued as being of county importance, along with barbastelle bats outside the consultation zone for the Exmoor and Quantocks Oakwoods SAC. Dormouse - The route includes locations near Banwell with good hedgerow networks, with dormouse found in Locking and Barton. However, it is noted that these records are discussed later in section 8.5. NG surveyors utilised tubes, whereas some dormouse surveyors advise they obtain a better uptake by dormice when using dormouse boxes (Craig Stenson pers. comm).	The ES has been updated to value all greater horseshoe, lesser horseshoe and barbastelle bats as of international importance. Impact assessment takes account of the Somerset Biodiversity Offsetting Consideration Zones (CZ) and CZ Modifier Bands. Dormouse records are clarified in section 8.4, Table 8.23 and section 8.5. The precautionary approach to impact assessment and mitigation allows for potential future or low level use by dormice. This is reflected in the BMS. NE Standing Advice does not stipulate use of boxes. NE Interim Advice Note WML-G37 12/11 (Dormouse surveys for mitigation licensing – best practice and common misconceptions, 2011), referenced in Standing Advice, suggests use of boxes in addition to tubes where there is sufficient time to ‘bed-in’ the boxes. Owing to project constraints, this was not possible.
The section does not refer to effects of dust on habitats or species, despite the air quality chapter considering the effect to be slight adverse after mitigation. There is no consideration of the effects of surface water run-off during construction which could be highly significant in areas of undergrounding, especially where these are in or near to designated sites.	Residual effects on ecological receptors identified in the the Air Quality and Emissions ES Chapter (Volume 5.13.1) are considered in Volume 5.8.1. Embedded mitigation set out in the Hydrology and Water Resources ES Chapter (Volume 5.10.1) forms part of the assessed scheme, which includes measures to satisfactorily avoid adverse effects associated with surface water run-off and emergency response measures.
Grassland replacement. It is not generally recommended for designated Wildlife Sites to be re-seeded; as they are designated for their intrinsic interest. It is preferable for topsoil to be stored and retained. It is important for designated Wildlife Sites to be brought into positive conservation management. This should form part of the on and offsite mitigation (through S.106 obligations that fund projects to provide advice and/or financial assistance to landowners to implement appropriate management).	In the main LWS’s are farmed land. Although topsoil will be retained and reused, the land owner may be unwilling to wait for the land to re-seeded as this affects their operations. Furthermore, there may be run-off concerns for local ditch systems (many of which have their own designations). Locally appropriate seed mixes are specified as part of the reinstatement package. National Grid has committed to management of reinstated habitats for 5 years to ensure these establish as intended.
In order to fully mitigate for the loss of tall hedgerows over the longer term, it is not sufficient to simply re-plant.	NG will manage the hedgerows for 5yrs. Only where replacement hedgerows are beneath overhead lines, heights will be restricted by electrical safety clearances.

Representation	Response
A net loss of bat foraging habitat value can be predicted for the scheme and it is likely that this would be considered a significant effect in EIA terms and an adverse effect on integrity in a HRA context.	No significant loss in bat foraging habitat is predicted in the long term and the approach to mitigating short term losses is detailed in the HRA and has been reviewed by NE's bat specialist.
The OSPES proposals for tree and hedgerow planting could be undertaken in Local Wildlife Sites. Of particular concern is planting of trees and hedgerows in Hallen Marsh Agricultural Land, as this site will provide compensatory areas for wintering birds from the Severn Estuary. Planting would compromise its ability to host waders which prefer open areas. Local Wildlife Sites identified in the OSPES proposals for tree and hedgerow planting should be assessed to identify actions to bringing them into positive conservation management.	The OSPES planting near Hallen Marsh is restricted to planting along the boundary of the site which is also along existing roads which are likely to have an existing displacement effect for wintering birds. The OSPES notes that any planting would be undertaken in consultation with BCC's ecologist. Planting in the OSPES has been reviewed to ensure it doesn't contradict the reasons for designation of any wildlife sites. The implementation of the OSPES will be within LPA control and further amendments could be made if assessments suggest it would be appropriate.
Hallen Marsh has been secured as a compensatory measure for effects on the Severn Estuary, so any effect on this site should be assessed as if it were part of the internationally designated Severn Estuary under the Habitats Regulations (Tyldesley & Chapman, 2013). The Councils do not consider that National Grid has presented the evidence to date which would satisfy these two tests. Compensatory measures, if relevant, would need to comply with relevant guidance, including that relating to timing of provision, compensation ratios and location (Guidance document on Article 6(4) of the Habitats Directive, E.C. Jan. 2007).	The ES is now explicit that Hallen Marsh is considered alongside the Severn Estuary designations. The assessment has been undertaken in accordance with HRA guidance and presented to Natural England. The assessment of the potential future bird displacement effect of the Proposed Development at Hallen Marsh concludes that the majority of the overhead line sits within the existing displacement zone of the Motorway, plantation and the Severn Road. It concludes that the remaining area of land more than allows for delivery of the area stated in the Cresswell report as being necessary to allow offsetting for future Avonmouth development.
The text states that the impact of works at Hallen Marsh will have a 'moderate beneficial' effect. This conclusion is questioned because it fails to take into account the fact that the 'Pool at eastern end of Hallen Marsh' identified in the Cresswell Stage 2 report will no longer be suitable for SPA qualifying interest feature birds.	The assessment of Hallen Marsh has been revisited. The pool was described from desk study and extrapolation from known bird assemblages in other areas of Avonside. NG's field assessment of the pool indicates it provides poor habitat for SPA species and it is within the displacement zone created by the M49 motorway. This is detailed in Appendix 8F.

Representation	Response
Reference is made in the mitigation column for many of the Local Wildlife Sites to measures including the BMS and Habitat Reinstatement. Habitat reinstatement is not mitigation as it only occurs after the completion of the construction phase. Consideration is needed of the effects during the 4 years of construction and measures to reduce the significance of those effects. The BMS does not contain specific information regarding mitigation at Local Wildlife Sites.	Habitat loss is a construction phase effect. Habitat reinstatement mitigates this. Reinstatement will be carried out in the latter part of the construction phase, once works are complete. This is set out in section 8.5. Reinstatement will take time to establish (different periods for different habitats) and accordingly the duration of each effect has been stated. The BMS now includes a site by site description of mitigation for all LWS's physically affected.
Whilst significant fisheries and biodiversity impact is unlikely, shading caused by the bridge works could result in a loss of bank-stabilizing vegetation. This could result in geomorphological changes including increased erosion and even bank failure. National Grid should review this risk and mitigate accordingly.	Bank stability is a key consideration of bridge design which will be determined at the detailed design stage. This is clarified in Volume 5.8.1. Two optional clear-span bridges are proposed at the River Axe and Towerhead Brook. Vegetation lost to the bridge construction is included in the habitat loss calculations. At the River Axe, the bridge is set back from the water with footings in adjoining agricultural land. The banks support a grassy sward of common species. Towerhead Brook is a shallow flowing stream with low banks colonised by species typically associated with the adjoining pasture and hedgerow habitats. In neither case would localised dieback from shading cause impact on bank stability or erosion.
There is a high risk of these culverts remaining in place because land-owners choose to keep the improved infrastructure on their land. Additionally, the culverts will be <i>in-situ</i> for approximately 5 years. It is suggested that these structures should be assessed as permanent structures and appropriate mitigation suggested.	The Proposed Development, and the Requirements of the DCO, stipulates that the culverts will be removed in the latter stages of construction. Volume 5.8.1 section 8.5 'Potential Construction Effect' now clarifies this point. It assesses potential effects of culverts being in place for the entire four year construction period.
There is no assessment of the potential increase in water temperature from the underground 400kV line. This could have a significant impact on trout in the Lox Yeo.	Temperature effects on aquatic and terrestrial habitats have been clarified in light of current scientific information available and consultation with the other environmental disciplines.

Representation	Response
National Grid needs to pre-determine a number of translocation sites where water voles are known to be absent. This is to avoid territorial fighting between resident and translocated voles. If any wetland habitat is being created as mitigation for impact (ditch creation) it may be worth ensuring this habitat is suitable for water voles and using it as a translocation option.	Sensitive vegetation clearance to displace water voles from working areas will be carried out in the season prior to territories becoming established, thereby avoiding territorial fighting between resident and relocated water voles later in the year. Volume 5.8.1 text has been amended to clarify this.
The proposal to underground one of the 132kv lines and remove the other 132kv line at Portbury Wharf Reserve remains. The AWT is still extremely concerned about the potential impacts of this development. The methodology needs to be consistent with undergrounding of the 400kv route. The Trust's view is that the approach needs to be the same for both.	Restrictions to the 132kV underground working areas have been achieved and are presented in the draft great crested newt licence application. On balance across all environmental disciplines National Grid concludes that the temporary effects on ecology during construction phase would be outweighed by long term environmental benefits during the operational phase.
The ES (para 8.8.1) states that undergrounding may lead to 'Modification of semi-improved neutral and marshy grassland (derived from former grazing marsh communities) where the process of reinstatement may not replicate the former species diversity and soil hydrology. This includes some very small parcels of land in designated sites (i.e. Portbury Wharf), but the largest contiguous area (in Nailsea and Tickenham Moor SNCI would be subject to HDD installation of a 132kV cable)'. In addition, the literature review at Paragraph 8.5.204 points to a Minor Significant Effect on Portbury Wharf. There is no mitigation proposed for this effect and we would appreciate further discussion on this.	The horizontal directional drilling (HDD) installation across Nailsea and Tickenham Moor SNCI is proposed to minimise effects on the SSSI ditches, any benefits on the SNCI are co-incidental. It is not the general approach of National Grid on this project to propose HDD of local wildlife sites.

Thematic Group Meetings

- 8.1.15 Following the selected Route Corridor announcement in September 2011 (see **Volume 5.2.1**), National Grid established three Thematic Groups (Landscape and Views, Biodiversity, and Historic Environment) comprising technical officers from local authorities and statutory consultees. These provided advice and commented on the information which National Grid gathered to use in its studies.
- 8.1.16 The Biodiversity Thematic Group met on 11 occasions between September 2011 and submission of the DCO. Minutes were circulated as a record of discussions.

The key themes for design, mitigation and assessment emerging from the BTG meetings were:

- Advice regarding field survey techniques especially for protected species, and assistance with interpretation of historic data collected for the assessment.
- Advice regarding the application of the 'mitigation hierarchy' to specific designated sites, species and habitats. This is the process whereby project designers gather information and using this information, seek to avoid adverse effects on ecological receptors. Mitigation is then applied to reduce the scale of adverse effects. Where there is a residual adverse effect, compensation is provided on or off-site to result in no net loss of biodiversity (sometimes through a compensatory mechanism of offsetting). Aside from the mitigation hierarchy, opportunities to enhance biodiversity are also sought.
- Advice regarding local nature conservation management schemes, such as the Avon Wildlife Trust's proposals for Portbury Wharf, habitat creation and enhancement at Hallen Marsh to offset development at Avonmouth and Severnside, the Mendip AONB Management Plan and the Somerset Biodiversity Offsetting Strategy and Methodology (Somerset County Council, 2013).
- Local precedents for mitigation of development near the Natura 2000 and Ramsar sites near the Proposed Development.
- Discussion of the appropriate ways to assess and mitigate the most significant perceived adverse effects, notably bird collision risk arising from overhead wires and the effect of underground lines on hedges, watercourses and bat habitat usage.

8.1.17 National Grid also met members of the Biodiversity Thematic Group in their respective administrative areas to examine the potential effects of the project on specific sites. This included meetings with ecologists from Somerset County Council, Bristol City Council, North Somerset Council and Avon Wildlife Trust. The Group also provided detailed comments on the first and second drafts of the BMS (**Volume 5.26.3**) and the draft Environmental Statement. The information gathered from the Group members was used to refine field surveys, to inform the Route Corridor selection process, and to focus the design process to avoid or, where this was not possible, to minimise effects where practicable. Their advice also informed the design of mitigation.

8.1.18 The Biodiversity Thematic Group members (both the consultees and National Grid's officers and consultants) shared information with their respective colleagues sitting on the Landscape and Views Thematic Group, to discuss how design and mitigation measures for the respective topics might work together, and to minimise conflicts between mitigation proposals.

Other Consultation

8.1.19 Additional consultation was carried out with bodies with a statutory remit as consultees to PINS in its consideration of Nationally Significant Infrastructure Projects (NSIP); the proposed overhead line Development Component forms an NSIP.

8.1.20 The Natural England (NE) Wildlife Licencing Unit was consulted to ensure the field surveys collected sufficient data to inform draft licence applications submitted as part of the DCO process. In particular, this involved the agreement of the scope and method for amphibian survey of the ditch networks, for which there is no

published standard guidance. Draft licence applications and protected species method statements were submitted in late 2013 and early 2014 in respect of great crested newts, bats, water voles and badgers. NE comments on the draft licences informed the detailed mitigation design.

- 8.1.21 NE also advised on bats, specifically the survey methods, assessments and mitigation proposals for horseshoe bat species for which various Special Areas of Conservation (SAC) are designated, where the Proposed Development intersected the 4km ecological zone of influence associated with the SAC bat designations (refer to section 8.4: Baseline Environment/Bats). As a consequence of this dialogue and reflecting the statutory HRA process, National Grid developed a scheme of mitigation including protection of bat flyways and replacement of hedgerows.
- 8.1.22 NE and RSPB advised on the ornithological assessment, particularly in relation to the scope and content of the HRA. These bodies directed National Grid to additional survey information that might inform the process of bird collision risk assessment, and advised on how the routeing and design of the Proposed Development might avoid or minimise bird collisions. As a consequence of this dialogue and a process mirroring statutory appropriate assessment, National Grid developed a scheme of mitigation, including the provision of bird flight diverters, monitoring and research.
- 8.1.23 NE advised on the scope of other matters relevant to HRA, including consideration of habitats, fish and otters which are qualifying features of Natura 2000 and Ramsar sites near the Proposed Development. Taking advice from NE on mitigation, these receptors were agreed not to be likely to experience significant effects in terms of their contribution to the Natura 2000 site network.
- 8.1.24 NE also advised on protection and mitigation measures appropriate in the Sites of Special Scientific Interest (SSSI) potentially affected by the Proposed Development. This included advice on construction working methods and a recommendation regarding water level management. These recommendations have been taken into account.
- 8.1.25 The Environment Agency (EA) advised on techniques for mitigation of impacts associated with watercourse crossings, water vole protection and fishery protection.
- 8.1.26 National Grid also consulted Avon Wildlife Trust regarding mitigation of works in the Portbury Wharf Avon Wildlife Trust Reserve (WTR).

8.2 Policy and Legislation

- 8.2.1 This section provides a summary of planning policy and legislation relevant to biodiversity and nature conservation in relation to the Proposed Development. It demonstrates how the provisions contained within planning policy and legislation are met in the approach to assessment and mitigation.

National Policy

- 8.2.2 The following National Policies have been reviewed:
 - Overarching National Policy Statement (NPS) for Energy EN-1 (EN-1), July 2011;

- NPS for Electricity Networks Infrastructure (EN-5), July 2011; and
- The National Planning Policy Framework (NPPF), March 2012.

National Policy Statement EN-1

8.2.3 The assessment of potential effects has been made with specific reference to relevant NPSs; these form the principal policy framework within which decisions on Nationally Significant Infrastructure Projects (NSIP) are made. The principal guidance for examination of the application is that provided by Overarching National Policy Statement for Energy (EN-1) and National Policy Statement for Electricity Networks Infrastructure (EN-5). NPS EN-1 is directly relevant to this chapter and the relevant sections and how they have been addressed are summarised in the table below.

Table 8.4 EN-1 and EN-5 requirements for biodiversity and how they have been addressed

Para	Requirement	ES Section	Compliance
EN-1			
Habitats and Species Regulations			
4.3.1	Prior to granting a development consent order, the IPC must, under the Habitats and Species Regulations ⁷⁹ , (which implement the relevant parts of the Habitats Directive and the Birds Directive ⁸⁰ in England and Wales) consider whether the project may have a significant effect on a European site, or on any site to which the same protection is applied as a matter of policy, either alone or in combination with other plans or projects.	Volume 5.20.1, section 3.3	This section discusses the number of potential effects that could influence the designated features of the European sites which may arise during the construction, operation and decommissioning of the Proposed Development. In-combination effects with other plans or projects are also discussed in Volume 5.20.1, section 3.9 of the HRA.
4.3.1	The applicant should seek the advice of Natural England and/or the Countryside Council for Wales, and provide the IPC with such information as it may reasonably require to determine whether an Appropriate Assessment is required.	Volume 5.20.1, section 1.5	National Grid has engaged Natural England and Natural Resources Wales (formerly CCW) in the process of HRA since 2009. A summary of the process is provided at Volume 5.20.2, Appendix 20C of the HRA.

Para	Requirement	ES Section	Compliance
4.3.1	In the event that an Appropriate Assessment is required, the applicant must provide the IPC with such information as may reasonably be required to enable it to conduct the Appropriate Assessment. This should include information on any mitigation measures that are proposed to minimise or avoid likely effects.	Volume 5.20.1; Volume 6.2	Information derived from ecological surveys and the consultation process has been used, alongside other environmental survey data, to inform the strategic routing and subsequent design of the proposed route, substation and ancillary works. This is demonstrated through the Route Corridor selection process has been further refined through the Change Request process. Both of these approaches are outlined in the HRA and ES and reported fully in the Route Corridor Study and Consultation Report.
Biodiversity and Geological Conservation			
5.3.3	The applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.	Volume 5.8.1, section 8.5 Volume 5.20.1	There are no sites of geological conservation importance within the Order Limits. Effects on designated sites are set out in Volume 5.8.2, Appendix 8A and Appendix 8O . Effects on protected species, habitats and other species of principal importance are discussed in the noted sections. Volume 5.8.1, section 8.4 describes the area within which the Proposed Development would occur. Volume 5.8.1, section 8.5 identifies the elements of the Proposed Development that are anticipated to have an effect on biodiversity and nature conservation, and sets out the sources of effect(s) during construction, operation and decommissioning phases, which are considered individually for each receptor – sites, habitats and species. Volume 5.20.1, section 3 also discusses effects on designated sites and protected species.

Para	Requirement	ES Section	Compliance
5.3.4	The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.	Volume 5.8.1, section 8.5 and 8.7 Volume 5.26.3, section 8.9	There are no sites of geological conservation importance within the Order Limits. In Volume 5.8.1 , opportunities to conserve and enhance biodiversity are described throughout the chapter, specifically within the mitigation sections. The OSPES (Volume 5.26.1) details a package of enhancement measures for off-site planting. The BMS also describes species conservation and habitat reinstatement and enhancement measures.
5.3.4	As a general principle, and subject to the specific policies in Part 5.3 of NPS EN-1, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives; where significant harm cannot be avoided, then appropriate compensation measures should be sought.	Volume 5.8.1, section 8.5 and 8.7 Volume 5.26.3, section 8.9. Volume 5.26.3.	There are no sites of geological conservation importance within the Order Limits. The mitigation sections of Volume 5.8.1 detail the mitigation measures proposed in order to avoid significant harm to biodiversity. Volume 5.8.1, section 8.9 also details proposals for additional mitigation, including compensatory offsetting measures. The BMS (Volume 5.26.3) describes how the mitigation measures will be implemented.
5.3.8	In taking decisions, the IPC should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; habitats and other species of principal importance for the conservation of biodiversity; and to biodiversity and geological interests within the wider environment	Volume 5.8.2, Appendix 8A. Volume 5.8.2, Appendix 8O. Volume 5.8.1 section 8.5	The Habitats Regulation Assessment process ensures that very detailed consideration has been given to sites of international value. The assessment in this chapter, follows Chartered Institute of Ecology and Environmental Management guidelines, ensuring that all receptors listed at EN-1 para 5.3.8 are considered.
5.3.9	For the purposes of considering development proposals affecting them, as a matter of policy the Government wishes pSPAs to be considered in the same way as if they had already been classified. Listed Ramsar sites should, also as a matter of policy, receive the same protection	Volume 5.8.1, section 8.4	All proposed or candidate designated sites have been considered as fully designated in Volume 5.8.1 . Further, in line with local draft planning policy we have considered proposed offset land for development at Avonmouth and Severnside (Hallen Marsh) as equivalent status to the Severn Estuary SPA Ramsar.

Para	Requirement	ES Section	Compliance
5.3.10	Many SSSIs are also designated as sites of international importance and will be protected accordingly. Those that are not, or those features of SSSIs not covered by an international designation, should be given a high degree of protection. All National Nature Reserves are notified as SSSIs.	Volume 5.8.1, section 8.5	The assessment at Volume 5.8.1, section 8.5 also summarises how scheme design has sought to avoid adverse effects both at the strategic route selection phase, and later by design refinements to avoid or reduce habitat losses and disturbance. In line with the EN-1 hierarchy, particular attention was focussed on avoiding adverse effects on internationally and nationally-designated sites
5.3.11	Where a proposed development on land within or outside an SSSI is likely to have an adverse effect on an SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect, after mitigation, on the site's notified special interest features is likely, an exception should only be made where the benefits (including need) of the development at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of SSSIs.		

Para	Requirement	ES Section	Compliance
5.3.13	Sites of regional and local biodiversity and geological interest have a fundamental role to play in meeting national biodiversity targets. Due consideration should be given to such designations. However, given the need for new infrastructure, these designations should not be used in themselves to refuse consent.	Volume 5.8.1, section 8.5 and section 8.8, Volume 5.8.2, Appendix 8A and Appendix 8O	No geological sites would be affected by the Proposed Development. 76 local sites were scoped into the assessment. 52 would potentially be affected, of which 3 (5 for the alternative route) would experience medium or high magnitude temporary adverse effects which would persist beyond the period of construction and habitat re-establishment, eventually reducing in magnitude to neutral. 33 sites (31 for the alternative route) would experience low magnitude temporary adverse effects which would persist through the period of construction and habitat re-establishment, reducing in magnitude to neutral some ten years from commencement of the Proposed Development. The above assessment takes account of design and mitigation measures described at Volume 5.8.1, sections 8.5 and 8.7.
5.3.14	Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated. The IPC should not grant development consent for any development that would result in its loss or deterioration unless the benefits (including need) of the development, in that location outweigh the loss of the woodland habitat. Aged or 'veteran' trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided. Where such trees would be affected by development proposals the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons why.	Volume 5.8.1, section 8.5, Volume 5.21.1	Volume 5.8.1, section 8.5 describes how the Proposed Development would result in modification of ancient woodland at the most north western part of Mogg's Wood. The assessment notes that the wood has already been modified due to the presence of the F Route and W Route 132kV overhead lines. The assessment describes and quantifies the modification of ancient woodland that would arise from the Proposed Development and explains that there are specific benefits in using this alignment, in minimising the scale of effect in respect of landscape and views. . The Arboricultural Impact Assessment (Volume 5.21.1) quantifies the loss of veteran trees and explains why their loss is unavoidable.

Para	Requirement	ES Section	Compliance
5.3.15	Development proposals provide many opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, the IPC should maximise such opportunities in and around developments, using requirements or planning obligations where appropriate.	Volume 5.7.1, section 7.8, Volume 5.7.3, Figures 7.32 – 7.36. Volume 5.8.1, section 8.5	The site-specific landscape proposals, notably for Sandford Substation (Volume 5.7.1, section 7.8, Volume 5.7.3, Figures 7.35), demonstrate the use of native-species woodland, creation of ditch and pool habitats. Volume 5.8.1, section 8.5 provides more detail on the habitats created as a result of the Proposed Development.
5.3.16	Many individual wildlife species receive statutory protection under a range of legislative provisions	Volume 5.8.1, section 8.5. Volume 5.26.3	Volume 5.8.1, section 8.5 describes the effects of the Proposed Development on great crested newts, bats, badgers, water voles, otters, reptiles and other species. The BMS (Volume 5.26.3) provides bespoke method statements for these and other species, and it is expected that Natural England licences will be obtained, where necessary, to carry out works affecting certain species.
5.3.17	Other species and habitats have been identified as being of principal importance for the conservation of biodiversity in England and Wales and thereby requiring conservation action. The IPC should ensure that these species and habitats are protected from the adverse effects of development by using requirements or planning obligations. The IPC should refuse consent where harm to the habitats or species and their habitats would result, unless the benefits (including need) of the development outweigh that harm. In this context the IPC should give substantial weight to any such harm to the detriment of biodiversity features of national or regional importance which it considers may result from a proposed development	Volume 5.8.1, sections 8.4 and 8.5	Volume 5.8.1, section 8.4 summarises the location and extent of such habitats and species. There are no nationally or regionally significant habitats significantly affected by the Proposed Development. Volume 5.8.1, section 8.5 notes that hedgerows, broadleaved tree groups, ditches and grassland with characteristics of floodplain grazing marsh would be affected. Species on the s41 list which would be encountered in the Proposed Development include bats, hedgehogs, amphibians, birds and invertebrates which use habitats of grassland, hedgerows, trees and ditches to varying extents. The effect on s41 habitats and species, prior to mitigation is quantified at Volume 5.8.1, section 8.5 . Mitigation measures are described at Volume 5.8.1, section 8.7 and a residual assessment is provided at Volume 5.8.1, section 8.8 .

Para	Requirement	ES Section	Compliance
5.3.18	The applicant should include appropriate mitigation measures as an integral part of the proposed development	Mitigation for biodiversity is described in Volume 5.8.1, section 8.7 and the BMS, Volume 5.26.3	Volume 5.8.1 describes how design includes ecological mitigation measures such as 1) avoidance of times and places where sensitive fauna are present, 2) habitat reinstatement in-situ and 3) landscape design measures for permanent infrastructure. Site and species-specific mitigation measures are discussed in detail in the BMS.
5.3.18	The applicant should demonstrate that during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works;	Controls and mitigation for construction works are provided in the BMS, Volume 5.26.3	These sections set out the modifications which have been incorporated into the engineering design as the Proposed Development has evolved, in order to avoid or minimise potential effects on ecological receptors. Volume 5.8.1, section 8.5 also describes how the Limits of Deviation are restricted to avoid encroachment onto selected ecological receptors. Notably SSSIs. Management of the construction footprint is also considered in the Draft Construction Environmental Management Plan (CEMP) (Volume 5.26.1) and the BMS (Volume 5.26.3). These would be DCO Requirements.
5.3.18	The applicant should demonstrate that during construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements	Volume 5.26.3	The BMS details best practice methods that will be followed to minimise risk of disturbance or damage to species or habitats. Some working method statements would be required by protected species licences issued by NE. These method statements cover preparatory survey, prior vegetation clearance, wildlife handling and displacement, exclusion and protection fencing, supervision and a number of bespoke measures specific to each receptor.

Para	Requirement	ES Section	Compliance
5.3.18	The applicant should demonstrate that habitats will, where practicable, be restored after construction works have finished	Volume 5.8.1, section 8.5 and 8.7 Volume 5.26.3	The BMS (Volume 5.26.3) details the habitat restoration which will be undertaken following completion of construction works. The section also details habitat restoration proposals following completion of construction works. The habitat reinstatement, including details of species choice and programme would be DCO Requirements.
5.3.18	The applicant should demonstrate that opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals	Volume 5.8.1, sections 8.5 and 8.7 Volume 5.26.3; section 8.9 Volume 5.25.1	There are proposals to enhance existing habitats by introducing greater biodiversity as part of the habitat reinstatement process, and in new habitats created in site landscaping for the cable sealing end (CSE) compounds and Sandford Substation. The landscape proposals are submitted as part of the DCO and their implementation would be a DCO Requirement.
5.3.19	Where the applicant cannot demonstrate that appropriate mitigation measures will be put in place the IPC should consider what appropriate requirements should be attached to any consent and/or planning obligations entered into.	Volume 5.8.1, section 8.8 and 8.9	Volume 5.8.1, section 8.8 describes the residual effects, taking account of mitigation measures that would form part of the DCO, such as the BMS. Beyond the BMS, National Grid proposes additional mitigation, described at Volume 5.8.1, section 8:9 . These measures would be delivered by third parties through s106 or other agreements, funded by National Grid.

Para	Requirement	ES Section	Compliance
5.3.3 to 5.3.19		Volume 5.8.1, section 8.8 and 8.9	The whole process follows the mitigation hierarchy encouraged by EN-1: information-gathering, avoidance, mitigation, compensation and enhancement. This includes: • making well-informed decisions through measures such as undertaking detailed ecological surveys, establishing a BTG to provide greater knowledge; • avoiding adverse effects through detailed alignment studies, so as to avoid permanent physical impacts on many designated sites; • mitigating adverse effects through the implementation of a bespoke method statement for each ecological receptor potentially affected by construction works; • implementing bespoke conservation schemes for all protected species and designated sites affected by the works; • reinstating all habitats temporarily affected by construction; • implementing landscape and habitat creation schemes at the new Sandford Substation and CSE compounds; • fitting bird diverters and adopting a bird monitoring strategy (outlined below in relation to NPS EN-5); • compensating to ensure no net loss of habitats of principal importance to biodiversity. This includes replacing trees that require clearance for construction or electrical safety at a positive ratio of 4:1, and landscape proposals including the Off-Site Planting Enhancement Strategy (OSPES); and • seeking enhancement opportunities which, where feasible would, include ensuring reinstated habitats are more diverse than those which were removed and, through the implementation of off-site schemes, would provide local enhancement.

Para	Requirement	ES Section	Compliance
5.3.20	The IPC will need to take account of what mitigation measures may have been agreed between the applicant and Natural England (or the Countryside Council for Wales) or the Marine Management Organisation (MMO), and whether Natural England (or the Countryside Council for Wales) or the MMO has granted or refused or intends to grant or refuse, any relevant licences, including protected species mitigation licences.	Volume 5.8.1 Volume 5.26.3	During the preparation of this Environmental Statement, National Grid has been consulting with Natural England on matters relating to Habitats Regulations, effects on SSSI's, effects on protected species and on general biodiversity interests. National Grid has provided Natural England with a draft Habitats Regulation Report and draft protected species licence statements, and has reflected the advice of Natural England in the DCO documents, specifically the BMS.
EN-5 Biodiversity and Geological Conservation			
2.7.1 & 2.7.2	Large birds such as swans and geese may collide with overhead lines associated with power infrastructure, particularly in poor visibility. Large birds in particular may also be electrocuted when landing or taking off by completing an electric circuit between live and ground wires. Even perching birds can be killed as soon as their wings touch energised parts. The applicant will need to consider whether the proposed line will cause such problems at any point along its length and take this into consideration in the preparation of the Environmental Impact Assessment (EIA) and ES (see Section 4.2 of EN-1). Particular consideration should be given to feeding and hunting grounds, migration corridors and breeding grounds.	Volume 5.8.1, section 8.5 Volume 5.20.1 Volume 5.8.2, Appendix 8F	As part of the baseline assessment, bird surveys were commenced at the project outset, and continued for three years, in consultation with NE, to establish baseline information about the movement of birds, especially the qualifying wide-ranging wildfowl and waders of the Severn Estuary SPA Ramsar and the Somerset Levels and Moors SPA Ramsar. Volume 5.8.2, Appendix 8F details the field survey methods which were devised. Volume 5.8.1, section 8.5 and the HRA (Volume 5.20.1) discuss the impacts of bird collisions on the populations of vulnerable bird species. To satisfy the HRA and the broader application of policy EN-5 regarding large birds, notably mute swans, a contribution for monitoring work is proposed to identify if the Proposed Development results in any increased bird collision risk within the Portbury Wharf area. Electrocution has been considered and discounted as a risk given the species encountered.

Para	Requirement	ES Section	Compliance
2.7.4	Careful siting of a line away from, or parallel to, but not across, known flight paths can reduce the numbers of birds colliding with overhead lines considerably.	Volume 5.2, Volume 5.8.1, section 8.5 Volume 5.20.1	These sections of the chapter discuss bird collision risk in detail, as does the HRA. Bird flight paths have been monitored and this information used to inform the location of overhead lines. Information derived from the bird surveys was used alongside the consultation process and other environmental survey data, to inform the strategic routing and subsequent design of the proposed route, substation and ancillary works. Selection of the selected Route Corridor sought to avoid or, where not possible, minimise effects on birds, designated wildlife sites, priority habitats and habitats associated with protected species.
2.7.5	Making lines more visible by methods such as the fitting of bird flappers and diverters to the earth wire, which swivel in the wind, glow in the dark and use fluorescent colours designed specifically for bird vision can also reduce the number of deaths. The design and colour of the diverters will be specific to the conditions – the line and pylon/transmission tower specifications and the species at risk.	Volume 5.8.1, section 8.7; Volume 5.8.2 (Appendices), Volume 5.26.3; and Volume 5.20.1	The mitigation strategy to address potential bird mortality caused by collision risk with the proposed overhead line is detailed in Volume 5.8.2, Appendix 8F and includes measures such as: • installation of bird diverters at three locations where landscape features indicate flight lines are most likely to occur; • implementing a monitoring strategy along additional sections of the overhead line where radar data has indicated potential movements of duck species (and diverters are not proposed); • application of the National Grid Bird Flight Diverter Protocol (Volume 5.8.2, Appendix 8G); and • although not specifically a mitigation measure for bird collision, the use of T-pylons is likely to reduce risk of collision compared to the steel lattice towers.

Para	Requirement	ES Section	Compliance
2.7.6	Electrocution risks can be reduced through the design of cross-arms, insulators and the construction of other parts of high voltage power lines so that birds find no opportunity to perch near energised power lines on which they might electrocute themselves.	Volume 5.8.1, section 8.7, Volume 5.26.3, Volume 5.20.1	Electrocution is not considered to be a risk for the species of bird encountered in the Proposed Development, of which the mute swan and grey heron are the only regularly encountered birds with a wingspan over 1.5m; the distances at which electrocution may begin to become a risk in certain conditions.

National Planning Policy Framework

- 8.2.4 Whilst the NPS are the primary policy documents for determination of applications for development consent relating to energy infrastructure, the NPPF is relevant in terms of shaping the topics for environmental assessments. NPPF is supported by a Planning Practice Guide (updated March 2014).
- 8.2.5 NPPF Section 11: Conserving and Enhancing the Natural Environment (paragraphs 109 – 125) identifies the importance Government places on development enhancing the natural and local environment by protecting and enhancing valued landscapes, geological conservation interests and soils, recognising the wider benefits of ecosystems, minimising the impacts on biodiversity and increasing the net gains in biodiversity, and preventing risk from unacceptable levels of effects on soil, air, water, noise pollution and land instability.
- 8.2.6 Like EN-1, NPPF emphasises the hierarchy of designations, the mitigation hierarchy and the principle that new development should result in no net loss of biodiversity. It describes the same range of receptors as listed in EN-1. This Environmental Statement has responded to NPPF as described in detail above for EN-1.
- 8.2.7 One specific point in NPPF is the need to regard sites that have been established as compensatory habitats for losses to Natura 2000 sites as having equivalent status to Natura 2000 sites themselves (NPPF paragraph 118, final bullet point). Within the Order Limits of the Proposed Development, Hallen Marsh has been identified as a site where habitat creation works would take place to compensate adverse impacts arising on the Severn Estuary SPA Ramsar from the development at the Avonmouth and Severnside. National Grid's mitigation proposals include measures to assist the habitat creation and to monitor to ensure that, in future, birds attracted by the new habitats are not at significant collision risk.

ODPM Circular 06/2005: Biodiversity and Geological Conservation

- 8.2.8 The Circular sets out the statutory obligations for planning authorities in relation to biodiversity and geological conservation. It is also referenced in EN-1 and the NPPF. Part I of the Circular describes the process for considering developments affecting internationally designated sites. This guidance has been further

developed in relation to NSIPs by PINS Advice Note 10 and these documents have been considered in the Applicant's HRA Report (**Volume 5.20.1**).

- 8.2.9 This Report considers potential for significant harm to European sites and requires specific mitigation for birds and bats to provide certainty that the Proposed Development would not affect the integrity of the Natura 2000 network and Ramsar sites.
- 8.2.10 In respect of birds, the key sites are the Severn Estuary SPA/Ramsar and the Somerset Levels and Moors SPA/Ramsar. As well as the route corridor and alignment selection process outlined at section 8.5 below, avoidance of adverse effects is addressed by the proposed fitting of bird diverters in certain sections of the route, together with monitoring and research proposals, which have been discussed with NE. These would be specific Requirements under the DCO.
- 8.2.11 In respect of bats, the key sites are the North Somerset & Mendip Bats SAC, the Mendip Limestone Grasslands SAC and the Exmoor and Quantocks Oakwoods SAC. The HRA Report describes mitigation in respect of bats. In addition to route selection and construction working practices to avoid adverse effects, the proposed mitigation includes measures for creation of temporary bat flyways and foraging areas during the period of construction when existing hedges would be removed for underground line installation.
- 8.2.12 These measures have been discussed with NE and would be specific Requirements under the DCO.
- 8.2.13 The Applicant's HRA Report also considers a range of other Natura 2000 and Ramsar sites potentially affected by the Proposed Development, and through a process of screening and scoping, assesses that (excepting the bird and bat sites listed above) the other sites are not likely to experience a significant effect on integrity.
- 8.2.14 This Environmental Statement also addresses the potential effects on internationally-designated sites. Section 8.5 identifies potential effects at construction and operational stages, concluding the significance of the effect, prior to mitigation. Mitigation is described at section 8.7, leading to a residual assessment at section 8.8 that there would be no significant adverse effect on any internationally-designated sites.
- 8.2.15 Part II of the Circular deals with nationally-protected sites, such as SSSI and National Nature Reserves (NNR). It advises on the process for consulting the statutory nature conservation body, NE, and for providing information to enable the assessment of impacts. The Proposed Development would potentially affect SSSI ditch systems in Puxton Moor, Biddle Street Yatton, and Tickenham, Nailsea and Kenn Moors. The effects would be temporary, related to crossings needed for access tracks. At Huntspill River NNR (400kV overhead line), temporary access is needed to remove an existing 132kV pylon. At Bridgwater Bay SSSI (Hinkley Line Entries), temporary access is needed to install pylons. At the Severn Estuary SSSI (River Avon Crossing), temporary access is required to remove a 132kV pylon. **Volume 5.8.2, Appendix 80** summarises the physical works likely in each designated site.
- 8.2.16 Consultation has been carried out with NE in respect of each of these activities, and as a result of this consultation and the ecological assessment, the BMS incorporates specific method statements for working in the SSSIs and for reinstatement following works.

- 8.2.17 Part III of the Circular concerns the conservation of habitats and species outside designated sites. It notes species and habitats prioritised in the UK Biodiversity Action Plan (now reflected in the NERC Act 2006 s41 list, as discussed in relation to EN-1). It also notes that linear features of the landscape such as hedges and watercourses are important; it notes the value of veteran and ‘substantial’ trees and references the Hedgerow Regulations 1997. This chapter includes an assessment of all these features as ecological receptors, and the BMS includes measures for protection and assessment.
- 8.2.18 Part IV of the Circular concerns protected species and the interactions between statutory protection, the wildlife licencing regime and the planning system. The circular lists the different legal protections afforded by European and UK laws and advises that protected species are a material consideration. This is reflected in EN-1. In response, the Environmental Statement has considered all protected species likely to be encountered, including desktop studies, field surveys. The BMS provides detailed method statements for construction activity where effects on the species and/or their habitat is predicted.
- 8.2.19 Part V of the Circular advises the need for EIA and an assessment against the Water Framework Directive (WFD), the latter following advice from the EA. This chapter includes an analysis of the ecological components of the WFD assessment.

Natural Environment White Paper

- 8.2.20 Making Space for Nature (Lawton, 2010) (Ref. 8.2) was an independent review of England’s wildlife sites and the connections between them, which informed the subsequent White Paper. This identified a number of recommendations to create a sustainable, resilient and more effective ecological network; and alongside this maintain water-quality, manage inland flooding, deal with coastal erosion and enhance carbon storage.
- 8.2.21 The Natural Environment White Paper (HM Government, 2011) (Ref. 8.3) was launched with the vision of repairing ‘inherited’ damage in the natural environment, leaving the natural environment in fitter condition for future generations. The key aims of the White Paper can be summarised as a commitment to protect and improve the natural environment, to grow a green economy, to reconnect people and nature, and to international monitoring and reporting.
- 8.2.22 Following the White Paper, Biodiversity 2020: A strategy for England’s wildlife and ecosystem services (2011) (Ref. 8.4) was published to provide a comprehensive picture of how international commitments are being implemented. Four priority areas for action were identified including a more integrated large-scale approach to conservation on land and sea and reducing environmental pressures.
- 8.2.23 The approach taken by National Grid to the Proposed Development was to avoid statutorily designated sites wherever possible, or where this is not possible to minimise direct effects, and to employ sensitive working methods when working close to any site designated for nature conservation. Where sites cannot be avoided, for example through the Tickenham, Nailsea & Kenn Moors SSSI, works will be undertaken sensitively and under licensing where required.

Local Policy

- 8.2.24 NSIPs are not subject to s38(6) of the Planning Compulsory Purchase Act 2004, which states that determination of planning consent must be made in accordance with a local development plan. However, local plan policies are relevant where they inform the assessment of potential effects.
- 8.2.25 The Proposed Development falls within the following administrative areas: Somerset County Council, Sedgemoor District Council, North Somerset Council, Bristol City Council, South Gloucestershire Council and West Somerset District Council. Local policies and guidance relevant to the Proposed Development in terms of biodiversity and nature conservation are listed below, with further detail text provided at **Volume 5.8.2, Appendix 8B**.
- 8.2.26 Somerset County Council:
- Biodiversity Offsetting Strategy and Methodology, July 2013.
- 8.2.27 Sedgemoor District Council Core Strategy (2011) and saved policies from the Sedgemoor District Local Plan (2004):
- S4 – Mitigating the Causes and Adapting to the Effects of Climate Change;
 - D14 – Natural Environment;
 - D15 – Bat Consultation Zone;
 - D16 – Pollution Impacts of New Development and Protecting Residential Amenity; and
 - D20 – Green Infrastructure.
- 8.2.28 North Somerset Council, Core Strategy – version following High Court Judgement (March 2013) and saved policies from the North Somerset Replacement Local Plan (2007):
- CS4 – Nature Conservation;
 - ECH/3 – Conservation Areas;
 - ECH/8 – Mendip Hills Area of Outstanding Natural Beauty;
 - ECH/9 – Forest of Avon;
 - ECH/10 – Biodiversity;
 - ECH/11 – Protected Species and their Habitats;
 - ECH/12 – Wildlife Sites of International Importance;
 - ECH/13 – Sites of Special Scientific Interest and National Nature Reserves;
 - ECH/14 – Wildlife and Geological Sites and Local Nature Reserves; and
 - ECH/15 – Coastal Zone.
- 8.2.29 Bristol City Council Core Strategy (2011) and relevant saved policies from the Bristol Local Plan (1997):
- BCS9 – Green Infrastructure;
 - BCS23 – Pollution;
 - ME2 – Pollution: Location and Design of Developments;
 - ME4 – Pollution: Controlling the Impact of Noise;
 - NE02 – Landscape Features;
 - NE03 – Trees and Woodland;
 - NE05 – Sites of Nature Conservation Interest;
 - NE06 – The Wildlife Network;

- NE07 – Local Nature Reserves; and
- NE11 – New Development: Natural Environment Considerations.

8.2.30 South Gloucestershire Council Core Strategy (2013) and saved policies from the South Gloucestershire Local Plan (2006):

- CS2 – Green Infrastructure;
- CS9 – Managing the Environment and Heritage;
- CS35 – Severnside;
- L7 – Site of Nature Conservation Interest;
- L8 – Sites of Regional and Local Nature Conservation Interest; and
- L9 – Species Protection.

8.2.31 West Somerset District saved policies from the West Somerset Local Plan (2006)

- TW/1 – Tree and Woodland Protection;
- TW/2 – Hedgerows;
- NC/1 – Sites of Special Scientific Interest;
- NC/3 – Sites of Local Nature Conservation and Geological Importance;
- NC/4 – Species Protection;
- NC/5 – Wildlife Habitats;
- W/7 – River Corridor Protection; and
- CO/1 – The Coastal Zone.

8.2.32 Key themes running through these policies relate to the protection of the natural environment and landscape features. A number of policies, including policies ECH/8, ECH9, ECH/12, ECH/13 and ECH/14 from the North Somerset Core Strategy, policies NE05 and NE07 from the Bristol City Core Strategy and West Somerset District Council saved policies NC/1 and NC/3 relate specifically to the protection of designated sites. Whilst others such as NE06 and BCS9 from the Bristol City Core Strategy and policies CS4 and ECH/4 from the North Somerset Core Strategy, seek to ensure the overall protection of the natural environment. Information on designated sites identified as part of the initial desk study, and other receptors identified through the extensive field surveys, was used to inform strategic routing and the subsequent design of the Proposed Development.

8.2.33 A number of local planning policies relate to the protection of species and their habitats. Some, such as the Sedgemoor District Council saved policy D15 relate specifically to bats, while others such as the North Somerset saved policy ECH/11 and West Somerset District saved local plan policies NC/4 and NC/5 provide general policy guidance for protected species and their habitats. Again, protected species and their habitats have been identified and included as part of this assessment.

8.2.34 South Gloucestershire Core Policy CS35 seeks to reconcile strategic development at Avonmouth and Severnside with the conservation objectives of the Severn Estuary SAC SPA Ramsar SSSI. In accordance with the mitigation hierarchy, where adverse impacts cannot be avoided, as a last resort, compensation is provided, hence; the policy includes a strategy to identify land for compensatory wetland habitat creation. The subsequent Hyder Cresswell report (2011) (Ref 8.5)

identifies a number of offset sites for wetland creation which have been referenced in the draft Site Allocations and Development Management Policies (2014) (Ref. 8.6) and therefore form a *material consideration* in the planning process. In accordance with the NPPF, these offset sites are considered of equivalent status to the Estuary. The offset sites have been considered as part of the baseline environment, particularly the future potential value of Hallen Marsh for birds, an area which is crossed by the Proposed Development in Section G.

- 8.2.35 Other relevant local planning policies include those which prevent development deemed to have an adverse impact on biodiversity and nature conservation through the creation of pollution. Relevant policies include Sedgemoor District Council saved local plan policy D16 and Bristol City Council Core Strategy policy BCS23 and saved policies ME2 and ME 4. Environmental topics identified as part of the extensive Screening and Scoping for the Proposed Development include air quality, noise and hydrology. The inter-relationship of such effects on ecological receptors is considered in section 8.6.
- 8.2.36 The remaining policies which are considered to be relevant relate to climate change. Sedgemoor District Council's Core Strategy Policy S4 seeks to ensure that the ability of landscapes, habitats and species to adapt to climate change is not affected, while North Somerset Core Strategy policy ECH/15 and West Somerset District saved local plan policy CO/1 restricts development within the coastal zone unless a coastal location is required. In line with EU guidance (European Commission, 2013), consideration is given to the effects of climate change on biodiversity. The ability of each receptor to cope with such effects has been considered as part of the assessment, taking into consideration the availability of connected habitat in a changing climate as well as effects on species such that may reduce their range or more directly, survival and ability to compete on a physiological level. Specific consideration, in light of current EC guidance, of the effects of climate change on Natura 2000 sites potentially affected by the Proposed Development is set out in **Volume 5.8.2, Appendix 8P**.

Policy Conclusions

- 8.2.37 As described above, there are a number of relevant national and local planning policies which have guided the strategic routing and technical design of the Proposed Development. This has been achieved through the identification of designated sites, habitats and species to be protected from any potential adverse effects.

Legislation

- 8.2.38 The international conventions, European Directives and UK legislation that have been taken into account in this assessment are listed in **Table 8.5**. As required by EN-1 and the ODPM Circular, surveys have been targeted for species covered by legislation, and the statutory processes relating to consultation, assessment and mitigation design have been followed in relation to protected sites and species.

Table 8.5 Relevant Wildlife Legislation

Reference	Relevant Application
International	
Council Directive 2009/147/EC on the Conservation of Wild Birds (codified from 79/409/EC)	Special Protection Area (SPA) designations
Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora	Special Areas of Conservation (SAC) designations Annex I habitats and Annex II species
The Convention on Biological Diversity 1992	UK and Local Biodiversity Action Plans (see note under UK NERC Act 2006)
The Convention on Wetlands 1971	Ramsar designations
UK	
Conservation of Habitats and Species Regulations 2010 (as amended)	SPA designations SAC designations European protected species (Annex II species)
National Parks and Access to the Countryside Act 1949	National and Local Nature Reserve designations
The Countryside and Rights of Way Act 2000	Augments protection for Sites of Special Scientific Interest (SSSI) and protected species
The Hedgerows Regulations 1997	Protection of hedgerows qualifying as 'important'
The Natural Environment and Rural Communities (NERC) Act 2006	Duty of public bodies to consider biodiversity in exercise of their functions, so far as is consistent with the exercise of those functions. Section 41 list of living organisms and habitats of principal importance for conserving biodiversity.
The Protection of Badgers Act 1992	Protection of badgers and their setts
The Wildlife and Countryside Act 1981 (as amended)	SSSI designations National Nature Reserve (NNR) designations Protection of species (all birds at nest, and special protection for Schedule 1 birds, Schedule 5 animals, Schedule 8 plants) Control of invasive species (Schedule 9)
The Eels (England & Wales) Regulations 2009	The main Statutory Instrument setting the EA obligations towards the European Commission's Eel Recovery Plan (Council Regulation 1100/2007)

Other Relevant Guidance

- 8.2.39 Local Biodiversity Action Plans (BAP), strategies and guidance has also influenced this assessment. These are listed in **Table 8.6**, together with an indication of how the guidance has been taken into account.
- 8.2.40 The South West Biodiversity Implementation Plan (2004) (Ref. 8.7) sets out a framework of policy, priorities, and actions to assist in a more joined-up approach in delivering biodiversity through the BAPs across the region. The Plan identifies key programmes of work for five sectors: farming and food, water and wetlands, woodlands and forestry, towns, cities and development, and coastal and marine. The generic priorities for each sector include maintenance and enhancement of biodiversity, integrating sustainable land management practices, and increasing understanding of the inter-relationship of biodiversity with health and economic productivity, all of which apply in the long-term. The Proposed Development crosses areas which fall within each of these sectors. The design and proposed methods of construction follow the fundamental principles of seeking to avoid, or where this is not possible minimise, impacts on biodiversity. Specific consideration has been given to BAP habitats and species as ecological receptors.
- 8.2.41 The Plan also sets out the management for Strategic Nature Areas (SNA), which are referenced in the BAPs. The SNA identify where there is opportunity for maintenance, restoration and expansion of Priority Wildlife Habitats (i.e. delivery of BAP targets) at the landscape-scale. Each SNA relates to a specific habitat type and collectively, they represent a useful aid to target nature conservation action. Planning policies relating to SNA are listed in **Volume 5.8.2, Appendix 8B**. Those which fall across or adjacent to the Order Limits include the Coastal and Floodplain Grazing Marsh SNA (through the Somerset Levels extending north to Portbury and south to Rook's Bridge, and at Hinkley Point), the Woodland SNA (across Tickenham Ridge), the Limestone Grassland SNA (around Crook Peak and at Knowle Park), the Mudflats SNA and the Maritime Cliff and Slope SNA (both in the vicinity of tidal areas). As the SNA are large-scale aspirational areas these offer a useful mechanism to consider the potential effect of the Proposed Development on resilience to climate change (see section 8.5: Consideration of Climate Change Effects on Biodiversity), as well as intra-specific residual effects (section 8.8).

Table 8.6 Relevant Wildlife Strategies and Guidance

Reference	Relevant Application
South West Biodiversity Implementation Plan (undated) and associated documents curated by Biodiversity Southwest	Regional review of national priority species and habitats present in Somerset, and subsequent action plans, including for Strategic Nature Areas.
'Wild Somerset' – the Somerset Biodiversity Strategy 2008-2018	Biodiversity conservation goals for Somerset
'Action for Nature' – the North Somerset Local Biodiversity Action Plan 2005	Local priority species and habitats within the district
South Gloucestershire Biodiversity Action Plan	Local priority species and habitats
Avon Biodiversity Action Plan	Local priority species and habitats
Somerset Biodiversity Action Plan	Local priority species and habitats
West Somerset Action Plan	Local priority species and habitats

Reference	Relevant Application
Somerset Highways Agency Biodiversity Action Plan – Habitats 2005 & Species 2006	Habitat and species action plans for the county, including design and management guidance for infrastructure.
Mendip Hills AONB Management Plan 2009-2014 Mendip Hills AONB Management Plan 2014-2019 Draft [awaiting adoption]	Priority habitats and species within the AONB. Guidance on hedgerow design for the replacement planting post-construction.
Somerset Woodland Strategy 2010	Guidance on hedgerow design for the replacement planting post-construction.
Flora of the Bristol Region 2000	Guidance on species choice for hedgerow reinstatement and landscape proposals at Sandford Substation.

8.3 Method

Assessment of Effects

- 8.3.1 The overarching approach to assessment of environmental effects is described in **Volume 5.5.1**. The Chartered Institute of Ecology and Environmental Management guidelines (July 2006) (Ref.8.8) for ecological impact assessment provides a framework for the assessment of effects, which is then informed by the interpretation of contextual information and professional judgment. A narrative description of each receptor and the predicted effects of the development are provided to allow the decision-maker to reach a more fully informed decision.

Valuation of Receptors

- 8.3.2 Ecological receptors are valued based on a geographical scale. Values are assigned purely on the innate value of the flora, fauna and habitats in terms of the conservation of genetic resources; they do not take account of the amenity or economic values of the ecological resources. Further, legal protection is considered separately from conservation value; not all legally protected species show the same rarity or range. To ensure consistency across the EIA topic areas, these categories of geographical value cross-reference the 'Biodiversity Conversion' categories shown in **Table 8.7**.

Table 8.7 Valuation of Ecological Receptors

Ecological Value	Criteria	Biodiversity Conversion
International	Designated or proposed/candidate Special Areas for Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites and their qualifying features, some of which may depend on land outside the designation boundaries. Under NPPF, land that is set aside as compensation for adverse effects of development on European sites should also be regarded as of European value. Species populations or habitat areas (such as those listed in Annex I, II or IV of the Habitats Directive or Annex I of the Birds Directive) of international importance due to relative size, rarity or quality of the receptor.	High
National	Designated or proposed Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Marine Nature Reserves (MNR) and their qualifying features, some of which may depend on land outside the designation boundaries. A viable area of ancient woodland. 'Important' hedgerows as described under the Hedgerows Regulations 1997. Species populations or habitat areas (including legally protected or NERC Act s41 species or habitats) of national importance due to relative size, rarity or quality of the receptor.	High
County	Designated or proposed County Wildlife Sites (CWS), Local Wildlife Sites (LWS), Sites of Nature Conservation Importance (SNCI) and their qualifying features where they occur within the designation boundaries. Species populations or habitat areas (including legally protected or NERC Act s41) or Nationally Scarce species or habitats of district or county importance (Somerset, North Somerset, Bristol City and South Gloucestershire) of county importance due to relative size, rarity or quality of the receptor. Sites should comfortably exceed Site of Nature Conservation Importance (SNCI) criteria if these exist, but not meet SSSI selection criteria.	Medium
Local	Local Nature Reserves (LNR) and Avon Wildlife Trust Reserves (WTR) unless also designated at a higher level, and other nature conservation designations (under local planning policies). Species populations or habitat areas (including legally protected or NERC Act s41 species or habitats) of parish or local importance due to relative size or quality. Features that appreciably enrich the local ecological resource, although these may themselves be common and widespread, such as long-established hedgerows, woodlands and ponds.	Low

Ecological Value	Criteria	Biodiversity Conversion
Neighbour hood	Populations of common and widespread species or habitats without protection or conservation designation. Isolated and small fragments of NERC Act s41 habitats or species (only where better representative examples of such habitats or species are common nearby).	Very low

8.3.3 The purpose of assigning value is to allow potential effects to be considered in relation to the receptor value. The viability of each ecological feature is considered at the appropriate geographic frame of reference, thereby determining whether the effect is significant or not. The term 'viability' is equivalent to the terms 'integrity' in respect of habitats and 'conservation status' in respect of species.

8.3.4 A significant ecological impact is defined in the CIEEM guidelines as *"An impact (adverse or positive) on the integrity of a defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, including cumulative impacts."* For the purposes of assessment, site 'integrity' is defined as *"The coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of species for which it was classified"* (Government Circular ODPM 2005/06). 'Favourable conservation status' of a species' is defined as when *"Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and the natural range of the species is neither being reduced nor is likely to be reduced in the foreseeable future; and there is, and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis"* (Habitats Directive, Article 1(i)).

Magnitude and Duration of Effect

8.3.5 The magnitude of a potential effect is the degree of change caused in an ecological receptor, assessed against the baseline conditions. It is a function of the sensitivity of a receptor to the nature of a given effect. In determining magnitude, reference is made to parameters including the duration, seasonal timing and frequency, reversibility or permanence, and spatial extent of an effect. Magnitude is a qualitative judgment of the ability of a receptor to maintain viability at the appropriate geographical scale, and is supported by quantitative information wherever possible. To ensure consistency across the EIA topic areas, the magnitude of effects is categorised as shown in **Table 8.8**.

Table 8.8 Magnitude of Effect

Impact Magnitude	Criteria
High	Permanent/long-term effect on the receptor, either across a relatively large area or a large-scale effect. Change in integrity or conservation status of the receptor is likely.
Medium	Permanent/long-term effect of a receptor across a relatively moderate area, or large-scale temporary effect. Any change-in overall integrity or conservation status of the receptor would not be long-term.
Low	Small-scale and/or temporary changes in quality or extent of a given population, habitat or site but not affecting the receptors' conservation status or integrity.
Neutral	Effects can be identified but they do not result in loss of overall quality or extent of receptor. No discernible change to conservation status or integrity of a receptor.

- 8.3.6 Of particular relevance to the Proposed Development is the duration of construction-stage effects. Following a construction period which may last around four years at any given place, most habitats will be reinstated. The exceptions are where permanent infrastructure is required (e.g. Sandford substation, other CSE compounds), or where tree and woodland habitats cannot be reinstated due to the need to maintain electrical safety and cable integrity.
- 8.3.7 Where habitats can be reinstated, the effects of the Proposed Development are described as temporary in terms of the criteria described in **Table 8.8**. The period during which habitats re-establish and recover their conservation status will vary, depending on the habitat in question. For the purposes of this assessment, a short-term effect is one which endures for one year or less, a medium-term effect endures for between one and five years, and a long-term effect endures for over five years, but would eventually disappear.
- 8.3.8 Where the complexities of this project mean these descriptors are too coarse, a narrative description is also provided. For example, hedges would be removed at the commencement of development and would be replanted post-construction, after which they would normally be expected to regain their conservation status in five years. Some particularly diverse hedges may take longer to regain conservation status. Taken from the start of construction, this is a long-term effect, but for the purposes of residual impact assessment it is helpful to clarify, in narrative form, the duration and magnitude of effect; for example "Low Magnitude long-term temporary effect reducing to Neutral after ca 15 years".
- 8.3.9 Another example is the effect of installing and removing watercourse crossings. These are two short-duration activities, which may have a short-term effect on sensitive receptor environments. These may be summarised in residual assessment as "Low Magnitude temporary effects experienced only in the short-term, reducing to Neutral Magnitude within one year of reinstatement".

Significance of Effect

- 8.3.10 To ensure consistency of description across the EIA topic areas, the significance of any given effect is determined as a function of the value of the receptor and magnitude of effect, as summarised in **Table 8.9**. Significant effects may be positive or adverse.

Table 8.9 Significance of Effect

Value of Receptor	Magnitude of Effect			
	High	Medium	Low	Neutral
High	Major	Major	Moderate	Not significant
Medium	Major	Moderate	Moderate/Minor	Not significant
Low	Moderate	Moderate/Minor	Minor	Not significant
Very low	Moderate/Minor	Minor	Not significant	Not significant

Likelihood of Effect

- 8.3.11 To ensure consistency of description across the EIA topic areas, the following four-point scale has been used to standardise the degree of confidence in the prediction of impact significance on ecological structure and function. The terms can also be used to make a judgement about the effectiveness of mitigation.
- 8.3.12 The terms allow the assessor to express a qualified prediction.
- Certain/near certain: Probability estimated at 95% chance or higher;
 - Probable: Probability estimated at above 50% but below 95%;
 - Possible: Probability estimated above 5% but below 50%; and
 - Extremely unlikely: Probability estimated at less than 5%.

Study Area

- 8.3.13 As described in section 8.1: Introduction, the overall study area has been refined as the proposal has developed. Data was initially collected on the basis of two Route Corridor options and progressively refined to focus on the preferred corridor and ultimately the selected route alignment and associated working areas i.e. the Proposed Development.
- 8.3.14 The specific study area for each receptor reflects the life-cycle of the species or functionality of the habitat in question, taking account of the potential effects of the development. The spatial scope of each desk study or field survey is described for each receptor in turn below.
- 8.3.15 Whilst it was appropriate to undertake field surveys prior to the finalisation of the connection design (owing to seasonal survey windows and to ensure survey findings could influence scheme design), rolling review of survey scopes against developing scheme design ensured an appropriate study area was used for each receptor. The scope of surveys has been consulted on throughout the development of the proposals.

Desk Study

- 8.3.16 A review of wildlife site designation data and of species and habitat records was undertaken early in the design process, and this has been updated through 2012 and 2013 to ensure the dataset is complete, reflecting updates in design. Data on internationally designated sites was initially collated across a 10km radius search area from the two Route Corridors (Ref.8.9) for national sites across a 2km radius,

and for local and county designated sites across a 1km radius. The data was refined in December 2013 to reflect these distances from the Order Limits. Information on SSSI beyond 2km, which form component parts of the international sites identified and that are designated for the same qualifying features, was also collated for completeness.

- 8.3.17 Data of protected and notable habitats and species was collated within a 1km buffer of the selected Route Corridor. For long ranging bird and bat species this search was supplemented with data from published or otherwise available, reports and studies to cover a wider area. Species records provide a useful indication of those present (or historically present) within a searched locality. However, the absence of a species record cannot be taken to represent actual absence in the field and to this end, species distribution patterns should be interpreted with caution
- 8.3.18 The list of data sources that have been contacted was agreed with the BTG through the consultation process. The sources, and the information they have provided, are summarised in **Table 8.10**.

Table 8.10 Desk Study Data Sources (listed in alphabetical order)

Source	Information Provided
Avon Badger Group	Badger records
Avon Bat Group	Bat roost data
Avon Reptile and Amphibian Group	Amphibian and reptile records
Avon Wildlife Trust	Wildlife Monitoring Reports and Nature Reserve locations
Bristol & Gloucestershire Mammal Group	Otter, water vole, dormouse and other mammal records
Bristol Regional Environmental Records Centre (BRERC)	Local Wildlife Site designations and citations; protected and priority species records
Environment Agency	Flood zone mapping, aquatic fauna records
Hawk and Owl Trust	Bird data
Joint Nature Conservation Committee (JNCC)	Citations for International and European designated sites
MAGIC Map	International, European and National site designations and ancient woodland
National Biodiversity Network	Protected and priority species records
NE	Citations for SSSI
North Somerset Council	Local Wildlife Site citations
RSPB	Bird data
Somerset Badger Group	Badger records
Somerset Bat Group	Bat roost and site data
Somerset Environmental Record Centre (SERC)	Local Wildlife Site designations and citations; protected and priority species records
Somerset Mammal Group	Records for otters, water voles, dormice
Somerset Wildlife Trust	Nature reserve locations
Wildfowl and Wetland Trust	Bird data

Source	Information Provided
Yatton and Congresbury Wildlife Action Group (YACWAG) Otter Group	Additional otter data 2012 & 2013

- 8.3.19 Some supplementary information was gathered from survey reports associated with current or historic planning applications, wildlife mitigation monitoring reports and published research papers associated with the area. This information is set out under the relevant receptor sub-sections in section 8.4: Baseline Environment.

Habitats and Flora

Habitat Walkover

- 8.3.20 An initial habitat assessment of the Route Corridors was undertaken in Winter 2011/12 to aid in the formulation of the survey scope for 2012. Mapping of habitats followed the standard Phase 1 Habitat survey methodology (JNCC, 2010) (Ref.8.10). Target Notes were used to record plant species (particular consideration was given to invasive species) and describe features of interest and any incidental faunal observations. Whilst this survey was undertaken outside of the optimum Phase 1 Habitat survey period and was restricted to areas of public access, it was not intended to replace the subsequent extended Phase 1 which was undertaken across the preferred corridor in the appropriate season once full access had been obtained.

Extended Phase 1 Habitat survey

- 8.3.21 An extended Phase 1 Habitat survey was undertaken in Spring/Summer 2012 across the preferred corridor and in Spring/Summer 2013 to cover additional working areas identified as the design process evolved. Some additional areas were surveyed in late Autumn 2013 to inform a review of representations for changes to the scheme design. The total study area for botanical survey data covers the entire Order Limits (and often extends much further) as illustrated in **Volume 5.8.3, Figures 8.2.1 – 8.2.17**. The survey was undertaken by experienced botanists (Field Identification Skills Certificate FISC Level 3 or higher) (Ref. 8.11) in line with JNCC 2010 and extended to include initial habitat assessments for protected and s41 species.
- 8.3.22 The survey data was digitised in GIS. Ditches and hedgerows that lie in close proximity are shown side by side for illustrative purposes but this has been taken into account in the habitat loss calculations.
- 8.3.23 Some areas of land under private ownership could not be accessed for survey at Mark, Rook's Bridge, Avonmouth Docks and south west of Hinkley Point. These are clearly shown within the Phase 1 Habitat survey maps (see section 8.4: Baseline Environment') and across the entire Order Limits total 8.46ha (<0.01%). This has been taken into account during the interpretation of habitat survey mapping and subsequent botanical and protected species surveys and as such, does not pose a significant constraint to the robustness of the EIA.

NVC Surveys – Woodland, Grassland and Wetland Habitats

- 8.3.24 Semi-natural woodlands were identified within the selected Route Corridor using the initial habitat survey data, Ordnance Survey maps and aerial imagery and subject to more detailed National Vegetation Community (NVC) survey (Ref. 8.12). The full survey method is detailed in **Volume 5.8.2, Appendix 8C** and survey areas are illustrated in **Volume 5.8.3, Figures 8.4.1 – 8.4.5**. The NVC surveys were undertaken in Spring 2012 by experienced botanists (FISC Level 4 or higher). TABLEFIT software was used to assign NVC categories to surveyed woodlands.
- 8.3.25 Grassland and wetland habitats within the Route Corridor were selected for more detailed NVC survey (Rodwell, 2000) (Ref. 8.13) using the findings of the extended Phase 1 surveys. Areas were selected on the basis of earlier data indicating species-richness and/or presence of designated sites. The surveys were undertaken in Summer 2012, again, by experienced botanists (FISC Level 4 or higher) and TABLEFIT software was used to assign NVC categories. As for woodland, the full survey method is detailed in **Volume 5.8.2, Appendix 8C** and survey areas are illustrated in **Volume 5.8.3, Figures 8.4.1 – 8.4.5**.

Hedgerow Assessments

- 8.3.26 Hedgerows with potential to be 'important' under the ecological criteria of the Hedgerows Regulations 1997 were identified during the extended Phase 1 Habitat surveys. Those that may be impacted by the Proposed Development were subject to full assessment in Spring/Summer 2013. The full survey method is detailed in **Volume 5.8.2, Appendix 8D** and survey areas are illustrated in **Volume 5.8.3, Figures 8.5.1 – 8.5.18**.

Outstanding Habitat Survey

- 8.3.27 Survey had not been conducted at three small parcels of land which were included within the final refinements to the Order Limits. Totalling 1.04ha, these are acknowledged in the habitat loss calculations and are summarised below. Given the nature of these parcels and the limited effects arising from the Proposed Development, this does not affect the rigour of the environmental assessment but for completeness these have been prioritised for survey during the examination period.
- Three small fields at Horncastle Farm, north west of Horncastle, totalling c.0.80ha. The nearest Development Component (the F Route access road) lies c.260m away.
 - A small field (0.10ha) at Sheepway Farm, Portbury. The land lies alongside the public highway which would be used for construction access but no Development Component overlies it.
 - A proposed access road runs through agricultural land alongside Caswell Hill Lane (south of Cherry Orchard Farm), south east of Portishead. The land totals c.0.10ha.

Arboriculture

- 8.3.28 The Arboricultural Impact Assessment is provided in **Volume 5.21.1**. The extent of the arboricultural survey was initially defined by the Order Limits presented in the PEIR documents and the scope subsequently updated to reflect the changing proposals as details of access roads and bellmouths were refined following

consultation responses. In addition to surveying trees within the Order Limits, any trees which could potentially fall over and land within the Order Limits were also considered. Survey of trees was across a 30m buffer outside the Order Limits (based on the average mature height of the UK's largest native tree) was undertaken at the surveyor's discretion.

- 8.3.29 To aid each surveyor and to try and improve feature accuracy, a desk study was carried out to digitally map what appeared to be trees, groups, woodlands and hedgerows based on aerial photography in advance of field survey. This was then subject to amendment by the surveyor who had the ability to add, delete, realign and amend features to accurately represent what was on the ground. Data was collected in the field using a tablet computer (Panasonic CF-U12 Toughbook) running ArcPad mapping software and OS landline information.
- 8.3.30 Survey data collected was adapted from the method presented in BS 5837:2012 'Trees in relation to design, demolition and construction – Recommendations', using the parameters listed below. The data was collected separately for trees, tree groups and hedgerows:
- position;
 - tree heights;
 - species (for groups – the primary species are listed);
 - height (for groups, the height of the tallest crown within the group);
 - diameter at breast height (DBH) (for groups a range is taken from smallest to largest);
 - crown width (for groups, the edge of the crown of the group was mapped);
 - Condition (Good/Fair/Poor/Veteran) – this is a combined assessment of the tree vigour, vitality and structural condition. The term veteran is used to describe a tree that is of increased biological, aesthetic or cultural interest because of its age, size or condition offering a range of rich but scarce habitats;
 - Age (Young/Middle-aged/Mature) – used to describe the developmental stage of a tree or group of trees and is linked to Life Expectancy;
 - Life Expectancy (Long/Medium/Short) – an estimate of the remaining life expectancy of a tree based on age, species, condition and current context;
 - Quality Category (Category A, B, C, or U) – an objective assessment based on the recommendations within BS 5837:2012:
 - Category A – Trees and groups of high quality and value;
 - Category B – Trees and groups of moderate quality and value;
 - Category C – Trees and groups of low quality and value; and
 - Category U – Trees and groups unsuitable for long-term retention.
- 8.3.31 The arboriculture data collection methods (detailed in **Volume 5.21.1**) differ from those of Phase 1 Habitat survey, as does the definition of receptor categories, for example, the Arboricultural definition of a 'tree group' does not directly translate to the various woodland, orchard or scrub Phase 1 Habitat types. The Arboricultural assessment is based on a measurement of canopy area from a birds eye perspective, whereas the Phase 1 Habitat Survey measures woodland and dense scrub based on ground-level field boundaries. The Phase 1 Habitat Survey records hedgerows as "lines" and scattered trees and scrub as dimensionless "points".

- 8.3.32 The inevitable differences in the datasets produced by arboricultural and Phase 1 Habitat surveys have been carefully reviewed to ensure they are sufficiently cross-compatible and fairly assessed. The assessment of effects on trees, treed habitats and hedgerows has been quantified using the arboriculture dataset, whilst the Phase 1 dataset has been used for all other habitat types (as set out under section 8.5: Approach to Habitat Calculations).

Birds

- 8.3.33 **Volume 5.8.2, Appendix 8F** details the field survey methods which were devised in consultation with NE to specifically address the potential effects of the Proposed Development on birds.

Survey Prior to Route Corridor Selection

- 8.3.34 The following surveys were carried out to inform the selection of a selected Route Corridor (Ref. 8.14)
- winter bird survey (November 2009 to February 2010);
 - detailed vantage point survey (October 2009 to April 2010);
 - nocturnal vantage point surveys (January 2010 to March 2010); and
 - detailed nocturnal vantage point surveys (October 2010 to April 2011).
- 8.3.35 The winter bird survey, undertaken in 2009/2010 used a combination of walked transects and point counts to survey protected sites designated for birds within or adjacent to Route Corridors 1 and 2 (see **Volume 5.2.1**). These designated sites included Tealham and Tadham Moors SSSI and Catcott, Edington and Chilton Moors SSSI (both constituents of the Somerset Levels and Moors SAC SPA Ramsar site), Nailsea, Tickenham and Kenn Moors SSSI, Kenn Church, Kenn Pier and Yew Tree Farm SSSI, Biddle Street Yatton SSSI and Puxton Moor SSSI. Three evenly-spaced surveys were undertaken across the period November 2009 to February 2010. Locations are shown in **Volume 5.8.3, Figures 8.11.1 – 8.11.2**.
- 8.3.36 Vantage point surveys were undertaken to identify flight patterns of various species of waders, wildfowl and raptors within the study area across the period late October 2009 to mid-April 2010. Energy Policy Statement EN5 notes that such species are vulnerable to collision with aerial obstructions. Vantage point survey locations were positioned to cover sections of the Route Corridor crossing major rivers or located between important wildlife sites for birds. The vantage point survey methodology followed guidance set out by Scottish Natural Heritage (SNH) (Ref. 8.15). All vantage points apart from vantage point 3 covered the Proposed Development. Vantage point 3 was positioned to record any movements from the Somerset Levels and Moors SPA and so directly recorded movements over Corridor 2 rather than the selected corridor (Proposed Development) as this was located closer to the SPA. The timing of vantage point visits was stratified to ensure that all parts of the day were covered, with emphasis on the early morning and late evening when birds were most likely to be moving across the study area. Observation periods varied in duration from 2 to 3 hours.
- 8.3.37 Nocturnal vantage point surveys were also undertaken during January, February and March 2010 on nights with a full moon. Bird flight lines were then analysed to determine collision risk for each species. The location of the vantage point surveys are illustrated in **Volume 5.8.3, Figures 8.11.1 – 8.10.2 and 8.20.1 – 8.19.7**.

- 8.3.38 Detailed nocturnal surveys were undertaken between October 2010 and April 2011 to observe nocturnal flight activity of waders and wildfowl species which may be active at night (including the dawn and dusk periods). A minimum of 39 hours of survey observation was undertaken at each vantage point apart from one location where 30 hours were undertaken. Surveyors used radios, night vision technology and sound recorders to enhance their ability to record nocturnal bird flight activity. The location of the nocturnal surveys are illustrated in **Volume 5.8.3, Figures 8.10.1 – 8.10.2 and 8.22.1 – 8.22.3** (VP1, VP2 and VP3 including 3a, 3b and 3c).

Survey of Selected Route Corridor

- 8.3.39 The following surveys were carried out to assess the selected Route Corridor:
- winter bird survey (January to March 2012);
 - breeding bird survey (April to June 2012);
 - winter bird survey (early October 2012 to March 2013);
 - breeding bird survey of additional areas (May to June 2013);
 - winter bird survey (November 2013 to March 2014); and
 - vantage point survey at Portbury Wharf (November 2013 to March 2014).
- 8.3.40 During January to March 2012 a winter bird survey was undertaken covering sections of the Route Corridor not previously subjected to a formal bird survey. Surveys included a combination of point counts and transect routes to record waders, wildfowl and raptors within the selected Route Corridor plus 250m buffer. Monthly visits were undertaken as well as nocturnal bird survey visits to those areas which possessed most habitat potential for waders and wildfowl. The survey undertaken in early 2012 included an assessment of land use and its suitability for supporting waders and wildfowl (refer to **Volume 5.8.3, Figures 8.15.1 – 8.15.8 and 8.16.1-8.16.8**).
- 8.3.41 Additional winter bird surveys were undertaken between October 2012 and March 2013 and between November 2013 and March 2014. The 2013/14 surveys covered additional land resulting from the new alignment at Mark. The locations of these survey areas are shown in **Volume 5.8.3, Figures 8.11.1 – 8.11.7**. These surveys included a combination of point counts and transect routes to record waders, wildfowl, raptors and groups of other Birds of Conservation Concern (BoCC) species within 250m of the Proposed Development. A visit was undertaken during each month within 3 hours of high tide, with one additional visit undertaken within 3 hours of low tide.
- 8.3.42 A vantage point survey was undertaken at Portbury Wharf between November 2013 and March 2014. The surveys were undertaken to identify if any bird movements occurred between Portbury Wharf and the Gordano Valley or across the alternative option for the proposed overhead line at Portbury Wharf. The vantage point survey methodology followed guidance set out by SNH and a single vantage point location was used. The location and findings of this survey are shown in **Volume 5.8.3, Figures 8.14.1**.
- 8.3.43 A breeding bird survey was undertaken along the entire Route Corridor in 2012 and in additional areas in 2013. The 2013 survey covered all substation sites as well as the Hinkley Line Entries. The survey was undertaken by experienced ornithologists in accordance with guidelines jointly published by the JNCC, RSPB and BTO (Ref.

8.16), (Ref. 8.17). The method uses a transect technique, combined with point counts (where appropriate), conducted during the morning on two occasions between April and June. During each survey visit a transect route was walked throughout the corridor, aiming to pass within 100m of all land within the corridor. The route was walked at a steady pace with stops at regular intervals. All bird activity encountered was recorded and mapped, including songs, calls, flight lines, feeding, nesting, territorial behaviour. Surveys were carried out between half an hour after dawn and mid-day to coincide with peak bird activity.

Other Relevant Bird Surveys

8.3.44 Bird surveys have been carried out by Entec to support the planning application for the EDF Hinkley Point C power station since 2006, covering an area of proposed modifications to the overhead lines at Hinkley Point as follows:

- Four breeding bird survey visits were undertaken between April and July 2007 following CBC methodology, which covered all land within at least 500m of the Proposed Development.
- To determine use of coastal fields by birds (particularly qualifying species of the Severn Estuary SPA Ramsar), walkover surveys were undertaken during daylight hours, which covered all land within at least 500m of the Proposed Development. Details of the species seen, their numbers and activity was recorded during each visit.
- To establish whether there was any nocturnal use of coastal fields during the Winter period, particularly in the Wick Moor area (part of Severn Estuary SPA Ramsar) a nocturnal winter bird survey was undertaken. The nocturnal visits were generally carried out within a week of full moon, using a combination of transect and point count techniques between December 2007 and May 2008 and between August 2008 and March 2009 inclusive.

8.3.45 Two radar studies were undertaken by FERA in 2011 to assess potential impacts of two proposed wind farm sites (Black Ditch Wind Farm and Withy End Wind Farm) between the Somerset Levels and Moors SPA Ramsar and the Severn Estuary SPA Ramsar. Both radar studies were supported by two field observers who investigated bird activity detected by the radar. A third radar study was commissioned by NE in 2010 to assess potential impacts of proposed mitigation works at Steart (to offset potential impacts of proposed development at Avonmouth Docks). These radar studies covered the Proposed Route south of the Mendip Hills and are summarised as follows:

- The Black Ditch radar detection operated continuously near the proposed Black Ditch Wind Farm site for 108 hours from 24 to the 29 January 2011. The radar system was located near to the River Huntspill and collected bird movement data over a range of four nautical miles. Parts of the Somerset Levels and Moors SPA and the Severn Estuary SPA were covered by the horizontal beam, as well as the proposed wind farm site. This radar study commenced three days after the nearest January vantage point survey visit undertaken for the Proposed Development.
- The Withy End radar study was undertaken between the 29 January and 02 February 2011, following the Black Ditch Wind Farm study. During the radar study temperatures dropped and water bodies within the Somerset Levels and Moors SPA Ramsar froze which appeared to limit bird movements during the study.

- The 2010 radar study was also undertaken for NE, was carried out during a period of Wintery conditions including snow fall, and accurate analysis could not be carried out due to ‘clutter’ (the term given to irrelevant radar echoes).

Bats

- 8.3.46 **Volume 5.8.2, Appendix 8H** details the bat survey methods devised in consultation with NE and the Biodiversity Thematic Group; a summary is provided below. The survey scope was informed by the findings of the desk study, review of habitats within the landscape that may be suitable for bats to roost, forage, commute or migrate, and also took into account those that may be impacted by the Proposed Development, e.g. through habitat loss or fragmentation.
- 8.3.47 The zones of ecological influence for Annex II bat species for which the SAC sites are designated were set to reflect the ‘Consideration Zone’ (CZ) and CZ Modifier Bands identified by Somerset County Council in support of their offsetting method (Somerset County Council, 2013) (Ref. 8.18):
- Lesser horseshoe – 5km (band A = 0.5km, band B = 2.75km);
 - Greater horseshoe – 5.75km (band A = 0.5km, band B = 3.4km);
 - Barbastelle – 9.45km (band A = 9km, band B = 9.22km); and
 - Bechstein’s – 1.35km (band A = 1km, band B = 1.2km).

Tree Roost Surveys

- 8.3.48 Ground-based assessments of individual trees for their potential to support bat roosts were carried out between December 2012 and January 2013 whilst trees were not in leaf, capturing all trees across the Proposed Development and the surrounding 100m. Trees were assessed as High, Moderate or Low potential.
- 8.3.49 437 trees were identified as having High or Moderate bat roost potential and were taken forward for further survey. Aerial inspections of 348 trees with Medium or High bat roost potential were undertaken by suitably qualified climbers during Spring/Summer 2013. The remaining trees in these categories were unsafe or not possible to climb and a few areas (<5% of the route) were not surveyed where access permission had not been established. Following aerial inspection, these trees were divided into four categories:
- a. No bat potential i.e. tree discounted;
 - b. Confirmed roost;
 - c. No confirmed evidence of roosting although Medium or High potential remains; and
 - d. Tree could not be climbed.
- 8.3.50 All trees in categories b to d (totalling 123 trees) were then subject to targeted nocturnal roost surveys through 2013. The roost survey method was devised with due consideration of the 2012 Bat Conservation Trust (BCT) guidelines (Ref. 8.19) and is detailed in **Volume 5.8.2, Appendix 8H**. Each tree was subject to up to three dusk emergence/dawn re-entry surveys, dependent on the level of potential (Medium or High) or evidence (bat droppings identified during aerial inspection, bats present during aerial or initial nocturnal surveys) identified.

- 8.3.51 Following finalisation of the Proposed Development and completion of the Arboricultural Impact Assessment additional trees (circa 5% of trees covered by arboricultural survey) were outside the original ground-based bat roost assessments. These trees have been scheduled for survey in Spring 2014 (with any additional surveys, if required, being completed prior to DCO hearings) and as such do not pose a significant constraint.

Building Inspection

- 8.3.52 Inspection of six buildings at Ashtrees Farm, west of Mark, was carried out in February 2014 where buildings have been scheduled for demolition following a refinement to the proposals. The buildings were searched for bats and evidence of bats, such as presence of droppings, characteristic scratch marks and staining, and feeding remains. The inspection was taken from ground level, with the aid of high-powered torches. A flexible micro-camera to inspect deep crevices and cavities in walls and joinery. The potential of the buildings to support roosting bats was also assessed, taking into account the materials, age condition and orientation of the structure, possible points of access/egress, and the surrounding land use (in terms of its suitability for foraging or linear features for commuting).
- 8.3.53 Most of the buildings were used for storage and the interior therefore difficult to inspect. However, several bat droppings and feeding remains were found. On balance, the content of the buildings did not pose a significant constrain the final result or recommendations of the internal inspection.
- 8.3.54 Several deep cracks and cavities, mainly in Building 6 but also in Building 2 could not be fully inspected and conclusion on bat absence cannot therefore be drawn. This has been taken into account in the recommendations for further nocturnal roost surveys (2014 prior to DCO hearings) and as such do not pose a significant constraint.

Activity Transects and Static Detector Surveys

- 8.3.55 Nocturnal transect surveys using public rights of way were undertaken in 2010 across the Route Corridor options, concentrating on areas where the corridors intersected the 4km ecological zone of influence associated with the SAC bat designations (the 4km SAC buffer) and where the Route Corridor options fell within 4km of other known horseshoe bat roosts. Fourteen transect routes (12 walked, one driven and one combined) totalling 118.4km were surveyed twice each month during suitable weather conditions, from June to October 2010 with due consideration for best practice guidelines of the time (BCT, 2007) (Ref. 8.20).
- 8.3.56 Ten additional transects totalling 96.7km were surveyed from June to October in 2012 to cover sections of the selected Route Corridor not surveyed in 2010 and to cover potential substation and 400kV underground routes. The survey method and frequency broadly followed that of the 2010 surveys to ensure data was comparable. April and May surveys were not carried out in either year owing to a combination of unseasonably poor Spring weather conditions and to access agreements. Following discussion with NE, October surveys were included during favourable weather as bats are frequently highly active in this month in south west England. Transect survey routes are shown in **Volume 5.8.3, Figures 8.29.1 – 8.29.10**.
- 8.3.57 In line with 2012 BCT guidelines, static detector surveys were also carried out alongside the 2012 transects, targeting areas of potential high impact based upon

observations on habitat suitability that were made during the extended Phase 1 surveys and developing scheme design. Detectors were set in 94 locations, constantly recording bat activity between sunset and sunrise for five consecutive nights at each position. Again, transect survey routes and static detector positions are shown in **Volume 5.8.3, Figures 8.35.1 – 8.35.3**.

Hazel Dormouse

- 8.3.58 The dormouse survey method, including collation of species records as part of the desk study, identification of survey sites and nest tube survey methodology, is detailed in **Volume 5.8.2, Appendix 8I**.
- 8.3.59 Potential areas of dormouse habitat were initially identified within the Route Corridor ('primary survey areas') and a 1km buffer zone ('precautionary survey areas') using the publically available MAGIC Habitat Inventory dataset, National Grid habitat survey data, aerial imagery and records identified through the desk study. As a result, four broad areas were identified for survey:
- South of Puriton (Section A);
 - Winscombe to Sandford (Sections B and C);
 - East of Yatton (Section D); and
 - Tickenham Ridge (Section E).
- 8.3.60 Within these four broad areas, 28 primary, precautionary and control sites were selected for dormouse survey (see **Volume 5.8.3, Figures 8.44.1 – 8.44.10**), 24 of which fall within the Order Limits (Ref. 8.21). The precise approach to site selection is provided in **Volume 5.8.2, Appendix 8I**. Surveyors then undertook reconnaissance to ground truth these desk based assessments and to determine precise locations for nest tube survey.
- 8.3.61 Nest tube surveys were carried out during 2012 in accordance with best practice guidance (Bright *et al*, 2006 (Ref. 8.22) and NE, 2011 (Ref. 8.23)). Groups of 50 nest tubes were erected in surveyed habitats at 15-20m intervals during April/May 2012 and removed during October/November 2012. Nest tubes were checked at least every two months during the deployment period, in accordance with the Index of Probability table provided in Bright *et al* (2006) to ensure that the period and intensity of survey met the standard to determine likely absence. The correct approach for undertaking dormouse population estimates on the survey data was taken from the aforementioned guidance documents and was confirmed with NE (detailed in **Volume 5.8.2, Appendix 8I**).

Water Vole

- 8.3.62 Surveys for presence of water vole were undertaken in Autumn 2012 concentrating on waterbodies potentially crossed by the proposed 400kV underground route through the Mendip Hills AONB and the Sandford Substation. In Summer 2013 survey scope was extended to include watercourses crossed by the proposed 132kV underground routes, CSE compounds and access routes. Some additional areas were surveyed out of season in late Autumn 2013 to inform a review of representations for changes to the scheme design. Waterbodies surveyed included rivers, streams and field ditches. In each case, the survey area extended 50m up and down stream of proposed works. No ponds are being lost to the Proposed

Development and therefore no survey of ponds was required, however, evidence was incidentally recorded during other field surveys. Surveyed waterbodies are shown in **Volume 5.8.3, Figures 8.46.1 – 8.46.31**.

- 8.3.63 The surveys were broadly carried out in accordance with guidance set out in the water vole conservation handbook (Strachan *et al*, 2011) (Ref. 8.24); the methods are detailed in **Volume 5.8.2, Appendix 8J**. Field signs sought included burrows, runs and grazed lawns, feeding remains, droppings and latrines, and footprints. Given the scale of the aquatic habitats requiring survey, the interconnected nature of many of these, the dynamic nature of water vole populations within and between years, and the long timeframe between survey to inform scheme design and eventual DCO examination, a precautionary approach to survey was taken. Survey along a ditch or watercourse ceased once the animal itself or a minimum of three types of field sign were recorded; presence was therefore assumed for the entire length of watercourse. Surveys otherwise continued along the entire length of watercourse.
- 8.3.64 All field signs of water vole, irrespective of the number or nature, are presented as confirmed presence. A comparative study of field signs of small mammals (Ref. 8.25) has shown considerable cross-over between species of vole and suggests more than one field sign should be used to confirm presence of water vole. The approach used in the Hinkley surveys is therefore precautionary.
- 8.3.65 As the range of water vole populations may extend and contract within a single survey season and between survey seasons, the data provides a snapshot of activity at the time of survey. It is also recognised that interconnected ditches allow dispersal of water vole, even if these are not actively used at the time of survey.
- 8.3.66 Water vole survey data (dating from April 2011) provided by the Avon Wildlife Trust in respect of the Portbury Wharf WTR has been included within this assessment and associated NE licence documents.
- 8.3.67 62 proposed watercourse crossing points were amended following the close of the 2013 water vole survey period. These locations were visited out of season in 2013. Any additional areas were covered by extended Phase 1 Habitat survey. However, these ditches have been identified for survey in 2014 prior to DCO hearings. The affected ditches are shown in **Volume 5.8.3, Figures 8.46.1 – 8.46.31**. These ditches and approach to 2014 survey have been discussed within the draft NE water vole licence application and are addressed within the baseline, assessment of effects and mitigation sections and as such do not pose a significant constraint to the assessment.

Otter

- 8.3.68 Surveys for presence of otter followed the same spatial scope described for water voles. Surveyed waterbodies are shown in **Volume 5.8.3, Figures 8.47.1 – 8.47.19**. The survey methods are detailed in **Volume 5.8.2, Appendix 8J**. These broadly followed the approach used in the national otter survey (EA, undated) (Ref. 8.26) recording evidence of otter activity including holts and shelters (8.27), footprints, feeding remains, spraints (dung) and anal jelly (territorial marking) during 2012 and 2013.
- 8.3.69 It is acknowledged that otters have large home ranges and even if holts, shelters or other field signs are not found during survey, the watercourse may be used by the species as ranging/commuting habitat. Therefore, considerable attention is given to otter records for the wider area and the potential for this species to range across

the Order Limits. As for water vole, 62 proposed watercourse crossing points were amended late in 2013. These ditches have been identified for otter survey in 2014 prior to DCO hearings. The affected ditches are shown in **Volume 5.8.3, Figures 8.47.1 – 8.47.19**. These ditches are addressed within the baseline, assessment of effects and mitigation sections and as such do not pose a significant constraint to the assessment.

Badger

- 8.3.70 Field signs of badger were initially collated during the extended Phase 1 Habitat surveys during March to September 2012 and April to June 2013. All linear field boundaries were walked and other habitats suitable for badger, such as woodland and scrub were surveyed. The locations of setts, and any further field signs incidentally encountered such as footprints, paths, dung, latrines and hairs, were recorded. Targeted survey to ascertain the status of setts within 30m of the Order Limits was carried out in November 2013. The location of each sett entrance was photographed and plotted using GPS, and a detailed description of the sett and surrounding habitat collated. Setts were classified in accordance with Harris *et al.* (1989) (Ref. 8.28).
- 8.3.71 Additional inspections were undertaken in 2014 across several small parcels of land and within a private land holding, Ashtrees Farm located west of Mark (where buildings have been scheduled for demolition following refinement of the proposals).

Other Mammals

- 8.3.72 Mammal species listed within the NERC Act which were identified in the desk study include brown hare, hedgehog, harvest mouse and polecat. Whilst no targeted survey was carried out for these species (as agreed through the Scoping process), the available data has been reviewed in detailed to gain an understanding of their distribution across the Order Limits, to inform the assessment.

Amphibians

- 8.3.73 Great crested newt (GCN) surveys were undertaken during Spring 2013 of both pond and ditch habitats within 250m of the Proposed Development, wherever access was permitted. In total 313 ponds and 2,750 ditches (approx. 550km) were surveyed. The approach to survey was agreed with the Biodiversity Thematic Group following consultation with NE European Protected Species NSIP licensing team. Surveys were carried out in accordance with NE (2001) (Ref. 8.29); the methods are detailed in **Volume 5.8.2, Appendix 8L** and surveyed waterbodies illustrated in **Volume 5.8.3, Figures 8.51.1 – 8.51.29**.
- 8.3.74 To address amendments to the Proposed Development and Order Limits which have occurred following the close of the 2013 GCN survey period, the 250m buffer has been recalculated, resulting in 15 ponds and 257 ditches being included in the buffer which have not previously undergone amphibian survey. These will be surveyed in spring 2014 prior to the DCO hearings. Additionally, repeated attempts will be made in 2014 to survey ditches and ponds within the Order Limits where survey conditions or absence of landowner permission to access prevented full surveys in 2013.

- 8.3.75 NE was consulted on the proposed 2014 survey areas in the first and second draft GCN licence applications (Autumn 2013 and January 2014).
- 8.3.76 The Avon Wildlife Trust provided GCN survey data for waterbodies (Ref. 8.30) within the Portbury Wharf WTR, which have been monitored over several years up to and including 2013. Following the first survey by TEP, a data sharing agreement was arranged and the field survey data for these ponds have been provided by the Trust. The field survey data has been included within this assessment and associated NE licence documents.

GCN Habitat Suitability Index Assessment

- 8.3.77 Habitat Suitability Index (HSI) (Oldham *et al*, 2000) (Ref. 8.31) provides a standardised approach to assess the suitability of ponds for GCN to breed. The score derived from a range of parameters translates to a suitability of Poor, Below Average, Average, Good or Excellent. This method was followed for all ponds within the survey area. For ditches, a modified HSI was developed as the standard method cannot be applied readily to a ditch system due to its linear and interconnected nature. Five ditch characteristics were devised, as described in **Volume 5.8.2, Appendix 8L**. HSI assessments commenced in March 2013 and continued throughout the amphibian survey season as access became available.

GCN Population Survey

- 8.3.78 Full GCN population survey was carried out on all ponds found to have an HSI assessment score of at least 'Below Average' i.e. only those scoring 'Poor' suitability were scoped out of further survey. For ditches, those found to have an overall positive or neutral score using the five ditch characteristics were subject to a full GCN survey i.e. only those found to have a negative score were scoped out. In total 125 ponds and 964 ditches (approx. 220km of ditches) were subject to full survey.
- 8.3.79 Population surveys (four visits to determine presence/likely absence and, where present, two additional visits to estimate population size class) were carried out in accordance with best practice guidance (NE, 2001) (Ref. 8.32), as detailed in **Volume 5.8.2, Appendix 8L**. Surveys commenced in early April 2013 and were completed by mid-June 2013.
- 8.3.80 Population size classes are then determined based on the peak adult count. This approach was applied to both pond and ditch habitats, although it is likely to result in an overestimate for ditches due to the generally higher coverage of the habitat by survey methods compared with a pond (where only the margins are visible for torch surveys).

Reptiles

- 8.3.81 The scope of reptile surveys was informed by the findings of the desk study, review of habitat survey data (including incidental records of reptiles) and consideration of potential effects associated with the Proposed Development. Reptile survey data (dating from 2011) provided by the Avon Wildlife Trust in respect of the Portbury Wharf WTR has been added to the desk study information.
- 8.3.82 Survey for presence/probable absence of common lizard, slow worm, grass snake and adder was undertaken in Spring and Summer 2013, targeting areas of comparatively 'good quality' reptile habitat (Ref. 8.33) within the Order Limits. A total of 17 survey sites were identified (illustrated on **Volume 5.8.3, Figure 8.54**).

Each survey location is described in the appendix, along with the grid reference and site photograph.

- 8.3.83 The primary survey method entailed the use of artificial refugia, in accordance with Froglife guidance (Halesworth, 1999) (Ref. 8.34), complemented by searching of existing features likely to shelter reptiles and careful observation of basking/moving reptiles whilst walking between refugia. The survey method is detailed in **Volume 5.8.2, Appendix 8M**.

Ditch Invertebrates and Flora

- 8.3.84 The potential for effects on invertebrates during the construction of overhead line are associated with the need for temporary crossings of ditches. Potential effects during the construction of 400kV and 132kV underground routes are associated with the installation of ducts to take the cables beneath the ditches, where HDD is not proposed. There would also be realignment of a ditch to facilitate the construction of Sandford Substation.
- 8.3.85 Based on the initial desk study information, the findings of the habitat surveys and a review of the Proposed Development, an initial reconnaissance visit was carried out in April to July 2013 to broadly scope the invertebrate surveys targeting species or species-groups. Surveys were undertaken in pairs with a terrestrial invertebrate surveyor working alongside an aquatic invertebrate surveyor. At least one person held a NE licence for lesser silver water beetle. At the time of this initial scoping, it was understood that the development design would alter during the upcoming year and the purpose of the survey scope (in combination with existing invertebrate data) was to provide an overall assessment of invertebrate assemblages within the habitats crossed by the Proposed Development.
- 8.3.86 Following this, a detailed visual inspection was carried out on 116 ditches and 3 ponds to further scope surveys, taking into account the type and quality of habitat present. Surveyors selectively targeted ditches of greater invertebrate habitat value. Essentially this equates to the ditch being largely dry or absent and in a few cases polluted/of poor water quality. The location of visually inspected ditches and ponds is mapped in **Volume 5.8.3, Figures 8.56.1 – 8.56.56**. At the same time, an assessment for their suitability to support lesser silver water beetle *Hydrochara caraboides* (W&CA Act 1981 Schedule 5) was carried out, based upon known habitat requirements of lesser silver water beetle in Somerset as given in Boyce (2004) (Ref. 8.35). A full list of wetland flora was recorded at select ditches to gain an understanding of the vegetation present.
- 8.3.87 Of those visually inspected, 67 ditches and 3 ponds had aquatic survey and 13 ditches had terrestrial-only survey. The full aquatic invertebrate surveys targeted species or groups of species to enable categorisation using Species Quality Indices, described below. Full surveys were carried out through May to September 2013 during suitable weather conditions. Two visits to each survey site was carried out – one earlier and one latter season. The survey methods, terrestrial and/or aquatic, were selected in accordance with standard guidance (Drake, 2007) (Ref. 8.36), as detailed in **Volume 5.8.2, Appendix 8N**. Although an exhaustive species list for every ditch is not generated, this level of survey is sufficient to provide an evidence base to determine the range of species associated with the ditch systems crossed by the Proposed Development and therefore, to predict effects and design

mitigation in relation to invertebrates. Furthermore, the *Hydrochara* assessment provides the additional level of information required to address the legal protection of this species.

- 8.3.88 For analysis of the invertebrate survey data (detailed in **Volume 5.8.2, Appendix 8N**), the Native Invertebrate Species Conservation Status Score (each aquatic invertebrate species is scored according to its relative rarity) and the Species Quality Index (essentially an average score for a given sample or a wetland) were calculated for each waterbody in line with Palmer *et al* (2013) (Ref. 8.37). Each ditch was then categorised as summarised in **Table 8.11**.

Table 8.11 Ditch Categories Reflecting Invertebrate Assemblage

Ditch Category	Species Quality Index	Comments
1	>2	Ditch has a high percentage of Species of Conservation Importance in the species count.
2	>1.5 but <2	Ditch contains several high scoring invertebrates and has the highest value based on Species of Conservation Importance.
3	>1.0 but <1.5	Ditch contains high scoring invertebrates but has lower value based on Species of Conservation Importance.
4	1.0	A ditch in which only common species were recorded, but with a minimum of 10 scoring aquatic invertebrates.
5	Species-poor	A ditch with less than ten scoring aquatic invertebrates.
6	Scoped out of survey	A ditch which was considered unsuitable for survey.

- 8.3.89 A list of wetland flora was taken during the invertebrate surveys for each ditch. Species of conservation concern were identified using standard criteria, as for invertebrates, including IUCN designated flora.

Fish

- 8.3.90 The Environment Agency has provided available fish data for watercourses that cross the Order Limits, dating from 2005 to present. Data was provided for seven sampling locations along five watercourses – the Huntspill River (Woolavington Bridge and Gold Corner), Old River Axe (Bow Bridge), River Banwell (Lower Gout Farm), River Yeo (Iwood and Beam Bridge) and River Kenn (Kenn Pier). The data has been reviewed, in conjunction with the wider desk study information and incidental records collated during the ditch invertebrate and flora surveys, to gain an understanding of the presence of species of conservation concern through the rivers, their tributaries. Key species of interest include river and sea lamprey, Annex II species for which the Severn Estuary SAC Ramsar is designated, European eel and sea trout for which the SSSI is designated, and brown trout understood to occur in the Lox Yeo River SNCI (EA, 2013) (Ref. 8.38); sections of both the Severn Estuary and Lox Yeo are crossed by the Order Limits.

8.4 Baseline Environment

- 8.4.1 Sections A to H of the Proposed Development (as described in **Volume 5.3.1**) were devised in consultation with the Landscape and Views Thematic Group to assist in the assessment process but do not relate to distinct ecological features or boundaries. The ecological baseline is therefore described for each receptor in turn, reflecting the approach that is subsequently taken to assess potential effects. Relevant landscape Sections A to H are however referenced to aid cross-referencing between ES chapters and aid the reader in identifying locations.

Projected Changes to the Baseline Environment (The Base Case)

- 8.4.2 The baseline environment (i.e. current conditions) is described for each receptor, based on the most recent survey data, augmented by desk study information. The Proposed Development is scheduled to commence in 2015 Q3. Any anticipated change to the baseline environment during the interim period is set out as the 'base case' for the purposes of assessment, in line with **Volume 5.5.1**.
- 8.4.3 The majority of the Proposed Development passes through farmed areas. Land use in the area of the Proposed Development is expected to remain in predominantly agricultural use. Although the continuing mild trend towards increased support for farm environmental planning may generally enhance conditions for the receptors listed in the tables above, no major shifts in wildlife abundance or distribution are anticipated within the base case.
- 8.4.4 The local landscape will be subject to change as a result of other developments coming forward and these are considered as part of the cumulative assessment in **Volume 5.17.1**; a summary of the implications for biodiversity is provided herein at section 8.11. Within the timeframe of the base case, the most significant is the proposed development at Avonmouth and Severnside which, while not directly affecting the same receptors as the Proposed Development in their current form, would result in the creation of compensatory bird habitat at Hallen Marsh thereby increasing the local value of this area for waders and wetland habitats. The development at Avonmouth and Severnside is scheduled for 2015-2019, although habitat creation works to offset this are yet to commence. It is therefore unlikely that any such habitats will have established ecological value substantially different to the current conditions by the onset of the Proposed Development and as such, the base case would remain broadly similar to the baseline environment described herein.
- 8.4.5 Short-term weather patterns, notably winter flooding, have been described in **Volume 5.10.1, section 10.4**. Species associated with ditches and rivers are most likely to experience seasonal change. Although the direction and extent of change is difficult to predict for many receptors, this is highlighted for relevant receptors, such as water vole. Longer term changes in respect of climate change, during the operation of the Proposed Development, are addressed in section 8.5: Consideration of Climate Change Effects.
- 8.4.6 The Arboricultural Impact Assessment (**Volume 5.21.1**) provides a summary of the status of ash trees in the area of the Proposed Development and the current knowledge regarding the spread of ash dieback disease (*Chalara fraxinea* infestation). This suggests that 25-35% of trees in the survey area are ash, which is probably consistent with the surrounding landscape. The disease is likely to

result in a general reduction of ash canopy in the area but there is insufficient evidence about the rate of spread of the disease or its long-term effect on the ecology of ash woodlands or the UK Government's response, to make any accurate judgement about the extent to which the baseline environment will alter in the coming years as a result of the disease. No short-term change to the base case has been assumed.

- 8.4.7 Chalara fraxinea has been considered specifically due to the relative abundance of ash in the region and the possibility of threats to the wide population of trees. The effects of other diseases known to pose risk to larch, pine, sweet chestnut and horse chestnut have not been considered because, although threats may arise at a site level (i.e. within one group or small area) there is no evidence that these threats may affect the populations through the wider area in a way that ash dieback disease may manifest. Acute oak decline, although a serious problem in other areas of England, has not been considered due to restrictions in its current geographical spread and the absence of evidence that it poses a risk in southwest England.

Designated Wildlife Sites

- 8.4.8 **Volume 5.8.3, Figures 8.1.1 – 8.1.17** illustrate the designated sites in the vicinity of the Proposed Development, overlaid with the Development Components. A full record of all sites falling within these search areas along with rationale for scoping sites in or out of the assessment is tabulated in **Volume 5.8.2, Appendix 8A. Tables 8.12 and 8.13** summarise the international and national, county designations identified through the Scoping process (by means of their qualifying features and their location in relation to the Proposed Development) as receptors for consideration within this chapter.
- 8.4.9 An area of land at Hallen Marsh has been identified in local planning policy as a location for future habitat creation in compensation for potential adverse effects on the Severn Estuary SPA Ramsar that result from development at the Severnside Enterprise Area (Hyder Cresswell, 2011). The offset land falls within Hallen Marsh Agricultural Land Wildlife Network Site (WNS), which forms part of the Bristol Wildlife Network which links designated sites to each other and the wider countryside. Although habitat creation works have not yet commenced, it will in the future have equivalent policy status as an SPA (in line with the NPPF; see section 8.2: Policy and Legislation). Potential effects on this WNS are therefore assessed as equivalent to effects on sites of international value. The WNS is also considered in the Applicant's HRA Report.
- 8.4.10 Of the county and local designated sites initially identified 76 lie within or near the Order Limits including sites that Local Planning Authorities considered may experience indirect effects. 52 sites are crossed by the Proposed Development. (Ref. 8.39). Several of these sites overlie each other and **Volume 5.8.2, Appendix 8A** clarifies that, where this occurs, the lower-value designations are assessed as part of a higher-value designation. Overlying designations are particularly complex at Portbury Wharf, where the Portbury Wharf Nature Reserve SNCI (the Avon Wildlife Trust Reserve (WTR)) extends west from Portbury Wharf SNCI. When considered collectively, as an entire ecological unit these sites are referred to as 'the Portbury Wharf nature reserves'
- 8.4.11 A summary table for the county and local designations is excluded from this chapter owing to its large size, but details are found at Appendix 8A. Appendix 8O goes on

to provide a statement of temporary and permanent habitat losses and a narrative account of changes likely to be experienced.

Table 8.12 International Designated Wildlife Sites within 10km of the Order Limits Scoped Into the Assessment

Name	Description	Distance from Order Limits
Somerset Levels & Moors SAC SPA Ramsar	6,395.47ha. One of the largest and richest areas of traditionally managed wet grassland and fen habitats in lowland UK. Peat extraction in parts of the site has created areas of open water, fen and reedbed. The site attracts important numbers of Wintering wildfowl and waders in Winter. The site also supports 17 species of British Red Data Book invertebrates. <i>SSSI components: Catcott Edington & Chilton Moors SSSI <2km east of the Order Limits, Curry & Hay Moors SSSI >7km south, West Sedgemoor SSSI >8km south, Southlake Moor SSSI 6km south, Kings Sedgemoor SSSI >5km south east, Moorlinch SSSI >4km south east, Westhay Heath SSSI >6km east (the citations reference wildfowl, and migrant waterfowl and waders in Winter or Spring passage), Shapwick Heath SSSI >6km east (supports breeding birds, raptors and Winter waders), Tealham & Tadham Moors SSSI >2.5km east & Westhay Moor SSSI >7km east (support Wintering wildfowl and breeding waders).</i>	• 3.45km north east of Section A • 1.88km east of Section B
Severn Estuary SAC SPA Ramsar	46,945.11ha designated for a variety of factors, which include coastal and intertidal habitats, migratory fish, invertebrates and internationally important populations of Annex 1 bird species, Spring and Autumn migratory bird species and wader and wildfowl assemblages. <i>SSSI components include: Bridgwater Bay SSSI NNR and Severn Estuary SSSI both crossed by the Proposed Development (citations reference intertidal habitats plus associated flora and fauna), Edington & Chilton Moors SSSI <2km (supports breeding birds and Wintering waterfowl).</i>	• 2.77km west of Section A • Crossed in Section G • 0.22km north of Section F • Crossed by Hinkley Point C Line Entries
Hallen Marsh Agricultural Land WNS	Part of the Bristol Wildlife Network which links designated sites to each other and the wider countryside. Identified in local planning policy for habitat creation in compensation for potential adverse effects on the Severn Estuary SPA Ramsar as a result of development at the Severnside Enterprise Area; accordingly assessed as equivalent international value.	Crossed in Section G

Name	Description	Distance from Order Limits
North Somerset & Mendip Bats SAC	558.48ha designated for its semi-natural dry calcareous grasslands, Tilio-Acerion forests and cave systems which provide important hibernation habitat for lesser and greater horseshoe bats and maternity habitat for greater horseshoe bats. <i>SSSI components: Banwell Ochre Caves SSSI 350m from the Order Limits (supports both horseshoe species) and Banwell Caves SSSI <2km from the Order Limits, Kings Wood & Urchins Wood SSSI 3km east, The Cheddar Complex SSSI >8km east (all support greater horseshoes).</i>	• 0.29km west of Section C • 2.23km east of Section D • 1.34km north of the Line Entries works at Churchill substation
Mendip Limestone Grasslands SAC	417.27ha designated for its European dry heaths, semi-natural dry calcareous grasslands, Tilio-Acerion forests and cave systems. It is also designated for greater horseshoe bat. <i>SSSI components include: Crook Peak to Shute Shelve Hill SSSI 150m from the Order Limits (citation references the cave system).</i>	Within 0.01km east in Section C
Exmoor & Quantock Oakwoods SAC	1,895.01ha designated for its Annex I old sessile oak and alluvial forest habitats. The oak woodland supports a maternity roost of Barbastelle bats, and Bechstein's bats and otters are also present. <i>SSSI components include: The Quantocks SSSI (citation does not reference bats).</i>	6.07km from Hinkley Point C Line Entries
Chew Valley Lake SPA	575.73 ha designated as an overwintering site for northern shoveler.	9.95km east of Churchill Substation

**Table 8.13 National Designated Wildlife Sites within 2km from the Order Limits
Scoped Into the Assessment**

Name	Description	Distance from Order Limits
Catcott Edington & Chilton Moors SSSI	1,085.17ha containing diverse range of habitats ranging from ditches and mire habitat to unimproved meadows which provide suitable feeding and nesting sites for a wide range of birds. Breeding ground for a range of bird species and supports waterfowl when flooded in Winter. A diverse invertebrate fauna is associated with the ditch system including rare water beetles. Otters are present. Part of the Somerset Levels & Moors SPA Ramsar.	1.88km east of Section B
Huntspill River NNR	148.98ha. A river, created to supply a Royal Ordnance factory, which supports otter populations and a range of valuable grassland and woodland habitats. The site is also an LWS titled 'Bridgwater Bay NNR'.	Crossed in Section B
Crook Peak to Shute Shelve Hill SSSI	332.71ha designated for its woodland, calcareous grassland, acidic dry dwarf shrub heath and cave habitats. Four nationally rare and seven notable plant species are present. Greater Horseshoe Bats are a qualifying feature. A component part of the Mendip Limestone Grasslands SAC.	Within 0.01km east in Section C
Max Bog SSSI	10.31ha of nationally rare calcareous lowland mire and wet grassland habitats which supports a rare grass species. It is also an Avon Wildlife Trust reserve.	0.41km south of Section C
Banwell Caves SSSI	1.64ha. A known hibernacula for greater horseshoe bats and a component site of the North Somerset & Mendip Bats SAC.	1.64km north west of Section C
Yanal Bog SSSI	1.56ha. A calcicolous lowland mire with nationally rare plant communities associated with the peat surface.	0.56km east of Section D
Puxton Moor SSSI	37.09ha. The site contains a network of rhynes which support a diverse range of aquatic plants and invertebrates.	Crossed in Section D
Biddle Street, Yatton SSSI	44.69ha. The site contains a network of rhynes which support a diverse range of aquatic plants and invertebrates. Also includes the Congresbury Yeo River, which runs along the south west boundary. The SSSI thereby overlaps Congresbury Yeo Adjacent Land & Rhynes SNCI.	Crossed in Section D
Kings Wood & Urchins Wood SSSI	130.37ha. One of the largest areas of ancient woodland remaining in Avon and is renowned for its botanical interest supporting nationally rare and scarce plant species. The site also supports nationally important populations of greater horseshoe bat and dormice and is a component site of the North Somerset and Mendip Bats SAC.	1.34km north of the Line Entries at Churchill substation

Name	Description	Distance from Order Limits
Tickenham, Nailsea & Kenn Moors SSSI	129.40ha. The site contains a network of rhynes, as well as Parish Brook and the Middle Yeo, which support a diverse range of aquatic plants and invertebrates. In particular, noteworthy populations of water beetle exist including 12 nationally rare species.	Crossed in Section D
Severn Estuary SSSI	10,001.17ha, part of the Severn Estuary SAC SPA Ramsar. The Estuary is designated for a variety of factors, which include coastal and intertidal habitats, migratory fish, invertebrates and internationally important populations of Annex 1 bird species, Spring and Autumn migratory bird species and wader and wildfowl assemblages.	• Crossed in Section G • 0.22km north of Section F
Bridgwater Bay SSSI NNR	6,237.47ha. The SSSI has an important bird population with approximately 190 species recorded on the reserve. Large numbers of wintering waders and waterfowl visit the site and some species use the area as a stop-off on migration routes. The NNR consists largely of intertidal mudflats with saltmarsh, sandflats and shingle ridges, some of which are vegetated. The Bristol Channel has the second largest tidal range in the world and this exposes huge mudflats and sand banks in the area which provide important feeding and over-wintering grounds for waders. The ditches and ponds of the NNR contain a diverse invertebrate fauna including six nationally rare species and eighteen nationally scarce species. Part of the Severn Estuary SAC SPA Ramsar.	• The SSSI is crossed by Hinkley Point C Line Entries in Section H • The NNR is within 500m north of the Hinkley Point C Line Entries in Section H
Chew Valley Lake SSSI	565.20ha. An internationally important staging post for migratory birds and one of the most important inland lakes in Britain for overwintering wildfowl. Particularly noted for supporting good numbers of shoveler and gadwall, and nationally important numbers of teal and tufted duck Part of Chew Valley Lake SPA.	9.95km east of Churchill Substation

Habitats and Flora

- 8.4.12 The Phase 1 Habitat maps are provided in **Volume 5.8.3, Figures 8.2.1 – 8.2.17** and accompanying target notes in **Volume 5.8.3, Figures 8.3.1 – 8.3.17** and **Volume 5.8.2, Appendix 8E**. The NVC assessment report is provided in **Volume 5.8.2, Appendix 8C** with accompanying **Volume 5.8.3, Figures 8.4.1 – 8.4.5**. The habitat types recorded across the route are described below with NVC communities cross-referenced where appropriate. The hedgerow assessment report is provided in **Volume 5.8.2, Appendix 8D** with accompanying **Volume 5.8.3, Figures 8.5.1 – 8.5.21**. Plant names are provided in English, with Latin provided in the technical appendices.

- 8.4.13 **Table 8.24** summarises the quantities of each habitat type found within the Order Limits, together with their evaluation using CIEEM criteria set out at **Table 8.7**.
- 8.4.14 There are records for a number of Nationally Scarce plants which are associated with the SSSI designations and include rootless duckweed, soft hornwort, hair-like pondweed, fen pondweed and whorled water-milfoil. The distribution of these within sites across the Order Limits is tabulated in **Volume 5.8.2, Appendix 8N**.

Woodland, Trees and Scrub Habitats

- 8.4.15 Broad-leaved woodland (semi-natural) accounts for 36.31ha across the Order Limits. Woodland habitats are generally uncommon across the route, although small parcels that qualify as s41 lowland mixed deciduous woodland occur in Sections A, C, E, G and H. Many of these woodlands are also designated as local wildlife sites, including some ancient woodland habitat.
- 8.4.16 Tickenham Ridge (Section E) is the most wooded section along the route, containing ancient semi-natural woodlands which form a strong connective feature across the wider landscape at this location. Small areas of Abbots Horn Wood (NVC site WD 7), Mogg's Wood (NVC site WD 9) and the eastern extension of Priors Wood (NVC site WD10) overlap the Order Limits and Chummock Wood (NVC site WD 8) lies alongside the Order Limits. The woodlands sampled in the Tickenham Ridge area all showed a generally good level of fit with W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland, with a strong affinity to W8b the *Anemone nemorosa* sub-community noted within Chummock Wood and Mogg's Wood. These woodlands all contained relatively diverse ground flora vegetation with frequent ancient woodland indicator species noted.

Photograph 8.1 Woodland Complex at Tickenham Ridge Showing Existing F Route (view north east, Chummock Wood to left, Mogg's Wood to right), Summer 2012



- 8.4.17 The cluster of woodlands south of Puriton (Section A) includes Chisland Covert (NVC site WD4), Home Covert and New Ground Covert, small areas of which lie within the Order Limits. To the south east, Knowle Hill (NVC site WD1) and The Dems (NVC site WD2) lie c.0.09km and <0.30km from the Order Limits respectively. The blocks of woodland south of Puriton were again found to have affinity to W8 woodland, however a number of samples showed affinity to W21b, the *Mercurialis perennis* sub-community of *Crataegus monogyna*-*Hedera helix* scrub vegetation, likely to be succession stage developing towards W8 woodland.
- 8.4.18 Broad-leaved woodland also occurs within the Order Limits along the Lox Yeo River (Section C) and an ash dominated woodland strip along Towerhead Brook (Section D), wooded sections of the railway embankment at Moorhouse Lane, Avonmouth and at Avonmouth Old Sidings (NVC site WD11, Section G). Avonmouth Old Sidings falls within the Avon BAP for Semi-Natural Woodland. The NVC survey found this band of woodland associated with the railway sidings to be in the stages of developing from scrub to woodland, with fair matches to W21 scrub vegetation types and with some similarities with W6 *Alnus glutinosa*-*Urtica dioica* woodland types also recorded.
- 8.4.19 Bluebell (W&CACT 1981 Schedule 8) was recorded amongst the ground flora at Abbots Wood, Round Wood, Chummock Wood, and the narrow belts of woodland by Chummock Wood-and along Towerhead Brook.

Photograph 8.2 Woodland Complex at Tickenham Ridge (view from edge of Chummock Wood across to Mogg's Wood), Summer 2012



- 8.4.20 24.98ha of broad-leaved plantation occurs across the Order Limits, typically as small areas of plantation recorded in mosaic with grassland and hedgerow habitats, for example, along the southern bank of Huntspill River, a small band of young broad-leaved plantation within the field just north of Southwick Road and a band of young broad-leaved plantation adjacent to Nye Road. The largest area of plantation surveyed is Eleven Acres Covert (NVC site WD3) at Tickenham Ridge (Section E).
- 8.4.21 Little coniferous plantation was recorded across the survey area, accounting for <0.01ha in total. The largest area surveyed is at Bullocks Bottom Woodland (an extension of Priors Wood), 0.19km from the Order Limits.
- 8.4.22 Orchard accounts for 0.23ha across the Order Limits. The majority, were intensively managed. Some small areas of less densely planted orchard with mature fruit tree specimens were recorded at East Huntspill and Mark (Section B), Kenn and Nailsea (Section D). As these have either frequently mown or relatively heavily grazed grassland below the orchard trees (often forming part of a private garden) they are unlikely to qualify as s41 habitat but may meet the description of traditional orchard in the Somerset BAP in terms of unusual apple varieties.
- 8.4.23 Scattered broad-leaved trees typically occurred along field boundaries and river corridors, but also occasionally across open pasture, such as the mature horse chestnut and oaks across the short horse-grazed grassland at Knowle Park.
- 8.4.24 Veteran trees are found in most sections, but predominantly in Section D. A total of 210 individual and two groups of veteran trees were recorded; these are mapped

and assessed in **Volume 5.21.1**. The two groups occur north of Martlands Farm at Woolavington (Grid ref. ST334141) and the second near East Huntspill, north of Merry Lane (Grid ref. ST335146).

- 8.4.25 The majority of veteran trees were recorded within Section D, with 112 veteran trees, predominantly mature pollards. The spread of trees through the remainder of the survey area included a single veteran tree (hawthorn) in Section A, 47 trees in Section B (two dead trees and several mature pollards), six trees in the Mendip Hills Section C (two dead trees and one hollow apple), 12 trees along the Tickenham Ridge in Section E (ash and oak veterans, many with exceptional girth and close to areas of ancient woodland such as Chummock and Mogg's Woods, 20 trees in Section F (predominantly mature willow pollards) and 12 veterans in Section G (also predominantly mature pollards). There are no veterans in Section H (Hinkley Line Entries). Veteran trees are covered by the 'Woodland Pasture and Veteran Trees Action Plan'.
- 8.4.26 Scattered coniferous trees are relatively few and far between across the Order Limits. Where present, these are typically ornamental, planted as part of private landscaping. Locations include field boundaries west of Priors Wood and near playing fields at Nailsea and near Pilrow Farm at Vole, near Mark Causeway and near Merry Farm at East Huntspill.
- 8.4.27 Dense and scattered scrub typically occurs in mosaic with hedgerow or wooded habitats as these naturally colonise adjacent grassland or ditches, for example. Scrub was recorded along the disused railway, alongside watercourses including the northern edge of the Huntspill and north of the River Avon, infilling shallow ditches, alongside green lanes and in association with and scattered across unmanaged grassland/tall ruderal herbs.
- 8.4.28 Continuous bracken totalling 0.11ha is found across the Order Limits and is limited to a few small patches near Priors Wood.
- 8.4.29 Introduced shrubs or ornamental planting was principally associated with areas of landscaping and accounted for <0.01ha, across the Order Limits. Regarding terrestrial non-native invasive species listed on W&CAct 1981 Schedule 9, giant hogweed (listed as it poses a human health risk) was recorded at a single location within the Order Limits – on the disused railway line, just north of the junction of the F Route and N Route, north of Sandford. Himalayan balsam (a vigorous shallow rooting species which smothers native flora and is associated with bank erosion) was recorded on three watercourses in close proximity to proposed works (on the River Brue in the vicinity of proposed scaffold areas, and on the East and West Brooks at Hinkley Point, both of which would be overflowed by the 400kV overhead line). Other Schedule 9 species recorded (all of which are listed as these pose a risk to native wildlife in terms of invasive growth habit or risk of hybridisation with Schedule 8 species) include giant rhubarb and cotoneaster species (both associated with private gardens), variegated yellow archangel, Virginia creeper. Japanese knotweed was recorded beyond the Order Limits within a private property boundary hedgerow along the southern edge of Weston Road.

Hedgerows and Ditches

- 8.4.30 The network of hedgerows and field drainage ditches, known locally as 'rhynes' (Somerset) or 'rhines' (Gloucestershire), extend across the majority of the route, with the exception of heavily built-up areas at Royal Portbury Docks. The hedgerow assessment report is provided in **Volume 5.8.2, Appendix 8D** with

accompanying **Volume 5.8.3, Figures 8.5.1 – 8.5.18**. The rhynes play an important part in reducing flood risk and as a consequence are subject to dredging and vegetation clearance on a cycle of, variously, one to five years. They allow irrigation of the extensive low-lying areas in dry periods and drain excess water during wet periods.

Photograph 8.3 Flowing Ditch and Adjacent Hedgerow Along Boundary of Pasture Field (view towards Brent Knoll), Spring 2012



- 8.4.31 11.25km of the hedgerows recorded across the Order Limits, are species-rich, 81.23km are species-poor and <0.01km is a conifer hedgerow. In accordance with the Phase 1 Habitat descriptions, hedgerows are considered species-rich where at least four species are recorded within the canopy, typically blackthorn, hawthorn, field maple and ash, or where a notably rich ground flora occurs. Species-poor hedgerows were typically dominated by blackthorn and/or hawthorn.

Photograph 8.4 Hedgerow Under Mixed Management – Part Flailed, Part Outgrown (south of Rook's Bridge), Spring 2012



- 8.4.32 The NERC Act description of hedgerows includes all with at least 80% native species, irrespective of diversity. With the exception of the more industrial land uses at Royal Portbury Docks, native hedgerows are abundant throughout the Order Limits, and although much of the Route Corridor has been farmed intensively, all hedgerows qualify as both s41 and Local (both Avon and Somerset) BAP habitat types.
- 8.4.33 **Volume 5.8.2, Appendix 8D** provides information on which hedgerows surveyed in the Order Limits met the ecological criteria for ‘importance’ under the 1997 Regulations, including information about which of the important hedgerows qualified by supporting native bluebell at the base alone. Of the entire hedgerow network, 3.47km were considered to be ‘important’ and 38.47km were over 3m in height, and an additional 1.08km met both these characteristics.
- 8.4.34 Both species-rich and species-poor hedgerows were recorded alongside ‘green lanes’ i.e. un-surfaced tracks of “*Major*” age that form part of the rights of way network (as defined in the ‘Somerset Roadside Verges and Green Lanes Habitat Action Plan’, undated), examples of which include Hack Mead Lane (Section B) and Sheep Way Lane (Section F).

Photograph 8.5 Green Lane – Example Developing Closed Canopy Over Unsurfaced Track (Banwell Hill), Spring 2012



Photograph 8.6 Green Lane – Flailed Double Hedgerows Flanking Surfaced Vehicle Access (Sandford), Spring 2012



Photograph 8.7 Green Lane – Grassed-over Droveway (public right of way) Flanked by Hedgerows (south of Rook's Bridge), Spring 2012



Photograph 8.8 Green Lane – Flailed Hedgerows Flanking Footpath with Initial Scrub Encroachment (Bason Bridge), Spring 2012



- 8.4.35 A total of 86.26km wet ditch and 3.58km running water were recorded within Order Limits. As part of the water level management across the Somerset levels, the ditch network is periodically cleaned out to prevent gradual in-filling by sediment and accumulated vegetation detritus through natural succession. Management (dredging and vegetation clearance on) is carried out on, variously, 1 to 5 year cycles by the EA, IDB and private landowners. Management that favours wildlife is that which maintains a range of ditch sizes and successional stages within the wider network, thereby supporting the highest diversity of flora and fauna. Late-stage successional ditches are particularly important to support the rare invertebrates that specialising in this habitat type (Somerset BAP for Ditches and Ponds).

Photograph 8.9 Example of a Ditch Following Recent Management, with Impoverished Aquatic and Marginal Flora along One Bank (roadside ditch south of Vole), Spring/Summer 2012



- 8.4.36 Wet ditches across the flood plains that carry limited or slow flow of water fall under the Somerset BAP for Ditches and Ponds (in contrast, ditches carrying one-directional flow fall outside the scope of this BAP habitat type). In many respects they can be considered as linear ponds. As described in the BAP “*the Somerset Levels is the largest area of lowland wet grassland in the UK and ditches there are the national stronghold for distribution of a wide range of plants and animals*” (JNCC, 1995) (Ref 8.40). Much of the botanical interest is associated with the waterbodies. 541 species recorded during the surveys included tubular water-dropwort, frogbit and opposite-leaved pondweed within the wet channel and immediate margins (locations listed under ‘Ditch Invertebrates and Flora’) and marsh stitchwort north of Caswell Lane. The non-native invasive waterweeds (W&CAct 1981, Schedule 9) were found to be widespread through a number of the field ditches, and Nuttall's waterweed was also recorded.

Photograph 8.10 Example of an Unmanaged/Late Management-cycle Ditch with Luxuriant Vegetation (Nailsea Moor), Spring/Summer 2012



- 8.4.37 Ditches with a diverse mix of aquatic species variously supported marginal and emergent species including common reed, greater reed-mace, reed canary-grass, branched bur-reed, false fox-sedge, greater pond-sedge, hard and jointed rushes and, flowering rush, common spike-rush, a club-rush., marsh horsetail, yellow flag iris hemlock and tubular water-dropworts and, water dock, frogbit, fool's watercress, amphibious bistort, water-violet, brookweed and marsh bedstraw. Floating and submerged species included duckweed, water-plantain, a water starwort, floating sweet-grass, a pondweed, water mint, circular-leaved water-crowfoot *Ranunculus circinatus*, rigid hornwort and a charophyte. Some open ditches were dominated by common reed and/or greater reed-mace and, where these exceed the minimum mappable unit, are mapped as swamp.
- 8.4.38 Regarding species listed on W&CAct 1981 Schedule 9, the aquatic waterweeds were generally found to be widespread. Water fern was recorded at Portbury. Himalayan balsam, as described with introduced shrubs above, was recorded on three watercourses.
- 8.4.39 Dry ditches (as recorded at the time of survey) were relatively infrequent across the Order Limits, typically heavily over-shaded and devoid of vegetation. Given the managed seasonal fluctuations in water levels across the local landscape, the length of these has been included within the overall length for wet ditches.

Peatland Habitats

- 8.4.40 No peatland habitats, such as mires, fen, fen meadow or wet heath, were identified within the Order Limits or in the immediate vicinity. As set out in **Volume 5.9.1**

(Ground Environment), areas of underlying peat soils within the Order Limits principally occur between Yatton and the Tickenham Ridge (Sections D and E), with isolated patches historically logged by the British Geological Survey (BGS) through Section F (Ref. 8.41). Trial pit data from the project ground investigations report (Structural Soils Ltd, 2013) (Ref 8.42) identified peat soils within Kenn Moor at depths of 0.5m to 0.9m (trial pit CPTC-LD67) and at Nailsea, slightly shallower, from around 0.2m depth (trial pits CPTC-LD73, 77 and 77a). The lack of active surface peatland habitats results from the depth of these peat soils and the extent of farming which has heavily modified the landscape.

- 8.4.41 The peat deposits do however influence ditch habitats, plants and invertebrates and as described in the Somerset BAP “ditches of the inland moors are generally peat based soils, or silt underlain with peat.”

Other Wetland Habitats

- 8.4.42 Running water in the form of rivers, streams and flowing ditches, was recorded in all Sections, A to H, totalling 3.58km. The larger rivers through the survey area include the King’s Sedgemoor Drain, Huntspill, Brue, Axe, Lox Yeo, Congresbury Yeo, Kenn, Land Yeo and Avon. In general terms, the watercourses all flow west into the Severn Estuary but those with prolonged stretches that meander through the Order Limits include the Lox Yeo, Congresbury Yeo and Parish Brook. The s41 description of rivers encompasses all natural and near-natural running waters but excludes ditches. Additionally, watercourses within Section G fall under the ‘Watercourse and Floodplain’ habitat as described in the Avon BAP.
- 8.4.43 Ponds including field ponds, an ornamental pond and two fishing lakes together accounted for 2.30ha across the Order Limits. With the exception of the fishing lakes, these all fall under the Somerset BAP habitats of ‘Ditches and Ponds’ as well as ‘Standing Open Water’. Those ponds supporting species of high conservation importance, exceptional assemblages of key biotic groups (namely those supporting GCN and/or water vole) also qualify as s41 habitat. Marginal and aquatic flora variously recorded in association with the ponds included floating sweet-grass branched bur-reed, watercress and water starwort. Similar to the wet field ditches, the bank/shoreline of field ponds were, on occasion, poached by cattle.
- 8.4.44 Swamp habitats accounted for 1.79ha across the Order Limits. In and around the ponds at the Portbury Wharf nature reserve (wetland NVC site WT2), the swamp included abundant hard rush, grey club-rush and greater reedmace, with frequent sea club-rush, common spike-rush and Yorkshire fog, occasional water-plantain, and rare lesser water-parsnip and soft rush. The samples recorded showed affinity with a wide range of grassland and wetland communities, with no strong matches with any defined NVC community. The relatively recent creation of these water-bodies explains the wide ranging variation. More widely across Royal Portbury Docks, patches of common reed-dominated swamp were also recorded in mosaic with marshy grassland, tall ruderal herbs and scrub, and along the drainage channels for the extensive areas of hardstanding. As a s41 habitat type, reedbed is described as being dominated by stands of common reed, wherein the water table is at or above ground level for most of the year. Areas of swamp habitat dominated by reed, where these are managed for wildlife within the Order Limits (i.e. within the Portbury Wharf nature reserves, Ref. 8.43) are therefore considered to qualify.
- 8.4.45 Saltmarsh and intertidal mudflats were recorded at the tidal River Avon (Section G), accounting for 8.71ha and 8.55ha across the Order Limits respectively. Both

habitat types are listed in s41 and the estuarine habitat at the mouth of the Avon falls within the Avon BAP. This saltmarsh habitat is considered to be fairly typical, the species mix comprising common flora that is associated with estuarine saltmarsh habitats. Sea Couch was dominant throughout the saltmarsh surveyed. Along the southern shore, frequent spear-leaved Orache, sea club-rush, English scurvy-grass, red fescue, saltmarsh-grass were recorded with occasional sea-aster, sea milkwort, sea plantain, common cord-grass, annual sea-blite and sea arrow-grass, with lesser burdock bristly oxtongue and saltmarsh rush at rare occurrence. Along the northern side, sea-purslane, lesser sea-spurrey and sea beet were additionally recorded.

Grassland Habitats

- 8.4.46 The Extended Phase 1 Habitat survey identified different classes of grassland, and NVC survey was used to check areas of potentially richer grassland.
- 8.4.47 Semi-improved calcareous grassland was recorded at two locations within the survey area (north east of Banwell Wood and at Knowle Park), and in total accounts for less than 0.01ha within the Order Limits. Within the cattle-grazed field north east of Banwell Wood, the sloped areas with stone outcrops were found to contain a good mix of species associated with calcareous grassland. This semi-improved sward may fall within the s41 description for lowland calcareous grassland. In contrast, the more gently sloped areas contained a greater abundance of neutral grassland species. NVC site G2 was found to be mainly similar to MG5b type, the *Galium verum* sub-community of *Cynosurus cristatus*-*Centaurea nigra* mesotrophic grassland, but with signs of transition to more calcicolous swards. The main calcicolous elements relate to CG1f, the *Festuca rubra*-*Scilla verna* sub-community of *Festuca ovina*-*Carlina vulgaris* grassland and CG6a, the *Dactylis glomerata*-*Briza media* sub-community of *Avenula pubescens* grassland.
- 8.4.48 Some of the low lying and ditch-bounded fields within the Order Limits fall into the broad UKBAP definition of 'Coastal and Floodplain Grazing Marsh' (Ref. 8.44) defined as "*periodically inundated pasture, or meadow with ditches which maintain the water levels. Almost all areas are grazed and some are cut for hay or silage. The ditches are especially rich in plants and invertebrates. Ephemeral wet hollows and permanent ponds with emergent swamp communities may occur*". The UK and south west (Ref. 8.45) descriptions note that the principal interest of floodplain grazing marsh relates to the botanical and invertebrate value of ditches and pools, and the winter value of the fields for waders and wildfowl rather than in the botanical value of the grassland.
- 8.4.49 The threats to this type of habitat arise from intensification of drainage and fertiliser application. This is evident in the low-lying grasslands within the Order Limits where agricultural practices have resulted in improvement of the sward and reduction of botanical diversity; almost no grassland in the Order Limits outside designated wildlife sites is species-rich. To assess which grasslands might be derived from floodplain grazing marsh, the GIS layer for this priority habitat type was downloaded from the Government's Multi-Agency Geographic Information for the Countryside (MAGIC) dataset) (Ref. 8.46) and compared with the Phase 1 Habitat survey data. Approximately 55% of the agricultural grasslands surveyed lie within the MAGIC floodplain grazing GIS layer; in broad terms, extending north from

Rook's Bridge to Loxton, at Towerhead across Puxton Moor to Hewish, extending north from Pilhay Bridge (Congresbury Yeo) towards south of North End, between Kennmoor Road and the Land Yeo, and near Portbury through to the Portbury Wharf nature reserves.

- 8.4.50 Semi-improved neutral grassland accounts for 372.84ha across the Order Limits, typically associated with grasslands cut for hay but also grazed pasture. Based on the MAGIC dataset, 210.07ha within the Order Limits is derived from floodplain grazing marsh. Incidental records of bluebell occurring away from hedgerow and woodland habitats occur sparsely scattered within semi-improved grassland amongst cattle grazed grassland, and along the Lox Yeo.
- 8.4.51 Poor semi-improved grassland accounts for 187.23ha across the Order Limits. Distinguished by the reduced floral diversity, these were typically associated with areas of more intense grazing. 115.15ha is derived from floodplain grazing marsh.
- 8.4.52 Improved grassland, 180.43ha across the Order Limits, was typically dominated by vigorous grass species such as Italian ryegrass, perennial ryegrass and smooth meadow-grass, with a limited number of common and widespread herbaceous plants typically tolerant of disturbance (heavy grazing or cutting), such as white clover. In areas with wetter ground conditions, improved grassland was recorded with patches of locally dominant or locally abundant cuckoo-flower, Yorkshire-fog, soft and jointed rush and, and/or floating sweet-grass; although in improved swards, the intensity of management prevents the sward from establishing sufficient diversity to be categorised as marshy grassland. 93.16ha is derived from floodplain grazing marsh.
- 8.4.53 Marshy grassland, 3.07ha across the Order Limits, occurred in mosaic with semi-improved grassland habitats and/or alongside standing water (including localised areas of ephemerally wet ground). Within the survey area, marshy grassland was typically dominated by rush and/or sweet-grass, with species such as marsh foxtail, cuckooflower and lesser spearwort also present. Marshy grassland contributes to the local mosaic of wetland habitats and as such those areas across the Somerset Moors (Section B) are likely to qualify within the Water and Wetlands Somerset BAP habitat type. 2.78ha is derived from floodplain grazing marsh.
- 8.4.54 Modified neutral grassland and poor modified neutral grassland, 40.68ha across the Order Limits, is not derived from agricultural grassland and the terms semi-improved and improved do not apply (verbal agreement for the use of this habitat type was given to TEP by JNCC in 2004). It naturally regenerates on disturbed ground and is unmanaged. It most commonly occurs in urban areas, road verges, abandoned amenity grass and on post-industrial land, for example, in unmanaged areas at Royal Portbury Docks where it occurs in mosaic with scrub and grades into reed-dominated swamp (below the existing pylons or adjacent to the railway and oil depot). Many modified neutral grassland swards are dense, coarse and species-poor; it is broadly referable to NVC grassland community MG1.
- 8.4.55 Tall ruderal herbs, accounts for only 2.22ha across the Order Limits, typically associated with peripheral areas of coarse grassland and/or unmanaged artificial habitats that have naturally colonised.
- 8.4.56 Ephemeral/short perennial vegetation is a transitional habitat type accounting for less than 0.01ha across the Order Limits. Typically recorded in association with recently cleared ground, example species included field horsetail, bristly oxtongue, scented mayweed, black medick, hedge mustard, herb robert, selfheal, common poppy and field madder.

- 8.4.57 Amenity grassland accounted for a relatively small area of the survey area with 8.98ha typically recorded at areas of recreational use or in association landscaped areas around Royal Portbury Docks and Seabank Power Station.
- 8.4.58 Arable habitats extend throughout the rural stretches of the Proposed Development route, interspersed with pasture farmland, and in total accounts for 161.53ha across the Order Limits. As with the semi-improved and improved grassland habitats, arable fields are interspersed by the network of hedgerows and field ditches that are characteristic of the area. The vast majority of arable land was intensively cultivated and no field margins specifically set aside and managed to provide benefits for wildlife were noted within the Order Limits. Narrow uncultivated margins alongside hedgerows or watercourses are therefore described as part of these linear habitat types. Occasional fallow fields were recorded, which support a mixture of grasses, ephemeral and tall ruderal herbaceous species and some crop regrowth. None of the arable flora listed within the West Somerset BAP were recorded within the Order Limits, although it is recognised that many of these species are annuals and may be dormant in seed bank.

Other Habitat Types

- 8.4.59 Bare ground, and spoil together account for 4.58ha across the Order Limits. Areas of bare ground and scree are often the result of recently cleared land and are associated with ephemeral/short perennial habitats. Spoil piles and earth banks include linear man-made mounds of earth (occasionally discarded ditch dredgings) with some marsh, ephemeral and tall ruderal species.
- 8.4.60 Industrial building and hardstanding habitats primarily occurred across Royal Portbury Docks. Including roads and tracks, these habitat types accounted for 96.88ha across the Order Limits.
- 8.4.61 The category of private gardens/farmyard was used where access was granted by the landowner or adjacent landowner but, once on site, the land was considered to be of limited ecological interest and detailed mapping with the Phase 1 alphanumeric codes was not deemed necessary. Nevertheless, by definition, private gardens within the Order Limits would qualify as 'Gardens and Urban Greenspace' within the Somerset BAP. The caravan site relates to a single location at Marks Causeway. These habitat types accounted for 7.34ha across the Order Limits.

Birds

Desk Study

- 8.4.62 Detailed descriptions of bird information obtained from the desk study are presented in **Volume 5.8.2, Appendix 8F**.
- 8.4.63 The majority of desktop records were of birds recorded within or near the Somerset Levels and Moors SPA and Severn Estuary SPA. Records for SPA bird species outside the designations included:
- Approximately 20 breeding pairs of gadwall using the ponds at Backwell Lake and Avonmouth Sewage Works. (Bland [Bristol Naturalists Society], *pers comm.*, October 2009).

- Small numbers of shelduck breeding in areas close to the estuary, especially Portbury Wharf.
- Small numbers of pochard over Winter at the Avonmouth Sewage Works and Backwell Lake.
- Estimated Winter population of 70 tufted duck present in the Bridgwater to Seabank area.
- A count of 134 lapwing on the eastern side of Tealham and Tadham Moors SSSI in December 2009.

8.4.64 Records of farmland birds to the south of the Mendip Hills within 1km of the Proposed Development were scarce but included concentrations of records at Woolavington Level including species such as bullfinch and reed bunting. A concentration of records was also present at the section of the Mendip Hills to the east of the Proposed Development at Crook Peak to Shute Shelve Hill SSSI. Species present included linnet, meadow pipit, nightingale, skylark, song thrush, stonechat and wheatear.

8.4.65 Within 1km of the Proposed Development north of the Mendip Hills a greater abundance of bird records was obtained, with greatest concentrations of farmland bird records at Avonmouth pools and sewage works, Nailsea Moor, Kenn Moor and Puxton Moor. Moderate concentrations of farmland bird species have also been recorded at Congresbury, Sandford, Kingston Symour, Lawrence Weston Moor and Yatton. Notable species include marsh tit, spotted flycatcher, redstart and yellow wagtail.

8.4.66 Other notable bird records from the data search include:

- Breeding barn owl at Portbury Wharf, sighting records for barn owl at Bawdrip, Kenn Moor, Congressbury and Yatton.
- Breeding peregrine at Avonmouth Docks, Portishead, Clevedon, Weston-Super-Mare, and in working quarries on the Mendip Hills.
- Kingfisher associated with watercourses throughout the study area.
- Breeding Dartford warbler at Crook Peak and Compton Hill SSSI near Webbington.

Winter Bird Survey (November 2009 to February 2010)

8.4.67 The detailed survey findings are presented in **Volume 5.8.2, Appendix 8F**.

8.4.68 Within Tickenham, Nailsea and Kenn Moors SSSI, through which part of the Proposed Development passes, a peak count of 51 mute swan was recorded. A peak count of 26 lapwing and seven snipe was recorded within the SSSI. No other wader species were present. Only small numbers of duck species including mallard, teal and wigeon were recorded, as well as low numbers of heron.

8.4.69 A peak count of two kingfisher was recorded flying along waterways within the SSSI and single raptors including buzzard, kestrel, merlin and peregrine.

8.4.70 Small numbers of waders and wildfowl were recorded at Kenn Church, Kenn Pier and Yew Tree SSSI as well as at Puxton Moor SSSI (adjacent to the Proposed

Development). These included mallard, teal, greylag goose, mute swan, lapwing and snipe.

- 8.4.71 11 heron and two little egret were recorded at Kenn Church, Kenn Pier and Yew Tree SSSI as well as a kingfisher. Raptors in this location included a peak count of three buzzard and two kestrel. Small numbers of heron and little egret were also recorded at Puxton Moor SSSI as well as a single kingfisher. Peak counts of one buzzard, kestrel, sparrowhawk and barn owl were also recorded in this location.

Winter Bird Survey (January to March 2012)

- 8.4.72 The detailed survey findings are presented in **Volume 5.8.2, Appendix 8F**. The locations of Wintering birds recorded during the Winter bird survey are illustrated at **Volume 5.8.3, Figures 8.13.1 – 8.13.8** and **8.14.1 – 8.14.8**. The Winter habitat assessment for waders and wildfowl is illustrated at **Volume 5.8.2, Figures 8.15.1 – 8.15.8** and **8.16.1 – 8.16.8**.
- 8.4.73 In most locations only small numbers of waders, wildfowl and raptors were found to use the survey area during the 2012 Winter bird survey. The largest concentration of wading birds was recorded at Portbury Wharf during the February visit, where a group of 16 lapwing was recorded. Small numbers of Lapwing were also recorded on Nailsea Moor.
- 8.4.74 The largest single group of waders recorded during the 2012 winter bird survey was a group of 500 lapwing. However, these birds were observed outside of the survey corridor, approximately 1km to the east of the corridor on Liberty Moor, East Huntspill. Individual green sandpiper were recorded at the Congresbury Yeo north of Hewish, and on the banks of a drain east of Kingston Seymour. Both of these birds are likely to have been on migration.
- 8.4.75 The most prevalent species of wildfowl recorded within the Route Corridor were mallard and mute swan. The largest concentration of mute swans observed was of 45 birds, however these were located approximately 1km outside of the Route Corridor, south of Kingston Seymour. Only low aggregations of mute swan were recorded within the corridor. A group of four Bewick's swan was also recorded at Nailsea Moor on one occasion; however these birds were more than 500m north of the Proposed Development.
- 8.4.76 The largest concentrations of duck species were recorded at Portbury Wharf. A high count of 22 tufted duck, 16 wigeon, 12 gadwall, nine shoveler, five mallard and two shelduck were recorded within the pool at the northern edge of the corridor. Other wildfowl species recorded in this location included Canada goose, greylag goose, coot, little grebe and mute swan. Small numbers of gadwall, mallard, mute swan, Canada goose and moorhen were recorded within the area of small pools further south within the corridor.
- 8.4.77 Moderate numbers of wildfowl were also observed to the north west of the sewage treatment works at Avonmouth. A group of 14 gadwall, five teal, five shelduck and four tufted duck were recorded in this location. Small numbers of teal were also recorded on rhynes and drains within Nailsea Moor.

- 8.4.78 Buzzard was widespread across the survey area but only at low concentrations. Small numbers of kestrel were also recorded in the south of the survey area.
- 8.4.79 Farmland bird species recorded within the survey area included low numbers of dunnock, linnet, reed bunting skylark and starling. Aggregations of starling were recorded in a few areas, with the largest groups recorded including a group of 550 on Huntspill Moor, 220 near to Woolavington and 130 north of Mark.
- 8.4.80 Kingfisher was recorded on the River Brue at East Huntspill. Cetti's warbler were recorded Woolavington Level and Portbury Wharf, however these birds are likely to be early migrants and would not have Wintered in these locations.

Nocturnal Survey

- 8.4.81 Small numbers of waders and wildfowl were recorded at Nailsea Moor during the March nocturnal survey. Wader and wildfowl activity was concentrated in the wetter fields and included ten lapwing, five snipe, a curlew, 11 mallard, a teal and a pair of mute swan. A tawny owl was also recorded at Nailsea Moor

Habitat Assessment for Birds

- 8.4.82 The majority of the land within the corridor was assessed to hold low potential for waders and wildfowl. A small number of fields were assessed as holding moderate potential for waders and wildfowl. Only two fields/field groups within the corridor were assessed as holding high potential for wildfowl. These included Portbury Wharf and Avonmouth Sewage Works. No areas were assessed as holding high potential for waders. Full details of the habitat assessment areas are shown in **Volume 5.8.2, Appendix 8F**.

Winter Bird Survey (October 2012 to March 2013)

- 8.4.83 The survey findings are also presented in **Volume 5.8.2, Appendix 8F**. Waders, wildfowl and raptors recorded during this Winter bird survey are illustrated within **Volume 5.8.3, Figures 8.13.1 – 8.13.18**. The abundance of Wintering birds recorded during the Winter bird survey is illustrated at **Volume 5.8.3, Figures 8.12.1 – 8.12.6**.
- 8.4.84 The majority of land within 250m of the proposed route only received very low or low use by waders and wildfowl.
- 8.4.85 Although no areas within the Winter bird survey area were found to support large numbers of waders and wildfowl (i.e. >100 individuals) a number of areas were found to support moderate numbers of waders and wildfowl (i.e. >50 individuals). These areas included: (Section references relate to **Volume 5.8.3, Figures 8.12.1 – 8.12.6**):
- land adjacent to Huntspill River (Section A8);
 - land south of Southwick (Section A11);
 - land south of Rook's Bridge, north of Vole (Section A16);
 - land between M5 and Crab Hole (Section A20);
 - land at Nye - AT Route (Section A30);
 - Puxton Moor (Section A34);
 - Nailsea and Tickenmoor Moor (Section A43); and
 - land between M5 and Portbury Wharf (Section A52).

- 8.4.86 Small groups of mute swan were recorded throughout the preferred corridor within 250m of the alignment. A peak count of 75 teal was observed within 250m of the alignment during the 2012-2013 Winter bird survey. These birds were recorded on the Brandeer Rhyne, east of Oldbridge River on Puxton Moor. A total of 97 teal were recorded within 250m of the alignment during January. The largest number of teal recorded within 250m of the proposed alignment during any other survey visit was 34 individuals during the February visit. Only low numbers of teal were recorded during the other survey visits.
- 8.4.87 Moderate numbers of wildfowl were recorded at Portbury Wharf and Avonmouth Sewage Works. Species included teal, wigeon, gadwall, pochard and tufted duck. The only location where pochard were recorded within 250m of the alignment was at the fishing lake at Woolavington level. A peak count of four individuals was recorded in this location. A peak count of two shelduck was recorded on the River Avon.
- 8.4.88 Small groups of lapwing were recorded throughout the 2012-2013 Winter bird survey; however the majority were recorded more than 250m from the proposed alignment. Lapwing were recorded on Huntspill Moor (Peak count: 42), Puxton Moor (peak count: 60) and, towards the end of the season, at Nailsea Moor (peak count: 18). A few larger groups of lapwing were recorded more than 500m from the proposed route. These included a group of 500 recorded south east of Rook's Bridge in January and a group of just over 300 recorded in the same location in February. A peak count of 130 lapwing was recorded using the large pool at Portbury Wharf during January.
- 8.4.89 A small group of golden plover was recorded flying over the proposed route on one occasion but these birds were not recorded to land.
- 8.4.90 The only location within 250m of the proposed route where redshank and curlew were recorded was on the banks of the River Avon. A peak count of four redshank and three curlew was recorded here.
- 8.4.91 Curlew was recorded at a greater distance from the proposed route at both Puxton Moor and Portbury Wharf. A peak count of 20 curlew were observed flying towards Portbury Wharf from Sheepway. Small numbers of snipe were recorded in scattered localities throughout the survey area.
- 8.4.92 Peregrine were recorded near to Puxton within 250m of the proposed alignment on two occasions during the early Winter period. A peregrine was also recorded perched on a pylon within 250m of the alignment west of Nailsea during February. Another peregrine was recorded perched on a pylon near to Sandford during February. A pair of peregrine was regularly recorded near to their known breeding location within Bristol Port Authority Land north of the River Avon during the Winter bird survey. Buzzard and kestrel were found to be scattered across the survey area in low concentrations

Breeding Bird Survey (April to June 2012)

- 8.4.93 The detailed survey findings are presented in **Volume 5.8.2, Appendix 8F**. The overall diversity of breeding birds recorded during the breeding bird survey within the corridor as well as the diversity of Birds of Conservation Concern species are illustrated at **Volume 5.8.3, Figures 8.18.1 – 8.18.8 and 8.19.1 – 8.19.8**.
- 8.4.94 The 1km sections of the survey area that were found to contain the highest breeding bird species abundance were (Section references relate to **Volume 5.8.3, Figures 8.18.1 – 8.18.8**):
- land adjacent to Huntspill River (Section A5);
 - land south of Southwick (Section A7 - A8);
 - land south of Rook's Bridge (Section A11 – A12);
 - land west of Yatton (Section A29 – A30);
 - Portbury Wharf (Section A45); and
 - Hallen Marsh, Avonmouth (Section A52 – A53).
- 8.4.95 The 1km sections of the survey area that were found to contain the highest number of breeding BoCC/protected species were very similar to those found to hold the largest overall number of species. However only three sections were found to contain a high number of BoCC species. These included (Section references relate to **Volume 5.8.3, Figures 8.18.1 – 8.18.8**):
- land south of Rook's Bridge, north of Vole (Section A12);
 - land west of Yatton (Section A30); and
 - Hallen Marsh, Avonmouth (Section A52 – A53).

Table 8.14 Peak Counts of Bird Species Recorded during the 2012 Breeding Bird Survey (Section H was covered during the 2013 survey)

Species or Assemblage	Section A	Section B	Section C	Section D	Section E	Section F	Section G
Wildfowl							
Mallard	2	12	1	43	1	6	5
Little grebe				1		4	2
Gadwall						2	
Shelduck						11	4
Teal						1	1
Tufted duck						16	1
Waders							
Curlew		1		1		1	2
Lapwing			1	12			

Species or Assemblage	Section A	Section B	Section C	Section D	Section E	Section F	Section G
Oystercatcher						1	1
Farmland Birds							
Linnet	3	12		16	2	5	8
Skylark	1	23		12	8	2	9
Yellowhammer	1		1	1	1	1	
Grey partridge		1			1	1	1
Yellow wagtail		1					
Tree sparrow		1					
Reed bunting	2	29	7	18		3	7
Wheatear				5			
Bullfinch	1	4	3	2	1	4	7
Dunnock	1	12	11	18	7	9	40
House sparrow	10	25	3	35	19	2	
Grey wagtail		3	1				
Mistle thrush	2	1		1	4		2
Song thrush	1	4	5	18	5	2	10
Whitethroat	6	13	5	18	6	10	29
Meadow pipit		4	2	1			
Willow warbler	3	8	1	7	8	1	3
Starling		14		57	2	4	
Swift	1	7		2	2	3	3
House martin		9		5	2		
Swallow	11	47	19	50	6	5	5
Cuckoo		3					
Stonechat							2
Redstart		1					1
Stock dove		1		10			3
Spotted flycatcher		1		1			
Green woodpecker	1	3	4		7	2	5
Grasshopper warbler		1		2			
Marsh tit			1				

Species or Assemblage	Section A	Section B	Section C	Section D	Section E	Section F	Section G
Raptors and Owls							
Kestrel		2		3	1	1	2
Peregrine				1			
Barn Owl						6	1
Hérons and Egrets							
Little egret		1					
Gulls							
Herring gull	4	31	4	36	2	43	25
Lesser black-backed gull	1	5	2	65	1	2	2
Black-headed gull				1			3
Great black-backed gull						1	
Schedule 1 Species							
Cetti's warbler		1		2		7	4
Kingfisher			2			1	
Common crossbill					1		

Breeding Bird Survey of Additional Areas (May to June 2013)

- 8.4.96 The survey findings are also presented in **Volume 5.8.2, Appendix 8F**. The number of all breeding bird species recorded during the breeding bird survey as well as the number of Birds of Conservation Concern species within the area of the Proposed Development are illustrated at **Volume 5.8.3, Figures 8.18.1 – 8.19.8** and **8.13.1 – 8.13.8**. The location of BoCC species recorded within the survey are shown at **Volume 5.8.3, Figures 8.17.1 – 8.17.34**

Table 8.15 Peak counts of bird species recorded during the 2013 breeding bird survey

Species or Assemblage	Bridgwater T	Webbington	Churchill	W Route	G Route	Hinkley Point
Wildfowl						
Mallard	6	2			2	1
Farmland Birds						
Linnet						1

Species or Assemblage	Bridgwater T	Webbington	Churchill	W Route	G Route	Hinkley Point
Reed bunting		1			2	1
Skylark						4
Yellowhammer						3
Whitethroat	2	1	1	1	6	10
Swallow	2	1				
Swift	3	3				
Dunnock		1	1	3	2	2
Song thrush		1				
Starling		1		2		
Bullfinch					1	
Willow warbler					4	1
House sparrow				8		
Mistle thrush				1		
Song thrush				1		1
House martin				10		2
Swallow				2	1	12
Raptors and Owls						
Kestrel						1
Gulls						
Black-headed gull					50	
Herring gull					66	
Lesser black-backed					22	

Detailed Vantage Point Survey (October 2009 to April 2010)

- 8.4.97 The detailed survey findings are presented in **Volume 5.8.2, Appendix 8F**. The flight lines of waders and wildfowl associated with the Somerset Levels and Moors SPA Ramsar and the Severn Estuary SPA Ramsar are illustrated at **Volume 5.8.3, Figures 8.20.1 – 8.20.7 and 8.21.1 – 8.21.7**.

Wildfowl

- 8.4.98 Mute swan was recorded from all vantage point locations with the exception of VP7. In total 41 flight lines were recorded flying at risk zone. The risk zone is defined as

the height at which birds would be vulnerable to collision (in this case 0 to 50m) with the proposed overhead line within 250m of the proposed route.

- 8.4.99 A total of six whooper swan flights were recorded during vantage point surveys. Only two of these passed through the risk zone.
- 8.4.100 A total of 14 teal flight lines were recorded flying within the risk zone. Seven shelduck were recorded within the risk zone, all of which were recorded flying along the River Avon.
- 8.4.101 Although small numbers of gadwall and shoveler flight lines were recorded, none were recorded within the risk zone.
- 8.4.102 A total of 57 wigeon flight lines were recorded near to the River Huntspill; however none of these birds passed within the risk zone.
- 8.4.103 A total of 189 mallard flight lines were recorded flying within the preferred corridor at between 0-50m in height. The majority of mallard were observed in small groups making low level flights.

Waders

- 8.4.104 Moderate numbers of golden plover were observed on a small number of occasions at the south end of the Proposed Development as well as once at the northern end, however none of these birds flew through the risk zone.
- 8.4.105 A total of 1,585 lapwing flight lines were recorded within 250m of the Proposed Development, however only 313 of these lapwing flight lines were recorded within the risk zone during the 2009 – 2010 survey.
- 8.4.106 A total of 12 redshank and 13 curlew flight lines were recorded within the risk zone during the survey, almost all of which flew along the River Avon. Two dunlin flights were recorded but none passed through the risk zone. A total of 14 snipe were recorded flying through the risk zone. Six green sandpiper flights were recorded within the risk zone, all of which flew along the River Huntspill. One common sandpiper was recorded at the River Huntspill flying within the risk zone.

Raptors and Owls

- 8.4.107 Peregrine were recorded from the majority of vantage point locations. They were often observed from VP2 and VP4 perching on pylons when foraging in these locations. A total of 6 peregrine flights were recorded within the risk zone.
- 8.4.108 Buzzard were recorded at all of the vantage point survey locations on at least one occasion. Kestrels were recorded at all vantage points throughout the survey period. Sparrowhawk were recorded from all vantage points except VP2. These three species were almost always recorded as lone individuals.
- 8.4.109 Six barn owl flight lines were recorded at VP7 although no barn owl flight lines were recorded within the risk zone. Short-eared owl was observed on one occasion flying through the preferred corridor at VP2 within the risk zone. Individual little owl were observed on one occasion at both VP2 and VP3 although neither flew through the risk zone.
- 8.4.110 Merlin were observed on a small number of occasions, however none flew within the risk zone.

Hérons and Egrets

- 8.4.111 Small numbers of grey heron were recorded from all vantage point locations. A total of 42 grey heron flight lines were recorded within the risk zone. Small numbers of little egret were recorded from all vantage point locations apart from VP7 at the River Avon. A total of 56 little egret flight lines were recorded within the risk zone.

Nocturnal Vantage Point Surveys (January 2010 to April 2011)

- 8.4.112 The detailed survey findings are presented in **Volume 5.8.2, Appendix 8F**. The flight lines of waders and wildfowl associated with the Somerset Levels and Moors SPA Ramsar and the Severn Estuary SPA Ramsar are illustrated at **Volume 5.8.3, Figures 8.22.1 – 8.22.3** and **Figures 8.23.1 – 8.23.3**.

Wildfowl

- 8.4.113 No significant movements of mute swan were recorded during the 2010 to 2011 nocturnal vantage point survey. No mute swan was recorded at risk height within 250m of the proposed route.
- 8.4.114 Small numbers of teal flight lines were recorded during the survey; however no significant movements of teal were recorded. A total of two tufted dusk were recorded during the survey, both of which flew through the risk zone.
- 8.4.115 A total of 121 mallard flight lines were recorded during the 2010-2011 bird survey. The largest number of mallard ducks was recorded from VP2. Approximately 55% of the flights recorded were through the risk zone. The majority of records were between one and two individuals. No significant movements of mallard were recorded.
- 8.4.116 Goosander was regularly recorded flying below risk height along the River Huntspill and King's Sedgemoor Drain during the vantage point surveys.

Waders

- 8.4.117 Considerably fewer lapwing flights were recorded during Winter 2010-2011 compared to Winter 2009-2010 suggesting that lapwing do not tend to take regular nocturnal flights across the study area. No lapwing were recorded within the risk zone during this survey. Only one golden plover flight line was recorded and this did not pass through the risk zone.

Raptors and Owls

- 8.4.118 Twelve buzzard flight lines, seven kestrel flight lines and three sparrowhawk flight lines were recorded during the survey.
- 8.4.119 Five barn owl flight lines were recorded during the survey; however none of these were within the risk zone. A single short-eared owl flight line was observed, but this was located more than a kilometre from the proposed route. Little owl were recorded calling from each vantage point location, however no flight lines were recorded. Two tawny owl flight lines were recorded, however none of these passed through the risk zone. Tawny owl was heard calling from Vantage point 1, 2 and 3. No other raptors or owls were recorded during the survey.

Hérons and Egrets

- 8.4.120** A total of 11 grey heron flight lines and five little egret flight lines were recorded within 250m of the Proposed Development during the 2010-2011 vantage point survey, however only six of the heron flight lines and three of the little egret flight lines were at collision risk height.

Discussion

Wildfowl

- 8.4.121 The majority of the land within and immediately alongside the Proposed Development holds low potential for wildfowl. A small number of fields were assessed as holding moderate potential for wildfowl. Only two field groups were assessed as holding high potential for wildfowl. These included Portbury Wharf and Avonmouth Sewage Works, although Avonmouth Sewage Works falls more than 700m from the Proposed Development.

Waders

- 8.4.122 The majority of the land within and immediately alongside the Proposed Development area holds low potential for waders. A small number of fields were assessed as holding moderate potential for waders. No field groups were identified as holding high potential for waders.
- 8.4.123 During the Winter bird survey only small numbers of curlew, redshank, snipe and green sandpiper were recorded within 250m of the development area. Portbury Wharf Nature Reserve SSSI WTR is occasionally used by moderate sized groups of lapwing. Although larger groups of lapwing are present in the wider area, none were recorded using land within the development area.
- 8.4.124 Small numbers of lapwing were recorded breeding within the development area. The majority of these were associated with Nailsea Moor and Kenn Moor. The only other wader species that may have bred within the development area is a single pair of oystercatcher at Avonmouth.
- 8.4.125 A number of wader species occasionally pass through the Proposed Development area, however many of these were only occasionally recorded to fly within 250m of the proposed overhead line at a height that could possibly result in collision. The wader species that crossed through this area the most number of times was lapwing.
- 8.4.126 The likely mortality rates through collision with the proposed overhead line have been calculated for each wader species where one or more flight line was recorded within the risk zone during the 2009-2010 vantage point survey. These mortality rates are shown in **Volume 5.8.2, Appendix 8F**.

Raptors and Owls

- 8.4.127 Buzzard, kestrel and sparrowhawk were found to be present throughout the Proposed Development area, but only at low concentrations. Peregrine are known to breed at Avonmouth Docks, Portishead, Clevedon, Weston-super-Mare, and in working quarries on the Mendip Hills. Peregrine were occasionally recorded within the development area. The majority of peregrine flight lines were recorded at the edge of the Mendip Hills in the proposed underground section. Merlin were recorded on three occasions during the Winter period, but not within the Order Limits of the Proposed Development.

- 8.4.128 Owls that have been recorded within or near to the Proposed Development include barn owl (a WC&A 1981 Schedule 1 species), tawny owl, little owl and short-eared owl. The first three of these are likely to be found in low numbers within the Proposed Development.
- 8.4.129 During the breeding season, barn owl were recorded at Portbury Wharf Nature Reserve and within the Avonmouth Area. Barn owl were recorded at Avonmouth, Puxton Moor and south of Rooksbridge during the winter.
- 8.4.130 Little owl were heard calling near to Bawdrip and the River Huntspill during the winter period. A pair of little owl were recorded to nest at Portbury Wharf. Tawny owl were recorded calling at various locations along the length of the Proposed Development. Short-eared owl were recorded on one occasion foraging to the north of Portbury Wharf Nature Reserve.

Hérons and Egrets

- 8.4.131 Ditches and rhynes as well as wetter fields were found to be used by small numbers of grey heron and egret throughout the development area. There was no evidence of either of these species breeding within the development area.

Farmland Birds

- 8.4.132 The relative value of each section of the Proposed Development for breeding farmland birds is shown in **Table 8.16**.

Table 8.16 Summary of Field Survey for Breeding Farmland Bird Species of Biodiversity Importance

Species or Assemblage	Section A	Section B	Section C	Section D	Section E	Section F	Section G	Section H
Moderately High* Wintering waders and wildfowl abundance	x	✓	x	✓	x	✓	x	x
High** breeding bird assemblages	x	✓	x	✓	x	✓	✓	x
Moderately High** breeding bird assemblages	x	✓	x	✓	✓	✓	✓	✓
High*** breeding BoCC assemblages	x	✓	x	✓	x	X	✓	x
Moderately High*** breeding BoCC assemblages	x	✓	x	✓	x	✓	✓	✓

*As per categories, shown in **Volume 5.8.3, Figures 8.12.1 – 8.12.6**

As per categories, shown in **Volume 5.8.3, Figures 8.18.1 – 8.18.8

***As per categories, shown in **Volume 5.8.3, Figures 8.19.1 – 8.19.8**

- 8.4.133 During the Winter period only small aggregations of wintering farmland birds were recorded. The largest bird aggregations were groups of starling, most commonly recorded at Huntspill Moor, Woolavington and land immediately to the north of Mark. Smaller aggregations of linnet and skylark were occasionally recorded, particularly on Nailsea Moor.

Schedule 1 Species

- 8.4.134 Cetti's warbler was recorded at low densities in Sections B, D and G during the breeding season. Higher densities were recorded at the Portbury Wharf nature reserves with a peak count of seven individuals.
- 8.4.135 A pair of kingfisher was recorded on the Lox Yeo River within Section C during the breeding bird survey suggesting this species may breed near to this location. A single kingfisher was also recorded flying along rhynes on Nailsea Moor.
- 8.4.136 A single common crossbill was recorded in one location within the development area in woodland between the Chummock Wood and Mogg's Wood in Section E.
- 8.4.137 Barn owl has also been recorded, as described in earlier paragraphs on raptors and owls.

Bats

Desk Study

- 8.4.138 15 UK bat species are known to be resident in Somerset (14 of which are confirmed as breeding in the county) and records of all species except for Nathusius' pipistrelle and Bechstein's were identified in the desk study:
- Horseshoe bats – greater horseshoe *Rhinolophus ferrumequinum* records were identified close to Banwell, Sandford, Yatton, and Nailsea. Lesser horseshoe *R.hipposideros* records have been provided at Hinkley Point Power Station, Banwell, Sandford, Yatton, North End and Nailsea.
 - Barbastelle *Barbastella barbastellus* – a single desktop record was provided to the north of Tickenham.
 - Long-eared bats – brown long-eared *Plecotus auritus* records were numerous and widespread. Two records of grey long-eared *Plecotus austriacus* dating from 1992 and 1993 were provided at Hinkley Point Power Station.
 - Pipistrelle bats – records of common and soprano pipistrelles *Pipistrellus pipistrellus* and *P.pygmaeus* were numerous and widespread throughout the Route Corridor. There are, however, no desktop records of Nathusius' pipistrelle *P.nathusii* along the Route Corridor.
 - Bats of the *Nyctalus* genus – noctule *Nyctalus noctula* records were numerous and widespread, with a cluster of records around Yatton and Congresbury. Records of Leisler's bat *Nyctalus leisleri* were provided near Yatton, north of Nailsea and east of Avonmouth.
 - Serotine *Eptesicus serotinus* records were numerous and widespread with a cluster of records around Yatton.
 - Bats of the *Myotis* genus – Daubenton's *Myotis daubentonii*, Natterer's *Myotis nattereri*, whiskered *Myotis mystacinus* and Brandt's bat *Myotis brandtii* records were numerous and widespread with a prominent cluster of Daubenton's records to the north of Puxton close to Oldbridge River.
- 8.4.139 Avon Wildlife Trust has recorded a night roost for lesser horseshoe and a day roost for a pipistrelle (species unconfirmed) within a derelict barn at Portbury Wharf WTR (based on Anabat recordings in 2012 and 2010). Nathusius' pipistrelle has been recorded close to the barns in 2010 and 2013 but no confirmed evidence of roosting has yet been recorded. Three adult common pipistrelle bats were also

recorded within one of the tree-mounted bat boxes located south west of the barn in Autumn 2013.

- 8.4.140 Bat activity transect surveys were undertaken of Portbury Wharf WTR by the Avon Wildlife Trust in 2011. The transect largely fell mainly within the Order Limits, following hedgerows and ditches, and passing close to the ponds within the SNCI. The surveys recorded at least five species. The majority of bat activity during each survey was of common and soprano pipistrelle. A number of noctule and serotine passes were also recorded across the surveys and a single pass of a *Myotis* bat was recorded in the August.

Tree Roost Surveys

- 8.4.141 The survey findings are detailed in **Volume 5.8.2, Appendix 8H** and illustrated on **Volume 5.8.3, Figures 8.28.1 - 8.28.3**. Following the daytime ground-level and aerial inspections, 123 trees were subject to nocturnal roost surveys. Bat roosts were identified in 21 trees within the Order Limits (listed in **Table 8.17**). Tree references quoted in this section and displayed on supporting Figures are specific to the roost surveys. These locations have been cross referenced with the arboricultural surveys and are reported in the Arboricultural Impact Assessment (**Volume 5.21.1**).
- 8.4.142 Tree 21aB was recorded with 21 whiskered bats roosting on the 22nd August, 10 on 10th September and 18 on 15th September; accordingly Tree 21aB was classed as a maternity roost. This tree, based on the growth form and condition, was also considered to have potential as a hibernation roost. Tree 21aB lies on the southern edge of Chisland Covert (semi-natural broad-leaved woodland) and adjoins a strong network of hedgerows that surround parcels of semi-improved neutral grassland.
- 8.4.143 12 trees were recorded with singleton bats emerging or returning to roost: Trees 1a and 553 (Natterer's), Trees 17, 86a, 91a and 115a (soprano pipistrelle), Trees 36, 118, 135a, 367 and 461 (common pipistrelle) and Tree 425 (pipistrelle sp.). Eight of these offered at least some potential to support hibernating bats. Eight roosts were identified through the presence of droppings alone; no bats were recorded emerging or returning to roost at the time of survey. These are Tree 63 (*Myotis* sp.), Tree 366 (long-eared bat) and Trees 106a, 122, 183a, 19, 250 and 653 (all pipistrelle sp.). Six of these roosts offered at least some potential for hibernation. The status of each roost was classed based on the potential roost features present as well as the number of droppings and number of bats recorded. Status ranged from use by individual bats on an occasional to use by low numbers, potentially on a regular basis, which is typically associated with Summer day (Ref. 8.47) or night roosts (Ref. 8.48), or possibly a transitional roost (Ref. 8.49).
- 8.4.144 Bats have a natural propensity to utilise a range of roost features throughout the year, some of which may be used on an opportunistic basis by single bats.

Table 8.17 Summary of Bat Tree Roosts Identified 2012-13

Tree Ref.	Location	Bat Species	Droppings	No. Bats**	Roost Status
1a	Section F (Portishead)	Natterer's	0	1	Individual bats, occasional use

Tree Ref.	Location	Bat Species	Droppings	No. Bats**	Roost Status
17	Section B (Somerset Levels & Moors South)	Soprano pipistrelle	0	1	Individual, potentially on regular basis *
21aB	Section A (Puriton Ridge)	Whiskered	0	21, 10, 18	Maternity *
36	Section B	Common pipistrelle	0	1	Individual, occasional (*)
63	Section B	<i>Myotis</i> sp.	1	0	Individual, occasional
86a	Section F (Portishead)	Soprano pipistrelle	0	1	Individual, occasional
91a	Section F	Soprano pipistrelle	0	1	Low numbers, potentially on regular basis *
106a	Section G (Avonmouth)	Pipistrelle	10+	0	Individual, potentially on regular basis *
115a	Section F	Soprano pipistrelle	0	1	Low numbers, potentially on regular basis *
118a	Section F	Common pipistrelle	0	1	Low numbers, potentially on regular basis *
122	Section C (Mendip Hills AONB)	Pipistrelle	10+	0	Low numbers, potentially on regular basis *
135a	Section D (Somerset Levels and Moors North)	Common pipistrelle	0	1	Individual, occasional (*)
183a	Section D	Pipistrelle	10+	0	Low numbers, potentially on regular basis (*)
191	Section D	Pipistrelle	2	0	Low numbers, potentially on regular basis *
250	Section D	Pipistrelle	1	0	Individual, potentially on regular basis *
366	Section D	Long-eared bat	20+	0	Individual, occasional
367	Section D	Common pipistrelle	0	1	Individual, occasional
415	Section D	Pipistrelle	0	1	Low numbers, potentially on regular basis *
461	Section E (Tickenham Ridge)	Common pipistrelle	0	1	Individual, potentially on regular basis *

Tree Ref.	Location	Bat Species	Droppings	No. Bats**	Roost Status
553	Section B	Natterer's	0	1	Individual, occasional
653	Section G	Pipistrelle	1	0	Low numbers, potentially on regular basis *

* Tree has potential to act as a hibernation roost / (*) limited potential only

** Multiple numbers relate to different nocturnal surveys

Building Inspection

- 8.4.145 Ashtrees Farm, at Mark would be demolished for the Proposed Development. Evidence that bats use the buildings of Ashtrees Farm has been found in form of sparse bat droppings and feeding remains from at least two bat species (brown long-eared bat and pipistrelle species). Based on the low numbers of droppings present it is possible to conclude that individual bats only use the buildings on an occasional basis and as individual visitors rather than a colony. Further surveys are continuing during spring and summer 2014 and will be completed prior to DCO hearings.

Activity Transects and Static Detector Surveys

- 8.4.146 The transect survey findings are detailed in **Volume 5.8.2, Appendix 8H** and illustrated on **Volume 5.8.3, Figures 8.29.1 – 8.29.10** and **8.34.1 – 8.34.10**. A total of 12 confirmed bat species were recorded, including alcathoe not previously recorded in the county), and a description of the activity of each is provided below. Bat activity 'hotspots', correlating to high species diversity and/or particularly high contact counts of a single species, are shown in **Volume 5.8.3, Figures 8.36.1 – 8.36.9**.
- 8.4.147 The assemblage of species recorded is consistent with the desk study records. Overall, the survey results emphasise the importance of this area to bats particularly wooded areas, but also water bodies, farm land, hedgerows and sheltered areas within the transect routes for bat commuting and foraging. Riparian habitats, especially where bordered by a mosaic of habitats, were shown to be key feeding areas for a range of bat species. Many bat species rely on linear features in landscapes when commuting between roosts and foraging areas; hedgerows and treelines, together with riparian corridors, are considered the most important natural linear features for bats in the landscape.
- 8.4.148 Somerset is a stronghold for greater and lesser horseshoe and both species were recorded widely throughout the route, with contacts consistently recorded on the Portbury Transect in the north and, albeit low in number, the Badgeworth Transect in the south, and at least one pass recorded on the majority of transects in between. Horseshoe bats have quiet and very directional echolocation and can therefore be under-recorded during activity surveys. Numerous contacts recorded across Kenn Moor (North End Transect, Yatton Transect), with several in the vicinity of the designated SAC sites (Webbington, Tickenham and Banwell Hill to Roleston Transects), across Puxton Moor (Puxton to Sandford and Dolemoor Transects). Occasional records were also recorded east of Portishead (Tickenham Transect) and on the Brinsea Transect to the east of the survey area. Lesser

horseshoe was consistently recorded on the Portbury Transect and in the vicinity of the designated SAC sites (Webbington, Banwell, Tickenham and Banwell Hill to Roleston Transects) and across the AONB close to the Lox Yeo River (AONB and Sandford Transects). Occasional contacts were also recorded across Puxton Moor (Dolemoor Transect), Mark Moor (Mark and East Huntspill Transects), and infrequently, east of Nailsea (Wraxhall Transect) and at Brinsea.

- 8.4.149 Notably high counts of barbastelle passes were however recorded close to Webbington in August (138 passes) and September (78 passes). During the remainder of surveys, records were typically limited across the survey area. Contacts were mostly recorded on the west and north western edge of Nailsea in both 2010 and 2012, and on one occasion in 2012 on Woolavington Transect in the south.
- 8.4.150 Long-eared bats have a particularly quiet echolocation and, despite brown long-eared being one of the most common and widespread UK species, is typically under-recorded during transect surveys. Correspondingly, a relatively low number of contacts were recorded across the survey area, although these were widespread across the survey area. Long-eared activity could not be determined to species level and whilst brown long-eared is common across the UK, grey long-eared is also known to occur in the county and may be included within the activity recorded (preferred habitats, as for brown long-eared, include woodland, orchards, pasture with trees, tree lines and hedgerows).
- 8.4.151 Common and soprano pipistrelle activity was typically abundant across the majority of surveyed areas, with high numbers of passes associated with foraging recorded or occasionally with commuting flyways. In contrast, Nathusius' pipistrelle, known to be scarce in the county, was recorded with very few contacts on only the Portbury and Brinsea Transects.
- 8.4.152 *Nyctalus* bats, typically far-flying and loud calling species, were recorded throughout the survey area. Records of noctule and serotine were clustered at Tickenham Ridge (southern end of Portbury Transect), Puxton Moor (Dolemoor, Hewish and Yatton Transects), Kenn Moor (North End Transect) and south of Nailsea (Youngwood Lane Transect). Leisler's activity was confirmed north of Nailsea close the Land Yeo (Wraxhall and Nailsea Transects), with occasional passes also north of Banwell (Puxton to Sandford Transect) and at Portbury.
- 8.4.153 Activity of *Myotis* bats was predominantly grouped as echolocations are difficult to accurately identify to species level, particularly when flying in or near clutter. Daubenton's and Natterer's, both relatively common and widespread species, were confirmed. Relatively high counts of Bechstein's passes were recorded during the transect surveys close to the proposed Sandford Substation and compounds (16 passes each at one static location in June and one static location in July). A single record of alcathoe was also confirmed in 2012 (just east of the M5, close to Wolvershill Manor on Banwell Hill to Roleston Transect), representing a new species for the county. The species has relatively recently been distinguished in the UK, first recorded in 2010 and the current picture indicates widespread national distribution, albeit at low occurrence.
- 8.4.154 The 2012 static detector survey data is presented graphically (number of contacts recorded for each species, each month through 2012), overlaid on the maps showing survey locations (**Volume 5.8.3, Figures 8.35.1 – 8.35.3**).

Discussion

- 8.4.155 The conservation value of each tree roost has been assessed with due consideration for Wray, S. *et al.* (2010) (Ref. 8.50), taking into consideration the local status of the species and the roost type. The whiskered bat is ‘widespread’ within the county (Ref. 8.51) although classed as ‘rarer’ nationally (Wray, 2010). Taking into consideration the limited number of known maternity roost records for the species and criteria for LWS designation (Biron, 2010) (Ref. 8.52), the roost is considered to most closely fit the category of County value. All other non-breeding roosts of the relatively common species – two Natterer’s roosts, four soprano pipistrelle, five common pipistrelle and one pipistrelle sp. are each of Local value. Similarly the bat use of Ashtrees Farm is also valued at Local level.
- 8.4.156 Regarding bat activity recorded outside of roost surveys, valuation of bats as receptors takes into account international and national legal protection as well as distribution and abundance in a more local context. Somerset is a stronghold for horseshoe bats which is seen to complement rather than counter their protection under international law. Given the level of activity recorded of each species across the survey area, within the ecological zone of influence for the North Somerset & Mendip Bats SAC and Mendip Limestone Grasslands SAC, both species are attributed International value. Taking a precautionary approach, this value is extended to both horseshoe bat species associated with the Proposed Development.
- 8.4.157 Barbastelle is an Annex II species associated with the Exmoor and Quantock Oakwoods SAC, it is also listed in the Somerset BAP as ‘very rare’ in the county. Very few barbastelle passes were recorded during the field surveys, the Hinkley Point C Line Entries lie within the outskirts of the 9.45km ecological zone of influence for this SAC species. Barbastelle is attributed County value.
- 8.4.158 Leisler’s, Nathusius’ pipistrelle and grey long-eared are listed in the Somerset BAP as ‘very rare’, a trend which was generally borne out in the activity surveys carried out, although in relative terms Leisler’s activity was more frequently and widely recorded. Bechstein’s and Brandt’s bats are listed as ‘rare’. Bechstein’s is an Annex II species associated with the Exmoor and Quantock Oakwoods SAC, however the Hinkley Point C Line Entries lie c.3km beyond the SAC buffer for Bechstein’s’. Whilst no confirmed activity of either species was recorded, passes of *Myotis* bats may include some of these two species (preferred habitats include woodland, wetter areas, treelines and hedgerows). Confirmed passes of Leisler’s and Nathusius’ pipistrelle were recorded either in areas of elevated species assemblage or alongside other, similar valued species. Therefore, these species are attributed County value.
- 8.4.159 Other *Myotis* bats confirmed present include Daubenton’s and Natterer’s, both of which are listed as ‘widespread’ in the Somerset BAP, and alcathoe (as yet unlisted). As may be expected for these survey methods, no confirmed passes of whiskered bats were recorded during the activity surveys. Serotine and noctule are listed as ‘local’, whilst common and soprano pipistrelles, together with brown long-eared bats are listed as ‘common’. Pipistrelle activity was typically abundant and widespread across the survey area, reflecting the national trend. These species, and habitats supporting relatively high levels of their activity, are therefore attributed

Local value, unless otherwise occurring as part of an elevated assemblage (and thereby of greater value).

Hazel Dormouse

Desk Study

8.4.160 The data search did not identify any dormouse records within the Route Corridor. However, it did reveal several dormouse records at three areas within the 1km buffer; the Mendip Hills AONB, east of Yatton and Tickenham Ridge/Priors Wood. Relevant records in relation to each survey area are detailed in **Volume 5.8.2, Appendix 8I** (tabulated alongside the habitat description, survey results and site photograph). Targeted searches for publically available data in respect of these populations were also sought from the NBN Gateway, the Wildlife Trusts, Woodland Trust, Nailsea Nature, YACWAG, Bristol Naturalists and Mendips AONB websites and in summary revealed:

- Mendip Hills AONB – dormouse populations have been recorded across the western half of the Mendip Hills AONB, with the strongest populations in The Perch SSSI and the Cheddar Complex SSSI, 8km from the Proposed Development. The National Dormouse Monitoring Programme (NDMP) was founded in the Cheddar and Perch sites and the area remains a regional stronghold for dormice. The Somerset Wildlife Trust Mendips Living Landscape Project conducted nest tube surveys between 2009-2011 at King's Wood, Broad Knoll and Crook Peak in woodlands within 1km to the south of and adjacent to the proposed underground line, finding dormice at each survey locale (Ref. 8.53). These areas are connected to the Cheddar and Perch sites via Cheddar Woods SSSI, Axbridge Hill & Fry's Hill SSSI and the Crook Peak to Shute Hill SSSI where records of dormouse exist (Ref. 8.54). Two records have been provided for Webbington close to Order Limits.
- East of Yatton – the regional stronghold described above extends towards Yatton, north of the Churchill Substation. King's Wood SSSI is designated as one of the largest areas of ancient woodland remaining in North Somerset. The dense understorey supports a nationally important population of hazel dormouse with one of the highest densities in the UK. King's Wood lies within the Somerset and Mendips SAC and is connected to Goblin Combe SSSI which is part of the NDMP. In 2009 Goblin Combe produced the most dormice across the 233 NDMP sites surveyed that year; 33 per 50 nest boxes (Ref. 8.55).
- Tickenham Ridge/Priors Wood – dormouse records exist for swathes of woodland within 1km of the Proposed Development along Tickenham Ridge, including Prior's Wood. A nest-tube survey by the Avon Wildlife Trust ('Dormice on your Doorstep' Project, 2003) recorded dormice at their Tickenham Hill reserve on the north side of the Ridge (Ref. 8.56), and the Woodland Trust recently recorded dormouse at their Towerhouse Wood site on the south of the Ridge (Ref. 8.57).

Field Survey

8.4.161 The survey results are provided in **Volume 5.8.2, Appendix 8I** and illustrated in **Volume 5.8.3, Figures 8.44.1 – 8.44.10**. No confirmed or conclusive, evidence of dormice was recorded during the survey although potentially suitable areas of dormouse habitat were present within the survey areas.

- 8.4.162 At one location, Site 8 (off Pill Road) in the Winscombe to Sandford survey area, one nest was found to display characteristics of a poorly structured dormouse nest, such as the type sometimes used by lone male dormice. However, no obvious weaving of nesting materials was apparent and it was considered more likely that the nest had been created by wood mice, as there were a large number recorded in close proximity and the nearest dormouse record identified in the desk study was approximately 5km to the north. Wood mice, and their nests, were commonly recorded throughout the survey area.
- 8.4.163 Much of the habitat across the Route Corridor provides limited opportunities for dormouse; although hedgerow field boundaries can be extensive across the landscape they do not represent favourable habitat for the species in terms of the quality of foraging resource, suitability for hibernation or habitat connectivity with areas of high quality habitat. In particular, the landscape in the south from the Huntspill River to the River Axe and in the north from Puxton Moor to Tickenham Moor is characterised by species-poor well-managed hedgerows associated with ditches, which provide a poor foraging resource for a species that needs a range of seasonal food sources during their active season and in preparation for Winter hibernation.
- 8.4.164 Another feature of the landscape that is counter-indicative for dormouse is the wet ditches frequently found along the base of the hedgerows, which reduce opportunities for hibernation. Even in the absence of ditches immediately beneath hedgerows, much of the landscape is subject to Winter flooding. The typical hibernation habits of dormouse would make them susceptible to flooding and indicate against long-term population survival in this landscape.

Discussion

- 8.4.165 The core UK dormouse population occurs in southern England and Wales. Avon is roughly in the centre of this distribution, with good populations recorded around the Mendip Hills in North Somerset. Dormouse was not recorded within the survey area; if present, individuals/populations occur at levels below that detectable by survey. It is however possible that dormouse utilise areas of woodland (albeit sparse), hedgerow and dense scrub within the Order Limits on an occasional basis, where these are connected to existing populations such as at Priors Wood. As such, taking into consideration the conservation status of the species, for the purposes of assessment, dormouse is attributed Local value.

Water Vole

Desk Study

- 8.4.166 Water vole records identified in the desk study are mapped in **Volume 5.8.3, Figures 8.46.1 – 8.46.31** (overlaid with the field survey results). Records are widespread across the Proposed Development, largely correlating to the extensive network of field ditches that is characteristic of the Somerset Levels landscape. Scattered records were identified from Bridgwater north to Puriton (Section A) and from Puxton Moor north to Tickenham and Nailsea (Section D), although the grid references provided with the data are not sufficiently specific to show whether these records fall within the Order Limits.

- 8.4.167 Numerous records occur between Portbury and Crook's Marsh (Section G) and fall within the Order Limits including data from Avon Wildlife Trust 2011 surveys at Portbury Wharf WTR (Ref. 8.58). Clusters of records are apparent along Drove Rhyne close to the Royal Portbury Docks, and along Kings Weston Rhyne and the adjacent ditches that surround the industrial land uses at Avonmouth.

Field Survey

- 8.4.168 The survey locations and findings of the water vole surveys are illustrated in **Volume 5.8.3, Figures 8.46.1 – 8.46.31**. Further details of the survey results are presented in **Volume 5.8.2, Appendix 8J**.
- 8.4.169 Evidence of water vole presence was confirmed within 269 of 434 (62%) of watercourses surveyed within the Order Limits. The south-most records were found at Fishers Farm (ditch ref. TEP14) and in the roadside ditch along Park Wall Rhyne (TEP68). Clusters of activity were principally found across the Levels, although activity extended north and presence was recorded at interconnected ditches south east of Portbury (TEP2446, 2462, 2484, 2489 and 2492), on the south western edge of the coal stockyard (TEP2476 between Redland Road and Marsh Lane and in the industrial area north of Avonmouth Way (TEP2514, 2523, 2541, 2536, 2543, 2574, 2589, 2584, 2622 and 2623).
- 8.4.170 Water vole presence was recorded in single ditches, some distance from the larger clusters of activity described above. In general terms, these are not considered isolated or remnant sub-populations; the water vole population is evidently mobile within the ditch network and occupancy may shift, particularly in light of on-going ditch management and the c.2km dispersal distance associated with this species (Aars *et al*, 2006) (Ref. 8.59). The Somerset LWS Manual (Biron, 2010) describes water voles as "*widespread and abundant in many areas in Somerset ... Individual populations tend not to occupy exactly the same area for a long stretch of time, but tend to 'twinkle on and off like lights'*". Interconnected ditches allow dispersal of water vole, even if these are not actively used at the time of survey. Management of the ditch network entails dredging and vegetation clearance on, variously, 1 to 5 year cycles. Whilst such management would influence the distribution and abundance of water voles, it is likely to offer some benefit by controlling scrub encroachment which would otherwise overshadow the ditches and reduce habitat suitability for the species.
- 8.4.171 The ditches affected by additional watercourse crossing points, identified after the close of the 2013 water vole survey period are also shown in **Volume 5.8.3, Figures 8.46.1 – 8.46.31**. For the purposes of assessment, given the interconnected nature of the ditches, water vole has been assumed present.

Discussion

- 8.4.172 Nationally the species has suffered catastrophic decline, although recent evidence indicates populations may be starting to recover in some areas, other locations including the south east, Devon and Cornwall remain vulnerable. The National Water Vole Database Alert Mapping (Leggett *et al*, 2010) (Ref. 8.60) shows several Local Water Vole Areas between Bridgwater and Seabank but none are currently flagged as a Regional Alert area. Although the Somerset Levels is a highly managed agricultural ditch system, high winter flood levels reduce the availability of suitable burrowing habitat; an effect which would be exacerbated in winter when voles are in torpor. Seasonal flooding will influence the base case, increasing the

vulnerability of the population. For the purposes of assessment, habitat within the Order Limits is of value to water vole at the County level.

Otter

Desk Study

- 8.4.173 The data searches revealed widespread records of otter across the majority of the Proposed Development, with the exception of areas around Churchill substation and north of Royal Portbury Docks (**Volume 5.8.3, Figures 8.47.1 – 8.47.19**) beyond which, the habitat is dominated by industrial land uses and offers limited suitability and connectivity for otter. Records were found within the rivers, tributaries and the network of rhynes, with the main clusters along the River Parrett to the south of Bridgwater, Oldbridge River at Puxton Moor, River Kenn near Clevedon, Land Yeo at Tickenham and the ditches at Portbury. The records did not reveal any holts or shelters; the majority relate to otter spraints with some records of prints and road casualties also noted.
- 8.4.174 Data provided by the YACWAG Otter Group relate specifically to Parish Brook, which flows alongside the existing 132kV F Route west of Nailsea, and crosses below the proposed 400kV overhead line. The data includes footprints (both *“mother and cub prints clearly visible”*) and spraints. Otters are also present on the Land Yeo, which is linked to Parish Brook by the ditch network (including Middle Yeo, Tickenham Boundary Rhyne and field ditches); *“it is not possible to be certain where one otter territory begins and another ends but the waterways are sufficiently close to be part of the same territory”*. YACWAG has also reported a natal holt on the rhyne on the south western edge of Towerhouse Wood, close to the Land Yeo and to Jacklands Fishing Lakes where, in February 2013, a trail camera recorded a female otter and two cubs climbing up the side of the rhyne c.20m from the holt, and since April 2014, a large otter was recorded regularly visiting to hunt. In addition, large prints (proposed to be a male) have been recorded in the area. Within Towerhouse Wood & Adjacent Fields SNCI *“a clear track has been seen running across the field [of marshy grassland] from the Land Yeo to the Boundary Rhyne”*. Jacklands Fishing Lakes lie c.0.56km east of the proposed 400kV line. Correspondence with YACWAG also referenced previous otter road casualties on the B3130, although no specific locations were identified within the desk study area.

Field Survey

- 8.4.175 The findings of the otter surveys are presented in **Volume 5.8.2, Appendix 8J** and illustrated on **Volume 5.8.3, Figures 8.47.1 – 8.47.19**.
- 8.4.176 Field signs of otter were recorded along the River Brue and associated tributaries (Section B), which lies in the south of the Somerset Levels. The survey findings are summarised in **Table 8.18**. Otter presence was confirmed in only four locations – prints, feeding remains and spraints indicate that otter is active through these watercourses at the surveyed stretches; although no otter holts or shelters were recorded. Note that select stretches were surveyed, targeting the locations of proposed watercrossings and as such otter activity in the wider area may not have been detected (surveyed stretches are listed in **Volume 5.8.2, Appendix 8J**). Otter is known to be widespread through the Somerset Levels and the paucity of positive survey data is likely to be a function of the restricted stretches of watercourse

surveyed, a high proportion of which is open ditch habitat largely unsuitable for shelter. The otter relies heavily on clean rivers, streams and associated land to supply its food, and on at least one bankside having well developed vegetation to provide cover (Ref. 8.61). The network of rhynes is however suitable for otters to forage, and disperse and potentially, laying-up areas where bankside vegetation is lush (a feature that can change with the ditch management rotation). It has been shown that otters use small streams and ditches including dry watercourses as regular routes (Chanin, 2003) (Ref. 8.62).

Table 8.18 Summary of Otter Presence and Field Evidence

Waterbody ref.	Holt/ Shelter	Prints	Feeding Remains	Spraint	Sighting
TEP420	No	Yes	Yes	Yes	No
TEP441	No	Yes	Yes	Yes	No
TEP528	No	No	No	Yes	No
TEP556	No	No	No	Yes	No

- 8.4.177 The Somerset Otter Group carries out an annual otter survey across the county (Ref. 8.63), including the Parrett, Brue and North Axe catchments, all of which supported records of otter. Results of their 2013 survey showed the otter population to have remained stable from previous years. As otters are known to be present on the main rivers that flow through the Order Limits, individuals are likely to move through these watercourses and associated tributaries as part of typical ranging behaviour. Therefore, for the purposes of identifying potential effects and appropriate mitigation, otter is assumed to utilise all watercourses through the Levels, extending south to Bridgwater and north to Portbury.
- 8.4.178 The ditches affected by additional watercourse crossing points, identified after the close of the 2013 otter survey period are also shown in **Volume 5.8.3, Figures 8.47.1 – 8.47.19**. For the purposes of assessment, these are assumed to support otter moving through these watercourses as part of typical ranging behaviour.

Discussion

- 8.4.179 Otter is known to be widespread throughout the main rivers that flow through the Order Limits, with evidence recorded during the 2012 and 2013 field surveys in the River Brue and tributaries, recent records from wildlife organisations at Portbury Wharf Nature Reserve SNCI WTR and along Parish Brook. The UK population is recovering but remains vulnerable, with the south west a stronghold for the species. For the purposes of assessment, habitat within the Order Limits is of value to otter at the County level.

Badger

Desk Study

- 8.4.180 Records of badger setts were received for the area located between Bridgwater in the south and Portbury in the north, with clusters of records at East Huntspill, Vole, Rook's Bridge, Compton Bishop and Barton, Sandford, Northend, Nailsea and Tickenham. The received sett records are within rural areas dominated by open farmland with numerous hedgerows and areas dominated by woodland. Avon

Wildlife Trust has also reported evidence of badgers ranging and foraging across their nature reserve at Portbury. Records of badger field evidence of an undisclosed nature were also received as part of the desk study. These records show widespread presence of badger within rural areas between Barton and Avonmouth. Overall, the rural areas of the Proposed Development are suitable to support badgers, with low potential of presence within the urban parts of the Route Corridor including areas within Nailsea and the industrial areas around Avonmouth.

Field Survey

- 8.4.181 The findings of the badger survey is detailed in **Volume 5.8.2, Appendix 8K** and illustrated on **Volume 5.8.3, Figures 8.48.1 – 8.48.33**. A summary of the status of each sett is listed in **Table 8.19**.
- 8.4.182 Twenty one badger setts were identified in the badger survey area – seven main/annex, seven subsidiary and seven outlier setts. All but one outlier (Sett 17) showed evidence of being active, either partially or well-used. Following refinement of the Order Limits, of the 20 setts identified, 17 fall within 30m of the Order Limits – six main setts, five subsidiary and six outlier (one of which was disused). All 21 setts are located between East Huntspill in the south and Portbury Wharf in the north – within the areas of East Huntspill, Vole, Barton, Sandford, North End, Stone-edge Batch, Tickenham Ridge and the Portbury Wharf nature reserves.
- 8.4.183 The rural habitats across the Order Limits provide a large resource of high quality habitats suitable for use by badgers. Low lying ground, typically dominated by agricultural grassland with high water table, limits the area suitable for sett construction. Setts were not found within ditches due to wet conditions but often at the top of ditch banks and into the adjacent fields where ground conditions are drier. Other setts are associated with features such as hillsides (Sett 16) and former railway embankments (Sett 9); all were found at locations where the ground levels are raised in comparison to the local water table.
- 8.4.184 The majority of setts are also associated with areas of cover including hedgerows, woodland, scrub and dense vegetation, although several setts have been excavated to extend into more open areas of grassland (Setts 5, 6, 12 and 13). Some setts appeared to be subject to the action of agricultural machinery immediately adjacent to, or occasionally across, the sett.
- 8.4.185 The network of hedgerows through agricultural fields provide dispersal routes and well-used paths are common in areas nearby to all the setts. However, paths are also common across open areas of grassland, away from hedgerows, circumnavigating ditches. Overall, the deep wet ditches within the study area are obstacles to badger movements. Badger paths are often clearly identifiable running alongside wet ditches and crossing points are determined by bridges, culverts or shallow parts of ditches. Dispersal routes through areas with a high density of ditches are therefore likely to be well-used and movement restricted by suitable crossing points.

Table 8.19 Summary of Badger Settle Status

Settle Ref.	Location	Settle Status	Activity Level
1	East Huntspill, Section B	Outlier	Partially used
2*	East Huntspill, Section B	Main	Well-used
2.1*	East Huntspill, Section B	Outlier	Partially used
3*	East Huntspill, Section B	Subsidiary	Partially used
4*	Northwick, Section B	Subsidiary	Well-used
5	Vole, Section B	Subsidiary	Well-used
6	Vole, Section B	Subsidiary	Well-used
7	Barton, Section C	Main	Well-used
8	Sandford, Section C	Main	Well-used
9	Sandford, Section D	Main	Well-used
10	Sandford Section D	Subsidiary	Partially used
11	Nye, Section D	Outlier	Partially used
12	Nye, Section D	Main	Well-used
13	North End, Section D	Subsidiary	Partially used
14	North End, Section D	Main	Well-used
15	Stone-edge Batch, Section D	Outlier	Partially used
16	Tickenham Ridge, Section E	Subsidiary	Partially used
16.1	Tickenham Ridge, Section E	Outlier	Partially used
17	Portbury, Section F	Outlier	Disused
18	Rook's Bridge, Section B	Outlier	Well-used
19	Mark, Section B	Main/annex	Well-used

* indicates setts that lie more than 30m from the final Order Limits

Discussion

- 8.4.186 Badger is known to be widespread throughout the rural areas of the Order Limits as well as the surrounding areas. 21 setts and associated field signs were recorded during 2012 and 2013 surveys between East Huntspill and Portbury Wharf, seven of which were main (i.e. breeding) setts. Badgers are widespread across the UK and large populations occur in the south west of England. For the purposes of assessment, habitat within the Order Limits is of Neighbourhood value to badger.

Other Mammals

Desk Study

- 8.4.187 Four s41 species were identified in the desk study – brown hare, hedgehog, harvest mouse and polecat. Whilst targeted field surveys were scoped out for these species, each is given high level consideration below.
- 8.4.188 The desk study identified approximately 100 records of brown hare between Winscombe (Section C) in the south (the south-most records date from the 1980's)

and Crook's Marsh (Section G) in the north. The majority of records are sightings from within Section D – one cluster of records occurs at Puxton Moor, with records dating back over several years to 1993, and a second, more outspread, concentration of records occurs west of Nailsea across Kenn Moor and Nailsea Moor. Brown hare is primarily associated with open field habitats, preferring mixed agricultural areas that provide shorter grassland for foraging through the year, interspersed with features for shelter such as hedgerows and scrub.

- 8.4.189 Brown hare is widespread throughout lowland England, although is more common in the east where farming has become predominantly arable (favoured habitat), than in the pastoral west. The national hare survey (Hutchings & Harris, 1996) (Ref. 8.64) calculated the mean density of hares in arable landscapes as 14.44 hares per km² (+/-1.59) and pastoral landscapes 9.80 (+/-1.83). The landscape across the Order Limits between Sections C and G includes semi-improved and, more intensively grazed, improved grassland pasture which may support the species outside of seasonal flooding. The arable fields are dominated by maize but seasonally offer suitable habitat to brown hare whilst the crop is short or following harvest. Brown hare is therefore anticipated to utilise these habitats, for at least parts of the year, as part of the wider landscape.
- 8.4.190 The desk study identified records of hedgehog between Puxton (the south-most record lies north west of Puxton) and Crook's Marsh. Many of the records are of road casualties with a small number of sightings. Although hedgehog numbers have been falling over the past decade at least, it remains a widespread and relatively common species. Hedgehog is typically found in grassland, hedgerows and wooded habitats, favouring areas that interface between these habitat types, including the green spaces within urban and peri-urban environs, such as parks and gardens. A recent review of hedgehog distribution (Hof, 2009) (Ref. 8.65) indicates that in lowland habitats they are more prevalent in the arable-dominated areas than in those dominated by pasture. The study attributes this difference, in the main, to associated differences in badger abundance. It also recorded the south west as having one of the lowest relative abundances of hedgehog in England. The majority of the habitat through the route is therefore available to the species, although unlikely to support high numbers due to the prevalence of pasture (areas subject to seasonal flooding or where significant barriers to their dispersal occur such as the M5 corridor and expansive areas of industrial land use may be less suitable).
- 8.4.191 A single record of polecat (a road casualty adjacent to the M5 slip road, close to the Avonmouth industrial area) dating from 1998 was identified in the desk study, 70m east of the Order Limits in Section G. The return of the polecat to Somerset was confirmed in 2005, having been absent for many years (Ref. 8.66), and further records of the species since this time occur across North Somerset. The polecat is a relatively wide-ranging species, able to exploit a range of habitat types, and any individuals present may occupy home ranges that encompass land within and well beyond the Order Limits. As a non-specialist carnivore it is known to forage along field boundaries and along woodland edges where these border open farmland, especially where rabbits are common. Given the opportunistic and adaptable nature of the species, no significant detrimental effects are anticipated on the local polecat population and as such, the species is not specifically considered further in this assessment.

- 8.4.192 Six records of harvest mouse were identified from the last 15 years, all of which occur toward the northern half of the route. The south-most record relates to Congresbury Moor (south west of Yatton) 1km east of the Order Limits. The remaining records include three at Lawrence Weston Moor (south of Hallen, east of Avonmouth) within 500m of the Order Limits, one from Kenn Moor over 500m from the Order Limits and one 10km grid square record over 500m from the Order Limits at Chelvey (south of Nailsea). Secret World Wildlife Rescue centre has released harvest mice into their Millennium Wood near Huntspill (over 60 youngsters in 2008), which lies over 1.5km west of the Order Limits. The habitat mosaic within the Order Limits, in the vicinity of the records, predominantly comprises semi-improved grassland and species-poor hedges. The majority of hedgerows between Congresbury Moor and Tickenham Ridge are alongside ditches and within the floodplain, and as such, these are likely to be subject to seasonal flooding. As with dormice, harvest mice are therefore unlikely to utilise these areas for hibernation. Furthermore, no notable areas of long tussocky grassland, reedbed or woodland edge habitats – habitats which harvest mice favour – occur within affected areas. No significant detrimental effects are anticipated on the local harvest mouse population and as such, the species is not specifically considered further in this assessment.

Discussion

- 8.4.193 Based on the interpretation of desk study information in light of the habitat survey data collated throughout the route (described above), for the purposes of assessment, brown hare is valued at the Local level and hedgehog at the Neighbourhood level.

Amphibians

Desk Study

- 8.4.194 In general terms, records show GCN to be reasonably widely distributed across the North Somerset area, although records become increasingly sparse farther south west. In South Somerset, populations are scattered across the district, notably at Dimmer and Fiddington (Burrows, 2009) (Ref. 8.67). Amphibian records identified through the desk study are **Volume 5.8.3, Figures 8.51.1 – 8.51.29**. Those identified within the Order Limits included confirmed GCN breeding at Hinkley Point. Through the Route Corridor, the south-most GCN record occurs at East Huntspill (one dead individual) and a small cluster of records occur west of Winscombe. Scattered records lie north of Winscombe toward the north-most records; a cluster at the Portbury Wharf nature reserves (confirmed breeding).
- 8.4.195 The distribution of common toad across Somerset is similar to that of GCN, although records generally extend farther south west. Through the Route Corridor, scattered records were identified across Puxton Moor, a cluster near Yatton and at the Portbury Wharf nature reserves. Consultee comments highlighted the presence of known toad migration routes and toad crossings in North Somerset. Toad crossings were identified from the publically available Froglife dataset (Ref. 8.68). None of the crossings fell within the Order Limits. The closest was at Fennel Road, Portishead over 230m from the nearest Development Component (F Route removal through Portbury Wharf Nature Reserve SNCI WTR) and a second over 350m away (construction access for F Route removal south of the River Avon crossing). The remainder lie over 1km from the Order Limits. These two crossings indicate

the importance of toad migration routes between semi-natural habitats in and around the Portbury Wharf nature reserves.

- 8.4.196 With regard to other amphibians, there are multiple records of common frog, smooth and palmate newts scattered across the Order Limits from Winscombe to Avonmouth, although fewer records of the latter were identified. Smooth newt records were also recorded identified north of Avonmouth, up to Crooks Marsh.

Field Survey

- 8.4.197 The full amphibian survey results are shown in **Volume 5.8.3, Figures 8.51.1 – 8.51.29**, the GCN HSI survey results are illustrated in **Volume 5.8.3, Figures 8.50.1 – 8.50.23**, and those waterbodies supporting GCN in **Volume 5.8.3, Figures 8.52.1 – 8.52.8**.
- 8.4.198 Up to and including 2013, GCN were recorded in 30 ponds and six ditches within 250m of the Order Limits. Ponds supporting GCN, as an Annex II species, fall within the criteria for UK BAP priority habitat. In accordance with the agreed approach with NE, when analysing the data, waterbodies within 250m of each other have been grouped to form 'Sites'. 14 such sites were identified across the survey area and the population size class of each is summarised in **Table 8.20**. Note that the population size class was applied to both pond and ditch habitats, although it is likely that the data for ditches is likely to be an overestimate due to the generally higher survey coverage of the shorelines.
- 8.4.199 GCN Sites have been identified at Bridgwater (Site 1), Woolavington (Sites 2 to 6), Rook's Bridge (Site 7), Sandford (Sites 8 to 10), Nailsea (Sites 11 and 12), Stone-edge Batch (Site 13) and Portbury Wharf (Site 14).

Table 8.20 Summary of GCN Sites

Site	Surveyed Waterbody	Peak Adult Count	Cumulative Peak Count	Population Size Class
1	TEP7	11	14	Medium
	TEP12	3		
2	P25	7	8	Small
	P26	1		
3	P27	2	2	Small
4	P32	4	9	Small
	P33	5		
5	P40	5	5	Small
6	P43	1	6	Small
	P46	Eggs only		
	P48	4		
	P265	1		
7	TEP1062	Eggs only	Eggs only	Small
	TEP1065	Eggs only		
8	P96	1	1	Small

Site	Surveyed Waterbody	Peak Adult Count	Cumulative Peak Count	Population Size Class
9	P104	2	11	Medium
	P107	9		
10	P101	3	3	Small
11	P144	3	3	Small
12	P145	1	1	Small
13	P157	3	3	Small
14	P193	1	51	Medium
	P199	10		
	P201	5		
	P204	3		
	P205	1		
	P206	2		
	P208	1		
	P256	1		
	P257	3		
	P258	6		
	P259	9		
	P260	4		
	P261	3		
	TEP2462	1		
	TEP2489	1		

'TEP' denotes ditch reference, 'P' denotes pond

- 8.4.200 Terrestrial habitats surrounding the ponds typically comprise a mosaic of neutral grasslands (heavily managed improved and semi-improved, marshy grassland and arable), private house/gardens, hedgerows, scrub and occasionally woodland (substantial areas occur at Chisland Covert between Sites 5 and 6, and surrounding Site 10 west of Churchill).
- 8.4.201 Incidental records of common toad, a NERC Act species, were noted during the GCN surveys. Toads, along with common frog and small newts were frequently encountered across the survey area and were much more widespread than the GCN findings.

Discussion

- 8.4.202 At the metapopulation level, three 'Medium' and 11 'Small' size GCN populations were identified along the route (in Sections A, B and D to F). These populations are not ecologically distinct and some interchange of animals is reasonably anticipated where these lie in relatively close proximity and/or are interspersed by favourable terrestrial habitat. Sites 2 to 5 lie within 500m of each other, for example, as do Sites 8 to 10, and Sites 15 and 16. For the purposes of assessment, collectively, the GCN population is valued at the County level and the wider amphibian population at the Local level.

- 8.4.203 Further surveys of previously unsurveyed ponds and ditches in spring 2014 may result in an amendment to Table 8.20, but given the location of the previously unsurveyed ponds and ditches, it is not expected that the 2014 surveys will result in significant new evidence emerging about the distribution of GCN within Order Limits.

Reptiles

Desk Study

- 8.4.204 Desk study data for reptiles is illustrated in **Volume 5.8.3, Figures 8.53.1 – 8.53.23**. Data searches have revealed that reptiles are widespread across the Somerset area around the Route Corridor. There are fewer records across the southern part of the route and no records at all between the Huntspill River and Compton Bishop.
- 8.4.205 There are numerous records of grass snake across the Route Corridor. The southernmost record is to the south of Bridgwater, beyond the southern extent of the Order Limits, and the northernmost records are located at Crooks Marsh. There are also two records of grass snake at Hinkley Point. There are clusters of grass snake records between Compton Bishop and Crooks Marsh. The most significant of these are at Congresbury Moor, west of Yatton, and at Portbury Wharf.
- 8.4.206 There are fewer records of slow worm however they cover a similar area to that covered by grass snake. There is one record near to Hinkley Point at Shurton. The southernmost record is located at Compton Bishop and the northernmost is again at Crooks Marsh. There are clusters of slow worm records at Congresbury Moor, Nailsea, Portbury Wharf and Pill.
- 8.4.207 Three records of common lizard were identified; at Compton Bishop (within the Order Limits, to the north of Banwell and at Clapton in Gordano).
- 8.4.208 Adder records range from Compton Bishop to Portbury. There are scattered records at Winscombe, Kenn Moor and Portbury. A cluster of adder records can be seen around Tickenham.

Field Survey

- 8.4.209 Low numbers of grass snake, slow worm and common lizard were recorded at select locations across the Proposed Development. Of the 17 targeted survey sites, eight were found to support reptiles as follows:
- Grass snake – recorded at Sites 6, 7, 11, 16 and 17;
 - Slow worm – recorded at Sites 5, 6, 8, 11 and 15; and
 - Common lizard – recorded at Site 6.
- 8.4.210 Where present, reptiles were typically recorded in single numbers, although on occasion, two slow worm were recorded at Site 8, two grass snake at Site 6, and up to three slow worms at Site 15. Whilst the survey method aimed to determine presence of reptiles, none of the survey results indicate presence of any particularly large populations or valuable locales for these species.

- 8.4.211 In relative terms, grass snake and slow worm were the most widespread of the reptiles recorded, and each was found present at five of the 17 sites surveyed. Site 6 (cattle-grazed, semi-improved grassland with narrow grassy margins and woody hedgerows) located at Sandford near Towerhead Brook, was found to support all three species, and was the sole location at which common lizard was recorded. Site 11 (improved grassland and wet grassland, with two areas of ephemeral puddled water) located northwest of Nailsea and south of Stone-edge Batch was found to support both grass snake and slow worm.
- 8.4.212 As Site 6 supports three species of reptile, it qualifies for the Key Reptile Sites Register, as defined by Froglife (1999) (Ref. 8.69), and so too the criteria for LWS designation in the county (Biron, 2010). This site is bounded by the tree-lined Towerhead Brook LWS in the north and east, and the road to the south. The wider landscape contains tree and hedge-line pasture, with extensive woodland to the south. However, Site 5 also lies adjacent to these wooded areas and unlike Site 6, only slow worm was recorded present.
- 8.4.213 Grass snake alone was additionally recorded at Site 7 (semi-improved grassland with bare earth grazed by chickens) located north of Sandford, and Sites 16 (short-grazed pasture) and 17 (short-grazed pasture with artificial ponds), both at the Portbury Wharf nature reserves). Given the distances covered by grass snake, it is likely that grass snake occurs across much of the route, at least in parts of the year. Whilst only low numbers were recorded during the surveys, features of particular value include potential egg-laying and hibernation sites.
- 8.4.214 Slow worm was additionally recorded at Site 5 (semi-improved grassland with slopes, wide grassy margins, woody hedgerows and a small stream/brook along the lower eastern margin) located adjacent to Banwell Wood southwest of Sandford, Site 8 (an arable field with rough grassy margins and hedgerows along with bare soil patches) located at Churchill substation and Site 15 (grassland with a single pond) located between Prior's Wood and the M5 motorway. Given the range of habitats used by slow worm, it is likely that this common and widespread species occurs throughout the route, albeit in low numbers. Within the areas subject to Winter flooding the, lack of suitable hibernation sites may be a limiting factor affecting reptile distribution across the Proposed Development.

Discussion

- 8.4.215 Low numbers of grass snake, slow worm and common lizard were recorded where areas of suitable habitat exist (through Sections A to H). The landscape across the Proposed Development, particularly the Somerset Levels, has a range of habitats that may be used by these relatively common and widespread species. On balance, the reptile assemblage is of Local value.

Ditch Invertebrates and Flora

Desk Study

- 8.4.216 The desk study identified 1381 invertebrate records along the route, including eight species classified IUCN Vulnerable or Near-threatened, 40 Nationally listed species and ten s41 species. Of the ten s41 species, eight are species of macro-moth included in s41 for research purposes only. The full dataset, including description of conservation criteria, is tabulated in **Volume 5.8.2, Appendix 8N**.

- 8.4.217 The landscape along much of the route is dominated by an extensive network of field ditches, particularly characteristic of the Somerset Levels. In addition to field ditches, there are a number of watercourses which also cross the route. These habitats have high potential for supporting aquatic invertebrates, especially within the SSSIs where the management is less intensive.
- 8.4.218 Of the eight IUCN classified invertebrates, only two (the great silver water beetle *Hydrophilus piceus* and variable damselfly *Coenagrion pulchellum*) are associated with water bodies. Two records of great silver water beetle and 40 records of variable damselfly (the majority from Tickenham, Nailsea & Kenn Moors SSSI) were received. Thirteen species of aquatic beetle were amongst the forty species with a National Classification. In general terms, the records were clustered around the SSSI designations, which may reflect recording effort rather than actual species distribution.

Field Survey

- 8.4.219 During the course of the survey a total 4,369 records of 484 species of invertebrate were made including 166 of aquatic invertebrate (Ref. 8.70). A further 2285 records of 171 plant species were made during the aquatic invertebrate survey. Full survey data is presented in **Volume 5.8.2, Appendix 8N**.
- 8.4.220 Following desk study, 116 ditches and 3 ponds were subject to field survey. The first stage resulted in 36 being scoped out of further aquatic survey and 13 requiring only terrestrial survey of bank habitats. The 70 waterbodies subject to aquatic survey were classified using the Species Quality Index (Category 1 being optimal and Category 6 being poorest) as follows: 2nr Category 2, 38nr Category 3, 24nr Category 4, 6nr Category 5 ditches. The three ponds were classed as Category 3.
- 8.4.221 IUCN and National invertebrates recorded are listed in **Table 8.21**. A single record of the IUCN Vulnerable crane fly *Limnophila pictipennis*, a new record for the county, was found in ditch TEP388 (Huntspill Moor). Lesser silverwater beetle, IUCN Near Threatened and listed in the W&CAct 1981, was recorded in TEP341 (Stoningpound Rhyne which extends north from Puriton Rhynes & Ponds LWS). Two further IUCN Near Threatened water beetles great silver water beetle (at three locations) and *Hydaticus transversali* (a single location) were also recorded, one Nationally Scarce water beetle *Peltodytes caesus* (four locations) and one Nationally Notable crane fly *Phalacrocerca replicata* (a single location).

Table 8.21 Location of IUCN and National Invertebrates Recorded

Scientific Name	Common Name	Designation	Waterbody
<i>Hydrochara caraboides</i>	Lesser silver water beetle	W&CAct 1981 IUCN (2001) Near Threatened	TEP341 Stoningpound Rhyne
<i>Hydrophilus piceus</i>	Great silver water beetle	IUCN (2001) Near Threatened	TEP1127 North of Tarnock TEP1471 Puxton Moor TEP1491 Puxton Moor
<i>Hydaticus transversalis</i>	a water beetle	IUCN (2001) Near Threatened	TEP341 Stoningpound Rhyne
<i>Limnoxenus niger</i>	a water beetle	IUCN (2001) Near Threatened	P24 Horsey Level
<i>Peltodytes caesus</i>	a water beetle	Nationally Scarce	P24 Horsey Level TEP246 Stoningpound Rhyne TEP733 Near Mark TEP1402 West of Nye
<i>Limnophila pictipennis</i>	a crane fly	IUCN (pre 1994) Vulnerable	TEP388 Huntspill Moor
<i>Phalacrocerca replicata</i>	a crane fly	Nationally Notable	TEP1491 Puxton Moor

8.4.222 Three IUCN designated plants were recorded – frogbit, opposite-leaved pondweed and tubular water-dropwort. The distribution of these species across the survey area is summarised in **Table 8.22**. In addition, the Biddle Street SSSI citation lists frogbit and Puxton Moor SSSI lists frogbit and opposite-leaved pondweed

Table 8.22 Location of IUCN Designated Plants Recorded

Scientific Name	Common Name	Designation	Waterbody
<i>Hydrocharis morsus-ranae</i>	Frogbit	IUCN (pre 1994) - Vulnerable	TEP37 Bridgewater TEP52 Bridgewater TEP320 Woolavington Level TEP327 Woolavington Level TEP341 Stoningpound Rhyne TEP715 Near Mark TEP816 Near Mark TEP952 Near Mark TEP1586 Puxton Moor TEP2118 Kenn Moor TEP2128 Puxton Moor TEP2137 Puxton Moor TEP2208 Nailsea Moor TEP2928 Nailsea Moor
<i>Groenlandia densa</i>	Opposite-leaved pondweed	IUCN (pre 1994) - Vulnerable	TEP1606 Puxton Moor TEP2137 Puxton Moor

Scientific Name	Common Name	Designation	Waterbody
<i>Oenanthe fistulosa</i>	Tubular water dropwort	IUCN (pre 1994) - Vulnerable	TEP2137 Puxton Moor TEP2208 Nailsea Moor

Discussion

- 8.4.223 The ditches associated with the Somerset Levels and Moors tend to be managed on a 1 to 3 year rotation from September to February, with groups of ditches being managed at the same time (McLaren *et al*, 2002) (Ref. 8.71). There are two aspects to the management – slubbing out to remove sediment and vegetation from the base and sides of the ditch, and secondly, vegetation cutting. This helps to maintain the value of the ditch habitats for invertebrates by providing a range of successional conditions, maintaining areas of open water and preventing ditches from drying out. Late-stage successional ditches (3+ years) are particularly important to support the rare invertebrates that specialising in this habitat type (Somerset BAP for Ditches and Ponds). The invertebrate assemblage forms an integral part of the grazing marshes. The future base case assumes continued management of the ditches. This will influence the successional vegetation and so too the suitability of ditches for invertebrates on a case by case basis; however, the presence of SSSI ditches, and the overall proportion of ditches within each category outside of these designations, is anticipated to remain unchanged.
- 8.4.224 For the purposes of assessment, all SSSI designated ditches are valued at the National level. 395 ditches surveyed are designated SSSI at some point along their length. Note that the SSSI designations relate to the ditch system rather than individual ditches, hence; the score for a short stretch targeted for survey that also fall within the SSSI does not necessarily reflect the condition of the ditch system as a whole. In fact, several SSSI ditches surveyed had species quality scores of only 5 or 6.
- 8.4.225 TEP341 Stoningpound Rhyne found to support the W&CA listed lesser silver water beetle, and TEP388 found to support the IUCN Vulnerable cranefly *Limnophila pictipenni* (both species of importance due to restricted distribution and limited records in Somerset) are valued at the County level. TEP246, 715, 1178, found to support over 50 aquatic invertebrate species, are also valued at County level, in line with LWS selection criteria (Biron, 2010) (Ref. 8.72). Ditch 1606 had a species quality score of 5 but contained the IUCN plant *Groenlandia densa* and is valued at County level.
- 8.4.226 The remaining Category 3 ditches and ponds, along with those listed in **Tables 8.21 and 8.22**, are valued at the Local level; despite restricted national distribution are common in Somerset. The remaining ditches of Category 4 and 5 are valued at the Neighbourhood level.

Fish

Desk Study

- 8.4.227 The Severn Estuary SAC is designated for migratory fish; sea lamprey, river lamprey and twaite shad are the Annex II species forming the primary reason for

designation. The Ramsar designation (in terms of fish) relates to the “*run of migratory fish between sea and river via estuary*” (Ref. 8.73), and the “*diversity of fish species throughout the estuarine and river system*” (Ref. 8.74). Salmon, sea trout, sea and river lamprey, allis and twaite shad, and eel are specifically listed in the designation as ‘Noteworthy Fauna’, although the extent to which these migratory species use the network of rivers and tributary streams that flow into the SAC Ramsar is not conclusively established.

- 8.4.228 The fish species recorded at each EA sampling point are illustrated in **Volume 5.8.3, Figures 8.57.1 – 8.57.15** and listed in **Table 8.23**. The majority of these are common freshwater fish, however, there are multiple records of European eel (NERC species, Avon BAP priority species and IUCN Red List – Critically Endangered), at each sampling location.
- 8.4.229 In broad terms, the fisheries data recorded a greater diversity of species within the Huntspill River and Old River Axe (11 and 12 respectively) in comparison to the Rivers Banwell, Yeo and Kenn (5-6 species each). Note that all of the local watercourses subject to EA water quality monitoring (most recently dated 2009) (Ref. 8.75) were found to be of ‘Very Good’ (Category A) or ‘Good’ (Category B) quality. Both these categories of quality correspond to the attributes of natural or near natural ecosystems, support of salmonid and cyprinid (i.e. carp or minnow family) fisheries, and suitability for abstracted use. Data for local watercourses (using the sampling point closest to the Order Limits) is summarised as follows:
- Category A – Kings Sedgemoor Drain, River Brue and River Axe; and
 - Category B – Lox Yeo and Congresbury Yeo.
- 8.4.230 The fisheries data revealed that eel is widespread through the five rivers sampled (Sections B and D), of which four flow into the Severn Estuary SSSI (i.e. all but the Huntspill River, which flows in to Bridgewater Bay SSSI); eel is listed in the Estuary SSSI citation. Eel was incidentally recorded at two locations during the ditch invertebrate and flora surveys at TEP2128 (field drain within Stogursey Brook catchment, south west of Hinkley Point C) and TEP464 (field drain in the Kenn catchment at Kenn Moor) and, more widely, during the GCN surveys from Huntspill Moor to Hallen Marsh (Ref. 8.76). Records of eel were identified in the desk study data in the Congresbury Yeo (Hewish Farm and Pilhay Bridge), Puxton Moor Oldbridge River Outflow, Land Yeo, Portbury Drain (Portbury Common), Red Rhine (records south west and south east of ICI Works) and along the M49 motorway (channel running along the western side). The eel naturally occurs in a wide range of aquatic habitats, including slow and sluggish watercourses such as the ditch system. The majority of its lifecycle is based in freshwater habitats but the species migrates to marine waters to breed. Whilst the only section of the Severn Estuary SSSI within the Order Limits is at Avonmouth, the species is evident through the wider route within the rivers that feed into the SSSI farther south.
- 8.4.231 Brown/sea trout (Ref. 8.77) (NERC and Avon BAP priority species) was recorded in the fisheries data along the River Yeo at both Iwood and Beam Bridge. Targeted searches of the NBN Gateway reveal clusters of records around the River Axe, Congresbury Yeo/River Yeo and River Kenn. There is also anecdotal evidence of brown/sea trout on the Lox Yeo. The brown/sea trout typically spawns in rivers and streams with fast flowing water. The sea trout then migrates back to sea in Autumn or overwinter in rivers and migrate in the Spring. The brown trout also undertakes significant seasonal migration. The Yeo and its tributaries flow through Section D to enter the Severn Estuary between Weston-super-Mare and Clevedon; these

watercourses are reasonably expected to support trout spawning and nursery areas (gravels) as well as offering habitat for adults to feed and grow.

- 8.4.232 Bullhead *Cottus gobio* (Annex II non-priority species although not a qualifying feature of the Severn Estuary SAC) was identified in the fisheries data in the Old River Axe and the River Yeo (both at Iwood and Beam Bridge). Bullhead was incidentally recorded during the ditch surveys in three ditches at Tickenham (TEP2294, TEP2316 and TEP2333). A single desk study record was also identified on the Lox Yeo from the desk study data dating from 2004. Bullhead is a small demersal fish (dwelling near the bottom of a waterbody) that lives both in cold, clear, faster-flowing, well-oxygenated small streams and in larger rivers. The bullhead is common to England and predominantly occurs in stony streams and rivers with a moderate flow. These range from high-altitude streams to headwaters and many types of upland and lowland rivers between these two extremes (Tomlinson & Perrow, 2003) (Ref. 8.78).
- 8.4.233 Stone loach *Barbatula barbatula* (IUCN listed Least Concern) was incidentally recorded during the ditch invertebrate and flora surveys at Tickenham (TEP2314 and TEP2333) and at Nailsea (TEP2197), and during the GCN surveys at Congresbury Moor (TEP1791).
- 8.4.234 Discussion with the EA indicated that the lampreys are not known within the Order Limits and that they are mostly found at headwaters. Current knowledge assumes that lamprey do not use watercourses crossed by the Proposed Development:
- Brook lamprey is the most abundant species of British lamprey; a non-migratory freshwater species, occurring in streams and occasionally lakes and requiring similar habitats to the sea lamprey (with the exception of the marine life stage). It appears more able to traverse obstacles such as weirs (or at least is less affected by these obstacles due to their wholly freshwater lifecycle). Whilst brook lamprey is a designated feature of the River Wye SAC (c.8.93km north west of the Order Limits, beyond the Severn Estuary) none of the records identified relate to watercourses crossed by the Proposed Development (Ref 8.79).
 - Sea lamprey occurs in estuaries but, as an anadromous species, requires clean gravel for spawning and slower flowing waters with marginal silt or sand for nursery areas. It is widespread in UK rivers but local status ranges from common to extinct in individual river systems. They are often restricted to the lower reaches of rivers due to their inability to negotiate physical obstacles such as weirs. Whilst the River Wye SAC supports a healthy sea lamprey population, none of the records identified relate to watercourses crossed by the Proposed Development.
 - No records of river lamprey were identified within the EA fisheries data, the desk study. The distribution of records available from the NBN Gateway indicates presence in the Estuary itself and in the rivers and headwaters that lead into Wales and Herefordshire. Within the Estuary designation, the '*species occurrence account is not yet available.*'
- 8.4.235 There are no known records for either allis or twaite shad species within the rivers east of the Severn Estuary. Shad are typically associated with marine rather than freshwater habitats, although allis shad will return to rivers to spawn. These two shad species are known, for example, to rely on the resource of mysid shrimps in

the salt wedge of the Severn Estuary for feeding and as a nursery ground. Current knowledge assumes they do not use watercourses crossed by the Proposed Development.

- 8.4.236 Atlantic salmon is an anadromous species; breeding adults are faithful to their spawning grounds in shallow gravels in clean rivers and streams where the water flows swiftly. A small number of records were identified in the Severn Estuary, and in the rivers farther north, but none were identified within the watercourses crossed by the Proposed Development.; current knowledge assumes them not to be present.

Table 8.23 Summary of EA Fisheries Data 2005 – 2013 with Incidental Records Shown Alongside

Species	Legal Status	Location(s) Identified *	Route Section(s)
Bleak	None	Woolavington Bridge, Beam Bridge,	B
Brown trout/sea trout	NERC s41 Avon BAP	Iwood, Beam Bridge	D
Bullhead	Annex II (non-priority species)	Bow Bridge, Iwood, Beam Bridge, [Incidental records: Tickenham]	B, D E
Chub	None	Bow Bridge	B
Common bream	None	Woolavington Bridge, Gold Corner	B
European eel	NERC s41 Avon BAP IUCN Red List (Critically Endangered)	Woolavington Bridge, Gold Corner, Bow Bridge, Lower Gout Farm, Iwood, Beam Bridge, Kenn Pier [Incidental records: Kenn Moor, Hinkley]	B, D, F, G D
Flounder	None	Bow Bridge	B
Gudgeon	None	Woolavington Bridge, Gold Corner, Bow Bridge, Iwood	B
Perch	None	Woolavington Bridge, Gold Corner, Bow Bridge, Lower Gout Farm, Iwood, Kenn Pier	B, D
Pike	None	Woolavington Bridge, Gold Corner, Bow Bridge, Lower Gout Farm	B, D
Rainbow trout	None	Beam Bridge	D
Roach	None	Woolavington Bridge, Gold Corner, Bow Bridge, Lower Gout Farm	B, D
Roach common bream hybrid	None	Woolavington Bridge, Gold Corner	B
Rudd	None	Woolavington Bridge, Gold Corner	B

Species	Legal Status	Location(s) Identified *	Route Section(s)
Ruffe	None	Woolavington Bridge, Gold Corner, Bow Bridge	B
Silver bream	None	Woolavington Bridge, Gold Corner	B
Stone loach	None	Bow Bridge, Lower Gout Farm, Kenn Pier [Incidental records: Nailsea, Tickenham]	B, D E
3-spined stickleback	None	Bow Bridge, Iwood, Beam Bridge, Kenn Pier [Incidental records: abundant throughout]	B, D
10-spined stickleback	None	Bow Bridge [Incidental records: abundant throughout]	B

*Survey locations: Huntspill River (Woolavington Bridge and Gold Corner), Old River Axe (Bow Bridge), River Banwell (Lower Gout Farm), River Yeo (Iwood, Beam Bridge), River Kenn (Kenn Pier)

Discussion

8.4.237 Available EA water quality monitoring data identified all local watercourses to be either Category A 'Very Good' or B 'Good'. A reasonable diversity of fish species was identified through the desk study and incidental field survey records. Eel is referenced within the Severn Estuary Ramsar designation and is widespread throughout the watercourses that cross the Proposed Development. Criteria for LWS designation (Biron, 2010) include "*recent records of one or more species listed on Annex II*", noting that a site for fish is defined as 200m up and downstream of the records. None of the Annex II species for which the Severn Estuary SAC is designated were recorded. However, records of bullhead were identified at Iwood, Beam Bridge and at Tickenham. As only short sections of the extensive network of rivers, tributaries and ditches falls within the Order Limits, for the purposes of assessment, the fish assemblage is valued at the Local level.

Valuation of Receptors

- 8.4.238 In summary, using the criteria for valuing receptors set out in **Table 8.7**, SAC, SPA and Ramsar form sites of International value, with SSSI and NNR of National value. In addition, Hallen Marsh Agricultural Land WNS (allocated to act as future compensatory habitat for development at Severnside which would compromise the integrity of the Severn Estuary SPA Ramsar) has been identified as equivalent International value.
- 8.4.239 The titles of SNCI, LWS, CWS and 'nature reserve' (or WTR) vary depending on the designating body. For the purposes of assessment, all are valued at the County level (except those solely designated as an LNR under the National Parks and Access to the Countryside Act 1949, which are valued at Local level) to reflect their value for habitats and species within the sub-national network of designated sites across the wider landscape.

- 8.4.240 In Bristol, areas of green infrastructure with actual or potential wildlife connectivity value are designated as Wildlife Network Sites (WNS). As these are not specifically designated in respect of nature conservation criteria such as rarity and diversity, the WNS identified has been ascribed a Local valuation.
- 8.4.241 For designated sites with several designations across a single area, the receptor is valued according to the higher level designation to avoid double-counting. Proposed or candidate sites are valued as a fully designated site.
- 8.4.242 The value of habitat types potentially affected by the Proposed Development is summarised in **Table 8.24**, and fauna in **Table 8.25**. Linear habitats are quantified by length and all other habitat areas in hectares. Trees, treed habitats and hedgerows are quantified using data from the arboricultural surveys to ensure compatibility across the DCO documents. Within the arboricultural assessment, area measurements of these habitat types reflect the canopy cover. Phase 1 Habitat survey mapping of scattered scrub is representative of what is present on site but the GIS dataset cannot be taken as an accurate measurement of this vegetation type and is therefore listed as ‘illustrative point data’.
- 8.4.243 Some habitat types, such as ditches and hedges, lie within designated wildlife sites and it is inevitable that the reporting of effects will overlap. For the purpose of valuation, **Table 8.24** relates to each habitat type based on the condition and extent it is found within the Order Limits, and any exceptions noted. For example, wet ditches are valued at a County level, but where they occur within SSSI designation, any effects on the specific ditches are reported as effects on a receptor of National value. The criteria for valuation and biodiversity conversion are described at **Tables 8.7 and 8.8**.

Table 8.24 Valuation of Habitat Types Across the Order Limits

Habitat Type	Area/ Length in Order Limits	Description	Value	
			Geographic Frame of Reference	Biodiversity Conversion
Woodland and Scrub Habitats				
Semi-natural broad-leaved woodland	36.31ha	An uncommon habitat within the local landscape, important for its diversity, fragility, typicalness and position in the ecological mosaic. Includes areas of ancient woodland, such as Mogg's Wood and Banwell Wood.	County	Medium
Broad-leaved plantation	24.98ha	Artificial habitat of value in conjunction with broad-leaved woodland and hedgerows. Includes a subset of the arboricultural 'tree group' dataset titled 'outgrown hedgerows' (see section 8.5: Approach to Habitat Loss Calculations').	Local	Low

Habitat Type	Area/ Length in Order Limits	Description	Value	
			Geographic Frame of Reference	Biodiversity Conversion
Coniferous plantation	<0.01ha	Artificial habitat, typically of limited extent. Of value in conjunction with semi-natural habitats.	Neighbourhood	Very Low
Orchard	0.23ha	Intensively managed commercial orchards, and/or with improved grassland below the fruit trees.	Neighbourhood	Very Low
Scattered broad-leaved trees	1806no.	Veteran trees (210 individuals and 2 groups)	County	Medium
		Non-veteran trees	Local	Low
Scattered coniferous trees	41no.	Typically planted ornamental specimens.	Neighbourhood	Very Low
Scattered tree groups	8.94ha	A subset of the arboricultural 'tree group' dataset which corresponds to scattered trees (see section 8.5: Approach to Habitat Loss Calculations). Dominated by broad-leaf specimens.	Local	Low
Dense scrub	16.31ha	A common and widespread habitat, typically occurring in small, scattered areas, although these contribute to the variety of the wider mosaic.	Neighbourhood	Very Low
Scattered scrub	Not measured	Typically recently established or a fragmented remnant of a linear feature, with limited diversity.	Neighbourhood	Very Low
Continuous bracken	0.11ha	A common and species-poor habitat type, occurring in small areas.	Neighbourhood	Very Low
Introduced shrub	<0.01ha	Ornamental non-native planting.	Neighbourhood	N/A
Hedgerows and Ditches				

Habitat Type	Area/ Length in Order Limits	Description	Value	
			Geographic Frame of Reference	Biodiversity Conversion
Species-rich hedges (incl. all sub-categories of intact, defunct, with and without trees)	11.25 km	The extensive hedgerow network is important both in terms of its inherent value (species-richness and structural diversity) and the connectivity it provides through the wider habitat mosaic.	County	Medium
Species-poor hedges (incl. all sub-categories of intact, defunct, with and without trees)	81.23 km	As for species-rich hedges, all native species hedges are classed as s41 habitats of principal importance. The extensive hedgerow network is important for the connectivity it provides through the wider habitat mosaic.	County	Medium
- Subset: 'Important' hedgerows i.e. those that meet the ecological criteria of the Hedgerow Regs.1997	4.55 km	<i>This is a sub-category of the species-rich and species-poor categories and is included within the measurements listed above. Most are also species-rich and approx. half are associated with ditches. Note that 1.08km are both important and over 3m ht.</i>	County	Medium
- Subset: Hedgerows over 3m height	39.55km	<i>This is a sub-category of the species-rich and species-poor categories and is included within the measurements listed above. Note that 1.08km are both important and over 3m ht.</i>	County	Medium
Conifer hedgerow	<0.01km	Planted ornamental habitat.	Neighbourhood	Very Low
Wet ditch	86.26km	A locally characteristic network, important for its fragility and position in the ecological mosaic. Includes dry ditches, ephemerally wet as a result of seasonal flooding.	County	Medium

Habitat Type	Area/ Length in Order Limits	Description	Value	
			Geographic Frame of Reference	Biodiversity Conversion
Running water	3.58km	An extensive network of rivers and tributary streams flow through the Order Limits, all of which qualify as s41 habitat. Of value for the diversity, fragility and connectivity through the ecological mosaic.	County	Medium
Other Wetland Habitats				
Ponds	2.30ha	Although most ponds in the area are not managed for wildlife, they are under Somerset BAP habitats of 'Ditches & Ponds and Standing Open Water and bring diversity to the ecological mosaic.	County	Medium
Swamp	1.79ha	Includes small areas managed for wildlife at the Portbury Wharf reserves and s41 reedbeds as well as naturally colonised ditches.	Local	Low
Saltmarsh	8.71ha	Habitat extending through the tidal River Avon, contiguous with the designated Severn Estuary.	International	High
Intertidal mudflats	8.55ha	As described above for saltmarsh.	International	High
Grassland Habitats				
Calcareous grassland	<0.01ha	Sloped, grazed pasture with stone outcrops found to contain a good mix of species associated with calcareous grassland, although a diminutive area falls within the Order Limits.	Local	Low
Semi-improved neutral grassland	372.84ha	A substantial area of land However, the grassland swards are of little diversity or rarity.	Local	Low

Habitat Type	Area/ Length in Order Limits	Description	Value	
			Geographic Frame of Reference	Biodiversity Conversion
		<i>Subset: 210.07ha lies within the MAGIC grazing marsh dataset which suggests the fields might fall within the broad UKBAP category of 'floodplain grazing marsh'. Outside designated sites, semi-improved grasslands derived from grazing marsh are valued at a Local level, because of low sward diversity and the BAP notes the key value relates to ditches, wetlands and winter bird usage.</i>	Local	Low
Poor semi-improved grassland	187.23ha	As above, with limited species diversity.	Local	Low
		<i>Subset: 115.15ha falls within the MAGIC grazing marsh dataset. Outside designated sites, improved grasslands derived from grazing marsh are valued at the Local level.</i>	Local	Low
Modified neutral grassland	35.26ha	A common and widespread habitat type on manmade substrate.	Neighbourhood	Very Low
Poor modified neutral grassland	5.42ha	As above, with limited species diversity	Neighbourhood	Very Low
Improved grassland	180.43ha	A highly managed habitat of limited species or structural diversity.	Neighbourhood	Very Low
		<i>Subset: 93.16ha falls within the MAGIC grazing marsh dataset. Outside designated sites, improved grasslands derived from grazing marsh are valued at the Local level.</i>	Local	Low
Marshy grassland	3.07ha	Whilst a relatively common and widespread habitat type, this is associated with the locally characteristic wet ground conditions, contributing to the variety of the wider habitat mosaic. Likely to qualify within the Water & Wetlands Somerset BAP.	Local	Low

Habitat Type	Area/ Length in Order Limits	Description	Value	
			Geographic Frame of Reference	Biodiversity Conversion
		<i>Subset: 2.78ha falls within the MAGIC grazing marsh dataset.</i>	Local	Low
Tall ruderal herbs	2.22ha	Relatively recently established on typically modified ground with an assemblage of common and widespread species.	Neighbourhood	Very Low
Ephemeral/short perennial vegetation	<0.01ha	Typically common and widespread species, recently established on typically modified ground.	None	None
Arable	161.53ha	Intensively cultivated, without Stewardship margins.	Neighbourhood	Very Low
Amenity grassland	8.98ha	Mown sward of restricted species and structural diversity.	Neighbourhood	Very Low
Other Habitat Types				
Earth bank	<0.01ha	Typically relatively recently colonised with limited diversity.	None	None
Bare ground	4.42ha	A highly modified habitat type, typically resulting from over-grazing and trampling by livestock.	None	None
Spoil	0.16ha	An artificial, highly modified habitat type occurring on post-industrial land.	None	None
Industrial buildings & hardstanding	54.17ha	A manmade habitat type of negligible value	None	None
Roads & track	42.71ha	A manmade habitat type of negligible value	None	None
Private gardens/farmyards/caravan site	7.34ha	An artificial and/or highly modified habitat type	None	None

8.4.244 The value of faunal receptors potentially affected by the Proposed Development is summarised in **Table 8.25**.

Table 8.25 Valuation of Fauna

Species/Group	Description	Value	
		Geographic Frame of Reference	Biodiversity Conversion
Birds	SPA Swans, geese, ducks and waders during Winter or on migration.	International	High
	SPA swans, geese, ducks and waders outside Winter or migratory period. Non-SPA swan, goose, duck or wader species during winter or on migration.	Local	Low
	Hérons & egrets	Local	Low
	Raptors & owls (excl. barn owl)	Local	Low
	Barn owl	Local	Low
	Farmland birds	Local	Low
	Kingfisher	Local	Low
	Cetti's warbler	Local	Low
	Common crossbill	Local	Low
	Swallows & passerines (Ashtrees Farm)	Neighbourhood	Very Low
Bats	Whiskered maternity tree roost	County	Medium
	Non-breeding tree roosts of common and widespread species - five common pipistrelle, four soprano and seven pipistrelle sp., one long-eared, two Natterer's and one <i>Myotis</i> .	Local	Low
	Greater & lesser horseshoe (a precautionary approach assumes all records associated with North Somerset & Mendip Bats SAC or Mendip Limestone Grasslands SAC despite some being outside the Somerset Biodiversity offsetting CZs).	International	High
	Barbastelle and Bechstein's (Annexe II bats) – few passes/records all of which were outside or on the boundary of the respective species CZs for the Exmoor & Quantock Oakwoods SAC.	County	Medium
	Leisler's and Nathusius' pipistrelle (recorded either in areas of elevated species assemblage or alongside other, similar valued species).	County	Medium

Species/Group	Description	Value	
		Geographic Frame of Reference	Biodiversity Conversion
	Daubenton's, Natterer's and alcahloe, serotine and noctule, common and soprano pipistrelles, and brown long-eared bats, as well as habitats supporting comparatively high levels of their activity.	Local	Low
	Ashtrees Farm – transient roost for brown long-eared and pipistrelle sp.	Local	Low
Dormouse	None recorded within surveyed habitats. However, dormouse may utilise areas of woodland (albeit sparse), hedgerow and dense scrub within the Order Limits on an occasional basis, where these are connected to existing populations in the wider landscape; the region supports relatively strong numbers.	Local	Low
Water vole	Population widespread through the survey area with abundant burrows, particularly through the network of rhynes in the Somerset Levels. Value takes account of the lack of Regional Alerts and the widespread populations identified through field survey.	County	Medium
Otter	Widespread through the main rivers that flow through the Order Limits, with evidence of otter activity (prints, feeding remains and spraints) recorded in the River Brue (2012/13), at Portbury Wharf WTR (2011) and at Towerhouse Wood/north western extent of Tickenham Moor SSSI/Parish Brook (2013/14). The UK population is recovering but remains vulnerable, with the south west a stronghold for the species.	County	Medium
Badger	Six main, seven subsidiary and seven outlier setts recorded through the survey area, with evidence suggesting a number of family groups utilise habitats across the Order Limits.	Neighbourhood	Very Low
Brown hare	Brown hare is anticipated to utilise the open grassland and arable habitats interspersed with hedgerows and other features offering shelter, for at least parts of the year, as part of the wider landscape.	Local	Low

Species/Group	Description	Value	
		Geographic Frame of Reference	Biodiversity Conversion
Hedgehog	A relatively common but declining species, anticipated to utilise grassland, hedgerows and wooded habitats, as well as the green spaces within urban and peri-urban environs, such as parks and gardens.	Neighbourhood	Very Low
Amphibians	Three Medium and 11 Small size GCN populations identified across the survey area.	County	Medium
	Common toad, frog and small newts are widespread across the Order Limits.	Local	Low
Reptiles	Eight of the 17 sites were found to support reptiles in low numbers. The overall assemblage includes grass snake, slow worm and common lizard – all common and widespread within the UK.	Local	Low
Ditch invertebrates & flora	SSSI ditches	National	High
	TEP341 Stoningpond Rhyne (Category 3 and supporting lesser silver water beetle). TEP388 Huntspill Moor (Category 3 and supporting the crane fly <i>Limnophila pictipennis</i>). TEP246, 715 & 1178 (Category 3 and supporting over 50 aquatic invertebrate species). TEP1606 has <i>Groenlandia densa</i>	County	Medium
	Category 3 ditches & ponds outside SSSIs. TEP1127, 1402 & 1491 (Category 4 ditches which support IUCN/Nationally Notable or Scarce invertebrate species). Category 4 or lower ditches which support IUCN designated flora	Local	Low
	Category 4 and 5 ditches outside designated sites	Neighbourhood	Very Low
Fish	Priority fish species are present within the Order Limits but as only short sections of the extensive watercourse network falls within the Order Limits, the value of this receptor is restricted.	Local	Low

8.5 Prediction and Assessment of Significance of Potential Effects Prior to Mitigation

- 8.5.1 This section describes the predicted effects arising from construction, operation and decommissioning of the Proposed Development.
- 8.5.2 Prior to detailed narrative accounts for each receptor, introductory sub-sections entitled ‘Modifications within the Scheme Design’, and ‘Limits of Deviation’ describe the design processes and implementation procedures that form part of the Proposed Development, including commitment to avoidance of certain ecological features during detailed siting.
- 8.5.3 The subsequent sub-sections explain the potential adverse ecological effects of construction, operation and decommissioning activities. As part of the construction effects, the ‘Approach to Habitat Loss Calculations’ is explained in a dedicated sub-section before the potential effects are described for each receptor in turn, following the order used in section 8.4: Baseline Environment. Summary tables are provided to address construction and operational effects, prior to mitigation.
- 8.5.4 The overall assessment made in this section assumes successful implementation of ‘embedded’ mitigation measures required by the other environmental disciplines, such as the design and construction of culverts and bridges in accordance with the EA consents process (embedded measures are those that form part of the DCO application in contrast to those that would be delivered under s106 agreement and as such are subject to landowner agreement).
- 8.5.5 The overall assessment made in this section assumes successful establishment of the habitat reinstatement proposed following construction, as well as the site-specific landscaping proposed at the permanent infrastructure locations. EN-1 paragraph 5.3.18 encourages developers to consider habitat reinstatement and creation as part of the design process.
- 8.5.6 A final sub-section considers how predictable climate changes influence the judgements made in this chapter, having regard to EU guidance.

Modifications within the Scheme Design

- 8.5.7 This section sets out the modifications which have been incorporated into the engineering design as the Proposed Development has evolved, in order to avoid or minimise potential effects on ecological receptors. Embedded mitigation required by the other environmental disciplines (e.g. landscape, hydrology) is also described insofar as it affects ecological receptors.

Ecological Design Considerations

- 8.5.8 Information derived from ecological surveys and the consultation process has been used, alongside other environmental survey data, to inform the strategic routing and subsequent design of the proposed route, substation and ancillary works. Selection of the selected Route Corridor sought to avoid or (where this is not possible), minimise effects on designated wildlife sites, priority habitats and habitats associated with protected species. The route alignment, extent of working areas and Limits of Deviation have been informed by Change Requests (design-stage

proposals for changes to the locations of select Development Components as a result of s42 consultation, discussions between land owners and National Grid and the recommendations of the EIA disciplines). From an ecological perspective, these Change Requests related to ancient woodland, the avoidance of bat roosts, badger setts and waterbodies that are designated and/or support protected species.

- 8.5.9 Prior to construction, National Grid will undertake a final design process to establish the precise siting of Development Components. National Grid undertakes that this process will not result in any physical encroachment of construction activity into internationally and nationally designated sites unless essential and unavoidable. In the case of the Severn Estuary, no encroachment will be permitted into the intertidal saltmarsh or mudflat habitats associated with the River Avon (with the potential exception for stringing the new 400kV pylons and de-stringing the 132kV pylons at this location). For the SSSI ditch systems (Puxton Moor, Biddle Street Yatton and Tickenham and Nailsea Moors), where the SSSI designation extends to 6m from the banktop, works will not be carried out within SSSI land unless absolutely necessary. Working areas adjoining SSSIs will be fenced and demarcated to prevent encroachment from machinery, equipment and stored materials.
- 8.5.10 During detailed design, all Development Components would be sited with a minimum 9m stand-off from watercourses wherever practicable. This applies to all components, with the exception of construction accesses which cross watercourses and, at a small number of locations, run alongside them. Works within the stand-off distance would be carried out under consent from the EA, Inland Drainage Board (IDB) or Lead Local Flood Risk Authority as appropriate.
- 8.5.11 Any works within SSSIs would be carried out with consent from Natural England.
- 8.5.12 Other than where larger root protection zones are specified, a minimum 2m stand-off will be maintained from retained trees and other field boundary features (taken from the outer edge of hedgerow or tree canopy).
- 8.5.13 Access routes utilise existing roads, tracks and maintenance routes wherever practicable. New routes have been informed by the ecology baseline data to avoid hedgerows, trees, watercourses and other sensitive features where possible.
- 8.5.14 Selection of the T-pylon design through Sections A and B has been influenced by the likely reduced collision risk to birds that it poses, in addition to landscape and visual and engineering design considerations. The T-pylon is lower than the standard 400kV steel lattice (thereby reducing the total collision risk zone).
- 8.5.15 In relation to the existing 132kV (which will be removed) configuration of the conductors and earth wire may be more visible to birds; the wires are thicker and have 'separators' along the length.
- 8.5.16 As the 400kV underground works lie within the SAC Consideration Zones for greater horseshoe bats, to minimise losses within the hedgerow network that may be used by these species, all storage and other construction activities to be located away from hedgerows; hedgerow removal would be restricted to the minimum cable working width. For the purposes of assessment, hedgerow losses are assumed to be no more than 5m from the outermost trenches (this varies along the route but measures no more than 45m for the 400kV swathe and 35m for the 132kV).
- 8.5.17 Phasing of works will be determined once a contractor has been appointed, although National Grid has committed to phase the conductor and earth wire

removal of the existing 132kV F Route south of Mark and stringing of the proposed 400kV line to avoid both lines being in place when potential wintering or migratory bird collision risk would occur.

Embedded Landscape Mitigation: Site-Specific Planting Plans

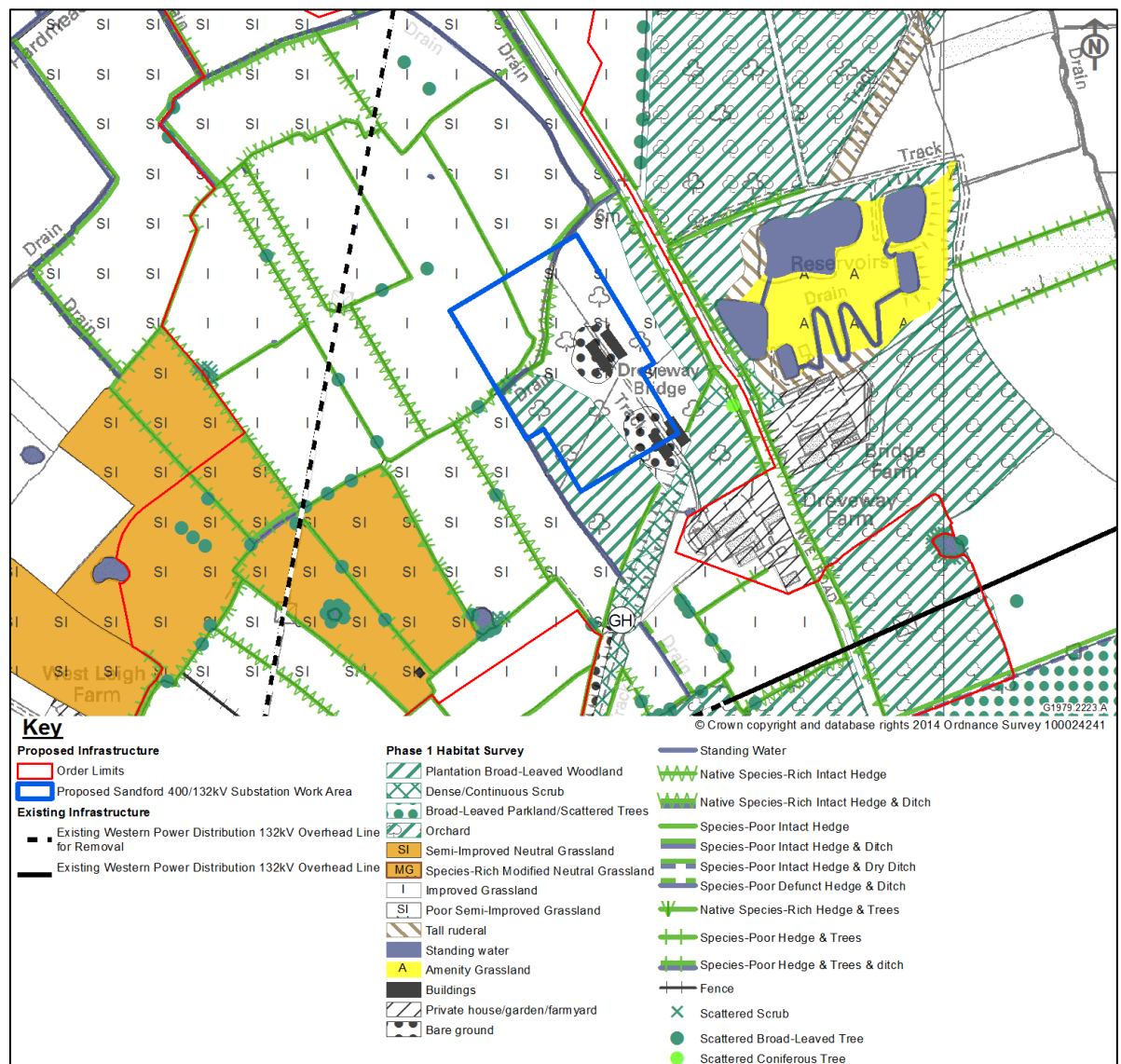
- 8.5.18 **Volume 5.6.1, section 6.7** sets out the embedded landscape works that form part of the DCO application, and therefore forms part of the Proposed Development assessed, prior to mitigation. Site-Specific Planting Plans are proposed for the areas of new permanent infrastructure at Sandford Substation (**Volume 5.7.1, section 7.8, Volume 5.7.3, Figures 7.35.1 – 7.35.5**), the CSE compounds (**Volume 5.7.3, Figures 7.32.1 – 7.32.5 and Figures 7.33.1 – 7.33.4**), and at the optional clear-span cable bridge at the River Axe (**Volume 5.7.3, Figure 7.34.6**) and at the clear span bridge or culvert option Towerhead Brook (**Volume 5.7.3, Figure 7.36.6**). These have been drawn up in consultation with the ecologists to maintain and extend ecological connectivity wherever possible and to optimise species and structural diversity. The Plans detail how the species and form of the locally characteristic wide hedges would be replanted. Structural planting (as initial whips) includes a range of native understorey species which would be managed to create a mixed thicket with varied structure. The detailed design and proposed management of orchards would be prepared in accordance with NE (2010) (Ref. 8.80).
- 8.5.19 Planting at each location is summarised in **Table 8.26**. **Insets 8.1 – 8.6** illustrate the existing Phase 1 Habitat types and the proposed planting at Sandford Substation and the two CSE compounds.
- 8.5.20 These are works which are committed on land over which National Grid would have control. The planting is proposed to assimilate the new development into the landscape and to screen views. Nevertheless, the planting would bring biodiversity benefits and would create and enhance habitats. Delivery *“in the first planting season after that part of the authorised development to which the landscaping or replacement planting works apply is first brought into operational use”* will be a DCO Requirement.

Table 8.26 Summary of Site-Specific Planting

Location of Planting	Trees		Hedgerows	
	Extra-heavy Standard Trees	Structural Planting Whips	New Hedgerow	Hedgerow Gap Planting
Sandford Substation	625no.	5,267no. /0.53ha	0.96km	0.98km
Bridgwater Tee CSE compound	53no.	4,387no. /0.44ha	0.27km	0.85km
CSE compound south of the Mendip Hills	254no.	12,213no. /1.22ha	0.29km	0
Optional clear-span cable bridge at River Axe	37no.	1,433no. /1.43ha	0.18km	0

Location of Planting	Trees		Hedgerows	
	Extra-heavy Standard Trees	Structural Planting Whips	New Hedgerow	Hedgerow Gap Planting
Clear-span bridge or culvert at Towerhead Brook	6no.	0	0.05km	0
Total	975no.	23,300no. /2.33ha	1.75km	1.83km

Inset 8.1: Existing Phase 1 Habitat Types at the Proposed Sandford Substation



8.5.21 The attenuation pond proposed at the Sandford Substation has been designed as a wildlife pond with shallow sloping margins and marginal aquatic planting. Whilst the pond has not explicitly been identified as mitigation for protected species, a range of native floating, emergent and marginal species are specified at densities that

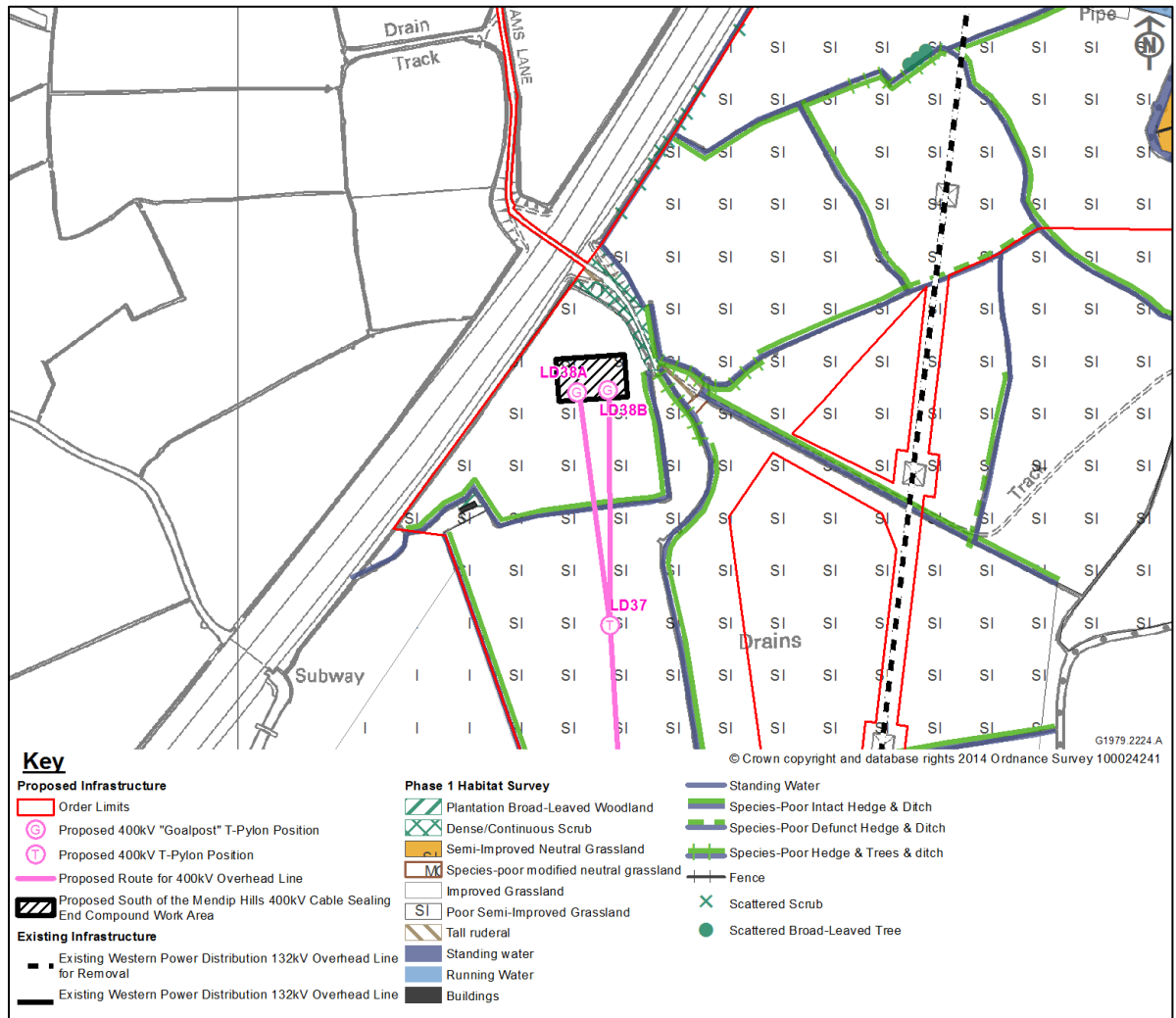
would create a structurally varied assemblage to benefit biodiversity, totalling 508m².

- 8.5.22 509m of existing ditch would need to be realigned to circumnavigate the substation building, totalling 523m. Aquatic and marginal planting would again be provided along the length of the realigned ditch.
- 8.5.23 The grassland surrounding the new attenuation pond at Sandford, and extending north of the substation itself (totalling 2.20ha) will be sown as wildflower meadow grassland of regional provenance. Similarly, meadow grassland of regional provenance totalling 0.57ha is proposed as part of the planting around the two CSE compounds at Bridgwater Tee, and 1.84ha extending south of the CSE compound south of the Mendip Hills.

Inset 8.2: Site-Specific Planting Proposed at Sandford Substation



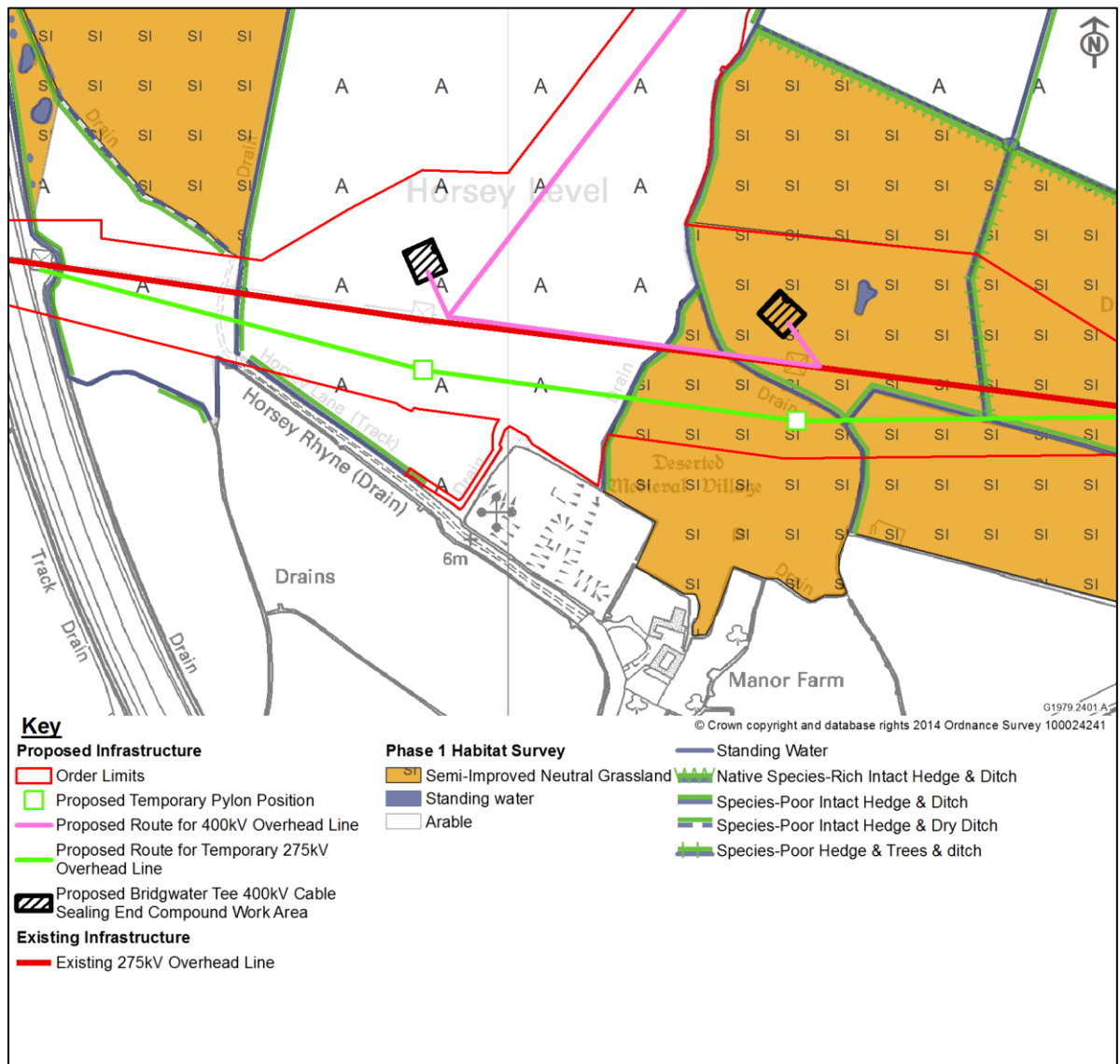
Inset 8.3: Existing Phase 1 Habitat Types at the Proposed CSE Compound South of the Mendip Hills



Inset 8.4: Site-Specific Planting Proposed at the CSE Compound South of the Mendip Hills



Inset 8.5: Existing Phase 1 Habitat Types at the Proposed Bridgwater Tee CSE Compound



Inset 8.6: Site-Specific Planting Proposed at Bridgwater Tee CSE Compound



Embedded Arboricultural Mitigation

8.5.24 The Arboricultural Impact Assessment (**Volume 5.21.1**) includes a detailed assessment of the effect of the Proposed Development on trees, tree groups and hedgerows. Standard trees within hedgerows or scrub thickets are assessed as individual trees. 'Tree groups' encompasses all woodland types and orchards as

well as smaller groups which would be mapped as scattered trees under Phase 1 Habitat survey; accurate measurement of the Phase 1 Habitat types has been taken by overlaying the two datasets. Tree groups also include ‘outgrown hedgerows’ – a term used to describe “*Where vegetation is within the transitional stage between managed hedgerow and fully developed individual trees*”. ‘Outgrown hedgerows’ have been drawn out of the tree group dataset where potential losses occur and form a distinct category.

8.5.25 Tree and hedgerow works detailed in the arboricultural assessment and referenced herein include:

- Removal – fell to ground level.
- Canopy removal – applies to tree groups only. Whilst the land would not be given over to permanent infrastructure, trees will be cut down to (worst-case) 2m to respect the electrical safety clearance below the 400kV overhead line. Any canopy regrowth would be subject to cyclical pruning or pollarding to maintain clearances. The severity of treeworks would not retain the original, functional canopy and thereby represents permanent loss of woodland canopy. As it would be possible to retain understorey and ground flora, this is described as permanent modification.
- Pruning – describes the reduction of a trees’ crown in one or more dimensions or, in a small number of cases, this will equate to managing the tree as a pollard where current age and species or past management allow. The extent of pruning will be determined during the detailed design stage. This applies to single trees only.

8.5.26 The retention or pruning of individual trees and specific stretches of hedgerow detailed in the arboricultural assessment has been informed by the ecological survey work. Note that trees and hedgerows which National Grid will aspire to avoid but at this stage cannot commit to (falling within the ‘Potentially Affected’ category presented in the arboricultural assessment) are included within the habitat loss calculations herein. However, all remaining trees and hedgerows within the Limits of Deviation (which make up the remaining ‘Potentially Affected’ category) are excluded (see instead the approach set out under ‘Limits of Deviation’ below). Accordingly, the loss figure calculated herein differs from the ‘headline’ figures of tree, tree group and hedgerow removal presented in the arboricultural assessment and summarised below.

8.5.27 Hedgerow replanting would be in-situ (i.e. following the existing alignment) wherever practicable, with exceptions at only Sandford Substation and its semi-permanent access road, including the Towerhead Brook crossing (totalling 0.63km). The lengths and locations at which hedgerows will be lost and replanted are set out in the Tree Impact Plans (**Volume 5.21.3, Figures 21.2 – 21.3**). Hedges referred to as ‘outgrown hedgerows’ in the Tree Impact Plans would be replanted as linear hedgerow totalling 1.35km (1.33km for the alternative route).

8.5.28 The arboricultural assessment provides planting specifications for standard hedgerows. It also provides four specific hedgerow types using locally-appropriate species mixes and increased density which will be implemented at 70 specific hedgerows, primarily within the Mendip Hills AONB. Delivery “*in the first planting season after that part of the authorised development to which the landscaping or*

replacement planting works apply is first brought into operational use” will be a DCO Requirement.

- 8.5.29 Impacts on trees and tree groups are identified (**Volume 5.21.1, Tables 7.1 and 7.4**). Trees that can be replanted in-situ (i.e. those unavoidably affected by construction accesses and working areas for only the duration of works) account for a small proportion of the number affected. In-situ replanting is proposed for 14 individual trees (12 for the alternative route) and 0.14ha tree groups (**Volume 5.21.1, Table 9.2**).
- 8.5.30 To avoid adverse effects on retained trees and treed habitats, a Tree Protection and Construction Mitigation Strategy will be included in the DCO Requirements, detailing proposals for the protection of retained trees and associated soils.

Embedded Hydrology and Water Resources Mitigation

- 8.5.31 **Volume 5.10.1** sets out the embedded mitigation measures in respect of hydrology and water resources, which would be delivered through the CEMP (**Volume 5.26.1**) as a DCO Requirement.
- 8.5.32 **Volume 5.10.1, section 10.2** sets out the Environment Agency pollution prevention requirements and good working practices, again delivered through the CEMP to ensure general maintenance of water quality. To address the risk of singular accidental events, mitigation measures include provision of spill kits and emergency response procedures. No significant residual effects were identified in respect of increased sedimentation and suspended content in runoff. No significant residual effects were identified in respect of pollutants entering the watercourses, with the exception of *“an extreme flood event [where] there is the potential for bunded areas to be overtopped”*, thereby providing a pathway for pollution to reach a watercourse. This was concluded to be of Minor adverse significance *“due to the extent of the flood plains in the working area, and the dilution and dispersion potential of the pollutant in the flood waters”*.
- 8.5.33 **Volume 5.10.1, section 10.7** summarises the embedded measures specified in the Flood Risk Assessments (**Volumes 5.23.1 – 5.23.10**) to ensure general maintenance of water flow rates, including surface water management arrangements, such as the use of permeable surfaces at CSE compounds and substations, and the design and construction of culverts and bridges in accordance with the relevant consenting authority’s requirements. Whilst individual culverts were concluded to pose no detrimental effect, *“where there are a number of watercourse crossings along the same watercourse or within the same watershed, this will result in a Minor adverse impact on hydrological regime during the construction phase.”* Residual effects on the banks and beds of the watercourses as a result of the culverts were concluded to be Not significant.
- 8.5.34 No significant residual effects as a result of *“bridging techniques”* or *“HDD techniques”* were identified following implementation of mitigation and consent requirements.
- 8.5.35 Regarding the underground line works, no significant residual effects were identified on drains, ditches and ponds *“as the in-situ cables will be set at a depth greater than the base of the watercourse and flows would have been maintained or diverted to adjacent or upstream watercourses during construction and reinstated post construction”*. However, *“Residual effects on the land drainage network [i.e. controlled drainage] following underground cable laying would be classed as Minor adverse, as the land drainage network would be reinstated as far as is practicable.*

Cables will be laid at a greater depth than the land drains and therefore would not impact on them post construction”. Further, “Residual effects on groundwater flow patterns [i.e. naturally occurring groundwater, not controlled] following the underground cable laying would be classed as Minor adverse, due to the permanent structure potentially impeding some flows. This would only be a slight impact as pathways would exist above and below the encased cables”.

Embedded Air Quality and Dust Mitigation

- 8.5.36 **Volume 5.13.1** sets out the mitigation measures in respect of air quality and emissions, which would be delivered through the CEMP (**Volume 5.26.1**) as a DCO Requirement.
- 8.5.37 Volume 5.13.1 identifies some sections may have slight adverse residual effects in respect of dust (sections B, C, D, G and H). As Volume 5.13.1 notes, adverse ecological effects can arise in respect of dust effects on vegetation, through smothering restricting photosynthesis or through chemical changes affecting highly specialised flora dependent on specific substrates. Volume 5.13.1 does not make any site-specific assessment in respect of ecological impact; it only provides a desk assessment of the proximity of receptors to the Order Limits, so requires site-specific ecological assessment.
- 8.5.38 Thus for sections B, C, D, G and H, where Volume 5.13.1 notes a slight residual adverse effect, this chapter makes an assessment of dust effects on sensitive ecological receptors (i.e. floristically-valuable sites) within 50m of the potentially dust-generating activity, based on Institute of Air Quality Management guidance.

Embedded Habitat Reinstatement

- 8.5.39 As part of the Proposed Development, during the latter stages of construction, National Grid would reinstate most habitats in-situ to their former condition
- 8.5.40 As outlined in the Arboricultural Impact Assessment (**Volume 5.21.1**), trees with statutory or policy protection (TPO) would be replaced within Order Limits, in or close to the original location. National Grid seeks the powers to implement this replacement planting as a Requirement under the DCO.
- 8.5.41 Hedgerows removed to facilitate excavation of cable trench or construction access tracks would be reinstated in-situ along existing field boundaries using a diverse mix of native species. This is of particular importance within the Consideration Zones for bat SACs. Tree Impact Plans are provided in **Volume 5.21.3, Figures 21.2 – 21.3**.
- 8.5.42 Grassland replacement would generally match the use of land prior to construction, with the exception of areas of meadow grassland specified in the Site-Specific Planting Plans. Appropriate seed mixes will be determined at the detailed design stage.
- 8.5.43 Following removal of watercourse crossings, in-channel vegetation will be allowed to naturally re-colonise and if necessary (Ref. 8.81) may be transplanted from connected ditches in the immediate vicinity to increase the speed and success of colonisation.

Establishment Periods for Reinstated Habitats

- 8.5.44 Replacement planting would take time to establish. In line with the landscape planting proposals, this assessment is based on 1-3 years for grassland, 2-4 years for ditch vegetation, 3-5 years for hedgerows and 15 years for trees, depending on the species and age-class planted. It is recognised that this describes the time for the sward, whips or standards to establish but longer periods would be required to allow semi-mature trees or hedgerows (e.g. those over 3m high) to develop i.e. over 5 years for tall hedgerows.
- 8.5.45 Vegetation growth at 15 years (against which residual effects on views are determined in **Volume 5.7.1**) assumes hedgerow planting at a height of 1.5m, understorey shrub planting at 4-6m and native tree planting 7-10m (depending on maintenance). In the case of veteran trees, the replacement planting would not replace the ecological functions of the tree within the operational life of the Proposed Development, although the retention of dead and decaying wood would go some way to appease this.
- 8.5.46 The quoted timeframes for planting to establish broadly corresponds to the timescales and feasibility for creation/restoration as set out in the national and Somerset offsetting guidance (DEFRA, 2012 & Burrows, 2011) (Refs. 8.82 & 8.83 respectively) where eutrophic ponds are listed with a timescale of 1-5 years, eutrophic grasslands 1-20 years and reedbeds 10-100 years (based on examples from Europe). Hedgerows, orchards, ponds and reedbeds are all listed as of 'Low' technical difficulty to recreate or restore.
- 8.5.47 National Grid would provide management over a five year period to ensure reinstatement planting takes place and habitats establish as intended. For ditches, this would entail aftercare of the naturally regenerating vegetation to allow less competitive species to flourish.

Habitats that Cannot Be Reinstated In-situ

- 8.5.48 Although most habitats can be reinstated in-situ, there are some exceptions:
- It would not be possible to replant many trees in-situ due to the need to respect the electrical safety clearance of the overhead line, and structural integrity of the underground cables;
 - Permanent infrastructure (notably the Sandford Substation and the CSE compounds) would prevent in-situ reinstatement of hedgerows, ditches and grasslands although the Site-Specific Planting Plans (**Volume 5.7.1, section 7.8**) offer compensatory and enhanced habitats which exceed, in quantitative terms, the extent of loss;
 - Grassland lost to pylon feet, which is not considered to be of biodiversity value, except within designated sites;
 - the option of providing a clear-span bridge (as opposed to HDD) which is proposed at the River Axe (Section B, carrying the 400kV cables) and the crossing (clear span bridge or culvert) of Towerhead Brook (Section D, carrying the semi-permanent access road and underground cables to Sandford Substation). Site-Specific Planting Plans (**Volume 5.7.1, section 7.8**) offer compensatory and enhanced habitats
- 8.5.49 These situations are described as permanent losses. In the case of woodlands where it is possible to retain a low canopy and undisturbed soil and ground flora beneath overhead lines, the change is described as a permanent modification.

Limits of Deviation

- 8.5.50 The Limits of Deviation (described in **Volume 5.5.1, section 5.6**) apply to the alignment of the overhead line pylons and the underground cable trenches. All other components (e.g. access tracks, Sandford Substation, CSE compounds) are assessed in the locations as shown on the Proposed Development Plans. National Grid is committed to constructing only within specific parcels of land. The exact location of access roads could alter, but taking account of restrictions to Order Limits (as discussed below) such small changes are unlikely to result in any significant change of effect.
- 8.5.51 National Grid considers the maximum lateral movement of any pylon to be 10m either side of the route centre line given the span of the pylon arms and the allowance for conductors to swing during windy conditions. Similarly, longitudinal movement would be restricted to 40m by the knock-on effects to neighbouring pylons along the line (National Grid aim to retain position within two pylon spans).
- 8.5.52 As the design evolved, where significant ecological features were identified along the Proposed Development, the Order Limits were reduced or otherwise altered, to exclude these features from the DCO application. Where exclusion from the Order Limits was not possible, Limits of Deviation were restricted to ensure individual elements of the Proposed Development avoided these significant ecological features and National Grid is committed to minimum stand-off zones from watercourses and ditches as previously described. Within the context of this discussion, significant ecological features include ancient woodland, ponds, ditches (including SSSI ditches and ditches supporting lesser silver water beetle), bat roosts and badger setts. Details of protection of important features are also provided within the bat, great crested newt, water vole and badger NE licence applications which are legally binding. Taking this into account, should any elements of the Proposed Development move within the Limits of Deviation or within the Order Limits, the significance of effect on ecological receptors would not change. If any situation occurs where this is not the case, such as at unavoidable watercourse crossings, this is highlighted and described within the assessment of effects.
- 8.5.53 As specified under ‘Modifications within the Scheme Design’, components would, wherever practicable, be located a minimum 9m stand-off distance from watercourses, hedgerows, trees and other boundary features. Lateral Limits of 10m are considered in this assessment as follows and have been used to inform the ‘Approach to Habitat Loss Calculations’ (see narrative in the later sub-section):
- For the proposed underground cables, habitat losses are calculated across the entire Limits of Deviation and therefore present the ‘worst-case scenario’ as, in practice, actual losses would be lower. A slightly different approach is taken for hedgerow and watercourses, because good working practices would restrict losses to that which is necessary for cable installation.
 - For the overhead lines, pylons may deviate up to 10m in any direction but must remain within the pylon working area, as all other Development Components are fixed. Deviation of the overhead lines therefore affects only the small-scale permanent habitat losses to the pylon feet. The effect of limits of deviation on trees (i.e. electrical safety clearances) have been assessed and fall within the

“could be affected” category within the Arboricultural Impact Assessment (**Volume 5.21.1**)

- Although no additional encroachment into designated sites would be incurred at detailed design, calculations for habitat losses within designated sites are precautionary and include the losses associated with the full extent of the working areas (with the exception of ditches which are calculated from the crossing schedule).

8.5.54 The vertical Limits are restricted to an increase of +4m; no restriction is placed on a reduced height. However, National Grid policy requires that the minimum height above ground for the lowest wires at 400kV must be at least 8.1m. The collision risk zone considered in analysing bird collision risk is 0-50m, therefore the vertical limits would not impact the bird collision risk assessment.

Potential Construction Effects Prior to Mitigation

8.5.55 The construction period is programmed for four years (medium-term), from 2015 Q3 to 2019 Q3 (see **Volume 5.3.1, Table 3.3**). This would include the removal of the construction accesses and associated water crossings, as well as initial re-seeding/re-planting. Specific tasks or works to specific sections of the route would be of shorter duration (short-term) within this period and the timeframe for specific tasks is set out below as each potential effect is discussed. Phasing of works will be determined once a contractor has been appointed, although, as set out in ‘Modifications within the Scheme Design’, National Grid has committed to de-stringing the existing 132kV F Route prior to stringing the proposed 400kV line south of Mark to reduce potential bird collision risk; bird collision risk is assessed under 8.5: Potential Operational Effects.

8.5.56 The Proposed Development has been divided into Sections A to H, as described in **Volume 5.3.1**. Individual Proposed Development components are also described in **Volume 5.3.1**, including the preferred route alongside the M5 and alternative route through Portbury Wharf (in Sections F and G). Where the two route options would cause differing effects, these are set out in the text as alternative, not additional effects.

8.5.57 In the absence of mitigation, potential construction effects include:

- Permanent habitat loss to the following Development Components:
 - the footprint of the pylons,
 - three CSE compounds – two at Bridgwater Tee and one south of the Mendip Hills;
 - the new Sandford Substation and extension of Churchill, Portishead Avonmouth and Seabank Substations (works at Portishead and Avonmouth take place inside existing substation curtilages);
 - the semi-permanent access road into Sandford Substation from the south, which would be surfaced with grasscrete; and
 - the option of providing a clear-span bridge across the River Axe (Section B, carrying the 400kV cables) and the clear span bridge or culvert at Towerhead Brook (Section D, carrying the semi-permanent access road and underground cables to Sandford Substation).
- Permanent loss of trees along the overhead line relates to removal of trees required for electrical safety clearance. Along the underground cables this relates to restrictions on deep-rooting tree species that may interfere with the technology. These restrictions do not apply to hedgerows.

- Permanent modification of woodland habitats beneath the overhead line. This relates to situations, such as the ancient woodland at Mogg's Wood where National Grid has opted to retain a very low canopy at 2m height, rather than completely remove trees.
- Temporary (medium-term) land take for construction compounds and laydown areas, accesses and undergrounding of new and existing lines. The proposed underground Limits of Deviation for the 400kV cable are 100m wide and for the 132kV cable, 60m wide to allow for the cable route haul road, spacing between cable ducts (which can vary according to terrain and buried depth) and soil storage mounds. However, the actual cable swathe would be narrowed at select locations to reduce losses of hedgerows, watercourses or other features which do not need to be used for soil storage mounds.
- Temporary risk of killing and injury or displacement of fauna associated with permanent and temporary land take.
- Temporary fragmentation of habitats and severance or barrier effects on commuting corridors and migration routes.
- Temporary disturbance effects associated with construction works and removal of existing lines and pylons relating to noise, vibration, lighting and dust deposition.
- Temporary risk of spread of giant hogweed north of Sandford, and of aquatic waterweed species (although majority of the rhynes support *Elodea* sp, accidental spread to un-infested watercourses may occur, particularly where equipment enters from/exits to other construction sites) (Ref. 8.84). If this occurs it might have a permanent effect on the receiving environment.

8.5.58 Two 400kV pylon designs are proposed. T-pylons (standard height 34.5m) are proposed for Sections A to F. Standard lattice pylons (standard height 46.5m) are proposed at the Bridgwater Tee and Huntspill split (within Sections A and B), Section G (Avonmouth) and Section H (Hinkley Point). There is little difference between the habitat loss likely to result from foundations between the two designs, or between the vehicular movements required to deliver construction materials for each. The T-pylon has wider cross-arms than the standard lattice (Ref. 8.85) which would result in some additional loss of trees to maintain electrical safety clearances beneath the overhead line. The lattice designs can take longer to construct; approximately 3-4 weeks for lattice towers including concrete curing, compared with approximately one week for the T-pylon if a monopole foundation is used (otherwise 3-4 weeks if concrete foundation used due to curing time). Conductors and the earth wire would be 'threaded' the new pylons using bond wires so that only a thin rope/cable would be pulled through along the ground.

8.5.59 Removal of the existing 132kV lines would require that the conductors to be recovered in short lengths of around 1 to 1.5km. Winch tractors will be positioned at tension pylons and from one end of the section the conductors are lowered to the ground one at a time. The old conductor is then wound on to empty conductor drums to be taken away and scrapped. This process is repeated for each wire in the section, until all the wires have been removed. Effects through the 'drop and drag' removal of the existing cables would be short-term. Boards or scaffold can be used to protect any particularly sensitive habitats including watercourses.

- 8.5.60 The preferred option for taking down pylons once all the fittings have been removed is to attach a bond to the top of the pylon and secure it to a winch on the ground, two legs of the pylon would then be cut and the winch used to pull the pylon to the ground for dismantling. In situations where felling is not possible sections of the pylon will be taken down by crane before further dismantling on the ground.
- 8.5.61 Access for removal of existing lines (away from existing maintenance routes) would incur temporary disturbance associated with access by a 4x4 vehicle and a crane (temporary tracking laid as appropriate). New accesses for other construction areas would incur disturbance during installation and removal (short-term) and land take for the duration of use (medium-term). The proposed overhead line, permanent infrastructure and associated working areas would be served by local accesses that use existing roads and tracks wherever practicable (quantified in **Table 8.28**). The proposed underground cables would be served by a single access running along the length of each cable section for the duration of construction. Culverts and bridge crossings are described further below. A 10mph speed limit along all construction areas/accesses would be imposed (**Volume 5.26.5, section 3.3 Construction Traffic Management Plan**).
- 8.5.62 A total of 304 watercourse crossings are proposed, including the replacement of 20 existing crossings (8 existing culverts and 12 existing bridges). Culverts for the temporary access road along the 400kV underground line would be 9m wide (7m roadway plus 1m culvert protruding at each end) and all other culverts 6m wide (4m roadway plus 1m protrudes). Within IDB ditches (37no.), culverts would be installed with an additional 2m stepped stone headwall at each end. The design proposals assume a 2m wide dry working area flanking each culvert would be required. The entire crossing structure would be removed on completion of works (except where they are upgrades of existing crossings). Of the 304 crossings, bridges are currently proposed in place of culverts at 61 (c.20%) and more may be identified following appointment of the contractor and site-specific review. The duration of work is anticipated to be 1-2 weeks (maximum) for installation or removal of each culvert.
- 8.5.63 Horizontal Directional Drilling (HDD) is proposed on the 400kV underground line at the Old Lox Yeo and the Lox Yeo River crossings. HDD is also an option at the River Axe crossing and at three road/utilities crossings (Ref. 8.86). On the 132kV W Route, HDD is proposed at two watercourse crossings (one below SSSI ditches/Tickenham Boundary Rhyne/Parish Brook, one below the Land Yeo) and at seven transport/utilities crossings (Ref. 8.87). On the 132kV G Route, three HDD road crossings are proposed (Ref. 8.88). HDD would pass at least 3m below any watercourse, although the precise depth and the distance set back from any given watercourse is dependent on the ground conditions at each locale. All associated working areas (not detailed within the Proposed Development Plans) would be sited in accordance with the stand-off distances described above in 'Modifications within the Scheme Design'.
- 8.5.64 Except where HDD is proposed, underground cables would be installed across watercourses using ducts, including in Section C (Ref. 8.89). A temporary culvert would be installed in the watercourse to carry flow for the duration of ducting works and trenches dug under the culverts to carry each duct. Duration of works is anticipated to be approximately 2-4 weeks for subsequent cable duct (1-2 weeks per duct, with ducts installed in pairs to reduce the overall duration of works in any given watercourse). Junction bays and their associated (above ground) joint pillars would be located every 0.70km-1km (reflecting manufactured cable lengths

delivered) within open fields, set-back from ditches and hedgerows. A similar approach would be taken for the 132kV underground lines but with fewer ducts required – the W Route through Tickenham Ridge (Section E) (Ref. 8.90), BW Route at Portbury Wharf (Section F) (Ref. 8.91) and G Route north of Avonmouth Substation (Section G) (Ref. 8.92).

- 8.5.65 Artificial lighting would be employed at the underground cable joint bays where works will continue through the night, although these works would be under cover. Construction lighting may also be employed during the winter months when working hours fall during darkness. Security lighting would be required at site compounds.

Approach to Habitat Loss Calculations

- 8.5.66 Habitat loss to construction was calculated using a GIS overlay on the Phase 1 Habitat maps (**Volume 5.8.3, Figures 8.2.1 – 8.2.17**). The calculations were run for each Development Component which would cause permanent habitat loss, and subsequently for each component which would cause temporary habitat loss prior to reinstatement. Temporary losses are therefore additional, over and above permanent losses. Losses to the 'semi-permanent' access to Sandford Substation are included within the permanent losses as this represents permanent infrastructure, albeit the route will only be used if the oversized equipment needs replacing.
- 8.5.67 Within the underground swathes (for both 400kV and 132kV lines), habitat losses have been calculated using the Limits of Deviation with the exception of hedgerows and watercourses. Hedgerow losses have been calculated using a 5m buffer on the alignment of the outermost trenches to reflect National Grid's commitment to reducing hedgerow loss particularly within the SAC buffer zones for horseshoe bats (see section 8.5: Modifications within the Scheme Design above). Watercourse losses within the underground swathes have also been calculated using a 5m buffer on the outermost trenches to allow for excavation slopes and dry working (this varies through the route but typically measures up to 45m through the 400kV swathe and 35m through the 132kV).
- 8.5.68 Habitat losses to the watercourse crossings have been calculated based on detailed measurements of culvert length, headwalls (for IDB ditches) and 2m buffer to accommodate the dry working area. The same measurements have been applied for bridge crossings (at least 61no.) as a worst-case scenario; these will sit low across the ditch and may incur loss of some bank habitat. The two optional clear-span bridges would leave bank and in-channel habitat entirely intact during both construction and operation; however terrestrial losses to the footings and associated working areas would occur, as shown on the Proposed Development Plans. HDD locations are shown in the Proposed Development Plans as standard-size positions within which drilling would occur; potential effects associated with HDD have been assessed on a case-by-case basis. Where two watercourse crossing options are proposed, both have been included within the assessment.
- 8.5.69 Habitat losses on construction accesses have been calculated using a 2m buffer to account for sloping road verges, drainage and other peripheral habitat loss batters (whereas within underground sections such losses would already be accounted for as part of the wider swathe). Habitat losses to bellmouths reflect the available

detail of the design; a standard area has been assumed (as illustrated at **Volume 5.3.1, Inset 3.5**) at select locations where detailed design is not yet available.

- 8.5.70 Loss calculations for trees, treed habitats and hedgerows are derived from the Arboricultural Impact Assessment (**Volume 5.21.1**), which provides calculations of tree-felling, pruning and canopy removal requirements to enable electrical safety clearances taking account of future tree growth. The arboriculture dataset has been overlaid with the Phase 1 and then Phase 1 Habitat codes have been allocated to ensure cross-compatibility. It should be noted that losses of trees and treed habitats described in the Arboricultural Impact Assessment are measured using canopy dimensions, from a “birds-eye” perspective, and thus will differ from (and exceed) measurements based on Ecological Assessment which measures woodlands based on ground-based field boundaries, and also does not measure canopies for scattered trees, scattered tree groups, scattered scrub and hedges (which instead are recorded as point and line data).
- 8.5.71 As a result of these two parallel assessments, there is some double-counting, for example where ‘tree groups’ in the arboriculture dataset overlies another habitat type such as grassland or road (Ref. 8.93). **Table 8.28** includes an additional category of ‘Scattered Tree Groups’; a subset of the arboriculture dataset for tree groups (measured in hectares) which corresponds to the Phase 1 Habitat type of scattered trees. This category includes both broad-leaf and coniferous specimens.
- 8.5.72 Losses of trees and treed habitats are considered permanent, as these cannot be reinstated in-situ beneath overhead lines or above underground cables.
- 8.5.73 Permanent habitat loss to the pylon feet has been calculated based on the Proposed Development Plans (Ref. 8.94) and is provided as a specific measure within designated sites. Given the precise positions will be subject to change assigning the loss to a particular grassland type in **Table 8.28** would not be accurate. These small-scale losses of grassland are therefore considered in the subsequent narrative.
- 8.5.74 Permanent habitat loss to the joint pillars (Ref. 8.95) will be dependent on the precise number and location of joint bays (to be confirmed at the detailed design stage once a contractor has been appointed). Joint bays would be sited away from linear boundary features. Again, these losses would occur in grassland and are therefore considered in addition to the calculations presented in **Table 8.28**.

Designated Wildlife Sites

- 8.5.75 The assessment of effects on designated sites takes account of habitats and species noted in site citations. Where non-citation species have been recorded within a designation these are only considered under the species receptors. Where non-citation habitats are recorded within a designation these are considered in so far as they might support species or communities noted in the site citation.

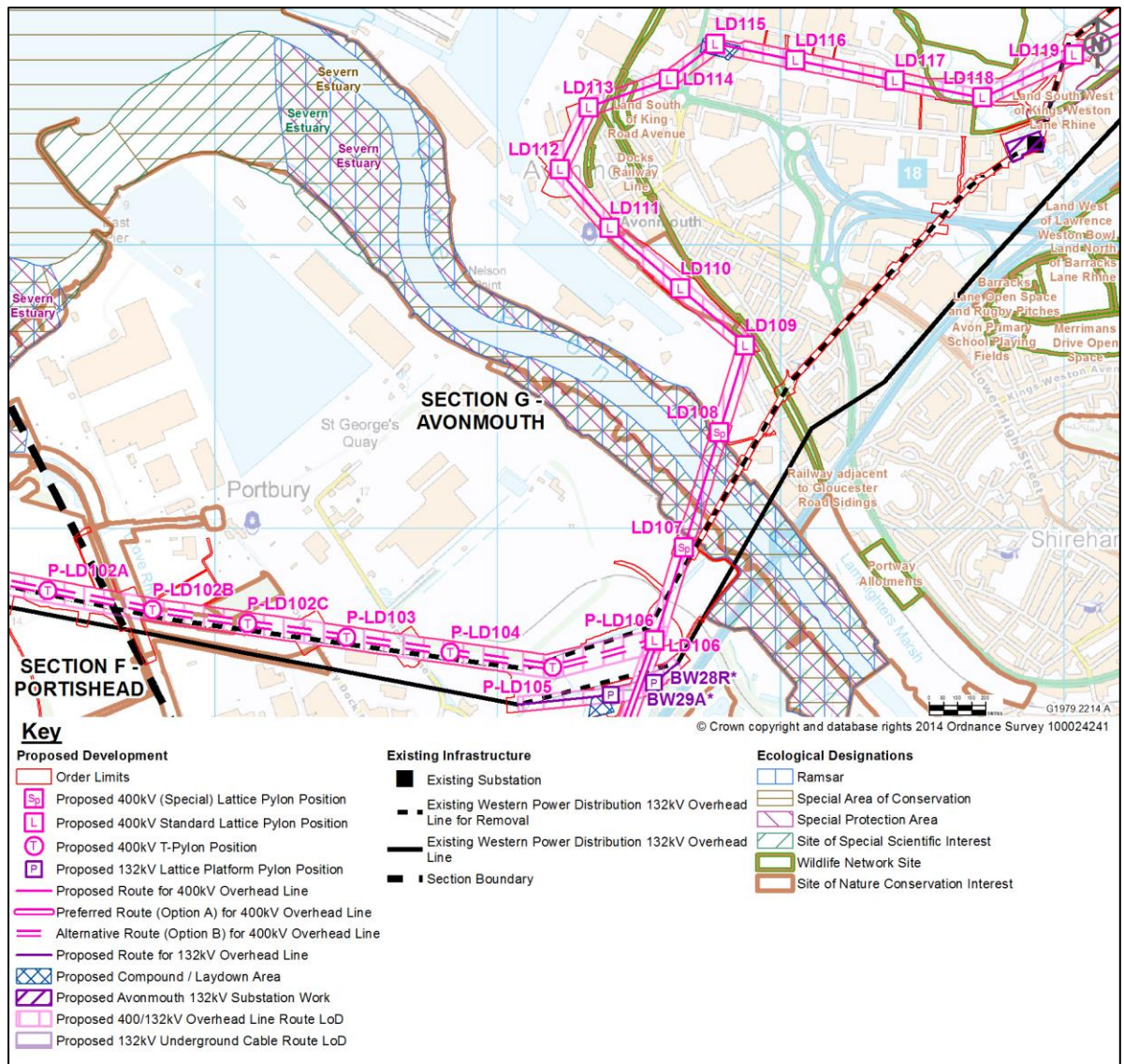
International Designated Sites

- 8.5.76 Potential effects on the internationally designated SAC, SPA and Ramsar sites are detailed within the Applicant’s HRA Report (**Volume 5.20.1**). The EIA process considers potential effects prior to mitigation before appropriate mitigation and subsequently residual effects are identified. In contrast, the HRA process takes mitigation into consideration.

Severn Estuary SAC SPA Ramsar

- 8.5.77 The Severn Estuary SAC SPA Ramsar lies within the Order Limits. Proposed 400kV overhead lines would oversail designated land in Section G (River Avon crossing) and would incur removal of existing pylons and construction of new pylons within designated land in Section H (Hinkley Line Entries). It would pass near the estuary in Section F at Portishead substation.
- 8.5.78 In Section G, designated land would be over-sailed by the new 400kV line crossing the River Avon. National Grid has committed to avoid encroachment into the intertidal saltmarsh and mudflat habitats of the Avon. The exception would be if pylon stringing could not be achieved by helicopter then pilot bonds would need to be walked to the water's edge and taken across the river in a boat. Indirect effects would be managed by the embedded mitigation measures set out in **Volume 5.10.1**. The habitats in question are not assessed as being particularly sensitive to the short-term dust emissions associated with the works. No adverse effects on the designated habitats are therefore predicted at this location.
- 8.5.79 If construction works either side of the Avon were scheduled during Winter, this may result in displacement of small numbers of qualifying species from Winter feeding or roosting grounds for the duration of these elements of work (i.e. medium-term). As only very low numbers of SPA species were occasionally observed within 250m of this location during the baseline surveys the effect is predicted to be of Low magnitude and therefore of **moderate adverse** significance prior to mitigation. The likelihood of effect is possible.

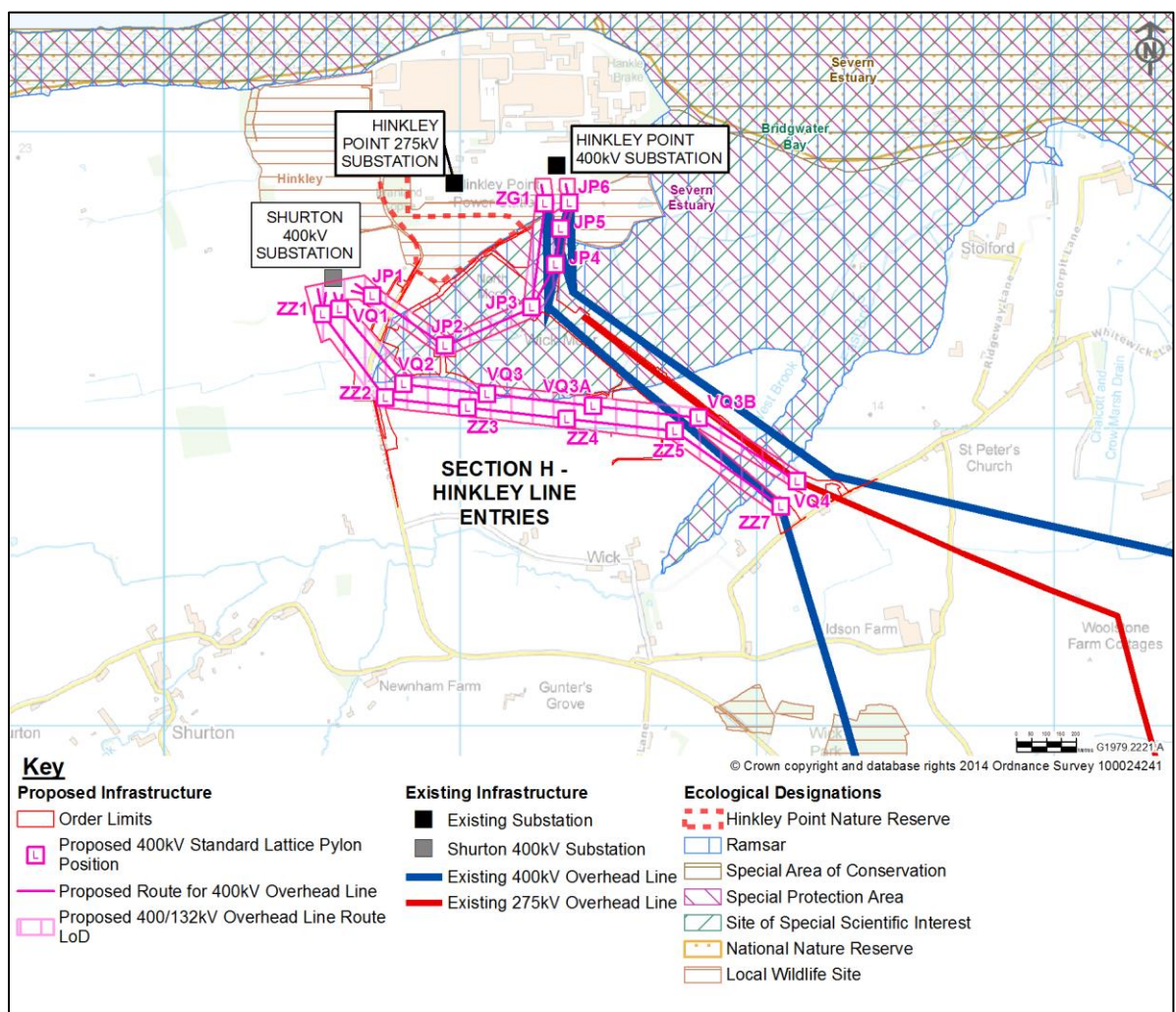
Inset 8.7: Proposed Development at River Avon Crossing (Overlying Severn Estuary SAC SPA Ramsar SSSI)



- 8.5.80 In Section H (Hinkley Line Entries), designated land comprising inland fields (arable and semi-improved grassland), would be subject to small-scale permanent land take for pylon feet (three towers totalling <0.01ha), and temporary land take of ca 4ha, mostly grassland for access route formation and pylon removal working areas. This includes crossing of hedgerows and ditches, loss of scrub and semi-improved grassland. The effect is of medium-term duration as there would be implementation of habitat reinstatement and recommencement of current agricultural uses. Very few SPA Ramsar qualifying bird species were found in the area. Further, the existing power station acts as a screen between the Severn Estuary and these proposed works. The habitats in question are not assessed as being particularly sensitive to the short-term dust emissions associated with the works. The permanent loss or degradation of Winter feeding or roosting grounds is not anticipated to affect the integrity of the site and as such is predicted to be of Low magnitude and therefore of **moderate adverse** significance prior to mitigation. The likelihood of effect is certain/near certain.

8.5.81 As set out in **Volume 5.10.1**, no significant residual effects were identified in respect of pollutants entering the watercourses within Order Limits, with the exception of “*an extreme flood event [where] there is the potential for bunded areas to be overtopped*”. The nature and extent of pollution in such events is difficult to predict, and so too potential effects on the Estuary into which the majority of watercourses crossed by the Proposed Development flow. In line with the broad assumption of **Volume 5.10.1**, that “*due to the extent of the flood plains in the working area, and the dilution and dispersion potential of the pollutant in the flood waters*”, and noting that the proportion of watercourses potentially subject to this effect form such a small part of the inflow to the Estuary, there is no likelihood of significant effect to the internationally-designated interest.

Inset 8.8: Proposed Development at Hinkley Line Entries (Overlying Severn Estuary SAC SPA Ramsar and Bridgwater Bay SSSI)

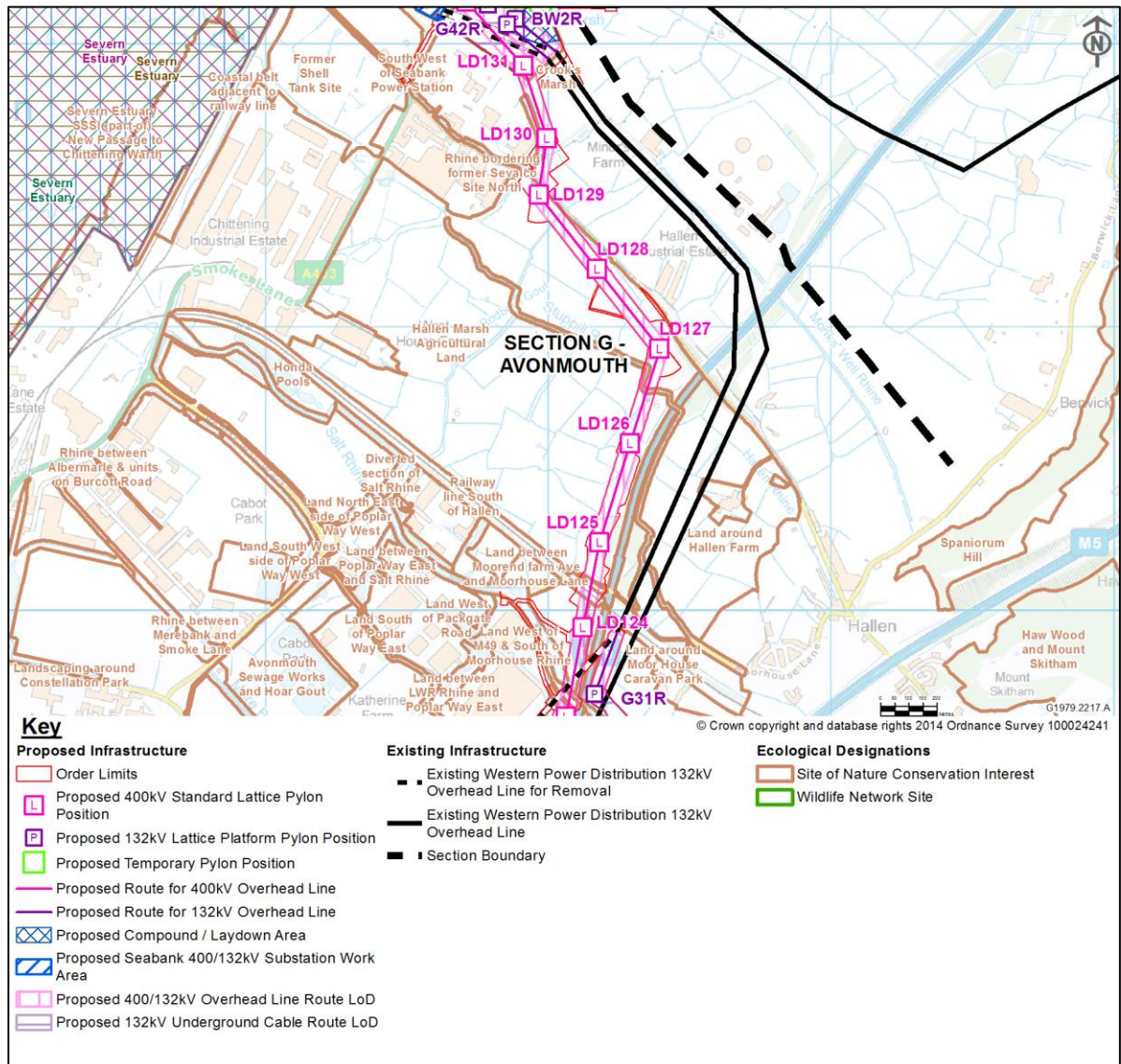


8.5.82 In Section F, the Proposed Development passes near Portbury Wharf where some waterbodies are used by wintering birds associated with the Severn Estuary. The works include 132kV removal and undergrounding. These activities are adjacent land which, although outside the internationally designated areas, is used by SPA species. An effect may arise during Winter and would be a short-term effect of Low

Magnitude and hence **moderate adverse** significance. The likelihood of effect is possible.

- 8.5.83 Hallen Marsh is compensatory land for third-party development affecting the Severn Estuary SPA Ramsar. It has not yet been subject to habitat creation works for SPA birds. The Proposed Development would have a permanent loss of grassland at pylon feet (<0.01ha) and temporary effect on ca 4ha grassland, 315m hedgerow and 4 watercourse crossings. Habitat reinstatement would occur in line with the aspirations to create habitats suitable for wintering birds. The construction-stage effect would be Neutral, which in policy terms, equates to **not significant**. The likelihood of effect is certain.

Inset 8.9: Proposed Development Overlying Allocated Offset Land at Hallen Marsh



Severn Estuary and Somerset Levels & Moors Ramsar SAC SPA Ramsar

- 8.5.84 Land between the Severn Estuary SAC SPA Ramsar and Somerset Levels and Moors SAC SPA Ramsar would be crossed by the new overhead line and could introduce an increased collision risk for qualifying bird species. This is an operational effect and is assessed in section 8.5: Potential Operational Effects.

North Somerset and Mendip Bat SAC

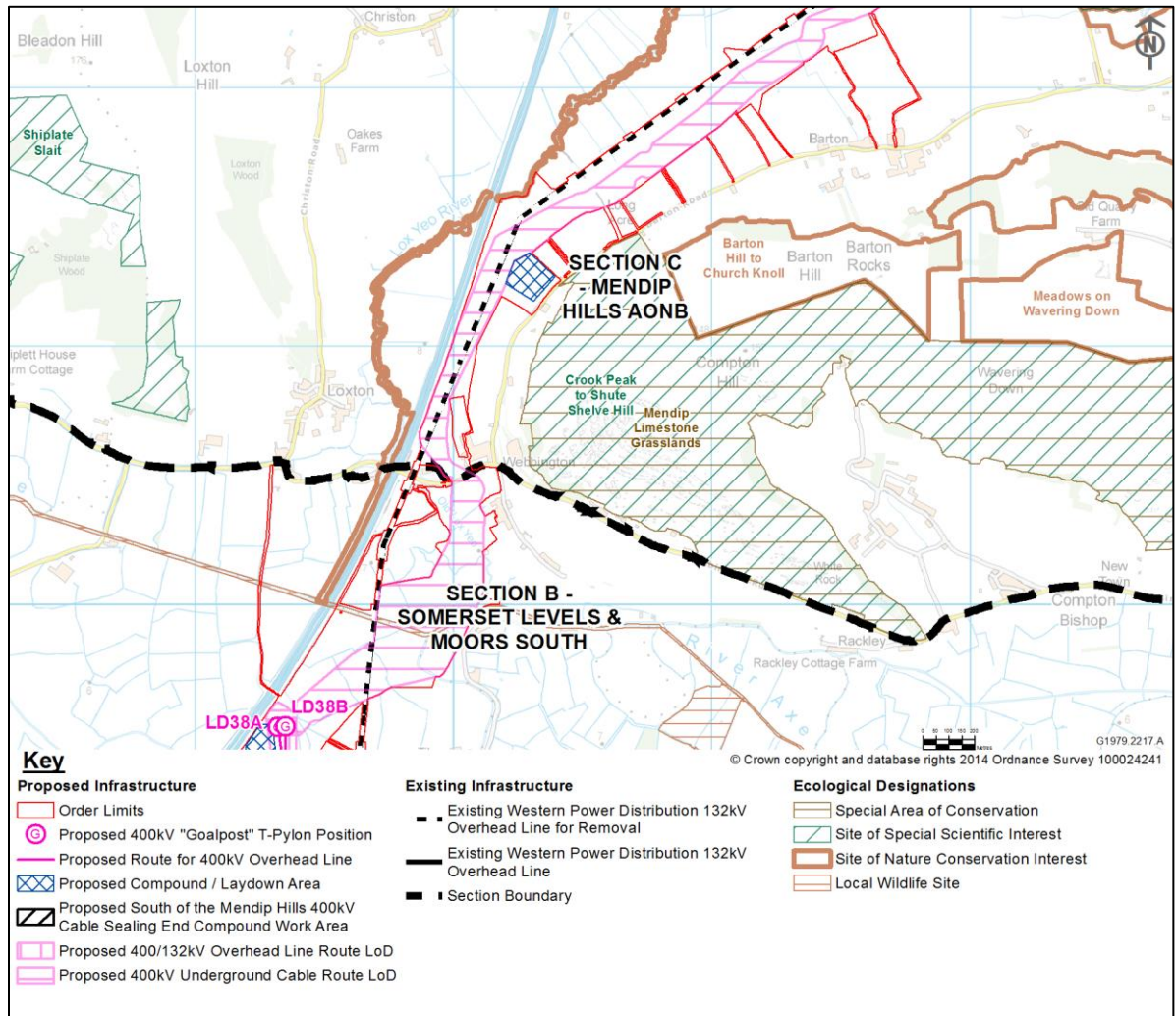
- 8.5.85 Potential indirect effects have been identified on three SAC sites that lie outside the Order Limits, all of which are designated for bat species. Each is addressed in turn below.
- 8.5.86 North Somerset and Mendip Bat SAC lies outside the Order Limits. No lesser or greater horseshoe bat roosts have been identified within the Order Limits; species for which the sites has been designated. Assuming the cave systems supporting maternity and hibernation roosts for which the SAC is designated extend to the SAC boundary, peak noise levels associated with underground line construction are calculated at 40dBA to 67dBA (measured at 705m from source) and overhead line decommissioning at 64dBA to 70dBA (60m from source) (Ref. 8.96). Potential noise disturbance associated with the works is predicted to be of Neutral magnitude and therefore is **not significant**. This effect is certain.
- 8.5.87 Construction entailing the loss or degradation (Ref. 8.97) of foraging habitats (trees, hedgerow and grassland habitats) may indirectly affect the designated bats. This particularly applies through the 400kV underground cable section (Sections B and C), at Sandford Substation (Section D) and to a lesser extent through 132kV underground cable routes (Sections D and E) where these fall within the SAC Consideration Zones for greater horseshoe. Under the Tree Impact Plans the majority of working areas would return to the previous condition post-construction, with the exception of ca 500m at Sandford Substation. There would be a time lag of 3-5 years as hedgerow planting establishes. Site-specific landscape planting would be implemented at the permanent Sandford Substation and the CSE compound south of the Mendip Hills, providing additional tree and hedgerow habitats in the long-term.
- 8.5.88 During the construction phase, hedgerow removal within the SAC CZs would potentially disrupt bat flyways and, together with loss of pasture could reduce availability of bat foraging habitat. Hedgerow loss along the 400kV underground cable swathe, at Sandford substation and associated compounds would be 4.6km and agricultural fields (pasture and arable) loss would be 32.15ha lost to active working areas and a further 70.55ha (worst case scenario) would be affected by creation of topsoil and subsoil piles but these would be seeded following their creation. The effect on the qualifying bats is predicted to be of Medium magnitude and therefore of **major adverse** significance prior to mitigation. The effect is near certain.
- 8.5.89 As a result of temporary hedgerow loss during the construction period (and permanent losses at the site of the Sandford Substation), severance of at least some commuting corridors for horseshoe bats moving across the landscape outside of the SAC could occur. This fragmentation would potentially impact a wider area, beyond the point of direct habitat loss. The effect on the qualifying bats

is predicted to be of Medium magnitude and therefore of **major adverse** significance prior to mitigation. The likelihood of effect is probable.

Mendip Limestone Grasslands SAC

- 8.5.90 The Mendip Limestone Grasslands SAC is also designated for greater horseshoe bats (secondary qualifying feature). No physical impact on the qualifying grasslands (primary qualifying feature), or indirect effect on soils or hydrology is predicted. The grassland SAC lies slightly closer to the Proposed Development than the Mendip Bat SAC. Peak noise levels at the SAC boundary associated with underground line construction are calculated to be in the region of 31dBA to 58dBA (measured at 180m from source) and overhead line decommissioning 55dBA to 61dBA (225m from source). Potential noise disturbance as a result of works is therefore predicted to be of Neutral magnitude and therefore is **not significant**. This effect is probable.
- 8.5.91 The Mendip Limestone Grasslands SAC lies within 20m of order limits. Two small access tracks (providing access to the 400kV UG swathe) are being constructed off Barton Road which borders the SAC. A compound is also being constructed approximately 35m away. Due to the high value of the designation and proximity to the Order Limits (access tracks), the Air Quality and Emissions ES Chapter (**Volume 5.13.1**) considers that a high impact is possible prior to mitigation (at 35m the compound may only have a medium impact) and slight adverse following mitigation. This assessment is based on the international value of the site and not a specific assessment of the sensitivity of the designation to dust emissions.

Inset 8.10: Proposed Development Close to the Mendip Limestone Grasslands SAC and Crook Peak to Shute Shelve Hill SSSI



- 8.5.92 Dust deposition has the potential to affect sensitive habitats and plant communities. Dust can have two types of effect on vegetation: physical and chemical. Chemical changes to soils or watercourses may lead to a loss of plants or animals for example via changes in acidity. Indirect effects (such as increased susceptibility to stresses) are only likely to occur as a result of long-term dust emissions on sensitive habitats. Neither chemical nor indirect effects are predicted to occur.
- 8.5.93 Direct physical effects (smothering by dust) can interfere with photosynthesis and transpiration and thus plant vigor. Lichens and bryophytes are thought to be particularly sensitive to dust smothering (Farmer 1993). Given the closest habitat to the Order Limits within the SAC is woodland which is not particularly to smothering and as impacts will often be reversible once dust emissions cease and (as described in paragraph 8.5.4) *"The overall assessment made in this section assumes successful implementation of 'embedded' mitigation measures required by the other environmental disciplines"* Potential impact of dust as a result of works is therefore predicted to be of Neutral magnitude and therefore is **not significant**. This effect is probable.

- 8.5.94 The temporary loss and degradation of foraging habitat on the qualifying bats during construction and until the hedgerow replacement and site-specific landscape planting establish, is an effect predicted to be of Medium magnitude and **major adverse** significance (certain/near certain).
- 8.5.95 The associated temporary severance effects on commuting corridors and associated habitat fragmentation to be of High magnitude and **major adverse** significance (probable).

The Exmoor and Quantock Oakwoods SAC

- 8.5.96 The Exmoor and Quantock Oakwoods SAC is designated for barbastelle and Bechstein's bats. Of the UK species of bat, these are perhaps the most closely associated with woodland and trees and both show a preference for woodland roost sites. No barbastelle or Bechstein's roosts have been identified within the Order Limits and more generally, records are minimal outside the SAC. No tree loss is proposed within the barbastelle or Bechstein's CZs associated with this SAC. Potential effects on roosts of the designated bats are therefore predicted to be of Neutral magnitude and therefore **not significant**. This effect is near certain.
- 8.5.97 No significant habitat loss or fragmentation is predicted within the 9.45km SAC buffer for barbastelle the Proposed Development at Hinkley Point C lies towards the outskirts of the CZ. Affected habitats include hedgerows (crossed at two locations) and grassland. This effect is predicted to be of neutral effect on favourable conservation status of the designated population. The effect is **not significant** and is near certain.

Chew Valley Lake SPA

- 8.5.98 Chew Valley Lake SPA is designated for its wintering population of shoveler. The vantage point (VP) surveys included a VP sited to oversee the stretch of proposed overhead line where, where bird movements between Chew Valley SPA and the Severn Estuary SPA, would most likely occur. No shoveler flight lines were recorded from this vantage point, indeed overall very few shoveler flight lines were recorded over the remainder of the proposed overhead line. Shoveler use marine waters only briefly and it is considered highly unlikely that birds associated with the Chew Valley Lake SPA would make regular movements to the Severn Estuary. Shoveler will use inland seas and saline inland waters and up to 23 birds were recorded on the pool at Portbury Wharf during winter bird surveys. However, this location is more than 18km north west of Chew Valley Lake, and it is considered highly unlikely that shoveler would move between the two SPAs. Accordingly, no collision risk for the qualifying birds has been identified and as such the SPA is not considered further in this assessment.

National Designated Sites

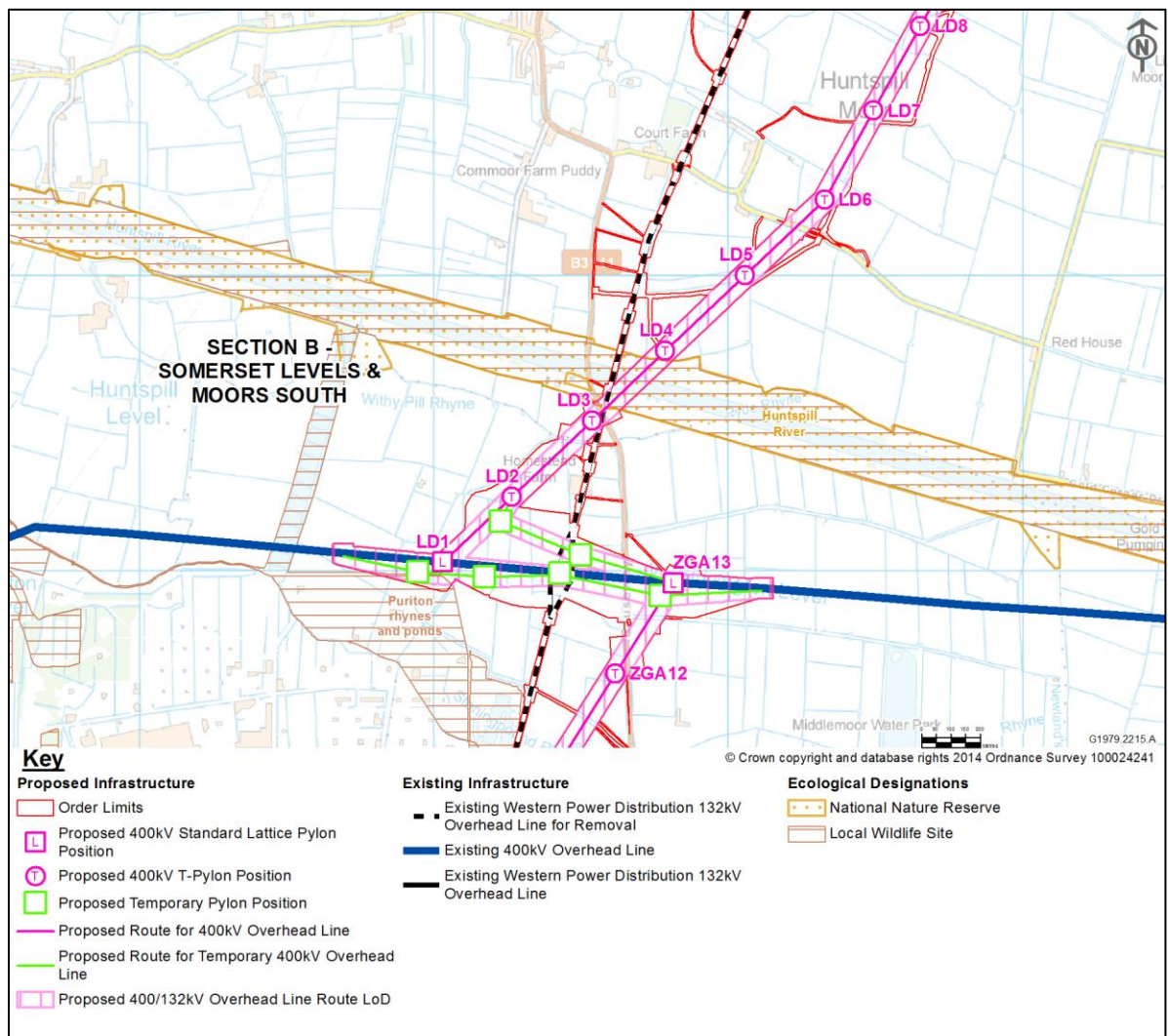
Bridgwater Bay SSSI

- 8.5.99 In addition to those effects discussed in relation to the Severn Estuary SPA Ramsar designation at Section H (Hinkley Line Entries), there is potential for effects on the ditch invertebrate community (for which the SSSI is designated). However, as only a single culvert of a wet ditch is proposed within the designation the effect is Low in magnitude and **moderate adverse** without mitigation. Probability of effect is possible.

Huntspill River NNR

- 8.5.100 The Huntspill River NNR would be subject to temporary loss of 0.341ha of semi-improved and species-poor modified neutral grassland during removal of the existing pylon which lies within designated land, and the associated construction working areas. Habitats would be reinstated in the 132kV removal area to grassland in agreement with Natural England.

Inset 8.11: Proposed Development Overlying Huntspill River NNR



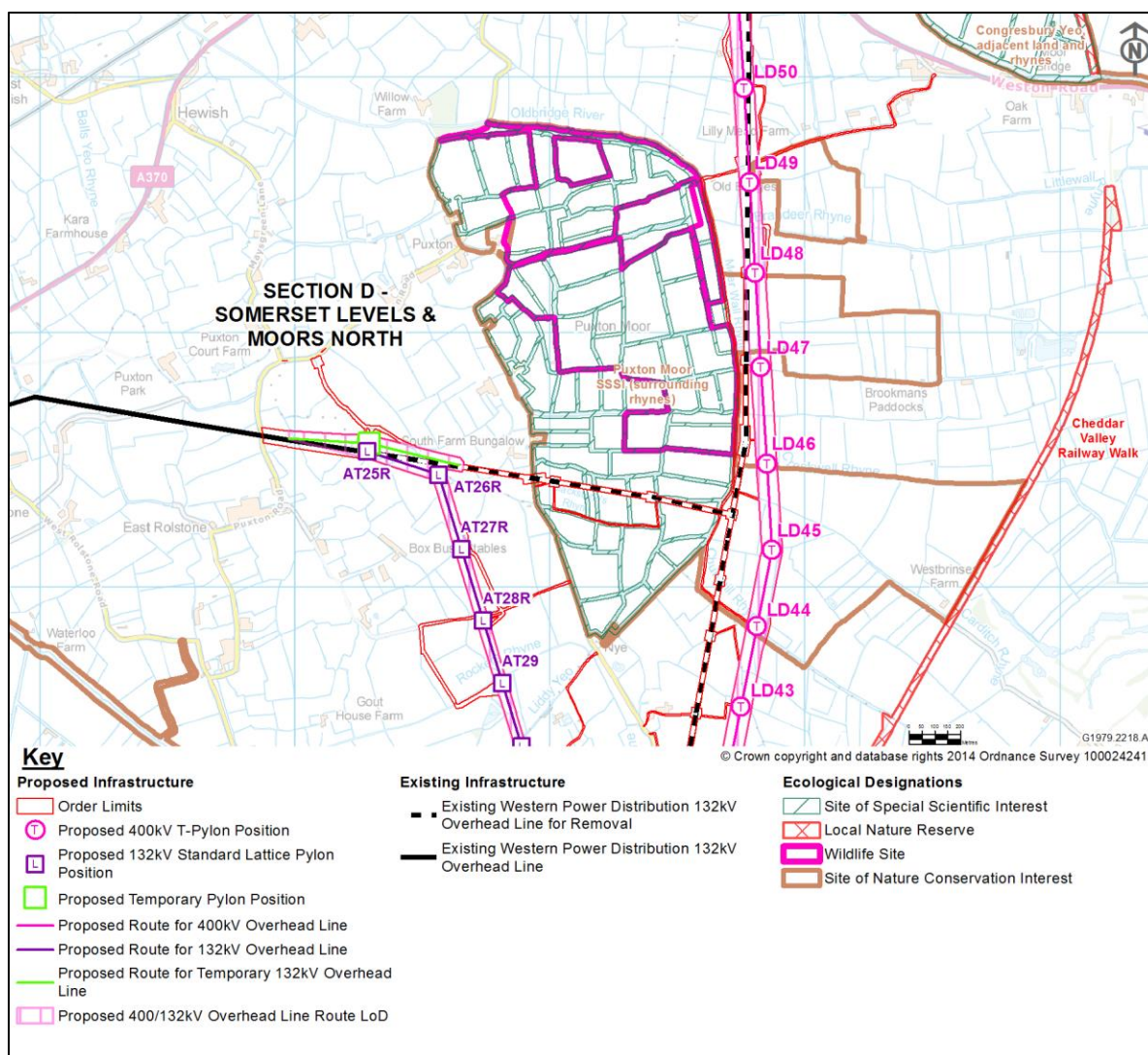
- 8.5.101 Pylons for the proposed 400kV overhead line would be set slightly farther back from the river's edge than the pylons for the existing 132kV. Potential disturbance of otter moving through the river corridor during pylon construction would be short-term and restricted to daylight hours. The habitats in question are not assessed as being particularly sensitive to the short-term dust emissions associated with the works. The overall effect is Neutral in magnitude and **not significant**. Probability of effect is certain.

Puxton Moor SSSI

- 8.5.102 The existing F Route runs close to the eastern boundary of Puxton Moor SSSI and the proposed 400kV east of that. The AT Route crosses the SSSI but oversails all

designated ditches; no new watercourse crossings are proposed within the SSSI. The SSSI site would be subject to up to 0.447ha temporary landtake to form working areas during removal of the existing line. However, this is a worst-case assessment since National Grid has committed to avoid encroachment into the designated land unless essential. As the A-T 132kV pylons will be removed from the area, the net effect of construction is considered to be Neutral magnitude and therefore **not significant** prior to mitigation. The likelihood of effect is probable.

Inset 8.12: Proposed Development Overlying Puxton Moor SSSI

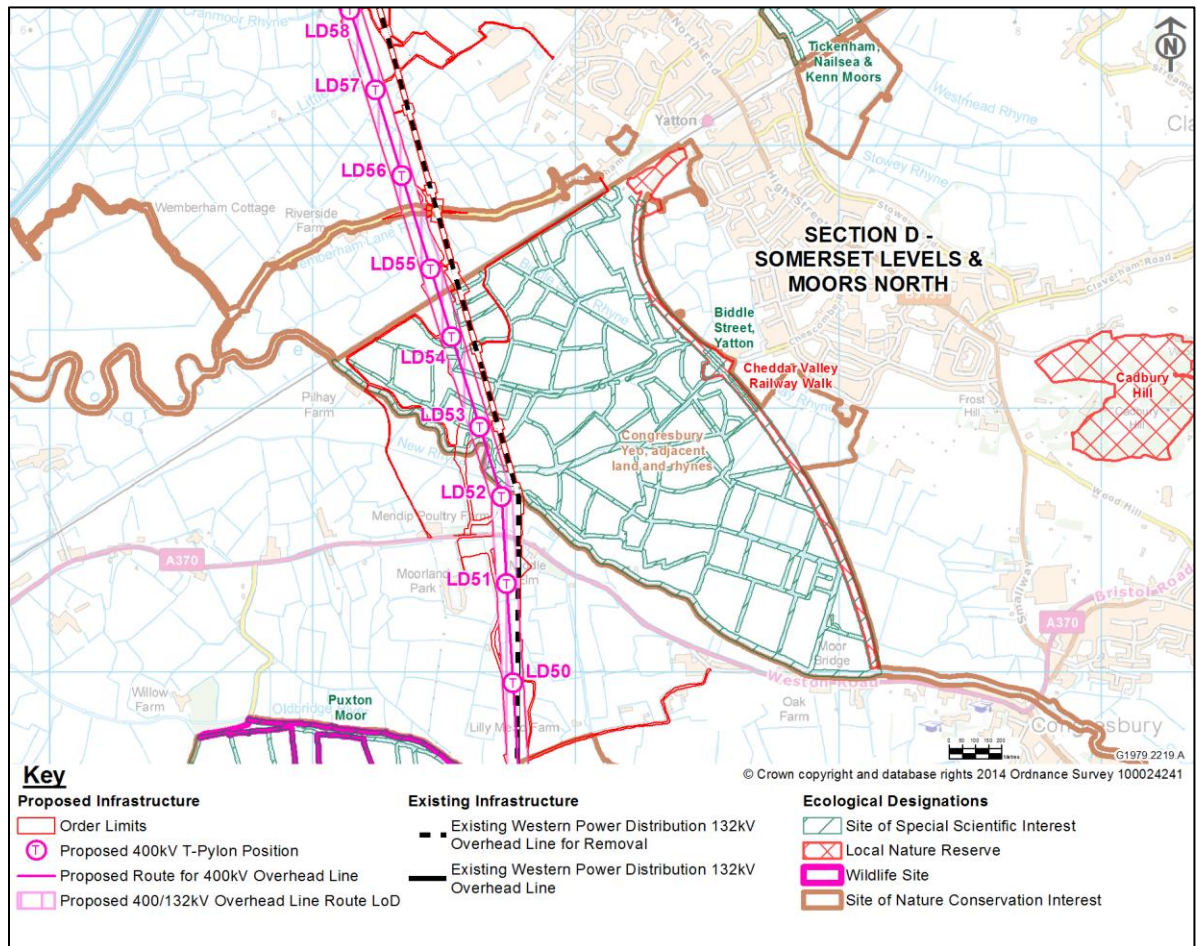


Biddle Street Yatton SSSI

- 8.5.103 Within Biddle Street Yatton SSSI, the ditches form the special interest and, like Puxton Moor, the SSSI designation applies also to the land extending 6m from the bank top either side of the ditches. The existing F Route traverses the western corner of the SSSI and the proposed 400kV line runs west of this. The SSSI would be subject to no permanent landtake and (as a worst-case) up to 1.182ha of temporary landtake associated with working areas for pylon removal and pylon installation. However National Grid has committed to avoid encroachment into the designated land for working areas unless essential. Three watercourse crossings (two culverts and one bridge) are proposed. No discernible effect on the integrity of the site is anticipated and as such, the effect is of Low magnitude in the short term

and therefore of **moderate adverse** significance prior to mitigation. The likelihood of effect is possible.

Inset 8.13: Proposed Development Overlying Biddle Street Yatton SSSI

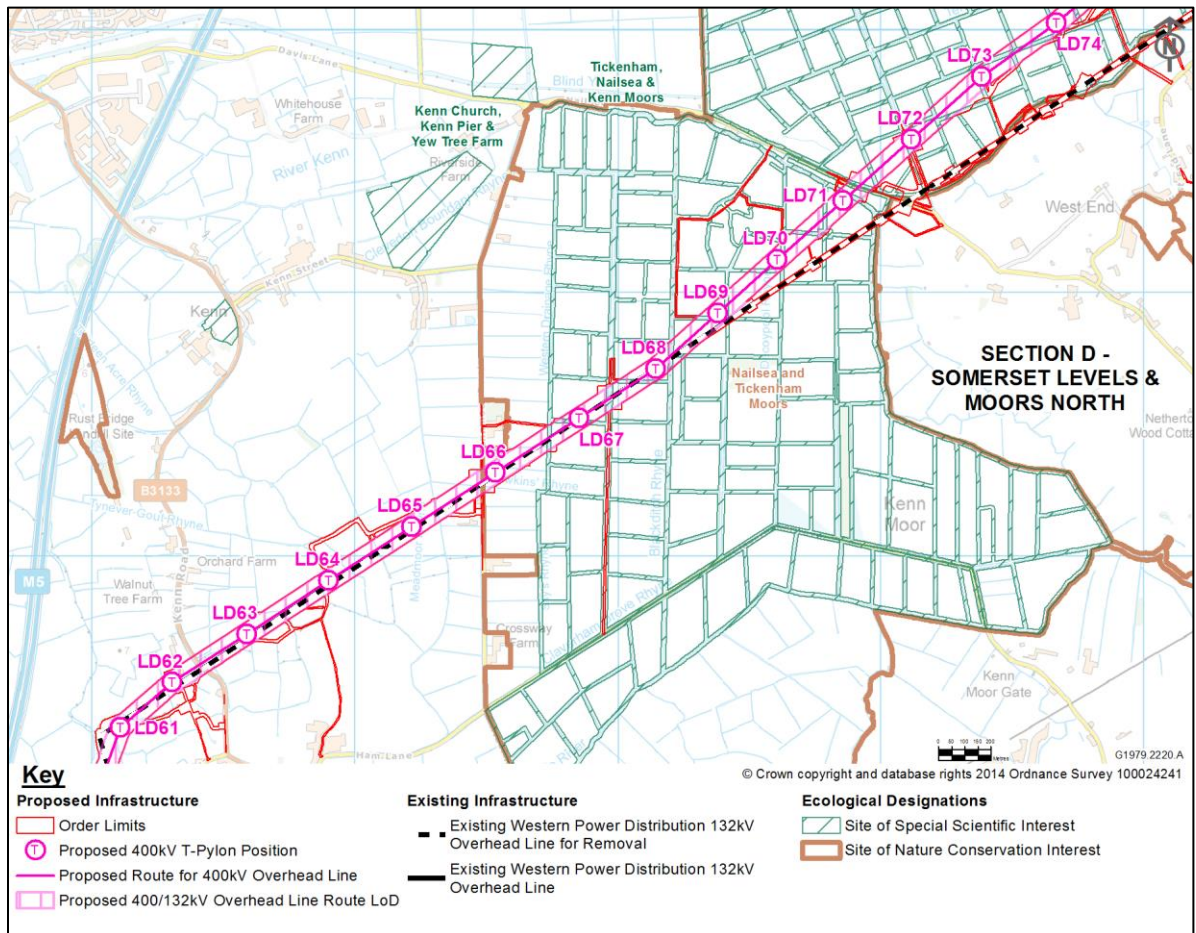


Tickenham, Nailsea and Kenn Moors SSSI

- 8.5.104 Tickenham, Nailsea and Kenn Moors SSSI is designated for its ditch habitats and the SSSI designation extends 6m from the bank top on either side of each ditch. The existing 132kV F Route would be dismantled, as would the W Route which would be undergrounded. The undergrounding is largely outside the SSSI, but it crosses 3 SSSI ditches in the northeast of the site, however these would be crossed using HDD. National Grid has committed to avoid encroachment into the designated land for pylon dismantling working areas unless essential. In a worst-case scenario, the working areas would occupy 3.093ha.
- 8.5.105 To install the new 400kV overhead line across the SSSI ditches there would be 32 temporary ditch crossings (28 culverts and 4 bridges) to accommodate the access routes across the SSSI. There would be permanent and temporary removal of trees and hedges on SSSI boundaries, although these features do not contribute to the SSSI designation.

8.5.106 Prior to mitigation, potential adverse effects on Tickenham, Nailsea and Kenn Moors SSSI would be of Medium magnitude in the short term and therefore of **major adverse** significance. This is certain/near certain.

Inset 8.14: Proposed Development Overlying Tickenham, Nailsea and Kenn Moors SSSI



Severn Estuary SSSI

8.5.107 There are no effects on this designation other than those already considered under the SAC SPA Ramsar designation (at the River Avon crossing).

Other SSSIs

8.5.108 Six further SSSI occur within 2km. As above, where these overlie international sites designated for the same qualifying features, potential effects have previously been assessed under 'International Designated Sites'. No risk of additional adverse effects on features designated at only the national level was identified. This is summarised as follows:

8.5.109 Catcott Edington & Chilton Moors SSSI:

- No adverse effect predicted on the hydrological function of the wetland habitats within the SSSI.
- Potential effects on qualifying bird species are assessed above for the Somerset Levels & Moors SPA Ramsar (under 'International Designated Sites'), which the SSSI forms a component part of.

8.5.110 Crook Peak to Shute Shelve Hill SSSI:

- No adverse effects predicted on habitats within the SSSI.
- Potential indirect effects on greater horseshoe bats are assessed above for the Mendip Limestone Grasslands SAC (under 'International Designated Sites'), which the SSSI forms a component part of.

8.5.111 Max Bog SSSI and Yanal Bog SSSI:

- The Proposed Development lies c.0.4km downslope of Max Bog and, taking into account the mitigation measures set out in **Volume 5.10.1, section 10.7**, works are not anticipated to speed or hinder drainage of the peatland habitats therein. No adverse effects are anticipated on the hydrological function of the calcareous lowland mire or wet grassland habitats of the SSSI.
- Similarly, the Proposed Development is not anticipated to have an adverse effect on the hydrological function of the calcicolous lowland mire of Yanal Bog. The distances from construction activity are greater than the 100m zone within which the Air Quality and Emissions assessment (**Volume 5.13.1**) considers there is potential for dust generation from the Proposed Development to cause effects on ecological receptors (**Volume 5.13.1**). Thus neither SSSI is considered further in this assessment.

8.5.112 Banwell Caves SSSI and Kings Wood and Urchins Wood SSSI:

- No adverse effects predicted on habitats within the SSSI.
- Potential indirect effects on greater horseshoe bats are assessed above for the North Somerset & Mendip Bats SAC, which the SSSI forms a component part of.

County and Local Designated Sites

8.5.113 Unlike the SNCIs and LWSs, Bristol's Wildlife Network Sites do not have individual citations, they are selected to function as a network of wildlife corridors and represent some 27% of the city. The assessment of effects on WNSs reviews losses of habitats within each site (as identified by the phase 1 habitat survey) and considers this in relation to their function as a link in the network of Bristol's wildlife corridors.

8.5.114 All potential direct and indirect effects on the 76 sites scoped into the assessment are tabulated in **Volume 5.8.2, Appendix 8O**. This includes 55 County sites (LWS/SNCI; some WTR), one LNR, one locally-valued WTR and 19 Wildlife Network Sites (WNS). Appendix 8O details the specific Development Components proposed within each site, along with measurements of any permanent and temporary loss, and a brief narrative regarding the species and habitats potentially affected. The Appendix only deals with predicted effects i.e. if a receptor is present but not affected, the Appendix does not highlight it.

8.5.115 Of the 76 sites, 50 sites are potentially affected by the construction of the Proposed Development (taking account of both options in Section F. **Table 8.27** ('Potential Effects Prior to Mitigation') summarises the extent of effect. Note that this table does not include potential effects where these would be entirely avoided by the

successful implementation of embedded hydrological and water resources mitigation measures set out in **Volume 5.10.1**, which form part of the Proposed Development assessed.

- 8.5.116 **Table 8.27** provides a description of effects including losses of trees and treed habitats as calculated through the Arboricultural Impact Assessment.
- 8.5.117 This informs the assessment of magnitude and significance of effect prior to mitigation which is formally recorded at **Table 8.29**.
- 8.5.118 Prior to mitigation, the preferred route would result in the following effects on county and local wildlife designations (total 49 sites):
- No High magnitude effects on County or Local sites;
 - Medium magnitude effects on 5 sites (all County value);
 - Low magnitude effects on 30 sites (19 County value, 11 Local value); and
 - Neutral effects on 14 sites (8 County value, 6 Local value) .
- 8.5.119 Prior to mitigation, the alternative route would result in the following effects on county and local wildlife designations (total 47 sites):
- No High magnitude effects on County or Local sites;
 - Medium magnitude effects on 5 sites (all County value);
 - Low magnitude effects on 28 sites (18 County value, 10 Local value); and
 - Neutral effects on 14 sites (8 County value, 6 Local value).
- 8.5.120 The following narrative reports on the 5 sites where a medium or high magnitude effect is predicted.

Nailsea and Tickenham Moors SNCI

- 8.5.121 Within Nailsea and Tickenham Moors SNCI, there would be small-scale permanent losses to pylon feet (<0.01ha) and 19.256ha (2.12% of the SNCI) of medium-term disturbance of grassland habitats. 1.14km of hedge loss and 0.126ha of tree loss (based on canopy spread) would also result. The integrity of the SNCI is not anticipated to be affected in the long-term and as such the effect is of Medium magnitude and of **moderate adverse** significance. The effect is certain/near certain. Effects resulting from watercourse crossing have already been assessed under the SSSI designation.

Tickenham Hill-Cadbury Camp-Chummock Wood Complex SNCI

- 8.5.122 Permanent habitat modifications through canopy removal (not affecting soils) of 0.36ha would occur at Tickenham Hill-Cadbury Camp-Chummock Wood Complex SNCI. Whilst this represents a relatively small proportionate loss across the SNCI, the Proposed Development bisects the various components of the SNCI. There would also be temporary losses of 66m of important species-rich hedgerow and 0.76ha of grassland. The magnitude of effect is therefore predicted to be of Medium magnitude and as such, of **moderate adverse** significance prior to mitigation. The effect is certain/near certain.

Portbury Wharf Nature Reserve SNCI and Portbury Wharf SNCI

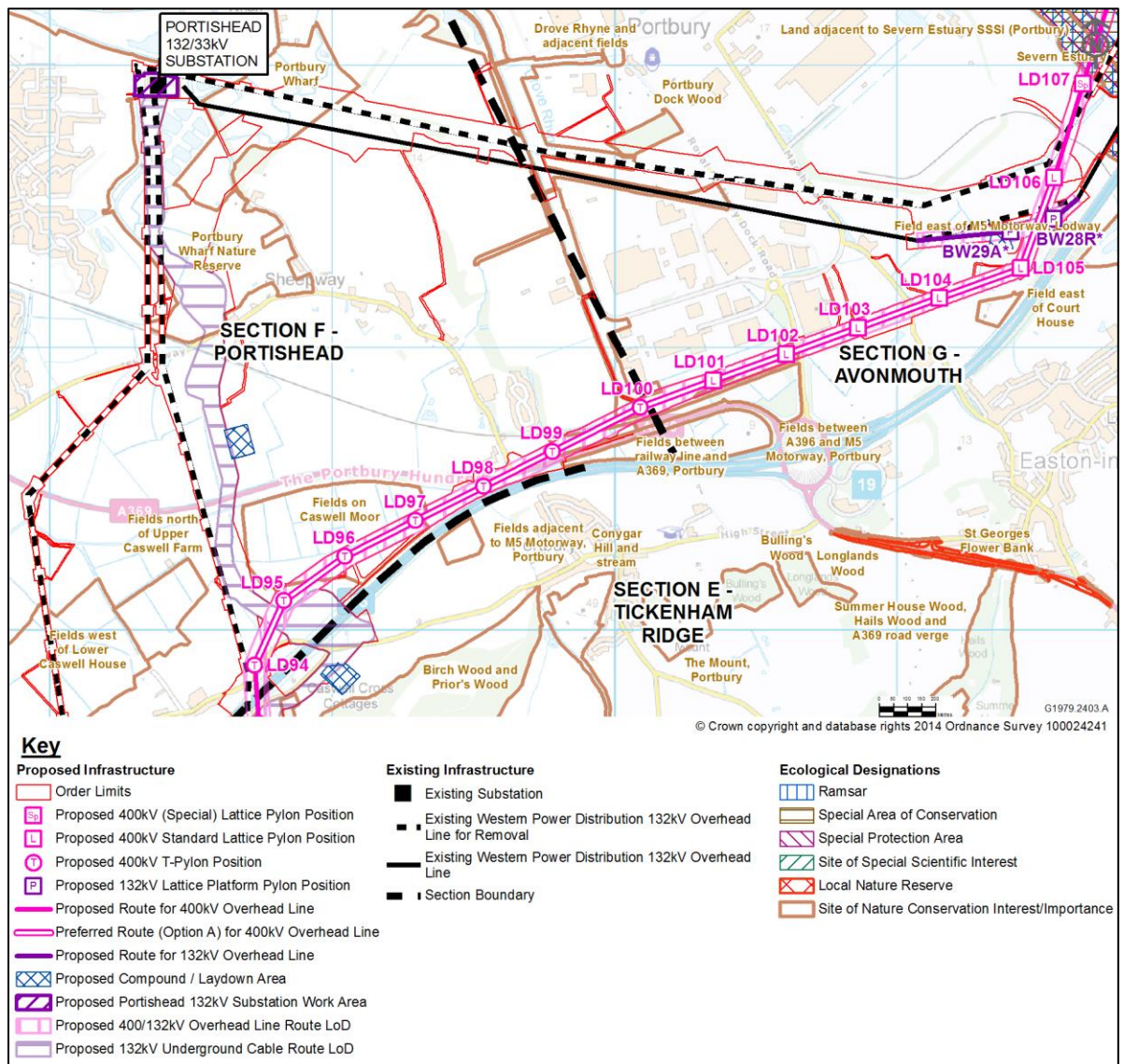
- 8.5.123 The Portbury Wharf SNCI and the Portbury Wharf Nature Reserve SNCI Avon Wildlife Trust Reserve will both be subject to landtake and disturbance as a result of the works to underground the existing lines, and, if the alternative route were

chosen, semi-improved neutral and marshy grasslands, hedgerows and trees. These Medium magnitude effects are predicted to be of **moderate adverse** significance prior to mitigation, for both routes. Although the effects are quantifiably greater for the alternative route (additional 132kV undergrounding and 400kV overhead line including pylons) these effects are not sufficient to push it into a higher category of impact magnitude. The effect is certain/near certain.

Gloucester Road Railway Sidings SNCI

- 8.5.124 At Gloucester Road Railway Sidings SNCI, the installation of the overhead line and pylons would require small-scale permanent losses due to pylon feet, but a larger magnitude impact would arise from loss of up to 1.2ha (measured by canopy area) of woodland, scrub and trees. Although the habitats could be managed as grassland or low scrub, given that this is a small site and the largest area of woodland in the neighbourhood, this is assessed as a Medium Magnitude effect of **Moderate adverse** significance. The effect is certain/near certain.

Inset 8.15 Preferred Route Alongside M5 Corridor



Key

Proposed Infrastructure

- Order Limits
- Proposed 400kV Standard Lattice Pylon Position
- Proposed 400kV T-Pylon Position
- Proposed 132kV Lattice Platform Pylon Position
- Proposed Temporary Pylon Position
- Proposed Route for 400kV Overhead Line
- Alternative Route (Option B) for 400kV Overhead Line
- Proposed Route for 132kV Overhead Line
- Proposed Route for Temporary 132kV Overhead Line
- Proposed Compound / Laydown Area
- Proposed Portishead 132kV Substation Work Area
- Proposed 400/132kV Overhead Line Route LoD
- Proposed 132kV Underground Cable Route LoD

Existing Infrastructure

- Existing Substation
- Existing Western Power Distribution 132kV Overhead Line for Removal
- Existing Western Power Distribution 132kV Overhead Line
- Section Boundary

Ecological Designations

- Local Nature Reserve
- Site of Nature Conservation Interest/Importance

SECTION F - PORTISHEAD

SECTION G - AVONMOUTH

SECTION E - TICKENHAM RIDGE

Portbury Wharf, Portbury Dock Wood, Drove Rhine and adjacent fields, Field east of Court House, Fields between railway line and A369 Portbury, Fields between A398 and M5 Motorway, Portbury, Fields on Caswell Moor, Fields adjacent to M5 Motorway, Portbury, Birch Wood and Prior's Wood, Conygar Hill and stream, The Mount, Portbury, Bulling's Wood, Longlands Wood, Summer House Wood, Hails Wood and A369 road verge, St George's Flower Bank, St Georges Flower Bank, Longlands Wood, Hails Wood, G1979 2404 A

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Section A, Puriton Ridge

- Upper Dunwear Brick Pits LWS.
- Beeches Pond LWS.
- Little Wall Lane LWS (within Order Limits but 50m from nearest construction component).

Section C, Mendip Hills AONB

- Max Bog, Winscombe Stream & Adjacent Fields SNCI.
- Banwell Hill SNCI.
- Dismantled Railway & Adjacent Fields Winscombe SNCI (within Order Limits but 100m from nearest construction component).

Section D, Somerset Levels & Moors North

- Yanal Bog & Adjacent Rhyne SNCI.
- Puxton Moor Avon WTR.

Section E, Tickenham Ridge

- Batch Farm Meadow SNCI.
- West End Meadows, Nailsea SNCI.
- Fields along Youngwood Lane SNCI.
- Summerhouse Wood SNCI.
- Prior's Wood WTR.
- Tickenham Hill WTR.

Section F, Portishead

- Gordano Valley, Clapton Moor, Middle Bridge & Rhynes SNCI.
- Fields north of Upper Caswell Farm SNCI.

Section G, Avonmouth

- Fields between A369 & M5 Motorway, Portbury SNCI (within Order Limits but 30m from nearest construction component).
- River Avon (part of) SNCI.
- Land West of King Street WNS.
- Avonmouth Sewage Works & Hoar Gout SNCI.
- Land Between Moorend Farm Avenue & Moorhouse Lane WNS.
- Land Around Hallen Farm WNS (within Order Limits but 50m from nearest construction component).
- Former Shell Tank Site WNS

Table 8.27 Summary of Effects on County and Local Designated Sites

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Hinkley LWS	38.91ha	1.11ha	<0.01 ha	<0.01%	0.55 ha	1.42%	• Permanent loss of <0.01ha grassland to the pylon feet. • Medium-term loss of 0.26ha modified neutral and semi-improved neutral grassland. • Medium-term loss of 94m hedgerow.	Low
Hinkley Point Nature Reserve	7.41ha	0.03ha	0	-	0.03 ha	0.40%	• Medium-term loss of semi-improved neutral grassland to construction of access road.	Low
New Ground Covert LWS	3.64ha	0.02ha	0	-	0	-	• Removal or pruning of 0.15ha semi-natural broad-leaved woodland (canopy measured from arboricultural dataset) along the southern edge of the LWS to a construction access (upgrade of an existing track).	Neutral
Stoning Pound Field South & Stoning Pound Rhynes LWS	1.68ha	0.10ha	0	-	0.05 ha	2.65%	• Medium-term loss of 0.04ha semi-improved grassland and swamp if encroachment cannot be entirely avoided at detailed design. • Remaining loss comprises hardstanding. • Pruning of 1x willow tree on the edge of Stoningpound Rhyne.	Neutral
Puriton Rhynes & Ponds LWS	28.86ha	0.76ha	0	-	0.21 ha	0.73%	• Medium-term loss of 0.17ha of semi-improved grassland to the temporary pylon. • Remaining loss (0.04ha) is an existing track.	Low
Borrow Pit, Puriton LWS	4.49ha	0.15ha	0	-	< 0.01 ha	0.09%	• Medium-term loss of <0.01ha of swamp during removal of an existing 132kV F Route pylon.	Neutral
'Bridgwater Bay NNR' LWS	134.87 ha	2.11ha	0	-	0.36 ha	0.27%	Effects as described for Huntspill River NNR in 'National Wildlife Designations' above.	Neutral

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
River Brue LWS	15.67ha	0.15ha	0	-	0	-	• Medium-term loss of 47m of species-poor hedgerow on the northern bank to the scaffold working area. • No direct or indirect effects predicted on the riparian corridor or grassland habitats within the LWS as a result of F Route construction or 132kV removal.	Low
River Axe LWS	36.38ha	0.93ha	0.02ha	0.06%	0.05ha	0.14%	• Optional permanent clear-span bridge would leave in-channel habitats intact. • 132kV F Route removal and optional clear-span bridge construction would incur loss of 0.05ha semi-improved grassland flanking the river. Loss reduced if the HDD option is selected. • Localised medium-term effects on the watercourse to install 1x crossing for construction access.	Low
Lox Yeo River SNCI	12.68ha	1.04ha	0	-	0.096ha	2.89%	• HDD of underground line minimises effects on the SNCI. • Removal of 0.02ha semi-natural broad-leaved woodland where the haul road crosses the river (canopy measured from arboricultural dataset). • Removal of one crack willow. • Medium-term effects on water voles. • Medium-term loss of 0.10ha arable and improved grassland alongside the river to construction access and working areas.	Low

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Cheddar Valley Railway Walk LNR	28.59ha	0.14ha	0	-	0.012ha	0.08%	• Medium-term loss of 0.01ha arable farmland to construction access. • Removal of 0.01ha young plantation to A-T Route underground line into Sandford Substation.	Neutral
Banwell Wood SNCI	39.67ha	0	0	-	0	-	• Severance of 'important' Hedgerows 56a & 56b extending north and east from the SNCI as a result of the 400kV underground line. • Potential effect on commuting and foraging bats.	Low
Towerhead Brook (part of) & Adjacent Land SNCI	37.42ha	1.09ha	0.02ha	0.06%	0.25ha	0.67%	• Permanent clear-span bridge would leave in-channel habitats intact. • Permanent loss of 7m species-poor hedgerow to the clear-span bridge. • Removal of 2x ash, both with bat roost potential. • Medium-term loss of 52m hedgerow/linear dense scrub. • Medium-term loss of improved and semi-improved grassland to construction working areas. • Localised medium-term effects on the watercourse to install 1x bailey bridge for construction. • Hedgerow and tree loss would result in fragmentation of habitats surrounding 1x bat tree roost (Tree 191) c.30m east of construction works, although not strictly part of the designation. • Terrestrial habitat loss would result in loss of GCN habitat (GCN ponds occur north and south of construction).	Low

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Puxton Moor SSSI & Surrounding Rhynes SNCI	241.75 ha	13.06	<0.01 ha	<0.01%	3.38 ha	1.39%	• Permanent loss of <0.01ha grassland to pylon feet (4x pylons). However due to the removal of 5x existing pylons there will be similar scale gain. • Removal of 4x willow and poplar, pruning of 5x. • Medium-term loss of 5x sections of species-poor hedgerow totalling 79m. • Localised medium-term effects on the ditch network to install 6x crossings for construction access. • Medium-term loss of 2.91ha dense scrub, improved and semi-improved grassland and tall ruderal herbs to pylon working areas. • Remaining loss comprises existing roads. • Medium-term effects on water vole associated with installation of water crossings.	Low
Rhynes South of Dolemoor Lane SNCI	11.55ha	0.40ha	0	-	0.07 ha	0.64%	• Medium-term loss of 0.07ha of semi-improved grassland to construction working areas. • Medium-term loss of hedgerow along Dolemoor Lane to the north of the SNCI totalling 276m. • Remaining loss comprises existing roads.	Low

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Congresbury Yeo Adjacent Land & Rhynes SSCI	283.24 ha	10.10 ha	0	-	3.85 ha	1.36%	• Medium-term loss of 3.61ha dense scrub, improved grassland, semi-improved grassland and tall ruderal herbs. • Medium-term loss of 106m species-poor hedgerow. • Removal of 1x ash, pruning of 1x. • Localised medium-term effects on the ditch network to install 3x crossings. • Medium-term effects on water voles associated with water crossing installation.	Low

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Nailsea & Tickenham Moors SNCI	1,001.95ha	62.11ha	<0.01ha	<0.01%	21.22ha	2.12%	• Permanent loss of <0.01ha grassland to the pylon feet. • Medium-term loss of 19.26ha semi-improved, marshy, improved and amenity grasslands, and arable. • Remaining losses listed comprise bareground, hardstanding, private garden or roads. • Medium-term loss of 1.14km, incl. 0.66km 'important' hedgerow. • Removal of part of 4x tree groups – 2x 'scattered tree groups' totalling 0.04ha, 2x 'outgrown hedgerows' totalling 0.09ha (canopy measured from arboricultural dataset). The latter will be replanted as hedgerows. • Removal of 39x trees and to the overhead easement and, specifically at Parish Brook, 5x trees at the crossing point of the W Route haul road. • Additional pruning of 24x trees. • Of the trees affected, 18x hold bat roost potential. • Localised medium-term effects on the ditch network to install 28x culverts and 4x bridges. • Medium-term effects on water vole associated with installation of water crossings. • In worst-case scenario, localised extinction of rare species may occur as a result of such medium-term habitat loss. • The SNCI supports otter (numerous records relate specifically to Parish Brook). Any potential disturbance to otter moving through the SNCI will be restricted to daytime working hours.	Medium

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Nursebatch Farm Fields SNCI	11.28ha	0.16ha	0	-	0.09 ha	0.82%	• Medium-term loss of 0.09ha semi-improved grassland to removal of an existing pylon.	Low
Abbot's Horn SNCI	1.20ha	0.25ha	0	-	0	-	• Medium-term loss (and so too severance) of 'important' Hedgerows 106 to 108, which lie outside but are connected to the SNCI. Loss totals 52.53m.	Low
Tickenham Hill, Cadbury Camp & Chummock Wood Complex SNCI	156.58 ha	156.58 ha	1.67 ha	<0.01%	0.85 ha	0.54%	• Permanent loss of <0.01ha grassland to the pylon feet. • Medium-term loss of 0.76ha semi-improved, improved and amenity grasslands. • Remaining losses listed comprise semi-natural woodland and roads. • Canopy removal of 0.36ha ancient woodland to accommodate the electrical safety clearance (measurement taken from arboricultural dataset) to accommodate the electrical safety clearance. • Medium-term loss of 66m 'important' species-rich hedgerow along Cadbury Camp Lane. The hedgerow contains 6x trees with bat roost potential that will be removed to facilitate scaffolding works.	Medium
Fields West of Lower Caswell House SNCI	19.81ha	1.24ha	0	-	0.64 ha	3.23%	• Medium-term loss of semi-improved grassland during removal of 2x existing pylons. • Construction accesses will use existing routes.	Neutral

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Birch Wood & Prior's Wood SSCI	89.21ha	0.22ha	0	-	0.224	0.25%	• Medium-term loss of arable, continuous bracken and semi-improved grassland. • Medium-term loss of 2x sections of species-poor hedgerow totalling 59m. • Removal of 1x ash tree to accommodate electrical safety clearance.	Low
Fields on Caswell Moor SSCI	18.93ha	3.89ha	Option A: <0.01 ha Option B: 0	<0.01% -	Option A: 0.90ha Option B: 0	4.75% -	Preferred Route (Option A) • Permanent loss of <0.01ha grassland to the pylon feet. • Medium-term loss of 0.83ha semi-improved grassland and arable to pylon working areas. • Remaining losses listed comprise existing roads. • Temporary loss of one species-poor hedgerow 33m in length. • Additional removal of 14x trees, pruning of 8x. Of these, 4x hold bat roost potential.	Low (preferred route) No effect (alternative route)

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Drove Rhyne & Adjacent Fields SSCI	19.64ha	4.29ha	Option A: <0.01ha	<0.01%	Option A: 0.56ha	2.84%	Both Routes • Medium-term loss of 0.29ha modified neutral grassland and dense scrub to removal of the existing G Route. Preferred Route (Option A) • Medium-term loss of 0.24ha dense/continuous scrub and tall ruderal herbs. • Remaining losses listed comprise hardstanding. • Removal of 0.07ha tree group (canopy measured from arboricultural dataset). • Removal of 16x trees, pruning of 20x. Alternative Route (Option B) • Medium-term loss of dense/continuous scrub, modified neutral grassland and species-poor modified neutral grassland • Medium-term loss of 32.4m species-poor hedgerow. • Removal of 8x trees, pruning of 3x. Of these, 3x hold bat roost potential.	Low (both routes)
			Option B: 0.01ha	<0.01%	Option B: 0.55ha	2.82%		

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Portbury Wharf Nature Reserve SNCI WTR	47.99ha	14.23ha	Option A: 0	-	Option A: 3.038 ha	16.75 %	Both Routes • Medium-term loss of 7.78ha semi-improved grassland, modified neutral grassland, tall ruderal herbs, swamp and scattered scrub to removal of the existing W Route. • Gain of <0.01ha grassland through removal of a pylon from within designated land. • Medium-term loss of 199m species-poor intact hedgerow and species-poor hedge with trees, and associated fragmentation of the network. • Remaining 0.26ha losses comprise hardstanding, roads and tracks. • Removal of 0.05ha tree group (canopy measured from arboricultural dataset). • Additional removal of 8x trees, pruning of 1x. Of these, 2x hold bat roost potential. • Medium-term effects on water vole associated with the W Route underground works and ditch crossings. • Loss and fragmentation of terrestrial GCN habitat (8x GCN ponds in the site and a further 5x within 250m) and associated risk of killing and injury. Alternative Route (Option B) • Permanent loss of <0.01ha grassland to pylon feet. • Medium-term loss of 0.53ha semi-improved grassland, tall ruderal herbs and dense/continuous scrub. • Medium-term loss of 96.98m of species-poor intact hedgerows and species-poor hedge with trees, and associated fragmentation of the network. • Remaining losses listed comprise hardstanding. • Removal of 0.06ha tree group.	Medium (both routes)
176			Option B: <0.01 ha	<0.01 %	Option B: 3.57ha	17.87 %		

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Portbury Wharf SSCI	16.29ha	8.90ha	Option A: 0	- <0.01%	Option A: 4.06ha	24.93%	Both Routes • Medium-term loss of 3.86ha semi-improved grassland, dense/continuous scrub and tall ruderal herbs to removal of the G Route. • Fragmentation of species-poor intact hedgerows and species-poor hedge and trees during construction activities. • Remaining 0.17ha losses comprise existing tracks. • Medium-term effects on water vole associated with the BW Route underground works and ditch crossings. • Loss and fragmentation of terrestrial GCN habitat (4x GCN ponds in the site and a further 7x within 250m) and associated risk of killing and injury. Alternative Route (Option B) • Medium-term loss of 1.80ha semi-improved and marshy grassland and dense/continuous scrub. • Medium-term loss of 292m hedgerow. • Removal of 5x tree groups totalling 0.58ha (measurement from arboricultural dataset). • Additional removal of 4x trees. • Trees to be removed incl. bat tree roost (Tree 118a) and 7x trees with bat roost potential. • Additional construction increases effects on water vole and GCN in particular.	Medium (both routes)
			Option B: <0.01 ha		Option B: 5.94ha	36.47%		

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Portbury Dock Wood SNCI	1.94ha	0.28ha	0	-	0	-	Alternative Route (Option B) - Removal of <0.01ha semi-natural broad-leaved woodland in the south of the SNCI. - Pruning of 4x poplar trees within Portbury Dock Wood, all of which hold bat roost potential.	Low (Alternative Route) No effect from preferred route
Priory Farm Avon WTR	0.66ha	0.63ha	0	-	0.04 ha	6.51%	Preferred Route (Option A) - Medium-term loss of 0.07ha modified neutral grassland. - Medium-term loss of 'outgrown hedgerows'. - Removal of 9x trees, pruning of 2x.	Low (Preferred Route) No effect from alternative route
Fields Between Railway Line & A369 Portbury SNCI	5.73ha	1.14ha	0	-	0.24 ha	4.26%	Preferred Route (Option A) - Medium-term loss of modified neutral grassland. - Medium-term loss of 31m of hedgerow within the SNCI. - Removal of 0.12ha 'tree groups' (essentially 'outgrown hedgerows'). - Additional removal of 12x trees and pruning of 2x. - Removal of bat tree roost (Tree 653) on the north SNCI boundary.	Low (Preferred Route) No effect from alternative route
Severn Estuary SNCI	12,504.19ha	2.04ha	0	-	0	-	Effects as described for Severn Estuary SSSI (see 'National Wildlife Designations' above).	Neutral

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Land adjacent to Severn Estuary SSSI (Portbury) SNCI	231.63 ha	0.83ha	0	-	0.08 ha	0.03%	• Medium-term loss of modified neutral grassland to working areas for pylon removal and construction. National Grid has committed to minimise such loss at detailed design where possible.	Neutral
Gloucester Road Railway Sidings SNCI	3.83ha	3.75ha	<0.01 ha	<0.01%	0.87 ha	22.70%	• Permanent loss of <0.01ha to pylon feet. • Canopy removal across 1.20ha woodland (canopy measurement from arboricultural dataset) to accommodate the electrical safety clearance. • Additional removal of 25x trees, pruning 5x. • Of the trees affected, 9x hold bat roost potential Medium-term loss of 0.59ha modified neutral grassland and dense continuous scrub. • Remaining medium-term losses comprise hardstanding.	Medium
Railway adjacent to Gloucester Road Sidings WNS	2.34ha	0.40ha	0	-	0.23 ha	9.62%	• All proposed Development Components are located on areas of existing hardstanding. • Removal of 5x poplar, pruning of 1x.	Neutral
Docks Railway Line WNS	8.67ha	0.20ha	0	-	0.09 ha	1.00%	• Medium-term loss of 0.07ha dense/continuous scrub. • Remaining loss comprises existing hardstanding. • Removal of 1x goat willow tree.	Neutral
Land South of King Road Avenue WNS	0.65ha	0.31ha	0	-	0.20 ha	30.46%	• Existing roads utilised for access. • Medium-term losses relate to dense/continuous scrub and modified neutral grassland. • Removal of 2x poplar trees.	Low

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Land South West of Kings Weston Lane Rhine WNS	33.89ha	9.91ha	<0.01 ha	<0.01%	4.30 ha	12.60%	• Permanent loss of <0.01ha grassland to pylon feet. • Canopy removal of 0.42ha broad-leaved plantation, 0.30ha semi-natural broad-leaved woodland, 0.02ha scrub and 0.18ha scattered tree groups to accommodate the electrical safety clearance (measurements taken from arboricultural dataset). • Additional removal of 18x trees, pruning of 6x. Of these, 6x hold bat roost potential. • Localised medium-term effects on the ditch network to install 5x crossings. • Medium-term loss of 3.87ha amenity grassland, dense/continuous scrub and modified neutral grassland. • Remaining loss listed comprises roads and hardstanding and woodland (as detailed above). • Medium-term effects on water vole associated with installation of water crossings.	Low

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Kings Weston Lane Rhine SNCI	33.89ha	0.36ha	0		0.24 ha	8.83%	• Removal of 0.05ha tree group (canopy measured from arboricultural dataset). • Medium-term loss of 0.20ha amenity grassland, dense/continuous scrub, semi-improved and modified neutral grassland. • Remaining losses listed comprise existing roads. • HDD will pass below the SNCI, minimising effects on terrestrial and ditch habitats. 1x water crossing located within the SNCI and 1x immediately adjacent. • Medium-term effects on water vole associated with installation of crossings.	Low
Land South of Sewage Treatment Works WNS	33.48ha	15.51 ha	0.01 ha	<0.01%	14.497	43.30%	• Permanent loss of <0.01ha grassland to pylon feet. • Loss 12.10ha dense/continuous scrub, modified neutral and semi-improved neutral grassland. • Remaining 0.21ha loss comprises bareground, hardstanding, industrial and roads. • Removal of 3x tree groups totalling 0.50ha. • Additionally removal of 3x trees, pruning of 7x. Of these, 3x hold bat roost potential. • Note: losses calculated include 3x crossing options for G Route below the M49 although only one will be selected at detailed design. • Localised medium-term effects on the ditch network to install 2x water crossings, with additional 1x each for two of the three M49 crossing options. • Medium-term effects on water vole associated with installation of crossings.	Low

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Lawrence Weston Road Rhines SSCI	3.90ha	0.71ha	0	-	0.56 ha	14.41 %	• Medium-term loss of 0.36ha modified neutral and semi-improved grassland. • Loss of 4m of hedgerow. • Remaining loss comprises roads and hardstanding. • Removal of 7x trees. • Localised medium-term effects on the ditch network to install the G Route underground line and 1x culvert. • Medium-term effects on water vole associated with works within the ditch network.	Low
Land between M49 and M5 WNS	11.95ha	10.78 ha	0	-	10.78 ha	90.18 %	• Medium-term loss of 10.31ha of modified neutral grassland. • Medium-term loss 123m of hedgerow. • Remaining 0.15ha loss comprises hardstanding and roads. • Removal of 1x tree group (0.07ha). • Additional removal of 1x English oak. • Note: losses calculated include 3x crossing options for G Route below the M49 although only one will be selected at detailed design. • Localised medium-term effects on the ditch network to install the G Route underground line and water crossings for construction access. • Medium-term effects on water vole associated with installation of crossings.	Low

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Fields along M5, Hallen SNCI	8.52ha	0.16ha	0	-	0.16 ha	1.9%	• Medium-term loss of modified neutral and semi-improved grassland. • Medium-term loss of 2m hedgerow within the SNCI. • Localised medium-term effects on the ditch network to install water crossings for construction access. • Medium-term effects on water vole associated with works within the ditch network.	Low
Land between LWR Rhine & Salt Rhine, east of M49 WNS	9.71ha	2.13ha	0	-	2.13 ha	21.94 %	• Medium-term loss of semi-improved grassland. • Removal of 7x trees on the drain adjacent to the northern boundary although not within the site itself. • Localised medium-term effects on the ditch network to install the G Route underground line and crossings for construction access. • Medium-term effects on water vole associated with installation of crossings.	Low
Salt Rhine & Moorhouse Rhine West SNCI	7.46ha	0.70ha	0	-	0.56 ha	7.49%	• Medium-term loss of 0.47ha modified neutral and semi-improved grassland. • Medium-term loss of 127m of hedgerow and associated fragmentation of the network. • Remaining loss comprises hardstanding or roads. • Loss of 7x willow and oak trees. • Localised medium-term effects on the ditch network to install G Route underground line and 2x crossings for construction access. • Medium-term effects on water voles as a result of underground G Route work and crossing installation.	Low

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Land Around Moorhouse Caravan Park WNS	13.66ha	2.66ha	0	-	1.77 ha	12.92 %	• Medium-term loss of modified neutral and semi-improved grassland. • Medium-term loss of 32m hedgerow. • Removal of 2x tree groups totalling 0.23ha. • Additional removal of 6x trees. • Localised medium-term effects on the ditch network to install 3x crossings for construction access. • Medium-term effects on water vole associated with water crossing installation.	Low
Railway Line South of Hallen WNS	13.18ha	0.43ha	0	-	0.06 ha	0.44%	• Location of Development Components based on existing areas of hardstanding and therefore no impact. • Removal of 0.03ha tree group. • Additional removal of 4x trees and pruning of 5x.	Neutral
Land West of M49 & South of Moorhouse Rhine WNS	3.02ha	2.18ha	<0.01 ha	<0.0 1%	0.87 ha	28.77 %	• Medium-term loss of 0.59ha modified neutral grassland. • Remaining loss comprises roads, tracks and hardstanding. • Removal of 3x trees, pruning of 2x.	Low

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Agricultural Land South of Railway WNS	4.45ha	2.02ha	<0.01 ha	<0.01%	0.92 ha	20.74 %	• Permanent loss of <0.01ha grassland to the pylon feet. • Medium-term loss of modified neutral grassland to a new pylon. • Loss of 29m of species-poor defunct and species-poor intact hedgerow to construction accesses. • Localised medium-term effects on the ditch network to install 2x crossings for construction access. • Removal of 2x trees, pruning of 1x. • Medium-term effects on water voles associated with water crossing installation.	Low
Land West of M49 & North of Moorhouse Rhine WNS	0.82ha	0.34ha	0	-	<0.01ha	1.10%	• Removal of 0.08ha tree group. • Medium-term loss of <0.01ha modified neutral grassland related to scaffold working areas.	Low
Moorhouse Farm & Stuppill Rhines SNCI	4.41ha	0.23ha	0	-	0	-	• Removal of 2x, pruning of 1x, crack willow to accommodate electrical safety clearance. • Localised medium-term effects on the ditch network to install 1x crossing for construction access.	Neutral
Rhine Bordering Former Sevalco Site North WNS	1.26ha	0.33ha	0	-	0.05 ha	4.05%	• Removal of 4x tree groups totalling 0.03ha. • Additional pruning of 5x willow trees. • Temporary habitat loss entirely comprised of hardstanding. • Localised medium-term effects on the ditch network to install 1x crossing for construction access.	Neutral

Site	Site Area	Site Area within Order Limits	Permanent Losses		Temporary Losses		Potential Effects Prior to Mitigation	Magnitude
			Area	%	Area	%		
Crook's Marsh WNS	14.59ha	8.76ha	<0.01 ha	<0.01%	6.66 ha	45.64%	• Permanent loss of <0.01ha grassland to pylon feet. • Medium-term loss 6.57ha of semi-improved neutral grassland. • Remaining loss comprises hardstanding and roads. • Removal of <0.01ha tree group and pruning of 1x oak.	Low
South West of Seabank Power Station WNS	12.60ha	0.70ha	0	-	0.42 ha	3.33%	• Removal of 0.15ha plantation woodland to access the 3x pylons to be removed. • Medium-term loss of 158m hedgerow. • Localised medium-term effects on the ditch network to install 2x crossings for construction access. • Remaining loss comprises hardstanding. • Medium-term effects on water voles associated with water crossing installation.	Low

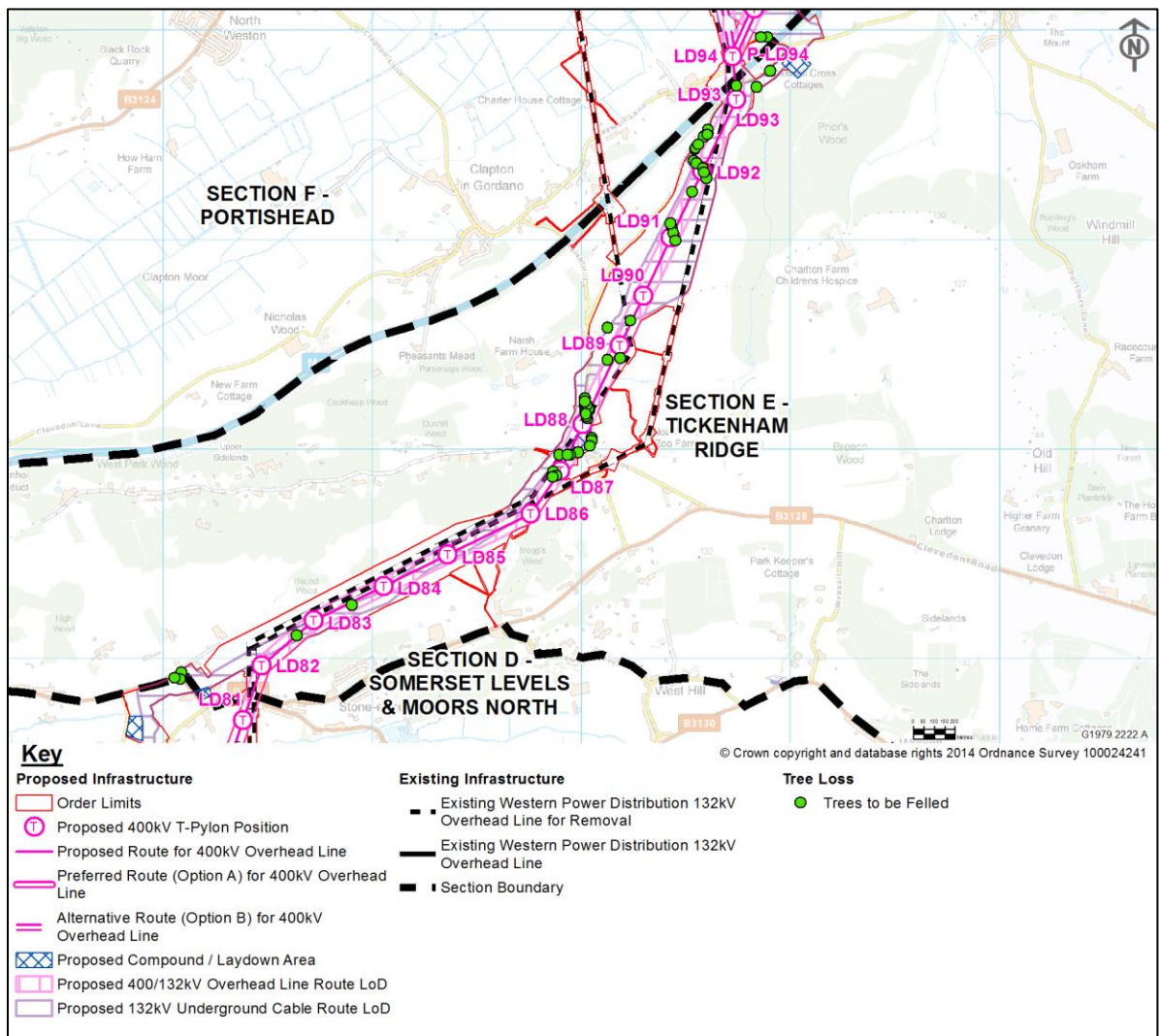
Habitats and Flora

- 8.5.126 Potential effects on habitats are described below. Permanent and temporary losses are listed in **Table 8.28**.

Woodlands and Trees

- 8.5.127 The Proposed Development would unavoidably incur loss of 2.23ha semi-natural broad-leaved woodland at seven locations, (eight for the alternative), (Ref.8.98) to accommodate the Proposed Development and associated electrical clearances. Whilst the only physical habitat loss to permanent infrastructure would be the pylon feet, removal of trees or of canopy represents a permanent change to this habitat type.

Inset 8.17: Proposed Tree Loss Across Tickenham Ridge



- 8.5.128 The most significant changes would occur in the complex of woodlands across Tickenham Ridge (as illustrated in **Inset 8.17**). Canopy removal through the complex of woodlands across Tickenham Ridge would be required to achieve electrical safety clearances for installation of the 400kV line, including ancient woodland at the northern tip of Mogg's Wood totalling 0.36ha. No other areas of ancient woodland would be lost to the Proposed Development. Although the existing 132kV F Route and W Route currently run through the complex and require

cyclical pruning the new 400kV line would require tree works in a slightly different area. Within the areas previously pruned the woodland structure is anticipated to undergo a combination of re-growth of the previously cut trees (which may be less stable in the long-term than natural apical growth) and new self-set growth from below. Within the areas newly affected by canopy removal, the structure is anticipated to undergo regeneration of the understorey (in the absence of canopy cover), and accordingly, the ground flora to become gradually more reminiscent of young woodland or scrub.

- 8.5.129 A short section of woodland would be removed on the Lox Yeo River SNCI to facilitate the 400kV underground haul road, although the line itself would pass via HDD below the watercourse. Whilst the area of loss is small, this would sever the wooded riparian corridor.
- 8.5.130 North of the River Avon, the 400kV overhead line longitudinally oversails the woodland south of Avonmouth station (Gloucester Road Railway Sidings SNCI). This is the only area of woodland within a heavily industrialised area, generally devoid of semi-natural habitat. North and west of Avonmouth substation, woodland loss would also occur along Shirehampton Rhine.
- 8.5.131 Loss of 4.04ha broad-leaved plantation (3.47ha for the alternative route) to accommodate the proposed overhead line and associated electrical clearance zone would occur at five locations, the majority of which is currently screening plantation along motorways, main roads and industrial development (off Whitehouse Lane at Tickenham, at land north of Rook's Bridge, off Avonmouth Way, along the M49 and around Seabank Substation and Hinkley Point C).
- 8.5.132 Permanent tree losses (i.e. removal or canopy removal) have been identified on 750 of the 1806 scattered broad-leaved trees recorded and pruning of a further 266 (734 and 257 respectively for the alternative route, as landscape screening along the northern edge of the M5 would be avoided). For the 41 coniferous trees, permanent loss of 29 trees and pruning of 7 has been identified (2 and 3 respectively for the alternative route).
- 8.5.133 13 of the broadleaved trees lost are veteran (11 for the alternative route).
- 8.5.134 Of the 8.94ha scattered tree groups recorded, 0.39ha would be permanently lost and 0.13ha temporarily lost (0.63ha and 0.13ha respectively for the alternative route).
- 8.5.135 0.89ha commercial orchard would be lost at the Sandford Substation. The trees lost are young specimens within rabbit guards. Therefore, whilst the loss is listed as permanent, the compensatory habitat provided in the Site-Specific Planting Plan is predicted to attain similar structure and functionality in the medium-term.
- 8.5.136 Losses of dense scrub have been calculated from Phase 1 Habitat survey data alone. The 0.22ha permanent loss and 4.89ha temporary loss (4.30ha for the alternative route) are relatively small in absolute terms and typically occur as small or peripheral areas of this habitat type. Similarly, temporary loss of continuous bracken (0.11ha) forms a small area.
- 8.5.137 The Tree Impact Plans identify 14 trees that would be replanted in situ (12 for the alternative route). The Site-Specific Planting Plans together provide new planting of 975 extra-heavy standard trees and 2.33ha structural planting which would be managed to establish a mixed thicket with varied structure (see 'Modifications

within the Scheme Design' above). Once established, this planting would go some way to compensate the loss of trees and treed habitats across the Proposed Development. However, it is recognised that it may take several decades for the ecological functionality of trees and woodland to be fully restored. In the case of veterans and ancient woodland, the replacement planting would not replace all the ecological functions within the operational life of the Proposed Development, although the retention of dead and decaying wood would go some way to appease this. Given the interval between the time of loss and the time at which the replacement planting has fully established, the effect would be long-term.

- 8.5.138 The loss of c.6% of the semi-natural broad-leaved woodland recorded within Order Limits forms a long-term change over a moderate area. This includes the permanent modification of 0.36ha ancient woodland and reflects the fact that the embedded compensatory planting for the semi-natural broad-leaved woodland resource as a whole would not fully establish in anything other than the long-term. The effect on this receptor is therefore classed as an effect of Medium magnitude and **moderate adverse** significance prior to mitigation. The likelihood of effect is certain/near certain.
- 8.5.139 The loss of approximately half of the scattered trees and scattered tree groups recorded is an effect of High magnitude as the embedded replacement and compensatory planting would not fully establish until the long-term. The significance is therefore of **moderate adverse** significance on broad-leaf trees and scattered tree groups, and of **Minor adverse** significance on scattered coniferous trees. The likelihood of effect is certain/near certain.
- 8.5.140 The loss of c.16% of the broad-leaved plantation woodland recorded is classed as Medium magnitude and **moderate adverse** significance. The likelihood of effect is certain/near certain.
- 8.5.141 The loss of young commercial orchard in areas that will be replanted, and the loss of relatively small areas of dense scrub and continuous bracken that are anticipated to recolonize naturally, are of Neutral magnitude and therefore **non significant**. The likelihood of effect is certain/near certain.
- 8.5.142 The alternative route would incur additional loss of semi-natural woodland at Portbury Dock Wood SNCI (<0.01ha) and loss of broad-leaved plantation along the Portbury Hundred, land near Royal Portbury Dock Road and land near Marsh Lane in Pill and Easton-in-Gordano (totalling 0.93ha).

Hedgerows

- 8.5.143 The Proposed Development would require removal of 22.42km hedgerow, 0.63km permanently, and 21.79km temporarily during the construction period, followed by reinstatement. **Table 8.28** provides a breakdown of loss by hedgerow type.
- 8.5.144 Of the 0.63km hedgerows to be permanently lost, 620m would be lost to Sandford Substation and its semi-permanent access road and 10m to the Towerhead Brook Bridge. This loss includes 0.21km 'important' hedgerow (Ref. 8.99).
- 8.5.145 Of the 21.79km temporary losses, 1.86km are considered 'important' (i.e. meet the criteria of the Hedgerow Regulations 1997), 8.21km measure over 3m in height, and an additional 1.31km fall into both categories. All the 21.79km would be reinstated in situ, using various mixes as scheduled on the Tree Impact Plans.

- 8.5.146 On the alternative route, hedgerow losses would be 22.96km (22.33km temporarily and 0.63km permanently). The 0.63km permanent losses are the same as the preferred route.
- 8.5.147 Of the 22.33km temporary losses on the alternative route, 1.86km are considered 'important' (i.e. meet the criteria of the Hedgerow Regulations 1997), 8.93km measure over 3m in height, and an additional 1.33km fall into both categories. All the 22.33km would be reinstated in situ, using various mixes as scheduled on the Tree Impact Plans
- 8.5.148 The Site-Specific Planting Plans together provide 1.75km of new hedgerow planting and 1.83km gapping up of existing hedgerows (see 'Modifications within the Scheme Design' above).
- 8.5.149 Taking account of the reinstatement and the site-specific landscaping, the Proposed Development will provide a net gain in hedgerow length across the Order Limits.
- 8.5.150 However, the interval between removal and full re-establishment may be up to 9 years (i.e. up to 4 years during the construction period when the hedges are removed, followed by 3-5 years for re-establishment to a hedgerow height of 1.5m. Hedgerows over 3m high will take longer; so it is anticipated that most ecological functions would be in place some ten years from re-planting (i.e. a long-term effect).
- 8.5.151 Hedgerows over 3m high are listed as a distinct subset of the affected hedgerows within **Table 8.28** and a breakdown of the permanent and temporary losses across the preferred and alternative routes is provided.
- 8.5.152 The significance of losses on the hedgerow network are assessed for lengths of loss less than 15m (i.e. short lengths of hedge typically associated with the construction accesses) or greater than 15m (e.g. longer lengths removed for underground cables or permanent infrastructure).
- 8.5.153 Outside of the underground line swathes and proposed permanent infrastructure, the lengths of individual hedgerows lost to access roads would typically be no greater than 15m wide (unless these cross the route obliquely) and would be replanted in-situ. The loss of hedgerow lengths no greater than 15m total 1.80km across the entire network (0.70km for hedgerows less than 3m high and 1.10km over 3m high), which will be replanted in-situ. Hedgerows may also be trimmed to facilitate the 'drop and drag' removal of the existing cables, although this would be localised is not anticipated to sever connectivity. Collectively, the loss of numerous short stretches of hedgerow for the duration of construction is not anticipated to permanently affect the integrity of the network as a whole. The medium-term effect on hedgerows less than 3m high is therefore predicted to be of Low magnitude and of **minor adverse** significance, and the long-term effect on hedgerows over 3m high is of Medium magnitude and **moderate adverse** significance. The likelihood of effect is certain/near certain.
- 8.5.154 Within the underground swathes the lengths of hedgerow removed would be greater – typically up to 45m lengths in the 400kV cable swathe and 35m in the 132kV cable swathe. Longer losses may also occur where a hedgerow is crossed obliquely by the Proposed Development.
- 8.5.155 The temporary loss of individual lengths of hedgerow >15m totals 18.67km across the entire network (10.25km less than 3m high and 8.42km over 3m high). These

will be replanted in-situ. The 0.62km hedgerow lost to permanent infrastructure at Sandford also comprises lengths greater than 15m. The fragmentation effect of removing these longer stretches is not anticipated to affect the integrity of the hedgerow network in the long-term once hedgerows have been replanted. The effect is therefore collectively of Medium magnitude and therefore of **moderate adverse** significance. The likelihood of effect is certain/near certain.

Wetland Habitats

- 8.5.156 509m of ditch will be realigned at Sandford Substation to circumnavigate the built footprint. The new stretch of ditch, which measures 523m will be planted with aquatic and marginal species of benefit to wildlife. Bank and in-channel vegetation is anticipated to establish within 2-4 years. On balance, the effect of ditch realignment is predicted to be of Neutral magnitude and therefore **not significant**.
- 8.5.157 Watercourse crossings within the Proposed Development are summarised as follows:
- 297 watercourse crossings (302 for the alternative option) for construction access, 20 of which are existing crossings to be replaced (to accommodate the requisite construction loads) and would remain in place following works;
 - Installation of cable duct crossings through the 400kV and 132kV underground swathes (at 25 no. and 14 no. watercourses respectively);
 - two optional clear-span cable bridges (across Towerhead Brook (alternative is a culvert) and the River Axe) where bank and in-channel habitats will be left intact; and
 - two HDD crossings (the Old Lox Yeo and the Lox Yeo River), and a third optional crossing (the River Axe) are proposed on the 400kV underground line and two on the 132kV W Route (SSSI ditches/Tickenham Boundary Rhyne/Parish Brook and the Land Yeo) to avoid loss of watercourse habitats.
- 8.5.158 The watercourse crossings would each incur lengths of habitat loss, usually between 9m and 17m. The habitat loss comprises:
- a medium-term component; the actual crossing structure which would be in place for four years; and
 - a short-term component; the dry working areas at each end of the crossing structure which would be affected for 1-2 weeks at installation and removal.
- 8.5.159 In addition to the watercourse crossings, ditches through the underground swathes would be affected by cable ducts and associated dry working areas. Across the 400kV swathe, 25 stretches of ditch would be affected in this way. Through the 132kV underground swathes, 14 ditches would be affected. The habitat loss comprises:
- a short-term component at installation; the dry working areas (in addition to the associated haul road culvert are typically 15-20m length, less for the 132kV) either side of the access culvert, each side would be affected for 1-2 weeks while the cable duct(s) is installed.
 - a medium-term component; where the cable duct is accompanied by a haul route requiring crossing structures up to 10m width which would be in place for four years; and

- another short-term component at removal of temporary crossings on completion of the underground installation.

- 8.5.160 During installation and removal, water would be pumped into the retained ditch either side, incurring short-term habitat fragmentation. Culverts would be buried to a depth of 100mm, thereby retaining continuity of the basal substrate. Cable trenches would be backfilled and the natural channel form reinstated. Taking into consideration the mitigation measures set out in **Volume 5.10.1, section 10.7**, no discernible effect on the integrity of the overall ditch network is anticipated as a result of the short term losses.
- 8.5.161 Bank and in-channel vegetation is anticipated to re-establish within 2-4 years.
- 8.5.162 In total, there would be 2,174m of open ditch affected by temporary short-term construction activity and 1,954m open ditch affected by temporary medium-term bridging, culverting or cable trenching during the period of construction. Figures for the alternative route are 2,194m and 1,984m respectively. In addition there will also be impact on running watercourses, consisting of 0.12km of short-term construction activity and 0.13km of medium-term construction activity totalling 0.27km.
- 8.5.163 The temporary effect on the watercourse network as a result of watercourse crossings and cable ducts is therefore predicted to be of Low magnitude and of **minor adverse** significance prior to mitigation. The likelihood of effect is certain/near certain. For SSSI ditches, the effect is assessed in terms under 'Designated Wildlife Sites' above, taking into account the elevated value. Potential effects on protected and priority species are described under the relevant fauna headings below.
- 8.5.164 Ditches and watercourses that would be oversailed by the proposed 400kV overhead line or that lie below the existing 132kV overhead lines to be removed would be protected during installation and removal of the cables through the use of boards or scaffold laid across each watercourse prior to the cable drop and promptly lifted following works to prevent damage as the cable is wound in (usually within a single day). This short-term effect on vegetation is predicted to be of Neutral magnitude and therefore **not significant**. The likelihood of effect is certain/near certain.
- 8.5.165 Two permanent clear-span bridges are proposed at Towerhead Brook (alternative option is for a culvert) and the River Axe (alternative option is if HDD). Bank and in-channel habitats will be retained; potential effects therefore relate to localised shading and loss of vegetation. At the River Axe, the banks of the watercourse support a grassy sward of common and widespread species, some tolerant of wet ground conditions, and marginal vegetation dominated by common reed. Any localised die back of this vegetation as a result of shading by the bridge is not anticipated to incur any significant impact on bank stability in terms of erosion.
- 8.5.166 At Towerhead Brook, the watercourse is a shallow flowing stream with low banks colonised by species typically associated with the adjoining pasture and hedgerow habitats. As such, potential effects of localised shading are unlikely to have a significant impact on bank stability in terms of erosion. Nevertheless, local ground conditions will be taken into account during detailed design of each bridge and where, as a result of soft bank substrate, stability (in terms of erosion as well as

bank failure) is reliant on vegetation, appropriate soft bank-face protection techniques will be incorporated into the design in line with best practice guidance at that time (Ref.8.100). The effect is therefore predicted to be of Neutral magnitude and is therefore **not significant**. The likelihood of effect is certain/near certain.

- 8.5.167 The Proposed Development does not incur loss of any ponds; National Grid is committed to retaining and protecting all ponds during works, principally to minimise effects on protected species. A new attenuation pond will be created at Sandford Substation as part of the Site-Specific Planting Plan. The proposed pond, measuring 508m², will be profiled and planted with marginal species to benefit wildlife (see 'Modification within the Scheme Design'). The new pond will add to the pond network, although the overall value of this receptor across the Order Limits will remain as of County value. The effect is therefore of Low magnitude and **minor beneficial** significance. The likelihood of effect is certain/near certain.
- 8.5.168 The Proposed Development would incur loss of 0.63ha of swamp habitat at Portbury Wharf Nature Reserve SNCI, during construction. This would be reinstated on completion. The assessment of the impact on the SNCI has been made above, but the effect on swamp habitats in the wider area is neutral magnitude and **not significant**. The effect is certain.
- 8.5.169 The Proposed Development does not incur any direct or indirect effect on the saltmarsh and intertidal habitats of the River Avon. National Grid is committed to avoiding encroachment during the detailed design stage and, although these habitats would be oversailed by the 400kV overhead line, implementation of the mitigation measures set out in **Volume 5.10.1, section 10.7** would avoid effects of indirect habitat degradation. Potential effects on these habitats are therefore predicted to be of Neutral magnitude and therefore are **not significant**. The likelihood of effect is certain/near certain.
- 8.5.170 As set out in **Volume 5.10.1**, no significant residual effects were identified in respect of pollutants entering the watercourses, with the exception of "*an extreme flood event [where] there is the potential for bunded areas to be overtopped*". The nature and extent of pollution in such events is difficult to predict, and so too potential effects on the watercourse network. Forward planning for adverse weather conditions and emergency response procedures in the event of a pollution event would be implemented as part of construction best practice (delivered through the CEMP). In line with the broad assumption of Volume 5.10.1, that "*due to the extent of the flood plains in the working area, and the dilution and dispersion potential of the pollutant in the flood waters*", the effect is judged to be of Low magnitude and therefore of **moderate adverse** significance on the watercourse network. As the 'extreme' nature of flooding implies an infrequent event, the likelihood of effect is possible.
- 8.5.171 There is risk of spreading non-native and invasive Schedule 9 species associated with watercourses during construction, as in-channel vegetation becomes lodged on construction machinery, which then moves to uncontaminated areas. This principally relates to the aquatic waterweed species, but also to water fern (recorded at Portbury). The waterweeds are widespread and, as is also true of water fern, infestations may regenerate from small fragments of vegetation. Himalayan balsam was also recorded on three watercourses in close proximity to proposed works (on the River Brue in the vicinity of proposed scaffold areas, and on the East and West Brooks at Hinkley Point, both of which would be overflowed by the 400kV overhead line). The spread of non-native invasive species to uninfested

waterbodies is an irreversible effect of High magnitude and therefore of **major adverse** significance at watercourses of National and County value, and **moderate adverse** significance elsewhere. However, given the embedded measures the likelihood of effect is possible.

Grassland Habitats

Calcareous Grassland

- 8.5.172 No direct effects on semi-improved calcareous habitat are anticipated as a result of the Proposed Development. There is a possibility of short-term dust deposition causing smothering, but given the short duration and distance between the receptor and the potential source of dust-generation, this effect is assessed as being Neutral magnitude and **non significant**.

Permanent Grassland Losses

- 8.5.173 The Proposed Development would incur permanent loss of semi-improved neutral grassland (1.55ha, including 0.64ha to the grasscrete emergency access to Sandford Substation which will re-vegetate), poor semi-improved grassland (1.99ha, including 0.18ha to the grasscrete access), modified neutral grassland (1.20ha), improved grassland (1.22ha, including 0.39ha to the grasscrete access) and arable (0.10ha). Small-scale losses of grassland to the pylon feet (circa 0.05ha) and joint pillars (circa 0.01ha) will form additional losses. However, it should be noted that, as part of scheme design, National Grid chose to avoid siting these Development Components in or over linear boundary features, thereby resulting in grassland being the preferred habitat for such components.
- 8.5.174 The Site-Specific Planting Plans would collectively deliver 4.60ha wildflower meadow grassland of regional provenance. The areas to be sown currently support arable, improved, modified and semi-improved grasslands which are of lower conservation value. These grassland habitats will be managed to ensure the intended species-rich sward establishes within 1-3 years, although the associated invertebrate fauna would take longer to develop. It is recognised that the creation of meadow grassland focuses at three locations whereas the loss occurs throughout the Proposed Development. On balance, the creation of 4.60ha meadow grassland would largely compensate for the permanent loss of 4.83ha (6.04ha including 1.21ha across the grasscrete access) grassland habitats of lower conservation value. The permanent loss and creation of grassland is predicted to be of Neutral magnitude and therefore **not significant**. The likelihood of effect is certain/near certain.

Temporary Loss of Grasslands

- 8.5.175 Along the Proposed Development, grasslands would be temporarily lost for construction, followed by reinstatement on completion of works. This comprises:
- 139.36ha semi-improved neutral grassland (64.47ha of which falls within the MAGIC dataset for floodplain grazing marsh); this receptor all being valued at a Local level.
 - 73.25ha poor semi-improved grassland (37.63ha falls within the MAGIC dataset); this receptor all being valued at a Local level.
 - 64.60ha improved grassland (22.69ha falls within the MAGIC dataset). The improved grassland within the MAGIC dataset is valued at a Local level, whereas improved grassland elsewhere is valued at Neighbourhood level.

- 0.97ha marshy grassland (0.85ha falls within the MAGIC dataset for floodplain grazing marsh); this receptor all being valued at a Local level.

- 8.5.176 Measurements of grassland losses for the alternative route differ only for semi-improved neutral grassland; 158.36ha of which 76.60ha falls within the MAGIC dataset.
- 8.5.177 As described in **Volume 5.9.1**, topsoil/subsoil will be stripped, along with surface vegetation, to facilitate construction of the access tracks. Surface soils will be reinstated following works and not therefore subject to compaction. Access tracks would be underlain by a drainage membrane which would allow natural infiltration of rainfall and would restrict ground compaction as a result of repeated use by heavy vehicles. The effect of any compaction would be spread across the length of the track.
- 8.5.178 Mitigation measures set out within **Volume 5.9.1** for *“peaty soils, where ground conditions would be very wet [include]... Topsoil stripping would be restricted to the width of the permanent elements of the Proposed Development thereby minimising disturbance to the integrity of the biomass... The use of appropriate geotextile membranes, wooden matting or aluminium trackways would be used over particularly sensitive areas. Soil loosening techniques such as deep-tine cultivation would be used, where required, to break up any compaction, which has occurred.”*
- 8.5.179 **Volume 5.9.1** concludes a Minor adverse effect in respect of *“potential loss of or damage to, the structure of topsoil/subsoil during soil stripping operations and reinstatement leading to changes in soil parameters (including compaction)”* across the entire route, including *“the more sensitive designated areas”*.
- 8.5.180 Following reinstatement of soils across the underground swathes, surface soils would be marginally less compacted but this is not anticipated to incur any significant change to the drainage regime. Localised change in surface vegetation may arise although this is unlikely to trigger a change in the habitat type given the nature and extent of agricultural management currently practiced.
- 8.5.181 Of the grassland types derived from floodplain grazing marsh, the semi-improved grassland would be likely to undergo a greater degree of floristic change than improved grassland.
- 8.5.182 Areas of marshy grassland may reduce in area and/or develop an assemblage more typical of the wider semi-improved or improved grasslands in comparison to baseline conditions.
- 8.5.183 However, none of these grassland types were found to support plant species of high conservation importance.
- 8.5.184 In the case of grassland habitats, the restoration of ecological function would in most cases be complete within three years. However, reinstatement of semi-improved habitats derived from former grazing marsh communities may take longer to replicate the former species diversity and soil hydrology, despite the extent of agricultural land use.
- 8.5.185 Areas of greatest effect would occur across the 400kV underground swathe (through the Mendip Hills) and W Route underground swathe (across Tickenham and Nailsea Moors, and Tickenham Ridge).

- 8.5.186 Medium-term changes to these grassland types of Local value (i.e. semi-improved grasslands, marshy grasslands and improved grasslands derived from floodplain grazing marsh) is anticipated to be of Medium magnitude and of **minor adverse** significance.
- 8.5.187 In area terms, this is 269.75ha for the preferred route of the Proposed Development and 273.75ha for the alternative route. The likelihood of effect is probable.
- 8.5.188 The medium-term effect of changes to improved grasslands (neighbourhood value) is Low or Neutral; and therefore **not significant**. The likelihood of effect is probable.
- 8.5.189 The other grassland types – including modified and poor modified neutral grasslands, amenity grassland, arable and tall ruderal herbs – are already heavily modified by land management and/or are artificially created, and this is reflected in the botanical assemblages that they support. Being less vulnerable to changes in soil compaction and drainage, no significant effect on reinstated areas of these habitat types is predicted. Permanent losses of these grassland types would be of no greater than Low magnitude and therefore **not significant**.
- 8.5.190 There is risk of spreading giant hogweed, which has been recorded just north of the junction of the F Route and N Route at Sandford, as construction vehicles and plant operate in the area. This irreversible effect would be of High magnitude and therefore of **major adverse** significance at watercourses of National and County value (as well as adverse effects on recreation and public health not assessed in this chapter). The likelihood of effect is possible.

Other Habitat Types

- 8.5.191 To minimise loss of semi-natural habitats, construction accesses follow existing roads, tracks and previously developed hardstanding wherever practical. Losses of these habitat types, along with the artificial and highly modified bare ground and spoil, are not therefore predicted to incur any adverse effect on ecology.

Summary of Habitat Losses

- 8.5.192 **Table 8.28** provides a summary of the effects of the Proposed Development. Losses are presented for the preferred route. Figures in brackets refer to the alternative route only where this differs from the preferred route. Where no figure is given in brackets, the data applies to both preferred and alternative routes. NB some Development Components through Sections F and G are common to both routes. The figure for “Outgrown Hedgerow” refers to overgrown hedges recorded in the Arboricultural Impact Assessment as canopy groups, rather than linear measures. These would require to be removed for construction and subsequently reinstated as hedgerows.

Table 8.28 Habitat Loss Calculations

Note: Figures provided within the table below refer to the Preferred Route Option A. Where there is a difference with the Alternative Route Option B the figure is displayed within brackets.

Grasslands:

Habitat Type	Area/ Length in Order Limits	Permanent Loss		Temporary Loss	
		Area/ Length	%	Area/ Length	%
Woodlands and Trees					
Semi-natural broad-leaved woodland	36.31ha	2.23ha	6.14%	0	-
Broad-leaved plantation	24.98ha	4.04ha (3.47ha)	16.17% (13.89%)	0	-
Coniferous plantation	<0.01ha	0	-	0	-
Orchard	0.23ha	0.89ha	47.25%	0	-
Scattered broad-leaved trees	1806no.	750no. (734no.)	41.53% (40.64%)	0	-
<i>Subset: Veteran trees</i>	<i>168no.</i>	<i>13no. (11no.)</i>	<i>7.74% (6.55%)</i>		
Scattered coniferous trees	41no.	29no. (2no.)	70.73% (4.88%)	0	-
Scattered tree groups	8.94ha	0.39ha (0.63ha)	4.36% (7.05%)	0.13ha	1.45%
Dense scrub	16.31ha	0.22ha	1.34%	4.89ha (4.30ha)	29.98% (26.36%)
Scattered scrub	<i>Illustrated on plans as dimensionless point data</i>	n/a	n/a	n/a	n/a
Continuous bracken	0.11ha	0	-	0.11ha	100%
Introduced scrub	<0.01ha	0	-	0	-
Hedgerows					
Native spp-rich intact	7.35km	0.20m	2.66%	1.39km (1.42km)	18.91% (19.32%)
Native spp-rich defunct	0.20km	0	-	0.03km	15.73%
Spp-poor intact	65.14km	0.41km	0.63%	14.23km (14.64km)	21.85% (22.47%)
Spp-poor defunct	7.43km	<0.01km	<0.01%	1.64km (1.67km)	22.07% (22.48%)
Native spp-rich w. trees	3.70km	0	-	0.71km	19.14%

Habitat Type	Area/ Length in Order Limits	Permanent Loss		Temporary Loss	
		Area/ Length	%	Area/ Length	%
Spp-poor intact w. trees	8.27km	<0.01km	<0.01%	1.76km (1.84km)	21.28% (22.25%)
Spp-poor defunct w. trees	0.39km	0	-	0.07km	19.50%
Outgrown hedgerow <i>(refer to Arboricultural Impact Assessment)</i>	Not measured for Order Limits	0	-	1.96km (1.95km) 0.33ha* (0.42ha)*	n/a
- Subset: 'Important' hedgerows <3m	3.47km	0.21km	n/a	1.86km	n/a
- Subset: Non-important hedgerows >3m ht.	38.47km	0.21km	n/a	8.21km (8.93km)	n/a
- Subset: Important hedgerows >3m ht.	1.08	0	-	1.31km (1.33km)	n/a
Conifer hedgerow	<0.01km	0	-	0	-
Watercourses					
Ditch	86.26km	0.52km	0.60%	4.13km (4.18km)	4.79% (4.85%)
Running water	3.58km	0	-	0.27km	7.54%
Other Wetland Habitats					
Ponds	2.30ha	0	-	0	-
Swamp	1.79ha	0	-	0.71ha (0.79ha)	39.66% (44.13%)
Saltmarsh	8.71ha	0	-	0	-
Intertidal mudflats	8.55ha	0	-	0	-
Grasslands					
Semi-improved calcareous	<0.01ha	0	-	0	-
Semi-improved neutral grassland	372.84ha	1.55ha	0.42%	139.36ha (146.17ha)	40.60% (37.38%)
- Subset: in MAGIC Floodplain grazing marsh dataset	210.07ha	0.10ha	0.05%	64.47ha (69.61ha)	30.69% (33.14%)

Habitat Type	Area/ Length in Order Limits	Permanent Loss		Temporary Loss	
		Area/ Length	%	Area/ Length	%
Poor semi-improved grassland	187.23ha	1.99ha	1.06%	73.25ha (75.71ha)	39.12% (40.44%)
- Subset: in MAGIC Floodplain grazing marsh dataset	115.15ha	0.25ha	0.22%	37.63ha (38.93ha)	32.68% (33.80%)
Modified neutral grassland	35.26ha	1.20ha	3.40%	21.93ha (21.57ha)	62.20% (61.17%)
Poor modified neutral grassland	5.42ha	0	-	0.94ha (0.98ha)	17.34% (18.08%)
Improved grassland	180.43ha	1.22ha	0.68%	64.60ha (67.90ha)	35.80% (37.63%)
- Subset: in MAGIC Floodplain grazing marsh dataset	93.16ha	0	-	22.69ha (25.52ha)	24.36% (27.39%)
Marshy grassland	3.07ha	0	-	0.97ha (1.03ha)	31.60% (33.55%)
- Subset: in MAGIC Floodplain grazing marsh dataset	2.78ha	0	-	0.85ha (0.91ha)	30.58% (32.73%)
Tall ruderal herbs	2.22ha	0	-	0.75ha 0.80ha	33.78% (36.04%)
Ephemeral/short perennial	<0.01ha	0	-	0	-
Arable	161.53ha	0.10ha	0.06%	72.78ha (74.42ha)	45.06% (46.07%)
Amenity grassland	8.98ha	0	-	3.91ha (3.75ha)	43.54% (41.76%)
Others					
Earth bank	<0.01ha	0	-	0	-
Bare ground	4.42ha	0.30ha	6.79%	2.06ha (2.12ha)	46.6% (47.96%)
Spoil	0.16ha	0	-	0.01ha	6.25%
Industrial buildings & hardstanding	54.17ha	4.04ha	7.46%	6.37ha (8.47ha)	11.76% (15.64%)

Habitat Type	Area/ Length in Order Limits	Permanent Loss		Temporary Loss	
		Area/ Length	%	Area/ Length	%
Road & track	42.71ha	0.05ha	0.12%	15.09ha (15.16ha)	35.33% (35.50%)
Private house/ garden/farmyard/ caravan site	7.34ha	1.40ha	19.07%	2.02ha	27.52%

* Outgrown hedgerows were recorded during the arboricultural survey as tree groups and therefore are measured as an area. However, as these features are historically hedgerows they will be replanted by NG as hedgerows. Replanted hedgerows are recorded in linear metres.

Birds

- 8.5.193 Potential construction-phase effects on breeding and non-breeding birds arise from:
- displacement due to disturbance during breeding and foraging; and
 - Loss of habitat for breeding and foraging.
- 8.5.194 Disturbance effects are temporary and would be experienced for the duration of the construction period. Disturbance effects would usually be short-term, affecting one season of bird activity at a time. Habitat losses are mostly temporary, from the start of the construction period until the reinstated habitats are established. Although temporary, habitat loss effects would be medium-term for grasslands and wetlands, and long-term for hedgerows and woodlands; these habitats being absent for up to nine years (4 years for construction and 3-5 years for successful re-establishment).
- 8.5.195 Permanent habitat changes would occur at the locations of the permanent infrastructure, but given that the site-specific landscape proposals result in net increases in woodland, hedgerow and wetland habitats at these locations, the effect is not significant.
- 8.5.196 Throughout the Proposed Development, there would be removal or reduction of trees and woodland for reasons of electrical safety or cable integrity. For certain woodland bird species, this may result in permanent habitat losses.
- 8.5.197 An overview of the potential construction impacts without mitigation is shown in **Table 8.29** below.

Displacement and Disturbance

- 8.5.198 Regarding potential displacement of waders, duck, swan and goose species for which the Severn Estuary and the Somerset Levels and Moors SPA and Ramsar are designated, the collated survey data of 2009 to 2013 revealed that overall use of the land by bird species for which the SPA and Ramsar sites are designated was very low. Construction activities would lead to some disturbance effects and displacement of birds present within the zone of disturbance. However, given the very low numbers of birds that could be attributed to the two SPA and Ramsar sites

using land along the Proposed Development, the potential for any disturbance and displacement effects that would be significant at the population level is considered extremely low and would not have a significant effect on the integrity of the designated bird populations of either the Severn Estuary SPA Ramsar or the Somerset Levels and Moors SPA Ramsar.

- 8.5.199 At Portbury Wharf, during the works to instal the 132kV underground cable and install the 400kV pylons, there is a risk of short term disturbance/displacement of wader and wildfowl species associated with the Severn Estuary SPA Ramsar or Somerset Levels SPA Ramsar, which is predicted to be of Low magnitude and therefore of **moderate adverse** significance. The likelihood of effect is probable.
- 8.5.200 These disturbance effects would be marginally greater if the alternative route is selected rather than the preferred route, due to the proximity of the alternative route to the pools at Portbury Wharf.
- 8.5.201 Only very low numbers of other wader, duck, swan and goose species for which the nearby SPA Ramsar sites are not designated were recorded to use land along the Proposed Development. The potential for any disturbance and displacement effects that would be significant at the population level is considered extremely low and would not have a significant effect on the integrity of the these species populations. This temporary effect is predicted to be of Low magnitude and therefore of **minor adverse** significance. The likelihood of effect is possible.
- 8.5.202 Grey heron and little egret were recorded in small numbers along the Proposed Development, mainly within wetter areas such as Nailsea Moor and Puxton Moor and along rhynes and rivers. There is a potential for small numbers of little egret to be displaced during works undertaken in the Winter period, and small numbers of heron to be displaced at any time of year. Due to the low densities of these species recorded the potential for any disturbance and displacement effects that would be significant at the population level is considered extremely low and would not have a significant effect on the integrity of the these species populations. This temporary effect is predicted to be of Low magnitude and therefore of **minor adverse** significance. The likelihood of effect is certain/near certain.
- 8.5.203 Raptor species including buzzard, kestrel and sparrowhawk were recorded in low densities throughout the site area. Although no confirmed breeding of these species was recorded it is possible that small numbers of these species could breed within larger trees near to the Proposed Development. There is therefore potential to displace small numbers of these species. It is considered unlikely that these effects would be significant at the population level. This temporary effect is predicted to be of Low magnitude and therefore of **minor adverse** significance. The likelihood of effect is possible.
- 8.5.204 Low densities of owls were recorded along the Proposed Development. Barn owl and little owl are known to breed at the Portbury Wharf nature reserves. If the alternative route is used in this location there is potential for a pair of each of these species to suffer disturbance and displacement during the breeding season. Barn owl may breed at any time of year, so works may potentially temporarily displace this species at any time of year. It is possible, but unlikely, that breeding tawny owl could be displaced as a result of the proposed overhead line in the vicinity of Knowle Hill. This temporary effect is predicted to be of Low magnitude and therefore of **minor adverse** significance. The likelihood of effect is certain/near

certain if the alternative route is selected and possible if the preferred route is selected.

- 8.5.205 Moderate numbers of farmland birds breed throughout Sections B, D, F, G and H. The majority of these species are likely to nest within hedgerows and field margins and in vegetation along watercourses. As the proposed works would have a minimum stand-off of 5m from these areas the displacement and disturbance effects on farmland birds are likely to be minimised. Skylark nest in open fields and there is therefore some limited potential to disturb/displace small numbers of breeding skylark. This temporary effect is predicted to be of Low magnitude and therefore of **minor adverse** significance. The likelihood of effect is possible.
- 8.5.206 Kingfisher may breed on the Lox Yeo River within 250m of the Proposed Development. A pair of kingfisher may also breed within rhynes on Nailsea Moor. There is potential for disturbance and displacement of two pairs of this Schedule 1 species if works are carried out within 20m of watercourses within these locations. This temporary effect is predicted to be of Low magnitude and therefore of **minor adverse** significance. The likelihood of effect is possible.
- 8.5.207 Cetti's warbler is a Schedule 1 species that breeds in a few locations along the Proposed Development, with concentrations at Portbury Wharf. There is a small potential for low numbers of pairs of this species to be disturbed and displaced if works are carried out within any reedbed, swamp or other dense vegetation close to watercourses between March and August. This temporary effect is predicted to be of Low magnitude and therefore of **minor adverse** significance. The likelihood of effect is probable for the alternative route and possible for the preferred route.
- 8.5.208 Common crossbill is a Schedule 1 species that breeds in the area of Mogg's Wood and Chummock Wood through which the Proposed Development would pass using T-pylons. The Proposed Development would also require removal of existing overhead lines, so there is a small potential for low numbers of pairs of this species to be disturbed and displaced if works are carried out within woodland or dense vegetation in this location at any time of year. This temporary effect is predicted to be of Low magnitude and therefore of **minor adverse** significance. The likelihood of effect is probable.

Habitat Loss

- 8.5.209 Regarding the loss of foraging habitats, the observed lack of use of land within the connection corridor by waterbirds indicates that its suitability as additional and functional supporting habitat outside the confines of the designated sites is very low. Given this and the fact that any disturbance to habitat that is occasionally used by waterbirds within the connection corridor would be temporary, habitat disturbance/loss as a result of the works would be unlikely to be significant within the context of available habitat within and adjacent to the designated sites and would not have an adverse effect on the populations of waterbirds in the wider area. This temporary effect is predicted to be of Neutral magnitude and therefore **not significant**. The likelihood of effect is possible.
- 8.5.210 It is highly unlikely that the Proposed Development would result in a loss of foraging habitat for buzzard, kestrel and sparrowhawk, tawny owl or little owl. There is a

potential for small amounts of barn owl foraging habitat to be lost, including areas of rough grassland around Portbury Wharf and in the Avonmouth Area (Sections F and G). This temporary effect is predicted to be of Low magnitude and therefore of **minor adverse** significance. The likelihood of effect is possible. This applies to both the preferred and alternative route.

- 8.5.211 The majority of farmland bird species are likely to nest within field boundaries and in vegetation along watercourses. The capacity for these habitats to be lost through the Proposed Development is considerably reduced due to the use of minimum stand-offs from these areas. However there would be permanent habitat loss for farmland bird species through loss of trees, scrub or other dense vegetation types lost for electrical safety or cable integrity reasons, and temporary losses due to hedgerow removal.
- 8.5.212 The temporary effect on farmland birds of construction-stage hedgerow removal in the undergrounding corridor would persist for up to nine years, taking into consideration the period for hedgerow re-establishment. This is assessed as being an effect of Medium magnitude, and therefore of **minor adverse** significance. The probability is certain.
- 8.5.213 The permanent effect on farmland and woodland-edge bird species of construction-stage removal of trees and scrub is of Low magnitude relative to the extent of the corridor and therefore of **minor adverse** significance. The likelihood of effect is certain.
- 8.5.214 Ground nesting species such as skylark were recorded in all but Section C. Skylark breed in open areas of ground not overlooked by trees or other tall structures that may provide perching areas for potential predators. It is possible that the installation of a pylon would cause some permanent habitat displacement for low numbers of skylark within 50m of the pylon locations. Taking account of the removal of existing 132kV pylons, this effect is predicted to be of Neutral magnitude and therefore **not significant**. The likelihood of effect is possible.
- 8.5.215 As the Proposed Development would have a minimum stand-off of 5m from watercourses, with a minimum 8m standoff from EA ditches, and a minimum 9m standoff from IDB ditches, watercourses within SSSIs and main rivers, there would be no habitat loss for kingfisher.
- 8.5.216 Much of the potential habitat loss for Cetti's warbler would be avoided through this stand-off from watercourses. However, this species also uses scrub and other dense vegetation habitats and there may therefore be some low amounts of habitat loss for this species. This temporary effect is predicted to be of Low magnitude and therefore of **minor adverse** significance. The likelihood of effect is possible.
- 8.5.217 At Mogg's Wood, the construction would require reduction to 2m height of tall trees to ensure electrical safety clearance. Understorey would not be affected, and other areas of the woodland currently under 132kV lines would be released to grow taller. Given the limited area of modification, this temporary effect on crossbill is predicted to be of Neutral magnitude and **not significant**.
- 8.5.218 Ashtrees Farm would be demolished. No evidence of owls using the site was found in Feb 2014. Several nests of swallow were located within building 3. This and anecdotal evidence suggests that the building is regularly used for nesting of one to

four pairs of swallows. Passerine bird nests were identified in building 6 and it is likely that more (or all) buildings on the grounds of Ashtrees Farm will be used for nesting by small passerine birds. Building 4 is covered in dense vegetation suitable for nesting birds.

- 8.5.219 The loss of nesting opportunities associated with the buildings is of Low magnitude in the context of the wider area within which the Proposed Development would take place. As the birds in question would be valued at Neighbourhood Scale, this is of **minor adverse** significance.
- 8.5.220 In respect of disturbance and habitat losses for birds, there are no significant differences between the preferred and alternative routes.

Bats

- 8.5.221 Potential effects on bats have initially been set out under 'Designated Wildlife Sites' above, specifically in respect of the qualifying species for the three relevant SAC sites. Effects on roosts, loss or degradation of foraging habitat, and habitat fragmentation are considered in respect of the wider bat assemblage below.
- 8.5.222 21 tree roosts were identified within the Order Limits. Six tree roosts would be lost to the Proposed Development under the preferred route and seven under the alternative route as follows:
- Section B – two non-breeding roosts would be felled – one of common pipistrelle (Tree 36) and one *Myotis* (Tree 63);
 - Section D – three non-breeding roosts would be felled – one of a pipistrelle species (Tree 250), one common pipistrelle (Tree 367) and one long-eared (Tree 366);
 - Section F – one soprano pipistrelle and one common pipistrelle, both non-breeding, roosts (Trees 91a and 118a respectively) would be felled under the alternative route; and
 - Section G – one non-breeding pipistrelle roost (Trees 653) would be felled under the preferred route.
- 8.5.223 At Ashtrees Farm, evidence of very low/single use by brown long eared and pipistrelle bats was identified. The building complex would be demolished except for one building (to be retained for bats).
- 8.5.224 Bats are particularly sensitive to impacts during the maternity and hibernation seasons, when they are physiologically vulnerable and they congregate in larger numbers. The maternity season typically extends May to August, and hibernation from mid-November to February but these are dependent on the weather conditions within any given year and, to some extent, the roost in question; not all will respond to the same degree. Whilst loss of a roost, and the associated risk of killing or injury to bats is generally of High magnitude, loss of a non-breeding roost in occasional use by low numbers of bats is unlikely to adversely affect the local population where alternative roost features remain available. All the affected roosts are of common and widespread bat species. Tree planting carried out as part of the site-specific landscape planting plans would take time to establish and mature, and are not considered to alleviate effects on roost provision in anything other than the very long-term. Collectively, tree loss including the loss of seven roosts out of

the 21 identified, as well as the loss of those trees identified to have High roost potential, is predicted to have a combined effect of High magnitude and therefore of **moderate adverse** significance on the local populations of these species. The likelihood of effect is certain/near certain. The alternative route would increase effects on the Portbury Wharf nature reserves, which supports locally notable bat activity. Two non-breeding roosts (Trees 91a and 118a) would be lost under this option, although effects on bat roosting area greater with this option, they do not raise the effect to a higher magnitude category.

- 8.5.225 Indirect effects on the retained roosts include disturbance and fragmentation of habitat in the immediate vicinity, principally in respect of tree and hedgerow pruning or removal to meet electrical safety clearance distances. Proposed works to vegetation in the vicinity of each retained roost revealed a Low fragmentation effect on some roosts, including the whiskered maternity roost. Collectively the effect is of **minor adverse** significance. The likelihood of effect is probable.
- 8.5.226 Loss or degradation of foraging habitat would occur across the Proposed Development but principally relates to the permanent loss of woodland across Tickenham Ridge to the 400kV overhead easement, and the larger-scale medium-term loss of hedgerows, trees and grassland/pasture to the installation of the underground lines. Again, bats are particularly sensitive to such effects during the maternity period when females are nurturing the young, and during the autumn when bats feed to build body reserves for hibernation. National Grid would minimise hedgerow losses through the underground swathes to minimise potential effects within the SAC bat CZs for greater horseshoe (see section 8.5: Modification within Scheme Design above).
- 8.5.227 During the latter stage of works, hedgerows would be reinstated under the Hedgerow Replacement Planting Plan and grassland would be re-sown as part of the broad commitment to re-instate habitats to their former condition in the latter stages of construction. Severance of commuting habitat as a result of habitat loss applies to the bat assemblage as a whole but horseshoe bats are particularly. Fragmentation leading to loss of wider landscape connectivity may potentially affect large numbers of commuting or migrating bats and/or those moving between SAC sites. The magnitude of the effects associated with habitat loss is therefore predicted to be High across the underground swathes and at Sandford Substation and Low across construction accesses. Correspondingly, significance is predicted to be of **minor adverse**, ranging up to **major adverse** depending on the value of the location for bats and the type of works. The likelihood of effect is probable.
- 8.5.228 Potential effects associated with artificial lighting at underground line joint bays where works will continue through the night are unlikely as these will be under cover (although some light seepage may occur depending on the strength of lighting and cover materials used) and positioned away from linear boundary features (hedgerows, watercourses, woodland edge habitats). Security lighting is proposed at site compounds. Construction lighting may also be employed during the winter months when working hours fall during darkness but this is when bats are least active in hibernation. Artificial lighting is anticipated to be greatest (both in extent and duration) at the working areas for Sandford Substation, the CSE compounds and at the site compounds. Adverse effects may occur where light spill falls onto roosting, foraging or commuting habitat, thereby deterring bat activity. Lighting which effectively severs commuting routes may have an exacerbated effect, affecting bat activity beyond the lit area itself (particularly on horseshoes which are sensitive to relatively small-scale severance). Bechstein's (a bat which

exhibits strong preference for wooded and riparian habitats) were recorded close to the proposed location of Sandford Substation. Potential adverse effects as a result of insensitive lighting are therefore predicted to be of Medium magnitude. Correspondingly, significance is predicted to be of **minor adverse** significance, ranging up to **major adverse** depending on the bat species. The likelihood of effect is possible.

Hazel Dormouse

- 8.5.229 Loss of woodland, hedgerow and dense scrub habitats to the 400kV overhead line through Tickenham Ridge and 400kV underground line through the Mendip Hills could affect dormouse if using these habitats on an occasional basis. Whilst hedgerows and scrub habitats would be reinstated or may naturally colonise on completion of works, loss of woodland and trees is a permanent effect within the easement.
- 8.5.230 Where the Proposed Development crosses the ridge, wooded habitats predominantly lie outside the Order Limits but are connected on either side by intact native hedgerows with trees, both species-rich and species-poor (records of dormouse relate to woodlands on both the north and south edges of the ridge). At the northern edge of the ridge, the Order Limits cross a small section of Prior's Wood and although no dormice were recorded within the western edge of the woodland surveyed in 2012, records occur within 250m. The habitat here is a mixture of semi-natural broad-leaved woodland, continuous bracken and scattered scrub.
- 8.5.231 Within the Order Limits through the Mendip Hills, several native species-rich intact hedgerows connect to Banwell Wood along the western edge of the Order Limits, predominantly crossing through arable fields (at Sandford Batch, north of Winscombe, dormouse records occur within 250m east of the Proposed Development). At the southern end of the underground line, records occur on Crook Peak and Barton Hill adjacent to the Order Limits. The mixture of arable, improved and semi-improved fields here are edged mainly by species-poor intact hedges and trees with a few native species-rich hedges.
- 8.5.232 In worst-case scenario, killing and injury would form an impact of High magnitude on the individual, although no discernible effect on the conservation status of the wider population given the absence of any positive survey data. The effect would be of moderate significance but given the absence of positive survey data, the probability is extremely unlikely.
- 8.5.233 Following implementation of the Tree Impact Plans and wider reinstatement of grassland habitats in the latter stages of construction, no significant long-term effect on wider habitat connectivity for dormice is anticipated. The effect is of Neutral magnitude and therefore **not significant**. The likelihood of effect is near certain.

Water Vole

- 8.5.234 As described for 'Habitats and Flora' above, the Proposed Development entails construction phase works in various watercourses:
- 297 watercourse crossings (302 for the alternative option) for construction access, 20 of which are existing crossings to be replaced (to accommodate the requisite construction loads) and would remain in place following works;

- Installation of cable duct crossings through the 400kV and 132kV underground swathes (at 25 no. and 14 no. watercourses respectively);
- At the River Axe, a temporary bailey bridge would be installed for construction access; however two options are included within the DCO for the cable crossing: via a permanent cable bridge or by Horizontal Direct Drilling (HDD) under the river. The final design is dependent upon detailed cable design following appointment of a contractor. Both options have been considered
- At Towerhead Brook, a temporary bailey bridge would be installed for construction access; the cables would cross the river embedded in the proposed permanent bridge and not be HDD or ducted under it, It is not yet confirmed whether the permanent road and cable crossing of Towerhead Brook would be by open span bridge or by box culvert. Both options have been assessed.
- two further HDD crossings (the Old Lox Yeo and the Lox Yeo River) are proposed for the 400kV underground cables and two for the 132kV W Route (SSSI ditches/Tickenham Boundary Rhyne/Parish Brook, and the Land Yeo) to avoid loss of watercourse habitats.

8.5.235 The bridges would be clear-span, leaving in-channel habitat intact. No evidence of water vole was recorded in the vicinity of Towerhead Brook, itself a heavily shaded, shallow stream that does not offer habitat suitable for the species, even if a culvert was used, effects are likely to be no greater than low magnitude. Water voles were recorded present within the ditch network that flanks the River Axe. The River Axe crossing is positioned within an area of largely open habitat and in-channel habitat would remain intact. No terrestrial losses to the bridge footings or associated working areas would occur within 9m of the watercourse. Construction at the River Axe would incur short-term disturbance for the duration of works, the effect of which is predicted to be of no greater than Low magnitude and therefore of **minor adverse** significance. The effect is certain/near certain.

8.5.236 HDD sites would be set back from any watercourse and pass at least 3m beneath the bottom of the watercourse (the precise location is dependent on the depth of drilling which in turn is dependent on the site-specific ground conditions). All associated working areas would be sited in accordance with the stand-off distances. No direct effects on water vole burrows that may be present are therefore anticipated. The level of localised disturbance generated during HDD installation (Ref. 8.101) may cause water vole to flee and, in worst-case scenario potentially abandon young if works are carried out during the breeding season. In such circumstances the disturbance effect would be of Low magnitude at the population level and of **minor adverse** significance. The likelihood of effect is possible.

8.5.237 Whilst each of the watercourse crossing points is relatively narrow, multiple crossings are required, particularly in areas subject to undergrounding. As reported earlier in regard to watercourse crossings, there would be medium-term loss totalling ca 2.1km watercourse across the entire ditch network for the duration of construction (four years). This is an overestimation as some crossings would replace existing culverts and bridges and some crossings would use bridges. Loss and disturbance of bankside habitats would be minimised as far as possible during removal of the existing culvert, although it is recognised that excavation may be required. During the de-watered installation period, short-term habitat fragmentation would occur.

- 8.5.238 Of all the surveyed ditches affected by crossings and ducts, a total of 1.10km watercourse was found to support water vole somewhere along its length in 2012 and 2013. The water vole population is to some degree mobile within the wider network of rhynes (particularly in response to on-going ditch management) so, as a precaution, is therefore considered present throughout.
- 8.5.239 Where burrows are found in affected areas, there is associated risk of killing or injury of water voles. Water voles are particularly sensitive during the breeding season (March to October) or during periods of torpor over Winter, and potential adverse effects on the population would be exacerbated should works commence after territories have established hence voles are less likely to move out of working areas.
- 8.5.240 Installation and removal of water crossings would also incur short-term disturbance, and in worst-case scenario displacement, of water vole in adjacent habitats for the duration of works. The noise level generated during dry working for culvert installation is anticipated to be similar to that for HDD, potentially causing water voles to flee. Following installation on replacement bedstone, flow (or the static wetted channel) would be returned to normal and water vole is anticipated to move within the watercourse, through the culverts. On completion of works, all ditches would be reinstated and in-channel vegetation is anticipated to re-establish within 2-4 years.
- 8.5.241 The Somerset Levels supports a strong population of water vole but nevertheless, the species is not resilient to stochastic change. As a result of the high winter flooding in 2013/2014, availability of suitable burrowing habitat will likely be reduced therefore exacerbating the vulnerability of the local population. However, the Levels is a highly managed agricultural ditch system therefore the water vole population will be used to habitat disturbance furthermore much of the flooding occurred south of Bridgwater. The effect on water vole by the medium-term culvert crossings and by the short-term cable duct installation is, in both cases of High magnitude and therefore of **major adverse** significance. The effect is certain/near certain.
- 8.5.242 As set out in **Volume 5.10.1**, no significant residual effects were identified in respect of pollutants entering the watercourses, with the exception of “*an extreme flood event [where] there is the potential for bunded areas to be overtopped*”. The nature and extent of pollution in such events is difficult to predict, and so too potential effects on the watercourse network. Forward planning for adverse weather conditions and emergency response procedures in the event of a pollution event would be implemented as part of construction best practice (delivered through the CEMP). In line with the broad assumption of Volume 5.10.1, that “*due to the extent of the flood plains in the working area, and the dilution and dispersion potential of the pollutant in the flood waters*”, the effect is judged to be of Low magnitude and therefore does not alter the assessment of significance given in the paragraph above.
- 8.5.243 The preferred route (Option A) entails one additional culvert in addition to the W Route, G Route and BW Route works proposed. The ditch was surveyed and no sign of water vole presence encountered.
- 8.5.244 The alternative route (Option B) entails four additional culverts in addition to the W Route, G Route and BW Route works proposed. One of these culvert positions has

been surveyed and the presence of water vole was found. Records of water vole activity at the Portbury Wharf nature reserves are abundant and widespread throughout the waterbodies there.

- 8.5.245 Therefore the alternative route potentially affects a slightly greater number of water voles than the preferred route, although in the same class of significance of effect i.e. **major adverse** and the effect certain/near certain.

Otter

- 8.5.246 As described for 'Habitats and Flora' above, the Proposed Development entails construction of two optional clear-span bridges and five (and a sixth optional) HDD crossings. 304 watercourse crossings are proposed (including 20 to replace existing crossings) which would incur a loss totalling 2.91km of ditch for the duration of works (up to four years, i.e. medium-term) and an additional 1.22km to the 2m wide dry-working area. The installation of cable duct crossings through the 400kV and 132kV underground swathes would incur a loss of 800m through the 400kV underground swathe (across 25 no. watercourses) and 394m through the 132kV swathe (14 no. watercourses) for the duration of works.
- 8.5.247 No holts or shelters were identified within the Order Limits, although the species is known to be widespread through the main rivers that flow through the Order Limits. The nearest known holt, a natal holt, lies on the south western edge of Towerhouse Wood c.0.56km east of the Proposed Development. Potential effects on otter relate to habitat fragmentation and disturbance during works and, to a lesser extent, the medium-term loss of habitat to watercourse crossings (numerous short stretches affected). Potential effects on water quality and so too prey availability are not anticipated to be significant following successful implementation of the mitigation measures set out in **Volume 5.10.1**.
- 8.5.248 Potential disturbance effects on otter principally relate to the works between Nailsea and Stone-edge Batch where removal of the existing F Route and W Route pylons, construction of the replacement 400kV F Route and installation of the replacement underground W Route are proposed. Note that the replacement W Route would pass via HDD below Tickenham Nailsea and Kenn Moors SSSI, including Parish Rhyne, thereby minimising potential effects at the surface (HDD would pass at least 3m below any watercourse) although an access route across these ditches is still required. The peak noise level calculated where the existing W Route crosses the Land Yeo is 60dBA, and where it crosses Parish Brook is 79dBA (Ref. 8.102); levels which could occur for the duration of works whilst the line is removed. The peak noise level calculated where the proposed W Route crosses Parish Brook is 71dBA; again, a level which could occur for the period of HDD drilling works.
- 8.5.249 These are temporary effects restricted to working hours, which in worst-case scenario may deter passage of otter and so too reduce the foraging range beyond that point (unless alternatively accessed via the wider ditch network, which would incur greater energy expenditure). Reduced foraging would have an exacerbated effect if works occur at a time when otter is breeding, nursing or accruing body reserves prior to winter. Elsewhere, potential disturbance effects associated with the removal of the existing 132kV lines and construction of the new 400kV overhead line (which would oversail the majority of watercourses including the Huntspill River and the River Brue where otter is known to occur), would be short-term and restricted to daylight hours.

- 8.5.250 Given the wide-ranging behaviour of otter and absence of any holts or shelter within, or in the immediate vicinity of, the Order Limits, the collective effects of watercourse crossings are predicted to be of no greater than Low magnitude and therefore of **minor adverse** significance. Given the limited positive survey results and, correspondingly, the weight attributed to desk study information, the likelihood of effect is probable.
- 8.5.251 In the vicinity of watercourses used by otter, there is potential for killing or injury should an otter fall into or become trapped within an open excavation, particularly underground line installation. In the absence of mitigation, the population effect would be of Medium magnitude and therefore of **moderate adverse** significance. As works would be sited with a 9m stand-off from watercourses the probability is extremely unlikely.
- 8.5.252 Following installation, otter movements may pass along the watercourse through the culverts but may also pass along the banks and thereby crossing the access roads. Given the 10mph speed limit and limited night time working, risk of road collision is **not significant**. The likelihood of effect is certain/near certain.
- 8.5.253 As set out in **Volume 5.10.1**, no significant residual effects were identified in respect of pollutants entering the watercourses, with the exception of “*an extreme flood event [where] there is the potential for bunded areas to be overtopped*”. The nature and extent of pollution in such events is difficult to predict, and so too potential effects on the watercourse network. Forward planning for adverse weather conditions and emergency response procedures in the event of a pollution event would be implemented as part of construction best practice (delivered through the CEMP). In line with the broad assumption of **Volume 5.10.1**, that “*due to the extent of the flood plains in the working area, and the dilution and dispersion potential of the pollutant in the flood waters*”, the effect is judged to be of Low magnitude and therefore does not alter the assessment of significance given in the paragraphs above.
- 8.5.254 No otter were recorded along the preferred route in Section F and G. However, given the wide-ranging behaviour of otter, their presence cannot be discounted.
- 8.5.255 Selection of the alternative route would incur loss of additional habitat known to be used by otter at Portbury Wharf. However, there is little significant difference on predicted effects at the population level between the preferred and the alternative routes.

Badger

- 8.5.256 Construction would result in the loss of one subsidiary sett at Northend (Section D) and three outlier setts at East Huntspill, Rook’s Bridge (both Section B) and Tickenham Edge (Section D) respectively. The main/annex sett at Mark (Section B) would also be subject to temporary closure whilst the outbuilding, under which the sett lies, is taken down. The site would then be overflowed by the 400kV overhead line, and no permanent infrastructure is proposed at this location.
- 8.5.257 Construction would also cause relatively high degree of disturbance to a main sett at Barton (Section C). This sett extends along at the base of a hedgerow which runs alongside the proposed access to an existing pylon for removal (short-term effect with peak noise levels calculated at 69dBA). The sett extends from 17m at the closest entrance to c.50m from the proposed 400kV underground line (medium-

term effect with predicted peak noise level of 77dBA calculated at the closest entrance) (Ref.8.103). The sett is constructed into the hedgebank with entrances, at least initially, leading away from the underground swathe. It is unlikely that the chambers and tunnels would be subject to direct damage as a result of the underground works, although this cannot be entirely discounted.

- 8.5.258 Badgers are particularly sensitive to disturbance during the breeding season (December to June inclusive) and works within this period have potential to disturb badgers with young. However works near setts would be governed by legal restrictions preventing unlawful disturbance, so the effect to be assessed is disturbance rather than loss of a sett with badgers inside. In the absence of mitigation, disturbance affecting setts would be of Low magnitude and **minor adverse** significance. The likelihood of effect is certain/near certain.
- 8.5.259 In the vicinity of badger paths and foraging areas, is also risk of killing, injury or entrapment of badgers falling into excavations created during, particularly underground line installation. The population effect would be of Neutral magnitude and of not significant prior to mitigation. The likelihood of effect is probable.
- 8.5.260 Construction would also incur loss of foraging habitat, principally to the installation of underground lines through Sections C, D and E, and to Sandford Substation in Section D (affecting three main, two subsidiary and two outlier setts). Further, the underground lines would sever habitat connectivity across the local landscape, potentially affecting badgers that move between setts which are not otherwise directly affected and isolating badgers within the same clan for the duration of works. This effect would be exacerbated where the design of fencing along the construction haul road may impede movement does not allow space for badgers to pass beneath, or where substrate of the road/track surface prevent badger digging underneath the fence, thereby impeding their movement. Potential effects associated with inappropriate artificial lighting may also exacerbate the effects of habitat loss or fragmentation if this falls on foraging habitat or badger paths.
- 8.5.261 Smaller areas of loss would also occur where construction accesses or working areas overlie foraging habitat. These typically fall within extensive areas of suitable habitat, hence, the effect of loss and any associated fragmentation would be proportionately less. Working areas would be reinstated to pre-construction conditions following works, with the exception of Sandford Substation and the CSE compounds where Site-Specific Replacement Planting Plans are proposed. Loss of foraging habitat across the Order Limits, and the associated severance of habitat, is anticipated to be of Low magnitude on the badger population and therefore of **minor adverse** significance prior to mitigation. The likelihood of effect is probable.
- 8.5.262 Given the 10mph speed limit and limited night time working, risk of road collision is **not significant**. The likelihood of effect is certain/near certain.
- 8.5.263 Records of badger were identified along the preferred route although no badger setts were identified within 30m of the Order Limits. Impacts to badgers would include minor loss of foraging habitats and habitat severance. The significance and probability of effects would remain as set out above.
- 8.5.264 There are numerous records of badgers around the Portbury Wharf nature reserves and along the Alternative Option and a single disused badger sett has been identified outside of the Order Limits. Impacts would include temporary losses of foraging habitats and severance of habitats. In terms of badgers, there are no

significant differences in significance of effects between the preferred and alternative routes.

Brown Hare

- 8.5.265 Where the Proposed Development directly affects habitat suitable to support brown hare potential effects may occur as a result of construction activities, particularly at Puxton Moor, Kenn Moor and Nailsea Moor where the majority of records cluster.
- 8.5.266 Leverets would be particularly susceptible to potential killing or injury during initial site clearance as they are left alone in forms during the day and may be reluctant to move from their places of refuge, whilst adults are more mobile and flee. There is also potential for hares to become trapped in excavations, pipes or wire mesh associated with construction activities, which may cause distress or injury.
- 8.5.267 As with badger, movement of brown hare through the local landscape may be restricted where long stretches of the haul road are fenced during construction, thereby causing severance of habitat for this wide ranging species. The likelihood of road kill is considered negligible given the 10mph speed limit that would be enforced during construction.
- 8.5.268 The combined effect on hare is anticipated to be no more than Low magnitude and therefore of **minor adverse** significance prior to mitigation. The likelihood of effect is possible.
- 8.5.269 In terms of brown hares, there are no significant differences in significance of effects between the preferred and alternative routes.

Hedgehog

- 8.5.270 Where the Proposed Development directly affects habitat suitable to support hedgehog there is potential for killing or injury, particularly during hibernation. Habitat loss and fragmentation may occur for the duration of works, particularly in respect of hedgerow removal, until reinstated habitats establish. The combined effect on hedgehog is anticipated to be no more than Medium magnitude and of **Minor adverse** significance prior to mitigation. Despite the absence of detailed field survey data, hedgehog is a relatively widespread and ubiquitous species, hence; the likelihood of effect is possible.
- 8.5.271 In terms of hedgehogs, there are no significant differences in significance of effects between the preferred and alternative routes.

Amphibians

- 8.5.272 There would be no permanent loss of aquatic habitat, either ponds or ditches, at any of the locations where GCN were recorded. There would however, be three temporary ditch crossings along ditches where GCN were found to be present during the 2013 surveys. The ditches in question are TEP1062 and TEP1065 at Rook's Bridge and TEP2489 at Portbury Wharf. The crossings at Rook's Bridge would require culverts to be installed to enable construction access roads to be built. A section of the ditch at Portbury Wharf would be open cut to allow the underground line (BW Route) to be installed into Portishead Substation.
- 8.5.273 These works would incur medium-term habitat loss for the duration of construction and, during installation and removal, there would be short-term fragmentation of the

aquatic habitat with construction taking between 1-2 weeks. GCN are particularly sensitive during the breeding (principally taken to run mid-March to early June) and hibernation (November to February) seasons. On completion of works, the ditches would be reinstated in accordance with the measures set out in **Volume 5.10.1, section 10.7**.

- 8.5.274 Bank and in-channel vegetation is anticipated to re-establish within 2-4 years. The effect on GCN is predicted to be of Low magnitude prior to mitigation and therefore of **minor adverse** significance. The likelihood of effect is probable. Whilst the wider amphibian assemblage was recorded present at a higher proportion of the waterbodies surveyed, the effect remains of Low magnitude and therefore **not significant** given the short length of habitat affected within any given stretch of ditch.
- 8.5.275 As set out in the Draft licence submitted to NE, permanent terrestrial habitat losses across the entire Order Limits total <0.01ha within 50m, <0.01ha within 250m and 2.01ha within 500m of GCN ponds. Temporary (medium-term) losses total 7.35ha within 50m, 32.08ha within 250m and 54.83ha within 500m of GCN ponds. As a result of terrestrial loss, some habitat fragmentation for GCN moving across the surrounding landscape would occur during the construction period and death and injury may result without mitigation. This is principally anticipated to occur in respect of underground line working and at Sandford where several GCN ponds occur. The loss and fragmentation, of habitat used by GCN, would also affect common toad, frog and the small newt species. The effect on GCN and the wider amphibian assemblage is predicted to be of Medium magnitude and therefore of **moderate** and **minor adverse** significance respectively, prior to mitigation. The likelihood of effect is probable.
- 8.5.276 No GCN were recorded along the preferred route at the point where it differs from the alternative route. The ditches and ponds along the preferred route were found to be largely unsuitable for GCN, with the terrestrial habitat in this area comprising far more hardstanding, in contrast to the semi-natural habitats of the nature reserve.
- 8.5.277 The alternative route would affect the Medium size GCN population at the Portbury Wharf nature reserves (Site 14). The majority of ponds and ditches surveyed for amphibians were found to contain GCN. The area offers a favourable terrestrial habitat mosaic, which would be subject to areas of permanent and temporary loss if the alternative route were selected. The Portbury Wharf area is also recognised to support migration of toads.

Reptiles

- 8.5.278 Potential construction effects on reptiles include habitat loss and the associated risk of killing or injury of grass snake, slow worm or common lizard within construction areas. Beyond the eight reptile survey sites found to support reptiles, these three species are anticipated to occur in low numbers through suitable areas of habitat; hence, effects may occur more widely across the Proposed Development. Potential effects are therefore associated with the few, more structurally-diverse grassland 'edge' habitats and the loss of hedgerow. As with other ecological receptors, the majority of habitat losses would occur for the duration of construction (medium-term), although permanent losses would occur at Sandford Substation and the CSE compounds.

- 8.5.279 Regarding permanent infrastructure, Sandford Substation overlies reptile survey Site 7 (where a low population of grass snake was recorded in 2013) and the semi-permanent access to the substation overlies Site 6 (found to support low populations of three species of reptile and therefore meets the Key Reptile Site criteria). The CSE compound south of the Mendip Hills and associated compound overlies reptile survey Site 1. Site-specific planting, particularly at Sandford Substation, incorporates grassland, scrub and tree planting as well as a pond, all of which would benefit reptiles, although it is recognised that there will be a time lag as these establish. The semi-permanent access to Sandford Substation would be surfaced with grasscrete and as such, whilst this is a permanent Development Component, it would remain available to reptiles for dispersal and potentially also foraging and basking.
- 8.5.280 Medium-term losses to construction principally relate to the underground line works, although hedgerow and watercourse field boundaries would be retained at the periphery of works. The construction compound north of Towerhead Road also overlies reptile survey Site 6. South of Towerhead Road, the proposed 400kV underground line crosses reptile survey Site 5 (found to support a low population of slow worm) and farther south the line and associated compound overlies, reptile survey Sites 2 to 4.
- 8.5.281 As a result of habitat loss, fragmentation of terrestrial habitat for reptiles would occur, particularly grass snake moving across the surrounding landscape. The wider construction access routes are not anticipated to pose a significant barrier to dispersing reptiles. Given the habitat reinstatement and site-specific planting proposed, habitat loss and fragmentation is collectively predicted to be of Medium magnitude on reptiles prior to mitigation and of **minor adverse** significance prior to mitigation. The likelihood of effect is probable.
- 8.5.282 Prior to mitigation, the risk of killing and injury of reptiles would be an effect of High magnitude to affected individuals and therefore of **moderate adverse** significance prior to mitigation. Given the low numbers of reptiles recorded present, the likelihood of effect is possible.
- 8.5.283 None of the habitats along the preferred route (where it deviates from the alternative route) were considered to be of sufficient suitability for reptiles as to warrant survey and as such, this section of the Proposed Development is not predicted to incur any significant loss of reptile habitat.
- 8.5.284 The alternative route would incur additional loss of habitat suitable for reptiles at the Portbury Wharf nature reserves where reptiles have been recorded. Overall, the magnitude and significance of this additional habitat loss and associated risk of killing and injury would remain as concluded above.

Ditch Invertebrates and Flora

- 8.5.285 Habitat losses at watercourse crossings are described above, under 'Habitats and Flora'. The effect would principally occur as a result of in-channel works at the time of crossing installation or removal, or cable duct installation. Once installed, whilst flow would return through the culvert, a discrete stretch of habitat loss to culverts would remain in the medium-term until the existing 'natural' profile is re-instated. Following works vegetation would colonise across areas of reinstated bank substrate. Cable ducts would incur habitat loss at the time of installation and given

the time taken for in-channel habitats to re-establish this is also considered to be a medium-term effect. Collectively, the localised effect of short sections of habitat loss is predicted to be of Low magnitude and correspondingly, significance ranges from **moderate adverse** for SSSI ditches of National value to invertebrates and flora (36 no. crossings) to **not significant** for ditches of Neighbourhood value. The effect is Probable.

- 8.5.286 In a worst-case scenario, such localised habitat loss in ditches may result in localised extinction of rare or threatened species (where ready colonisation from the wider ditch network is not possible/highly restricted). Species of conservation importance occur in ditches valued at the National, County and Local (Category 3) level and in such circumstances, the effect is predicted to be of High magnitude and therefore of **moderate adverse** significance in each case. The effect is possible.
- 8.5.287 Clear-span cable bridges are proposed at the River Axe (HDD alternative option) and Towerhead Brook (culvert alternative option). These permanent structures would leave in-channel habitats intact and therefore no adverse effect on ditch invertebrates or flora is anticipated. Even with the culvert option on Towerhead Brook, no additional effects are predicted.
- 8.5.288 As set out in **Volume 5.10.1**, no significant residual effects were identified in respect of pollutants entering the watercourses, with the exception of “*an extreme flood event [where] there is the potential for bunded areas to be overtopped*”. The nature and extent of pollution in such events is difficult to predict, and so too potential effects on the watercourse network. Forward planning for adverse weather conditions and emergency response procedures in the event of a pollution event would be implemented as part of construction best practice (delivered through the CEMP). In line with the broad assumption of **Volume 5.10.1**, that “*due to the extent of the flood plains in the working area, and the dilution and dispersion potential of the pollutant in the flood waters*”, the effect is judged to be of Low magnitude and therefore does not alter the assessment of significance given in the paragraphs above.
- 8.5.289 None of the ditches or ponds along the preferred route (where it deviates from the alternative route) supported any invertebrates or plants of Conservation Concern and this option would only incur loss of predominantly agricultural land.
- 8.5.290 The alternative route would result in the loss of semi-natural habitats in and around the Portbury Wharf nature reserves. Whilst none of the ditches or ponds along the alternative route supported any invertebrates or plants of Conservation Concern, ditches TEP2484 and ponds P199 and 207 supported high numbers of aquatic invertebrates, which would be disturbed if the alternative route were selected.

Fish

- 8.5.291 No direct effects on fish are anticipated at the Huntspill River, Kings Sedgemoor Drain, River Brue, Congresbury Yeo, Land Yeo or River Avon all of which would be overflowed by the proposed 400kV overhead line. As part of the assessed scheme, detailed design would ensure permanent and temporary Development Components do not encroach into the immediate riparian corridor.
- 8.5.292 Optional clear-span cable bridges are proposed at the River Axe (alternative HDD) and Towerhead Brook (alternative culvert). These permanent structures would leave in-channel habitats intact, thereby avoiding direct effects on fish. The effect of shading on the watercourse immediately adjacent is unlikely to pose an adverse effect on any fish populations that may be present for at least parts of the year

given the mobility of these species and, in the case of Towerhead Brook, the extent of existing shade. Even with the culvert option on Towerhead Brook, no additional effects are predicted.

- 8.5.293 Loss of ditch habitats as a result of watercourse crossings are set out under 'Habitats and Flora' above. The medium-term loss of short stretches of natural channel habitat is not anticipated to have any discernible effect on fish, although there will be short-term fragmentation during installation and removal.
- 8.5.294 Migratory species are particularly sensitive during the migration seasons during Spring and Autumn (Ref. 8.104) and should works fall within these periods, migration would effectively delay in the short-term whilst dry working is underway. Eel is the more widespread across the Order Limits and, coupled with its preferred habitat (slow or static waters where eel is known to exploit refugia in/on the basal substrate, in contrast to brown/sea trout which prefer faster flowing fresh waters), is therefore more likely to be affected by the proposed watercourse crossings.
- 8.5.295 All ditches would be reinstated on completion of works; bank and in-channel vegetation is anticipated to re-establish within 2-4 years. The effect of short-term fragmentation at numerous discrete locations is predicted to be of Low magnitude and therefore of **minor adverse** significance prior to mitigation. The likelihood of effect is probable.
- 8.5.296 No significant adverse effects on water quality are predicated during installation or removal following implementation of the measures set out in **Volume 5.10.1, section 10.7**.
- 8.5.297 Noise and vibration effects, such that may arise during installation and removal of water crossings, is a little understood field. The level of disturbance created during dry working for culvert installation (Ref. 8.105) is anticipated to cause fish to flee, rather than be of an explosive volume, such that may impart physiological damage. This is again a short-term effect during works, and as works would focus on a single watercourse at any given time, incidence would be relatively isolated. Watercourses are reasonably assumed to be particularly sensitive during the breeding periods; areas where breeding habitat occurs include the trout gravels of the Lox Yeo. Indirect disturbance associated with HDD (which would pass at least 3m below any given watercourse, such as the Lox Yeo) are anticipated to be no greater than that calculated for watercrossings as above. The effect of short-term disturbance is predicted to be of Low magnitude and therefore of **minor adverse** significance prior to mitigation. This effect is probable.
- 8.5.298 Eel is also vulnerable to accidental killing or injury if the species moves between watercourses across land, and becomes trapped within an open excavation. However, works would be sited with a 9m stand-off from watercourses, further, given the 10mph speed limit and limited night time working, the risk is **not significant**.
- 8.5.299 As set out in **Volume 5.10.1**, no significant residual effects were identified in respect of pollutants entering the watercourses, with the exception of "*an extreme flood event [where] there is the potential for bunded areas to be overtopped*". The nature and extent of pollution in such events is difficult to predict, and so too potential effects on the watercourse network. Forward planning for adverse weather conditions and emergency response procedures in the event of a pollution

event would be implemented as part of construction best practice (delivered through the CEMP). In line with the broad assumption of **Volume 5.10.1**, that “*due to the extent of the flood plains in the working area, and the dilution and dispersion potential of the pollutant in the flood waters*”, the effect is judged to be of Low magnitude and therefore does not alter the assessment of significance given in the paragraphs above.

- 8.5.300 There are no significant differences in predicted effects on fish associated with either preferred or alternative routes at Portbury.

Summary Regarding Habitats and Species of Principal Importance for Biodiversity, Comparing Preferred and Alternative Routes

- 8.5.301 **Table 8.29** summarises potential construction effects on ecological receptors prior to mitigation.
- 8.5.302 In terms of habitat loss, the preferred route would undergo slightly less permanent woodland loss although there would be greater loss of dense scrub and scattered trees (both permanent and temporary). There would also be less temporary hedgerow loss and fewer watercourse crossings.
- 8.5.303 Along the alternative route, greater effects are predicted in terms of both woodland and hedgerow loss. There are however, fewer scattered trees lost as the landscape screening which runs along the northern side of the M5 is left in place.
- 8.5.304 Potential construction-stage effects on birds, bats, water vole, otter, GCN, reptiles and aquatic would be less for the preferred route than the alternative.
- 8.5.305 There would be little difference in the potential effects on fish between the two routes.
- 8.5.306 An additional five watercrossings would be required along the alternative route resulting in additional medium term loss of ditch habitat and associated aquatic fauna. Whilst none of these were found to support invertebrates or plants of conservation concern, three supported particularly high numbers of aquatic invertebrates.
- 8.5.307 Effects on water vole would be greater along the alternative route and although evidence of otter is scarce at Portbury Wharf, suitable habitat would additionally be lost. The loss of additional semi-natural habitats at Portbury Wharf associated with the alternative route would include a bat tree roost as well as trees with bat roost potential and bat foraging habitat.
- 8.5.308 The effects on bird species, in particular waders, wildfowl and Cetti's warbler, would be marginally greater along the alternative route. The alternative route would incur additional effects on the GCN population at Portbury Wharf, the largest identified through the entire Order Limits, through loss of terrestrial habitat; habitat which is also known to support reptiles.
- 8.5.309 Although the adverse effects on most habitats and species are slightly greater for the alternative route, there are no habitat or species receptors where the increased magnitude would result in a different category of significance of effect.

Table 8.29 Potential Construction Effects Prior to Mitigation

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
International Designated Wildlife Sites					
Severn Estuary SAC SPA Ramsar	International	River Avon: Proposed 400kV overhead lines would oversail designated land in Sections G (River Avon crossing). The existing 132kV G Route which would be removed, potentially requires short-term disturbance to saltmarsh and mud habitats in working area. However, this is not expected to result in permanent habitat loss or disturbance to Winter feeding or roosting grounds and is not anticipated to affect the integrity of the site.	Low	Moderate Adverse	Possible
		Portishead Substation (near Portbury Wharf): Proposed 132kV removal and undergrounding (and under the alternative route, 400kV overhead line construction) is undertaken in land adjacent used by SPA Wintering species and may disturb birds.	Low	Moderate Adverse	Possible
		Bridgwater Bay (Hinkley Line Entries). Small-scale permanent losses to pylon feet (<0.001ha). Medium-term temporary loss to construction working areas and accesses. Habitat loss or disturbance to Winter feeding or roosting grounds is not anticipated to affect the integrity of the site.	Low	Moderate Adverse	Certain/Near certain
Agricultural Land at Hallen Marsh WNS – Severn Estuary SPA Ramsar offsetting land	International	Hallen Marsh: Compensatory land to offset development affecting an SPA, not currently managed as such. Loss of grassland to pylon feet and temporary disturbance of grassland and hedges for construction access.	Low	Moderate Adverse	Certain/near certain

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
North Somerset & Mendip Bats SAC	International	Potential disturbance to bats while roosting from noise, vibration and light associated with underground works.	Neutral	Not significant	Probable
		Loss or degradation of foraging habitats (trees, hedgerow and grassland habitats) within the SAC CZs may indirectly affect the designated bats. Despite Replacement Planting Plans and landscape planting at Sandford Substation and the CSE compound south of the Mendip Hills, prior to mitigation, removal of hedgerow and loss of pasture to active working areas would occur in the bat SAC CZs affected by underground and substation works.	Medium	Major Adverse	Probable
		Severance of commuting corridors for horseshoe bats moving across the landscape outside of the SAC, impacting a wider area.	Medium	Major Adverse	Probable
Mendip Limestone Grasslands SAC	International	Potential disturbance to bats while roosting from noise, vibration and light associated with underground works.	Neutral	Not significant	Certain
		Loss or degradation of foraging habitats (trees, hedgerow and grassland habitats) within the SAC bat CZs may indirectly affect the designated bats.	Medium	Major Adverse	Certain/near certain
		Severance of commuting corridors used by bats moving across the landscape outside of the SAC, impacting a wider area.	Medium	Major Adverse	Probable
Exmoor & Quantock Oakwoods SAC	International	Given the distance between the roost sites for which the SAC is designated and the location of proposed habitat loss, no disturbance effects on the roosts of designated bats are anticipated.	Neutral	Not significant	Certain/near certain
		No significant habitat losses or severance effects are predicted within the SAC CZs for barbastelle or Bechstein's. Habitat losses are minimal and outside the CZ for Bechstein's and on the outskirts of the CZ for barbastelle.	Neutral	Not Significant	Probable
National Designated Wildlife Sites					

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Bridgwater Bay SSSI	National	In addition to effects assessed under the Severn Estuary SPA Ramsar designation, culverting of one ditch may impact the SSSI invertebrate ditch communities in that location.	Low	Moderate Adverse	Certain/near certain
Huntspring River NNR	National	Short-term loss or disturbance to improved and species-poor modified neutral grassland to enable removal of the existing pylon and construction working areas, and scaffolding for 400kV overhead line. The new pylon would be set farther back from the river's edge and habitats within the NNR reinstated Potential disturbance of otter moving through the river corridor during pylon construction would be short-term and restricted to daylight hours.	Neutral	Not significant	Certain/near certain
Puxton Moor SSSI	National	The SSSI site would be not subject to landtake or watercourse crossing. Access for works would use existing easement rights and no new road surfaces or watercourse crossings are required. 132kV pylons would be removed.	Neutral	Not Significant	Probable
Biddle Street, Yatton SSSI	National	The existing F Route traverses the western corner of the site. 2 pylons adjacent the SSSI ditches would be removed. 3 pylons would be constructed adjacent (not in) SSSI ditch buffer zones. Working areas are expected to be managed to remain outside the SSSI. Three watercourse crossings (two culverts and one bridge) are proposed.	Low	Moderate Adverse	Possible

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Tickenham, Nailsea & Kenn Moors SSSI	National	Existing 132kV pylons would be removed and replacement 400kV overhead line installed. The G Route (132kV) would be installed underground, using HDD methods at SSSI ditch crossings (3no.). Also, watercourse crossings of SSSI ditches needed for access. Working areas are expected to be managed to remain outside the SSSI. Potential disturbance to otter moving through the SSSI during construction.	Medium	Major Adverse	Certain/near certain
Severn Estuary SSSI	National	There are no addition effects predicted to those already assessed under the Severn Estuary SAC, SPA, Ramsar designation.	N/A	N/A	N/A
County and Local Designated Wildlife Sites (see Table 8.27 and Volume 5.8.2, Appendix 8O for details)					
Nailsea and Tickenham Moors SNCI	County	Small-scale permanent losses relate to semi-improved and marshy grassland habitats (grazing marsh) affected by pylon feet Habitat modification may occur to semi-improved and marshy grassland affected by 132kV undergrounding (500m stretch). Temporary habitat losses associated with pylon working areas, pylon removal working areas, HDD working areas and temporary access routes relate to semi-improved grassland and small areas of scattered scrub, hedgerows (including 'important' species-rich hedgerows 19a, 22a, 92a&b, 93a and 94a) and dry ditch.	Medium	Moderate Adverse	Certain/near certain

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Tickenham Hill, Cadbury Camp & Chummock Wood Complex SNCI WTR	County	Permanent and temporary loss/disturbance of NVC woodland WD8 (Chummock Wood) from construction of pylon C-LD85 and access road for the 400kV overhead line and removal of existing F and W route 132kV pylons. One 132kV route would be undergrounded using HDD techniques beneath the woodland. Medium-term temporary loss/disturbance of semi-natural broad-leaved woodland, important-species rich hedgerow, improved grassland, scattered trees and scattered scrub from the construction activities.	Medium	Moderate Adverse	Certain/near certain
Portbury Wharf Nature Reserve SNCI WTR* including the Avon Wildlife Trust Reserve	County	Medium-term temporary/permanent loss/disturbance of semi-improved neutral grassland, marshy grassland, semi-natural broad-leaved woodland species-poor hedge and trees and running and standing water during underground installation activities. Fragmentation of species-poor intact hedgerows, some with trees during construction of access road, pylon and the 132kV W Route underground line. Disturbance to great crested newt terrestrial habitat, and risk to aquatic habitat. Risk to water voles and fragmentation of water vole habitat from temporary crossings. Risk to invertebrate aquatic habitat. Loss of nesting bird habitat (particularly trees, hedgerows and scrub habitats), including barn owl and bat boxes. Alternative Route: Loss of 2 bat roosts, 91a and 118a, due to overhead line clearance distances for the 400kV line	Medium (both routes)	Moderate Adverse (both routes)	Certain/near certain

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Portbury Wharf SNCI	County	Medium-term temporary/permanent habitat loss of semi-improved grassland, species-rich modified neutral grassland and marshy grasslands with scattered trees, species-poor hedgerow with trees, native species-rich intact hedge, running water and scrub. Potential disturbance to GCN and loss and fragmentation of GCN terrestrial habitats. Loss of nesting bird habitat (particularly trees, hedgerows and scrub habitats). Fragmentation of species-poor intact hedgerows and species-poor hedge and trees during construction activities. Disturbance of water vole in TEP2484 and potential adverse effects on aquatic invertebrates in ditches Alternative Route: Loss of bat roost (Tree 118a) on the southern boundary of the SNCI (reported above for AWT reserve).	Medium (both routes)	Moderate Adverse (both routes)	Certain/near certain
Gloucester Road Railway Sidings SNCI	County	400kV Overhead line passes through the SNCI with associated access roads, scaffolding and tree clearance requirements for electrical safety clearances. Two pylons within site. Permanent loss of woodland, scattered trees, dense scrub arising from safety clearances, including some with bat roost potential. Temporary loss of species-rich modified neutral grassland and scrub habitats to form accesses and working areas.	Medium	Moderate Adverse	Certain/near certain

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Local Wildlife sites subject to Low magnitude disturbance. (refer to Volume 5.8.2, Appendix 8O for details of effects on individual sites)	County	Sites subject to small-scale permanent habitat loss to pylon feet (typically <0.01ha) and/or small-scale temporary habitat loss to one or more Development Components (typically <1.00ha) and/or disturbance effects; none of which adversely affect the integrity. Hinkley LWS, Hinkley Point Nature Reserve, Towerhead Brook (part of) and adjacent land SNCI, River Axe LWS, Puriton Rhynes & Ponds LWS, Lox Yeo River SNCI, Puxton Moor SSSI and surrounding rhynes SNCI, Rhynes South of Dolemoor Lane SNCI, Congresbury Yeo Adjacent Land & Rhynes SNCI, Nursebatch Farm Fields SNCI, Birch Wood & Prior's Wood SNCI, Drove Rhyne & Adjacent Fields SNCI, Kings Weston Lane Rhine SNCI, Lawrence Weston Road Rhines SNCI, Salt Rhine & Moorhouse SNCI, Fields along M5, Hallen SNCI, Preferred Route only: Fields on Caswell Moor SNCI, Fields Between Railway Line & A369 Portbury SNCI <u>Alternative Route only:</u> Portbury Dock Wood SNCI	Low	Minor Adverse	Certain/near certain

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Wildlife Network and other sites of local designation, not of county value; subject to Low magnitude disturbance. (refer to Volume 5.8.2, Appendix 8O for details of effects on individual sites)	Local	Sites subject to small-scale permanent habitat loss to pylon feet (typically <0.01ha) and/or small-scale temporary habitat loss to one or more Development Components (typically <1.00ha) and/or disturbance effects; none of which adversely affect the integrity. Agricultural Land South of Railway WNS, Land South of King Road Avenue WNS, Land South of Sewage Treatment Works WNS, Land between M49 and M5 WNS, Land between Lawrence Weston Rhine & Salt Rhine east of M49 WNS, Land Around Moorhouse Caravan Park WNS, Land South West of Kings Weston Lane Rhine WNS, South West of Seabank Power Station WNS, Crook's Marsh WNS, Land West of M49 & South of Moorhouse Rhine WNS, Land West of M49 & North of Moorhouse Rhine WNS. <u>Preferred Route only</u> : Priory Farm WTR	Low	Minor Adverse	Certain/near certain
Habitats and Flora (refer to Table 8.28 for quantitative assessment)					
Semi-natural broad-leaved woodland	County	Permanent loss of c.6% of such woodland recorded within the Order Limits. Associated effects of severance particularly relevant through the Tickenham Complex (refer to SNCI described above) and edge effects on the remaining woodland parcels.	Medium	Moderate Adverse	Certain/near certain
		Modification by pruning and canopy removal in 0.36ha ancient woodland, principally at Mogg's Wood. This is an irreplaceable habitat type, albeit already modified by cyclical pruning for the 132kV corridor	Medium	Moderate Adverse	Certain/near certain
Broad-leaved plantation	Local	Permanent loss of 2.73ha (3.13ha for alternative route)	Medium	Moderate Adverse	Certain/near certain
Coniferous plantation	Neighbourhood	Negligible loss	Neutral	Not significant	Certain/near certain
Orchard	Neighbourhood	Permanent loss of 0.89ha. This largely relates to loss of commercial orchard close to Sandford Substation, where replacement planting is proposed. Planted trees would take 15 years to establish.	Neutral	Not significant	Certain/near certain

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Scattered broad-leaved trees	County	695 of the 1806 individual trees recorded in the Arboricultural Survey (679 for the Alternative Route). Site-specific landscape planting plans include a total of 976 extra-heavy standard trees, 23,794 whips for structure planting. Planted trees would take 15 years to establish.	Medium	Moderate Adverse	Certain/near certain
Veteran trees	County	13 veteran trees would be lost (11 for alternative route).	Low	Minor Adverse	Certain/near certain
Scattered coniferous trees	Neighbourhood	Tree losses and replanting proposals as set out above.	Neutral	Not significant	Probable
Dense scrub	Neighbourhood	Small-scale permanent losses to pylon feet, temporary loss of 4.71ha across the Proposed Development. Scrub is anticipated to readily naturally recolonise on cessation of works.	Neutral	Not significant	Certain/near certain
Continuous bracken	Neighbourhood	Accounts for a small area and subject to limited loss.	Neutral	Not significant	Certain/near certain

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Hedgerows	County	For preferred route, 21.69km hedgerows would be removed. For alternative route 22.05km hedgerows would be removed. For both routes, 630m hedgerow cannot be replaced in-situ, mainly at Sandford Substation. The site-specific landscape planting plans include 1.84km new hedgerow and 1.83km of existing hedgerows to be gapped up. For both routes, all other losses would be replanted in situ following construction Medium-term temporary effect would during construction stage before hedgerows are replaced. For the 400kV undergrounding and the Sandford Substation and hedges over 3m height, the effect is assessed as Medium magnitude. Elsewhere for construction access, hedgerow removal is generally in short lengths <10m, an effect assessed as Low magnitude	Medium (400kV undergrounding, Sandford Substation and any other hedges over 3m height) Low (elsewhere)	Moderate Adverse (400kV undergrounding, Sandford Substation and any other hedges over 3m height) Minor Adverse (elsewhere)	Certain/near certain
Wet ditch	County	Realignment of Sandford Substation Ditch Ca 300 watercourse crossings and cable ducts, with installation period of 1-2 weeks, crossings in place for construction period (ca 4 years) then removed. CEMP ensures continuity of basal substrate maintained and control over pollution and siltation. All ditches reinstated on completion of works. Bank and in-channel vegetation anticipated to re-establish within 2-4 years.	Neutral (Sandford Substation) Low (Watercourse crossings and cable ducts)	Not Significant (Sandford Substation) Minor Adverse (Watercourse crossings and cable ducts)	Certain/near certain

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Running water	County	Two clear-span bridge options are proposed – the River Axe and Towerhead Brook. In-channel habitat remains intact; losses to footings and foundations relate to adjacent terrestrial. No significant adverse effects of shading anticipated. HDD is proposed in various locations. HDD would be set back from the watercourse and pass at least 3m below the bed, leaving in-channel habitats in tact. All associated working areas would recognise the stand-off distance. No adverse effects in respect of pollution or siltation following measures set out in Volume 5.10.1 .	Neutral	Not significant	Probable
Ponds	County	No ponds would be lost to the proposed development. One new attenuation pond at Sandford Substation. No adverse effects in respect of pollution or siltation predicted.	Low	Minor beneficial	Certain/near certain
Swamp	Local	Small areas of temporary loss associated with marginal habitats, principally at the Portbury Wharf nature reserves	Neutral	Not Significant	Probable
Saltmarsh	International	At River Avon crossing, the risk of encroachment from the working area for pylon removal/installation would be avoided by National Grid's commitment to work outside the designated site. No adverse effects in terms of pollution anticipated.	Neutral	Not Significant	Probable
Intertidal mudflats	International	As described for saltmarsh	Neutral	Not Significant	Probable
Wetland Habitats (general)	County	Risk of pollution arising from an extreme flooding event during construction	Low	Moderate adverse	Possible
Wetland Habitats (general)	County	Risk of spread of invasive weeds arising from construction works, especially installation and removal of crossings	High	Major adverse	Possible

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Semi-improved neutral grassland	Local	Small-scale permanent losses to pylon feet. Temporary loss in underground line corridors. Soil replaced and re-seeded in latter stages of construction, but likely to become better drained and drier than previously, therefore the habitat would tend to become like improved grassland (of lower value).	Medium	Minor Adverse	Probable
Poor semi-improved grassland	Local	Similar effects as described for semi-improved grassland, with small-scale losses to pylon feet, and habitat modification arising from drier, looser soil structure. Impacts are Lower in magnitude because habitats are poorer in the first place.	Medium	Minor Adverse	Probable
Improved grassland	Local (where derived from former floodplain grazing marsh)	Similar effects as described for semi-improved grassland, with small-scale losses to pylon feet, and habitat modification arising from drier, looser soil structure. Impacts are Lower in magnitude because habitats are poorer in the first place.	Medium	Minor Adverse	Probable
Modified neutral grassland	Neighbourhood	Medium-term impact on a habitat that is common across the local landscape.	Low	Not significant	Certain/near certain
Poor modified neutral grassland	Neighbourhood	Medium-term impact on a habitat that is common across the local landscape.	Low	Not significant	Certain/near certain
Marshy grassland	Local	Small and scattered areas undergoing permanent modification due to drier conditions in underground line corridor	Low	Minor Adverse	Certain/near certain
Tall ruderal herbs	Neighbourhood	Small and scattered areas lost	Low	Not significant	Certain/near certain
Arable	Neighbourhood	Large scale medium-term effect, anticipated to be relatively readily re-established following completion of works.	Low	Not significant	Certain/near certain
Amenity grassland	Neighbourhood	Temporary loss on the south western edge of Nailsea, readily re-established following completion of works	Neutral	Not significant	Certain/near certain
Fauna					

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Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
egrets		Medium-term loss or degradation of feeding or breeding grounds throughout the survey area. Hydrology mitigation would avoid/negate potential effects on water quality including accidental damage. Any dry working required for the underground line would not lead to a drying out of adjacent land (Volume 5.10.1). It is therefore predicted that there would be no long-term loss or degradation of feeding or breeding grounds throughout the survey area as a result of direct land take or accidental pollution or changes in hydrology. The majority of working areas would revert to previous condition post construction; any permanent changes in drainage would be small scale.	Low	Not significant	Extremely Unlikely
Birds - Raptors & owls (excl. Barn owl)	Local	The temporary displacement from breeding grounds applies to all working areas containing mature trees for the duration of construction (medium-term). This effect applies where works are unavoidably timed during the breeding season.	Low	Minor Adverse	Possible
		Medium-term loss or degradation of feeding or breeding grounds throughout the survey area. The loss or degradation of feeding or breeding grounds applies to all working areas containing mature trees or rough grassland habitats for the duration of construction (medium-term). The majority of working areas would revert to previous condition post construction and replacement tree planting could reverse effects in the long-term.	Low	Minor Adverse	Possible
Birds - Barn owl	Local	If the alternative route is selected, displacement from feeding, or breeding grounds at Portbury Wharf and Avonmouth as a result of construction activities creating noise or human activity disturbance. This medium-term temporary effect applies to construction at any time of year.	Medium	Moderate Adverse (alternative route)	Probable (assuming works undertaken within 30m of nest box)

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
		If the preferred route is selected, displacement from feeding, or breeding grounds where construction activities creating noise or human activity disturbance are carried out within 30m of mature trees. This medium-term temporary effect applies to construction at any time of year.	Low	Minor Adverse (preferred route)	Possible
		If the alternative route is selected, loss or degradation of feeding or breeding grounds at Portbury Wharf and Avonmouth as a result of construction land take, particularly loss of any nest boxes or any mature tree removal. This effect applies to construction at any time of year. The majority of working areas would revert to previous condition post construction and replacement hedgerow and tree planting and re-installation of nest boxes could reverse effects in the long-term.	Low	Minor Adverse (alternative route)	Probable
		If the preferred route is selected, loss or degradation of feeding or breeding grounds as a result of construction land take, particularly loss of any mature tree removal. This effect applies to construction at any time of year. The majority of working areas would revert to previous condition post construction and replacement hedgerow and tree planting could reverse effects in the long-term.	Low	Minor Adverse (preferred route)	Possible

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Birds - Farmland birds	Local	Displacement from feeding, or breeding grounds during construction (medium-term) applies throughout the survey area but the greatest impacts are anticipated in: • Woolavington Level to Huntspill River • East Huntspill to Southwick • Northwick to Rook's Bridge • Land west of Yatton • Nailsea Moor • Portbury Wharf [alternative route] • Hallen Marsh. This effect applies where works are unavoidably timed during the breeding season.	Low	Minor Adverse	Probable
		Loss or degradation of feeding or breeding grounds during construction due to initial tree and hedgerow removal for which the greatest impacts are anticipated in those areas listed above. The working areas would revert to farmland uses post-construction and replacement hedgerow planting would be implemented. .	Medium	Minor Adverse	Certain
Birds - Kingfisher	Local	Displacement from feeding, or breeding grounds at Nailsea Moor and Lox Yeo River. This temporary effect would arise if construction activities are unavoidably carried out during the breeding season.	Low	Minor Adverse	Possible

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
		Loss or degradation of feeding, breeding or perching grounds as a result of temporary bank habitat loss for water crossings. Hydrology mitigation would avoid/negate potential effects on water quality (Volume 5.10.1). The majority of working areas would revert to previous condition post construction and replacement scrub planting or re-seeding by watercourses would reverse effects in the long-term.	Low	Minor Adverse	Possible
Birds - Cetti's warbler	Local	If the alternative route is selected, temporary displacement from feeding or breeding grounds during any construction works within 20m of a nest. This effect applies to works unavoidably scheduled during the breeding season.	Medium	Minor Adverse (alternative route)	Probable
		If the preferred route is selected, temporary displacement from feeding or breeding grounds during any construction works within 20m of a nest. . This effect applies to works unavoidably scheduled during the breeding season.	Low	Minor Adverse (preferred route)	Possible
		If the alternative route is selected loss or degradation of feeding or breeding grounds apply throughout the Portbury Wharf and Avonmouth area where removal of reedbed, other dense riparian vegetation or patches of scrub within wetland areas occurs. The majority of working areas would revert to previous condition post construction and replacement scrub planting or re-seeding by watercourses could reverse effects in the long-term.–This medium-term temporary effect applies to works unavoidably scheduled during the breeding season.	Low	Minor Adverse (alternative route)	Probable

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
		If the preferred route is selected loss or degradation of feeding or breeding grounds apply throughout the survey area where removal of reedbed, other dense riparian vegetation or patches of scrub within wetland areas occurs. The majority of working areas would revert to previous condition post construction and replacement scrub planting or re-seeding by watercourses could reverse effects in the long-term. This medium-term temporary effect applies to works unavoidably scheduled during the breeding season.	Low	Minor Adverse (preferred route)	Possible
Crossbill	Local	Disturbance to woodland habitats at Mogg's Wood, including habitat modification by pollarding of tall trees	Neutral	None	Probable
Swallows and passerines (Ashtrees Farm)	Neighbourhood	Loss of swallow and passerine nest sites due to demolition	Low	Not significant	Certain/near certain
Bats - Tree roosts	Local	Six non-breeding roosts would be lost to the preferred route including 2x common pipistrelle (Trees 36, 367), 2x pipistrelle species (Trees 250 & 653), 1x long-eared (Tree 366) and 1x <i>Myotis</i> (Tree 63). Seven roosts lost to alternative route, 3x common pipistrelle (Trees 36, 118a & 367), 1x soprano pipistrelle (Tree 91a), 1x pipistrelle species (Trees 250), 1x long-eared (Tree 366) and 1x <i>Myotis</i> (Tree 63).	High	Moderate Adverse	Certain/near certain
		Fragmentation and short-term disturbance effects on some retained roosts, including the whiskered maternity roost.	Low	Minor Adverse	Probable
Bats Horseshoe activity	International	Assessed under 'Designated Sites' above.	N/A	N/A	N/A

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Bats - Barbastelle (non-SAC animals)	County	Loss or severance of commuting habitat and loss or degradation of foraging habitat. Barbastelle is a fast, far-flying bat and would cross open habitats. Nevertheless, permanent loss of woodland across Tickenham Ridge and the open-cut working throughout the 400kV and 132kV underground swathes could pose a significant change to habitat availability and landscape connectivity in the medium-term.	Medium	Moderate Adverse	Probable
		Inappropriate artificial lighting may cause severance of commuting habitat and/or avoidance of foraging habitat. Lighting is restricted to compound areas and some working areas during Winter months near Webbington where high levels of bat activity were recorded during the late Summer/Autumn; accordingly magnitude of risk is Medium.	Medium	Minor Adverse	Possible
Bats - Bechstein's, Leisler's and Nathusius' pipistrelle	County	Loss or degradation of foraging habitat and loss or severance of commuting habitat – the loss of trees, medium-term loss of hedgerows and grassland/pasture across the underground swathes. Whilst hedgerows replacement planting would be provided in the latter stages of construction, these would take 3-5 to establish. Medium-term effect across a large area.	Medium	Moderate Adverse	Probable
		In appropriate artificial lighting may cause severance of commuting habitat and/or avoidance of foraging habitat. Lighting is restricted to compound areas and some working areas during Winter months near Sandford Substation where relatively high levels of bat activity have been recorded.	Medium	Minor Adverse	Possible

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Bats - Daubenton's, Natterer's and alcahloe, serotine and noctule, common and soprano pipistrelles, and brown long-eared bats, as well as habitats supporting comparatively high levels of their activity.	Local	Loss or severance of commuting habitat and loss or degradation of foraging habitat. Re-instatement of habitat through hedgerow replacement and mitigation planting around the substations and CSE compound would alleviate such adverse effects, although this would incur a time lag as habitat features establish and mature. Impacts are therefore anticipated to relate principally to the open-cut underground swathes and the loss of woodland at Tickenham Ridge.	Medium	Moderate Adverse	Probable
Dormouse	Local	Given the absence of any positive survey data, following implementation of the hedgerow replacement planting and wider reinstatement of grassland habitats on completion of works, no significant long-term effect on wider habitat connectivity for dormice is anticipated.	Neutral	Not significant	Near certain
Water vole	County	No direct effects on water vole burrows that may be present are anticipated as a result of HDD or associated working areas. The level of disturbance generated may cause water voles to flee for the duration of works and, in worst-case scenario, potentially abandonment of young if works are carried out during the breeding season.	Low	Minor adverse	Possible

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
		Medium-term habitat loss to culverts, bridges and cable ducts with multiple short stretches affected. Water voles found regularly, but the species is mobile and may colonise new areas or experience population fluctuations. Short-term habitat fragmentation and disturbance during the installation or removal of water crossings and cables ducts. Risk of killing and injury during works. Potential effects would be exacerbated should works commence after territories have established hence voles are less likely to move out of working areas, or during Winter torpor. Ditch habitats would be reinstated on completion of works and vegetation is anticipated to re-establish within 2-4 years.	High	Major Adverse	Certain/near certain
Water vole	County	River Axe bridge crossing	Low	Minor adverse	Certain/near certain
Otter	County	Medium-term habitat loss to culverts and bridges (multiple short stretches affected) Short-term loss to cable ducts. Short-term habitat fragmentation and disturbance during the installation or removal of water crossings and cables ducts during the installation and removal of water crossings. Ditches would be reinstated on completion of works. Bank and in-channel vegetation is anticipated to re-establish within 2-4 years.	Low	Minor Adverse	Probable
		Risk of killing or injury from open excavations.	Medium	Moderate Adverse	Extremely unlikely

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Badger	Neighbourhood	Loss of 1x subsidiary sett at North End (Section D) and 3x outlier setts at East Huntspill, (Section B), Rook's Bridge (Section B), main/annex sett at Mark (Section B), Tickenham Edge (Section D). Disturbance and possible damage of a Main sett at Barton (Section C) for the duration of works. Effects would be exacerbated by works scheduled during the breeding season. Medium-term temporary disturbance of 2x further main setts, 3x subsidiary setts and 2x outlier setts during construction. Badgers are particularly sensitive to disturbance during the breeding and hibernation seasons. Medium-term temporary loss of foraging habitat and associated fragmentation – potentially severance between setts within the same clan, principally in areas of open-cut swathe for the underground lines (Sections C-E) and Sandford Substation (Section D). Smaller areas of habitat loss to construction accesses and compounds. Reinstatement of habitat on completion of construction. Risk of killing or injury to badgers through works directly affecting the setts and/or in the event that a badger falls into/becomes entrapped within construction excavations.	Low	Minor Adverse	Certain/near certain

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Brown Hare	Local	Habitat loss, particularly at Puxton Moor and west of Nailsea across Kenn Moor and Nailsea Moor. Associated killing or injury during initial site clearance (leverets particularly susceptible). Movement may be restricted where long stretches of the haul road are fenced during construction, although the likelihood of road kill is considered negligible given the 10mph speed limit that would be enforced during construction. Potential for hares to be trapped in excavations, pipes or wire mesh associated with construction activities, which may cause distress or injury.	Low	Minor Adverse	Possible
Hedgehog	Local	Habitat loss and fragmentation may occur for the duration of works, particularly in respect of hedgerow removal, until reinstated habitats establish. Risk of killing or injury during initial site clearance, particularly during hibernation.	Medium	Minor Adverse	Possible
Amphibians - GCN	County	Permanent habitat loss at three short sections of ditch. No effects on ponds. Other non-breeding ditches would be reinstated on completion of works. Bank and in-channel vegetation is anticipated to re-establish within 2-4 years. NE licence would ensure no impact on animals	Low	Minor Adverse	Probable
		Terrestrial habitat losses across the entire Order Limits in the vicinity of GCN breeding ponds total 4.48m within 50m of GCN ponds and 20.87ha within 250m (permanent loss) and 4.48ha within 50m and <0.01ha within 250m (medium-term temporary loss). As a result of terrestrial habitat loss, temporary fragmentation of terrestrial habitat for GCN moving across the surrounding landscape would occur and potential for killing or injury.	Medium	Moderate Adverse	Probable

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Amphibians - Wider assemblage	Local	Medium-term habitat loss to multiple watercourse crossings, although the length affected within any given stretch is short. Short-term disturbance effects during installation and removal.	Low	Not significant	Probable
		Terrestrial habitat losses and associated fragmentation outlined for GCN above would also affect common toad, frog and the small newt species.	Medium	Minor Adverse	Probable
Reptiles	Local	Habitat loss, principally of medium-term temporary effects for the duration of construction. Permanent losses would occur at Sandford Substation and the CSE compounds, and site-specific landscape planting at each of these locations is anticipated to compensate for this loss in the long-term once established. Medium-term temporary severance, principally associated with underground line working; grass snake particularly susceptible.	Medium	Minor Adverse	Probable
		Associated risk of killing or injury of grass snake, slow worm or common lizard within construction areas.	High	Moderate Adverse	Possible
Ditch Invertebrates and Macrophytes	National	Medium term habitat losses due to watercourse crossings, which would be reinstated on completion of works. Some potential for localised extinction if population is fragmented during works	Low	Moderate Adverse	Probable
	County	Medium term habitat losses due to watercourse crossings, which would be reinstated on completion of works. Some potential for localised extinction if population is fragmented during works	Low	Moderate Adverse	Probable
	Local	Medium-term habitat losses across the ditch network to multiple short watercourse crossings, which would be reinstated on completion of works.	Low	Minor Adverse	Probable

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
	Neighbourhood	Medium-term habitat losses across the ditch network to multiple short watercourse crossings, which would be reinstated on completion of works.	Low	Not significant	Probable
Fish	Local	Short-term severance effects during installation and removal of culverts (1-2 weeks) and the installation of cable ducts for underground lines (2-4 weeks at any given stretch). Eel and trout are particularly sensitive during the migration seasons. Short-term disturbance (noise and vibration) effects during installation and removal may cause fish to flee. All ditches reinstated on completion of works. Bank and in-channel vegetation anticipated to re-establish within 2-4 years.	Low	Minor Adverse	Probable

Potential Operational Effects Prior to Mitigation

- 8.5.310 The operational period is programmed to commence in Q3 2019 (see **Volume 5.3.1, Table 3.3**). The Proposed Development components are anticipated to have lifespans of between 25 and 80 years. Maintenance would therefore be required and is anticipated to entail refurbishment and replacement of equipment including insulators and fittings (lifespan of 25 years), CSE compound and substations (40 years), conductors (40-60 years), underground lines (50 years) and pylons (80 years i.e. the lifespan of the project).
- 8.5.311 Once installed, no further habitat loss or fragmentation further to that assessed under construction would occur. Habitats sown and planted in the latter stages of construction would continue to establish and naturally colonise.

Indicative Access for Future Maintenance

- 8.5.312 Access for maintenance would typically be made by foot, 4x4 vehicle or tractor and trailer, and would not typically require any new temporary access tracks. However, access to tension pylons may require temporary stone roads or aluminium trackway to be laid. The indicative Future Maintenance Access Plans are provided in **Volume 5.3.1, Figure 3.5-3.6**. The requirements for segregation and reinstatement of excavated soils set out in **Volume 5.9.1**, as part of the Soil Management Plan, will apply to such future accesses. Similarly, any temporary watercourse crossings would be assessed on a case by case basis and subject to the consenting procedures as set out for construction. Accordingly, potential localised effects on ecological receptors would be reassessed. Assuming these mitigation measures are implemented, effects are anticipated to be similar to those identified for construction but at a smaller scale. Upon completion of any maintenance works, surfaces would be restored to their condition at the commencement of the works.

Bird Collision Risk from Overhead Lines

- 8.5.313 The principal ecological effect during operation relates to the risk of collision for certain bird species in specific locations. This would be partially mitigated by the removal of considerable lengths of existing overhead line and is explored in detail under 'Birds' below. It is recognised that the certainty with which the effects of the T-pylon on bird collision can be assessed is inherently limited (in the absence of any monitoring data available), however, available guidance and current research has been used to inform the assessment.
- 8.5.314 It is recognised that, as the new overhead line is installed in sections, some stretches would be in place during the latter stage of the construction phase.

Heat Generated by Underground Cables

- 8.5.315 Cables generate heat when they carry a current and can therefore have a heating effect on the surrounding soil. For the majority of the route, underground lines would be buried to a depth of 1.1m, although much deeper below watercourses and at least 3m if passing via HDD. The specifications and standards for thermal design are set out in the Thermal Rating Reports (Mott MacDonald 2013a, 2013b) (Ref. 8.106), taking into consideration seasonal soil temperatures.
- 8.5.316 The maximum operating temperature (i.e. carrying the maximum current) of a cable conductor of the type proposed for the 400kV line is 90°C. Calculations based on an underground cable passing below a running watercourse at the depth proposed

for the 400kV underground line (watercourse assumed to be 1m wide, 10cm deep, flowing at 1cm/sec) concluded that the cable “*will generate around 180 W/m of heat when running at peak current... it can be calculated that the watercourse will have a temperature rise of 0.043°C due to the cable circuit*” (National Grid, 2014, unpubl.) (Ref. 8.107). From this it was extrapolated that “*even a water course with a low flow rate will experience negligible rises in temperature*”.

Electro-Magnetic Field Interference

- 8.5.317 The Proposed Development complies with the current public exposure guidelines (in respect of human health) for electro-magnetic field (EMF) during operation, as set out in **Volume 5.16.1, section 16.2**.
- 8.5.318 The NPS for Electricity Networks Infrastructure (EN-5, July 2011) states that “*There is little evidence that exposure of crops, farm animals or natural ecosystems to transmission line EMF has any agriculturally significant consequences*” (Part 2, Section 2.10.8).
- 8.5.319 **Volume 5.16.1** details EMF in relation to the Proposed Development and a summary is provided here. The electric field (referred to as the E-field) and the magnetic field (the B-field) both occur naturally. The earth’s geomagnetic field is c.50µT, which is a static field and all of life has evolved in its presence. Electricity transmission and distribution can also produce EMFs which have the same frequency as the voltages and currents that produce them (50Hz in the UK). The fields are described as ‘power-frequency’ or ‘extremely-low-frequency’ alternating electric and magnetic fields, and exist in addition to the earth’s steady natural fields. In UK homes that are not close to high-voltage overhead lines or underground cables, the average background power-frequency magnetic field (the field existing over the whole volume of the house) ranges typically from 0.01-0.20µT with an average of c.0.05µT. The highest magnetic fields to which most people are exposed arise close to domestic appliances that incorporate motors and transformers. For example, close to the surface, fields can be 2000µT for electric razors and hair dryers, 800µT for vacuum cleaners, and 50µT for televisions and washing machines.
- 8.5.320 The maximum magnetic fields that the Proposed Development could produce are presented in **Volume 5.16.1**. It is very rare that the overhead lines and cables operate at this maximum capacity, and typically will produce lower magnetic fields on a daily basis. Typical magnetic fields produced by 132kV and 400kV, overhead and underground power lines are provided below (calculated at ground level directly beneath the conductors or above the cables, at 5m from the centrepoint). EMF levels drop off away from the centre point therefore potential effects from the EMF related to the Proposed Development are limited to the alignment of the 400kV connection and immediately adjacent habitat.

Table 8.30 Typical Magnetic Fields Produced by 132kV and 400kV Power Lines

Voltage	Connection Type	Typical µT at Ground Level	
		At Centreline	5m from Centreline
132kV	Overhead	1.84	1.35
132kV	Underground	5.01	1.78
400kV	Overhead	3.80	3.80

Voltage	Connection Type	Typical μT at Ground Level	
		At Centreline	5m from Centreline
400kV	Underground (buried 1.1m)	24.00	3.00

- 8.5.321 The potential for EMF effects on migratory movements of fish is discussed later in this section in relation to eels and salmonids. It is the magnetic field (B-field) which fish species detect. In summary, while EMF can cause behavioural modifications e.g. slower swimming, it is not expected to result in any significant effect on populations or migratory movement in watercourses crossed by the Proposed Development.
- 8.5.322 The potential effect of EMF interference on bat navigation was highlighted as requiring consideration in the Scoping Opinion, in terms of preventing access to roost or foraging habitat. Little is currently known about the effects of EMF on bats. Extrapolation from EMF studies has suggested the indirect reduction in bat foraging habitat as a result of reduction in insect prey, and potential effects of thermal induction, although an advice note from the Bat Conservation Trust considers the basis for such conclusions are largely unclear (BCT, 2011) (Ref. 8.108). No predictable effect as a result of EMF is therefore identified on bats.

Designated Wildlife Sites

Bird Collision Risk

- 8.5.323 Collision risk is explored in more detail under 'Birds' below. Potential collision effects in respect of designated sites are summarised here.
- 8.5.324 Bird collision risk is seasonal depending on the species or assemblage for which any given site is designated. The Severn Estuary SAC SPA Ramsar and Somerset Levels & Moors SAC SPA Ramsar (and the component SSSI) are designated for Wintering birds subject to collision risk. Land between these two sites is crossed by the existing F Route and would be crossed by the replacement 400kV overhead line in broadly similar alignment.
- 8.5.325 Survey work carried out to assess the collision risk impact of the Proposed Development on birds found only low numbers of bird movements associated with the two SPAs across the Proposed Development. However, key potential corridors for bird movement between these two sites include the Huntspill River NNR as well as King's Sedgemoor Drain and the River Brue. Taking into consideration the survey findings, together with the factors listed below, overall collision risk associated with the Proposed Development is predicted to be no greater than that of the existing baseline conditions:
- a greater length of overhead line would be removed than installed (c.64km overhead line would be removed and only c.56km replacement line installed);
 - sections to be removed and not replaced include an area currently oversailing Portbury Wharf (an area classed as holding high potential for wildfowl) and an area in the south of the Proposed Development at Bridgwater (found to be used as a fly way by a number of SPA species);
 - use of T-pylons which incur reduced collision risk in comparison to the existing lattice pylons (lower overall height, with more visible conductors and earth wires that hang at only two heights); and
 - given the similar alignment of the F Route to be removed and the replacement overhead line, the geographic spread of any zones of potential collision risk

would be broadly similar, although the level of risk incurred by the proposed T-pylon design is predicted to be lower than the existing lattice pylons.

- 8.5.326 During the s42 consultation process, NE advised of some uncertainty in concluding that there would be no significant change in collision risk owing to evidence from other studies regarding movements of Wintering birds between the Severn Estuary SAC SPA Ramsar and Somerset Levels & Moors SAC SPA Ramsar. Information from the 2011 FERA radar studies (for wind farm projects within the Huntspill area) indicates that there may be movements of birds between the Somerset Levels and Moors and the Severn Estuary towards the southern end of the Proposed Development (between Bridgwater and Mark. These movements may involve some SPA qualifying species, notably small ducks such as teal and wigeon. Vantage point surveys undertaken for the Proposed Development recorded movements of groups of waders associated with the Somerset Levels & Moors SPA, such as lapwing and golden plover, across the Proposed Development south of the Mendip Hills.
- 8.5.327 Following consultation with FERA, NE and RSPB, the authors undertook additional analysis of flight speed data during December 2013 to try and determine what species might be involved in the flights associated with the radar tracks recorded. From the analysis there seems to be a 'corridor' of squares with higher average speeds (20-25m/s) crossing the overhead line both at the River Brue and further north between Southwick and Mark. This flight speed correlates with that associated with waterfowl quoted by Bruderer & Boldt (2001). This analysis has however made no correction for wind speed or direction, which could lead to decreased or increased flight speeds. Although the radar study indicates movements by wildfowl the number of birds that make the movements remains unknown, the species' involved, the height at which they fly, or the regularity at which such movements occur.
- 8.5.328 There is currently no evidence that confirms movements of SPA species across the existing F Route and the replacement line, particularly at heights that would pose a collision risk. However, a slight uncertainty remains in relation to the potential for bird movements between the two SPA Ramsar sites.
- 8.5.329 Overall collision risk associated with the Proposed Development is therefore predicted to be of Neutral magnitude and **not significant** prior to mitigation. Given the remaining uncertainty, the likelihood of effect in respect of the Severn Estuary SAC SPA Ramsar and Somerset Levels & Moors SAC SPA Ramsar is possible.
- 8.5.330 Although Hallen Marsh is proposed as SPA Ramsar offsetting for Severn Estuary bird species, it is currently unsuitable for this species. The degree to which birds may use the area in the future if habitat enhancement works are undertaken is uncertain although it is the intention to encourage SPA species to this area. It is also uncertain whether SPA birds using the area would fly across the 400kV overhead line and if they did, if those flights would be within the collision risk zone. The magnitude of effect cannot be predicted with any certainty but as a precaution is predicted to be of Medium magnitude and therefore of **major adverse** significance. The likelihood of effect is Possible.
- 8.5.331 A concentration of Wintering bird activity was also recorded at the Portbury Wharf nature reserves and Avonmouth Sewage Works & Hoar Gout SNCI. The Proposed

Development does not pass between these sites and the estuary; hence, the corresponding collision risk is reduced. Vantage point surveys have been undertaken at Portbury Wharf during the winter of 2013-2014 to investigate whether movements of birds occur between Portbury Wharf and the Gordano Valley over the proposed location the Alternative Route. Only very occasional movements of small numbers of birds were observed. The magnitude of effect on birds associated with Portbury Wharf is predicted to be of Low magnitude and therefore of **minor adverse** significance. The likelihood of effect is possible.

Heat Generated by Underground Cables: Aquatic Habitats

- 8.5.332 Potential effects of heating on aquatic habitats with designated sites relate to ditches (both static and flowing) and to running watercourses below which the underground cables pass. Heat dissipates with distance from source (varying with substrate type and the associated water content). Heating may have beneficial or adverse effects on ecological receptors depending on the degree of temperature change.
- 8.5.333 An HDD crossing is proposed below the SSSI ditches at Tickenham, Nailsea and Kenn Moor SSSI/Nailsea and Tickenham Moors SNCI. HDD will pass at least 3m below the ditches. Calculations based on an underground cable passing below a running watercourse at the depth proposed for the 400kV underground line concluded that the cable *“will generate around 180 W/m of heat when running at peak current... it can be calculated that the watercourse will have a temperature rise of 0.043°C due to the cable circuit”* (National Grid, 2014, unpubl.). From this it was extrapolated that *“even a watercourse with a low flow rates will experience negligible rises in temperature”*. Given the depth of HDD and the short stretches of ditch crossed, this degree of heating is unlikely to cause a discernible effect on the integrity of the wider SSSI SNCI (something that it explored further under ‘Ditch Invertebrates and Flora’ below) and is therefore is **not significant**. Given the limited availability of empirical data, particularly with regard to the collective effects of several duct crossings on any one stretch of watercourse, the certainty of effect is possible.
- 8.5.334 HDD is also proposed beneath the Lox Yeo River SNCI and at this point the river flows directly through the 400kV underground easement for c.210m. Within running watercourses the flow of water will to some extent dissipate any heat generated, although the affected length of watercourse is greater than elsewhere on the route. The SNCI supports otter and the EA reports anecdotal evidence that the watercourse supports trout. Potential adverse effects on fish within the river principally relate to the development of eggs and young should sufficient change in temperature occur; something that is explored in greater detail under ‘Fish’ below. Given the small-scale change in temperature calculated, no significant adverse effects of heating on fish (and so too availability of prey for otter) are predicted. Similarly, potential effects on the integrity of the SNCI are anticipated to be of Neutral magnitude and therefore **not significant**. The certainty of effect is possible.
- 8.5.335 An optional HDD is also proposed at the River Axe LWS, with an alternative option of a clear-span cable bridge above the watercourse. A clear-span (or box culvert) cable bridge will also be constructed over Towerhead Brook (part of) and Adjacent Land SNCI. As a single crossing point below or above a running watercourse, heating is unlikely to have any discernible effect on the integrity of either site and as

such, is of Neutral magnitude and therefore **not significant**. The certainty of effect is possible.

Heat Generated by Underground Cables: Terrestrial Habitats

- 8.5.336 Regarding terrestrial habitats, current literature regarding heat effects on terrestrial habitats (Macaulay Scientific, 2013) (Ref. 8.109) is based on cables and pipes buried c.1.2m below ground. For the majority of the route, underground lines would be buried to a depth of 1.1m, surrounded by well-compacted thermally suitable indigenous backfill. Heat dissipates with distance from source (varying with substrate type and the associated water content) and any interaction with above ground vegetation is often cited as resulting from changes to soil warming and drying around the roots of arable crops (c.30cm below ground). This can lead to early germination and faster crop growth immediately above the heat source. In periods of drouth/dry conditions, this can also exacerbate the effects of dry conditions on crop growth. It is unknown if a noticeable effect would also be generated for the continual managed pasture or hedgerow field boundaries that account for much of the habitat along the underground swathes.
- 8.5.337 It is anticipated that during hot dry conditions, outside of seasonal flooding, that localised surface vegetation would reflect the warmer and drier ground conditions. The potential effect of heating on such sites is anticipated to be no greater than Low magnitude. The significance on designated sites overlying the underground easement therefore corresponds to no more than **minor adverse** on the designated grassland habitats across Nailsea and Tickenham Moors SNCI (a section of which would be laid through HDD at greater depth, thereby reducing any potential heating effects), Tickenham Hill, Cadbury Camp & Chummock Wood Complex LWS (132kV passes below components of the complex), Birch Wood & Priors Wood SNCI WTR (132kV passes below the north-most area of woodland) and the Portbury Wharf nature reserves (W Route and G Route pass below). Given the limited availability of site or habitat specific empirical data regarding, the certainty of effects is Possible.

Habitats and Flora

- 8.5.338 As set out for 'Designated Wildlife Sites' above, localised heat effects on terrestrial habitats would be exacerbated during hot dry conditions, outside of seasonal flooding and accordingly, this may be reflected in the surface vegetation. This seasonal effect on the managed grassland and arable habitats, and the interconnecting hedgerows, that dominate across the underground swathes would be very localised and only likely to exhibit in limited conditions. Given the availability of these habitats in the landscape effects on these receptors are Neutral and therefore **not significant**. The likelihood of effect is possible. No significant adverse effects on aquatic habitats in respect of heating have been identified.

Birds

- 8.5.339 The potential effects on birds during operation of the proposed 400kV connection, and the 132kV overhead line replacements arises from risk of collision with overhead lines resulting in bird mortality during migration flights, daily movements between roosting and feeding areas, or during normal daily flight patterns.

- 8.5.340 Electrocution is not considered to be a risk for the species of bird encountered in the Proposed Development, of which the mute swan and grey heron are the only regularly encountered birds with a wingspan over 1.5m. Mute swans do not perch on overhead apparatus so would be unlikely to try and alight. Given the design of the overhead conductors, it is very unlikely that alighting herons would form electrical circuits as there is little opportunity for this to happen. For 400kV lines, the heat at the wire surface is $>50^{\circ}\text{C}$, thus reducing the likelihood of any birds using the conductors for perching in the first place.
- 8.5.341 A literature review of collision mortality issues is provided in **Volume 5.8.2, Appendix 8F**. Empirical data regarding the population effects of collision mortality on most species are not available. However, information provided in APLIC (1994) (Ref. 8.110) states that most researchers agree that collisions are not a biologically significant source of mortality for thriving populations of birds. Studies providing collision rates generally indicate that mortality due to this impact does not threaten population viability, and is Not significantly higher than for other mortality factors.
- 8.5.342 Certain bird groups are known to be susceptible to collision mortality with man-made aerial structures such as overhead lines and wind farms. These groups of birds include wildfowl, waders, raptors and herons. The potential effects of collision risk on receptors that fall within each of these bird groups are assessed below.
- 8.5.343 Although collision risk is predicted to occur for a number of species due to the installation of the proposed 400kV overhead line, the Proposed Development would also include the removal of a greater length of existing 132kV overhead line (approximately 56km of 400kV overhead line would be installed, whereas approximately 64km of 132kV overhead line would be removed). Due to the proximity of the proposed line to be installed and that to be removed, as well as the similar collision risk zones for both types of overhead line, the change in overall collision risk to birds associated with the installation and removal of overhead line would be broadly neutral in most sections of the Proposed Development.
- 8.5.344 In addition, the proposed overhead line removal includes more than 3km of 132kV overhead line which would not be replaced to the south of the most southerly point of the proposed 400kV overhead line, a section that potentially lies on the flight path of birds that may undertake movements between the southern part of the Somerset Levels and Moors SPA (notably Kings Sedgemoor) and Bridgwater Bay. The proposed 400kV overhead line would therefore result in a reduction in the overall length of overhead line to the south of the Mendip Hills, in the location where most movement of birds prone to collision risk is likely to occur.
- 8.5.345 The proposals also include the removal of a section of overhead line that crosses Portbury Wharf, the area assessed as holding highest potential for waders and wildfowl. The Proposed Development would be undergrounded through the Mendip Hills, further reducing overall collision risk.
- 8.5.346 The Ornithological Assessment provides a detailed narrative account for the principal species vulnerable to collision. A summary of effects, not accounting for mitigation, is presented below.

Swans

- 8.5.347 Swan species recorded during the bird surveys undertaken between 2009 and 2013 included mute swan, Bewick's swan and Whooper swan. Bewick's swan is a qualifying species for the Somerset Levels and Moors SPA Ramsar. Due to the very low numbers of Bewick's swan and Whooper swan recorded, and as only 2

Whooper swan flight lines were recorded flying through the risk zone, potential collision risk effects on these species are assessed as negligible. Based on desktop and field survey findings during 2009 to 2011 there is little evidence to indicate that migrating Bewick's swan fly within the study area. It is likely that the majority of Bewick's swan migrate to the Somerset Levels overland via Scotland, possibly Welney in East Anglia and the majority flying to the Somerset Levels would therefore not fly through the preferred corridor during migration.

- 8.5.348 While the risk of migrating Bewick's swan colliding with an overhead line in the preferred corridor is very low, the potential for collision mortality to this species cannot be discounted, and given its small Wintering population on the Somerset Levels, any mortality loss could potentially be significant. However, due to the removal of existing overhead line, and the removal of 132kV overhead line to the south of the Proposed Route which would not be replaced, it is considered that there would be no increase in collision risk to Bewick's swan. The effect on Bewick's swan species designated for the Somerset Levels and Moors SPA Ramsar is therefore anticipated to be of Very Low magnitude across the length of Proposed Route and therefore is **not significant**. Given the lack of evidence suggesting that Bewick's swan regularly fly across the Proposed Development, the certainty of effects is Extremely Unlikely.
- 8.5.349 Mute swan were recorded throughout the Proposed Development at low densities during both the Winter and breeding periods. Although not formally designated, they are listed as a Species/population identified subsequent to designation for possible future consideration for the Somerset Levels and Moors Ramsar. The collision risk model (CRM) predicts that the Proposed Development would result in an annual collision mortality averaging 5.23 mute swan associated with the Somerset Levels and Moors Ramsar. However, due to the removal of existing overhead line, including the section of overhead line oversailing the Portbury Wharf nature reserves which is likely to be of highest risk to mute swan there is likely to be no net increase in mute swan collision mortality. The effect on mute swan is therefore anticipated to be of Very Low magnitude across the length of Proposed and therefore is **not significant**. The certainty of effects is considered possible.

Ducks

- 8.5.350 Duck species associated with the Somerset Levels and Moors SPA Ramsar or the Severn Estuary SPA Ramsar with more than 1 flight line through the risk zone during the 2009-2010 vantage point survey included teal and shelduck. The CRM predicts a mortality rate of 0.56 teal associated with the Somerset Levels and Moors SPA and 3.55 teal associated with the Severn Estuary SPA. Only seven shelduck flight lines were recorded within the risk zone during 48 hours of observation, and they were only recorded from one vantage point. Due to the removal of existing overhead line, including the section of overhead line oversailing the Portbury Wharf nature reserves which is likely to be of highest risk to mute swan there is likely to be no net increase in teal or shelduck collision mortality. The effect on teal designated for the Somerset Levels and Moors SPA Ramsar and shelduck species designated for the Severn Estuary SPA Ramsar is therefore anticipated to be of Very Low magnitude and therefore is **not significant**. The certainty of effects is considered possible.

- 8.5.351 Mallard are included in the Severn Estuary SPA Wintering bird assemblage. Mallard were regularly recorded along the Proposed Development using rivers and Rhynes. Many mallard flights recorded within the study area were short flights involving small groups of birds flying below the risk zone. The majority of the mallard flew within 10 metres of the water at a height which would allow these birds to fly below the proposed overhead lines. Due to the removal of existing overhead line, including the section of overhead line oversailing the Portbury Wharf nature reserves which is likely to be of highest risk to mallard there is likely to be no net increase in mallard collision mortality. The effect on mallard is therefore anticipated to be of Very Low magnitude and therefore is **not significant**. The certainty of effects is considered possible.
- 8.5.352 Radar studies carried out by FERA during 2011, summarised in the Ornithological Assessment, suggest regular movements of duck species may occur across the proposed route of the overhead line south of the Mendip Hills. However the study does not provide information on numbers of birds involved, the species or the height at which they fly.
- 8.5.353 Non-SPA duck species which have been recorded within the vicinity of the Proposed Development either from desktop or field survey include common scoter, eider, goldeneye, and scaup. Due to the very small number of these species recorded, and the absence of any flight lines during vantage point survey the effect of collision risk on these additional duck species is therefore anticipated to be of Neutral magnitude across the length of Proposed and therefore **not significant**. The certainty of effects is considered extremely unlikely.

Waders

- 8.5.354 Lapwing were regularly recorded flying over the southern end of the study area during vantage point surveys. Lapwing is a qualifying species for the Somerset Levels and Moors SPA Ramsar. Lapwing also forms part of the Severn Estuary SPA Wintering bird assemblage. However, Lapwing rarely use land within 250m of the Proposed Development. The CRM predicts a mortality rate of 46.09 birds possibly associated with the Somerset Levels and Moors SPA per year, and 34.09 birds possibly associated with the Severn Estuary. However, due to the removal of existing overhead line, and the removal of 132kV overhead line to the south of the Proposed Route which would not be replaced, it is considered that there would be no increase in collision risk to lapwing. The effect on lapwing designated for the Somerset Levels and Moors SPA Ramsar is therefore anticipated to be of Very Low magnitude across the length of Proposed Route and therefore is **not significant**. The certainty of effects is considered possible.
- 8.5.355 Golden plover is a qualifying species for the Somerset Levels and Moors SPA Ramsar. A total of 552 golden plover flight lines were recorded within 250m of the Proposed Development during the 2009-2010 vantage point surveys, with the majority (>90%) recorded at the southern end of the site near to the River Huntspill and King's Sedgemoor Drain. However no flight lines were recorded at risk heights, as the birds flew at a height greater than 50m. Therefore the CRM predicts no golden plover deaths each year through collision with the proposed overhead line. Due to the flight characteristics of this species the overhead line still poses some collision risk to this species if poor weather conditions caused them to fly at a reduced height. Due to the removal of existing overhead line, and the removal of 132kV overhead line to the south of the Proposed Route which would not be replaced, it is considered that there would be no increase in collision risk to

lapwing. The effect on lapwing designated for the Somerset Levels and Moors SPA Ramsar is therefore anticipated to be of Very Low magnitude across the length of Proposed Route and therefore is **not significant**. The certainty of effects is considered possible.

- 8.5.356 Non-SPA wader species which have been recorded within the vicinity of the Proposed Development either from desktop or field survey include common sandpiper, greenshank, ruff, turnstone, black-tailed godwit, whimbrel, jack snipe and little ringed plover. Due to the very low number of flight lines of these species recorded during vantage point surveys the effect of collision risk on these species is anticipated to be of Neutral magnitude across the length of Proposed and therefore **not significant**. The certainty of effects is considered extremely unlikely.

Raptors, Owls and Birds of Prey

- 8.5.357 Field survey findings confirm that foraging buzzards often tend to fly in the risk zone when flying within the study area. Therefore there is some potential for buzzard collision mortality to occur, particularly if the proposed overhead line is located within 50 metres of blocks of mature woodland such as that on Knowle Hill. This is because breeding buzzard require an area free from aerial obstacles so that they can access the nest and undertaken aerial territorial displays without risk of collision. As the only location where the overhead line passes within 50m of mature woodland is at Knowle Hill and no nests buzzard nests have been confirmed within 100m of the Proposed Development, it is highly unlikely that buzzard would be significantly impacted by collision mortality from the Proposed Development. The effect of collision risk on buzzard is therefore anticipated to be of Neutral magnitude across the length of Proposed and therefore **not significant**. The certainty of effects is considered extremely unlikely.
- 8.5.358 Field survey findings confirm that foraging kestrel often tend to fly within the risk zone when flying within the study area. However, as existing overhead lines in this location do not appear to detrimentally affect kestrel flight behaviour it is likely that there is only low potential for kestrel collision mortality to occur. Collision mortality is predicted to be a low effect for kestrel. Field survey findings also confirm that sparrowhawk do not frequently use the study area for foraging. Therefore the potential for a sparrowhawk overhead line collision to occur is very low. The effect of collision risk on sparrowhawk is therefore anticipated to be of Neutral magnitude across the length of Proposed and therefore **not significant**. The certainty of effects is considered extremely unlikely.
- 8.5.359 Field survey findings confirm that peregrine occasionally use the study area for foraging. Observations of peregrine foraging behaviour along the Proposed Development confirm that peregrine regularly use existing overhead line pylons as viewpoints when seeking prey. Therefore the potential for a peregrine overhead line collision to occur is very low. The effect of collision risk on peregrine is therefore anticipated to be of Neutral magnitude across the length of Proposed and therefore **not significant**. The certainty of effects is considered extremely unlikely.
- 8.5.360 Field survey findings confirm that merlin very occasionally forage within the study area. The potential for an overhead line collision to occur is considered to be very low since merlin tend to fly often below 10 metres when foraging. The effect of collision risk on merlin is therefore anticipated to be of Neutral magnitude across

the length of Proposed and therefore **not significant**. The certainty of effects is considered extremely unlikely.

8.5.361 Barn owl are not a prevalent species within the study area. There is also some limited potential for barn owl breeding sites associated with Portbury Wharf, Congresbury Moor, Puxton Moor SSSI and Environment Agency barn owl boxes associated with rivers in the study area to be affected by overhead line collision mortality. Barn owls in the UK do not migrate and will nest all year round if food is plentiful. Avon Wildlife Trust have reported that barn owls nest in fields adjacent to the Alternative Route and often fly beneath the existing overhead lines in the Portbury Wharf area. The effect of collision risk on barn owl is therefore anticipated to be of Neutral magnitude across the length of Proposed and therefore **not significant**. The certainty of effects is considered extremely unlikely.

8.5.362 Little owl nest in the field adjacent to the existing 132kv pylons, whilst short-eared owl and long-eared owl have occasionally been recorded at Portbury Wharf. Due to the rarity of short-eared owl and long-eared owl recorded and the tendency for all of these species to fly below risk height it is considered highly unlikely that these species would suffer from collision risk effects. The effect of collision risk on these owl species is therefore anticipated to be of Neutral magnitude across the length of Proposed and therefore **not significant**. The certainty of effects is considered extremely unlikely.

Hérons and Egrets

8.5.363 There is some low potential for grey heron and little egret to be affected by overhead line collision during feeding flights across several parts of the study area where these species occur. However field surveys indicate that populations of these species along the Proposed Development are not large. Due to the removal of existing 132kV overhead line, it is considered that there would be no increase in collision risk to lapwing. The effect on collision risk to grey heron and little egret is therefore anticipated to be of Very Low magnitude across the length of Proposed Route and therefore is **not significant**. The certainty of effects is possible.

Bats

8.5.364 As with construction, adverse effects may occur if light spill falls onto roosting, foraging or commuting habitat, thereby deterring bat activity. Lighting would be required at the Sandford Substation. Bechstein's and horseshoe bat activity was recorded close to the proposed substation site and a bat activity hotspot (Criteria 2, **Volume 5.8.3, Figure 8.36.4**) was identified to the west. A pipistrelle tree roost (single bat roost ID 250, **Volume 5.8.3, Figure 8.28.9**) was identified at the substation site although this tree roost will be lost to the Proposed Development. The next closest roosts were also pipistrelle and located within trees along Towerhead Brook (roost ID 183a and 191). Potential adverse effects as a result of insensitive lighting are unlikely to have a substantial effect as the substation will be unmanned and lighting will only be used if maintenance works are required. As such effects from operational lighting are predicted to be of Low magnitude without mitigation and so too of **minor adverse** significance, ranging up to **moderate adverse** depending on the bat species. The likelihood of effect is possible.

Hazel Dormouse

8.5.365 No adverse effect on dormouse is anticipated during operation, further to those already assessed under construction.

Water Vole

- 8.5.366 No operational effects on water vole are anticipated associated with the permanent watercourse crossing at the River Axe or Towerhead Brook bridge, further to those already assessed under construction. Infrequent use by maintenance vehicles are not predicted to pose any perceptible effect on the water vole population. Similarly, no operational effects on water vole are anticipated following removal of the temporary bridges and culverts. The ditch system would return to the current form of management by local land owners/managers, with occasional dredging, vegetation clearance and/or access by cattle.

Otter

- 8.5.367 As set out for water vole, no adverse effect on otter is anticipated during operation, further to those already assessed under construction.

Badger

- 8.5.368 No adverse effects on badger are anticipated during operation, further to those already assessed under construction.

Brown Hare

- 8.5.369 No adverse effects on brown hare are anticipated during operation, further to those already assessed under construction.

Hedgehog

- 8.5.370 No adverse effects on hedgehog are anticipated during operation, further to those already assessed under construction.

Amphibians

- 8.5.371 No significant adverse effects on amphibians are anticipated during operation, further to those already assessed under construction. As grassland, hedgerows, scrub and coppice woodland re-establish following construction, these offer some terrestrial habitats suitable for amphibians including foraging, ranging and shelter.

Reptiles

- 8.5.372 No significant adverse effects on reptiles are anticipated during operation, further to those already assessed under construction. As described for amphibians above, semi-natural habitats suitable for grass snake, slow worm or common lizard would continue to re-establish following construction. The permanent access road along the 400kV underground cable route may support basking reptiles but the risk of killing and injury is anticipated to be minimal given the 10mph speed limit.

Ditch Invertebrates and Flora

- 8.5.373 No significant adverse effects on reptiles are anticipated during operation, further to those already assessed under construction. The degree of heating within the watercourse generated by underground cables that has been calculated is less than 0.5°C. Accordingly, potential effects such as vegetation growth (of both desirable marginal and aquatic species, and of algae within the water column) are anticipated to be to be limited. A literature review indicates that, whilst the

development and success of invertebrate species are influenced by temperature, this small-scale increase is unlikely to result in a discernible change to the diversity or abundance present (Ref. 8.111 & 8.112). As such, no significant effect on the invertebrates or flora in habiting the ditches or other watercourses is predicted.

Fish

Heat Generated by Underground Cables

- 8.5.374 For the majority of the route, the underground lines pass any given watercourse at a single crossing point; however, the underground 400kV line runs below and alongside the Lox Yeo. The Environment Agency has identified this as a receptor to the potential effects of heat. The Lox Yeo flows within the Order Limits for 525m and the underground line will pass below the river via HDD. The river flows directly through the 400kV underground easement for c.210m and beyond this, 295m meanders within 50m of the easement. Heat from the underground lines has been calculated to incur small increases in temperature within a watercourse (National Grid, 2014 unpubl.).
- 8.5.375 Water temperature affects the seasonal movement of fish and, in the vicinity of spawning and nursery grounds, egg development and survival of young. Research on trout (Elliot & Elliot, 2010) (Ref.8.113) concluded that the temperature tolerance for alevins (newly hatched fish) is slightly lower than that for parr and smolts, and that eggs have the lowest tolerance; this being the most vulnerable life stage to any temperature increase. Temperatures for trout spawning need to be between 10-15°C (below the preferred temperatures of adult fish), and trout eggs will not hatch over 14.4°C (Snyder, 2010) (Ref. 8.114). Gunnes (1979) (Ref.8.115) found that survival of incubated brown trout eggs was highest at temperatures around 8°C, with almost total mortality above 12°C. Frost & Brown (1967) (Ref.8.116) reported that mortality of trout eggs increases markedly outside the range of 5-13°C, and further, that alevins are smaller when hatching from eggs incubated outside the range 7-12°C.
- 8.5.376 Higher temperatures diminish the solubility of oxygen and thus decrease its availability for fish and their eggs. Elevated temperatures increase the metabolism, respiration and oxygen demand of fish, and other aquatic life, approximately doubling the respiration for a 10°C rise in temperature thereby increasing the demand for oxygen during the very conditions that supply is lowered (Maitland, 2003) (Ref. 8.117). A study on the River Wye (Ormerod, 2010) (Ref. 8.118) suggested that populations of trout and salmon declined by 67% and 50% respectively in 1985 and 2004 when stream temperatures rose by only 1°C in combination with low water levels. Fish can be more tolerant of higher temperatures if the temperature increases gradually over time rather than a sudden temperature increase Solomon and Lightfoot, (2008) (Ref. 8.119), found that brown trout may survive short-term high stream temperatures by seeking cooler thermal refuges in pools and deeper water. For brown trout, growth can occur between 3.5°C and 19.5°C, with maximum growth (given feeding to satiation) at 13.1°C. Elevated temperatures can also increase the solubility of many toxic substances, and so too the risk of uptake by fish, which, in the event of an external unpredicted pollution event, would pose an adverse effect on aquatic life.
- 8.5.377 Given the <1°C increase in temperature calculated within a flowing watercourse which overlies an underground cable, any potential adverse effect of heating on fish at the Lox Yeo, namely trout eggs, and hatchlings, is anticipated to be a negligible. A Neutral magnitude is therefore concluded and so too, the effect is **not**

significant. Given the lack of empirical data regarding the collective effects of several duct crossings, the certainty of effect is Possible.

EMF

- 8.5.378 Certain fish species including European eel and to a lesser extent brown/sea trout are electrosensitive and respond to magnetic fields in the environment. Some species such as eel, have significant magnetically sensitive material (magnetite) within their skeletal structure which is commonly thought to be used for direction finding using the Earth's geomagnetic field.
- 8.5.379 The locations where the Proposed Development may have an impact on electrosensitive fish are summarised as follows:
- The Huntspill River, River Yeo/Congresbury Yeo and River Kenn would be oversailed by the 400kV overhead line in locations where 132kV overhead lines already exist. The typical increase in magnetic field (comparing the existing 132kV to the proposed 400kV) experienced at ground level at these locations would be 1.96 μ T.
 - The Lox Yeo would be crossed by the 400kV line passing at least 3m below the river bed via HDD. EMF at this depth would be 10.5 μ T (although given the way the magnetic field dissipates this would likely be less) and based on this, the increase in typical EMF at the watercourse, compared to the existing 132kV overhead line would be 8.66 μ T.
 - The River Axe would have a either clear-span cable bridge or HDD to carry the 400kV underground cable across the river. Again, a 132kV overhead line also exists at this location. Assuming the cable bridge was c.1m above the river a typical increase of 22.16 μ T would be expected, or 8.66 μ T associated with the HDD.
- 8.5.380 Research into the potential effects of EMF on wildlife includes controlled experiments into behavioural responses and observations in the wild for a range of species. Much of the work relating to fish is based on the potential effects of unburied subsea cables, which, although not directly transferable, offer some interpretation. A study carried out by Westerberg & Lagenfelt (2008) (Ref. 8.120) off the coast of Sweden showed that eel swimming speed was slower when crossing unburied subsea cables between two landmasses when compared to their swimming speed on approach to and moving away from the cable. The study concluded that although a behavioural response was recorded, it did not appear to translate into an environmental effect on the eel population as it did not prevent the eel migration. A literature review commissioned by Scottish Natural Heritage (Gill & Bartlett, 2010) (Ref. 8.121) revealed that EMFs from subsea cables may interact with eels if migration routes take them over cables in shallow water but no evidence of deviation from migration routes was recorded. They concluded that: *“Current knowledge suggests that EMF from subsea cables and cabling orientation may interact with migrating eels (and possibly salmonids) if their migration or movement routes take them over the cables, particularly in shallow waters (<20m). The effect, if any, could be a relatively trivial temporary change in swimming.”*
- 8.5.381 Within the baseline data, eel are anticipated to be widespread through the watercourses that would be crossed by the Proposed Development. The potential

effect of EMF from the overhead and underground cables is recognised. However, given the low strength of typical magnetic fields calculated, and based on available research, it is not anticipated that EMF would significantly affect eel migratory behaviour. It should be noted that brown/sea trout are likely to show significantly less sensitivity to the effects of EMF than eel, and therefore **no significant** EMF effect is anticipated.

Summary

- 8.5.382 **Table 8.29** summarises potential operational effects on ecological receptors prior to mitigation. Only those receptors where effects have been identified are included in the table.

Table 8.29 Potential Operational Effects Prior to Mitigation

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
International Designated Wildlife Sites					
Somerset Levels & Moors SAC SPA Ramsar	International	Potential collision risk for Wintering bird activity associated with potential corridors for bird movement between the site and the Severn Estuary along the Huntspill River NNR LWS as well as King's Sedgemoor Drain and the River Brue. As a greater length of 132Kv line would be removed than replaced by 400kV line, with both lines in similar locations, with similar orientations and collision risk zone, on balance there is unlikely to be an increase in bird collision.	Neutral	Not significant	Possible
Severn Estuary SAC SPA Ramsar	International	Potential collision risk for Wintering bird activity associated with potential corridors for bird movement between the site and the Somerset Levels along the Huntspill River NNR LWS as well as King's Sedgemoor Drain and the River Brue. As a greater length of 132kV line would be removed than replaced by 400kV line, with both lines in similar locations, with similar orientations and collision risk zone, on balance there is unlikely to be an increase in bird collision.	Neutral	Not significant	Possible

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Hallen Marsh Agricultural Land WNS – SPA offsetting land	International (equivalent)	The intention is for habitat enhancement works to be undertaken to encourage SPA species into this area. Whether this would result in SPA bird colliding with the 400kV overhead line cannot be predicted with any certainty. A precaution approach is taken to assigning magnitude.	Medium	Major adverse	Possible
National Designated Wildlife Sites					
Severn Estuary SSSI	National	Assessed as part of the SPA Ramsar, which the site forms a component part of.	-	-	-
Tickenham, Nailsea and Kenn Moor SSSI	National	The 132kV underground line passes through the SSSI, a section of which would be laid through HDD, thereby reducing any potential heating effects further. Although quantitative data regarding the generation of heat and its transfer through the soil is lacking, during hot dry conditions, outside of seasonal flooding, localised surface vegetation would reflect the warmer and drier ground conditions, particularly as the affected areas would comprise uncompacted soils susceptible to drying. However the grasslands do not form part of the SSSI, rather they are in the SNCI	Neutral	Not significant	Possible
Bridgwater Bay SSSI	National	Assessed as part of the Somerset Levels & Moors SAC SPA Ramsar, which the site forms a component part of.	-	-	-
County and Local Designated Wildlife Sites					

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
River Axe LWS	County	With the HDD option, the 400kV underground cable passes below the SNCI. Localised adverse effects on surface vegetation within the SNCI are unlikely due to the depth of the buried cable at these locations. With the cable bridge option, shading may alter bankside vegetation immediately beneath the bridge, but this is unlikely to translate into an effect on the LWS.	Neutral (with either option)	Not significant	Possible
Lox Yeo SNCI	County	HDD is proposed beneath the SNCI. The river flows directly over the 400kV underground lines. Potential adverse effects from cable heating are not predicted.	Neutral	Not significant	Possible
Towerhead Brook (part of) and Adjacent Land SNCI	County	With the cable bridge option, shading may alter bankside vegetation immediately beneath the bridge. With the culvert option, there would be continued loss of some bankside habitats although site specific planting along the bridge would offset. Effects from either option are unlikely to translate into an effect on the LWS.	Neutral (with either option)	Not significant	Possible
Nailsea and Tickenham Moors SNCI	County	During hot dry conditions, outside of seasonal flooding, localised surface vegetation could reflect the warmer and drier ground conditions, particularly as the affected areas could comprise uncompacted soils susceptible to drying. However, only a very small proportion of the site is crossed by underground cables and HDD is used for the majority of the installation.	Neutral	Not significant	Possible

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Tickenham Hill, Cadbury Camp & Chummock Wood Complex SNCI	County	The 132kV underground cables pass below component parts of the Complex via HDD at greater depth than with open cut installation. Localised adverse effects on surface vegetation may occur during hot dry conditions.	Neutral	Not significant	Possible
Birchwood and Prior’s Wood SNCI WTR	County	The 132kV underground cables pass below the north-most area of woodland. Localised adverse effects on surface vegetation may occur during hot dry conditions. However, only a very small propotion of the site is crossed by underground cables.	Neutral	Not significant	Possible
Portbury Wharf SNCI	County	Potential collision risk associated with Wintering bird activity would probably decline with the preferred route due to the removal of two 132kV overhead lines, unlike the alternative option, no new overhead line would be constructed near the sites.	Low (preferred)	Minor beneficial	Possible
			Neutral (alternative)	Not significant	Possible
		132kV cables are installed within the designation and localised adverse effects on surface vegetation may occur during hot dry conditions. may have an effect on the grassland habitats associated with the open water habitats.	Low (either option)	Not significant	Possible
Portbury Wharf Nature Reserve SNCI	County	Potential collision risk associated with Wintering bird activity would probably decline with the preferred route.	Low (preferred)	Minor beneficial	Possible
			Neutral (alternative)	Not significant	Possible
		132kV cables are installed within the designation and localised adverse effects on surface vegetation may occur during hot dry conditions. may have an effect on the grassland habitats associated with the open water habitats.	Low (either option)	Not significant	Possible
Habitats and Flora					

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Wet ditch	National	Potential heating effects on the ditches below which the underground cables pass.	Neutral	Not significant	Possible
	County	Potential heating effects as described above.	Neutral	Not significant	Possible
Running water	County	Potential heating effects from underground cables. At those locations with deep HDD and/or single crossing points, heating is not predicted to cause any discernible effect on running watercourses.	Neutral	Not significant	Possible
Semi-improved neutral grassland	Local	In areas overlying the 400kV and 132kV underground lines, localised adverse effects on surface vegetation may occur during hot dry conditions. However, only relatively small areas could be affected out of the available habitat.	Neutral	Not significant	Possible
Hedgerows	County	In areas overlying the 400kV and 132kV underground lines, localised adverse effects on surface vegetation may occur during hot dry conditions. However, only relatively small areas could be affected out of the available habitat.	Neutral	Not significant	Possible
Fauna					
- Swans & geese – species designated for Somerset Levels & Moors SPA, or Severn Estuary SPA undertaking feeding flights or on migration during Winter period only.	International	Mortality associated with collision with overhead lines. Due to removal of existing overhead lines, no increased collision mortality is expected.	Very Low	Not significant	Extremely Unlikely

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
- Swans & geese - outside Winter or migratory period or non-SPA species during these periods. Also includes species designated for SPA's that are on the ground.	Local	Predicted 4.61 annual mute swan collisions possibly associated with Somerset Levels and Moors. Although very small numbers of whooper swan flight lines were recorded, none flew through the risk zone. Due to removal of existing overhead lines, no increased collision mortality is expected.	Very Low	Not significant	Possible
- Ducks -species designated for Somerset Levels & Moors SPA, or Severn Estuary SPA undertaking feeding flights or on migration during Winter period only.	International	Mortality associated with collision with overhead lines. Predicted 0.67 teal collisions each year of birds associated with Severn Estuary (0.01% of the SPA population) and 0.51 teal (representing 0.002% of the SPA population) associated with the Somerset Levels and Moors Very low numbers of shelduck flight lines recorded. Due to removal of existing overhead lines, no increased collision mortality is expected.	Very Low	Not significant	Possible
- Ducks outside Winter or migratory period, or non-SPA species during these periods. Also includes species designated for SPAs that are on the ground.	Local	Non-SPA duck species which have been recorded within the vicinity of the Proposed Development either from desktop or field survey include common scoter, eider, goldeneye and scaup. Only very small number of these species has been recorded, and no flight lines of these species were recorded during vantage point surveys.	Neutral	Not significant	Extremely Unlikely

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
- Waders –species designated for Somerset Levels & Moors SPA, or Severn Estuary SPA undertaking feeding flights or on migration during Winter period only.	International	Mortality associated with collision with overhead lines. Predicted 18.66 annual lapwing collisions associated with the Severn Estuary (0.18% of the SPA population) and 41.14 annual lapwing collisions associated with the Somerset Levels and Moors (0.01% of the SPA population). Very few redshank collisions. Very few curlew flight lines recorded. Very few snipe flight lines recorded Due to removal of existing overhead lines, no increased collision mortality is expected.	Very Low	Not significant	Possible
- Waders outside Winter or migratory period, or non-SPA species during these periods. Also includes species designated for SPA's that are on the ground.	Local	Non-SPA wader species which have been recorded within the vicinity of the Proposed Development either from desktop or field survey include common sandpiper, greenshank, ruff, turnstone, black-tailed godwit, whimbrel, jack snipe and little ringed plover. Only little ringed plover and common sandpiper flight lines were recorded during vantage point surveys. Only very low numbers of flight lines of each of these species were recorded. Due to removal of existing overhead lines, no increased collision mortality is expected.	Neutral	Not significant	Extremely Unlikely
Birds - Raptors & owls (excl. Barn owl)	Local	Due to removal of existing overhead lines, no increased collision mortality is expected.	Neutral	Not significant	Extremely Unlikely
Birds - Herons & egrets	Local	Due to removal of existing overhead lines, no increased collision mortality is expected.	Very Low	Not significant	Possible
Birds - Barn owl	Local	Due to removal of existing overhead lines, no increased collision mortality is expected.	Neutral	Not significant	Extremely Unlikely

Receptor	Value	Potential Effect(s) Prior to Mitigation	Magnitude	Significance	Probability
Bats	County	Potentially adverse effects on roosting, foraging and commuting habitat associated with occasional use of operation lighting required at Sandford Substation.	Low	Minor – Major adverse (depending on species)	Possible
Fish	Local	At those locations with deep HDD and/or single crossing points, heating is not predicted to cause any discernible effect on watercourses.	Neutral	Not significant	Possible
		Potential effect of EMF from the overhead and underground cables, impact to eel migratory behaviour.	Neutral	Not significant	Possible

Potential Decommissioning Effects Prior to Mitigation

- 8.5.383 At the end of the 80 year operational period, the scheme would be decommissioned (some Development Components with shorter lifespan would be upgraded/replaced earlier and the effects associated with this are addressed under 'Potential Operational Effects'). It is currently assumed that the pylons, cables and associated infrastructure would be removed across a period of up to four years. As with construction, specific tasks or works to specific sections of the route would be of shorter duration (short-term) within this period.
- 8.5.384 In broad terms, the effects associated with decommissioning would reflect those described for the construction phase and similar mitigation would apply. It is however recognised that the significance of effects would depend on the future land use i.e. the nature and extent of habitats which would be created at the close of the decommissioning process and so too the ecological value of these and associated fauna. The future land use is yet to be determined.
- 8.5.385 Habitats most immediately affected would be those located in the immediate vicinity of the pylons, CSE compounds, substations, haul road and accesses as well as compounds and ancillary works. Cables would be removed. Habitats that have been created at the periphery of the site, as off-site mitigation or as part of the biodiversity offsetting package would continue under the agreed management arrangements and, where appropriate, licence conditions for a five year period beyond National Grid ownership.
- 8.5.386 Appropriate ecological surveys would be carried out prior to decommissioning in accordance with best practice guidance at that time. As with the construction phase, mitigation would be delivered through sensitive working practices (including alignment of access routes and seasonal constraints), subject to Method Statements and licensing where appropriate. Adverse effects on bat tree roosts and on GCN ponds are anticipated to be minimal, as these two habitat types would largely be absent from the overhead and underground easements.
- 8.5.387 As part of habitat reinstatement following decommissioning, opportunities for ecological enhancement, particularly in terms of habitat connectivity across the local landscape, would be reviewed as part of the mitigation strategy.

Programme Sensitivity Analysis

- 8.5.388 This assessment has been undertaken based on the programme set out in **Volume 5.3.1, Table 3.3**. National Grid acknowledges that there may be changes to the programme as a result of changes in the generation background (i.e. contracted connection dates) and from weather events. Three programme variation scenarios are considered.
- 8.5.389 Programme variation 1, with construction commencing in March 2016 and completed in October 2019, is based on the 'contracted generation' set out in the Need Case in **Volume 5.2.1**. If the DCO is granted later than the 2015 start date yet completion dates remain as shown at **Table 3.3**, National Grid would need to deploy additional resources to meet the presently contracted connection dates. In this scenario, no significant change to the base case is anticipated. Note that in any event, pre-construction surveys would be carried out as part of the mitigation measures stipulated in the BMS (**Volume 5.26.3, section 8.7**) which will inform

review of recommendations in respect of designated sites, and priority and protected habitats and species. The phasing of works would be tighter meaning that some elements of works would be carried out at the same time as each other. Potential effects such as severance of habitat may therefore occur over an extended area at any given time. However, this assessment is not based on any specific phasing schedule and as such, phasing is not proposed as mitigation for such effects. The findings, recommendations and conclusions of this assessment are not therefore anticipated to change.

- 8.5.390 Programme variation 2 (commencing October 2018, completed in October 2022) is based on the premise that the dates by which National Grid is obliged to connect the proposed power stations at Hinkley Point C and at Seabank may change. National Grid considers that a reasonable assumption in relation to contracted connection dates is that these would be up to three years later than presently agreed, however, the construction period would be of the same duration as that on which this assessment is based. As for variation 1, no significant change in the base case is anticipated in the interim period, furthermore, the pre-construction surveys would detect any smaller fluctuations in baseline conditions that in turn inform review of the recommendations. The findings, recommendations and conclusions of this assessment are not therefore anticipated to change.
- 8.5.391 Programme variation 3 (commencing March 2016, completed in October 2022) is based on the premise the severe weather events of the winter 2013/2014 comprising sustained periods of very high rainfall and flooding in the south west, may be repeated in the future. National Grid considers that if weather events affected the installation of the underground cables, construction could be restricted to 'Summer' working periods rather than being undertaken throughout the year. In such circumstances, the works north of Sandford Substation (i.e. through Sections D to G) would commence up to two years later than programmed, although the works to the south of Sandford (Sections A to C) would remain unchanged. The overall duration of construction period would be extended to 6.5 years.
- 8.5.392 Unavoidable habitat loss has been considered in this assessment and where these effects may be exacerbated during a particular season, such as the loss of hedgerows on bat foraging and commuting activity, or the loss of ditch habitats on breeding water voles, this has been highlighted. In the event that condensed Summer working is required to facilitate installation of the underground lines outside of winter flooding, prior habitat clearance would be phased accordingly and losses may be consolidated into a shorter, potentially sensitive, period. Irrespective of the start date, vegetation clearance would be carried out in accordance with the BMS to avoid direct adverse effects on protected species such as nesting birds. Habitat reinstatement would be carried out following completion of each of the phased elements of work, thereby ensuring the interval between habitat removal and reinstatement is not extended beyond that assessed. If the 'shut down' period over winter extends into any key migration period, checks will be carried out to ensure appropriate mitigation measures, such as the temporary bat flyways, remain intact and fully functional. On this basis no substantial additional adverse residual effects are anticipated.

Consideration of Climate Change Effects on Biodiversity

- 8.5.393 EU guidance (European Commission, 2013) (Ref. 8.122), requires that EIA considers the effects of projects on climate change and on biodiversity. Although this document treats the two topics as separate issues, it notes that there are

interactions between climate change and biodiversity, and advises that assessment of permanent effects of a project, and the mitigation thereof, should take account of climate change projections applicable to the nature and scale of development.

- 8.5.394 The guidance notes that assessment should consider whether any long-term effects need to be modified in the light of the projected climate for the timeframe that the assessment applies to. **Volume 5.8.2, Appendix 8P** contains a summary of the relevant climate change projections for south west England insofar as they may impact biodiversity interests. It also signposts the reader to further information sources regarding climate change.
- 8.5.395 The EU guidance indicates that effects which are only likely to be experienced in the next 20 years should be based on current weather patterns or near-future projections if available and relevant. In relation to biodiversity, almost all significant effects of the Proposed Development are experienced in this timeframe, with the exception of collision risk to birds. The assessment of residual effects (see section 8.8) finds that almost all affected habitats would have been reinstated in or close to the project area and fauna would have re-established therein. However, there are four material considerations pertinent to climate change and biodiversity that the assessment of longer-term effects must take into account.
- 8.5.396 The first is that there is a possible residual collision risk to birds arising from the presence of overhead lines. It is therefore necessary to assess whether the assessment of significance of collision risk allows for future climate changes that may alter patterns of bird flights, and whether additional mitigation is required. The collision risk assessment needs to be made specifically in relation to birds associated with the Severn Estuary SAC SPA Ramsar and the Somerset Levels & Moors SPA Ramsar. **Volume 5.8.2, Appendix 8P** contains information about climate change effects on qualifying birds relevant to the Proposed Development. The Applicant's HRA Report (**Volume 5.20.1**) considers the robustness of the HRA and the effectiveness of mitigation, in the face of future climate change, specifically in relation to these two designated sites. This is reflected in the proposed mitigation (section 8.7) and is taken forward to the residual assessment (section 8.8). In essence, the fitting of bird flight diverters, application of the National Grid Bird Flight Diverter Protocol, and the implementation of a mortality monitoring study addresses collision risk during the operational phase of the Proposed Development. The residual effect is therefore Not Significant.
- 8.5.397 Secondly, further EU guidance (Ref. 8.123) requires the bodies concerned with managing the Natura 2000 Network, including the UK Government, to take account of climate change in their forward-planning. Although the guidance is directed at land managers and policy-developers, it specifically notes the issue of collision risk for migratory birds of European importance. The guidance suggests how projects might be assessed in terms of their effects on the 'manageability' of the Natura 2000 network. By implication, projects that impose significant constraints on the adaptability of management plans merit consideration as to whether mitigation for this is possible. This assessment is made in **Volume 5.8.2, Appendix 8P**, and is summarised below.
- *Does the Proposed Development contribute to existing pressures on the site(s)?* There is no significant direct effect on Natura 2000 sites. The proposals to fit bird flight diverters and to ensure rapid reinstatement of climate-

resilient hedgerows adequately avoid compounding any existing pressures on the sites.

- *Does the Proposed Development contribute to or restrain information-sharing, including the ability for site managers to maintain dialogue with a range of stakeholders?* The Proposed Development has resulted in the collation of significant information and the formation of a Biodiversity Thematic Group. On-going dialogue with relevant bodies (as a minimum, NE and other managers of designated sites) would through the lifespan of the project, which supports the Natura 2000 aims.
- *Does the Proposed Development constrain the possibility of adaptive management plans for the sites themselves, or for the land around and between them?* The connection and associated wayleave agreements precludes the retention or establishment of trees over, under and near the electrical components, and restricts the creation of wetlands over the underground line. However, these restrictions are local to the connection route and do not affect existing Natura 2000 sites, nor the ability of landscape managers and landowners to manage the wider landscapes. In relation to the offsetting land at Hallen Marsh, the presence of the overhead line would impose some constraints on future management of the site in that habitat enhancement would be appropriate at least 50m from overhead lines to avoid any increase in collision risk. However, the site is not yet under management for SPA birds, and National Grid proposes to fund habitat enhancement, such as removal of hedgerows and creation of wetland scrapes. These measures would be implemented by Bristol City Council using funds provided under s106 contribution by National Grid. Existing wildlife corridors, important for the movement of priority species between Natura 2000 sites are retained and/or reinstated.
- *Does the Proposed Development constrain future monitoring of climate change effects on biodiversity within the sites?* The scheme includes monitoring and research to assist with a) examining the issue of bird collisions, a matter of national interest, and b) with local bird flight movements between the Severn Estuary and the Somerset Levels and Moors.

8.5.398 Thirdly, the EIA Guidance requires developers to ensure that their designs and mitigation measures are resilient to projected climate change. In this case, the principal mitigation for the construction-phase vegetation removal is prompt reinstatement, notably of hedgerows. These hedgerows are valued ecological receptors at a County scale, but within the Consideration Zones for horseshoe bats associated with the SACs, the hedgerows are likely to have an important functional role in supporting bat foraging and commuting. It is therefore important that their design is resilient to future climate change. This assessment is made in **Volume 5.8.2, Appendix 8P** and confirms that the replacement hedgerows and other new landscapes would be planted in accordance with guidance set out by Forestry Commission's UK Forestry Standard concerning Forests and Climate Change (2011) (Ref. 8.124).

8.5.399 Fourthly, the EU guidance about assessing the impact of development on the manageability of Natura 2000 sites is transferable to a consideration of the impact on general manageability of biodiversity in the area of the Proposed Development. This can be assessed in terms of management of the network of designated sites, bearing in mind Government commitments to maintain SSSIs in favourable condition and for the majority of local wildlife sites to be actively managed. The

South West Biodiversity Forum's aspirations for positive management of Strategic Nature Areas are also relevant to an assessment of the impact of the Proposed Development, bearing in mind climate change. This assessment is made in **Volume 5.8.2, Appendix 8P** and is summarised as follows:

- *Does the Proposed Development contribute to existing pressures on the sites and Strategic Nature Areas?* The development would compound pressures in the short-term but following habitat reinstatement most of the sites, except those of a more wooded nature (Mogg's Wood, part of the Tickenham Hill SNCI complex and Gloucester Road Railway Sidings LWS) would revert to their existing status. National Grid's Bird Flight Diverter Protocol would apply to the route and allows for responsive monitoring and retrofitting of diverters.
- *Does the Proposed Development contribute to or restrain information-sharing, including the ability for site managers to maintain dialogue with a range of stakeholders?* As described above, the Proposed Development has resulted in the gathering of significant information and the formation of a Biodiversity Thematic Group. On-going dialogue with relevant bodies (as a minimum, NE and other managers of designated sites) would through the lifespan of the project.
- *Does the Proposed Development constrain the possibility of adaptive management plans for the sites themselves, or for the land around and between them, especially the Strategic Nature Areas?* As described above, the connection and associated wayleave agreements preclude the retention or establishment of trees over, under and near the electrical components, and restricts the creation of wetlands over the underground line. These effects are experienced at within some wildlife sites (as detailed in section 8.5) but do not constrain adaptive management of the landscape around sites. National Grid proposes funding for offsetting effects on local wildlife sites that cannot be mitigated, this would be secured through s106 agreement. This could enable woodland and wetland creation elsewhere in local ecological networks, improving their resilience to climate change.
- *Does the Proposed Development constrain future monitoring of climate change effects on biodiversity within the sites?* The scheme includes monitoring and research to assist with examining the issue of bird collisions, a matter of national interest, and with local bird flight movements between the Severn Estuary and the Somerset Levels and Moors.

8.5.400 The potential long-term effects of the Proposed Development, and mitigation thereof, have been considered as to whether they are resilient in a changing climate. In summary, the Proposed Development would have been constructed and replacement habitats re-established within 10 to 15 years of commencement. The replacement habitat designs utilise species which take account of climate change predictions and therefore the embedded mitigation is likely to be resilient. The principal operational stage effect which may be exacerbated by climate change relates to bird collision risk. Although the effects of collisions, in the absence of mitigation, are not predicted to be significant at either a site or population level, there is some uncertainty regarding this prediction. Climate change effects increase the level of uncertainty.

8.6 Inter-relationship of Effects

Landscape and Views

- 8.6.1 **Volumes 5.6.1 and 5.7.1** address landscape and visual effects respectively. Landscape planting proposals – both embedded mitigation and additional s106-delivered enhancement – have been devised in consultation with the ecologists. The proposals and the associated effects these may have on ecology are clearly set out and addressed in this chapter. No further inter-related effects are anticipated.

Geological Conservation

- 8.6.2 This chapter has been drafted in consultation with the author of **Volume 5.9.1** to ensure sound interpretation of soils and associated ecology, both in terms of baseline data and assessment of potential effects. In particular this relates to peat soils, the inter-relationship of ground conditions/compaction and ground water/drainage, and the potential effects of heat and heat transfer within the soil.

Hydrology

- 8.6.3 The findings and recommendations of **Volume 5.10.1** have been included within this chapter. The mitigation measures set out therein have been assessed as part of the Proposed Development assessed (see section 8.5: Modifications within the Scheme Design).

Historic Environment

- 8.6.4 Pre-construction archaeological investigations are set out in **Volume 5.11.1**. All such intrusive ground investigations are proposed within the footprint of the Proposed Development; none fall within 9m of a watercourse or waterbody. These would target specific locations, accessed using existing routes or construction accesses already in place. All would be reviewed with the ECOW in advance of works commencing, and be subject to the same seasonal constraints, Method Statements and, where appropriate, licence requirements set out under section 8.9: Mitigation During Construction.

Air Quality

- 8.6.5 Potential issues with air quality are set out in **Volume 5.13.1**. Ecological receptors are identified as designated sites within 20m of the Proposed Development, where these are sensitive to dust; all designated sites within this distance are listed within **Volume 5.13.1, section 13.5** 'Identification of Receptors'. Fugitive dust emissions are described for each works component based on the scale of work. The recommended mitigation measures of **Volume 5.13.1**, including fugitive dust emissions, are specified in the CEMP and will be delivered through a DCO requirement. These include a number of working practices to minimise dust production and practical measures to contain and avoid its spread. Residual effects of slight adverse significance are identified, collectively on all receptors, in Sections B to D, G and H.
- 8.6.6 **Volume 5.13.1, section 13.6** 'Inter-relationship of Effects' identifies two possible sources of adverse effects on ecological receptors in terms of air quality. First, the use of water suppression to mitigate dust generation may lead to adverse effects on aquatic receptors i.e. siltation. However, following implementation of mitigation

measures set out in **Volume 5.10.1**, no adverse effects on water quality are anticipated. Second, the seeding of stockpiles to mitigate dust generation may lead to effects on ecology. Seeding stockpiled earth is a mitigation measure required to alleviate the effect of reduced bat foraging habitat, specifically within the 4km SAC buffer. Whilst any additional seeding of stockpiles to mitigate for fugitive dust is likely to augment any benefit to biodiversity, the extent of this yet to be confirmed and as such has not been explicitly considered in this assessment.

- 8.6.7 Fugitive dust generated during construction is not predicted to generate a significant residual effect following successful implementation of the proposed mitigation measures. The negative effects of dust would be experienced by receptors with sensitive flora, within 50m of the dust-generating activity. Having reviewed the proximity of floristically sensitive receptors in relation to the Proposed Development, only the Tickenham and Nailsea Moors SNCI would be likely to experience an adverse effect but this is not expected to exacerbate the magnitude or significance of construction-stage disturbance already assessed for this site.
- 8.6.8 Nitrogen deposition associated with exhaust emissions from increased road traffic is not predicted to have a significant effect on sensitive ecological receptors in the vicinity. As set out in **Volume 5.13.1**, the predicted increase in road traffic due to construction of the proposed development does not exceed criteria set out in guidance on air quality assessment which would trigger a requirement for quantitative assessment.

Noise

- 8.6.9 Data collected for **Volume 5.14.1** has been used to assess potential noise effects on ecological receptors (see section 8.5). Modelled data for the construction Phase includes the predicted sound pressure levels at each badger sett (measurements taken from the entrance closest to the development footprint) and sound pressure levels at various receptors generated by HDD. No data is available to quantify vibration effects during construction. Whilst this is not expected to be significant for human receptors; no scientific judgement can accurately be made for ecological receptors. Operational noise is unlikely to have a significant effect on species.

EMF

- 8.6.10 An assessment of EMF, associated with the Proposed Development, is set out in **Volume 5.16.1**. As described under section 8.5: Potential Operational Effects, the Proposed Development complies with the current public exposure guidelines for EMF during operation. The NPS for Electricity Networks Infrastructure (EN-5, July 2011) states that “*There is little evidence that exposure of crops, farm animals or natural ecosystems to transmission line EMF has any agriculturally significant consequences*” (Part 2, section 2.10.8). Potential EMF effects on electrosensitive fish and on bats is explored as part of the potential operational effects but no tangible effect on the ecological receptors has been identified.

8.7 Mitigation

- 8.7.1 This section sets out the ecological mitigation measures that will be delivered as part of the DCO application. They are additional to the embedded mitigation

measures required by the other environmental disciplines (as set out in section 8.5: Modifications within the Scheme Design).

- 8.7.2 Reference should also be made to section 8.5 Modifications to Scheme Design, which lists habitat reinstatement and site-specific landscaping measures that will be implemented as part of the Proposed Development. National Grid's commitment to ensure that temporary working areas are fenced or demarcated so they would not encroach into SSSIs, unless absolutely unavoidable, is also set out at section 8.5.
- 8.7.3 The aim of the mitigation measures, in line with National Policy Statement EN-1, is to ensure no net loss of biodiversity interest and to reduce any unavoidable adverse effects to a negligible significance, while aspiring to implement compensatory works that contribute to wildlife networks.
- 8.7.4 The key themes of mitigation are listed as follows:
- Avoidance of effects, e.g. through sensitive working methods (including licensed method statements for great crested newts, bats and water voles);
 - Maintaining wildlife habitats and corridors during construction, such as the use of temporary bat 'flyways' at night to aid bat navigation where hedgerows are removed to enable installation of the underground lines, establishing bat foraging areas in grassland adjacent the underground works, fixing bat boxes to suitable trees, and installing fencing/gates to allow passage of badger; and
 - Reduction of bird collision risk through fitting of flight diverters to sections of overhead line where assessments show that there is residual uncertainty regarding the risk of collision.
- 8.7.5 The BMS (**Volume 5.26.3**) is the delivery document for all embedded mitigation.
- 8.7.6 SMART (Ref. 8.125) monitoring will be carried out during the implementation of the BMS. The objective(s) of each mitigation measure will have a specified threshold to indicate whether the aims are being met and if not, trigger appropriate remedial action(s).
- 8.7.7 The BMS describes measures applicable to all construction areas:
- pre-construction surveys will be carried out to ensure baseline data remains up to date;
 - an appropriately qualified Ecological Clerk of Works (ECOW) will be appointed. The role of the ECOW is set out in the BMS and the appointed person(s) would be a member of the Chartered Institute of Ecology and Environmental Management or hold equivalent accreditation;
 - advance notification will be given to land owners and land managers of any wildlife protection measures, and notification will be given to NE for works in or near SSSIs and notification of the Local Authority Ecologist for works in or near Local Wildlife Sites;
 - there will be a demarcation of the working areas (including storage areas and accesses), using appropriate fencing, to protect retained habitats and features;
 - traps or wildlife exclusion fencing will be installed (and maintained), as required by protected species licences;
 - fencing along the haul road that is permeable to badger and brown hare will be installed, to allow movement across the local landscape;
 - clearance of trees, hedges, watercourse banks and other habitats will take place under supervision and at the appropriate time of year, as appropriate to the site/species in question;

- measures to avoid spread of non-native plant species listed in the W&CA 1981 Schedule 9 will be implemented;
- any nest or roost boxes, required to meet protected species licence obligations or other commitments in the BMS, will be installed;
- controlled lighting measures (to be delivered as a Lighting Scheme as specified in the CEMP) will be implemented; and
- there will be prompt reinstatement of habitats to their former condition, including any measures to enhance species diversity.

8.7.8 The BMS comprises:

- Procedures for designated sites affected by the Proposed Development
- General Method Statements for habitat protection, works affecting hedgerows and watercourse crossings
- Species-specific Method Statements, addressing protected and priority species

8.7.9 The BMS is to be read alongside the Arboricultural Impact Assessment (**Volume 5.21.1**) which summarises the approach to tree works, including felling, pruning, pollarding, replacement tree and hedgerow planting, and use of protective fencing and root protection zones in accordance with BS5837:2012.

8.7.10 However, the mitigation measures described in this section are distinct from the additional measures that will be delivered under s106 agreement, which are separately described in section 8.9: Additional Mitigation Measures.

Mitigation of Construction Phase Effects

8.7.11 In quantitative terms, the majority of habitats lost during the construction phase will be replaced in-situ or re-created near the Proposed Development in accordance with the commitments set out in section 8.5: Modifications within the Scheme Design:

- National Grid's general commitment to reinstate habitats to their former condition during the latter stages of construction (except in areas of permanent infrastructure and, specifically of trees and treed habitats under or over the connection).
- Site-Specific Planting Plans.
- The Arboricultural Impact Assessment, specifically the Tree Impact Plans.

8.7.12 These new and replacement habitats would begin to function in ecological terms as they establish and mature. The timeframe for habitats to establish, on which this assessment is based, is set out in section 8.5: Embedded Habitat Reinstatement.

8.7.13 The Proposed Development would restrict land management: owing to the need to maintain electrical safety clearances, to prevent interference with underground apparatus and to maintain access, it would not be possible to re-establish trees and treed habitats under or over the connection. Whilst this can largely be compensated in quantitative terms, at particular locations along the connection corridor, it limits the capacity of the site managers to establish trees and woodland, which may reduce the long-term capacity to support species of interest.

Designated Wildlife Sites

- 8.7.14 Protection of designated wildlife sites would be delivered through the site specific method statements and supported by the habitat and species method statements set out in the BMS. An ECOW would supervise mitigation and construction activity in each designated site. The ECOW role may be provided by the site's managing agent, such as the Avon Wildlife Trust at Portbury Wharf. The following paragraphs provide a summary of the approach to working within designated site, but full details are provided in the BMS (**Volume 5.26.3, section 2**).

Severn Estuary SAC SPA Ramsar SSSI and Somerset Levels & Moors SAC SPA Ramsar SSSI

- 8.7.15 The Hinkley Line Entries oversail the Severn Estuary SPA Ramsar at the Bridgwater Bay SSSI. Temporary access routes, and associated vegetation clearance would be required. Reinstatement details for grassland and hedges would be agreed with NE.
- 8.7.16 Methods to avoid bird collision will be employed along the 400kV overhead line between the Bridgwater Tee and Mark. Stringing of the new 400kV overhead line along this stretch will only be undertaken once removal of the earth wire and conductors of the F Route 132kV line has been completed along this stretch. At Portishead Substation, works near Portbury Wharf, would be undertaken outside Winter to avoid disturbing SPA/Ramsar birds and would also be subject to supervision and controls on encroachment.
- 8.7.17 At the River Avon crossing, working areas would be adjusted to encroachment into the Severn Estuary SSSI (other than existing areas of hardstanding) to remove the existing 132kV pylon bases. Stringing of the 400kV and de-stringing of the 132kV overhead lines may require limited access into the designation, if required, these elements would be agreed with NE in advance of works commencing and supervised by the ECOW. At the time of overhead line installation, the ECOW would ensure information is provided to NE and would advise the contractors on appropriate precautions for the task of stringing the conductors.
- 8.7.18 The Watercourse Crossing Method Statement would ensure that temporary indirect effects on otters and fish in watercourses that are tributaries of the SAC sites are avoided.
- 8.7.19 With mitigation, no adverse effects are predicted at the construction footprint, and no indirect effects of the construction of the Proposed Development would affect the internationally-designated interests.

Hallen Marsh

- 8.7.20 Tree and hedgerow planting is not proposed at Hallen Marsh as the conservation objectives for this area seek more open habitat to attract waders and wildfowl under future offsetting proposals for impacts on the SPA/Ramsar site as a result of future development at Avonmouth/Sevenside. Where trees and hedgerows are removed to facilitate construction, locally appropriate compensatory planting is proposed elsewhere
- 8.7.21 With mitigation, no direct or indirect adverse effects are predicted to result from the construction of the Proposed Development that would affect the ability of the Hallen Marsh area to deliver effective SPA/Ramsar offsetting.

North Somerset and Mendip Bats SAC and Mendip Limestone Grasslands SAC

- 8.7.22 Mitigation is required to address the indirect effects arising from fragmentation of bat commuting corridors and reduction in foraging for horseshoe bats associated with the removal of hedgerows and soil stripping of agricultural fields to enable installation of cable trenches and the cable haul route. Details are provided in the the BMS (**Volume 5.26.3, section 2**), and in the Applicant's HRA Report (**Volume 5.20.1, section 5**), and illustrated in (**Volume 5.8.3, Figures 8.42, 8.43 and 8.44**), summarised in the paragraphs below:
- Hedgerows – provision of temporary bat flyways where underground cable installation would result in significant gaps in hedges important to SAC bats.
 - Foraging – along the 400kV underground swathes and Sandford Substation site 64ha of grassland would be managed to provide invertebrate prey. Spoil mounds (circa 70ha) would be sown with nectar-rich mixes, and the bases of retained hedgerows (4.5km) would be managed to encourage invertebrates.
 - As part of the Lighting Strategy, artificial lighting in construction areas within the SAC bat species Consideration Zones would be kept to a minimum and directed away from flyways.
 - Prompt reinstatement of lost hedgerows, using relatively nectar-rich species mixes.
- 8.7.23 The delivery of this mitigation is guaranteed as the land is within National Grid's control and the DCO will enable prior entry for surveys and post-construction monitoring. The likelihood of effect is certain/near certain.

National and Local Designated Sites: General Measures

- 8.7.24 Potential effects and appropriate mitigation measures for SSSIs and locally-designated sites are set out in the BMS. These measures include the provisions that address relevant SAC SPA and Ramsar qualifying features that the SSSIs support (habitats, bird, bat, otter and fish), as well as the other special interest features.
- 8.7.25 The ECOW would meet a representative of NE (and if applicable the site managing agent), no less than one month prior to commencement of works and would agree any special measures additional to those covered by the BMS that are necessary for maintenance of the site's special interest. Examples include localised re-profiling of rhyme banks within the SSSI when watercourse crossings are removed to create a stepped profile, and relocation of in-channel vegetation (within a single rhyme) to speed re-colonisation in the longer stretches affected by installation of cable ducts for the 400kV underground line.
- 8.7.26 The ECOW would advise the Contractor's site staff of interest features/other sensitive receptors through 'toolbox talks' in advance of works. The ECOW would visit each designated site at the start of each phase of development to review working arrangements and would make at least weekly visits while works are carried out in a SSSI.
- 8.7.27 For SSSI and LNR, prior to works, a s28E consent application will be made to NE. This will detail the proposed works, submitted a minimum of 30 working days prior to works commencing. Following works the ECOW would provide a bespoke report to NE describing the works carried out, including 'as-built' drawings of any

permanent infrastructure, ecological and landscape measures, such as the location of GCN hibernacula or replanted hedgerows.

- 8.7.28 The proposed mitigation of construction-phase effects is deliverable by National Grid directly through the construction, tree works and landscape contracts, as supervised by the ECOW. Protected species licences would apply to several sites. The proposed mitigation measures would reduce the significance of the medium-term effects arising from habitat loss and disturbance. The likelihood of effect is certain.
- 8.7.29 The following narrative summarises the mitigation for each nationally-designated sites potentially affected by the Proposed Development. It also summarises mitigation for County value sites where construction is predicted to have a medium or high magnitude effect in the absence of mitigation.

Huntspill River NNR

- 8.7.30 National Grid will adjust working areas at the 400kV pylon location to ensure it is outside the boundaries of the designation. Scaffolding and 132kV removal works cannot avoid the NNR. For all locations within and adjacent to the NNR, fencing and signs will be used to prevent encroachment outside set working areas. Within the working areas soil piles will be covered by sheeting to prevent run-off. Sheeting will be fixed to perimeter works fencing and bunds will be placed along the base fencing where they are adjacent to the designation. This is an additional precaution to standard practices described in the CEMP to ensure any run-off or windblown debris will not enter the designation. Watercourse Crossing and Otter Method Statements would also apply.

Puxton Moor SSSI, Biddle Street Yatton SSSI and Tickenham, Nailsea & Kenn Moors SSSI

- 8.7.31 Within these three SSSI ditch systems the designation includes the ditches and land extending 6m from the bank top. As committed to in section 8.5: Modifications to Scheme Design, National Grid would seek to avoid, or where this is not possible minimise, encroachment of construction working areas into the SSSI designations at the detailed design stage.
- 8.7.32 For all locations within and adjacent to the SSSI, fencing and signs will be used to prevent encroachment outside set working areas. Within the working areas soil piles will be covered by sheeting to prevent run-off. Sheeting will be fixed to perimeter works fencing and bunds will be placed along the base fencing where they are adjacent to the designation. This is an additional precaution to standard practices described in the CEMP to ensure any run-off or windblown debris will not enter the designation.
- 8.7.33 Installation, removal, mitigation and monitoring of temporary watercourse crossings will follow the watercourse crossing method statement.
- 8.7.34 Replacement tree and hedgerow planting are not proposed in these three SSSI as open habitats meet the site-specific conservation objectives more closely i.e. are more beneficial the species/assemblages that these sites support. In these cases, locally appropriate compensatory tree planting is proposed elsewhere through the Off-Site Planting Enhancement Strategy (OSPES) (see section 8.9: Additional Mitigation Measures).
- 8.7.35 During removal of temporary water crossings in these SSSI, the steep/vertical bank profile would not be reinstated but contoured to create a stepped bank within the

discrete stretch already affected by works to enhance ditch habitats for invertebrates. The stepped bank profile would vary on a case by case basis, depending on the surrounding land use. As elsewhere within the ditch network, vegetation would be allowed to recolonise naturally and, in the long-term, would be managed in line with the wider network management regime.

- 8.7.36 This small-scale variation in habitat structure (in terms of temperature, light levels and vegetation/open water) at the crossing points within the SSSI is predicted to form a beneficial effect of Low magnitude and therefore of **Moderate beneficial** significance on the three SSSI. The likelihood of effect is probable. Monitoring proposals are set out under 'Ditch Invertebrates and Flora' below.
- 8.7.37 Following completion of works and removal of crossings, ditch habitats will be surveyed in the following summer to determine if banks are establishing as predicted and any remedial measures will be agreed with Natural England under National Grid's commitment to maintain reinstated habitats for five years.
- 8.7.38 Installation of a tilting weir (in line with the Somerset Ditches and Ponds Habitat Action Plan) to control Winter water levels across the north of Tickenham, Nailsea and Kenn Moors SSSI is set out under section 8.9: Additional Mitigation Measures.

Bridgwater Bay SSSI and Severn Estuary SSSI

- 8.7.39 Mitigation for these sites has been discussed above in relation to the international designations (Severn Estuary SPA Ramsar SAC) within which they are located. In addition, measures relating to the SSSI ditch invertebrate assemblage of the Bridgwater Bay SSSI will be adhered to when installing the temporary culvert crossing.

Nailsea and Tickenham Moors SNCI

- 8.7.40 This site would experience temporary loss and disturbance of grassland, principally due to construction of access routes to dismantle the 132kV pylons. Some loss of hedges and trees would take place.
- 8.7.41 Fencing and signs will be used to prevent encroachment outside working areas. Within the working area soil piles will be covered in sheeting to prevent run-off into adjacent ditches.
- 8.7.42 44 trees and parts of 5 tree groups will be felled. Natural England has requested that replacement tree planting is not undertaken adjacent to SSSI ditches. None of the fields crossed by the works are unimproved, therefore re-seeding mixes will be agreed with the landowner seeking to replicate current conditions.
- 8.7.43 In addition to the approach detailed for the SSSI ditches, as the working areas are adjacent to and cross SNCI designated ditches, and as the SNCI citation mentions invertebrates, particular reference is made to the watercourse crossings method statement and invertebrates method statement in the BMS.

Tickenham Hill, Cadbury Camp, Chummock Wood Complex SNCI

- 8.7.44 This site contains ancient woodland, unimproved and semi-improved calcareous and neutral grassland which supports a range of botanical communities, invertebrates, birds and badger
- 8.7.45 National Grid will adjust the 132kV pylon removal and 400kV construction working areas to avoid ancient woodland habitat and contain the works within the semi-

improved species-poor grassland area of the designation. A species-rich hedgerow within the SNCI, connected to the woodland, may still be lost to scaffolding. National Grid will review this when scaffolding contractors have been appointed and will advise the Local Planning Authority of the proposals for scaffolding.

- 8.7.46 It is not possible to avoid tree works within the SNCI, due to the need for electrical safety clearances beneath the 400kV overhead line. Woodland canopy will be lost, although woodland ground flora will be retained. Fencing and signs will be used to prevent encroachment outside working areas. Arisings from the felling will be placed within the SNCI to create habitat piles.
- 8.7.47 None of the SNCI fields crossed by the works are unimproved, therefore re-seeding mixes will be agreed with the landowner, seeking to replicate current conditions.
- 8.7.48 As the SNCI citation mentions hedgerows, birds, badgers and invertebrates, and as these may be affected by the construction works, particular reference is made to the hedgerow, birds, badger and invertebrates method statements in the BMS.

The Portbury Wharf Nature Reserves (SNCIs)

- 8.7.49 These two sites would be affected by both the preferred and alternative options, to a lesser degree with the preferred option. Scrub and grassland clearance, installation of watercourse crossings and excavation of cable trenches would all be required. Application of several habitat and species method statements would be needed, along with the presence of the ECOW. The works would require a bespoke programme to ensure advance vegetation clearance and installation of amphibian fencing (and removal and replacement of bat roost trees on the alternative option) accorded with protected species licences.
- 8.7.50 Habitats would be reinstated in accordance with Avon Wildlife Trust's current site management plan (this may include leaving open habitats alongside ditches following completion of works).
- 8.7.51 The mitigation measures would reduce the significance of the medium-term construction effects on the special interest of the sites. The compensatory measures would ensure that the biodiversity within and dependent on the site regains its current status. As the site is under a long-term management plan, and the reserve managers have indicated that should the scheme be granted consent they would be willing to agree a detailed mitigation scheme, the mitigation can be delivered and therefore the likelihood of effect is certain with the preferred route and near certain with the alternative route which has a greater initial effect.
- 8.7.52 As the citations mention birds, otter, water vole and great crested newts and these receptors may be affected by the construction works, particular reference is made to the birds, water vole, otter and amphibian method statements in the BMS.
- 8.7.53 As the working areas are adjacent to and cross watercourses, particular reference is also given to the watercourse crossings method statement.

Gloucester Road Railway Sidings SNCI

- 8.7.54 This site would undergo tree removal. As the woodland SNCI is noted for its bird community, particular reference is made to the bird method method statement in the BMS.

Habitats and Flora

- 8.7.55 Protection measures that apply to all habitats in and around working areas, irrespective of special protection, are detailed in the BMS (**Volume 5.26.3, section**

3) which has specific Method Statements are provided for works affecting hedgerows, for watercourse crossings and in relation to biosecurity and invasive species. The Arboricultural Impact Assessment (**Volume 5.21.1**) provides a summary of the tree protection measures, the details of which would become a DCO Requirement.

- 8.7.56 Monitoring of planted trees and hedgerows, and of sown grasslands would continue through the first five years following construction to ensure these establish as intended.

Trees

- 8.7.57 Existing trees to be retained would be protected during works in accordance with BS5837:2012 'Trees in relation to design, demolition and construction. Recommendations'. All tree and hedgerow works would comply with BS3998:2010 'Tree Work – Recommendations'.
- 8.7.58 To restrict spread of tree pathogens, all equipment and machinery and vehicles used for tree, hedge and shrub removal would be cleaned, disinfected and used in accordance with current Forestry Commission biosecurity guidance and the ECOW would advise on whether each working area requires 'red' or 'amber' level biosecurity precautions.
- 8.7.59 Wherever practicable, arisings from tree lopping or felling would be used to create habitat piles of dead and decaying wood. These would be appropriately sited to maximise benefit to wildlife.

Hedgerows

- 8.7.60 The Hedgerow Method Statement applies to all works across the Order Limits. As with watercourses, this requires marking out and micro-siting to minimise hedgerow loss. Inspection for protected species would be carried out prior to removal of the hedgerow in line with the pre-construction survey requirements set out for faunal receptors below. Licensable protected species mitigation would be implemented as appropriate.
- 8.7.61 Any affected hedgerows known to contain native bluebell would also be inspected and bulbs translocated to suitable receptor locations (typically an adjacent section of hedge) identified in agreement with the ECOW.
- 8.7.62 Hedgerow removal may affect bat foraging and commuting along the proposed underground lines and the Sandford Substation. In these locations, where removal would result in gaps of more than 15m, temporary bat flyways would be used to ensure that bat flight corridors are maintained at night during the active season (March to October inclusive). These temporary features would be maintained throughout the construction period and, if necessary, during the early years of establishment of replacement hedgerow planting reaches the intended canopy height.
- 8.7.63 Replacement hedgerow planting would follow the existing landscape pattern, with the exception of the realignment of hedgerows at Sandford Substation and the semi-permanent access route, which would be removed and replaced in the Site-Specific Planting Plans. Hedgerow planting would include at least five locally appropriate native species. The Arboricultural Impact Assessment (**Volume 5.21.1**) provides planting specifications for standard hedgerows and for four specific

hedgerow types (locally-appropriate species mixes and increased density) which will be implemented at 70 hedgerows, primarily within the AONB. Livestock fencing would be provided to safeguard planted specimens.

- 8.7.64 Taking into consideration the in-situ hedgerow replacement and the landscape schemes, ca. 41.92km of new hedge under the Preferred Route Option A would be planted to replace the 16.81km hedgerows currently lost to the development and an additional 2.99km that could be affected to be determined at detailed design. Hedgerow lengths for the Alternative Route Option B vary slightly with 42.45km replanted to replace 17.27km due for removal under current proposals and an additional 2.37km that could be affected at detailed design. An additional 11.12km of hedgerow gaps would be filled. (This mitigation is certain to be delivered within the Order Limits, fully mitigating the medium-term adverse effects. Mitigation would be effective for fauna within 10 years of the start of construction (4 years' construction, 3-5 years' establishment). The likelihood of effect is certain.

Watercourse Crossings

- 8.7.65 The Watercourse Crossing Method Statement in the BMS applies to all crossings, both major rivers and smaller field ditch systems. Working areas can almost always be set back at least 9 metres from bank tops, and any works within the buffer zone would be covered by EA pollution prevention guidelines (Ref. 8.126). Additional BMS controls for works within 9m of a watercourse include biosecurity measures, fencing and demarcation of working areas, avoidance of storage of any materials within the buffer zones, and specific measures for installation and removal of temporary and permanent crossings.
- 8.7.66 The BMS lists the major rivers and notes that crossings will be by HDD or clear-span cable bridges, with no effects to channel or bank habitats.
- 8.7.67 The BMS also applies to smaller watercourses and field ditches. It addresses the installation and removal of temporary culverts and bridges for access purposes, and the installation of cable ducts beneath existing watercourses.
- 8.7.68 Culverts would be buried to a depth of 1.1m, thereby retaining continuity of the basal substrate. Cable trenches would be backfilled and the natural channel form reinstated.
- 8.7.69 In some cases, the density of ditches in the landscape is so great that it may not be possible to install access tracks which maintain a 9m buffer from all watercourses. In this case, optimum siting of access tracks would be agreed with the IDB (and in the case of SSSI/LWS ditches, in consultation with NE or the site manager) in order to minimise encroachment into the 9m zone.
- 8.7.70 Careful marking out and micro-siting led by the ECOW will be carried out to minimise loss of sensitive receptors. The lead-in period would allow sufficient time for survey for water vole, otter, fish and aquatic invertebrates to take place within the appropriate season, and for subsequent mitigation of water vole. Additional consideration of protected species such as riparian mammals and invertebrates apply at select locations.
- 8.7.71 All watercourses would be reinstated on completion of works and specific measures for this are set out in the BMS. Where short stretches of watercourse are affected, and sufficient native vegetation remains in the adjacent channel, vegetation will be allowed to re-colonise naturally. Alternatively, re-seeding and re-planting of the banks and channel shall be carried out using floral mixes in line with Flora of the

Bristol Region (Ref. 8.127), or as otherwise approved by the relevant local planning authority.

8.7.72 At the time of removal of temporary crossings, there may be an opportunity to implement areas of localised enhancement of the bank profile which may benefit habitats and invertebrates.

8.7.73 Given the rate of recovery of river and ditch ecosystems following minor disturbance, the likely effectiveness of the faunal protection measures and the limited footprint of the crossings in relation to the ditch ecosystems, it is expected that the short-term disturbance at the time of installing the crossing points would be fully mitigated within 18 months and similarly the short-term disturbance associated with removal of the crossing point would be fully mitigated within 12 months. The likelihood of effect of this is certain.

Arisings and Soil Mounds

8.7.74 Regarding the management of arisings, topsoil would be conserved where possible for subsequent reinstatement in accordance with the measures set out in **Volume 5.9.1** Ground Environment. Locations for stockpiling cut vegetation arisings (e.g. logs, brash, grass) would be specified in advance by the ECOW to avoid accidental creation of additional habitat for protected species. Where arisings cannot be stockpiled outside of the working area, this must be removed, or chipped and spread thinly in specified areas (agreed with the ECOW and subject to landowner consents).

8.7.75 Within the undergrounding corridor, any soil piles likely to be present throughout the Summer would be seeded with a nectar-rich grass/flower mix to encourage invertebrates which would act as prey for bats.

Non-Native Invasive Flora and Diseases

8.7.76 The BMS includes an Invasive Species Method Statement, which addresses both terrestrial and aquatic invasive species. The measures include prior survey, toolbox talks, fencing and warning signs, supervision of works in areas where invasive species are recorded, and biosecurity provisions in line with EA and Forestry Commission pollution prevention and biosecurity guidance.

8.7.77 The BMS would reduce the effect of spreading invasive species from a Major Adverse significance to a neutral effect. As some species may not be visible at certain times of the year, there is a risk that the method statement may not be fully effective, so the certainty of mitigation is classed as probable.

Birds

8.7.78 Mitigation in the BMS includes a Bird Method Statement, alongside the general habitat precautions and the Hedgerow and Watercourse Crossings Method Statements. These address the risks of disturbance and habitat loss identified at section 8.5.

Mitigation of Impacts on Nesting Birds

8.7.79 Disturbance of hedgerows/shrub/trees or dense vegetation would be kept to a minimum. Vegetation clearance, especially of hedgerows and trees would be timed to be carried out in Winter. Where these measures are not possible and works are needed to be carried out during the bird breeding season (March to August

inclusive), all areas to be affected would be checked for evidence of nesting birds a maximum of 24hrs prior to the vegetation removal/tree felling works taking place. If any active bird nests are discovered these would be given a minimum standoff of 5m (this may increase depending on species/proposed works and location) where no potentially disturbing works would take place until the young have fledged and the nest vacated. A second nesting bird check would then be undertaken to ensure the tree/vegetation does not contain any further active nests prior to felling/removal works taking place.

- 8.7.80 To prevent disturbance or destruction of active nests of ground nesting birds the following mitigation would be carried out. Where the development passes through open fields within areas known to support ground nesting birds such as Nailsea Moor, Kenn Moor, Puxton Moor and Tickenham Ridge during March to August, a nesting bird check would first be carried out by an ecologist to establish whether ground nesting birds such as lapwing and skylark are nesting within that location. If active bird nests are located, the nest would be marked and all potentially disturbing works within at least 20m of the nest location would be stopped until the active nest had been vacated. Prior to works in the area commencing a further nesting bird survey would be required to establish that no active bird nests were present within the area.
- 8.7.81 Barn owls are protected under Schedule 1 of the Wildlife and Countryside Act and so are protected from disturbance during the breeding season which may be at any time of year. To prevent disturbance/destruction or displacement of active barn owl nests any works proposed to be undertaken within 50m of a known barn owl box would require inspection of the box for signs of current nesting activity by a licenced barn owl surveyor a maximum of 24hrs prior to works commencing. Should barn owl be found to be nesting, no works would take place within a minimum disturbance buffer distance of 50m surrounding the nest location while the nest is active. This applies to the Portbury Wharf nature reserves should the alternative route be selected, where a pair of barn owl is known to nest within a nest box.
- 8.7.82 Cetti's warbler are protected under Schedule 1 of the Wildlife and Countryside Act and so are protected from disturbance during the breeding season. To prevent disturbance or destruction of active Cetti's Warbler nests, any removal of dense vegetation within the period March to August would require a nesting bird check a maximum of 24hrs prior to works taking place. If Cetti's warbler are suspected to be nesting, a licenced ecologist may be required to check the nest directly. If Cetti's warblers are established to be breeding, a minimum standoff of 20m would be applied to the nest location. This disturbance buffer may be increased at the discretion of the licenced ecologist depending on the proposed works and the habitats present.
- 8.7.83 Kingfisher are also protected under Schedule 1 of the Wildlife and Countryside Act 1981 and so are protected from disturbance during the breeding season. The BMS defines a 9m buffer zone from all watercourses. Any works within the buffer zone first require a kingfisher survey to be undertaken along the proposed watercourse by an ecologist. If kingfisher are suspected of currently nesting, a further survey by a licenced ecologist would be required a maximum of 24hrs prior to works taking place to establish whether the kingfisher nest is active. If kingfisher are established to be breeding, a minimum standoff of 20m would be applied to the nest location. This disturbance buffer may be increased at the discretion of the licenced ecologist depending on the proposed works and the habitats present.

- 8.7.84 Common crossbill are protected under Schedule 1 of the Wildlife and Countryside Act and so are protected from disturbance during the breeding season. If any tree removal is required from any woodland between the Chummock Wood and Mogg's Wood, near to Cadbury Camp Lane, a nesting bird check for common crossbill would be required a maximum of 24hrs prior to works taking place. If common crossbill are suspected to be nesting, a licenced ecologist may be required to check the nest directly. If common crossbill are established to be breeding, a minimum standoff of 20m would be applied to the nest location. This disturbance buffer may be increased at the discretion of the licenced ecologist depending on the proposed works and the habitats present.
- 8.7.85 Demolition of Ashtrees Farm, including removal of climbing vegetation would take place outside the bird breeding season or only once nesting bird checks confirm not active nests are present.
- 8.7.86 Impacts on birds nesting opportunistically in working areas would be minimised through an ecologist checking any sections of bare ground of more than 0.5ha for active bird nests if these areas have been left undisturbed (more than 50m from an active working area) for more than 1 week during the breeding season. If nesting birds are found, measures appropriate to the species, location and proposed works would be implemented as advised by the ecologist to ensure nests are not destroyed or disturbed while active.

Avoidance and Mitigation of Habitat Loss

- 8.7.87 Watercourses would be avoided other than at crossing points and alterations to hydrology minimised. Any loss of wet grassland habitat would be re-instated following development works. To mitigate for unavoidable habitat loss for both breeding and non-breeding birds all hedges/shrub or dense vegetation would be re-instated following works through replacement planting. Any nest boxes lost through the development would be re-instated on a 2:1 basis. The replacement nest boxes would be sited in appropriate habitat as near as possible to the locations of the nest boxes to be removed.
- 8.7.88 If the alternative route is selected, disturbance and/or displacement to Wintering birds would be minimised through avoiding the period September to April to carry out works within 250m of the pools at Portbury Wharf where possible. Works would avoid the period February to March. This is the period when Wintering birds are especially sensitive to losing valuable feeding time due to disturbance.
- 8.7.89 Issues relating to birds at Hallen Marsh have been considered under the site designation section of this report.

Bats

Bat Roosts

- 8.7.90 The surveys identified 21 trees with known bat roosts that were potentially affected by felling to install the proposed 400kV connection or to ensure electrical safety clearances. During the design process in late 2013, the opportunity was taken to adjust pylon positions to reduce this effect. Seven trees with known bat roosts would be felled and a draft licence application has been made to NE to enable this.
- 8.7.91 Prior to site clearance, the Bat Method Statement requires pre-construction surveys (tree climbing inspections and nocturnal surveys at the appropriate time of year) of

all trees identified to have roosts or high bat roost potential. The purpose of survey is to establish whether roosting bats are present in any of the trees scheduled to be felled and to establish the extent that bats use the habitat areas for foraging. This would be carried out in advance of each phase of the works throughout the duration of the project, allowing sufficient time for NE licences to be secured where roosts are identified in trees that require felling.

- 8.7.92 If any additional roosts are identified, the proposed works would be reviewed to see if any adjustments can be made. This may be more practical for roosts affected by access tracks than for roosts in trees under or near the 400kV line. Nevertheless the licencing process requires consideration as to whether there are any satisfactory alternatives.
- 8.7.93 NE licensing requirements would be employed as appropriate, and as part of this proportionate mitigation would be implemented and seasonal constraints would apply to works. Alternative roosts would be provided within the Order Limits, and would be sited in habitat safeguarded from works, with favourable habitat connectivity, as close to the lost roost as possible. The alternative roosts would normally take the form of tree-mounted boxes, of a dimension and design appropriate to the roost being lost, with boxes being replaced on a 3:1 minimum ratio.
- 8.7.94 Where roost trees to be felled also have features capable of supporting hibernation, additional hibernation boxes would be installed on nearby trees in the Order Limits.
- 8.7.95 To compensate for the loss of trees of high roost potential (i.e. where no roosts were actually found, but the features may support future roosting), additional boxes would be installed at a 1:1 ratio.
- 8.7.96 A licenced ecologist prior to, and at the time of felling of a roost tree will be in attendance. The ecologist will implement exclusion measures in suitable cavities with the aim of ensuring all bats have left before felling, rather than having to rescue live bats from a roost. The ecologist would also brief the Arboricultural contractors about precautions should a bat or roost be found elsewhere. Known bat roosts or High value trees would be marked on plans supplied to the Arboricultural Contractors to raise awareness when carrying out pruning or pollarding or felling near a known roost tree.
- 8.7.97 At Ashtrees Farm, evidence of very low/single use by brown long eared and pipistrelle bats was identified. The building of the farm complex would be demolished (avoiding hibernation and maternity seasons where bats have been confirmed roosting) except for one building which would be retained and enhanced for bats.
- 8.7.98 A draft version of the licence has been submitted to NE prior to the DCO consent being granted. This will be updated in 2014 and, assuming this is obtained, a full licence obtained post DCO approval. Monitoring requirements at affected roosts would be determined in accordance with NE licence requirements at that time.
- 8.7.99 The Bat Method Statement, in conjunction with licencing controls, would reverse the adverse effect of loss of roosts and trees of roost potential. The likelihood of effect is certain.
- 8.7.100 Compensatory native tree planting at a ratio of 4:1 would be undertaken as described in the introduction to this section. Over time this would provide additional roost potential, resulting in a Low magnitude beneficial effect for receptors of local significance (i.e. pipistrelles, long-eared and, by rivers, Daubenton's bats, the

species most likely to be found). This is of **minor beneficial** significance. The likelihood of effect is near certain.

Lighting

- 8.7.101 The need for lighting is minimal due to the relatively restricted working hours. However, where necessary, lighting would be directed away from trees, hedgerows, woodland and watercourses to avoid the possibility of deterring bat activity or, in the worst-case, abandonment of a roost. Lights would be installed at appropriate height, with directional hoods fitted to minimise spillage and with low pressure sodium bulbs or UV filters. This would reduce the adverse effects of construction activity to **no** significance.

Foraging and Commuting

- 8.7.102 Losses of bat important foraging and commuting habitat across the Order Limits are relatively small. Exceptions include tree and hedge works at Tickenham Ridge which may have a fragmentation effect on bats, although restrictions to canopy removal, and future consultation with scaffolding contractors, should ensure vegetation cover remains at this location, for bat to navigate or feed along, allbeit in an altered state.
- 8.7.103 Hedgerows and linear stretches of vegetation would be maintained as 2m high lines of scrub where such features are crossed by the overhead line during the construction phase. This would maintain bat commuting corridors during the construction works. Temporary flyways would be provided as illustrated in **Volume 5.8.3, Figure 8.44**.
- 8.7.104 Temporary habitat losses would be greatest along the 400kV underground swathe. Here temporary bat flyways would be provided to avoid fragmentation through hedgerow removal and agricultural land within the Order Limits would be managed for bats (as described earlier) for the duration of construction to compensate for the loss of foraging habitat. Additionally, earth bunds created from excavated soils would be sown with seedmixes during construction. These would be available for the period that excavations are open and, once established, would therefore provide interim foraging habitat in the short-term.
- 8.7.105 Replacement hedgerow planting would be undertaken in the first planting season following completion of construction and general ground reinstatement. Specifications are provided in the Arboricultural Impact Assessment, and for certain areas of the Mendip Hills AONB within the SAC buffer zone, specific nectar-rich mixes would be deployed.
- 8.7.106 These measures have been agreed with NE in relation to the HRA for the relevant Bat SAC sites. They would be delivered as DCO Requirements. The measures would result in no adverse effect on the integrity of the SAC and are likely to reverse the adverse effects of loss of commuting and foraging with effect throughout the construction period. The likelihood of effect of mitigation in terms of the SAC site integrity is certain and the likelihood of effect for individual bat activity is near certain.
- 8.7.107 Monitoring of planted trees and hedgerows, and sown grasslands would continue through the first five years of the operational period, together with any remedial measures to maintain flyways. This would ensure that the embedded mitigation

required by the Habitats Regulations is confirmed as having no residual adverse effect.

Hazel Dormouse

- 8.7.108 Potential effects on hedgerows that may be utilised by dormice have been minimised through modifications within the scheme design by avoidance of impacts on woodland and hedges with recent dormouse records.
- 8.7.109 The Dormouse Method Statement stipulates that pre-construction surveys would be carried out in areas considered to provide potential habitat for dormouse (as advised by the ECOW in advance of clearance works).
- 8.7.110 There is one hedge connecting two ancient woodlands with records of dormice, and HDD techniques would be used to install the underground line ducts.
- 8.7.111 In the event that dormice are found during pre-construction checks, works would cease and NE licensing requirements followed to enable works to continue. The principles of licensable mitigation are set out in the BMS. These include controlled site clearance, translocation and enhancement measures.
- 8.7.112 The general principles of maintaining habitat connectivity and habitat enhancement benefit dormice, encouraging distribution of the species within the wider area in the long-term. Hedgerow replacement specifications in the Arboricultural Impact Assessment (**Volume 5.21.1**) include a range of the preferred habitat and food plants of dormouse in suitable areas, such as hazel, oak and honeysuckle.
- 8.7.113 The slight net increase in hedgerows in the sections of route with previous dormouse records, coupled with the infilling of hedge gaps, as proposed in the embedded mitigation would enhance conditions for dormice in the long-term. The net beneficial effect would be of Low magnitude to a receptor of County value, in this case being of **minor** significance. The likelihood of effect is probable.

Water Vole

- 8.7.114 In accordance with the BMS's Watercourse Crossing Method Statement, all retained ditches would be protected from construction working areas and vehicle movements through the installation of Heras fencing to the minimum stand-off distances wherever possible, to prevent encroachment into potential water vole habitats. Where maintenance of the stand-off distances cannot be secured, further measures to minimise the risk of pollution or siltation in accordance with the recommendations set out in **Volume 5.10.1** and **Volume 5.26.1**.
- 8.7.115 As part of the Water Vole Method Statement, a pre-commencement water vole survey would be carried out of all ditches where the minimum stand-off distance cannot be maintained, to update the existing baseline.
- 8.7.116 Where no water vole burrows are identified, vegetation control would be undertaken as specified in the Method Statement to dissuade water voles from colonising the working area during the interim period. Vegetation within the working area should be regularly trimmed to ensure that water voles are dissuaded from colonising. Works would be carried out in the season before territories are established to avoid fighting between resident and relocated individuals later in the year.
- 8.7.117 Where water voles are present measures would be taken to ensure water voles are moved out of the area, either by vegetation management to humanely displace water vole in advance of works or by licensed translocation, trapping and exclusion for the duration of works. Again, works would be carried out in the season before

territories are established. As with other protected species, a draft version of the licence has been submitted to NE prior to the DCO consent being granted and, assuming this is obtained, a full licence obtained post DCO approval.

- 8.7.118 Water voles are expected to be encountered in many ditches. The majority of works undertaken as part of the development would affect individual sections of water vole habitat of less than 50m in length, and therefore displacement methods are recommended in the Water Vole Conservation Handbook (Strachan, 2011) (Ref. 8.128).
- 8.7.119 Installation of cable ducts for the underground lines could result in some ditches needing to be cleared of vegetation for distances over 50m over a period of 3-6 weeks (current assessment indicates 400kV cable duct working areas will be circa 45m wide) . In this situation, trapping, translocation and exclusion are proposed, as detailed in the draft licence. Construction of Sandford Substation entails permanent loss of c.560m of the Parish Rhyne watercourse. No voles were found during surveys of 2012 and 2013. However, if water voles colonise in the intervening years, licensed translocation would be required as detailed in the BMS.
- 8.7.120 The crossings will be removed following construction. Mitigation would entail localised displacement by vegetation management in advance, not requiring a licence, but this would be informed by surveys carried out in advance of works. Watercourse banks would be reinstated as described under 'Habitats and Flora' above.
- 8.7.121 Taking account of mitigation, disturbance to water voles caused by crossing installation or removal would have a short-term adverse effect. This is because voles are relatively mobile and could adapt to displacement from the short lengths of affected stretches. The relatively of the crossings would not impair movement. The likelihood of effect of mitigation in the short-term is near certain.

Otter

- 8.7.122 In accordance with the BMS's Otter Method Statement, pre-construction surveys would be undertaken approximately three months prior to the start of construction to inspect for holts or shelters and natal dens. If such places are identified within 50m (or 150m for natal dens), NE licence requirements would apply, including a requirement to create alternative features.
- 8.7.123 The BMS sets out the principles for licenced otter mitigation, but evidence from surveys in 2012/13 suggests that there are no holts, shelters or dens within the Order Limits, so no further mitigation would be required.
- 8.7.124 If holts, shelters or dens are found, disturbance during works should be minimised by imposing a buffer of least 30m around any holt or shelter (precise distance would be determined based on the status/level of use) prior to works commencing. The buffer would be fenced to prevent works encroaching, whilst permitting otter movement.
- 8.7.125 Access to the riparian corridor used by otter would be retained at all times and potential effects on established otter paths and traditional routes (such as field drains) during the construction phase should be avoided. Wherever possible, works in the vicinity of water courses showing signs of regular use by otters would

not take place within two hours of sunset or sunrise, so short-term restrictions on working may be needed.

- 8.7.126 Any excavations left open overnight that cannot be boarded or fenced would be carefully lit so as to deter otter access and ramps would be installed to allow any otter that may become trapped to escape. Culvert pipes stored on site would be capped or if caps are not available, stored vertically to prevent otter entrapment.
- 8.7.127 The 10mph speed limit means that mortality from construction traffic is very unlikely.
- 8.7.128 Given the mobile behaviour of otters and the short-term nature of the crossing installation or removal, the proposed mitigation would avoid adverse effects on individuals or populations. The likelihood of effect is certain/near certain.

Badger

- 8.7.129 The BMS's Badger Method Statement sets out measures to identify and close any directly affected setts. A draft licence application has been made to NE, since some works may, in the absence of licenced mitigation, cause injury to badgers.
- 8.7.130 Pre-construction surveys would be undertaken to determine the presence of any setts that may have been constructed, changed in extent or level of use during the interim period since surveys were completed.
- 8.7.131 On the basis of current evidence, no main sett would be permanently lost as a result of the Proposed Development, although the main sett at Mark would be subject to temporary closure. The sett would remain closed until completion of the works in the vicinity, after which the sett would be re-opened. Any subsidiary or outlier sett that would be lost would be excluded prior to commencement of works and destroyed under licence once it is clear that badgers are not in residence. In the event that the underground chambers or tunnels of the main sett at Barton are compromised, the damaged part of the sett will be excavated under licence.
- 8.7.132 Sett closures would be undertaken through installation of one way badger gates in accordance with licence requirements. Exclusion works for badgers can only be undertaken outside of the breeding season, between July and November inclusive. Exclusion works on each sett would therefore begin during July of the year preceding works affecting the specific setts. As with other protected species, a draft version of the licence has been submitted to NE prior to the DCO consent being granted and, assuming this is obtained, a full licence obtained post DCO approval.
- 8.7.133 All retained setts would be monitored throughout works to ensure that the setts remain undamaged. Setts located within 30m of working areas would be fenced to prevent machinery accidentally causing damage by getting too close.
- 8.7.134 For any sett that would experience disturbance, the ECOW, taking advice from NE, would make a judgment on whether the badgers' welfare is better conserved by retaining the sett open or by a temporary closure.
- 8.7.135 As with otter, any excavations left open overnight that cannot be boarded or appropriately fenced would be carefully lit so as to deter badger access and ramps would be installed to allow any animal that may become trapped to escape. Culvert pipes stored on site would be capped or if caps are not available, stored vertically to prevent entrapment.

- 8.7.136 Construction fencing installed along the haul road will be permeable to badger to allow movement across the local landscape. The fence specification will be finalised at the detailed design stage but may include options such as leaving a minimum 0.2m high gap at the base.
- 8.7.137 These measures, secured as DCO Requirements through the BMS with additional licencing conditions, would secure badger welfare in accordance with legislation. The likelihood of effect is certain.

Brown Hare

- 8.7.138 The siting of temporary works compounds and construction traffic crossings has been designed to minimise loss of open grassland, particularly at Puxton Moor and west of Nailsea across Kenn Moor and Nailsea Moor where the majority of hare records are clustered.
- 8.7.139 Pre-construction checks for leverets will be made by the ECoW immediately ahead of site clearance within the areas stated above to avoid risk of killing or injury.
- 8.7.140 As with badger and otter, open excavations will either be enclosed by appropriate fencing, boarded overnight, left with overnight escape ramps in place and/or carefully lit to prevent hares being injured or entrapped.
- 8.7.141 As described for badger, construction fencing installed along the haul road will be permeable to hare to allow movement across the local landscape.

Hedgehog

- 8.7.142 As part of the BMS's Hedgerow Method Statement, the base of each stretch of hedgerow scheduled for removal would be checked for hedgehog that may be sheltering or hibernating (particularly as works would be scheduled outside of the nesting bird season). Any hedgehog encountered would be relocated to an alternative suitable hedgerow, free from risk of frost or flooding.

Amphibians

- 8.7.143 The BMS's Amphibian Method Statement reflects the provisions required by NE through their European protected species licencing regime for GCN. As with other protected species, a draft version of the licence has been submitted to NE prior to the DCO consent being granted and, assuming this is obtained, a full licence would be obtained post DCO approval.
- 8.7.144 Based on surveys in 2013, there are 14 Sites where licensable works would be required. Further pre-construction surveys would be carried out in the season prior to works commencing to ensure that final licence conditions reflect latest population data.
- 8.7.145 Where construction activity is proposed within 250m of a GCN breeding pond or ditch, the construction footprint, including access, would be surrounded by robust exclusion amphibian fencing and subject to humane trapping, in accordance with NE (2001). All amphibians encountered (including the s41 species common toad) would be taken to a release site close to the pond. Vegetation will be progressively cleared and refugia dismantled from trapped areas prior to construction.
- 8.7.146 The risk of killing GCN is minimised by the avoidance of works in GCN ponds and the vast majority of ditches, with the exception of three ditch crossings.

- 8.7.147 The exclusion fencing would remain in place for the duration of the construction and reinstatement period. To avoid severance of habitat, the exclusion fencing would be installed with gates at key locations, such as select linear features, which will allow movement of wildlife at night.
- 8.7.148 Monitoring of licensed works will be carried out during and post-construction, in accordance with the licence.
- 8.7.149 The works would be carried out under NE licence requiring removal and exclusion of GCN and bi-catches of other amphibians from the construction footprint. The residual effect on GCN is of Neutral magnitude and therefore Not significant. The likelihood of effect is certain/near certain.
- 8.7.150 Outside the GCN licence areas, standard working precautions may not remove all amphibians, hence; a Low magnitude adverse effect of **minor adverse** significance remains for common toad. The likelihood of effect is possible.

Reptiles

- 8.7.151 Given the low population sizes of reptile species recorded during the baseline surveys, it is not anticipated that replacement habitats would be required as mitigation for loss of habitat. Where proposals impact habitat suitable to support reptiles, mitigation to avoid killing and injury would be required.
- 8.7.152 The BMS's Reptile Method Statement specifies three different working procedures for the following construction circumstances:
- temporary works, small working areas and works affecting sub-optimal habitats – reasonable avoidance measures to prevent injury or impacts to reptiles would be implemented;
 - permanent construction works, large working areas and areas of high value reptile habitat or with large populations – specific mitigation measures are set out for the Sandford Substation and CSE compounds; and
 - works overlapping licensed GCN mitigation – GCN occur in and around the Order Limits and works affecting reptiles may overlap with areas already subject to licensed mitigation for GCN.
- 8.7.153 The reptile mitigation measures would provide reasonable avoidance of killing or injury and would protect populations. They have a likelihood of effect of near certain.

Ditch Invertebrates and Flora

- 8.7.154 Some ditch systems, notably across the Somerset Levels and Moors, have high invertebrate value. The following measures are proposed to mitigate effects caused by installation or removal of watercrossings.
- 8.7.155 Within SSSI ditch systems, additional supervision and monitoring would apply. Pre-construction surveys would be carried out at crossing points to ensure the baseline data remains up to date and, coupled with the existing records, will be used to inform the mitigation proposals.
- 8.7.156 The BMS's Invertebrate Method Statement sets out the measures that would apply at all watercourse crossings to avoid adverse effects on invertebrates, including controlled installation of dams either side of any de-watered working area (sandbags, piling or other material), use of mesh-filters on all pumps within ditches of county or higher value to invertebrates, gradual draw-down and subsequent

release of water, and ‘resting’ of any removed silt or vegetation on the ditch bank (outside of the de-watered section) for at least 24 hours to allow invertebrates to make their way back into the water.

- 8.7.157 Bank reinstatement would take place promptly on completion of works. Where the ditch system is extensive and propagules are abundant, it is likely that invertebrate and macrophyte recovery would be rapid. At select locations within the SSSIs, where landowners permit, National Grid would reinstate banks using modified or stepped profiles as advised by NE.
- 8.7.158 To avoid potential effects on lesser silver water beetle, prior to the commencement of any works (between April and August) to install or remove the watercrossing at the northern end of ditch TEP341, a licenced surveyor would net all the floating vegetation within 10m of the crossing point. Any lesser silver water beetle egg cocoons, larvae, pupae or adults found should be relocated upstream of any discharge from the de-watering process (if a flow exists). Cocoons should be placed in areas free of duckweed.
- 8.7.159 The mitigation proposals would avoid major incidents affecting invertebrates. The likelihood of effect is near certain.

Fish

- 8.7.160 Sensitive working methods would be employed at all watercourse crossings and at all works within 9m of a watercourse, in accordance with the Watercourse Crossing Method Statement. Dams either side of the de-watered working area (sandbags, piling or other material) would be carefully installed under supervision of the ECOW to avoid killing or injury of fish.
- 8.7.161 Fish rescue (netting) will be carried out as deemed appropriate by the ECOW, in the latter stages of de-watering during installation/removal of watercrossings. The rescue will be undertaken by specialists who are accredited under the ‘Performing Section 30 Fish Health Checks Accreditation Scheme’ (Ref. 8.129) (to meet the requirements of the EA under Section 30 of the Salmon & Freshwater Fisheries Act 1975), and all data collated and submitted to the EA. Fish will be released into the adjacent channel (up or downstream release to be determined by the ECOW on a case by case basis depending on the connectivity of the watercourse/tributary and the time of year).
- 8.7.162 As eels often shelter in the base of silty ditches and emerge as the ditches dry, the ECOW may request (if practical given the rates of flow) that the ditch is left for 24-48 hours before being de-silted and culverts installed.
- 8.7.163 Once the culvert crossing is in place, flow would gradually be allowed to return through the culvert. All watercourses would be reinstated on completion of works and specific measures for this are set out in the BMS. Bank side and in-channel vegetation is anticipated to re-establish within 2-4 years.
- 8.7.164 The mitigation would avoid killing or injury of fish at the time of culvert installation, and recovery of fish passage is expected quickly. The likelihood of effect of mitigation is near certain.

Monitoring of Construction-phase Mitigation

- 8.7.165 Post-construction monitoring relating to construction, reinstatement and mitigation activity will continue:
- at designated wildlife sites, informed by the pre-construction surveys;
 - as agreed with NE under protected species licence conditions; and
 - as agreed by NE and/or the relevant site managing body in accordance with the CEMP.
- 8.7.166 Such monitoring will be compared against baseline levels. Any adverse effects detected will trigger appropriate remedial action in accordance with the provisions of the BMS.

Mitigation of Operational Phase Effects

Designated Wildlife Sites: Bird Collision Risk

- 8.7.167 The findings of the collision risk assessment concluded that the overall risk to any of the qualifying bird populations, taking into consideration removal of the existing F Route as well as installation of the replacement 400kV overhead line, would be sufficiently low to be classed as not significant. However, slight uncertainty remains regarding the potential for bird movements, and so too collision risk and bird mortality, between the Severn Estuary SPA Ramsar SSSI SNCI and the Somerset Levels & Moors SAC SPA Ramsar SSSI.
- 8.7.168 The mitigation strategy to address this potential risk with the proposed overhead line is detailed in **Volume 5.8.2, Appendix 8F** and summarised below:
- Bird flight diverters would be installed along the stretches of proposed overhead line which cross the three potential flight corridors identified i.e. where flight lines of large birds are most likely to occur (the Huntspill River NNR LWS, King's Sedgemoor Drain and the River Brue);
 - Implementation of a mortality monitoring study along additional sections of the overhead line where radar data has indicated potential movements of duck species (and diverters are not proposed);
 - National Grid's Bird Flight Diverter Protocol (**Volume 5.8.2, Appendix 8G**) would apply to the entire route, enabling currently unforeseeable incidences of collisions at future dates to be addressed by fitting of diverters, if this is the most appropriate response;

Bird Flight Diverters

- 8.7.169 **Volume 5.8.2, Appendix 8G** sets out National Grid's approach to the fitting and retrofitting of bird flight diverters. This protocol and the supporting case studies demonstrate that National Grid considers, during the design stages of a project, evidence from field survey and consultation as to whether diverters would bring benefits to birds of statutory interest. National Grid keeps the protocol under review, in light of changes of circumstance, land use and climate that may result in changed bird flight patterns. Using an evidence-based approach, and where a bird collision problem cannot be addressed in another way, National Grid would consider retrofitting diverters.
- 8.7.170 The 'bird diverter' device proposed by National Grid for the Proposed Development is a variation of the Swan-Flight Diverter which comprises a spiral with its greatest

diameter at the centre of the device. These can be spaced at distances from 5m to 30m and are available in a variety of colours, which would be agreed at the detailed design stage. A number of studies show large reductions in collision with use of this design (APLIC, 2012 (Ref 8.130)).

- 8.7.171 Birds are known to use watercourses to navigate and waterfowl are known to use watercourses to forage. Combined with the lack of other topographical features and vantage point survey data obtained for the Proposed Development, the King's Sedgemoor Drain, Huntspill River and River Brue are considered the most effective locations to install bird diverters. In addition to marking the conductors directly spanning these three watercourses, diverters would be installed to mark the overhead line either side of each watercourse to minimise potential risk on birds not flying directly over the watercourse as well as on birds during take-off and landing in the watercourses. The proposed lengths of overhead line to be marked with bird diverters are shown in **Volume 5.8.3, Figure 8.27** and described under the sub-sections below. The narrative also sets out the reasons why National Grid chooses not to install diverters at the River Avon crossing.

King's Sedgemoor Drain

- 8.7.172 The section to be marked extends c.50m to the north of the King's Sedgemoor Drain and 500m to the south of the watercourse and includes two spans of overhead line. This takes into account the general absence of bird movements observed to the north. These observations are likely to be due to a channelling effect from both the Drain and Puriton Ridge to the north. This marked section would incorporate the vast majority of flight lines that were observed crossing the overhead line from the vantage point survey work.

Huntspill River

- 8.7.173 The proposed section to be marked includes three spans of overhead line, extending c.500m either side of the Huntspill River.

River Brue

- 8.7.174 The proposed section to be marked includes three spans of overhead line, extending c.500m either side of the River Brue. This takes into account movements of birds that could potentially 'cut the corner' between the Cripps River in the east and the River Brue.

River Avon

- 8.7.175 The route oversails the River Avon where it forms part of the Severn Estuary SPA Ramsar, however, it is considered unlikely that birds would be susceptible to collision with an overhead line at this location as the Proposed Development closely parallels the M5 motorway bridge (within 250m). The multiple stimuli at a lit, noisy motorway bridge are anticipated to lead already to a significant avoidance reaction in waterbird flight lines under existing conditions. Birds recorded during the 2009-2010 vantage point survey were observed to either fly low along the River Avon below the bridge or high above the bridge, thus placing birds in flight at this location outside of any potential collision risk zone. It should also be noted that there is no indication of any significant collision mortality associated with the existing 132kV G Route crossing of the Avon at this location. Kiessling *et al.* (2003) (Ref. 8.131.) suggests that locating an overhead line in the vicinity of tall bridges/other man-made structures may reduce the collision risk as well as alongside main roads

where birds usually increase their flying height. It has been suggested that birds increase their flight height at night time to reduce risk of collision with natural as well as man-made features (APLIC, 2012) (Ref: 8.130). It is therefore considered that bird diverters would not be required on the proposed line crossing the River Avon.

Hallen Marsh

- 8.7.176 Hallen Marsh has been identified as a location for future habitat enhancement to offset habitat loss for SPA birds arising from future development by third parties at Avonmouth Severnside. It is likely that birds will be encouraged into the Hallen Marsh area from offsetting works. However, it is not clear whether any birds associated with the Severn Estuary using the Hallen Marsh fields would cross the proposed line or if they did, whether those movements would be at collision heights. National Grid would commit funds via s106 agreement to Bristol City Council for two years of winter monitoring. Should evidence be found that bird diverters are required, National Grid's Bird Diverter Protocol sets out its commitment to fitting these devices.

Mortality Monitoring Study

- 8.7.177 The mortality monitoring study targets the Proposed Development between the River Brue and Mark, where uncertainty regarding predicted collision risk remains, i.e. where radar tracks recorded during the FERA study were likely to have comprised duck species, as revealed by flight speed analysis. As flight diverters will be fitted along the replacement 400kV overhead line extending 500m either side of the River Brue, monitoring is not proposed along this stretch. Monitoring would therefore target three stretches of the overhead line as listed below and illustrated in **Volume 5.8.3, Figure 8.27**.
- Two stretches close to areas where radar tracks with flight speeds above 20m/s were recorded:
 - 2.3km extending north from the River Brue crossing with diverters to Mark Causeway; and
 - 1km between the crossings of the Huntspill River and the River Brue.
 - A 2.6km control site, extending between Woolavington Road and the crossing of the Huntspill where diverters are fitted. This stretch does not fall within or adjacent to an area where flight speeds above 20m/s were recorded, but does lie between the Somerset Levels & Moors and the Severn Estuary.
- 8.7.178 Monitoring work would be carried out during the first winter period following installation of the 400kV overhead line. Survey would commence at the beginning of October and continue until the end of March to take into account the full winter period when qualifying species of bird would be present .
- 8.7.179 The survey approach would use a corpse searching method. A surveyor would walk the length of the overhead line within the search areas, walking a zigzag route to search land 150m either side of the overhead line (total survey width 300m). This is a wide search corridor, double that used by Heijnis (1976) (Ref.8.132), to take into account the high flight speed exhibited by target species such as teal and wigeon. This wide search corridor would also reduce any crippling loss bias (i.e. the bias when birds strike the overhead line but fall outside the survey area, or are injured but able to move far enough outside of the survey area before they die and thereby avoid detection). Smaller birds are likely to have higher crippling loss bias than larger birds (APLIC, 2012). The sizes of target species for this study are moderate to large and therefore crippling loss bias is not likely to be a major issue.

- 8.7.180 Weekly monitoring surveys are proposed. Ponce *et al.* (2010) (Ref. 133.) found that the accumulated number of birds removed by scavengers each day reduce logarithmically, with 32% removed over the initial two-day period, but only 1.5% removed on a daily basis by day 28. The authors suggested that fortnightly to monthly searches were sufficient to detect larger bird corpses but not smaller birds. Erickson *et al.* (2005) (in APLIC, 2012) cites a number of case studies with average carcass persistence times ranging from less than one to 28 days, whilst Brown & Drewien (1995) (Ref. 8.134.) suggest it can be longer. The target species for this study are qualifying ducks associated with the Somerset Levels & Moors SPA and/or the Severn Estuary SPA, the smallest of which is teal (mean weight 330g (BTO, 2013) (Ref. 8.135.)). On the basis that fortnightly to monthly checks for large birds are sufficient and teal is a medium-sized bird, weekly checks are a reasonable search frequency.
- 8.7.181 Each monitoring survey would commence within an hour of dawn. Across the season, the surveys would cover a range of weather conditions to take into account the effect that this may have on bird collision, hence; a locally-based surveyor would be used so that they can respond quickly to differing weather conditions. At least one of the survey visits each month would aim to carry out the search following a night time where poor visibility weather conditions have occurred (e.g. fog).
- 8.7.182 A critical threshold would be determined, in agreement with NE, for the monitoring data that, if reached, would trigger the need for further flight diverters to be retrofitted to reduce collision risk. The monitoring data would be discussed with NE and the RSPB as the survey progresses. A total of up to three Winter seasons of monitoring would be undertaken along the area south of Mark. The timing of the surveys would be confirmed in consultation with NE, following review of each year's survey data. For example if results from the first Winter indicated thresholds were close to being reached or exceeded, then surveys would occur in the following year, otherwise they may be delayed until year 3.

Monitoring for Collisions of other Large Birds

- 8.7.183 Appendix 8F contains a collision risk model for a number of large bird species, including those which do not enjoy special protection as qualifying features of SPAs and Ramsar sites. National Policy Statement EN-5 uses the generic term "large birds" when advising consideration of collisions. Section 8.5 has noted that, in respect of mute swans (a non-qualifying species), Avon Wildlife Trust has noted the potential collision risk arising from the Proposed Development within the Portbury Wharf area. In the unlikely event that significant increases in mute swan collisions are identified, bird flight diverters would be fitted under the National Grid Bird Flight Diverter Protocol .

Conclusion Regarding Mitigation of Bird Collision Risk

- 8.7.184 The current evidence, using the project survey data from 2009 to 2014, is that the numbers of bird collisions would not have an impact on population levels of any vulnerable bird species. In relation to the Natura 2000 sites, there is some uncertainty about whether birds associated with the two SPAs may move between the SPAs during certain weather conditions. Bearing in mind future climate change effects, a precautionary approach consistent with the objectives of the Habitats Regulations would be to use the T-pylon design (adopted for landscape and visual

benefits) and to fit diverters in certain areas. The National Grid Bird Flight Diverter Protocol is a statement of National Grid's responsible management of its infrastructure.

- 8.7.185 In addition, the mortality monitoring study enables future evidence of collision risk affecting birds of statutory interest to inform a decision to retrofit diverters. This applies to SPA birds and to other large birds covered by the broader application of policy EN-5.
- 8.7.186 The mitigation (of fitting diverters and implementation of a monitoring programme) is presented in the Applicant's HRA Report and would be secured through DCO Requirements. The residual effect on the Severn Estuary SPA Ramsar and the Somerset Levels & Moors SPA Ramsar is of Neutral magnitude and is therefore **Not significant**. The likelihood of effect is certain/near certain. Additionally, a tagging study to be secured through s106 agreement is described in section 8.9: Additional Mitigation Measures.

Bats

- 8.7.187 The Sandford Substation lighting scheme is unlikely to have a substantial effect on bats using the area as the substation is unmanned. Lighting will only be used when maintenance works are required. An outline approach to providing a bat-friendly lighting scheme is outlined in the BMS (**Volume 8.26.3, section 2 and 4**). It is expected that approval of a lighting scheme for the substation will be a Requirement of the DCO.

Mitigation During Decommissioning

- 8.7.188 Mitigation during decommissioning would reflect that proposed during construction, informed by updated baseline surveys at the time. Licensing, Method Statements and an ECOW would be employed as appropriate, and as required by the statutory nature conservation body under the terms of any licences or consents required to implement the works.

8.8 Residual Effects

- 8.8.1 **Table 8.32** summarises the residual effects on each receptor following implementation of the mitigation described above. Only receptors which were assessed as having a potentially significant effect prior to mitigation are included. **Table 8.32** is derived from **Tables 8.30 and 8.31**, which summarise potential construction and operational effects respectively.
- 8.8.2 There is inevitably some duplication in that protected species may be associated with particular designated sites and are also found in the wider landscape. Where the feature of interest for a designated site relates to a particular species, the effect on the site is largely determined by the effect on the species, such as the horseshoe bats at the Mendip Bat Caves SAC. Such species may also be assessed as receptors in their own right, and this is seen later in the table.
- 8.8.3 The mitigation column does not include Additional Mitigation Measures (see section 8.9). These would be delivered under s106 agreement rather than as a DCO Requirement.
- 8.8.4 The mitigation column provides a short narrative providing a judgement about the change in magnitude of effect arising from the mitigation e.g. "*Medium magnitude*

reducing to Neutral in the long-term". The descriptors for magnitude and duration are set out **Table 8.8** in section 8.3 of this document.

- 8.8.5 The residual effect column reports the significance of the effect, using the descriptors at **Table 8.9** in section 8.3 of this document. National Grid has committed to a 5 year period of habitat management post-reinstatement, the residual effect is reported at the end of this 5 year management. In some instances receptors may continue to recover after this period, where this is the case it is reported within the narrative of the mitigation column.

Residual Adverse Effects

- 8.8.6 The Proposed Development would result in small-scale permanent land-take in designated sites and priority habitats, due to pylon feet and other small working areas. These losses are **not significant** in terms of affecting the ecological function or the management of the sites in question.
- 8.8.7 Residual adverse effects on biodiversity that cannot be wholly mitigated would arise as follows:
- Net loss of mature trees and tree groups felled or reduced for construction and electrical safety clearance, coupled with the restriction on re-establishment of large trees under or over the connection. Although the quantum of tree replacements is delivered through the collective mitigation proposals, including Additional Mitigation Measures, these net losses have local significance where woodland wildlife corridors for relatively immobile species are found.
 - New tree planting cannot replicate the biodiversity function of ancient woodland or veteran trees, modified by, or lost to, the Proposed Development. Loss of 13 veteran trees along the route and loss of the 0.36ha canopy within the ancient woodland at Tickenham Hill-Cadbury Camp-Chummock Wood Complex SNCI are effects which cannot be mitigated.
 - The net reduction of ca 1ha woodland cover at Gloucester Road Railway Sidings SNCI, and its replacement by open habitats, would alter the biodiversity function of the site and its contribution to local woodland wildlife networks.
 - The Proposed Development would disturb and displace wildlife due to clearance of vegetation and exclusion of wildlife from the construction footprint for the construction period (up to four years), followed by a period of habitat re-establishment during which time ecological functionality would gradually recover. The mitigation measures would ensure that the conservation status of protected species and many s41 species was maintained during construction, but for some s41 species and other species of local value, there would be a temporary contraction in range.
 - In areas where installation of underground cables or creation of access routes requires excavation of semi-improved neutral and marshy grassland derived from former floodplain grazing marsh the process of soil reinstatement and re-seeding may not replicate the grasslands' former species diversity and soil hydrology. This effect would largely be experienced in managed farmland, rather than designated sites.
 - The habitat disturbance effects mentioned in the above two points would occur across relatively high proportions of three county-value wildlife sites; Nailsea and Tickenham Moors SNCI and (for the alternative route only) Portbury Wharf

Nature Reserve SNCI WTR and Portbury Wharf SNCI. It is concluded that the residual effects would be felt at Low Magnitude for up to 15 years, after which the sites would resume a favourable conservation status, albeit of a different character than baseline.

- The mitigation measures to reduce bird collisions are expected to be effective in terms of avoiding adverse effects on SPA integrity and population perturbation to birds of conservation concern, but inevitably some bird collisions would occur, as described in **Volume 5.8.2, Appendix 8F**.

Residual Beneficial Effects

- 8.8.8 Mitigation seeks to ensure that risk of significant harm is avoided as far as reasonably practicable. In the majority of instances, once established, replacement habitats would be similar to, or an enhancement of, those lost. Enhancement would generally result from the use of diverse species-mixes used in replacement planting and the provision of gap-planting in existing hedgerows. The Proposed Development would not however be a position of comprehensive enhancement as aspired to in NPPF paragraph 9.
- 8.8.9 Nevertheless, there are some instances where the Proposed Development, including the mitigation described at section 8.7, results in beneficial effects:
- At the River Avon crossing (part of the Severn Estuary SSSI) and at Huntspill River NNR, existing 132kV pylons would be removed from within the designation, and replacement 400kV pylons sited outside the designation.
 - There would be a net increase in hedgerow length (20.16 km) for the Preferred Route Option (20.86km respectively for the Alternative Route) and robustness (11.18km gap planting within existing hedges).
 - At the site of Sandford substation, there would be enhanced habitat diversity, compared to the baseline.
 - It is likely that there will be a net reduction in bird collisions, given that there would be a reduction in the overall length of overhead line compared to the baseline, and bird flight diverters would be used at three waterway corridors.

Table 8.30 Residual Effects

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Internationally Designated Sites				
Somerset Levels & Moors SAC, SPA, Ramsar Site	Operation: Potential collision risk for qualifying Wintering birds associated with potential corridors for bird movement between the site and the Severn Estuary, resulting in adverse effect on integrity of the site.	Provision of deflectors through stretches of the overhead line crossing the three potential flight corridors – the Huntspill River, King's Sedgemoor Drain and the River Brue. Monitoring informed by baseline surveys and monitoring during construction The National Grid Bird Flight Diverter Protocol The magnitude of effect was assessed as Neutral but not certain over the long-term. The mitigation provides certainty	Not significant	Certain
Severn Estuary SPA, Ramsar Site	Construction: Medium-term temporary loss of grazing marsh and scrub to enable access to the construct Hinkley Line Entries (Section H) at Bridgwater Bay SSSI, including removal of existing pylons. However, the footprint does not affect habitats used by Winter feeding or roosting birds and is not anticipated to affect the integrity of the site.	BMS Habitat reinstatement and enhancement. Magnitude of effect Low reducing to neutral in the medium-term	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Severn Estuary SAC, SPA, Ramsar Site	Construction: Section G: Designated land would be over-flown by the new 400kV line crossing the River Avon, and underlies the existing 132kV G Route which would be removed. 0.013ha of saltmarsh and modified neutral grassland falls within pylon working areas (pylon LD-107 and LD-108), however NG has committed to avoiding saltmarsh habitat. No adverse effects on aquatic habitats or associated fish or invertebrates predicted. Section F: Potential disturbance to birds	BMS Habitat Reinstatement at pylon foot Winter working will be avoided to prevent disturbance to Wintering birds. Effect would be Low magnitude at time of works and Neutral in effect within a year.	Not significant	Certain
	Operation: Potential collision risk for qualifying Wintering birds associated with potential corridors for bird movement between the site and the Somerset Levels.	Provision of deflectors through stretches of the overhead line crossing the three potential flight corridors – the Huntspill River, King's Sedgemoor Drain and the River Brue. Monitoring informed by baseline surveys and monitoring during construction The National Grid Bird Flight Diverter Protocol The magnitude of effect was assessed as Neutral but not certain over the long-term. The mitigation provides certainty	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Mendip Limestone Grasslands SAC	Construction: The loss or degradation of foraging habitat on the qualifying horseshoe bats. Given the distance between the roost sites for which the SAC is designated and the Proposed Development, no noise, vibration and light disturbance effects on bats while roosting are anticipated.	Provision of temporary flyways using brushwood and ivy screens after hedgerow removal, following lines of former hedges. Grassland management during construction phase within Order Limits to provide additional invertebrate prey. Seeding of soil mounds with nectar-rich mixes to provide additional invertebrate prey. Hedgerow Replacement Plan, including bespoke mix design. Magnitude of effect reduces from Medium to Neutral for construction and habitat reinstatement period	Not significant	Certain/near certain
	Construction: Severance of commuting corridors and associated habitat fragmentation used by qualifying horseshoe bats.	Provision of temporary flyways using brushwood and ivy screens after hedgerow removal, following lines of former hedges. Magnitude of effect reduces from Medium to Neutral	Not significant	Certain
North Somerset & Mendip Bats SAC	Construction: Potential noise, vibration and light disturbance to bats while roosting as a result of works to underground 132kV and 400kV cables may occur given the proximity of the maternity and hibernation roosts for which the site is designated.	None proposed.	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
North Somerset & Mendip Bats SAC	Construction: Loss or degradation of foraging habitats (trees, hedgerow and grassland habitats) may indirectly affect lesser or greater horseshoe bats. This particularly applies through the 400kV underground line section (Sections B and C), at Sandford Substation (Section D) and through 132kV underground line routes (Sections D and E) where these fall within the SAC buffer for horseshoe bats. Despite Replacement Planting Plans and landscape planting at the permanent Sandford Substation and the CSE compound south of the Mendip Hills, prior to mitigation, removal of hedgerow within the SAC buffer would disrupt bat flyways and, together with loss of pasture would reduce availability of foraging habitat for qualifying bat species.	Provision of temporary flyways using brushwood and ivy screens after hedgerow removal, following lines of former hedges. Grassland management during construction phase within Order Limits to provide additional invertebrate prey. Seeding of soil mounds with nectar-rich mixes to provide additional invertebrate prey Hedgerow Replacement Plan, including bespoke mix design Magnitude of effect reduces from Medium to Neutral for construction and habitat reinstatement period	Not significant	Certain
	Construction: As a result of habitat loss, severance of commuting corridors for horseshoe bats moving across the landscape outside of the SAC would occur, impacting a wider area, beyond the direct habitat loss.	Provision of temporary flyways using brushwood and ivy screens after hedgerow removal, following lines of former hedges. Magnitude of effect reduces from Medium to Neutral	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Hallen Marsh (SPA Offsetting Site)	Construction: Hallen Marsh is compensatory land for third-party development affecting the Severn Estuary SPA Ramsar. It has not yet been subject to habitat creation works for SPA birds. The Proposed Development would have a permanent loss of grassland at pylon feet (<0.01ha) and temporary effect on ca 4ha grassland, 315m hedgerow and 4 watercourse crossings.	Habitat reinstatement would occur in line with the aspirations to create habitats suitable for wintering birds. The construction-stage effect would be of Low Magnitude	Moderate Adverse	Certain
	Operation: Although Hallen Marsh has not yet been created as compensatory and displacement habitat for Severn Estuary SPA losses caused by third party development at Avonmouth Severnside, it is expected to contain wetland habitats which would increase wader and possibly wildfowl numbers, potentially resulting in increased collision risk for SPA birds. Bristol City Council is the lead agent for site design and management	Contribution to Habitat Management works. Contribution for future collision monitoring. National Grid Bird Flight Diverter Protocol.	Not significant	Near Certain (lack of certainty only pertains to unknown design and programme for Hallen Marsh scheme)
Exmoor and Quantock Oakwoods SAC	Construction: Potential indirect effects on the qualifying species may occur as a result of the loss or degradation of foraging habitats during construction, although no significant habitat losses or severance effects are predicted within the SAC buffer for barbastelles.	Hedgerow Replacement Plan, including bespoke mix design Magnitude of effect remains at Neutral for construction and habitat reinstatement period.	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Nationally Designated Sites				
Huntspill River NNR	Construction: Temporary loss of 0.333ha semi-improved and species-poor modified neutral grassland; no direct effects on riparian corridor or associated fauna. Potential short-term disturbance of otter. Overall temporary habitat loss of 0.341ha which equates to 0.23% of the NNR.	BMS Habitat Reinstatement Timing of Works Magnitude of effect Neutral	Not significant	Certain
Puxton Moor SSSI	Construction: Temporary loss of improved and semi-improved grassland during removal of the 132kV overhead line (AT Route). Removal of pylons will use existing access roads and existing watercourse crossings. Overall temporary habitat loss of 0.447ha which equates to 1.2% of the SSSI.	BMS Habitat Reinstatement Adjustment of working areas to avoid encroachment Magnitude of effect Neutral	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Biddle Street, Yatton SSSI	Construction: Medium-term temporary loss of 1.182ha of habitats including semi-improved grassland, tall ruderal herb and dense scrub, associated with the 132kV removal (F Route) and 400kV overhead line construction. No 400kV pylons will be located within SSSI ditch buffers. Temporary loss of aquatic habitats for watercourse crossings where 2 culverts and a bridge would be installed and then removed. Potential effects on invertebrates. Overall temporary habitat loss of 1.182ha which equates to 2.64% of the SSSI.	BMS Habitat Reinstatement Adjustment of working areas to avoid encroachment Low magnitude of effect reducing to Neutral in the long-term	Not significant	Certain
Tickenham, Nailsea & Kenn Moors SSSI	Construction: Temporary loss of aquatic habitats for 32 watercourse crossings (28 culverts and 4 bridges) to enable access for 132kV pylon removal and 400kV pylon installation. Potential effects on invertebrates. Potential disturbance of otter in Parish Brook and otter movement through the SSSI during construction. Overall temporary habitat loss of 3.093ha which equates to 1.85% of the SSSI. In addition there will be 0.097ha of tree canopy loss which is considered permanent.	BMS Invertebrate Method Statement Use of HDD for 132kV undergrounding below rhynes Adjustment of working areas to avoid encroachment Habitat Reinstatement Provision of tilting weir to assist with wetland management (addressed as part of the SSSI mitigation) Medium magnitude of effect reducing too Low at end of Construction period and Neutral in the long-term	Not significant	Near certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Severn Estuary SAC SPA Ramsar SSSI -includes Severn Estuary SNCI (Section G Avon Crossing)	Construction: Temporary habitat losses principally relate to modified neutral grassland and small areas of scattered scrub. 0.16ha of saltmarsh would be temporarily affected at working area of pylon LD-108. Potential disturbance effects on qualifying bird species are assessed separately for the SPA & Ramsar, of which the SSSI forms a component. No adverse effects on aquatic habitats or associated fish or invertebrates predicted. 1.35ha (0.01% of site, of which 0.000144ha would be permanently affected	BMS Habitat Reinstatement at pylon foot Adjustment of working areas to minimise encroachment Low magnitude at time of works and Neutral in effect by following Winter	Not significant	Certain
Severn Estuary SAC SPA Ramsar SSSI (Section F Portishead Substation)	Potential disturbance effects on qualifying bird species are assessed separately for the SPA & Ramsar, of which the SSSI forms a component	Work Programming and adjustment of working areas to minimise disturbance Low magnitude at time of works and Neutral in effect by following Winter	Not significant	Certain
Bridgwater Bay SSSI	Effects below are in addition to the effects discussed for the Severn Estuary SPA/Ramsar. The majority of construction accesses utilise existing accesses and/or fall outside of the SSSI. Only 1 culvert is proposed within the SSSI itself. Potential effects on invertebrates. Overall temporary habitat loss of 4.038ha which equates to 0.06% of the SSSI. Permanent habitat loss of <0.001ha relating to pylon feet. In addition there will also be 0.0026ha of tree canopy loss which is considered permanent.	BMS Habitat Reinstatement Adjustment of working areas to minimise encroachment Low magnitude at time of works until end of construction, reducing to Neutral in medium-term	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Local Wildlife Sites				
Hinkley LWS	Construction: Temporary loss of modified neutral and semi-improved grassland totalling 0.256ha. Temporary loss of 94m of hedgerow related to pylon working areas. Temporary effects on birds and butterflies. Overall temporary habitat loss of 0.553ha which equates to 1.42% of the LWS. Permanent habitat loss <0.001ha related to pylon feet.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in medium-term	Not significant	Certain
Hinkley Point Nature Reserve	Construction: Temporary loss of semi-improved grassland and scattered scrub (0.03ha) associated with the construction of an access road. Overall temporary habitat loss of 0.03ha which equates to 0.4% of the Nature Reserve.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in short-term	Not significant	Certain
Stoning Pound Field South and Stoning Pound Rhyne LWS	Construction: Medium-term temporary loss of semi-improved grassland (grazing marsh) and swamp habitat. Overall temporary habitat loss of 0.045ha which equates to 2.65% of the LWS.	BMS Habitat Reinstatement Low magnitude reducing to Neutral in medium-term	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Puriton Rhynes & Ponds LWS	Construction: Medium-term temporary loss of semi-improved grassland as a result of the construction of a temporary pylon. Overall temporary habitat loss of 0.211ha which equates to 0.73% of the LWS.	BMS Habitat Reinstatement Low magnitude reducing to Neutral in medium-term	Not significant	Certain
Borrow Pit, Puriton LWS	Construction: Short-term temporary loss of swamp habitat resulting from the removal of an existing 132kV pylon (F Route). Overall temporary habitat loss of 0.004ha which equates to 0.09% of the LWS.	BMS Habitat Reinstatement Low magnitude reducing to Neutral in medium-term	Not significant	Certain
Bridgwater Bay (NNR) LWS	Construction: Temporary loss of semi-improved grassland and dense scrub totalling 0.333ha. Loss of 2 trees to facilitate scaffolding working areas. Potential effect on otter. Overall temporary habitat loss of 0.341ha which equates to 0.27% of the LWS.	BMS Habitat Reinstatement Neutral magnitude	Not significant	Certain
River Brue LWS	Construction: Temporary loss of 47m of species-poor hedgerow associated with scaffolding working area along the northern bank. The River Brue itself is oversailed by the overhead line and therefore no impacts to the river itself.	BMS Habitat Reinstatement Neutral magnitude	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
River Axe LWS	Construction: Disturbance to channel and banks from installation of permanent cable bridge (ca 14m width) and temporary construction access bridge. If the HDD option is selected there will be no effect within LWS. Potential effects on riparian fauna. Potential disturbance to otter. Overall temporary habitat loss of 0.052ha which equates to 0.14% of the LWS. Permanent habitat loss of 0.023ha with the cable bridge option which equates to 0.06%. Operation: Shading to bank and channel vegetation with the cable bridge crossing option.	Use of bridge crossing (Both HDD and clear-span bridge options would leave in-channel habitats intact) BMS Habitat Reinstatement Low magnitude reducing to Neutral in short-term	Not significant	Certain
Lox Yeo River SNCI	Construction: The 400kV cable will be HDD beneath the river reducing impact to the riparian habitat. However an online temporary haul road will be required for construction purposes. Temporary habitat loss of arable and improved grassland (0.096ha) which equates to 2.89% of the SNCI. Permanent habitat loss of 0.0195ha of semi-natural broad-leaved woodland. Potential effects on riparian fauna and fish. Operation: Restriction on woodland planting.	BMS Habitat Reinstatement Low magnitude reducing to Neutral in medium-term	Not significant	Near Certain (delivery of replacement planting scheme not confirmed)

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Cheddar Valley Railway Walk LNR	Construction: Temporary habitat loss of 0.012ha of arable farmland. Overall temporary habitat loss equates to 0.08% of the LNR. Minor permanent loss of 0.014ha of young broad-leaved plantation woodland to access road.	BMS Habitat Reinstatement Neutral	Not significant	Certain
Towerhead Brook (part of) & Adjacent Land SNCI	Construction: Disturbance to channel and banks from permanent cable bridge (ca 14m width). Potential effects on riparian fauna. Hedgerow loss is generated through construction activities, (temporary loss of 52m and permanent loss of 7m). This hedgerow loss includes 2 ash trees with bat roost potential. Overall temporary habitat loss of 0.251ha which equates to 0.67% of the SNCI. Permanent habitat loss of 0.017ha which equates to 0.06% of the SNCI. Operation: The permanent cable bridge and temporary construction bridge is clear span and will produce no significant shading effects.	Use of cable bridge crossing (will leave in-channel habitats intact) BMS Habitat Reinstatement Medium magnitude reducing to Neutral in medium-term	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Puxton Moor SSSI and surrounding rhynes SNCI	Construction: Temporary loss of 2.908ha of semi-improved and improved grassland habitats (grazing marsh). Loss of 4 scattered trees along field boundaries and species-poor hedgerows totalling 79m. Overall temporary habitat loss of 3.382ha which equates to 1.39% of the SNCI. Permanent habitat loss of <0.001ha related to pylon feet.	BMS Habitat Reinstatement Low magnitude reducing to Neutral in medium-term	Not significant	Near certain
Rhynes South of Dolemoor Lane SNCI	Construction: Temporary medium-term loss of semi-improved grassland of 0.069ha. Temporary loss of 276m of hedgerow that lies along Dolemoor Lane. Overall temporary habitat loss of 0.074ha which equates to 0.64% of the SNCI.	BMS Hedgerow Replacement Plan Habitat Reinstatement Low magnitude reducing to Neutral in medium-term	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Congresbury Yeo Adjacent Land & Rhynes SNCI	Construction: Effects below are in addition to the effects discussed for the Biddle Street, Yatton SSSI. Temporary habitat loss of 3.611ha in the SNCI related to semi-improved and improved grassland habitats (grazing marsh), dense scrub and tall ruderal herbs. Temporary loss of 106m of native species-rich and species-poor intact hedgerows, affected by working areas. Overall temporary habitat loss of 3.852ha which equates to 1.36% of the SNCI. Permanent habitat loss of <0.001ha related to pylon feet.	BMS Habitat Reinstatement Adjustment of working areas to reduce encroachment on hedgerows. Low magnitude reducing to Neutral in medium-term. Hedgerows are not detailed within the citation so therefore long-term recovery is not relevant.	Not significant	Near Certain (Grazing marsh modification may persist long-term)

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Nailsea and Tickenham Moors SNCI	Construction: Effects below are in addition to the effects discussed for Tickenham, Nailsea and Kenn Moor SSSI. Medium-term temporary loss of amenity, arable, improved, semi-improved and marshy grassland totalling 19.256ha. Permanent loss of 0.132ha of treed habitat. Temporary loss of 1.14km of hedgerow including 6.5m of 'important' hedgerow. Disturbance or loss of 18 trees with bat roost potential along the construction route. Overall temporary habitat loss of 21.22ha which equates to 2.12% of the SNCI. Permanent habitat loss of <0.001ha related to pylon feet.	Provision of tilting wier to assist with wetland management (addressed as part of the SSSI mitigation) Use of HDD to install 132kV underground route beneath grazing marsh BMS Habitat Reinstatement Medium magnitude reduces to Low in medium-term reducing to Neutral in the long-term.	Minor Adverse	Near Certain
Nursebatch Farm Fields SNCI	Construction: Medium-term temporary loss of 0.092ha semi-improved neutral grassland to the working area for removal of an existing 132kV pylon. Overall temporary habitat loss of 0.092ha which equates to 0.82% of the SNCI.	BMS Habitat Reinstatement Low magnitude reducing to Neutral in medium-term	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Tickenham Hill, Cadbury Camp & Chummock Wood Complex SNCI	Construction: Temporary loss of 0.760ha of amenity, improved and semi-improved grassland. Temporary loss of 66m of 'important' species-rich hedgerow within which loss of 6 bat roost potential trees to facilitate scaffolding working areas. Permanent loss and disturbance of small area of semi-natural broad-leaved woodland (0.361ha canopy cover). Loss and disturbance of nesting bird habitat (particularly trees, hedgerows and scrub habitats, including common crossbill). Overall temporary habitat loss of 0.850ha which equates to 0.54% of the SNCI. Operation: Change in bird nesting habitat arising from tree management requirements and botanical communities.	BMS Habitat Reinstatement Medium magnitude reduces to Low in medium-term	Minor adverse	Certain
Fields West of Lower Caswell House SNCI	Construction: Temporary loss of semi-improved grassland during removal of 2 existing 132kV pylons. Overall temporary habitat loss of 0.64ha which equates to 3.23% of the SNCI.	BMS Habitat Reinstatement Neutral magnitude	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Birch Wood & Prior's Wood SNCI	Construction: Temporary habitat loss of 0.224ha of arable semi-improved grassland and continuous bracken. Temporary loss of 59m of species-poor hedgerow along Caswell Hill. Permanent loss of 1 tree within the SNCI. Overall temporary habitat loss of 0.224ha which equates to 0.25% of the SNCI.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in short-term	Not significant	Certain
Fields on Caswell Moor SNCI (only within Preferred Option A)	Construction: Temporary loss of arable and semi-improved grassland (0.83ha) associated with pylon working areas. Temporary loss of 33m of species-poor hedgerow. Passerine habitat stated as reedbed within the SNCI citation. Permanent loss of 14 trees within the site. Overall temporary habitat loss of 0.9ha which equates to 4.75% of the SNCI. (Construction impact only on the Preferred Route Option A.)	BMS Habitat Reinstatement Low magnitude reducing to Neutral in the short-term	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Drove Rhyne & Adjacent Fields SNCI	Construction: <u>Under Preferred Route Option A:</u> Temporary loss of modified neutral grassland, tall ruderal herbs and dense scrub totalling 0.531ha. Permanent loss of 0.066ha of tree canopy. An additional loss of 16 trees within the SNCI. Overall temporary habitat loss of 0.557ha which equates to 2.84% of the SNCI. <u>Under Alternative Route Option B:</u> Temporary loss of modified neutral grassland and dense scrub totalling 0.553ha. Temporary loss of 32m of species-poor hedgerow. Permanent loss of 8 scattered broad-leaved trees of which 3 were considered to have bat roost potential. Overall temporary habitat loss of 0.553ha which equates to 2.82% of the SNCI. Permanent loss of <0.001ha associated with the pylon feet. Operation: Reduction in Mature Tree Cover	BMS Habitat Reinstatement Low magnitude reduces to Neutral in medium-term for both route options.	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Portbury Wharf Nature Reserve SNCI WTR	Construction: <u>Under Both Routes:</u> Temporary loss of semi-improved grassland, modified neutral grassland, tall ruderal herbs, swamp and scattered scrub totalling 7.778ha. Temporary loss of 199m of hedgerow within the SNCI. Permanent loss of 0.05ha of tree canopy and an additional 8 scattered trees. Loss of terrestrial GCN habitat (8 GCN ponds lie within the site and 5 within 250m) and associated habitat fragmentation. No ponds directly affected. Loss of nesting bird habitat (particularly trees, hedgerows and scrub habitats). Potential effects on water vole and invertebrates from underground cable and culvert installation works. Potential disturbance to Winter birds. 2.2ha (ca 5% of site) Overall temporary habitat loss of 8.038ha which equates to 16.75% of the SNCI. <u>Additional Construction Effect from Alternative Route:</u> Additional temporary loss of 0.536ha of grassland habitats as a result of Option B. Temporary loss of 96m of hedgerow. Permanent loss of 0.06ha of tree canopy within the SNCI and an additional 16 broad-leaved trees. Loss of 2 trees with confirmed bat roosts. Permanent habitat loss of <0.001ha related to pylon feet.	BMS Appointment of ECOW for site supervision Timing of certain works to avoid Winter disturbance Protected Species Licences Habitat Reinstatement The Preferred Route Option A has Medium magnitude effect reducing too Low in medium-term and Neutral in the long-term. The Alternative Route Option B has Medium magnitude Effect reducing too Low on reinstatement and reducing to Neutral in the long-term.	Pref. Route Minor Adverse Alt Route Minor Adverse	Pref Route Near Certain Alt. Route Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
	Operation: Loss of scrub woodland reducing bird breeding opportunities. Additional Construction Effect from Alternative Route: Loss of two bat roosts (Trees 91a & 118a) to F-Route overhead easement. Disturbance of 17 BRP trees in/in close proximity to the SNCI WTR.			

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Portbury Wharf SNCI	Construction: <u>Under Both Route Options:</u> Temporary loss of semi-improved, dense scrub and tall ruderal herbs totalling 3.864ha. Loss of terrestrial GCN habitat. Loss of nesting bird habitat (particularly trees, hedgerows and scrub habitats). Potential effects on water vole and invertebrates through construction activities related to the ditch network. Overall temporary habitat loss of 4.061ha which equates to 24.93% of the SNCI. <u>Additional Construction Effect from Alternative Route:</u> Additional temporary loss of 1.88ha of grassland habitats as a result of Option B. Temporary loss of 292m of hedgerow. Permanent loss of 0.58ha of tree canopy within the SNCI and an additional 4 broad-leaved trees. Loss of 1 tree confirmed as a bat roost. Permanent habitat loss of <0.001ha related to pylon feet. Operation: Loss of scrub changing bird nesting opportunities.	BMS Appointment of ECOW for site supervision Timing of certain works to avoid Winter disturbance Protected Species Licences Habitat Reinstatement The Preferred Route Option A has Medium magnitude effect reducing to Low in medium-term and Neutral in the long-term. The Alternative Route Option B has Medium magnitude Effect reducing to Low on reinstatement and reducing to Neutral in the long-term. Although not enough to push into the higher category, the Alternative Route has greater impact as more undergrounding cable works are proposed and a greater number of pylons will be constructed within the SNCI.	Pref. Route Minor Adverse Alt Route Minor Adverse	Pref Route Near Certain Alt. Route Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Portbury Dock Wood SNCI (Alternative Route Option Only)	Construction: Permanent loss of 0.002ha of semi-natural broad-leaved woodland on the edge of the SNCI and therefore no fragmentation affect. Overall temporary habitat loss of 0.002ha which equates to 0.1% of the SNCI. Operation: Reduced woodland cover changes opportunities for bird nesting and foraging associated with mature woodland	BMS Habitat Reinstatement Low magnitude impact persists, albeit only a small area affected, which reduces to Neutral. The effects do not affect the quality or extent of receptor in the long-term.	Not significant	Possible (reduced woodland cover means site ecological functions would change)
Priory Farm WTR (Preferred Route Only)	This site is an inlier of 'Fields Between Railway Line and A369 Portbury SNCI' and is assessed above. No additional effects.	N/A	N/A	N/A
Fields Between Railway Line & A369 Portbury SNCI (Preferred Route Only)	Construction: Temporary loss of 0.244ha of modified neutral grassland. Temporary loss of 31m of hedgerow within the SNCI. Additional loss of 0.118ha of tree groups that are effectively outgrown hedgerows and will be replaced as such. Permanent loss of 12 scattered trees. Overall temporary habitat loss of 0.244ha which equates to 4.26% of the SNCI.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in short-term.	Not significant	Certain
Severn Estuary SNCI -Within Severn Estuary SSSI	This site is an inlier of the 'Severn Estuary SSSI' and is assessed above. No additional effects.	N/A	N/A	N/A

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Land adjacent to Severn Estuary SSSI (Portbury) SNCI	This site is an inlier of the 'Severn Estuary SSSI' and is assessed above. No additional effects.	N/A	N/A	N/A
Gloucester Road Railway Sidings SNCI	Construction: Temporary loss of modified neutral grassland and dense scrub totalling 0.586ha. Permanent loss of 1.2ha of woodland based on canopy cover. An additional 25 trees will also be lost within the SNCI. Overall temporary habitat loss of 0.872ha which equates to 22.7% of the SNCI. Permanent loss of <0.001ha related to pylon feet. Operation: Reduced woodland cover changes opportunities for bird nesting and foraging associated with mature woodland	BMS Habitat Reinstatement Medium magnitude reduces to Low in medium-term.	Minor adverse	Certain
Railway adjacent to Gloucester Road Sidings WNS	Construction: Permanent loss of 5 scattered trees. Overall temporary habitat loss of 0.225ha which equates to 9.62% of the WNS. However the majority of works within the site are within an area of hardstanding and therefore no impact.	BMS Habitat Reinstatement Neutral	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Docks Railway Line WNS	Construction: Temporary loss of 0.069ha of dense scrub. Permanent loss of 1 scattered tree. Overall temporary habitat loss of 0.087ha which equates to 1% of the WNS.	BMS Habitat Reinstatement Neutral	Not significant	Certain
Land South of King Road Avenue WNS	Construction: Temporary loss of 0.197ha of modified neutral grassland and dense scrub. Permanent loss of 2 scattered trees within the WNS. Overall temporary habitat loss of 0.198ha which equates to 30.46% of the WNS.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in short-term	Not significant	Certain
Land South West of Kings Weston Lane Rhine WNS	Construction: Temporary loss of 3.873ha of amenity grassland, modified neutral grassland and dense scrub. Temporary impact on aquatic habitat due to installation of 5 culverts. Potential effect on water vole. Permanent loss of 0.9ha of plantation, semi-natural woodland and scattered trees and 0.015ha of scrub. An additional 18 scattered trees will be lost within the WNS. Overall temporary habitat loss of 4.304ha which equates to 12.6% of the WNS.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in short-term	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Kings Weston Lane Rhine SNCI (3 Options for G Route 132kV Undergrounding)	Construction: Temporary loss of 0.198ha amenity grassland, semi-improved grassland, modified neutral grassland and scrub during 132kV pylon removal. Aquatic habitat temporarily impacted due to culvert installation for construction access road. Permanent loss of 0.053ha of tree canopy within the SNCI. Overall temporary habitat loss of 0.242ha which equates to 8.83% of the SNCI.	HDD avoids direct impact on in-channel habitats however 1 culvert is required for construction access road. BMS Habitat Reinstatement Low magnitude reduces to Neutral in medium-term All 3 options would have similar impacts although open cut option would have higher short-term impacts. The percentage of site impacted and habitat losses stated account for all 3 options therefore in reality a much lower percentage would be affected hence the Low magnitude reducing to Neutral.	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Land South of Sewage Treatment Works WNS (3 Options for G Route 132kV Undergrounding)	Construction: Temporary loss of 12.009ha of dense scrub, modified neutral and semi-improved grassland. Temporary impact on aquatic habitat due to installation of up to 3 culverts dependent on the option. Permanent loss of 0.5ha of tree canopy and an additional 3 scattered trees. Loss of plantation not significant to role of WNS. Overall temporary habitat loss of 14.497ha which equates to 43.3% of the WNS. Permanent loss of <0.001ha associated with pylon feet.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in medium-term All 3 options would have similar impacts although open cut option would have higher short-term impacts. The percentage of site impacted and habitat losses stated account for all 3 options therefore in reality a much lower percentage would be affected hence the Low magnitude reducing to Neutral.	Not significant	Certain
Lawrence Weston Road Rhines SNCI (3 Options for G Route 132kV Undergrounding)	Construction: Temporary loss of modified neutral grassland and semi-improved grassland totalling 0.361ha related to the working area for the 132kV pylon removal. Temporary loss of 4m of hedgerow. Installation of 2 culverts proposed within the site. Potential effects on water vole. Permanent loss of 7 scattered trees within the SNCI. Overall temporary habitat loss of 0.562ha which equates to 14.41% of the SNCI.	BMS Water Vole Method Statement Habitat Reinstatement Low magnitude reduces to Neutral in medium-term All 3 options would have similar impacts although open cut option would have higher short-term impacts. The percentage of site impacted and habitat losses stated account for all 3 options therefore in reality a much lower percentage would be affected hence the Low magnitude reducing to Neutral.	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Land between M49 and M5 WNS (3 Options for G Route 132kV Undergrounding)	Construction: Temporary loss of 10.305ha of modified neutral grassland. Temporary loss of 123m of hedgerow. Permanent loss of 0.07ha of tree canopy and in additional loss of 1 scattered broad-leaved tree. Overall temporary habitat loss of 10.777ha which equates to 90.18% of the WNS. Permanent loss of <0.001ha associated with pylon feet.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in medium-term All 3 options would have similar impacts although open cut option would have higher short-term impacts. The percentage of site impacted and habitat losses stated account for all 3 options therefore in reality a much lower percentage would be affected hence the Low magnitude reducing to Neutral.	Not significant	Certain
Fields along M5, Hallen SNCI	Construction: Temporary loss of 0.161ha of modified neutral and semi-improved grassland. Temporary loss of 2m of hedgerow. Medium-term temporary habitat loss with culvert installation. Overall temporary habitat loss of 0.161ha which equates to 1.9% of the SNCI.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in short-term.	Not significant	Certain
Land between Lawrence Weston Rhine and Salt Rhine, east of M49 WNS	Construction: Temporary loss of semi-improved grassland (2.13ha) related to G Route undergrounding. Installation of culverts along 2 ditches within the WNS. Potential effects on water voles Overall temporary habitat loss of 2.13ha which equates to 21.94% of the WNS.	BMS Habitat Reinstatement Neutral Low magnitude reduces to Neutral in short-term	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Salt Rhine & Moorhouse Rhine SNCI	Construction: Temporary loss of modified neutral and semi-improved grassland totalling 0.466ha. Temporary loss of 127m of hedgerow. Installation of 4 culverts for construction access roads. Potential effect on water voles Permanent loss of 7 scattered trees. Overall temporary habitat loss of 0.559ha which equates to 7.49% of the SNCI.	BMS Water Vole Method Statement Habitat Reinstatement Low magnitude reduces to Neutral in medium-term.	Not significant	Certain
Land Around Moorhouse Caravan Park WNS	Construction: Temporary loss of modified neutral and semi-improved grassland (1.765ha) associated with G Route undergrounding. Temporary impact on aquatic habitats due to Installation of 3 culverts. Potential effect on water vole. Permanent loss of 0.233ha of tree groups based on canopy size. In addition there will be 6 scattered trees lost to construction. Overall temporary habitat loss of 1.765ha which equates to 12.92% of the WNS.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in medium-term	Not significant	Certain
Railway Line South of Hallen WNS	Construction: Permanent loss of 0.031ha of tree groups based on canopy size. In addition loss of 4 scattered trees. Overall temporary habitat loss of 0.031ha which equates to 0.44% of the WNS. However the majority of construction works lying within the WNS falls on existing hardstanding and therefore no further effect.	BMS Habitat Reinstatement Neutral	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Land West of M49 & South of Moorhouse Rhine WNS	Construction: Temporary loss of modified neutral grassland (0.593ha) related to the construction of the 400kV pylons. Permanent loss of 3 scattered trees within the WNS. Overall temporary habitat loss of 0.869ha which equates to 28.77% of the WNS. Permanent loss of <0.001ha related to pylon feet.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in short-term	Not significant	Certain
Agricultural Land South of Railway WNS	Construction: Temporary loss of 0.923ha of modified neutral grassland. Temporary loss of 29m of species-poor hedgerow. Permanent loss of 2 trees scattered trees. Overall temporary habitat loss of 0.923ha which equates to 20.74% of the WNS. Although a relatively large percentage of site impacted the WNS is part of a coherent network of sites in the Avonmouth area therefore reducing the overall impact.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in medium-term	Not significant	Certain
Land West of M49 & North of Moorhouse Rhine WNS	Construction: Temporary loss of modified neutral grassland (0.009ha) related to scaffolding working area. Permanent loss of 0.084ha of tree groups based on canopy size. Overall temporary habitat loss of 0.009ha which equates to 1.1% of the WNS.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in short-term	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Moorhouse Farm and Stuppill Rhine SNCI	Construction: Medium-term temporary loss of ditch habitat through the installation of 1 culvert. Potential effect on ditch flora and dragonflies. Permanent loss of 2 trees to facilitate construction.	BMS Habitat Reinstatement Neutral magnitude	Not significant	Certain
Rhine Bordering Former Sevelco Site North WNS	Construction: Permanent loss of 0.002ha of tree canopy. Overall temporary habitat loss of 0.051ha which equates to 4.05% of the WNS, however this is made up of almost entirely hardstanding. Permanent loss of <0.001ha of grassland habitat associated with pylon feet.	BMS Habitat Reinstatement Neutral magnitude	Not significant	Certain
Crook's Marsh WNS	Construction: Temporary loss of 6.57ha of semi-improved grassland. Permanent loss of 0.002ha of tree groups based on canopy size. Overall temporary habitat loss of 6.659ha which equates to 45.64% of the WNS. Permanent loss of <0.001ha related to pylon feet.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in short-term	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
South West of Seabank Power Station WNS	Construction: Temporary loss of 158m of hedgerow. Permanent loss of 0.152ha of plantation based on canopy size surrounding existing pylons for removal. Overall temporary habitat loss of 0.419ha which equates to 3.33% of the WNS. However the majority of construction falls within existing hardstanding therefore causing no further detrimental effect.	BMS Habitat Reinstatement Low magnitude reduces to Neutral in short-term	Not significant	Certain
Habitats and Flora				
Semi-natural broad-leaved woodland	Permanent loss of a total of 2.23ha broadleaved woodland based on canopy size across the route.	Arboricultural method statement (minimising losses) Landscape Planting at Sandford and CSE compounds Medium magnitude , declining to Low in long-term (OSPES may result in no net loss)	Minor significance	Probable
Broad-leaved plantation	Permanent loss of structure planting and amenity plantations. The total measure for the preferred route is 4.04ha and 3.47ha for the alternative route option.	As above	Minor significance	Probable
Orchard	Permanent loss of intensively managed young orchard Total measure of 0.89ha.	As above Low magnitude, declining to neutral as Sandford landscape establishes	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Scattered broad-leaved trees	750 trees lost with the Preferred Route Option A and 734 trees with the Alternative Route Option B.	Arboricultural method statement (minimising losses) Landscape Planting at Sandford and CSE compounds Medium magnitude , declining to Low in long-term (OSPES may result in no net loss)	Minor significance	Certain
Veteran trees	13 veterans (included in above number)	Minor magnitude effect persists	Minor significance	Certain
Dense scrub	Permanent loss of 0.22ha of dense scrub lost with both route options. Temporary loss of 4.89ha with the Preferred Route Option A and 4.30ha with the Alternative Route Option B.	Natural regeneration of scrub is expected to mitigate the minor losses	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Hedgerows	Permanent loss of 0.61km of hedgerows across both route options. Of the permanent hedgerow losses 0.21km meet the definition of ‘important’ under the Hedgerow Regulations. In addition 0.21km fall into the category of above 3m in height. Temporary loss of 19.83km of hedgerows under the Preferred Route Option A and 20.38km under the Alternative Route Option B. Of the temporary hedgerow losses 1.86km meet the definition of “important” under Hedgerow Regulations, 8.21km fall into the category above 3m in height and an additional 1.31km falls into both categories for the preferred route. For the alternative route 1.86km, 8.21km and 1.33km of hedgerow loss respectively. In addition loss of 0.33ha of tree groups considered to be outgrown hedgerows with Option A and 0.42ha of outgrown hedgerow loss with Option B. The temporary hedgerow losses will be replaced in situ following completion of construction works. New landscape schemes include 1.75km new planting and 1.83km hedgerow gapping up.	Hedgerow replacement plan, including various hedgerow mixes to deliver species-richness appropriate to different areas Permanent landscape schemes deliver new hedges and gap-filling Medium magnitude effect declines in medium-term to neutral and long-term minor beneficial (OSPES hedgerow schemes deliver additional hedgerow planting and may further increase the beneficial effects in the long-term).	Minor beneficial	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Wet ditch	Ca 300 watercourse crossings, with installation period of 1-2 weeks, crossings in place for construction period (ca 4 years) then removed. CEMP ensures continuity of basal substrate maintained and control over pollution and siltation. All ditches reinstated on completion of works. Bank and in-channel vegetation anticipated to re-establish within 2-4 years. Losses in the 400kV and Sandford Substation are of 45m (ca 500m Sandford) and are assessed as Medium magnitude. Losses for shorter access-only crossings are 13 to 17m and are assessed as Low magnitude	BMS Water vole, Otter and Invertebrate Method statements Invasive species method statement Additional controls in designated sites as listed above Medium magnitude in short-term, reducing to Neutral in medium-term	Not significant	Probable (ditches may not recover at various rates)
Running water	See notes above re ditches	See notes above re ditches	Not significant	Certain
Swamp	Small temporary losses at various locations across the route specifically within Portbury Wharf Nature Reserve SNCI.	Habitat reinstatement Low magnitude reducing to neutral in medium-term	Not significant	Certain
Semi-improved neutral grassland	Small-scale permanent losses to pylon feet. Temporary loss in underground line corridors. Soil replaced and re-seeded in latter stages of construction, but likely to become better drained and drier than previously, therefore the habitat would tend to become like improved grassland (of lower value). Impacts are of greatest significance in the grassland SNCIs associated with SSSI ditch systems (reported above). 64.47ha is derived from floodplain grazing marsh under Option A and 69.61ha under Option B.	BMS CEMP – good soil-handling practices Habitat reinstatement Medium magnitude effect reducing to Low in long-term	Minor significance	Probable (recovery may be quicker)

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Poor semi-improved grassland	See notes above re semi-improved grassland. 37.63ha is derived from floodplain grazing marsh under Option A and 38.93ha under Option B.	BMS CEMP – good soil-handling practices Habitat reinstatement Low magnitude effect reducing to Neutral in long-term	Not significant	Probable
Marshy grassland	0.85ha former grazing marsh would probably not be capable of restoration in-situ under Option A and 0.91ha under Option B.		Minor adverse	Certain
Fauna				
Birds (Swans & geese)	Construction: Displacement from feeding, or breeding grounds throughout the survey area as a result of construction activities creating noise or human activity disturbance. This medium-term temporary effect applies to construction at any time of year. The only goose or swan species regularly present is mute swan, which has plentiful habitat in the wider area.	If the alternative route is selected, construction would avoid disturbing activity within 250m of Portbury Wharf during the Winter period (October to March inclusive). This is the only location found to hold high habitat potential for wildfowl.	Not significant	Probable
	Construction: Loss or degradation of feeding or breeding grounds throughout the survey area as a result of direct land take or accidental pollution or changes in hydrology (drainage). The only goose or swan species regularly present is mute swan, which is not considered vulnerable to disturbance.	This medium-term temporary effect applies to areas where wet grassland is lost to construction works at any time of year. The majority of working areas would revert to previous condition post construction and replacement hedgerow planting would reverse effects in the long-term; any permanent changes in drainage would be small scale.	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
	Operation: Collision risk during migration and feeding flights.	Bird flight diverters would be fitted in areas where bird movements are likely to occur (three sections of the route near to major watercourses south of the Mendip Hills). Monitoring would be undertaken in areas where radar studies indicate bird movement is most likely to take place, outside of those sections where bird diverters are proposed to be fitted. National Grid would provide a contribution to carrying out monitoring work at Portbury Wharf. National Grid's Bird Flight Diverter Protocol would apply to the entire route The mitigation would not prevent all collisions, but would ensure that birds of conservation concern are prioritised in the consideration of where to place diverters. A residual Low magnitude collision risk persists	Minor adverse	Certain
Birds (Ducks)	Construction: Displacement from feeding, breeding or Wintering grounds throughout the survey area as a result of construction activities creating noise or human activity disturbance. This medium-term temporary effect applies to construction at any time of year.	If alternative route is selected, works would avoid works within 250m of Portbury Wharf during Winter period (October to March inclusive). This is the only location found to hold high habitat potential for wildfowl.	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
	Construction: Loss or degradation of feeding or breeding grounds throughout the survey area as a result of direct land take or accidental pollution or changes in hydrology (drainage). This medium-term temporary effect applies to areas where wet grassland is lost to construction works at any time of year.	The majority of working areas would revert to previous condition post construction; any permanent changes in drainage would be small scale. Where the development passes through open fields where breeding waders may be present during the breeding season, a nesting bird check would first need to be carried out by an ecologist to establish whether any active nests are present. If active bird nests are located, the nest would be marked and all potentially disturbing works within at least 20m of the nest location would be stopped until the active nest had been vacated.	Not significant	Near Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Birds (Ducks)	Operation: Collision risk during migration and feeding flights.	Bird flight diverters would be fitted in areas where bird movements are likely to occur (three sections of the route near to major watercourses south of the Mendip Hills). Monitoring would be undertaken in areas where radar studies indicate bird movement is most likely to take place, outside of those sections where bird diverters are proposed to be fitted. National Grid would provide a contribution to carrying out research to further understand duck movements in the vicinity of the Somerset Levels and Severn Estuary. National Grid would provide a contribution to carrying out monitoring work at Portbury Wharf. National Grid's Bird Flight Diverter Protocol would apply to the entire route The mitigation would not prevent all collisions, but would ensure that birds of conservation concern are prioritised in the consideration of where to place diverters. A residual Low magnitude collision risk persists	Minor adverse	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Birds (Waders)	Construction: Displacement from feeding, or breeding grounds throughout the survey area as a result of construction activities creating noise or human activity disturbance. This medium-term temporary effect applies to construction at any time of year.	The majority of working areas would revert to previous condition post construction; any permanent changes in drainage would be small scale. Where the development passes through open fields where breeding waders may be present during the breeding season, a nesting bird check would first need to be carried out by an ecologist to establish whether any active nests are present. If active bird nests are located, the nest would be marked and all potentially disturbing works within at least 20m of the nest location would be stopped until the active nest had been vacated.	Not significant	Certain
Birds (Waders)	Construction: Loss or degradation of feeding or breeding grounds as a result of direct land take. This medium-term temporary effect applies to areas where wet grassland is lost to construction works at any time of year. The majority of working areas would revert to previous condition post construction and replacement hedgerow planting could reverse effects in the long-term; any permanent changes in drainage would be small scale.	Where the development passes through open fields where breeding waders may be present during the breeding season, a nesting bird check would first need to be carried out by an ecologist to establish whether any active nests are present. If active bird nests are located, the nest would be marked and all potentially disturbing works within at least 20m of the nest location would be stopped until the active nest had been vacated.	Neutral	Possible

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
	Operation: Collision risk during migration and feeding flights.	Bird flight diverters would be fitted in areas where bird movements are likely to occur (three sections of the route near to major watercourses south of the Mendip Hills). Monitoring would be undertaken in areas where radar studies indicate bird movement is most likely to take place, outside of those sections where bird diverters are proposed to be fitted. National Grid would provide a contribution to carrying out monitoring work at Portbury Wharf. National Grid's Bird Flight Diverter Protocol would apply to the whole of the route The mitigation would not prevent all collisions, but would ensure that birds of conservation concern are prioritised in the consideration of where to place diverters. A residual Low magnitude collision risk persists	Minor adverse	Certain
Birds (Raptors & owls (excl. Barn owl))	Construction: Displacement from feeding grounds throughout the survey area as a result of construction activities creating noise or human activity disturbance.	All watercourses would be avoided where possible and alterations to hydrology minimised. Any loss of wet grassland habitat would be re-instated following development works	Minor adverse	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
	Construction: Displacement from feeding, or breeding grounds at Portbury Wharf and Avonmouth as a result of construction activities creating noise or human activity disturbance (particularly any initial mature tree removal). This medium-term temporary effect applies to construction at any time of year. The majority of working areas would revert to previous condition post construction and replacement hedgerow planting could reverse effects in the long-term.	Any works proposed to be undertaken within 50m of a known barn owl box would require inspection of the box for signs of current nesting activity by a licenced barn owl surveyor a maximum of 24hrs prior to works commencing. Should barn owl be found to be nesting, no works would take place within a minimum disturbance buffer distance of 50m surrounding the nest location while the nest is active.	Preferred route – Not significant Alternative route – Minor adverse	Near Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
	Construction: The loss or degradation of feeding or breeding grounds also applies to all working areas containing mature trees for the duration of construction (medium-term). Direct land take or accidental pollution or changes in drainage. The majority of working areas would revert to previous condition post construction and replacement tree planting could reverse effects in the long-term. This effect applies where works are unavoidably timed during the breeding season.	All hedges/shrub/trees or dense vegetation would be retained as much as is practicable. Where these measures are not possible and works are needed to be carried out during the bird breeding season, all areas to be affected would be checked for evidence of nesting birds a maximum of 24hrs prior to the vegetation removal/tree felling works taking place. If any active bird nests are discovered these would be given a minimum standoff of 5m (this may increase depending on species/proposed works and location) where no potentially disturbing works would take place until the young have fledged and the nest vacated. Any nest boxes lost through the development would be re-instated on a 2:1 basis. The replacement nest boxes would be sited in appropriate habitat as near as possible to the locations of the nest boxes to be removed.	Not significant	Near certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Birds (Hérons & egrets)	Construction: Loss or degradation of feeding grounds throughout the survey area as a result of direct land take loss of wet grassland, accidental pollution or changes in hydrology (drainage). The majority of working areas would revert to previous condition post construction and replacement planting could reverse effects in the long-term. Due to the abundance of suitable foraging habitat in the wider area, this is unlikely to be a significant effect.	All watercourses would be avoided where possible and alterations to hydrology minimised. Any loss of wet grassland habitat would be re-instated following development works	Minor adverse	Certain
Birds (Barn owl)	Operation: Collision risk during migration and feeding flights.	Bird flight diverters would be fitted in areas where bird movements are likely to occur (three sections of the route near to major watercourses south of the Mendip Hills). Monitoring would be undertaken in areas where radar studies indicate bird movement is most likely to take place, outside of those sections where bird diverters are proposed to be fitted. National Grid Bird Flight Diverter Protocol National Grid would provide a contribution to carrying out monitoring work at Portbury Wharf.	Not significant	Possible (Collisions cannot be ruled out entirely, but should be isolated and a strategy is in place for monitoring and response

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
	Construction: The temporary displacement from feeding, or breeding grounds applies to all working areas containing mature trees for the duration of construction (medium-term). This effect applies where works are unavoidably timed during the breeding season.	All hedges/shrub/trees or dense vegetation would be retained as much as is practicable. Where these measures are not possible and works are needed to be carried out during the bird breeding season, all areas to be affected would be checked for evidence of nesting birds a maximum of 24hrs prior to the vegetation removal/tree felling works taking place. If any active bird nests are discovered these would be given a minimum standoff of 5m (this may increase depending on species/proposed works and location) where no potentially disturbing works would take place until the young have fledged and the nest vacated.	Not significant	Near certain
Birds -Barn owl	Construction: Loss or degradation of feeding or breeding grounds at Portbury Wharf and Avonmouth as a result of construction land take, particularly any initial mature tree removal This temporary effect applies to construction at any time of year. The majority of working areas would revert to previous condition post construction and replacement hedgerow planting could reverse effects in the long-term.	Any nest boxes lost through the development would be re-instated on a 2:1 basis. The replacement nest boxes would be sited in appropriate habitat as near as possible to the locations of the nest boxes to be removed.	preferred route – Not significant alternative route – Minor adverse	Possible

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
	Construction: Displacement from feeding, or breeding grounds during construction (medium-term) applies throughout the survey area but the greatest impacts are anticipated in: • Woolavington Level to Huntspill River • East Huntspill to Southwick • Northwick to Rook's Bridge • Land west of Yatton • Nailsea Moor • Portbury Wharf [alternative route] • Hallen Marsh. This effect applies where works are unavoidably timed during the breeding season.	All hedges/shrub/trees or dense vegetation would be retained as much as is practicable. Where these measures are not possible and works are needed to be carried out during the bird breeding season, all areas to be affected would be checked for evidence of nesting birds a maximum of 24hrs prior to the vegetation removal/tree felling works taking place. If any active bird nests are discovered these would be given a minimum standoff of 5m (this may increase depending on species/proposed works and location) where no potentially disturbing works would take place until the young have fledged and the nest vacated	Minor adverse	Possible

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Birds (Farmland birds)	Construction: Loss or degradation of feeding or breeding grounds during construction (particularly initial hedgerow removal) applies throughout the survey area but the greatest impacts are anticipated in those areas listed above. The majority of working areas would revert to previous condition post construction. And replacement hedgerow planting could reverse effects in the long-term.	All hedges/shrub/trees or dense vegetation would be retained as much as is practicable. All hedges/shrub/trees or dense vegetation would be re-instated following works through replacement planting Any nest boxes lost through the development would be re-instated on a 2:1 basis. The replacement nest boxes would be sited in appropriate habitat as near as possible to the locations of the nest boxes to be removed. All watercourses would be avoided where possible and alterations to hydrology minimised. Any loss of wet or rough grassland habitat would be re-instated following development works	Not significant	Near Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Birds (Kingfisher)	Construction: Displacement from feeding, or breeding grounds at Nailsea Moor and Lox Yeo River. This temporary effect would arise if construction activities are unavoidably carried out during the breeding season.	A standoff of at least 5m would be applied to all watercourses. This would be increase to 9m in any SSSI. Any works within 8m of a watercourse in the detailed locations would first require a kingfisher survey to be undertaken along the proposed watercourse by an ecologist. If kingfisher are suspected of currently nesting, a further survey by a licenced ecologist would be required a maximum of 24hrs prior to works taking place to establish whether the kingfisher nest is active. If kingfisher are established to be breeding, a minimum standoff of 20m would be applied to the nest location. This disturbance buffer may be increased at the discretion of the licenced ecologist depending on the proposed works and the habitats present.	Not significant	Possible

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Birds (Kingfisher)	Construction: Loss or degradation of feeding or breeding grounds as a result of direct land take (particularly works entailing removal of vegetation within 8m of watercourses) or accidental pollution or changes in hydrology. This effect applies if construction activities are unavoidably carried out during the breeding season. The majority of working areas would revert to previous condition post construction and replacement scrub planting or re-seeding by watercourses could reverse effects in the long-term.	A standoff of at least 5m would be applied to all watercourses. This would be increased to 9m in any SSSI. Any works within 8m of a watercourse in the detailed locations would first require a kingfisher survey to be undertaken along the proposed watercourse by an ecologist. If kingfisher are suspected of currently nesting, a further survey by a licenced ecologist would be required a maximum of 24hrs prior to works taking place to establish whether the kingfisher nest is active. If kingfisher are established to be breeding, a minimum standoff of 20m would be applied to the nest location. This disturbance buffer may be increased at the discretion of the licenced ecologist depending on the proposed works and the habitats present.	Not significant	Possible

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Birds (Cetti's Warbler)	Construction: Temporary displacement from feeding or breeding grounds during any construction works within 20m of a nest apply throughout the survey area but greatest effects are predicted at Portbury Wharf and Avonmouth. This effect applies to works unavoidably scheduled during the breeding season.	Any removal of dense vegetation within the period March to August would require a nesting bird a maximum of 24hrs prior to works taking place. If Cetti's warbler are suspected to be nesting, a licenced ecologist may be required to check the nest directly. If Cetti's warblers are established to be breeding, a minimum standoff of 20m would be applied to the nest location. This disturbance buffer may be increased at the discretion of the licenced ecologist depending on the proposed works and the habitats present	Not significant	Possible
Birds Cetti's warbler	Construction: Loss or degradation of feeding or breeding grounds as a result of direct land take (particularly works entailing removal of vegetation within 8m of watercourses) or accidental pollution or changes in hydrology. This effect applies if construction activities are unavoidably carried out during the breeding season. The majority of working areas would revert to previous condition post construction and replacement scrub planting or re-seeding by watercourses could reverse effects in the long-term.	Any removal of dense vegetation within the period March to August would require a nesting bird a maximum of 24hrs prior to works taking place. If Cetti's warbler are suspected to be nesting, a licenced ecologist may be required to check the nest directly. If Cetti's warblers are established to be breeding, a minimum standoff of 20m would be applied to the nest location. This disturbance buffer may be increased at the discretion of the licenced ecologist depending on the proposed works and the habitats present	Preferred Route – Not Significant Alternative Route- Minor Adverse	Possible

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Birds (Common Crossbill)	Construction: Temporary displacement from feeding or breeding grounds during any construction works within 20m of a nest. This applies to the woodland between the Chummock Wood and Mogg's Wood, near to Cadbury Camp Lane. This effect applies all year round.	If any tree removal is required from this section a nesting bird check for common crossbill would be required of the trees a maximum of 24hrs prior to works taking place. If common crossbill are suspected to be nesting, a licenced ecologist may be required to check the nest directly. If common crossbill are established to be breeding, a minimum standoff of 20m would be applied to the nest location. This disturbance buffer may be increased at the discretion of the licenced ecologist depending on the proposed works and the habitats present	Not significant	Certain
Birds (Common crossbill)	Construction: Loss or degradation of breeding grounds as a result of direct land take (any tree removal associated with the woodland between the Chummock Wood and Mogg's Wood, near to Cadbury Camp Lane. The majority of working areas would revert to previous condition post construction and replacement scrub planting or re-seeding by watercourses could reverse effects in the long-term.	If any tree removal is required from this section a nesting bird check for common crossbill would be required of the trees a maximum of 24hrs prior to works taking place. If common crossbill are suspected to be nesting, a licenced ecologist may be required to check the nest directly. If common crossbill are established to be breeding, a minimum standoff of 20m would be applied to the nest location. This disturbance buffer may be increased at the discretion of the licenced ecologist depending on the proposed works and the habitats present.	Not significant	Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Bats (Roosts)	Construction: Loss of non-breeding roosts common and soprano pipistrelle, long-eared and a <i>Myotis</i> species. (6 with preferred route, 7 with alternative route)	Implementation of NE licence requirements to facilitate roost exclusion and tree felling. Mitigation Roost boxes pre-construction surveys. High magnitude effect reduces to neutral	Not significant	Certain/near certain
Bats (Roosts)	Construction: Indirect effects on the retained roosts include disturbance and habitat fragmentation in the immediate vicinity, which in the worst-case, may cause abandonment of the roost.	Retained trees roosts would be safeguarded, although fragmentation effects of Low magnitude would remain until planted habitats establish. Mitigation informed by pre-construction surveys. Low magnitude effect reduces to neutral in medium-term	Not significant	Probable
	Construction: Loss or severance of commuting habitat and loss or degradation of foraging habitat. Re-instatement of habitat under the Replacement Planting Plans across the majority of working areas, although this would incur a time lag as habitat features establish and mature. Principal effects on horseshoes relate to the permanent loss of woodland across Tickenham Ridge to the 400kV overhead easement, and more widely, medium-term loss of hedgerows, trees and grassland/pasture across the underground swathes	Use of 'temporary' hedgerows overnight across the 4km SAC buffer overnight to ensure continuity of bat flyways. Sowing and management of compensatory grassland for foraging bats across the SAC buffer. Provision of alternative and additional habitat through the Tree Impact Plans. Medium-term effects of Low magnitude would remain until planted habitats establish, although 'temporary' hedgerows would go some way to alleviate this. Mitigation informed by pre-construction surveys. Impact Reduces from Medium magnitude to Neutral	Not significant	Probable

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Bats (Horseshoe activity within SAC buffer)	Construction: Loss or severance of commuting habitat and loss or degradation of foraging habitat, as described above. Outside the SAC buffer, horseshoe activity was limited.	Provision of temporary flyways using brushwood and ivy screens after hedgerow removal, following lines of former hedges. Grassland management during construction phase within Order Limits to provide additional invertebrate prey. Seeding of soil mounds with nectar-rich mixes to provide additional invertebrate prey Hedgerow Replacement Plan, including bespoke mix design Magnitude of effect reduces from High to Neutral for construction and habitat reinstatement period	Not significant	Near Certain
Bats (Horseshoe activity outside SAC buffer)	Construction: Loss or severance of commuting habitat and loss or degradation of foraging habitat. Barbastelle is a fast, far-flying bat and would cross open habitats. Nevertheless, permanent loss of woodland across Tickenham Ridge and the open-cut working throughout the 400kV and 132kV underground swathes would pose a significant change to habitat availability and landscape connectivity in the medium-term.	Mitigation as described above.	Not significant	Near Certain
Bats (Barbastelle)	Construction: Loss or severance of commuting habitat and loss or degradation of foraging habitat. Re-instatement of habitat under the Replacement Planting Plans across the majority of working areas, although this would incur a time lag as habitat features establish and mature.	Mitigation as described above.	Not significant	Near Certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Bats (Bechstein's, Leisler's and Nathusius' pipistrelle)	Construction: Loss or severance of commuting habitat and loss or degradation of foraging habitat. Re-instatement of habitat through the Replacement Planting Plans and mitigation planting around the substations and CSE compound would alleviate such adverse effects, although this would incur a time lag as habitat features establish and mature. Impacts are therefore anticipated to relate principally relate to the open-cut underground swathes and the loss of woodland at Tickenham Ridge.	Provision of temporary flyways in the 400kV underground section using brushwood and ivy screens after hedgerow removal, following lines of former hedges. Provision of alternative and additional habitat through the Replacement Plans. Medium-term effects of Low magnitude would remain until planted habitats establish. Mitigation informed by pre-construction surveys. Medium magnitude reducing to neutral in the medium to long-term	Not significant	Probable
Bats (Activity) (Daubenton's, Natterer's and alcahloe, serotine and noctule, common and soprano pipistrelles, and brown long-eared bats, and habitats supporting comparatively high levels of their activity.)	Construction: Loss and severance of hedgerows and tree-removal	Provision of temporary flyways in the 400kV underground section using brushwood and ivy screens after hedgerow removal,, following lines of former hedges. Hedgerow Replacement Plan, including bespoke mix design Medium magnitude reducing to neutral in the medium to long-term	Not significant	

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Water vole	Construction: Medium-term temporary loss to temporary culverts for the duration of construction. Additional short-term temporary loss to the wider de-watered working area for the 1-2 week period of installation and removal. Short-term temporary habitat and fragmentation along the 400kV and 132kV underground lines to the installation of cable ducts during installation (2-4 weeks). Ditches would be reinstated on completion of works. Bank and in-channel vegetation is anticipated to re-establish within 2-4 years. Installation and removal of water crossings would also incur short-term disturbance, and in worst-case scenario displacement, of water vole in adjacent habitats for the duration of works. Risk of disturbance associated with the movement of construction vehicles in the medium-term. Potential effects would be exacerbated should works commence after territories have established hence voles are less likely to move out of working areas, or during Winter torpor.	Implementation of sensitive working practices in accordance with the Water Vole Method Statement and, where appropriate, NE licence requirements. Riparian habitat connectivity would be maintained and smaller ditch habitats reinstated following construction, although temporary disturbance of Medium magnitude would remain during construction. Mitigation informed by pre-construction surveys. Protected Species Licence requirements. High magnitude effects at installation and removal of crossings, mitigated to Low magnitude at the time through working practices. Medium magnitude habitat disturbance effects persisting through construction phase and reducing to neutral in medium-term	Minor adverse To Not significant long-term	Certain/near certain

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Otter	Construction: Short-term temporary habitat fragmentation, loss of foraging habitat (including indirect effects should fish on which otter predate be adversely affected by the proposed water crossings) and disturbance effect during the installation and removal of water crossings (1-2 weeks). Risk of death or injury should an otter fall into or become trapped within an open excavation, particularly underground line installation.	Implementation of sensitive working practices in accordance with the Otter Method Statement. Riparian habitat connectivity would be maintained and smaller ditch habitats reinstated following construction, although temporary disturbance would remain during construction. Mitigation informed by pre-construction surveys and licence data. Low magnitude effects reducing to neutral	Not significant	Probable

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Badger	Construction: Loss of 1x subsidiary sett at North End (Section D) and 3x outlier setts at East Huntspill, (Section B), Rook's Bridge (Section B), Tickenham Edge (Section D). Disturbance and possible damage of a Main sett at Barton (Section C) for the duration of works. Effects would be exacerbated by works scheduled during the breeding season. Medium-term temporary disturbance of 2x further main setts, 3x subsidiary setts and 2x outlier setts during construction. Badgers are particularly sensitive to disturbance during the breeding and hibernation seasons. Medium-term temporary loss of foraging habitat and associated fragmentation – potentially severance between setts within the same clan, principally in areas of open-cut swathe for the underground lines (Sections C-E) and Sandford Substation (Section D). Smaller areas of habitat loss to construction accesses and compounds. Reinstatement of habitat on completion of construction. Risk of killing or injury to badgers through works directly affecting the setts and/or in the event that a badger falls into/becomes entrapped within construction excavations.	Implementation of NE licensed badger mitigation for all works affecting setts. Risk of entrapment avoided through best practice construction methods set out in the BMS. Provision of alternative habitat through the Replacement Plans. Temporary habitat losses of Medium magnitude would remain until habitat establishes. Mitigation informed by pre-construction surveys and licence data. Medium magnitude effects reducing to neutral	Not significant	Certain
Brown hare	Construction: Death or injury during initial site clearance (leverets particularly susceptible). Potential entrapment in excavations, pipes or wire mesh associated with construction activities, which may cause distress or injury.	Risk of entrapment avoided through best practice construction methods set out in the BMS. Medium magnitude effects reducing to neutral.	Not significant	Probable

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Hedgehog	Construction: Risk of killing and injury, particularly where site clearance is carried out during Winter hibernation. Habitat loss, fragmentation during installation of underground lines.	Implementation of sensitive working methods as part of the Hedgerows Method Statement to avoid risk of killing and injury. Provision of alternative habitat through the Replacement Plans. Temporary habitat losses would remain until habitat establishes. Medium magnitude effects reducing to neutral in long-term	Not significant	Probable
Amphibians (GCN)	Construction: Medium-term temporary habitat loss to a single culvert at ditch TEP1062 (GCN Site 7). Ditches would be reinstated on completion of works. Bank and in-channel vegetation is anticipated to re-establish within 2-4 years. Terrestrial habitat losses across the entire Order Limits in the vicinity of GCN breeding ponds total 4.48m within 50m of GCN ponds and 20.87ha within 250m (permanent loss) and 4.48ha within 50m and <0.01ha within 250m (medium-term temporary loss). Fragmentation of terrestrial habitat for GCN moving across the surrounding landscape.	Implementation of NE licensed mitigation for all works within areas of GCN habitat. Mitigation informed by pre-construction surveys and licence data. Medium magnitude Effect in Specific Areas for duration of construction period, reducing to Neutral as habitats are reinstated	Not significant	Probable (uncertainty relates to timescales of habitat reinstatement)

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Amphibian (Wider assemblage)	Construction: The habitat losses and associated fragmentation outlined for GCN above would also affect common toad, frog and the small newt species.	Avoidance of potential killing and injury through implementation of sensitive working methods for GCN. Other watercourse crossings outside GCN licence to be subject to Amphibian Method Statement Medium magnitude Effect in Specific Areas for duration of construction period, reducing to Neutral as habitats are reinstated	Not significant	Probable (uncertainty relates to timescales of habitat reinstatement)
Reptiles	Construction: Habitat loss, principally of medium-term temporary effects for the duration of construction, although permanent losses would occur at Sandford Substation and the CSE compounds. Associated risk of killing or injury of grass snake, slow worm or common lizard within construction areas. Medium-term temporary severance, principally associated with underground line working; grass snake particularly susceptible.	Implementation of sensitive working through the Reptile Method Statement. Habitat Reinstatement Mitigation informed by pre-construction surveys Temporary habitat losses of Medium magnitude would remain until habitat establishes.	Not significant	Probable

Receptor	Potential Effect(s) Prior to Mitigation	Mitigation	Residual Effect	Likelihood of Effect
Ditch invertebrates (National and County value)	Construction: Medium-term habitat losses across the ditch network to watercourse crossings, with associated risk of localised extinction of rare or threatened species. All ditches reinstated on completion of works. Bank and in-channel vegetation anticipated to re-establish within 2-4 years.	Implementation of sensitive working through the Watercourse Crossing Method Statement and Lesser Silver Water Beetle Method Statement. Creation of stepped banks within SSSI ditches following removal of culverts. Mitigation informed by baseline data and construction surveys. Temporary disturbance effects of Low magnitude during installation and removal (short-term) and the period during which vegetation and invertebrates themselves re-establish (medium-term) in the short affected stretches from the wider ditch network. Low magnitude effect reducing to neutral in medium-term	Not significant	Certain
Fish	Construction: Short-term severance effects during culvert and removal (1-2 weeks each) and the installation of cable ducts for underground lines (2-4 weeks at any given stretch). Eel and trout are particularly sensitive during the migration seasons. Short-term disturbance (noise and vibration) effects during installation and removal may cause fish to flee. All ditches reinstated on completion of works. Bank and in-channel vegetation anticipated to re-establish within 2-4 years.	Implementation of sensitive working through the Watercrossing Method Statement. Temporary disturbance effects of Low magnitude would remain during installation and removal (short-term) in the short affected stretches from the wider ditch network. Creation of stepped banks within SSSI ditches following removal of culverts. Low magnitude effect reducing to neutral in medium-term	Not significant	Probable

8.9 Compensation, Offsetting and Enhancement Measures

- 8.9.1 The measures described in this section are distinct from the embedded mitigation delivered as part of the DCO consent, as they would be delivered under s106 agreement. These measures are included in the assessment because there is a commitment from National Grid to provide the finance and resources to deliver and, based on consultations to date, the relevant consultees have the interest and capacity to implement the works. Whilst it is recognised that any measures delivered under s106 agreement will be reliant on agreements with the Local Authority and/or landowners, as with any mitigation, any such measures are included only where there is reasonable likelihood of success. The residual effects assessed previously in section 8.8 do not take account of the measures described in this section.

Off-site Planting and Enhancement Scheme

- 8.9.2 The Off-Site Planting Enhancement Strategy (OSPES) (**Volume 5.25.1**) comprises proposals to plant trees and hedgerows on land in the vicinity of the Proposed Development, subject to landowner agreement. The OSPES does not therefore form mitigation or screening but a package of compensatory and enhancement measures. The Schedule of Enhancements (**Volume 5.25.2, Appendix 25A**) describes the works required and the Landscape Specification (**Volume 5.25.2, Appendix 25C**) details the materials, standards and workmanship expected during construction, implementation and management of soft landscape works. Guide management operations are provided in **Volume 5.25.2, Appendix 25D**; Local Authorities existing specifications addressing local conditions, character and management can be used.
- 8.9.3 National Grid is committed to funding the provision of this quantum of planting, which would be delivered by the Local Authorities who would be able to draw down funding to achieve its implementation. The funding includes costs of professional fees for putting in place agreements, design, procurement, implementation, inspection and maintenance and management for five years. National Grid has high confidence that works equivalent to those set out in the OSPES would be implemented.
- 8.9.4 The OSPES has been drawn up in consultation with the Local Authority ecologists to optimise ecological connectivity and species and structural diversity wherever possible. Planting would use native species in mixes characteristic of the areas in which they are proposed. The planting includes ‘gapping up’ existing hedges to improve connectivity. Although the primary focus of the OSPES is to strengthen landscape character and to introduce some screening of views of the Proposed Development, it would inevitably bring biodiversity benefits.
- 8.9.5 The OSPES can begin to be implemented before some habitat is lost, because the great majority of the proposals it contains are outside of the footprint of the construction works for the Proposed Development.

Overall Habitat Creation under OSPES

- 8.9.6 The OSPES comprises planting of 2,238 trees, 7.46ha structural whips (as initial whips which, as with the Site-Specific Planting Plans, would be managed to create a mixed thicket with varied structure), 10.58km of new native hedgerow planting

and gapping up of 11.12km existing hedgerows. To reflect the existing landscape character, Where in-situ replacement of trees lost at the onset of construction was not possible within the immediate vicinity of the over or underground lines, OSPES planting is provided within the same Section of the Proposed Development to reflect the existing landscape character. The distribution of the proposals comprising the scheme is summarised in **Table 8.31**.

Table 8.31 Spatial Breakdown of OSPES Planting

Location	Native Tree Planting	Structure Planting Whips	New Native Hedgerow Planting	Gap Planting to Existing Hedgerows
Section A	217no.	46,610no./4.61ha	899m	200m
Section B	617no.	9,076no./0.91ha	2.77km	5.64km
Section C	226no.	0	0.50km	0.48km
Section D	572no.	5,790no./0.58ha	3.47km	3.30km
Section E	195no.	6,231no./0.623ha	1.65km	0.83km
Section F	91no.	969no./0.10ha	0.47km	0.67km
Section G	214no.	5,957no./5.96ha	0.83km	0
Section H	106no.	0	0	0
TOTAL	2,238no.	74,633no./7.46ha	10.58km	11.12km

- 8.9.7 The total native planting of the OSPES in combination with the Site-Specific Planting Plans (see section 8.4: Modifications within the Scheme Design) is summarised in **Table 8.32**.

Table 8.32 Total Native Planting Proposed

Location	Native Tree Planting	Structure Planting Whips	New Native Hedgerow Planting	Gap Planting to Existing Hedgerows
OSPES	2,238no.	74,633no./7.46ha	10.58km	11.12km
Site-Specific Planting Plans	975no.	23,300no./2.33ha	1.75km	1.83km
GRAND TOTAL	3,213no.	97,933no./9.79ha	12.33km	12.94km

OSPES Works in and Adjacent Designated Wildlife Sites

- 8.9.8 The OSPES envisages proposals for tree and hedgerow planting in and around a number of designated wildlife sites, as listed below. Planting seeks to augment existing habitats, strengthening and/or extending features such as defunct hedgerows and scattered scrub. Near SSSIs where the site-specific conservation objectives require open habitats (at Puxton Moor SSSI, Biddle Street Yatton SSSI and Tickenham, Nailsea & Kenn Moors SSSI), tree planting in adjoining SNCI's is proposed at distance from SSSI ditch habitats.

8.9.9 Designated wildlife sites which would experience some OSPES planting are listed below. This planting has taken into consideration the conservation benefit of open habitats, for example to waterfowl and waders. Planting is not proposed where such conservation objectives are a priority and could be damaged by tree or hedgerow planting.

- Huntspill River NNR;
- Lox Yeo River SNCI (planting to complement the riparian corridor – see narrative under sub-section below);
- Towerhead Brook (part of) and adjacent land SNCI;
- Cheddar Valley Railway Walk LNR;
- Biddle Street Yatton SSSI ;
- Congresbury Yeo, Adjacent Land & Rhynes SNCI;
- Puxton Moor SSSI & Surrounding Rhynes SNCI;
- Nailsea & Tickenham Moors SNCI;
- Birch Wood & Priors Wood SNCI;
- Fields west of Lower Caswell House SNCI;
- Fields north of Upper Caswell Farm SNCI;
- Fields on Caswell Moor SNCI;
- Fields adjacent to M5 Motorway, Portbury SNCI;
- The Portbury Wharf Nature Reserves;
- Drove Rhyne & Adjacent Fields SNCI;
- Land South of Sewage Treatment Works WNS;
- Land Between M49 and M5 WNS;
- Salt Rhine and Moorhouse Rhine West Rhine SNCI;
- Land Around Moorhouse Caravan Park WNS;
- Land West of King Street WNS;
- Agricultural Land South of Railway WNS;
- Hallen Marsh Agricultural Land WNS (restricted to structure planting alongside the existing road network to avoid interference with flight lines – see narrative under dedicated sub-section below);
- Former Shell Tank Site WNS (avenue tree planting at the periphery of the WNS is not predicted to affect flight lines of birds associated with the Estuary); and
- Bridgewater Bay SSSI (planting would avoid intertidal areas and other open habitats types of value).

Lox Yeo River SNCI

8.9.10 The Environment Agency has suggested that planting trees along the Lox Yeo. Tree planting along rivers is often cited as a way to improve conditions for salmonids; benefits include shading to minimise water heating in Summer, prevention of bank erosion and associated siltation and increase in invertebrate prey through leaf fall. Although there is some discussion on whether the temperatures experienced in UK rivers (unlike lower latitudes) are likely to require shading to maintain appropriate thermal regimes, future climate change is predicted to result in warmer and possibly drier Summers.

8.9.11 The section of the Lox Yeo River between the M5 in the west and the wastewater treatment works (near Max Mill Lane) in the east is sparsely vegetated and is an appropriate location for planting small, scattered groups of trees, at least some of

which would be sited on the riverbank itself to overhang the watercourse. This would provide cooler shaded areas for salmonids and in time may also provide additional cover for birds and for otter, without shading out the entire watercourse. Tree planting would also augment the riparian corridor as foraging and commuting habitat for bats, in particular Daubenton's which are strongly associated with this habitat type and potentially also horseshoe bats associated with the nearby SAC sites.

- 8.9.12 Excessive shading can have a negative effect on watercourses, by limiting the amount of marginal and aquatic vegetation growth which in turn can limit invertebrate communities or water vole presence. Management of OSPES planting at the SNCI (funded by National Grid for five years) would seek to ensure planting establishes in accordance with the conservation objectives for the SNCI.
- 8.9.13 Delivery of planting throughout the entire stretch of the Lox Yeo River SNCI presented in the OSPES would provide an enhancement over and above the mitigation of tree loss to the 400kV underground haul road. Once planting becomes established, this is anticipated to form an effect of Medium magnitude and of **moderate beneficial** significance in the long-term.

Hallen Marsh

- 8.9.14 Hallen Marsh has been selected as compensation habitat for wintering birds associated with the Severn Estuary SPA Ramsar, therefore, OSPES planting has been kept to the perimeter of the Hallen Marsh area along roads where there is existing development or where there is proposed development. Many wader and wildfowl bird species are deterred from foraging in habitats with small field sizes where hedgerows or other physical structures can have a displacement effect. This is thought to originate from a predator avoidance strategy, as such features limit the ability of the birds to see an approaching threat. No adverse effect of the OSPES planting on potential future value of Hallen Marsh for birds is therefore anticipated. However, due to the ongoing review of the Local Plan and development of bird habitat enhancement proposals for Hallen Marsh, the OSPES states that details of any planting at this location must be discussed with Bristol City Council's Ecologist prior to implementation.

OSPES Benefits to Habitats and Flora

- 8.9.15 The planting provided by OSPES would compensate for the Low magnitude medium-term adverse effect of tree losses and the Low magnitude long-term adverse effect of restricted woodland cover over underground cables or beneath overhead lines.
- 8.9.16 Taking account of these mitigation measures, the medium-term adverse effects are reversed to become neutral and of No significance. Depending on the extent of additional planting and habitat creation, which varies from place to place, the long-term effect could range from Neutral magnitude (**not significant**) to a Low magnitude beneficial effect on a series of County level receptors, the latter representing **minor beneficial** significance.

Additional Offsetting Measures

- 8.9.17 National Grid would provide further sums for offsetting in recognition of the adverse effects that could arise on biodiversity within designated wildlife sites, notwithstanding the habitat reinstatement measures, the embedded BMS proposals and the OSPES as previously described. This would allow for habitat creation and management works in the affected local sites and/or wider ecological networks. These offsetting activities would compensate for adverse effects arising from the construction-stage disturbance to habitats and species and associated habitat re-establishment; and in some cases would provide enhancements.
- 8.9.18 The offsetting measures fall into three categories:
- a contribution to biodiversity offsetting for local wildlife sites;
 - a funding of a tilting weir for Tickenham, Nailsea and Kenn Moors SSSI; and
 - a contribution to the Avonmouth Severnside offsetting project.

Local Wildlife Sites Offsetting

- 8.9.19 National Grid's proposals, deliverable by s106 agreement, would provide the funds for compensatory habitat creation and management works to be undertaken within affected Local Wildlife Sites, or within the wider ecological network. This funding would ensure that the network of Local Sites maintains its biodiversity value, through the offsetting of the medium-term effects arising from construction works.
- 8.9.20 Section 8.8 lists the Local Wildlife Sites which would experience an adverse residual effect of minor or moderate significance in the medium or long-term. Typically these are where a relatively high proportion of the designated site would be disturbed and/or where a relatively large area of trees would require removal.
- 8.9.21 Section 8.8 also lists the Local Wildlife Sites which would experience a minor adverse residual effect in the short-term, but which would decline to a non-significant effect in the medium term. Although these effects may not be significant for the site itself, National Grid recognises that the effect is nevertheless adverse, and in combination with other adversely-affected local sites, there is a slight decline in biodiversity in the short-to medium term.
- 8.9.22 The purpose of the funding is to mitigate the residual harm that arises from habitat modifications in and around designated sites and to offset the adverse effects arising from the period of time that the designated sites and associated wildlife corridors are subject to disturbance and/or where reinstated habitats have not yet recovered their former ecological functions.
- 8.9.23 The works to be carried out under the scheme could include habitat creation and management measures such as tree and hedge planting, grassland enrichment, wetland creation and management as deemed appropriate by the LPA. As the measures would be implemented under supervision of the relevant Local Planning Authority, National Grid is confident that the works would be appropriate and proportionate, resulting in local enhancement and avoiding adverse effects on ecological receptors.

Tilting Weir at Tickenham, Nailsea & Kenn Moors SSSI

- 8.9.24 A tilting weir would be funded to replace the existing sluice at Tickenham, Nailsea and Kenn Moors SSSI to enable greater, graded control of the water regime across the north of the site. The weir has been agreed with NE and is predicted to create a beneficial effect of Low magnitude and therefore of **moderate beneficial** significance on the SSSI. The likelihood of effect is certain/near certain.

Avonmouth Severnside Offsetting Project

- 8.9.25 Hallen Marsh has been identified as offsetting land for development in the Avonmouth Severnside area that would likely affect birds associated with the Severn Estuary SPA Ramsar. National Grid will make a contribution towards the offsetting scheme for wader and wildfowl habitat enhancement works. Although the Hallen Marsh area even with the proposed overhead line provides more than enough land for the SPA offsetting, this funding recognises, potential restrictions to the future use of Hallen Marsh habitats for wildfowl and waders.
- 8.9.26 National Grid will also commit funds to the Avonmouth Severnside Offsetting Scheme for two year's bird collision monitoring. The funds will be calculated using the monitoring method set out for the section of overhead line south of Mark. The bird collision mortality monitoring will include the section of overhead line between the railway line along the south of Hallen Marsh and the Severn Road in the north. If any monitoring (whether funded by National Grid or other sources) identifies a bird collision issue then National Grid would revert to the NGET Bird Diverter Protocol.
- 8.9.27 These measures would be implemented by Bristol City Council using funds provided under s106 contribution by National Grid. These measures are predicted to create beneficial effect of Low magnitude in the long-term, over and above the negation of detrimental effects and are therefore anticipated to be of **moderate beneficial** significance. The likelihood of effect is near certain.

Bird Tagging Study

- 8.9.28 National Grid proposes to make a financial contribution for research into the relationship between the Somerset Levels and Moors SPA and the Severn Estuary SPA. National Grid has agreed a tagging study with NE to examine whether particular species of duck make regular movements across the Proposed Development, at what height the flights occur and whether there is diurnal or seasonal variability in this. This study would add to the body of knowledge both at local and national level about bird collision risk.
- 8.9.29 GPS mini-trackers weighing a few grams have been developed which can be attached to birds using a harness. Such tracking devices have already been used to track species such as black-tailed godwit and Caspian tern. These trackers record bird location and direction. They also record altitude which can be used to determine flight height of the bird. Acceleration and temperature is also recorded. Current GPS devices are relatively expensive and studies inclusive of costs to trap birds, fit devices, download tracking data and undertake analysis of the data can be expensive. The BTO are undertaking trials in the Summer of 2014 of new GPS devices that offer the potential for significant cost savings in comparison with the

existing devices. If the trials are successful then these could become available for use relatively soon afterwards.

- 8.9.30 The main species involved in potential movements between the Somerset Levels and Moors SPA and the Severn Estuary SPA are wigeon and teal. Wigeon and potentially teal could be fitted with GPS devices and their movements tracked over Winter. The exact period would depend on the battery life of the devices available at the time. It is anticipated that funding would be provided to the BTO by National Grid to carry out the research.
- 8.9.31 Birds would be trapped in order to fit the GPS devices. Initial field work would be undertaken to determine suitable trapping locations. This initial work could also help target birds that are part of the SPA-based populations potentially moving between the sites. Some data from the radar studies is available to indicate the likely origin of duck species undertaking the movements and initial field work would be concentrated at these locations.
- 8.9.32 As these devices have not been fitted to wigeon and teal before, for licensing reasons any potential project is likely to be limited to a small sample size. However, based on initial results it might be possible to increase the overall sample size.
- 8.9.33 The information gathered from this study could provide valuable data about how these species use the two SPAs, the flight routes undertaken and flight height of these species across land. In turn, this data could provide additional information on the potential level of collision risk that birds undertaking these movements may be subject to. This information could also be analysed against a range of geographical features to provide information highly useful not just for the Hinkley Point C Connection Project but for other projects where data on the flight behaviour of these species may be of relevance.
- 8.9.34 It is considered that such a study could provide valuable and interesting information to help determine the nature of any functional links for Wintering migratory waterfowl between the Somerset Levels and Moors SPA Ramsar and the Severn Estuary SPA Ramsar sites.

8.10 Consideration of the Water Framework Directive

- 8.10.1 Ecological parameters set out in the WFD are considered below in respect of the networks of ditches affected by construction of temporary crossings for access roads, Parish Rhyne (which would be subject to permanent diversion to facilitate construction of Sandford Substation) and three permanent cable bridges proposed for Towerhead Brook, River Axe and a ditch near Portishead Substation (this a 132kv cable bridge).
- 8.10.2 **Volume 5.10.1** identified no residual significant adverse effect on water quality (which correlates to the 'water chemistry' parameters of the WFD). Similarly, no significant effect on flow rates was concluded through the Flood Risk Assessments (**Volume 5.23**).
- 8.10.3 Across the networks of ditches, the installation of culvert and bridge water crossings would incur loss of the natural bank morphology in the medium-term whilst the culverts remain in place (up to four years). Whilst numerous, the number of

crossings are individually short (typically requiring bank and channel modifications over lengths of between 13m and 17m, taking into consideration headwalls and working areas) except within the 400kV and 132kV underground cable swathes (where lengths are typically 45m and 35m respectively), although these greater lengths are temporary, during the 3-6 weeks period of cable duct installation. This would be a shorter period for 132kV where only 2 cable ducts are required. Culvert lengths themselves would be between 6m and 9m. There is also a time lag post-removal of culverts whilst bank and channel vegetation re-establishes (typically two years). Collectively the modifications account for a small proportion of the total network.

8.10.4 WFD objectives are as follows:

- Objective 1: The proposed scheme will not cause deterioration in the status of the ecological elements of the adjacent surface water bodies.
- Objective 2: The proposed scheme will not cause a detrimental change in the status of the chemical elements of the waterbody
- Objective 3: The proposed scheme will not compromise the ability of the water body to meet its WFD status objectives.
- Objective 4: The proposed scheme will not cause a permanent exclusion or compromise achieving the WFD objectives in other water bodies of water in the same River Basin District.
- Objective 5: The proposed scheme contributes to the delivery of the WFD objectives

8.10.5 In terms of the WFD objectives the medium-term term loss of habitat is therefore predicted to be of Medium magnitude through the underground swathes (affecting a longer affected stretch) and Low magnitude elsewhere. Culverts would be buried to a depth of 100mm, thereby retaining continuity of the basal substrate. Cable trenches would be backfilled and the natural channel form reinstated. Potential effects associated with pollution or siltation would be avoided through implementation of mitigation measures set out in **Volume 5.10.1** (part of the assessed scheme prior to mitigation).

8.10.6 Potential effects on flora and fauna principally relate to the period of installation or removal of culverts and cable trenches, when there is risk of killing and injury of protected species, localised extinction of rare invertebrates within the SSSI, habitat fragmentation during dry working and disturbance effects. These short-term effects are addressed through the Watercourse Crossing Method Statement and other relevant species method statements in the BMS (a DCO Document). The effect in the cable swathe is reduced to Low magnitude following mitigation and Negligible for the other ditch crossings, when mitigation is taken into account. These effects would reduce to Neutral in the medium-term.

8.10.7 Parish Rhyne (survey reference TEP1323) was initially identified for survey of ditch invertebrates and flora but was dry at the time of survey. The ditch was vegetated and a list of the plant species present made, and found to include a moderate diversity of marginal and aquatic species (full details provided in **Volume 5.8.2, Appendix 8N**). Nearby ditches TEP1318, 1320 and 1330 were found to support similar assemblages. No s41 list species were recorded during the course of the surveys, nor protected species such as GCN, water vole or otter. Proposed

realignment of the Parish Rhyne is therefore anticipated to have an impact on WFD ecological parameters of Low magnitude whilst diversion works are underway. Following implementation of the site-specific landscape planting plans, this is predicted to reduce to **not significant** in the long-term, once planting has established.

- 8.10.8 At the River Axe, a temporary bailey bridge would be installed for construction access; however two options are included within the DCO for the cable crossing: via a permanent cable bridge or by Horizontal Direct Drilling (HDD) under the river. The final design is dependent upon detailed cable design following appointment of a contractor. Both options have been considered.
- 8.10.9 At Towerhead Brook, a temporary bailey bridge would be installed for construction access; the cables would cross the river embedded in the proposed permanent bridge and not be HDD or ducted under it. It is not yet confirmed whether the permanent road and cable crossing of Towerhead Brook would be by open span bridge or by box culvert. Both options have been assessed.
- 8.10.10 The bridges would span the channels of the affected watercourses enabling retention of bank structure, although bank and channel vegetation would be shaded this is not expected to have anything other than a neutral effect on the watercourse. Installation would be subject to the Watercourse Crossing Method Statements in the BMS. Given the widespread occurrence of water vole this would require localised displacement. Given the small scale of the bridge and the retention of bank and channel structure, the cable bridges have a negligible impact on the ecological objectives of the WFD.
- 8.10.11 In the absence of any significant residual permanent effect on these aquatic receptors, no adverse impact on WFD status or objectives is anticipated.

8.11 Cumulative Effects

- 8.11.1 Thirty two developments have been identified with potential significant cumulative effects in relation to biodiversity. These are classified at **Volume 5.17.1**, and the ID references cited below relate to those used in **Volume 5.17.1**. This assessment has taken account of the Programme Sensitivity Analysis described at the end of section 8.5 above.
- 8.11.2 There are three projects with potential significant cumulative effects in Section A, including the uprating works of the 275kV overhead line (ID6). One relates to a mixed use development north of Bridgewater (ID8) and the third is a proposed wind turbine development near Staple Cross (ID10). Impacts to biodiversity would be experienced in combination with the proposed 400kV overhead line through the construction of all three developments and operational impacts are also predicted for ID8 and ID10. The predicted potential residual cumulative effect on the significance of biodiversity receptors in Section A would be no greater than moderate adverse with most receptors experiencing a **minor adverse** or negligible significance of effect.
- 8.11.3 Seven developments with potential significant cumulative effects in relation to biodiversity are predicted in Section B. Two relate to a proposed energy park at the former BAE works (ID12 and 13). A single housing development also has potential

to impact amphibian populations on the outskirts of Woolavington (ID15). Three Wind turbine developments (ID18, ID20 and ID21) are proposed within the area and a reservoir development (ID22) all have potential to impact a range of biodiversity receptors. The predicted potential residual cumulative effect on the significance of biodiversity receptors in Section B would be no greater than moderate adverse with most receptors experiencing a **minor adverse or negligible** significance of effect.

- 8.11.4 Six developments with potential significant cumulative effects in relation to biodiversity are identified in Section D. Two mixed use developments located near to Weston Supermare (ID25) and Nailsea (ID39) have potential to impacts a range of biodiversity receptors. Two are solar energy developments east of Puxton (ID35 and ID 36) and two developments close to Yatton which include wind turbines (ID37 and 38). All the developments have potential to impact a range of biodiversity receptors. The predicted potential residual cumulative effect on the significance of biodiversity receptors in Section D would be no greater than moderate adverse with most receptors experiencing a **minor adverse or negligible** significance of effect.
- 8.11.5 Eight developments with potential significant cumulative effects in relation to biodiversity are identified in Section G. Seven developments are industrial developments related to energy production (ID43, ID51 and ID67), port activities (ID46, ID48 and ID50) or recycling (ID59). A single wind turbine development (ID62) has also been identified. All of the identified developments are located within Avonmouth. All the developments have potential to impact a range of biodiversity receptors. The predicted potential residual cumulative effect on the significance of biodiversity receptors in Section G would be no greater than moderate adverse with most receptors experiencing a **minor adverse or negligible** significance of effect.
- 8.11.6 Five developments with potential significant cumulative effects in relation to biodiversity are identified in Section H. Two developments relate to Gas Fired Power station in Severnside (ID69 and ID70). A large area earmarked for future development has also been identified as a source of potential cumulative impacts (ID71). Two further wind turbine developments have also been identified north of the Proposed Development (ID72 and ID75). The predicted potential residual cumulative effect on the significance of biodiversity receptors in Section H would be no greater than moderate adverse with most receptors experiencing a **minor adverse or negligible** significance of effect.
- 8.11.7 Two developments with potential significant cumulative effects in relation to biodiversity are identified in Section H. These relate to development of the Hinkley Point C Nuclear Power Station (ID85 and ID86). The predicted potential residual cumulative effect on the significance of biodiversity receptors in Section H would be no greater than moderate adverse with most receptors experiencing a **minor adverse or negligible** significance of effect.
- 8.11.8 None of the predicted cumulative effects would have a greater significance than the predicted effect of the Proposed Development. The categories of magnitude and significance of predicted effects provide a range within which the effects are assessed by professional judgement (that is a moderate cumulative may be marginally greater than a moderate non-cumulative, but both are within the moderate spectrum). No increase in the magnitude of effects on the biodiversity receptors is predicted and it is therefore concluded that the mitigation proposals

described at section 8.8 within this volume are robust and no additional mitigation above that stated in this volume is required with regards to biodiversity.

8.12 Conclusions

- 8.12.1 This ecological assessment has been informed by a process of policy review, desk top study, consultation with statutory, local and voluntary wildlife bodies, field surveys and subsequent discussions between project ecologists, designers and stakeholders.
- 8.12.2 This chapter describes how the process of Route Corridor selection and subsequent connection option studies was influenced by an objective of minimising land take and adverse effects on statutorily or locally designated wildlife sites and on other features of biodiversity importance recognised in national and local policy, e.g. hedgerows, ancient woodlands, ponds and species and habitats of principal importance for biodiversity.
- 8.12.3 The assessment has contributed to the five stage mitigation hierarchy (gather information; avoid; mitigate; compensate; enhance).

International Designated Sites

- 8.12.4 The potential impacts of the Proposed Development on many internationally important wildlife sites were considered in a screening assessment. A separate Habitats Regulation Report (**Volume 5.20**) has been prepared by National Grid which details this screening process. Since inception of the environmental assessment in 2009, National Grid has been aware of the international value of the Severn Estuary and the Somerset Levels and Moors, both enjoying multiple designations as SSSI, SPA, SAC, and Ramsar sites. Both sites are important for numerous birds for which the sites hold internationally important numbers and assemblages. The design of the Proposed Development has avoided any direct adverse effects on these sites and has gathered survey information to assess bird flight activity, including migratory and daily feeding flights.
- 8.12.5 National Grid has also been aware of the importance of the Mendip Bat Caves SAC, the Mendip Limestone Grasslands SAC and the Exmoor and Quantocks Oakwoods SAC; all designated for horseshoe bats. None of these sites are directly affected. Since 2010, detailed field studies have been carried out in the 'zones of influence' surrounding these sites, upon which the roosting bats depend for foraging and through which they commute.
- 8.12.6 These sites were recognised as being potentially vulnerable to indirect adverse effects. The adverse effects would be experienced in the form of bird collisions with overhead lines and disruption to bat foraging and flyway patterns caused by construction-stage hedgerow removal.
- 8.12.7 Detailed bird and bat surveys were carried out during the process of corridor selection and later stages of project design.
- 8.12.8 Surveys indicated that the projected level of bird collision mortality is less than is predicted to cause an adverse effect on populations of birds in the Severn Estuary and the Somerset Levels and Moors. However, bearing in mind information from other studies about bird movements between the estuary and the Somerset Levels

and Moors; and bearing in mind possible future climate change bringing wetter weather and increased flooding the decision was taken to confirm the use of the T-pylon for use in various sections of the route and to fit bird flight diverters in three broad watercourse corridors which are the most likely flyways between the two Natura 2000 sites.

- 8.12.9 The situation regarding bird collision would be held under continual review. Post-construction monitoring would be carried out after the overhead line is put into commission to assess whether the predictions of collision mortality require further refinement and, if necessary, to retrofit diverters. This would be carried out at various places along with a strategic research study to examine duck movement between the two sites. National Grid's own bird flight diverter protocol applies to its operations and demonstrates how, if evidence points that way, National Grid would undertake monitoring and retrofitting of bird flight diverters where statutory interests are affected and the collision risks cannot be managed in an alternative way.
- 8.12.10 In relation to horseshoe bats, the principal adverse effect, in the absence of mitigation, would arise from the removal of hedgerows to enable the installation of underground lines in the Mendip Hills, within the Consideration Zones of the North Somerset and Mendips Bats SAC and the Mendip Limestone Grasslands SAC. Although the hedgerows would be replaced on completion of construction in accordance with National Grid's project design, the period of time (4 years) during which the hedgerows would be absent, coupled with the loss of pasture in the cable swathe would present a Medium magnitude adverse effect on the integrity of the SACs and would also reduce the favourable conservation status of the horseshoe bats and other bats in the area.
- 8.12.11 In order to mitigate these construction stage impacts, National Grid would install temporary bat flyways along the lines of the removed hedges to enable bats to echolocate and thereby continue to disperse and feed. National Grid would also manage grasslands retained within the Order Limits to promote flowering thus encouraging invertebrates and replacing the value of hedgerows and pastures affected by construction.
- 8.12.12 On completion of construction, replacement hedges would be planted, using nectar-rich shrubs and climbing plants to promote rapid re-establishment of canopy cover and flyway for the bats to use. This mitigation is discussed in detail in the Applicant's Report to support HRA. This chapter concludes that, with mitigation, there would be no adverse effects on the integrity of bat sites of national and international importance.

National and Local Designated Sites

- 8.12.13 The route would require construction works and/or tree-felling within six nationally designated sites (SSSI/NNR) and 50 county or local designated sites (SNCI/LWS/LNR/WNS). In most cases temporary construction access tracks are needed, requiring vegetation clearance and installation of watercourse crossings. Long-term vegetation clearance is also required to establish and maintain electrical safety clearance beneath overhead lines. The underground line sections also require vegetation clearance to allow trench excavation and duct installation. Electrical integrity considerations restrict the replanting of deep rooting or highly

water demanding tree species above or close to the cables; thereby preventing in-situ tree replacement.

- 8.12.14 The nature and extent of effect on each designated wildlife site has been calculated and tabulated at **Volume 5.8.2, Appendix 8O**. This appendix also notes other ecological receptors in the wildlife site, e.g. bat roosts, water vole colonies, great crested newt populations. The design of the proposed development has sought to avoid effects on local wildlife sites but it is inevitable that a linear project of this scale would affect some designated sites. National Grid proposes a number of 'embedded' mitigation measures, notably:
- habitat reinstatement following construction;
 - site-specific landscape planting at the permanent infrastructure e.g. Sandford substation, CSE compounds;
 - pollution prevention, hydrological and air quality mitigation measures incorporated into the CEMP (**Volume 5.26.1**);
 - implementation of a BMS (**Volume 5.26.3**), which includes method statements for habitats, watercourse crossings, protected species and habitats and species of principal importance for biodiversity; and
 - licenced mitigation schemes for protected species (great crested newt, bats, water voles, badgers).
- 8.12.15 Taking account of mitigation, no long-term residual adverse effects are expected in any nationally-designated sites.
- 8.12.16 Taking account of mitigation, long-term residual low magnitude of effects are expected in the following county-value designated sites:
- Nailsea and Tickenham Moors SNCI;
 - Tickenham Hill, Cadbury Camp & Chummock Wood Complex SNCI;
 - Gloucester Road Railway Sidings SNCI;
 - Portbury Wharf Nature Reserve SNCI WTR; and
 - Portbury Wharf SNCI.
- 8.12.17 Based on Chartered Institute of Ecology and Environmental Management criteria, these residual effects would be of low magnitude and **minor significance**. The above sites would not experience significant permanent landtake; rather they will undergo habitat modification.
- 8.12.18 Several other designated sites would experience short and medium-term adverse effect during the construction stages. These would persist until replacement planting established; and in these cases, it is predicted the adverse effect would have declined to no significance about ten years after the commencement of the Proposed Development.
- 8.12.19 As additional mitigation, a Local Sites Offsetting Scheme would provide funds, under s106 agreement, for tree planting, woodland, wetland and other habitat creation and management works in Local Wildlife Sites, including those adversely affected by the Proposed Development. Section 8.9: Additional Mitigation describes these and other schemes to mitigate and offset adverse effects on biodiversity.
- 8.12.20 For some designated sites and habitats it is expected that there would be a net enhancement as a result of the mitigation in combination with implementation of the

OSPES and offsetting funding, along with the benefits arising from removal of the 132kV overhead line in places. It is expected that hedgerow habitats would increase and water management practices on the Tickenham, Nailsea and Kenn Moors SSSI would also benefit; in turn benefitting the Nailsea and Tickenham Moors SNCI which has a grassland value in part dependent on ditch water level management.

Habitats and Flora

- 8.12.21 A medium-term adverse effect on most habitats that need to be cleared for construction and operation of the Proposed Development has been identified. This would persist through the construction period and would decline as habitats are reinstated and become established. For woodland and trees, the effects would be long-term, reflecting the longer period required for trees to establish.
- 8.12.22 The medium-term adverse effect would also be experienced by species using these habitats and is also expected to decline as the habitats become re-established. National Grid recognises that many habitats support protected species, or species that are qualifying interest features of SSSI, Natura 2000 sites and Ramsar sites. Some habitats are in locally-designated sites. For such habitats and species, mitigation and compensation measures (as noted above) would be put in place prior to, during and after development, to ensure that the effect of construction clearance does not compromise the favourable conservation status of the habitat or species in question in the short, medium or long-term.
- 8.12.23 While there is certainty in respect of the quantity of reinstated habitats, there is some uncertainty regarding the period of time required for certain habitats to regain their former ecological functions. There is also uncertainty about the extent to which the reinstatement process may be affected by soil and drainage changes arising from the construction process. These uncertainties are greatest in respect of mature habitats.
- 8.12.24 For all temporarily-affected habitats, the mitigation commitment is a) to reinstate following construction and b) to provide mitigation in respect of habitats which support protected species or lie within designated sites.
- 8.12.25 For the preferred route, the only habitats that cannot be satisfactorily replaced in-situ are:
- 567 trees, of which 13 are veteran trees.
 - 0.36ha ancient woodland experiencing permanent modification at Mogg's Wood
 - 7.52ha of woodland and scattered tree groups
 - 0.63km hedgerow lost at Sandford Substation and associated semi-permanent access road.
 - A 500m section of ditch diverted and re-created at Sandford Substation.
 - Short sections of the Towerhead Brook and the River Axe, where two permanent bridges may be installed.
 - the grassland at pylon feet, which is not considered of biodiversity significance, except where within designated sites.
- 8.12.26 For the alternative route, the only habitats that cannot be satisfactorily replaced in-situ are:

- 533 trees, of which 13 are veteran trees.
- 0.36ha ancient woodland experiencing permanent modification at Mogg's Wood.
- 8.18ha of woodland and scattered tree groups.
- 0.63m hedgerow lost at Sandford Substation and associated semi-permanent access road.
- A 500m section of ditch diverted and re-created at Sandford Substation.
- Short sections of the Towerhead Brook and the River Axe, where two permanent bridges may be installed.
- the grassland at pylon feet, which is not considered of biodiversity significance, except where within designated sites.

8.12.27 National Grid's habitat reinstatement and site-specific landscape proposals would address these matters in part through planting and habitat creation elsewhere within the Proposed Development. The proposed landscapes at Sandford Substation and the CSE compounds would more than replace, in quantitative terms the losses of hedges, ditch and individual trees, although replacement of veteran trees would not be possible.

8.12.28 National Grid would also provide funds for the OSPES under a s106 agreement with Local Authorities, for new hedges and woodlands throughout the broad area of the Proposed Development and surrounding communities. In addition the Local Sites Offsetting Scheme would provide funds, under s106 agreement, for tree planting, woodland, wetland and other habitat creation and management works in Local Wildlife Sites. Section 8.9: Additional Mitigation describes these and other schemes to mitigate and offset adverse residual effects on biodiversity.

Fauna

8.12.29 The Proposed Development would affect a number of protected species and species of principal importance for biodiversity, at the construction stage. The effects on these species are short-term and can be mitigated through a combination of industry-standard working practices, which have been drawn together in a BMS. This BMS includes specific method statements for

- designated sites,
- watercourse crossings;
- hedgerows,
- invasive plants;
- birds;
- bats;
- dormouse;
- water vole;
- otter;
- badger;
- other mammals;
- amphibians;
- reptiles;
- fish; and
- invertebrates.

- 8.12.30 In the case of European and UK protected species, the method statements would be implemented under the terms of licences issued by NE under either the Habitats Regulations or the wildlife and Countryside Act or the Protection of Badgers Act.
- 8.12.31 The method statements would ensure reasonable avoidance of killing or injury and strict protection for several species and their habitats.
- 8.12.32 Local populations of some species would suffer perturbation as a result of construction activity, but a range of measures are proposed to maintain breeding and hibernation sites, wildlife corridors and migratory routes.
- 8.12.33 It is expected that populations of any affected species would recover in line with the establishment period for new and replacement habitats.
- 8.12.34 At the operational stage there would be a residual bird collision risk. As described above for the Severn Estuary and the Somerset Levels and Moors, a number of mitigation measures are proposed to reduce collision risk. These would reduce risk to large birds generally, as well as ensuring no adverse effect on the integrity of the Natura 2000 network.

Summary Regarding Compliance with Policy Objectives

- 8.12.35 **Table 8.4** summarises how the design, mitigation and assessment of the Proposed Development has sought to accord with the specific objectives of National Policy Statements EN-1 and EN-5.
- 8.12.36 The Proposed Development avoids causing significant direct loss of internationally and nationally designated sites, including the non-designated Hallen Marsh which is allocated as compensatory land for third-party developments affecting an internationally-designated site. Where permanent or temporary landtake is required, mitigation proposals would minimise construction footprints and provide reinstatement measures. Indirect effects on the sites would occur through bird collision and disruption to bat foraging and commuting. Design and mitigation measures would reduce these effects to neutral magnitude, non-significant status, in line with EN-1.
- 8.12.37 Paragraph 5.3.14 of EN-1 refers to the high value of ancient woodland and that it cannot be replaced. It advises that development consent should not be granted for any development that would result in loss or deterioration of ancient woodland unless the benefits (including need) of the development in that location outweigh the loss of the woodland. The Proposed Development would result in modification of ancient woodland at the north western part of Mogg's Wood. This part of the wood has already been modified because the F Route and W Route 132kV overhead lines pass through the woodland. The F Route would be removed and the W Route would be removed and replaced by underground cables. The new 400kV overhead line would pass through this part of Mogg's Wood resulting in trees being pruned ('topped') to avoid infringing electrical safety clearances. This process would allow the ancient woodland's soil and ground flora to remain undisturbed.
- 8.12.38 The alignment at Mogg's Wood minimises the scale of effect in respect of landscape and views and avoids the need to cause disturbance to less modified

woodland. Trees which are presently pruned beneath the 132kV overhead lines that do not infringe the safety clearance of the proposed 400kV line would be able to re-grow to full height, thereby countering the effect to some degree.

- 8.12.39 EN-1 paragraph 5.3.14 (quoted above in relation to ancient woodland) also notes that: *“Aged or veteran trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided. Where such trees would be affected by development proposals the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons why.”* A footnote advises that this does not prevent the loss of such trees where the Secretary of State is satisfied that their loss is unavoidable. 13 veteran trees would unavoidably be lost to the Proposed Development, and the Arboricultural Impact Assessment notes the reasons why these trees cannot be retained.
- 8.12.40 EN-1 paragraph 5.3.13 notes that the hierarchy of designations includes Local Sites. The design and mitigation of the Proposed Development has considered each site in detail (**Volume 5.8.2, Appendix 8O**). Three county-value sites (five for the alternative route) would experience a long-term low magnitude adverse effect of minor significance. These effects would persist for about 15 years, after which the sites would be expected to resume a full range of ecological functions, albeit of a different character than at present due to tree removal.
- 8.12.41 The assessment notes that, for 30 local sites (28 for the alternative route), there would be a low magnitude effect during the construction period, reducing to neutral magnitude following habitat reinstatement.
- 8.12.42 EN-1 paragraph 5.3.17 is concerned with habitats and species of principal importance for biodiversity. For habitats in the locally-designated sites, along with watercourse crossings, hedgerow removals and grassland disturbance outside the local sites, there would be a period of time (up to 4 years) during construction where there would be a reduction in extent of semi-natural habitat. Following construction, the habitats would be reinstated and a period of time (up to 5 years) during which such habitats would re-establish.
- 8.12.43 Implementation of the embedded mitigation and the Local Sites Offsetting Scheme, together with the OSPES works would secure mitigation and compensation of significant harm, and local enhancements of biodiversity consistent with the overall thrust of policies in EN-1.
- 8.12.44 EN-5 draws attention to risks of bird collisions and electrocutions from overhead lines. Although electrocutions are not envisaged for the Proposed Development, some collisions are inevitable. A significant effort has been made by National Grid to survey and assess the collision risk, and provide mitigation for a range of large birds, particularly those associated with the Severn Estuary and Somerset Levels and Moors SPA Ramsar sites. Taking account of scheme design, including removal of existing 132kV lines, routing of the 400kV line, fitting of diverters, monitoring schemes and the application of National Grid’s Bird Flight Diverter Protocol, the total number of collisions is expected to decline from baseline conditions, and no adverse effects are predicted for the Natura 2000 network.
- 8.12.45 The Proposed Development is assessed in respect of the future effects of climate change on biodiversity and on the mitigation measures proposed. The assessment (in 8.5 and at **Volume 5.8.2, Appendix 8P**) concludes that the mitigation measures

are resilient in respect of projected climate change and that the Proposed Development would not prevent or significantly restrict the future management of the Natura 2000 network, or of the network of national and local designations.

- 8.12.46 The Proposed Development is assessed in terms of the ecological objectives of the Water Framework Directive. The assessment, at section 8.10, concludes that the Proposed Development would not prevent the achievement of water quality objectives for groundwater, watercourses or standing waterbodies.

8.1 Natura 2000 sites scoped into the HRA include the Severn Estuary SPA/SAC/Ramsar, the Somerset Levels and Moors SPA Ramsar, the Wye Valley and Forest of Dean Bat Sites SAC, the River Wye SAC, the North Somerset and Mendip Bats SAC, the Mendip Limestone Grassland SAC, the Exmoor and Quantock Oakwoods SAC, the Mells Valley SAC and the Bath and Bradford-on-Avon SAC.

8.2 Lawton, J. (2010) Making Space for Nature: A review of England's wildlife sites and ecological network. DEFRA, London

8.3 HM Government (2011) The Natural Choice: Securing the Value of Nature

8.4 DEFRA (2011) Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services

8.5 South Gloucestershire Council, Bristol City Council & Natural England (2011) Severnside & Avonmouth Wetland Habitat Project Stage 2: Review of Consent at Severnside and Avonmouth Impact Assessment. Hyder Cresswell

8.6 Bristol City Council (2014) Site Allocations and Development Management Policies (Published version*, March 2013) *incorporating draft proposed main and additional modifications Jan2014' http://www.bristol.gov.uk/sites/default/files/documents/planning_and_building_regulations/planning_policy/local_development_framework/SA%26DMP%20Publication%20Main%20Doc%20incorporating%20draft%20proposed%20modifications%206%20Jan%202014_0.pdf

8.7 South West Regional Biodiversity Partnership (2004) South West Biodiversity Implementation Plan

8.8 IEEM (2006) Guidelines for Ecological Impact Assessment. Institute of Ecology and Environmental Management. June 2006

8.9 Additional sites beyond the search areas are considered in respect of far-ranging species including bats and birds in the Applicant's HRA report.

8.10 JNCC (2010) Phase 1 Habitat Survey – a technique for environmental audit. Joint Nature Conservation Committee

8.11 Field Identification Skills Certificate, awarded by the Botanical Society of Britain & Ireland

8.12 JNCC (2001) National Vegetation Classification - field guide to woodland

8.13 Rodwell, J.S. (Ed.) (1991-2000) British Plant Communities (Volumes 1 to 5)

8.14 Overarching report: National Grid (2011) Preferred Connection Report, August 2011

8.15 Scottish Natural Heritage (2005) Guidance: Survey methods for use in assessing the impacts of onshore windfarms on bird communities. There is no current guidance for collision risk assessment in relation to overhead lines, so the SNH guidance is used as a source document as many of the survey and assessment techniques are transferable.

8.16 Bibby, C.J., et al. (2000) Bird Census Techniques 2nd ed. Academic Press, London

8.17 BTO Census Unit: Breeding Bird Survey Instructions (BTO, JNCC & RSPB), 1994

8.18 The Consideration Zone and CZ Modifier Bands were provided by the Council and correct at the time of writing. It must be noted that the band widths are, at this time, in development through a collaborative process with a number of relevant organisations and independent specialists, taking into account current research. The band widths may therefore be subject to change in the future.

- 8.19 Bat Conservation Trust (2012) Bat Surveys Good Practice Guidelines, 2nd Edition. Bat Conservation Trust, London
- 8.20 Bat Conservation Trust (2007) Bat Surveys Good Practice Guidelines. Bat Conservation Trust, London
- 8.21 Dormouse Survey Area 1 lies over 50m from the Order Limits, Survey Area 21 approx.145m away, Survey Area 24 over 15m away and Survey Area 28 c.60m away.
- 8.22 Bright, P, Morris, P & Mitchell-Jones, T. (2006) Dormouse Conservation Handbook, 2nd Edition. NE, Peterborough
- 8.23 NE (2011) Interim Advice Note WML-G37 12/11: Dormouse surveys for mitigation licensing – best practice and common misconceptions
- 8.24 Strachan, R et al (2011) Water Vole Conservation Handbook. 3rd Edition
- 8.25 Ryland K and Kemp B (2009) Using Field Signs to Identify Water Voles – Are we getting it wrong? IEEM In Practice Vol.63, March 2009
- 8.26 Environment Agency (undated) Fifth Otter Survey of England 2009-2010 - Technical Report
- 8.27 The home range of an otter may include cavities below ground (holts) as well as shelters above ground. Shelters include 'couches' in vegetation and 'lie-ups' in cavities under overhanging tree roots and banks or between boulders.
- 8.28 Harris S, Cresswell P and Jefferies D (1989) Surveying for Badger. Occasional Publication of the Mammal Society No. 9. Mammal Society, Bristol
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- 8.30 AWT waterbody ref. Pond 1/TEP ref P257, AWT Pond 2/TEP P258, AWT Cattle Pond/TEP P259, AWT Dew Pond/TEP P199, AWT Dipping Pond/TEP P195.
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- 8.33 Habitat quality was determined taking into consideration parameters such as structural and topographical diversity, connectivity, etc as described in **Volume 5.8.2, Appendix 8M**.
- 8.34 Halesworth (1999) Froglife Advice Sheet 10: Reptile Survey - an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife
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- 8.37 Palmer, Drake and Stewart (2013) A Manual for the Survey and Evaluation of Aquatic Plants and Invertebrate Assemblages of Grazing Ditch Systems. Buglife
- 8.38 Environment Agency pers. Comm G Mahoney, November 2013.
- 8.39 76 sites within or near the Order Limits of which, 52 are crossed by the Proposed Development (including preferred and alternative routes) 36 SNCI and LWS, one LNR, 15 WNS, three Avon WTR and one Nature Reserve. Several of these designations overlap each other to apply to the same land.
- 8.40 JNCC (1995) Standard data form for Special Protection Areas: Somerset Levels and Moors. Joint Nature Conservation Committee
- 8.41 Superficial organic deposits occur within the tidal flats at Avonmouth (Section F), although these are not considered to form peat (see Volume 5.9.1).
- 8.42 Structural Soils Ltd (2013) Hinkley to Seabank 400kV Connection: Trial Pit Logs, pages 189-192
- 8.43 NVC site WT2 (Nailsea Moor West) lies over 250m from the Order Limits, surrounded by pasture and arable farmland fields. This habitat lies beyond the zone of influence of the scheme.
- 8.44 Summary habitat description at http://jncc.defra.gov.uk/pdf/UKBAP_BAPHabitats-07-CoastFloodGrazingMarsh.pdf
- 8.45 http://www.oursouthwest.com/Wild_Hab/Coast%20and%20Marine/Coastal%20Floodland%20Grazing%20Marsh/coastal.htm
- 8.46 www.magic.defra.gov.uk
- 8.47 Used during the day to rest in by males and/or non-breeding females. Determination of roost status broadly based on BCT (2012).

- 8.48 Where bats rest between periods of foraging activity during the night.
- 8.49 Where bats may be present during the spring or autumn between hibernation and maternity seasons.
- 8.50 Wray S., Wells D., Long E., Mitchell-Jones A.M. (2010). Valuing Bats in Ecological Impact Assessment. In Practice (Dec 2010) 23-25. Institute of Ecology and Environmental Management
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- 8.56 Avon Wildlife Trust (2004) Endanger Mouse. <http://www.avonwildlifetrust.org.uk/ABAP/publications/documents/dormouse revised.pdf> [Accessed Jan 2014]
- 8.57 Save Our Woods website article Local Woodland Love Affair (2011) <http://saveourwoods.co.uk/get-involved/love-trees/gill-shares-her-local-woodland-love-affair/> [Accessed Jan 2014]
- 8.58 Evidence of water vole (burrows, latrines, feeding remains and occasional sighting) was recorded in ditches TEP 2497 (AWT Transects 9-14), TEP 2492 (AWT Transects 17-23), TEP 2489 (AWT Transects 1, 3 and 4), TEP 2462 (AWT Transects 5-8) and at pond P210. Breeding female territories (judged on the basis of at least six latrines) were identified in AWT Transects 5, 9-12 and 18.
- 8.59 Aars, J., Dallas, J.F, Piertney, B., Marshall, F., Gow, J.L, Telfer, S and Lambin, X. (2006) Widespread gene flow and high genetic variability in populations of water voles *Arvicola terrestris* in patchy habitats. Molecular Ecology 15, 1455 – 1466
- 8.60 Leggett *et al* (2010) National Water Vole Database and Mapping Project: Guide to the use of project outputs up to 2010. May 2012
- 8.61 Somerset Otter Species Action Plan, Somerset Biodiversity Action Plan
- 8.62 Chanin, P. (2003) Ecology of the European Otter, Conserving Natura 2000 Rivers Ecology Series No. 10
- 8.63 <http://www.somersetottergroup.org.uk/?p=347> [Accessed December 2013]
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- 8.65 Hof A.R (2009) A Study of the Current Status of the Hedgehog (*Erinaceus europaeus*) and its Decline in Great Britain since 1960, PhD Thesis Royal Holloway University of London
- 8.66 <http://www.somersetwildlife.org> [Accessed November 2013]
- 8.67 Burrows, L. (2009) The Distribution of European Protected Species in South Somerset: Guidance for spatial planning
- 8.68 <http://www.froglife.org/what-we-do/toads-on-roads/tormap/> [Accessed March 2014] Froglife crossing ref. 640 – Fennel Road (over 230m from F Route removal through Portbury Wharf Nature Reserve SNCI WTR), 40 – Pill Cycle Path (>350m from construction access for F Route removal south of the River Avon crossing), 37 – Mendip Road (over 1km from the Order Limits), 38 – Nortons Wood Lane (over 2.5km from the Order Limits), 41 – Winscombe Hill Road (over 2km from the Order Limits)
- 8.69 Froglife (1999) Advice Sheet 10: Reptile Survey
- 8.70 An aquatic invertebrate is defined as one that is listed as a “*Target Native Aquatic Invertebrate of Grazing Marshes*” (Palmer, M., Drake. M & Stewart, N. (2013) A Manual for the Survey and Evaluation of the Aquatic and Invertebrate Assemblages of Grazing Ditch Systems. Esmee Fairbairn & Environment Agency)
- 8.71 McLaren R *et al* (2002) Environmentally Sensitive Areas Scheme: The effectiveness of ditch management for wildlife in the broads and the Somerset Levels & Moors ESAs, ADAS report to DEFRA. April 2002.
- 8.72 Aquatic invertebrates are used as an LWS selection criterion for Standing Water sites (including Ponds) rather than for ditches. Ponds with more than 50 species of aquatic invertebrate species (one that relies on water for at least part of its life cycle by their definition) meet the criteria. Note that individual ditches are not

considered as LWS but Lowland Ditch Systems are. There is insufficient information within the project dataset for aquatic macrophytes to review this against the criteria for LWS.

8.73 Ramsar criterion 4: The following species are listed: salmon, sea trout, sea lamprey, river lamprey, allis shad, twaite shad, and eel.

8.74 Ramsar criterion 8: The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Salmon, sea trout, sea lamprey, river

lamprey, allis shad, twaite shad, and eel use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary. The site is important as a feeding and nursery ground for many fish species particularly allis shad and twaite shad, which feed on mysid shrimps in the salt wedge.

8.75 Environment Agency data extracted from the publically available 'What's in My Backyard' dataset.

8.76 Eel incidentally recorded during GCN surveys at Huntspill Moor (TEP447, 280m from River Brue), north of Mark nr. Vole (TEP922), Congresbury Moor (TEP1791, 170m from Congresbury Yeo), Nailsea Moor (TEP2264, North Drove Rhyne), Tickenham Moor (TEP2289 & TEP2315), Portbury Wharf (including elvers, TEP2451, TEP2462, TEP2489 & TEP2497), Avonmouth (TEP2580) and Hallen Marsh (TEP2662 & TEP2666).

8.77 This species has two life-history forms – the freshwater resident brown trout and the anadromous (sea going) sea trout.

8.78 Tomlinson, M. L & Perrow, M. R. (2003) Ecology of the Bullhead: Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature

8.79 Recent Environment Agency data (2005 onwards) did not identify this species in rivers crossed by the Proposed Development. JNCC (2007) and NBN records of the species (dating from the 1990s) do not relate to rivers crossed by the Proposed Development but south west of Bridgwater and west of Hinkley. An additional record dated 1994 occurs on the Congresbury Yeo some 5km east of where this river is crossed by the Proposed Development.

8.80 NE (2010) Technical Information Note TIN 020 Traditional Orchards: Orchards and wildlife

8.81 'Where appropriate' essentially refers to those location where (i) there is sufficient vegetation cover at the 'donor' stretch, (ii) there are no protected species constraints and (iii) the non-native waterweeds are not prevalent. Further detail is provided in the BMS Water Crossing Method Statement.

8.82 DEFRA (2012) Biodiversity Offsetting Pilots Technical Paper: The metric for the biodiversity offsetting pilot in England. March 2012

8.83 Burrows, L. (2012) Somerset Biodiversity Offsetting Strategy and Methodology, July 2013. Somerset County Council, Natural England & Somerset Wildlife Trust

8.84 Note that the risk of spreading ornamental species listed on W&CACT 1981 Schedule 9, such as cotoneaster, are considered negligible as these principally occur in private gardens where works would not encroach.

8.85 Standard height lattice: 18.2m, T-pylon: 31.0m.

8.86 Webbington Road, Castle Hill and the gas pipe south of Sandford.

8.87 Clevedon Road, Cadbury Camp Lane, Whitehouse Lane, M5, Network Rail/Sheep Way and Portishead Substation. Of these, only at Cadbury Camp Lane and Portishead Substation is HDD definitively selected, all others are optional.

8.88 Kings Weston Lane, the M5/M49 underpass (both optional), and the M49.

8.89 The 400kV underground line extends from the CSE compound south of the Mendip Hills (just south of the River Axe) to Sandford substation, largely following the route of the existing F Route overhead line.

8.90 The 132kV W Route underground line extends from south west Nailsea to Portishead substation at Portbury Wharf. The line would pass via HDD below the north western end of Tickenham, Nailsea and Kenn Moors SSSI and continues north, largely along the route of the existing overhead line. The final c.150m passes via HDD into Portishead substation, passing below a number of waterbodies at Portbury Wharf Nature Reserve SNCI WTR.

8.91 Under the preferred option, a short stretch of the BW Route would be laid underground at the point it crosses below the proposed 400kV overhead line. Under the alternative option, the western end of the 132kV BW Route would be laid underground for c.600m as it enters Portishead substation, passing through the Portbury Wharf nature reserves.

8.92 Over 2km of the G Route will be laid underground north of Avonmouth Substation, where this crosses below the proposed 400kV overhead line.

8.93 Double-counting of losses between the arboriculture data set for tree groups and the Phase 1 Habitat dataset include 29.52ha semi-natural broad-leaved woodland, 9.81ha broad-leaf plantation woodland, -1.65ha orchard and 8.94ha scattered tree group.

8.94 T-Pylons – 3.14m², tension T-Pylons – 4.15m², Lattice pylons – 1.44m².

8.95 Four joint pillars will be installed per joint bay, to allow monitoring of underground cables during operation. The precise location of joint bays will be dependent on a number of factors, including the length of cable supplied (to be confirmed at detailed design stage once a contractor has been appointed). Each pillar measures 1.5m high (above ground), 1m long, 0.6m wide i.e. 0.6m² habitat loss each or 2.4m² per joint bay. In total, 44 to 48 joint bays will be required across the underground sections incurring a total habitat loss of 105.6m² to 115.2m² total

8.96 For reference, 40dBA is described as equivalent to 'a quiet garden, 50dBA to 'a quiet office', 60dBA to 'normal conversation' and 70dBA to 'a busy road at kerbside'.

8.97 Degradation specifically refers to the removal or pruning of trees within the 400kV overhead easement to maintain the safety clearance along the new line.

8.98 Woodland losses: at Puriton Hill (along the Southern edge of New Ground Covert, an LWS, to facilitate construction access and the South eastern part of Home Covert overflown which would be by the proposed 400kV line), on Horsey Level (south western portion of the woodland surrounding Withy Pool would be overflown by the proposed 400kV line), on the Lox Yeo River (an SNCI, to accommodate the 400kV underground haul road, although the line itself will pass below the river corridor), and at Portbury and Avonmouth (the proposed 400kV line runs through the southern portion of Portbury Dock Wood SNCI, longitudinally through Gloucester Road Railway Sidings, and oversails Shirehampton Rhine off Avonmouth Way).

8.99 The remaining 0.63km represents permanent removal for infrastructure – Sandford Substation (139m of 'important' native species-rich and 381m of intact species-poor) and semi-permanent access road (58m 'important' native species-rich and 42m of species-poor hedgerow, of which 14.50m is important) and Towerhead Brook Bridge (10m species-poor hedgerow).

8.100 Such techniques may include bioengineered options and/or locally appropriate re-vegetation (establishment of young plants and trees or by planting seeds). Current guidance includes *Good Practice Guide for Bank Protection: Rivers and Lochs* (SEPA, 2008), *Waterway Bank Protection: A guide to erosion assessment and management* (EA, 1999) and *Environmentally Sensitive Channel and Bank Protection Measures* (NCHRP, 2005).

8.101 Noise level calculated within 3m of the source, based on tracked excavator, water pump operation and generator in operation, is 88dBA. This reduces to 84dBA within 5m, 78dBA within 10m and 72dBA within 20m. A level of 60dBA is calculated at a distance of 50m from the source. For reference, 60dBA is described as equivalent to 'normal conversation', 70dBA to 'a busy road at kerbside', 80dBA to 'a motorway at hard shoulder' and 100dBA to a power lawnmower.

8.102 For reference, 60dBA is described as equivalent to 'normal conversation', 70dBA to 'a busy road at kerbside' and 80dBA to 'a motorway at the hard shoulder'.

8.103 For reference, 60dBA is described as equivalent to "normal conversation", 70dBA to 'a busy road at kerbside' and 80dBA 'a motorway at hard shoulder'.

8.104 Young eels migrate into UK watercourses in the spring (April and May), with return migration of adults to the spawning grounds in the autumn (from August onward). Brown/sea trout also migrate in the spring – brown trout may make short distance migrations to spawning grounds, sea trout migrate to and from saltwater to breed in freshwater.

8.105 Peak noise level calculated within 3m of the source, based on a tracked excavator, water pump and generator in operation, is 88dB. For reference, 60dB is described as equivalent to 'normal conversation', 70dB to 'a busy road at kerbside', 80dB to 'a motorway at hard shoulder' and 100dB to a power lawnmower.

8.106 Mott MacDonald (2013a) Hinkley C Connection 132kV Cable System: Thermal Rating Report: Part I

Mott MacDonald (2013b) Hinkley C Connection 132kV Cable System: Thermal Rating Report: Part II

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