Environmental Statement - Volume 6
Cannington Park and Ride
CHAPTER 1: INTRODUCTION
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1. **INTRODUCTION**

1.1 **Introduction**

1.1.1 This chapter of the Environmental Statement (ES) has been prepared in respect of the proposed park and ride facility at Cannington, referred to hereafter as the proposed development on land referred to by EDF Energy as the Cannington Park and Ride site (the site) (see Figure 1.1 for the Site Location Plan). A detailed description of the proposed development is provided in Chapter 2 of this volume of the ES.

1.1.2 The proposed development forms part of the Hinkley Point C (HPC) Project to which this application for Development Consent to the Infrastructure Planning Commission (IPC) relates. The components of the HPC Project are defined in Volume 1, Chapter 1 of this ES (see Figure 1.2 for the HPC Project Site Context Plan). This proposed development would be used by EDF Energy during the construction phase of the HPC power station for approximately eight years. See Chapter 4 of this volume of the ES for details of the operational phase of the proposed development.

1.1.3 Following construction of the HPC power station, the proposed development would be removed and the land restored to its existing use (agricultural land). Chapter 5 of this volume of the ES provides details on the post-operational phase of the proposed development. Chapter 5 should be read in conjunction with the Post-operational Strategy appended to the Planning Statement. However, should a planning application be submitted outside of the Development Consent Order (DCO) process, for use of the site post-operation, this application would be considered by the local planning authority.

1.1.4 This chapter provides details on:

- the structure and scope of the Environmental Impact Assessment (EIA) of the proposed development; and
- the location and existing land uses on the site; and any relevant planning history and planning policy context.

1.1.5 This chapter should be read in conjunction with the Planning Statement and the Cannington Park and Ride Design and Access Statement which provide further information on both the rationale for the proposed development and its design. The Consultation Report summarises the responses to EDF Energy’s Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations and identifies how the proposed development has evolved in response to consultations.

1.1.6 A glossary of terms is contained in Volume 1 of this ES.
1.2 Environmental Impact Assessment and this Environmental Statement

a) Requirement for Environmental Impact Assessment

1.2.1 Schedule 1 to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (the Infrastructure Planning EIA Regulations) (Ref. 1.1) lists developments for which an EIA is mandatory. Nuclear power stations are listed at 2(b) of Schedule 1, and consequently an EIA is required for the HPC Project.

b) Structure of the Environmental Statement

1.2.2 Volume 1 of this ES provides the following details of the HPC Project:

- the rationale for the proposed HPC Project;
- consideration of the alternatives to the proposed HPC Project;
- the legislative and planning policy context of the proposed HPC Project; and
- the methodology adopted for the EIA of the proposed HPC Project.

1.2.3 This volume of the ES covers the following relevant environmental topics, in separate chapters, insofar as they relate to the proposed development:

- **Chapter 1**: Introduction.
- **Chapter 2**: Description of Proposed Development.
- **Chapter 3**: Construction.
- **Chapter 4**: Operation.
- **Chapter 5**: Post-operation.
- **Chapter 6**: Alternatives.
- **Chapter 7**: Socio-economics.
- **Chapter 8**: Transport.
- **Chapter 9**: Noise and Vibration.
- **Chapter 10**: Air Quality.
- **Chapter 11**: Soils and Land Use.
- **Chapter 12**: Geology, Land Contamination and Groundwater.
- **Chapter 13**: Surface Water.
- **Chapter 14**: Terrestrial Ecology and Ornithology.
- **Chapter 15**: Landscape and Visual.
- **Chapter 16**: Historic Environment.
- **Chapter 17**: Amenity and Recreation.
- **Chapter 18**: Summary of Environmental Mitigation.
1.2.4 Refer to Volume 1, Chapter 7 of this ES for details of the scoping and consultation undertaken since Spring 2008 in connection with this EIA.

1.2.5 Where appropriate, the environmental topic chapters have been prepared to a standard format applying the following structure:

- Introduction
- Scope and Objectives of Assessment
- Legislation, Policy and Guidance
- Methodology, including Study Area
- Baseline Environmental Characteristics
- Assessment of Impacts
- Mitigation of Impacts
- Residual Impacts
- Summary of Impacts

1.2.6 Volume 2 of this ES reports on the EIA carried out in respect of the HPC development. The assessments carried out in respect of the other associated developments are reported separately in other volumes of this ES.

1.2.7 All appendices to this volume (including correspondence, data, technical reports, photomontages and plans) relating to the proposed development are provided in this volume of the ES.

1.2.8 A Non-Technical Summary (NTS) of this ES has also been prepared in support of the application for Development Consent.

1.2.9 A detailed description of the EIA methodology applied to the HPC Project is provided in Volume 1, Chapter 7 of this ES.

c) Environmental Impact Assessment Assumptions

1.2.10 Where assumptions have been made for individual environmental topic assessments these are identified within the relevant environmental topic chapters in this volume of the ES.

d) Cumulative Impacts

1.2.11 For each environmental topic assessments of the site-specific cumulative impacts arising from the proposed development are reported in the relevant environmental topic chapters in this volume of the ES.

1.2.12 Cumulative impacts arising from this proposed development in combination with other elements of the HPC Project and other relevant projects are identified and assessed in Volume 11 of this ES.
1.3 Development Site

a) Location and Land Uses

1.3.1 The site (Figure 1.1) is located to the immediate south of the village of Cannington, just outside of the settlement boundary. The site is within the administrative area of Sedgemoor District Council (SDC). The site is approximately 8km south-east of the HPC development site. Figure 1.2 identifies the location of this site and the other proposed associated developments (see Volume 1, Chapter 3 of this ES for details) in relation to the HPC development site.

1.3.2 The site lies within a landscape characterised primarily by agricultural activities. Cannington is surrounded by agricultural land, scattered farms and small settlements.

1.3.3 Bridgwater, the largest town within the district of Sedgemoor, lies approximately 3km to the south-east of the site. The M5 motorway is located to the east of Bridgwater, approximately 5km to the south-east of the site.

1.3.4 The site covers an area of approximately 5.2ha, of which approximately 1.9ha would be developed (excluding soft landscaped areas). It is bounded to the immediate south by the A39 and agricultural land on the remaining site boundaries. The closest residential properties to the site are on Mill Close, approximately 160m to the north of the site and on Oak Tree Way and Brownings Road approximately 250m to the east of the site. To the north of the site, separated by agricultural land, there is a further residential building at Denman’s Farm.

1.3.5 The site is currently used for agricultural purposes, largely comprising a single closely grazed grassland field. The site also includes an existing hedgerow within the field to the east of the field in which the park and ride facility would be located to facilitate landscape mitigation proposals, which are described in Chapter 2 of this volume of the ES. The site also includes part of the A39, in order to facilitate site access works and the provision of a pedestrian footway.

1.3.6 Existing access is gained from the A39, to the southern boundary of the site.

b) Planning History

1.3.7 There is no relevant planning history in relation to the site.

c) Planning Policy Context

1.3.8 Volume 1, Chapter 4 details the overarching legislative and planning policy context for the HPC Project, including relevant legislation and national and regional planning policy. Where applicable, further details of the relevant legislation and planning policies specific to the different environmental topics are set out in the technical assessment chapters in this volume of the ES.

1.3.9 The following adopted and emerging local policies are of potential relevance to the site.

1.3.10 The Sedgemoor District Local Plan forms part of the development plan for Sedgemoor. The Local Plan was adopted in 2004 (with relevant policies saved from 27 September 2007).

1.3.11 The Proposals Map (Inset Map No. 14) indicates that the site is not subject to any specific designations. The site is outside of the defined Development Boundary.

1.3.12 The site is bounded to the north by a site identified as Green Wedge, Edge or Strategic Gap (Policy CNE4) and to the west by a Locally Important Nature Conservation Site (Policy CNE9). There are also four Sites of County Importance (Policies HE9 and HE12) located to the immediate south of the site.

1.3.13 Policy STR3 (Development Outside Settlement Boundaries) states:

“The countryside will be protected for its own sake. Outside defined development boundaries, new house building and other new development will be strictly controlled. Development will not be permitted unless it accords with other policies in this Plan which provide, exceptionally, for development in the countryside. In general, all such development will benefit economic activity, will maintain or enhance the environment, and will not increase the need to travel.”

1.3.14 Policy STR4 (Development Location Strategy) states:

“The overall policy on development distribution for the period 1991-2011 is to identify land and sites on the basis of the following priorities:

1 Firstly on brownfield land or sites which offer the opportunity for redevelopment or re-use, the development of which would contribute towards regeneration, viability and vitality, and which are within or close to existing or proposed public transport corridors in this order:
   a) within Bridgwater, Burnham-on-Sea and Highbridge;
   b) within Rural Centres and Villages;
   c) in the countryside, re-using existing buildings, or for development where a countryside location is essential.

2 Secondly on greenfield sites, only if it is demonstrated that sufficient brownfield sites or re-use opportunities are unavailable. It shall be in this order:
   a) at Bridgwater;
   b) at Burnham-on-Sea/Highbridge;
   c) at Cheddar; and
   d) at Rural Centres and Villages which have the greatest range of facilities and are the most accessible by means other than the car.”

1.3.15 Policy CNE4 (Countryside Around Settlements) states:
“Areas of land which have particular importance as green wedge, green edge or strategic gap are defined on the proposals map. Whatever their individual character or function are, these are predominantly open areas, mostly outside development boundaries, which retain a largely rural character and appearance. Positive land management which benefits the landscape, countryside access, amenity, nature conservation or urban area containment/enhancement functions of these areas will be encouraged and developments which would have a detrimental effect on these functions will not be permitted.”

1.3.16 Policy CNE9 (Nature Conservation: Interest on Other Sites) states:

“The nature conservation value of land outside nationally designated sites will be a material consideration. Development which would damage

a) the nature conservation interest of a County Wildlife Site, County Geological Site, Local Nature Reserve or non-statutory Nature Reserve, or

b) natural features such as watercourses, hedgerows, trees, copses and ponds which provide wildlife corridors, links or stepping stones from one habitat to another, will not be permitted unless the need for the development in that location is unavoidable and of overriding importance.

Where planning permission is sought for development which would damage the nature conservation value of a site, such damage should be kept to a minimum and mitigation or compensation measures provided.

Developers are encouraged to make positive provision for wildlife through appropriate habitat creation/restoration and subsequent management. If appropriate opportunities arise, the District Council will establish additional Local Nature Reserves and/or support other bodies in establishing additional nature reserves.”

1.3.17 Policy BE1 (Sustainable and Quality Development) states that applicants for planning permission for all development will be required to submit justification as to how the proposal has considered a wide range of design criteria, including sustainable development issues.

1.3.18 Policy HE9 (Other Archaeological Sites and Areas) states that where development proposals will affect Areas of High Archaeological Potential and elsewhere where there is reason to believe that there may be archaeological remains, an assessment of the nature, character and importance of the site will be sought prior to the determination of any planning application.

1.3.19 Policy HE12 (Other Archaeological Sites and Areas) states that planning permission will not be granted for development which would damage or destroy locally important archaeological remains, unless the importance of the development outweighs the local significance of the remains. Where physical preservation in-situ is not possible, mitigation strategies will be required for the protection and/or recording of the site.
ii. Sedgemoor Local Development Framework (LDF) Core Strategy (Proposed Submission) (September 2010) (Ref 1.3)

1.3.20 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from September to November 2010. An addendum to the Core Strategy was subject to a further consultation from 23 November 2010 until 18 January 2011. Changes prior to submission, proposed as a result of the consultation process were reported and endorsed by SDC’s Executive Committee on 9 February 2011. The Core Strategy Proposed Submission was submitted to the Secretary of State on 3 March 2011 and an Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy will form part of the Development Plan for Sedgemoor.

1.3.21 EDF Energy submitted representations objecting to the Core Strategy (Proposed Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1, MIP2 and MIP3 contained in that chapter) and those sections relating to housing and Hinkley Point. EDF Energy also participated at the relevant EiP hearings.

1.3.22 At the close of the hearing sessions on 26 May 2011, the Inspector agreed with SDC and EDF Energy that, in an attempt to reach agreement on the disputed Chapter 4, SDC would re-draft Chapter 4 and EDF Energy would have the opportunity to respond. The position of both parties in relation to the re-drafted Chapter 4 was set out in correspondence between SDC, EDF Energy and the Inspector. As a result of the correspondence invited by the Inspector, SDC has agreed to further changes to the Core Strategy which make clear that the Core Strategy does not set any policies, tests or requirements for the IPC to apply in deciding whether any element of the development comprised in an application for development consent is acceptable, nor the basis on which any such application should be approved. Instead, the chapter is to set out those matters which SDC may take into account in preparing its LIR for the Hinkley Point C DCO application. These, therefore, represent aspirations of the Council, rather than formal planning policy for the Hinkley Point C DCO application. This was confirmed in the Inspector’s binding report of the EiP, published on 27 September 2011. It is expected that the Core Strategy will be adopted in October 2011. Emerging policies MIP1, MIP2 and MIP3 relate specifically to the HPC Project, as set out in the re-drafted Chapter 4 (dated 29 July 2011).

1.3.23 Emerging policies MIP1, MIP2 and MIP3 relate specifically to the HPC Project, as set out in the re-drafted Chapter 4 (dated 29 July 2011).

1.3.24 Policy MIP1 (Major Infrastructure Proposals) explains that applications for major infrastructure development will be considered against the relevant national planning policy and the strategy and relevant policies of the development plan. The objective from the Council’s perspective is that major infrastructure proposals should, where possible, contribute positively to the implementation of the spatial strategy and meet the underlying objectives of it.

1.3.25 Policy MIP2 (Hinkley Point C Associated and Ancillary Development) sets out the considerations that the Council will take into account in the preparation of a LIR in responding to proposals for development associated with, or ancillary or related to the HPC Project, where they are not the determining authority. Such considerations include: directing accommodation proposals to a range of sites, primarily in Bridgwater; measures to avoid, minimise and then mitigate adverse impacts on the transport network; meeting the accommodation needs of the temporary workforce in
a way that does not have an unreasonable adverse effect on the housing market; providing appropriate community facilities where demand is generated by the project; delivery of education, employment and training opportunities for the local community; and the delivery of investment in infrastructure, buildings and green infrastructure.

1.3.26 Policy MIP3 (Hinkley Point C: Planning Obligations and Mitigation) states that the Council will seek to ensure, wherever possible, that the proposals avoid, minimise and mitigate (including, where appropriate, compensate for) impacts during the construction, operation, decommissioning, and restoration phases.

1.3.27 In addition, the following emerging policies contained in the Core Strategy (Proposed Submission) are considered to be of potential relevance.

1.3.28 Policy S1 (Spatial Strategy for Sedgemoor) states, in relation to development outside of the identified settlements:

“…consideration will be given to the re-use and recycling of previously developed land and buildings for appropriate scale employment opportunities or where a countryside location is essential.”

1.3.29 Policy S2 (Infrastructure Delivery) states that all new development that generates a demand for infrastructure will only be permitted if the necessary on and off-site infrastructure required to support and mitigate the impact of the development is either already in place or there is a reliable mechanism in place to ensure that it will be delivered at the time and in the location it is required.

1.3.30 Policy S3 (Sustainable Development Principles) states:

“Development proposals will be expected to be supported where they contribute to meeting all of the relevant following objectives:

• mitigating the causes of climate change and adapting to those impacts that are unavoidable;

• prioritise where appropriate the re-use of previously developed land and buildings within existing settlements and then at the most sustainable locations on the edge of the identified settlements in accordance with the Spatial Strategy (Policy S1: Spatial Strategy for Sedgemoor);

• be located to minimise the need to travel and to encourage any journeys that remain necessary to be possible by alternative modes of travel including maximising opportunities for walking, cycling and the use of public transport; and

• a vibrant, diverse and responsive local economy that supports investment and regeneration of our towns and rural settlements…”

1.3.31 Policy S4 (Mitigating the Causes and Adapting to the Effects of Climate Change) states that development should contribute to both mitigating and adapting to climate change and to meeting targets to reduce carbon dioxide emissions.

1.3.32 Policy D2 (Promoting High Quality and Inclusive Design) states, amongst other things, that development will need to demonstrate high quality, sustainable and
inclusive design that responds positively to the characteristics of the site and surrounding area, as well as taking into account climate change.

1.3.33 Policy D3 (Sustainable Construction and Reducing Carbon Emissions in New Development) states that the Council will encourage the use of sustainable construction techniques that promote the reuse and recycling of building materials, maximise opportunities for the recycling and composting of waste on all new development proposals (residential and non-residential) and reduce CO2 emissions.

1.3.34 Policy D4 (Renewable or Low Carbon Energy Generation) states that the Council will support proposals that maximise the generation of energy from renewable or low carbon sources, provided that the installation would not have significant adverse impact taking into account, amongst other things, the impact of the scheme on landscape character, visual amenity, historic features and biodiversity.

1.3.35 Policy P6 (Development in the Countryside) states:

“Proposals for new development outside of identified settlements will be strictly controlled. Development will be supported where it accords with other relevant policies contained in the Core Strategy that provide, exceptionally, for development in the countryside.

Where development proposals in the countryside are not addressed by other policies of the Core Strategy, new development must relate to specific countryside needs, such as those of the local agricultural industry and local food producers, enhancement of the environment or where a countryside location is essential or more sustainable.

In all cases development should benefit economic activity, maintain or enhance the environment, and provide opportunities for sustainable transport options where impacts are likely to be significant.”

iii. Hinkley Point C Project Supplementary Planning Document (Consultation Draft) (February 2011) (Ref. 1.4)

1.3.36 SDC and West Somerset Council (WSC) have jointly prepared draft supplementary planning guidance in relation to the HPC Project. Public consultation on the Consultation Draft version of the Hinkley Point C Project Supplementary Planning Document (“the draft HPC SPD”) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which object to the draft HPC SPD.

1.3.37 Following the Sedgemoor Core Strategy EiP and subsequent correspondence with the Inspector, it is clear that the SPD cannot set tests, policies or requirements for the IPC to apply to the consideration of the HPC project. If the Councils continue with the SPD preparation, its text will need to be considered in this light and it could not carry any significant weight in the determination of the application for Development Consent. As it may be relied upon by some stakeholders, however, the principal contents of the draft SPD as it relates to the site are summarised below.

1.3.38 The draft HPC SPD provides advice in relation to the HPC proposals, expanding upon the policy context for the proposals. This includes the associated development.
1.3.39 Paragraph 9.16 in the draft HPC SPD relates to Cannington Park and Ride. This section states, amongst other things:

“The Councils recognise that Park and Ride sites have the potential to assist in promoting more sustainable travel patterns to Hinkley Point, where the need for, location and size of facilities are determined through a robust transport assessment and thorough site options appraisal. Nevertheless, a Park and Ride at Cannington is likely to be located on greenfield land outside the settlement boundary where development would normally be resisted.”

1.3.40 With regard to the approach to Cannington Park and Ride, Box 32 in the draft HPC SPD states:

“For a temporary Park and Ride site at Cannington to be acceptable, it should form part of a well evidenced and robust HPC project transport strategy and investment package. This should seek to prevent where possible and otherwise minimise as far as possible adverse traffic impacts arising and contribute to the achievement of wider transport objectives in Cannington and along the A39 transport corridor. The overarching objective for the transport strategy should be to minimise the size of the Park and Ride site required at Cannington. Should the need for a Park and Ride be demonstrated, the following criteria and guidance will apply:

- A comprehensive approach to flood risk management for the site that also contributes to flood risk alleviation for the village should be provided. A strategy is expected to comprise sustainable urban drainage techniques and improvement of flood channels.
- A safe and secure pedestrian/cycle route connection to the village centre is secured.
- Legacy options are considered with Cannington Parish Council to meet local needs and as an integral part of the long term development of the village and wider area”.
References

1.3 SDC. Sedgemoor District Local Development Framework Core Strategy (Proposed Submission). September 2010.
CHAPTER 2: DESCRIPTION OF PROPOSED DEVELOPMENT
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Figure 2.5: Proposed Site Drainage Plan
2. DESCRIPTION OF PROPOSED DEVELOPMENT

2.1 Introduction

2.1.1 This chapter of the Environmental Statement (ES) has been prepared in respect of the proposed park and ride facility and new access onto the A39, referred to hereafter as the proposed development, on land referred to by EDF Energy as the Cannington park and ride site (the site) (see Figure 1.1). The proposed development consists of:

- a park and ride facility, including two separate parking areas for the parking of workforce (132 car and minibus/van spaces) and visitors' vehicles (120 car and minibus/van spaces) including a bus waiting area and some ancillary structures including bus shelters and security/welfare facilities;
- a new access off of the A39 via a new left turn entry and exit junction;
- widening of the A39 and provision of footway between site access and A39 Main Road eastern roundabout;
- landscaping, screen planting and the provision of earth bunds for visual mitigation and spoil storage;
- surface water drainage infrastructure (including a detention pond); and
- other ancillary development, including signage, fencing, lighting, CCTV and utilities.

2.1.2 The proposed development forms part of the Hinkley Point C (HPC) Project to which this application for Development Consent to the Infrastructure Planning Commission (IPC) relates. The components of the HPC Project are defined in Volume 1, Chapter 1 of this ES (see Figure 1.2). This proposed development would be used by EDF Energy during the construction phase of the HPC power station to transport and manage the flow of some of the construction workforce to and from the HPC development site for approximately eight years. The proposed development would mainly attract those workers living close by to Cannington and smaller settlements to the south and west of Cannington. It would also attract visitor traffic from further afield. Workers living within Cannington itself could also walk or cycle to the site.

2.1.3 It is anticipated that construction of the proposed development would commence in Quarter 1 2013 and last for approximately 11 months. It is anticipated that the park and ride would be operated by EDF Energy between Quarter 4 2013 and Quarter 1 2022 (see Volume 1, Chapter 1 of this ES for details). Following construction of the HPC power station, the proposed development would be removed and the land restored to its existing use (agricultural land).

2.1.4 Details of each phase of the proposed development is provided in Chapters 3 to 5 (construction, operation and post-operation, respectively) of this volume of the ES.
2.1.5 This chapter provides details on:

- the design principles adopted for the proposed development;
- the masterplan, including site layout, scale and components of the proposed development; and
- the quantum of development proposed.

2.1.6 This chapter should be read in conjunction with the Cannington Park and Ride Design and Access Statement which provides details of the proposed development in terms of land use, amount of development, layout, scale, landscaping, appearance and access.

2.2 Design Principles

2.2.1 The proposed development has evolved through the adoption of the following principles:

- an understanding of the operational requirements for the proposed development in terms of use by the HPC construction workforce and visitors to the HPC Public Information Centre;
- the outcomes of the Environmental Impact Assessment (EIA) undertaken for the proposed development, to avoid where possible, or mitigate and manage potential impacts on sensitive receptors;
- the site’s context; and
- the planning policy context.

2.2.2 The design process for the proposed development has been iterative, undertaken over approximately 24 months; and has been informed by consultation with statutory consultees. The formal Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations are documented in detail in the Consultation Report. Any meetings or other engagement held with relevant statutory consultees to discuss specific EIA-related aspects of the proposed development are documented within the relevant environmental topic chapters in this volume of the ES.

2.2.3 The process by which the siting and sizing of the proposed development has been determined, as part of a holistic strategy for the wider HPC Project, is detailed in the Transport Assessment.

2.2.4 Chapter 6 of this volume of the ES provides a description of the alternatives considered in terms of the siting, sizing, masterplanning and detailed design of the proposed development. It should be read in conjunction with the Alternative Site Assessment which is appended to the Planning Statement.

2.3 Site Masterplan and Design

2.3.1 The layout and land uses of the site are shown in Figure 2.1 and listed in Table 2.1.

2.3.2 For further details on the masterplan for the proposed development, reference should be made to the Cannington Park and Ride Design and Access Statement.
a) Site Layout and Access

2.3.3 Vehicular and pedestrian access to the proposed development would be via a new access from the A39. The access would be in the form of a priority junction which would have left-turn entry and exit. The new access would be constructed in accordance with the Highway Authority’s standards, adopting an appropriate design life, and would bridge the existing highway drainage ditch and any future flood relief channel.

2.3.4 Within the site, the internal circulation road would run along the eastern boundary of the site, before turning west into the centre of the site, providing a vehicular access into and out of the parking area and bus terminus. The bus terminus would be located within the centre of the site and would include four bus shelters and four bus parking bays.

2.3.5 The parking area would be split into two separate areas, accessed separately from the internal roundabout; one for visitor parking and one for workforce parking. There would be clear on-site signage to indicate which area would be for workers and visitors.

2.3.6 Those using the park and ride facility would enter the site by their chosen mode, park and then walk to the bus terminus where they would board a bus. Vehicular and pedestrian traffic would be segregated as far as practical, to provide safe routes for pedestrians. Where complete segregation of pedestrian and vehicular traffic would not be possible, a clear pedestrian priority would be provided, such as at the entrance to the bus terminus, using clearly marked crossings to ensure a safe link to and from the parking bays.

2.3.7 Two on-site amenity/welfare buildings would be provided, one for workforce and one for visitors, which would be provided either side of the central bus terminus. The workforce amenity/welfare/security building would support the site employees, including bus drivers, who would work at the park and ride facility. The visitor amenity/welfare building would provide toilet facilities for male and female visitors and a mess room for bus drivers and security staff. The security office would be located within the workforce amenity/welfare building.

i. Public Access

2.3.8 The existing Public Right of Way (PRoW) (BW5/27) located at the north-eastern corner of the site would be linked to the site in order to provide pedestrian access from Cannington village. The footpath would be retained in its current condition, over grass fields, in order to minimise disruption to the existing agricultural operation. It is proposed that buses would stop at defined bus stops within Cannington to pick up workforce en-route to the HPC development site. When workforce are allocated Cannington as their park and ride site, they would also be provided with a welcome pack which would advise them of the route of the existing footpath, should they choose to access the site on foot.

2.3.9 The proposed development would be designed to ensure adherence with the Disability Discrimination Act (DDA) 1995 (Ref. 2.1). The proposed buildings and bus shelters would be wheelchair accessible, and accessible parking bays would be provided within the parking areas.
b) Land Use and Quantum

2.3.10 Specific elements of the proposed development and the amount of land required to accommodate them are summarised in Table 2.1.

Table 2.1: Land Use and Site Area

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Amount of Land</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Park and Ride Facility:</strong></td>
<td></td>
</tr>
<tr>
<td>246 car parking spaces (129 for workforce and 117 for visitors) (including 7 accessible spaces)</td>
<td>1.9ha</td>
</tr>
<tr>
<td>6 minibus/van spaces (3 for workforce and 3 for visitors)</td>
<td></td>
</tr>
<tr>
<td>18 motorcycle spaces (12 for workforce and 6 for visitors)</td>
<td></td>
</tr>
<tr>
<td>Bicycle storage (12 bicycles for workforce and 6 for visitors)</td>
<td></td>
</tr>
<tr>
<td>Bus terminus (4 bus stops and 4 bus parking spaces)</td>
<td></td>
</tr>
<tr>
<td>‘Kiss and ride’ drop-off facility</td>
<td></td>
</tr>
<tr>
<td>Workforce security and amenity building</td>
<td></td>
</tr>
<tr>
<td>Visitors amenity and welfare building</td>
<td></td>
</tr>
<tr>
<td>Highways infrastructure including new access via a priority junction from the A39</td>
<td></td>
</tr>
<tr>
<td>Spoil bunds</td>
<td></td>
</tr>
<tr>
<td>Foul water drainage infrastructure</td>
<td></td>
</tr>
<tr>
<td>Surface water drainage infrastructure including detention pond</td>
<td></td>
</tr>
<tr>
<td><strong>Soft Landscaping:</strong> (including native species planting and water courses)</td>
<td>5ha</td>
</tr>
</tbody>
</table>

Note: For the purposes of this assessment, some parts of the development has been assumed to be included in both developed area and soft landscaping, for example landscaped bunds.

2.3.11 A plan showing the development area of the site is provided in Figure 2.2.

c) Building Scale and Design

2.3.12 The proposed minimum and maximum building dimensions for each of the single storey buildings are detailed Table 2.2. However, a modest degree of flexibility is sought, enabling the submission of alternative details for approval within fixed parameters.

Table 2.2: Parameters for Proposed Buildings

<table>
<thead>
<tr>
<th>Building</th>
<th>Building Dimensions Identified on the Planning Drawings (m) (height x width x length)</th>
<th>Minimum Building Dimensions (m) (height x width x length)</th>
<th>Maximum Building Dimensions (height x width x length)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workforce amenity/welfare and security building</td>
<td>3.6 x 4.4 x 19.3</td>
<td>3.3 x 4.1 x 19.0</td>
<td>3.9 x 4.7 x 19.6</td>
</tr>
<tr>
<td>Visitor’s amenity/welfare building</td>
<td>3.6 x 4.4 x 19.3</td>
<td>3.3 x 4.1 x 19.0</td>
<td>3.9 x 4.7 x 19.6</td>
</tr>
</tbody>
</table>
2.3.13 The proposed buildings would be constructed in accordance with the approved plans unless alternative details are submitted to and approved by the IPC (or successor body) prior to commencement of the relevant part of the development.

2.3.14 Separate amenity/welfare buildings would be provided for the workforce and visitors. The workforce amenity/welfare building would also contain the security office, which would have CCTV monitoring equipment and a computer system linked to a central system. Both buildings are proposed to be simple, single storey structures faced with a vertical timber cladding to reflect the character of the surrounding area.

2.3.15 The visitors’ amenity/welfare building would contain toilets for male and female visitors as well as a mess room for bus drivers and security staff.

2.3.16 Two temporary shelters would be provided within the terminus area. The cladding to the shelters would incorporate transparent panels allowing the shelters to be illuminated by the proposed site lighting. Full details of these structures would be submitted to and approved by the IPC (or successor body) prior to commencement of the relevant part of the development.

2.3.17 There would be other small ancillary structures within the site, as shown on the proposed site layout, including an air source heat pump, smoking shelters and security huts. Full details of these structures would be submitted to and approved by the IPC (or successor body) prior to commencement of the relevant part of the development.

d) Security

2.3.18 The park and ride facility would have a 24 hour manned security presence. The security guards would monitor the access point, CCTV and carry out patrols of the facility. Further details of security principles intrinsic to the operation of the proposals are provide in Chapter 4 of this volume.

e) External Appearance (including lighting and landscaping)

2.3.19 External lighting would be designed to adhere with the Institute of Electrical Engineers’ recommendations (Ref 2.2) in order to minimise ecological and amenity impacts in the vicinity of the site. It is anticipated that lighting columns would be 10m in height. Lighting levels would reduce towards the site boundary (Figure 2.3).

2.3.20 The perimeter of the site would be dedicated to landscaping, including supplemental and additional hedgerow planting. An additional landscaped screen including additional hedgerow trees would be provided to the east of the proposed park and ride site, to help provide screening to nearby residential properties. Excavated material (i.e. spoil) generated during site preparation works would be used to create a bund across the western edge of the site to facilitate additional screening of development from sensitive receptors. Additional native screen planting would also be provided to the east of the proposed parking areas and embankments either side of the proposed access road with hedgerow planting, to provide further screening of the proposed development from residential areas to the east. A plan showing the proposed planting during operation is provided at Figure 2.4.
2.3.21 The proposed development would include security fencing around the parking and bus terminus area of 1.8m in height and badger and otter fencing along the proposed internal circulation road.

2.3.22 A hard landscaping strategy would use different materials to identify different areas within the site. The pedestrian areas and car park carriageways within the site are proposed to be asphalt concrete with parking bays in permeable paving. Pedestrian footpaths around the site and connecting to the existing public right of way are proposed to be gravel.

f) Drainage

2.3.23 A drainage scheme incorporating sustainable drainage systems (SuDS) techniques has been developed to manage surface water run-off associated with the proposed development. A plan showing the proposed drainage for the site during operation is provided at Figure 2.5. Further details on the surface water management strategy are provided in Chapter 13 of this volume.

2.3.24 All surface water flows from site are proposed to be discharged into a detention pond which is in turn connected to the existing flood relief channel in the south-eastern corner of the site.

2.3.25 The foul drainage system consists of a series of gravity drains from each of the buildings to a waste water treatment plant located to the north of the proposed access road.

g) Utilities

2.3.26 Utilities (including electricity, water and telecommunications) are proposed to be connected to the site via a utilities trench along the internal circulation road, running down the A39 and connecting to the Main Road and A39 eastern roundabout.

2.3.27 The proposed buildings would be lightly serviced with a low energy ventilation system, low energy heating and low energy lighting.
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Figure 3.1: Construction Work Area and Access/Egress Plan
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3. CONSTRUCTION

3.1 Introduction

3.1.1 This chapter of the Environmental Statement (ES) has been prepared in respect of the proposed park and ride facility at Cannington, referred to hereafter as the proposed development, on land referred to by EDF Energy as the Cannington park and ride site (the site) (see Figure 1.1). This chapter of the ES describes the construction methods and phasing of the proposed development and should be read in conjunction with Chapter 2 of this volume of the ES which describes the proposed development.

3.1.2 Details of the construction phase are necessarily broad at this stage and may be subject to modification during the detailed design stage or once a contractor is appointed. For this reason, a likely worse-case scenario has been taken, applying experience in relation to other developments of a similar size and nature and the best judgement of environmental experts.

3.1.3 The environmental impacts and disturbance arising from the construction activities would be managed through a range of control measures and monitoring procedures, the principles of which are outlined in the Environmental Management and Monitoring Plan (EMMP) with further details provided in the subject-specific management plans (SSMPs) for the site.

3.1.4 This chapter should be read in conjunction with the Construction Method Statement (Annex 2) of this ES.

3.1.5 This chapter provides the following indicative details:

- a programme of works;
- the hours of work and resources;
- an overview of the construction works;
- a description of the construction site access and egress and likely traffic implications; and
- a list of the plant and equipment likely to be used.

3.2 Programme of Works

3.2.1 The construction phase of the HPC Project would start following grant of the Development Consent Order (DCO) and discharge of any relevant pre-commencement requirements, in Quarter 1 2013.

3.2.2 Overall construction of the proposed development would take approximately 11 months, which includes preparatory works. For the purposes of this Environmental Impact Assessment (EIA), it is anticipated that the proposed development would be operational by Quarter 4 2013 (see Chapter 4 of this volume of the ES for details).
3.3 Hours of Work and Resources

a) Hours of Work

3.3.1 It is anticipated that the core working hours for the construction phase would be:

- Monday to Friday 08.00 – 19.00.
- Saturday 08.00 – 13.00.
- No working on Sundays, Bank or Public Holidays.

3.3.2 Any work outside these hours would be in extraneous circumstances or where works are carried out within the internal area of buildings. Undertaking works outside of these hours would be subject to prior agreement, with reasonable notice (a minimum of 14 days), by Sedgemoor District Council’s Environmental Health Department, who may impose reasonable restrictions.

b) Resources

3.3.3 The number of workers needed to construct the proposed development would fluctuate during the course of the construction programme. It is estimated that the peak construction workforce would be approximately 25 persons over the anticipated 11 months construction phase.

3.4 Description of Works

3.4.1 Table 3.1 provides an overview of the preparatory and construction works. These works, and the individual activities within each stage, would overlap and are only indicative at this stage.

Table 3.1: Overview of Works

<table>
<thead>
<tr>
<th>Works</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Works</td>
<td>Gaining of permits, licenses and consents</td>
</tr>
<tr>
<td></td>
<td>Ecological mitigation</td>
</tr>
<tr>
<td></td>
<td>Erection of temporary site fencing</td>
</tr>
<tr>
<td></td>
<td>Creation of temporary site access at existing access from A39</td>
</tr>
<tr>
<td></td>
<td>Temporary site security, office, welfare facilities, compound and temporary utilities.</td>
</tr>
<tr>
<td></td>
<td>Site Clearance</td>
</tr>
<tr>
<td>Construction Works</td>
<td>Excavations and earthworks</td>
</tr>
<tr>
<td></td>
<td>Completion of landscaping to east of main site on adjacent field boundary</td>
</tr>
<tr>
<td></td>
<td>Construction of internal roads and parking areas</td>
</tr>
<tr>
<td></td>
<td>Utilities diversions, installation and connection</td>
</tr>
<tr>
<td></td>
<td>Construction of proposed access</td>
</tr>
<tr>
<td></td>
<td>Construction of pedestrian access route</td>
</tr>
<tr>
<td></td>
<td>Bridge for future flood relief channel</td>
</tr>
<tr>
<td>Works</td>
<td>Activity</td>
</tr>
<tr>
<td>-------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td>Construction of buildings – foundations, superstructure, envelope and fit out</td>
</tr>
<tr>
<td></td>
<td>Installation of markings to internal roads and parking areas</td>
</tr>
<tr>
<td></td>
<td>Installation of proposed fencing and access control</td>
</tr>
<tr>
<td></td>
<td>Installation of external lighting, CCTV cameras and signage</td>
</tr>
<tr>
<td></td>
<td>Removal of site construction accommodation and temporary facilities</td>
</tr>
<tr>
<td></td>
<td>Completion of landscaping works</td>
</tr>
</tbody>
</table>

### a) Preparatory Work

#### i. Ecological Mitigation

3.4.2 Ecological mitigation by means of habitat creation and protected species relocation would be required. Further details are provided in Chapter 14 of this ES. This would require temporary localised fencing to prevent harm to protected species.

#### ii. Site Establishment

3.4.3 In conjunction with or following ecological mitigation works (as appropriate), the site would be secured with suitable temporary fencing at the boundary of the work area. The proposed construction work area and access/egress point is shown in Figure 3.1. The necessary vehicle and pedestrian entrances would be provided in the south-east corner of the site with a temporary site access on to the A39, which would be removed following construction of the proposed development.

3.4.4 The temporary site office, welfare accommodation, security, materials storage areas, site parking and internal site access routes would be constructed within the site. These structures would be of prefabricated, modular construction and would be delivered to site on flat-bed road vehicles.

3.4.5 Temporary site utilities comprising power, water, drainage and data would be provided at the earliest opportunity.

3.4.6 The site clearance would progress across the site, removing vegetation and stripping the topsoil. The topsoil would be stored in the north-west portion of the site and would be available for use in the landscaping works and the eventual reinstatement of the site.

### b) Construction Works

#### i. Earthworks

3.4.7 The earthworks and excavation works would level the site and infill or re-route the drainage channels. The detention pond would also be excavated and formed at this stage.

3.4.8 The material arising from the topsoil strip and excavations would be stored on site in spoil storage mounds that would be developed in the north-west section of the site.
ii. Construction of Internal Roads and Parking Areas

3.4.9 The internal roads would be designed and constructed as asphalt concrete construction. Initially the roads would be constructed to base course level, with the final wearing course layer being added towards the end of the construction phase.

3.4.10 The car parking areas would be formed using a permeable material arrangement.

3.4.11 A bridge would be constructed to accommodate the future flood relief channel proposed by the Environment Agency (EA). The flood relief channel is not part of EDF Energy’s proposals; however the scheme has been prepared to accommodate any future proposed development carried out by the EA.

iii. Utilities

3.4.12 A new detention pond would be created on the site to provide attenuation of the surface water run-off prior to it discharging into the local drainage network. This would be carried out early in the construction phase.

3.4.13 The surface water drainage runs would be installed at the same time as the roads, parking areas and building foundations.

3.4.14 The timing of the installation of the permanent utilities connections would be dependent on the timing requirements of the detailed construction programme, the availability of the necessary connection points and the connection procedures and requirements of the local utilities service providers.

3.4.15 It is likely that limited construction works would be required to deliver the temporary and permanent utilities to the site boundary. At this stage, it is anticipated that these works would be carried out by the utility service providers using methods and procedures acceptable to the local authorities.

iv. Construction of Proposed Site Access

3.4.16 The section of internal road providing access to the A39 would be completed to adoption standards under the supervision of the highway authority; and at a mutually agreed time in the programme the connection to the A39 would be made. This site access would then be maintained throughout the operation of the proposed development and removed following reinstatement of the site.

v. Construction of Buildings and Structures

3.4.17 The proposed buildings are likely be of prefabricated and/or modular construction in whole or part, on concrete foundations, with no piling necessary due to the simple nature of the buildings.

3.4.18 The building elements would be delivered to the site by flat-bed truck, then lifted into position by mobile cranes and connected together.

3.4.19 The assembled building shells would then be fitted out and the internal mechanical and electrical services installed.

3.4.20 Some of the smaller buildings such as security booths and bus shelters could be delivered fully prefabricated.
vi. Installation of Internal Road Markings and Signage

3.4.21 After the final surface layers have been laid to the internal roads the appropriate markings would be applied to the roads and parking areas.

3.4.22 Directional and statutory signage would be erected throughout the site.

vii. Installation of Proposed Fencing and Access Control Measures

3.4.23 A new security fence would be erected around the perimeter of the vehicle parking areas. The fence would be 1.8m high.

3.4.24 Access control to the park and ride would be by automatic rising barriers, which would be open during peak hours and lowered during off-peak hours.

viii. Installation of Lighting and CCTV Systems

3.4.25 External lighting and CCTV security cameras would be installed throughout the facility.

ix. Removal of Site Construction Accommodation and Temporary Facilities

3.4.26 Towards the end of the construction of the park and ride facility, the site construction accommodation and associated temporary facilities would be progressively removed from site.

x. Landscaping Works

3.4.27 The supplementary planting works to the east of the site on the adjacent field boundary would be completed at the start of the construction phase, together with any fencing off of ecological zones. The remaining planting within the site would then be phased throughout the construction process, with boundary planting being delivered as soon as possible within the construction phase. The final landscaping works would be completed after the removal of the site construction accommodation and other temporary facilities.

3.4.28 Wherever possible the landscaping would incorporate the topsoil and spoil from the earlier excavation works.

3.5 Construction Site Access and Traffic Implications

a) General

3.5.1 It is estimated that there would be approximately 3,144 (two-way) vehicle movements over the 11 month construction phase. These movements would be principally associated with the delivery of materials, removal of waste and journeys to/from the site by contractors (see Transport Assessment for details).

b) Construction Site Access and Egress

3.5.2 The construction access into the site would be constructed off the A39 at the southeastern corner of the site.

3.5.3 A construction vehicle access gate would be formed in the site fence at this point and the intention would be to minimise any impact on the traffic using the A39.
3.5.4 All site traffic would be required to park within the site boundary to avoid any congestion in the surrounding areas. The site security access would be arranged to minimise the amount of construction traffic queuing outside the construction site boundary. This would include the following, where feasible:

- setting specific delivery dates and collection times;
- consolidation of deliveries;
- a requirement for authorisation when visiting the site via vehicle, including restrictions on the workforce travelling to the site by car; and
- reviews of the Travel Plan by the management team.

c) Road Closures and Diversions

3.5.5 During the construction of the temporary site access there would be a requirement for temporary localised road width restrictions on the A39.

3.5.6 Further temporary localised width restrictions would be required during the construction of the permanent access to the development.

3.5.7 These works would be planned and timed to cause the minimum of disruption to local road users.

3.6 Construction Plant and Equipment

3.6.1 It is anticipated that the following typical plant and equipment are likely to be used during the construction phase:

- excavators – rubber-tyred and tracked;
- dozers and loading shovels;
- articulated dump trucks;
- rollers;
- portable generators;
- floodlights;
- compressors;
- concrete saws and drills;
- lorry mounted concrete pumps;
- concrete mixer trucks;
- poker vibrators;
- mobile cranes;
- hoists;
- tipper lorries;
- asphalt pavers and planers;
- piling rigs;
• flat bed lorries and fork lift trucks;
• vans;
• mobile elevating work platforms;
• telescopic handlers;
• delivery vehicles; and
• pumps.
CHAPTER 4: OPERATION
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4. OPERATION

4.1 Introduction

4.1.1 This chapter of the Environmental Statement (ES) has been prepared in respect of the proposed park and ride facility at Cannington, referred to hereafter as the proposed development on land referred to by EDF Energy as the Cannington park and ride site (the site) (see Figure 1.1). This chapter of the ES describes the operational phase of the proposed development and should be read in conjunction with Chapter 2 of this volume of the ES.

4.1.2 This chapter provides indicative details of the following:

- an overview of the operational phase;
- the park and ride use;
- staffing;
- site maintenance; and
- security processes.

4.2 Operational Phase Overview

4.2.1 It is anticipated that the proposed development would be operational from Quarter 4 2013 to Quarter 1 2022. Details of the post-operational phase are provided in Chapter 5 of this volume of the ES.

4.3 Park and Ride

4.3.1 The proposed development would operate in conjunction with the other park and ride facilities at Junction 23, Junction 24 and Williton (see Volume 1, Chapter 3 for details).

4.3.2 The proposed park and rides have been located to maximise the bus transport of workers to the site and reduce car trips on the local highway network.

4.3.3 The park and ride facility would be operational seven days a week. There would be no planned arrivals or departures between the hours of 01:30 and 05:00.

4.3.4 The lighting would be operated 24 hours a day, seven days a week. It is necessary for the perimeter to be lit at all times for security reasons.

4.3.5 The proposed development would have separately designated areas for workforce parking and visitor parking.

a) Workforce Parking

4.3.6 Access to the park and ride would be generally through an automatic barrier system. Any vehicle or person not authorised to use the park and ride site would be directed to a lay-by where their details would be checked and, if appropriate, the vehicle could then leave the site.
4.3.7 Once within the facility the user would park their car and catch the next available bus to be transported to the Hinkley Point C development site.

4.3.8 Buses would operate to accommodate the HPC construction project shift pattern, which is set out in Table 4.1.

Table 4.1: HPC Weekday Shift Pattern

<table>
<thead>
<tr>
<th>Shift</th>
<th>Start</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift 1</td>
<td>06:00-07:30</td>
<td>14:00-16:00 (or after 17:30)</td>
</tr>
<tr>
<td>Shift 2</td>
<td>13:30-15:00</td>
<td>22:00-00:00</td>
</tr>
<tr>
<td>Night</td>
<td>20:30-22:00</td>
<td>06:00-08:00</td>
</tr>
<tr>
<td>Single Shift</td>
<td>07:00-08:30</td>
<td>16:30-18:30</td>
</tr>
<tr>
<td>Office</td>
<td>07:30-09:00</td>
<td>17:30-19:00</td>
</tr>
</tbody>
</table>

4.3.9 Different shift patterns would apply at weekends, with some workers working the weekday shift pattern, some working a shorter shift which starts between 06:00 and 08:00 and finishes between 13:00 and 15:00, and some not working weekends.

4.3.10 It is anticipated that bus drivers and the workforce would arrive at the park and ride site from 05:00 onwards to be ready to catch buses departing for the HPC development site from approximately 05:30 onwards, to arrive at the HPC development site in time to start the first shift.

4.3.11 Upon arriving at the HPC development site, buses would drop off their passengers and then proceed back to the park and ride site to pick up more workforce, until approximately 07:00, when the last bus would depart the park and ride site with workforce for Shift 1. Buses would then proceed back to the park and ride site and be ready to pick up workforce for the start of Shift 2, at approximately 13:00. Once buses arrive at the HPC development site to drop off workers for Shift 2, they would start to bring workforce back who are finishing Shift 1, and this process would continue throughout the day. There would be a limited service running between shifts.

4.3.12 The last bus would depart the HPC development site at around midnight and arrive at the park and ride site around 00:30.

4.3.13 The peak use of the park and ride site is anticipated to be in 2016, when the construction workforce for the HPC Project would be at its peak.

b) Visitor Parking

4.3.14 Visitor access to the park and ride facility would be via a barrier and through taking a ticket. A call button would be used to alert local management and site security of any issues.

4.3.15 Exit from the visitors’ car park would also be via a barrier and presenting a validated ticket; ticket validation would be done at the Hinkley Point Public Information Centre.

4.3.16 Upon arriving at the park and ride site, visitors would be able to board a shuttle bus which would run to the HPC development site approximately every 20 minutes, or
higher during school holiday periods. During off peak periods, there would be revised timetable, running less frequently.

4.3.17 It is anticipated that the shuttle system would be managed via communications to each shuttle from the park and ride and the HPC development site, and between shuttles.

4.3.18 Ticket access to the visitor’s car park is likely to be enabled 30 to 45 minutes before the HPC Public Information Centre opens and 60 minutes before it closes. The current proposed opening hours for the Public Information Centre is 10:00 to 18:00, every day except Christmas Day, Boxing Day and Easter Sunday. The visitor’s car park would therefore be operational between approximately 09:00 and 19:00.

4.4 Staff

4.4.1 It is anticipated that there would be a total of 10 staff working at the park and ride facility; which is expected to be made up of approximately six bus drivers and four security staff. Staff would work on a shift basis and therefore full time equivalent jobs are likely to be in the region of 20.

4.4.2 Staff travelling to the site by vehicle would park within the park and ride parking area.

4.5 Site Maintenance

a) Maintenance

4.5.1 It is anticipated that prior to operation, responsibility for the maintenance of the site and buildings would be handed over to a facilities management organisation.

4.5.2 Maintenance of drainage, landscape and ecological mitigation areas is provided for within the suite of management plans that accompany this application for Development Consent.

b) Waste Management

4.5.3 Waste would be generated from the operation of the park and ride (general waste) and there would also be some garden type waste from the landscape maintenance operation.

4.5.4 Bins for waste collection would be located in appropriate areas, both internally and externally, and all waste would be processed and disposed of by a specialist and licenced waste contractor.

4.5.5 Details of the waste management for each of the associated development sites are set out in the Waste Management Implementation Strategy.

4.6 Security Processes

4.6.1 Security would be provided on-site, to be manned 24 hours a day, supported by CCTV. The site would be bounded by a perimeter fence with a height of 1.8m.

4.6.2 Lighting would be provided to the perimeter fence, within the parking bay areas, the bus terminus, access roads and footways on the site.
4.6.3 Security passes would be needed by each workforce individual to gain access to the bus service.

4.6.4 Access to the parking area would be controlled by traffic flow control plates which would allow egress but prevent access.
CHAPTER 5: POST-OPERATION
5. POST-OPERATION

5.1 Introduction

5.1.1 This chapter of the Environmental Statement (ES) has been prepared in respect of the proposed park and ride facility at Cannington, referred to hereafter as the proposed development on land referred to by EDF Energy as the Cannington park and ride site (the site) (see Figure 1.1). This chapter of the ES provides a description of the post-operational phase of the proposed development and should be read in conjunction with Chapter 2 of this volume of the ES.

5.1.2 This chapter describes and explains each part of the post-operational process of the proposed park and ride facility and is structured as follows:

- overview of the post-operational phase;
- description of post-operational works and phasing;
- resources and working hours;
- access and traffic; and
- plant and equipment.

5.2 Overview of Post-operational Phase

5.2.1 The proposed development is expected to be in operation for approximately eight years. Once the proposed development is no longer required to support the construction of the Hinkley Point C power station, the proposed development site would be restored to its existing agricultural use (Figure 5.1). Should a subsequent intervening planning application be submitted outside of the Development Consent Order (DCO) process, for use of the site post-operation, this application would be considered in due course by the local planning authority.

5.2.2 Additional landscaping and ecological habitats provided by EDF Energy as part of the use of the site for the proposed development would however be left in place, with the exception of the additional planting adjacent to the hedgerow to the east of the site, and within the park and ride facility, which would be removed following operation to enable agricultural use of the remaining fields in the future.

5.2.3 It is anticipated that the operation of the site would cease in Quarter 1 2022 and deconstruction of the proposed development would then commence and would be complete in 12 months (i.e. by Quarter 4 2022), with the land being available for use for agricultural purposes by Quarter 4 2024. It is currently assumed that the post-operational works would be carried out in the following phases:

- Phase 1: Removal of all hard surfacing and built structures and site clearance – would commence in Quarter 1 2022.
5.3 Description of Post-operation Works and Phasing

a) Post-Operation Works

5.3.1 Table 5.1 sets out the currently assumed scenario of the infrastructure which would either be removed from or retained during the post-operational stage. Worst case assumptions have been applied to the determination of environmental impacts arising from post-operational activities.

<table>
<thead>
<tr>
<th>To be retained</th>
<th>To be removed</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Some landscaping/screen planting and ecological habitat&lt;br&gt; • Footway along A39</td>
<td>• Platform&lt;br&gt; • Hardstanding for vehicle parking&lt;br&gt; • Bus shelter&lt;br&gt; • Welfare building&lt;br&gt; • Security building&lt;br&gt; • Internal roads&lt;br&gt; • Site access&lt;br&gt; • Spoil bund (visual mitigation and spoil storage)&lt;br&gt; • Fencing&lt;br&gt; • Lighting&lt;br&gt; • CCTV&lt;br&gt; • Utilities&lt;br&gt; • Some landscaping/screen planting&lt;br&gt; • Surface water drainage infrastructure&lt;br&gt; • Detention pond&lt;br&gt; • Badger tunnel&lt;br&gt; • Signage&lt;br&gt; • Some ecological habitat (would be relocated to A39 in post-operational phase)</td>
<td>• The part of the flood relief channel constructed at site access</td>
</tr>
</tbody>
</table>

5.3.2 The same preventative and management measures applied during the construction phase, as set out in Chapter 3 of this volume of the ES, would also be applied during the post-operational phase and would be carried out in accordance with an Environmental Mitigation and Monitoring Plan (EMMP), or any subject-specific management plans, which would be agreed prior to the commencement of the post-operational phase.

5.3.3 The partial construction of the flood relief channel would be retained in the post-operational phase, should the Environment Agency decide to construct the channel after the site is no longer needed by EDF Energy. If the remaining part of the flood relief channel is constructed in the future, it would need to ensure appropriate access over the flood relief channel to the retained agricultural field access.
5.4 Resources and Working Hours

5.4.1 The number of people employed to carry out the relevant works would fluctuate during the course of this phase. It is estimated that the peak workforce for this phase would be approximately 15 persons over the anticipated 12 months of works.

5.4.2 Generally, the construction activities would be expected to be carried out between 08:00 and 19:00 Monday to Friday and 08:00 and 13:00 Saturdays. No working would take place on Sunday, Bank or Public Holidays.

5.5 Access and Traffic

a) Access

5.5.1 The primary access point to support this phase would be located along the southern boundary of the site, from the existing A39 Cannington bypass. This access would be used for the duration of the phase of works.

5.5.2 All associated traffic would be required to park within the site boundary to avoid any congestion in the surrounding areas. The site security access would be arranged to avoid any construction traffic queuing outside the site.

b) Vehicle Movements

5.5.3 This phase requires the removal of the built structures and other infrastructure. It is estimated in the Freight Management Strategy that approximately 21,412 tonnes of materials would be removed from the site during these works (including a 20% contingency). This equates to approximately 2,868 HGV movements (two-way) to waste facilities where the materials would be disposed of in an appropriate manner.

5.5.4 Any spoil/topsoil stored on the site during the operation of the park and ride facility would be reused in the restoration process. It is not anticipated that any additional material would be required to be brought on to site to restore the land to an agricultural use.

c) Traffic Management

5.5.5 No temporary closures are anticipated in connection with the post-operational works. However, should any be required they would be carried out in accordance with the arrangements set out in an EMMP which would be submitted to and approved by the Infrastructure Planning Commission (or successor body) prior to the post-operational phase of works commencing.

5.6 Plant and Equipment

5.6.1 It is anticipated that the following typical plant and equipment are likely to be used during the post-operational phase:

- excavators – rubber tyred and tracked
- dozers and loading shovels
• articulated dump trucks
• portable generators
• floodlights
• compressors
• concrete saws and drills
• mobile cranes
• hoists
• tipper lorries
• flat-bed lorries and fork lift trucks
• vans
• mobile elevating work platforms
• telescopic handlers
• delivery vehicles
• pumps
CHAPTER 6: ALTERNATIVES
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6. ALTERNATIVES

6.1 Introduction

6.1.1 This chapter of the Environmental Statement (ES) has been prepared in respect of the proposed park and ride facility at Cannington, referred to hereafter as the proposed development on land referred to by EDF Energy as the Cannington park and ride site (the site) (see Figure 1.1) and should be read in conjunction with Chapter 2 of this volume of the ES.

6.1.2 Schedule 4 to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (the Infrastructure Planning EIA Regulations) (Ref. 6.1) requires applicants to outline the main alternatives studied by the applicant and an indication of the main reasons for the applicant’s choice, taking into account the environmental effects.

6.1.3 Specifically, this chapter provides an outline of the following:

- how potential environmental impacts of the proposed development have been minimised;
- alternative sites considered for the proposed development;
- alternative sizing and land uses of the proposed development; and
- design iteration for the proposed development which is provided in more detail in the Cannington Park and Ride Design and Access Statement.

6.1.4 This chapter should be read in conjunction with Volume 1, Chapter 5 of this ES, which considers alternatives of the wider HPC Project. For further information refer to the Alternative Site Assessment appended to the Planning Statement, which identifies all of the sites considered by EDF Energy and the rationale for site selection; and the Transport Assessment which identifies the strategy for transporting workers and visitors during the construction phase of the HPC Project.

6.2 Alternative Sites

a) Background

6.2.1 As set out in the Transport Assessment, EDF Energy has developed a park and ride strategy to intercept the HPC construction workforce at key locations on the road network and then use buses to transport them the remainder of the way to the HPC development site.

6.2.2 The Transport Assessment explains that park and ride facilities would be established near to Junctions 23 and 24 of the M5 motorway, and at Cannington and Williton. These would serve both home-based and non-home-based workers who would travel to the park and ride facilities and then be transferred by bus to the HPC development site.
6.2.3 In considering appropriate sites for a park and ride facility, the Cannington area would prove the most convenient location for those living or staying locally (in the vicinity of the HPC development site, in west Bridgwater and around Cannington) and to intercept construction workers and other key personnel travelling via more rural areas for whom the other park and ride facilities would be too distant to be convenient to use.

6.2.4 A park and ride facility in the Cannington area would also prove the most convenient location for visitor parking as it is the most centrally located of the park and ride facilities. All visitors would be directed to this park and ride facility, and from here they would be transported to the HPC development site by bus.

6.2.5 It was considered important that trips were intercepted before they travelled through Cannington village and therefore a location to the south of Cannington was also considered important. In order to allow ease of access to the facility for those construction workers living in Cannington, a location within or close to the village was also considered important.

b) History of Site Selection

6.2.6 In EDF Energy’s first stage of consultation, land at Cannington was identified as a potentially suitable location to accommodate was considered for a combination of temporary accommodation for construction workers; a freight consolidation facility for road borne and/or water borne freight; and a park and ride facility for up to 900 cars.

6.2.7 Two search areas were identified as potentially suitable locations for a park and ride facility, ‘CAN-A’ and ‘CAN-B’. The ‘CAN-A’ search area was located directly to the south of Cannington, outside of the settlement boundary. The ‘CAN-B’ search area was located to the north-west of Cannington, to the east of Cannington quarry and to the west of Rodway. The ‘CAN-A’ search area was EDF Energy’s preferred location for a park and ride facility at Stage 1. EDF Energy also identified two further search areas, ‘CAN-C’ and ‘CAN-D’, as potentially suitable locations for an accommodation campus for up to 120 construction workers.

6.2.8 Four further search areas were discounted by EDF Energy at Stage 1 to the north, east, and west and in the centre of Cannington for a variety of reasons, including inability to intercept vehicles before they travelled through the centre of Cannington and environmental considerations including flood risk and loss of agricultural land.

6.2.9 At the Stage 2 consultation, EDF Energy refined its proposals in light of the changes to the freight management and accommodation strategies so that the proposal consisted of a single park and ride facility for 360 cars. At the Stage 2 Update Consultation, the number of parking spaces was reduced to 252.

6.2.10 The Alternative Site Assessment provides an assessment of the all of the alternative sites near to Cannington considered by EDF Energy. The assessment describes how they were considered according to one or two filters; the first being key operational pre-requisites and the second being planning and environmental criteria.
6.2.11 Full details of the merits and constraints of each site considered by EDF Energy are detailed in the Alternative Site Assessment, which is appended to the Planning Statement. In summary, this assessment concluded that there are no more suitable or deliverable sites than the proposed development site. The Consultation Report provides details of EDF Energy’s formal consultation and informal engagement, including feedback received.

6.3 Alternative Sizing

6.3.1 The size of the park and ride facility has been determined having regard to the size of the HPC construction workforce, assumptions about where the workforce would be living, and thus where they needed to be intercepted to reduce impact on the local highway network. The rationale and assumptions relating to the size of each of the proposed park and ride facilities is provided in the Transport Assessment together with the gravity model and an explanation of how this has been used to arrive at the relevant figures.

6.3.2 The design iterations of the proposed development, which has been informed through responses received throughout the consultation process, is set out below. With particular regard to the alternative sizes considered, the size of the proposed development has decreased significantly since EDF Energy presented its Stage 1 and Stage 2 consultations, as a result of the expectation that there would be less workers living within the immediate catchment of the HPC development site than originally envisaged.

6.3.3 At Stage 1, outline proposals were presented for 900 cars, together with a freight consolidation facility and an accommodation campus for up to 200 construction workers. At Stage 2, this reduced to 381 parking spaces and was reduced further at the Stage 2 Update consultation to 252 parking spaces.

6.3.4 Throughout the consultation process, various site sizes have therefore been considered and the current proposals represent the minimum site size necessary to support the transport strategy and to provide sufficient land for mitigation.

6.4 Design Iteration

6.4.1 This section briefly details the alternative design options considered and iterations during the design process. This process has been informed by:

- responses to consultation (see the Consultation Report for details);
- technical assessments, which include, but are not limited to an environmental impact assessment and a Flood Risk Assessment;
- operational requirements of EDF Energy (see the Cannington Park and Ride Design and Access Statement for details); and
- design development using expertise of the full design team (see the Cannington Park and Ride Design and Access Statement for details).
a) Consultation Stages

6.4.2 At Stage 1, EDF Energy presented outline proposals for the ‘CAN-A Search Area’ (see Figure 6.1) which included a park and ride facility to accommodate up to 900 cars, together with a freight consolidation facility and an accommodation campus for up to 200 construction workers. At this stage, the ‘CAN-A Search Area’ covered approximately 32ha, with proposals taking up approximately 17-20ha of this land.

6.4.3 Following the Stage 1 consultation, and in response to written responses received by statutory consultees, EDF Energy refined its proposals for the ‘CAN-A Search Area’, removing both the accommodation campus and freight consolidation facility, and reducing the size of the park and ride facility to approximately 381 parking spaces. The revised proposals were presented during EDF Energy’s Stage 2 consultation (see Figure 6.2).

6.4.4 Following the Stage 2 consultation, in response to further written responses from statutory consultees, further amendments have been made to the design of the park and ride facility in order to mitigate environmental impact and enhance the sustainability of the proposals, which were presented at EDF Energy’s Stage 2 Update consultation (see Figure 6.3).

6.4.5 Regular design meetings have been held to discuss the evolving design of the proposed development, with input received from design consultants including ecologists, landscape architects, civil engineers, hydrologists, sustainability specialists and noise and air quality specialists.

6.4.6 Key design changes since the Stage 2 consultation are summarised in Table 6.1.

<table>
<thead>
<tr>
<th>Change</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Further reduction from Stage 2 proposals from 381 spaces to 252 spaces.</td>
<td>Reduced to reflect lower numbers of workers anticipated to be living in the immediate catchment area of the HPC development site.</td>
</tr>
<tr>
<td>Re-location of the park and ride facility to the western part of the site, further from existing homes.</td>
<td>To move the park and ride facility further from existing homes.</td>
</tr>
<tr>
<td>Changes to the internal layout of the site.</td>
<td>To provide separate parking areas for workers and visitors and to reduce the bulk and massing of the park and ride facility visible from existing homes.</td>
</tr>
<tr>
<td>Amendments to site boundary.</td>
<td>To provide hedgerows as part of landscaping scheme.</td>
</tr>
<tr>
<td>Improved access arrangements onto the A39.</td>
<td>Provision of a priority junction in place of the roundabout proposed at the Stage 2 consultation, reflecting the lower volumes of traffic that would be using the park and ride facility and to reduce environmental impact, particularly on roadside verges and ditches on the A39.</td>
</tr>
<tr>
<td>Reduction in size and location of proposed park and ride facility to minimise disruption on public</td>
<td>The proposals have been designed to minimise impact and disruption on users of public rights of way.</td>
</tr>
</tbody>
</table>
6.4.7 Key design changes since the Stage 2 Update consultation are summarised in Table 6.2.

<table>
<thead>
<tr>
<th>Change</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>rights of way.</td>
<td>The proposals have been reduced in size and located within a single field boundary and as such do not result in any diversions to existing public rights of way.</td>
</tr>
</tbody>
</table>

Table 6.2: Key Design Changes since the Stage 2 Update Consultation

<table>
<thead>
<tr>
<th>Change</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to A39 changed from left turn only and left and right turn exit to left in and left out only.</td>
<td>To respond to request by highway authority.</td>
</tr>
<tr>
<td>Combined footway/cycleway along A39 removed from scheme.</td>
<td>It is not possible to provide a footpath/cycleway of sufficient width without significant impact on ecology in existing roadside verges and ditches; however the scheme includes a new footway along the A39 to help facilitate pedestrian access.</td>
</tr>
<tr>
<td>Alteration to size and shape of proposed spoil bunds.</td>
<td>Change made after receiving information about the water table and potential impact on flooding.</td>
</tr>
<tr>
<td>Revisions to pedestrian and cycle access strategy.</td>
<td>Following discussions with the existing landowner and SCC, it was proposed that people living within Cannington would be picked up in the village en route to the HPC construction site, to reduce travel by car and to minimise disruption to the existing agricultural operation at Denman’s Farm.</td>
</tr>
<tr>
<td>Amendments to off-site landscaped screening.</td>
<td>Following discussions with the landowner relating to concerns over the provision of permanent landscaping and ability to farm the land following operation, the proposals were amended to include supplemental planting of the hedgerow and trees to provide a landscaped screen to housing on Brownings Road and Oak Tree Way, which would be removed after they were no longer required to screen the proposed development.</td>
</tr>
</tbody>
</table>

6.4.8 Following the Stage 2 Update consultation, Sedgemoor District Council (SDC) and West Somerset District Council (WSC) were invited to comment on the revised designs. Their comments included whether the height, and consequently the number, of the lighting columns could be reduced.

6.4.9 From a landscape and visual perspective, a reduction in lighting column height from 10m to 5m would not significantly improve the visual impact of the site as this would not reduce the locations of visual receptors from which lighting would be seen. Having lower columns but at a significantly greater density is not considered to be an improvement. The colour of columns and sensitive design of the luminaires would be more effective in reducing their visual impact. At night the lighting impact from visual receptors would not be significantly reduced with such a change as although they would be at a lower level, there would be more sources of light from the increased number of columns.
In addition to the main alternatives considered as part of the Stage 1, Stage 2 and Stage 2 Update consultations alternative site layouts were considered as part of the internal design evolution are briefly set out in **Table 6.3**, together with the reasons why they were not incorporated.

<table>
<thead>
<tr>
<th>Alternative Layout</th>
<th>Reason Not Chosen</th>
</tr>
</thead>
<tbody>
<tr>
<td>One, rectangular parking area to south of site and bus turning area and stands to the north, stretching across two field boundaries.</td>
<td>Providing a more compact layout enables the facility to be provided in one field, reducing the impact on hedgerows and in landscape and visual terms.</td>
</tr>
<tr>
<td>One large spoil heap to west, or north of site.</td>
<td>Providing a bund across the entire western edge of the development site was considered to have less visual impact and enabled the facility to be screened from views from the west.</td>
</tr>
<tr>
<td>Proposed flood relief channel along southern boundary of site.</td>
<td>It was agreed that the proposals would include a temporary bridge over the course of the proposed flood relief channel, to accommodate it in the event that a scheme comes forward by the EA during the lifetime of the development.</td>
</tr>
<tr>
<td>Internal access route on north-south axis, terminating with roundabout and car parking accessed from either side.</td>
<td>Access road following existing visual boundary provided by hedgerow was considered to be more suitable from a landscape and visual perspective.</td>
</tr>
<tr>
<td>Combined parking area for visitors and workers.</td>
<td>The visitor facilities at Cannington are for those visitors who do not need to access the construction site. Visitors and workers are required to have separate amenity, parking and welfare facilities for security reasons.</td>
</tr>
<tr>
<td>Earth bund to eastern edge of park and ride facility to screen impact from residential areas to east of site.</td>
<td>A softer landscaped screen on the existing hedgerow boundary was considered more appropriate, having regard to the landscape character.</td>
</tr>
<tr>
<td>Detention pond in adjoining field.</td>
<td>The design approach has been to provide all development within one field envelope (with the exception of off-site screening and public right of way upgrades) to minimise landscape and visual impact.</td>
</tr>
</tbody>
</table>

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7. **SOCIO-ECONOMICS**

7.1 **Introduction**

7.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential socio-economic impacts associated with the construction, operational and post-operational phases of the proposed Cannington park and ride facility, referred to hereafter as the proposed development on land referred to by EDF Energy as the Cannington park and ride site (the site). Detailed descriptions of the site, proposed development, construction, operational and post-operational phases are provided in Chapters 1 to 5 of this volume of the ES.

7.2 **Scope and Objectives of Assessment**

7.2.1 The scope of the assessment has been determined through a formal Environmental Impact Assessment (EIA) scoping process undertaken with the Infrastructure Planning Commission (IPC). It has also been informed by ongoing consultation with statutory consultees (including Sedgemoor District Council (SDC), West Somerset Council (WSC) and Somerset County Council (SCC)), the local community and the general public in response to the Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations. The assessment of socio-economic impacts has been undertaken adopting the methodologies described in Section 7.4 of this chapter.

7.2.2 The baseline environmental characteristics, against which the likely environmental impacts of the proposed development are assessed, have been determined through a desk-based analysis of demographic and economic characteristics relating to the proposed development and are described in Section 7.5 of this chapter. The immediate study area for this assessment is illustrated in Figure 7.1.

7.2.3 Socio-economic impacts are presented in Section 7.6 of this chapter, and appropriate mitigation measures aimed at preventing, reducing or off-setting any potential adverse impacts that are identified to be of significance are identified in Section 7.7 of this chapter. An assessment of residual impacts following implementation of these mitigation measures is presented in Section 7.8 of this chapter. Section 7.9 of this chapter provides a summary of potential impacts.

7.2.4 Cumulative socio-economic impacts arising from the HPC Project (i.e. the combined impact of the HPC power station and the associated developments) are assessed in **Volume 2, Chapter 9** of this ES.

7.2.5 Cumulative socio-economic impacts arising from this proposed development in combination with other relevant projects are identified and assessed in **Volume 11** of this ES.

7.2.6 The objectives underlying the socio-economic impact assessment were to:

- describe the socio-economic baseline of the immediate study area in terms of economic, demographic and housing data and existing policy;
• identify the sensitive receptors applicable to the proposed development (the local community and economy) and identify an immediate study area;
• assess the socio-economic impacts (on employment, expenditure, accommodation, local facilities and demographics) of the proposed development during the construction, operational and post-operational phases;
• recommend mitigation measures, if determined necessary, to prevent, reduce or off-set the development’s impacts on socio-economics; and
• assess the residual impacts of the development on socio-economics.

7.2.7 A glossary of the terminology used in this chapter is provided in Volume 1 of the ES.

7.3 Legislation, Policy and Guidance

7.3.1 As stated in Volume 1, Chapter 4 of this ES, the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (Ref. 7.1) when combined with the NPS for Nuclear Power Generation (NPS EN-6) (Ref. 7.2) provides the primary basis for decisions by the IPC on applications for nuclear power generation developments that fall within the scope of the NPSs. NPS EN-1 section 5.12 and NPS EN-6 section 3.11 draw attention to the need to assess the socio-economic impacts of nationally significant energy infrastructure.

7.3.2 In addition to this, the IPC may consider other matters that are both important and relevant to its decision-making. This could include Planning Policy Statements (PPSs), Planning Policy Guidance Notes (PPGs), regional and local policy documents, although, if there is a conflict between these and the NPS, the NPS prevails for the purposes of IPC decision making.

7.3.3 Further, the Planning Act 2008 provides that the IPC must, in making its decision on an application, have regard to any Local Impact Report (LIR) prepared by relevant local authorities. It is anticipated that the LIRs will rely in part on PPSs, PPGs, regional and local policy to provide a context for their assessment. On this basis, regard has been given to these documents (where relevant to the technical assessment) since they are likely to inform the LIRs prepared by the relevant local authorities.

a) International Policy and Legislation

i. Inter-organisational Committee Guidelines and Principles for Social Impact Assessment (Ref. 7.3)

7.3.4 Some international guidance is provided by the Inter-organisational Committee on Guidelines and Principles for Social Impact Assessment (ICGPS), with more recent academic updates by Vanclay (Ref. 7.4), Glasson (Ref. 7.5) and Chadwick (Ref. 7.6). The ICGPS defines social impacts as:

“the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organise to meet their needs, and generally cope as members of society.”
ii. EU Directive 85/337/EEC (the EIA Directive) (Ref. 7.7)

7.3.5 EU Directive 85/337/EEC, (as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC) on the assessment of the impacts of certain public and private projects on the environment, requires a description of possible impacts on human beings. In the Lisbon Declaration (Ref. 7.8), a subsequent statement on sustainable economic growth in Europe, the main dimensions of social sustainability in the context of EIA are defined as education, employment policy (to create more and better jobs), modernising social protection and the promotion of equality to counter poverty and social exclusion.

b) National Policy and Guidance

7.3.6 There is no national legislation that specifies the detailed content required for socio-economic assessments or provides appropriate standards and thresholds for impact significance. However, there are a number of guidelines of relevance to socio-economic assessment.


7.3.7 Early guidance from the UK Government suggested that:

“certain aspects of a project including numbers employed and where they will come from should be considered within an environmental statement”.


7.3.8 More recent guidance on the use of official statistics in baseline assessment work is provided in the Office of the Deputy Prime Minister (ODPM) publications.


7.3.9 This guidance on the approach to EIA is provided by the Department of Communities and Local Government (DCLG). This guidance outlines standard approaches to baseline data collection, consultation, methodology, impact assessment and mitigation that adhere to the above legislative framework on preparing an EIA.


7.3.10 PPS1 was published in 2005 and sets out the Government’s overarching planning policies on the delivery of sustainable development through the planning system.

7.3.11 Paragraph 5 states that planning should facilitate and promote sustainable and inclusive patterns of urban and rural development by, amongst other things: contributing to sustainable economic development; and ensuring high quality development through good and inclusive design, and the efficient use of resources.

7.3.12 Paragraph 16 of PPS1 advises that development plans should promote development that creates socially inclusive communities, including suitable mixes of housing. It states:
“Planning policies should:

- ensure that the impact of development on the social fabric of communities is considered and taken into account;
- seek to reduce social inequalities;
- address accessibility (both in terms of location and physical access) for all members of the community to jobs, health, housing, education, shops, leisure and community facilities;
- take into account the needs of all the community, including particular requirements relating to age, sex, ethnic background, religion, disability or income;
- deliver safe, healthy and attractive places to live; and
- support the promotion of health and well being by making provision for physical activity.”

7.3.13 Paragraph 23 advises that the Government is committed to promoting a strong, stable, and productive economy that aims to bring jobs and prosperity for all. Amongst other things, planning authorities should:

“(i) Recognise that economic development can deliver environmental and social benefits.

(ii) Recognise the wider sub-regional, regional or national benefits of economic development and consider these alongside any adverse local impacts.

(iii) Ensure that suitable locations are available for industrial, commercial, retail, public sector (e.g. health and education) tourism and leisure developments, so that the economy can prosper.

(v) Recognise that all local economies are subject to change; planning authorities should be sensitive to these changes and the implications for development and growth.

(viii) Ensure that infrastructure and services are provided to support new and existing economic development and housing”.


7.3.14 PPS4 sets out the Government’s comprehensive policies for the planning of sustainable economic development in both urban and rural areas. The policies contained in PPS4 apply to development which: provides employment opportunities; generates wealth; or produces or generates an economic output or product.

7.3.15 Paragraph 9 states that the Government’s overarching objective is sustainable economic growth.

7.3.16 Paragraph 10 states that the Government’s objectives for planning are to, amongst other things: build prosperous communities by improving the economic performance of cities, towns, regions, sub-regions and local areas, both urban and rural; reduce the gap in economic growth rates between regions, promoting regeneration and
tackling deprivation; promote the vitality and viability of town and other centres as important places for communities; and, raise the quality of life and the environment in rural areas by promoting thriving, inclusive and locally distinctive rural communities whilst continuing to protect the open countryside for the benefit of all.

7.3.17 Policy EC6 (Planning for Economic Development in Rural Areas) states that local planning authorities should ensure that the countryside is protected for the sake of its intrinsic character and beauty, the diversity of its landscapes, heritage and wildlife, the wealth of its natural resources and to ensure it may be enjoyed by all.

7.3.18 It further advises that in rural areas, local planning authorities should, amongst other things: strictly control economic development in open countryside away from existing settlements, or outside areas allocated for development in development plans; and, identify local service centres and locate most new development in or on the edge of existing settlements.

7.3.19 Policy EC10 (Determining Planning Applications for Economic Development) advises that local planning authorities should adopt a positive and constructive approach towards planning applications for economic development and that planning applications which secure sustainable economic growth should be treated favourably.

7.3.20 Paragraph EC10.2 states that all planning applications for economic development should be assessed against the following impact considerations:

   “a. whether the proposal has been planned over the lifetime of the development to limit carbon dioxide emissions, and minimise vulnerability and provide resilience to, climate change;

   b. the accessibility of the proposal by a choice of means of transport including walking, cycling, public transport and the car, the effect on local traffic levels and congestion (especially to the trunk road network) after public transport and traffic management measures have been secured;

   c. whether the proposal secures a high quality and inclusive design which takes the opportunities available for improving the character and quality of the area and the way it functions;

   d. the impact on economic and physical regeneration in the area including the impact on deprived areas and social inclusion objectives; and

   e. the impact on local employment.”

7.3.21 Policy EC11 (Determining planning applications for Economic Development other than for Main Town Centre Uses which are not in accordance with the Development Plan) advises local planning authorities to:

   “a. weigh market and other economic information alongside environmental and social information;

   b. take full account of any longer term benefits, as well as the costs, of development, such as job creation or improved productivity including any wider benefits to national, regional or local economies; and
c. consider whether those proposals help to meet the wider objectives of the development plan.”

7.3.22 Policy EC12 (Determining Planning Applications for Economic Development in Rural Areas) states that in determining planning applications for economic development in rural areas, local planning authorities should, amongst other things, support development which enhances the vitality and viability of market towns and other rural service centres.

vi. Planning Policy Statement 7: Sustainable Development in Rural Areas (PPS7) (Ref. 7.14)

7.3.23 PPS7 sets out the Government’s planning policies that apply to rural areas, including country towns and villages and the wider, largely undeveloped countryside up to the fringes of larger urban areas.

7.3.24 The following key principles are considered relevant:

“(i) Decisions on development proposals should be based on sustainable development principles, ensuring an integrated approach to the consideration of:

- social inclusion, recognising the needs of everyone;
- effective protection and enhancement of the environment;
- prudent use of natural resources; and
- maintaining high and stable levels of economic growth and employment.

(v) Priority should be given to the re-use of previously-developed (‘brownfield’) sites in preference to the development of greenfield sites, except in cases where there are no brownfield sites available, or these brownfield sites perform so poorly in terms of sustainability considerations (for example, in their remoteness from settlements and services) in comparison with greenfield sites.

(vi) All development in rural areas should be well designed and inclusive, in keeping and scale with its location, and sensitive to the character of the countryside and local distinctiveness.”

c) Regional Policy

7.3.25 The Government’s revocation of regional strategies was quashed in the High Court on 10 November 2010. However, on that same date the Government reiterated in a letter to Chief Planners its intention to revoke regional strategies through the Localism Bill. This letter was also challenged but, on 7 February 2011, the High Court held that the Government's advice to local authorities that the proposed revocation of regional strategies was to be regarded as a material consideration in their planning development control decisions should stand. The decision of the High Court was upheld by the Court of Appeal on 27 May 2011. Therefore, the regional strategies remain in place but in the case of development control decisions it is for planning decision makers to decide on the weight to attach to the strategies (see Volume 1, Chapter 4 of this ES for a full summary of the position regarding the status of regional planning policy).
i. Regional Planning Guidance 10 for the South West 2001-2016 (2001) (Ref. 7.15)

7.3.26 RPG 10 sets out the broad development strategy for the period to 2016 and beyond. The HPC Project falls within the Central sub-region.

7.3.27 With regards to the Central sub-region, Policy SS 3 (The Sub-Regional Strategy) advises that the planning of development and infrastructure investment in the region should be based on the following objectives:

- “raise the economic performance of the sub-region;”
- encourage sustainable growth at Exeter and Taunton and economic diversification at Torbay;
- improve transport and economic links within and through the sub-region and with neighbouring areas;
- focus housing, employment, retail and social facilities in sustainable locations to reduce social exclusion and rural need; and
- conserve and enhance important environmental assets.”

7.3.28 Policy EN5 (Health, Education, Safety and other Social Infrastructure) states that health, education and other social infrastructure requirements need to be taken into account fully in development planning throughout the region.

7.3.29 Policy EC 1 (Economic Development) advises that local authorities, the South West of England Regional Development Agency (SWRDA), local economic partnerships and other agencies should support the sustainable development of the regional economy by, amongst other things:

- “positively promoting and encouraging new economic activity in the areas where it can bring the greatest economic and social benefits and make the greatest contribution to reducing regional disparities in prosperity;
- ensuring that the region’s unique environmental and cultural assets are maintained, enhanced and utilised to attract and develop business activity; and
- developing the skills and abilities of the region’s people by improving access to training, education and employment opportunities.”

7.3.30 Policy EC 3 (Employment Sites) states that local authorities, the SWRDA and other agencies should aim to provide for a range and choice of employment sites to meet the projected needs of local businesses and new investment. These should include, amongst other things, major strategic sites suitable for significant inward investment and large-scale reinvestment by existing companies.

ii. The Draft Revised Regional Spatial Strategy for the South West Incorporating the Secretary of State’s Proposed Changes 2008-2026 (RSS) (July 2008) (Ref. 7.16)

7.3.31 The Secretary of State for Communities and Local Government published the proposed changes to South West’s long-term plan (the Draft Regional Spatial
Strategy (RSS)) on 22 July 2008, which marked the start of a 12 week consultation which ran until 24 October 2008. The Secretary of State’s Proposed Changes to the Draft RSS take account of the Examination in Public Panel's recommendations along with representations made about the Draft RSS and other relevant evidence. The Review has now been suspended awaiting the Government’s intended revocation of Regional Spatial Strategies.

7.3.32 The draft RSS looks forward to 2026 and sets out the Government’s policies in relation to the development of land within the region. Policy SD4 (Sustainable Communities) states that growth and development will be planned and managed positively to create and maintain Sustainable Communities throughout the region by, amongst other things:

- “Realising the economic prosperity of the South West and reducing disparity.
- Linking the provision of homes, jobs and services based on role and function so that cities, towns and villages and groups of places have the potential to become more self contained and the need to travel is reduced.
- Encouraging business activity and particularly small businesses and their contribution to the region’s prosperity, including through promoting regional sourcing.
- Making adequate and affordable housing available for all residents, including the provision of a range and mixture of different housing types to accommodate the requirements of local communities.
- Making the best use of existing infrastructure and ensuring that supporting infrastructure is delivered in step with development.
- Supporting social and economic progress by enhancing education, skills development and training.”

7.3.33 Development Policy D (Infrastructure) states that the planning and delivery of development should ensure efficient and effective use of existing infrastructure and should provide for the delivery of new or improved transport, education, health, culture, sport and recreation and green infrastructure in step with development.


7.3.34 The Somerset and Exmoor National Park Joint Structure Plan was adopted in 2000 with relevant policies saved from 27 September 2007. All policies have been saved with the exception of Policy 53 which is unrelated to socio-economic impacts. The Plan provides a strategic base for all land use planning within the plan area for the period up to 2011.

7.3.35 Policy STR1 (Sustainable Development) states that development in Somerset and the Exmoor National Park should, amongst other things:

- “ensure access to housing, employment and services;
- give priority to the continued use of previously developed land and buildings; and
7.3.36 Policy STR6 (Development Outside Towns, Rural Centres and Villages) states that development outside Towns, Rural Centres and Villages should be strictly controlled and restricted to that which benefits economic activity, maintains or enhances the environment and does not foster growth in the need to travel.

7.3.37 Policy STR7 (Implementation of the Strategy) states that to ensure that development in Somerset and the Exmoor National Park is implemented in a way that meets the sustainable development aims of the strategy, development should fairly and reasonably contribute towards the provision of relevant community services and facilities, environmental improvements and infrastructure, that are directly related to and necessary for the development to proceed.


7.3.38 This document sets out the Somerset Strategic Partnership’s long term vision for Somerset in 2026. The document does not contain any policies of specific relevance to the HPC Project. More generally, the document seeks to broaden and strengthen the local economy through: increasing the overall employment rate; increasing the average earning of employees in the area; and, increasing the new business registration rate.

d) Local Policy


7.3.39 The Sedgemoor District Local Plan forms part of the Development Plan for Sedgemoor. The Local Plan was adopted in 2004 (with relevant policies 'saved' from 27 September 2007). The Proposals Map (Inset Map No. 14) indicates that the site is not subject to any site-specific designations relevant to socio-economic impacts. The site is outside of the defined development boundary.

7.3.40 The following saved policies are of relevance to socio-economics.

7.3.41 Policy STR4 (Development Location Strategy) sets out that the first priority for development is on brownfield land or sites which offer the opportunity for redevelopment or re-use, and in the following order: a) within Bridgwater, Burnham-on-Sea and Highbridge; b) within rural centres and villages; c) in the countryside. The second priority would be for development on greenfield sites, only if it is demonstrated that sufficient brownfield sites or re-use opportunities are unavailable, and in the following order: a) within Bridgwater; b) within Burnham-on-Sea and Highbridge; c) within Cheddar; and d) within rural centres and villages.

7.3.42 Policy E6 (New and Existing Employment Sites) states that in the countryside beyond settlement boundaries, the establishment of new employment sites will only be permitted where a countryside location is essential and no suitable alternative is available within or adjoining a local settlement.
ii. Sedgemoor District Local Development Framework Core Strategy (Proposed Submission) (September 2010) (Ref. 7.20)

7.3.43 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from September to November 2010. Changes prior to submission proposed as a result of the consultation process were reported and endorsed by the Council’s Executive Committee on 9 February 2011. The Core Strategy (Proposed Submission) was submitted to the Secretary of State on 3 March 2011 and an Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy will form part of the Development Plan for Sedgemoor.

7.3.44 EDF Energy submitted representations objecting to the Core Strategy (Proposed Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1, MIP2 and MIP3 contained in that chapter) and those sections relating to housing and Hinkley Point. EDF Energy also participated at the relevant EiP hearings. See Volume 1, Chapter 4 of this ES for a full summary of the position regarding the status of the Core Strategy.

7.3.45 Vision 1 of the Core Strategy (A Spatial Vision for Sedgemoor) outlines that, by 2027 Sedgemoor will have a thriving, diverse and resilient economy underpinned by an ambitious and skilled local labour force.

7.3.46 A number of strategic objectives have been developed to underpin the Core Strategy approach. This includes Strategic Objectives SO4 ‘To create more sustainable communities’ and SO6 ‘To ensure the economic wellbeing of our communities’, by developing an economic blueprint to shape the restructuring of our economy and transform the workforce.

7.3.47 The following Core Strategy (Proposed Submission) policies are of potential relevance to socio-economics.

7.3.48 Policy S1 (Spatial Strategy for Sedgemoor) states that to create the most sustainable form of growth for Sedgemoor, Bridgwater will be the focus for the District’s housing, and employment growth. Also, priority will be given to development opportunities in the identified settlements that contribute towards regeneration, viability and vitality, and which are within or close to existing or proposed public transport corridors.

7.3.49 Policy S2 (Infrastructure Delivery) states that all new development that generates a demand for infrastructure will only be permitted if the necessary on and off-site infrastructure required to support and mitigate the impact of the development site is either already in place or there is a reliable mechanism to in place to ensure that it will be delivered at the time and in the location it is required.

7.3.50 Policy S3 (Sustainable Development Principles) states that development proposals will be expected to, amongst other things, promote greater self containment of settlements by contributing to communities that are supported by adequate services, a diverse range of employment opportunities and physical and social infrastructure. Also, development proposals will be expected to contribute towards a vibrant, diverse and responsive local economy that supports investment and regeneration of our towns and rural settlements.

7.3.51 Policy D2 (Promoting High Quality and Inclusive Design) states, amongst other things, that development will need to demonstrate high quality, sustainable and
inclusive design that responds positively to the characteristics of the site and surrounding area.

7.3.52 Policy D4 (Renewable or Low Carbon Energy Generation) states the Council will support proposals that maximise the generation of energy from renewable or low carbon sources, provided that the installation would not have significant adverse impact taking into account, amongst other factors, the extent of any direct benefits to the local area and community.

7.3.53 Policy D11 (Economic Prosperity) advises that, in general, employment proposals will be supported where they contribute to the following objectives:

- “Accord with the Spatial Strategy.
- Deliver a minimum of 9,620 new jobs between 2006-2027.
- Encourage a diverse, robust, thriving and resilient (in terms of both climate change and economic resilience) economy.
- Enhance the image of the area as a business location.
- Provide or retain appropriate work spaces to meet local demand.
- Provide local and higher quality job opportunities.
- Improve the skills of the resident workforce.
- Increase self-containment, reduce the need to travel and accessible by sustainable transport modes; and
- Are compatible with the scale and character of their location.”

7.3.54 Policy D19 (Health and Social Care) states that new development that creates a need for additional health care that cannot be met through existing facilities will be expected to meet any identified shortfall. All major planning applications will be required to provide a Health Impact Assessment.

7.3.55 Policy D20 (Green Infrastructure) states that Green Infrastructure will be safeguarded, maintained, improved, enhanced and added to, as appropriate, to form a multi-functional resource which, amongst other things, will provide enhanced settings for existing and proposed developments and create pleasant and sustainable places in which to live in, work in or visit.

iii. Sedgemoor District Council: Consultation Draft Hinkley Point C Project Supplementary Planning Guidance (2009) (Ref. 7.21)

7.3.56 SDC and West Somerset Council (WSC) have jointly prepared draft supplementary planning guidance in relation to the HPC Project. Public consultation on the Consultation Draft version of the Hinkley Point C Project Supplementary Planning Document (the draft HPC SPD) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which object to the draft HPC SPD. See Volume 1, Chapter 4 of this ES for a description of the position regarding the status of the draft HPC SPD.
Paragraph 6.9 sets out that, to ensure that the Hinkley development acts as a key driver for the achievement of a more dynamic, entrepreneurial, inclusive and sustainable economy, proactive measures should be taken in relation to:

- “People – to ensure the local workforce has the skills to become involved in the HPC Project and related industries.
- Place – to ensure provision is made in suitable locations for HPC associated employment development sites and that positive employment legacy uses are enabled where appropriate.
- Business – establish positive procurement practices and support to ensure local businesses can fully participate in the supply chain by having access to and the ability to compete for HPC contracts.”

Specifically in relation to the site, the Draft HPC SPD advises that should the need for a park and ride be demonstrated, amongst other things, post-operational options are considered with Cannington Parish Council, to meet local needs, and as an integral part of the long term development of the village and the wider area.

### iv. Other Local Planning Documents

The Sedgemoor Economic Masterplan 2008-2026 (SEM) (Ref. 7.22) is SDC’s economic development strategy and is intended to complement other strategies, including the Sedgemoor Local Development Framework, Corporate Plan (Ref. 7.23) and Sustainable Community Strategy (Ref. 7.24). The SEM outlines SDC’s approach to economic regeneration in the District and how it considers the economy should grow in a sustainable manner into the future. The SEM recognises the importance of the HPC Project to SDC’s economy and the benefits and opportunities offered by the nuclear energy sector.

Further planning policy context is provided in Volume 1, Chapter 4 of this ES and Chapter 1 of this volume of the ES.

### 7.4 Methodology

The socio-economic impact assessment establishes the potential social and economic impacts of the proposed development and assesses the expected impacts against the current baseline conditions.

An Environmental Appraisal was produced as part of EDF Energy’s Stage 2 consultation. This included a socio-economic assessment and individual socio-economic appraisals of each of the proposed associated developments. A number of comments were received on the approach to the technical assessment; mainly from SDC and WSC within their consultation responses (see the Consultation Report for details).

EDF Energy has been working with the Councils since the Stage 2 consultation to address these comments.

The ES submitted in support of this application for Development Consent includes an overall assessment of the impacts of the HPC Project, including the construction workforce on the surrounding area (Volume 2, Chapter 9 of this ES).
specific chapters for each of the proposed associated developments (Chapter 7 in Volumes 3 to 10 of this ES) address the direct socio-economic impacts of each of those proposed developments.

7.4.5 **Volume 2, Chapter 9** of this ES includes updated employment assessments incorporating the construction employment impacts of the sites into a single assessment including likely home-based and non-home-based workers (see Technical Paper 1, Workforce Profile, published as part of the Stage 2 Update consultation and appended to Volume 2, Chapter 9 of this ES).

7.4.6 The approach adopted for this assessment has been designed to comply with the legislation and guidance described above, the methodology described in Volume 2, Chapter 9 of this ES (the socio-economic impact assessment for the HPC Project) and the generic criteria presented in Volume 1, Chapter 7 of this ES.

7.4.7 The construction labour force requirements for each of the proposed off-site associated developments have been provided by EDF Energy’s construction team, based on the likely costs of construction and previous experience of similar projects. These have been cross checked against similar projects requiring similar labour skills. The numbers contained in the assessment represent a peak workforce, but it is assumed that this will be similar to the average number of workers on site over the construction phase. These numbers represent part of the civils histogram contained in Volume 2, Chapter 9 of this ES.

7.4.8 This chapter includes an assessment of the socio-economic impact of the potential loss of agricultural land, severance within farm units, and the related direct and indirect socio-economic impacts. This assessment has not involved the undertaking of site surveys or detailed financial implications for individual farm units.

**a) Study Area**

7.4.9 The study areas for the HPC project-wide (Volume 2, Chapter 9) and associated development (Volumes 3 to 10, Chapter 7) socio-economic assessments have been chosen to reflect different types of impacts that might be expected at appropriate spatial scales. Therefore, for the HPC project-wide assessment, labour markets have been identified at 60-minutes and 90-minutes travel time from the main site to address economic impacts, and district- and county-wide areas are identified to address accommodation market impacts. Other community and population impacts, for example on public service provision and community facilities, have been assessed using ward clusters within the 60-minute travel area.

7.4.10 The geographical extent of the study area for this socio-economic assessment of an associated development is the immediate study area surrounding the site (as shown in Figure 7.1) – comprising the Lower-level Super Output Areas (LSOAs) in the immediate vicinity of the site (Sedgemoor 007B and 007C). These LSOAs, which are areas of statistical geography containing around 1,500 people (residents), incorporate the settlement of Cannington and its immediate rural surroundings, including the smaller settlements of Bradley Green, Rodway and Spaxton, and as such account for the population and community facilities that represent sensitive receptors to development in the immediate study area.

7.4.11 Statistical information relating to the local level (SDC and WSC), county/regional level (Somerset and/or South West England) and national level (England and Wales) is,
however, taken into account when assessing the sensitivity of receptors and hence the overall significance of impacts.

b) Baseline Assessment

7.4.12 Baseline socio-economic conditions for the relevant study area have been established through:

- consultation with appropriate statutory bodies; and
- analysis of nationally recognised data and survey information obtained from the Office of National Statistics (ONS) and other Government departments including the Department of Communities and Local Government, including:
  - Indices of Multiple Deprivation (2010) (Ref. 7.28).

7.4.13 Due to the nature of socio-economic data, no specific surveys were commissioned or undertaken for the assessment.

c) Consultation

7.4.14 Consultation has been undertaken throughout the EIA process and further information is provided in the Consultation Report.

7.4.15 EDF Energy has undertaken consultation through a Planning Performance Agreement with the local authorities. A socio-economic workstream was established through this process and other formal and informal consultation. Responses to all comments received by EDF Energy are set out in the Consultation Report, which is submitted in support of this application for Development Consent. Key points are summarised below.

7.4.16 Meetings have been held with SDC, WSC and SCC throughout the EIA process to discuss the scope of the assessment. These meetings are summarised in the Consultation Report. In addition, workshops have been held with local authorities to identify and confirm the likely socio-economic impacts associated with the proposed development, and to identify possible measures to mitigate for these impacts.

7.4.17 A formal socio-economic working group, incorporating representatives from SDC, WSC, SCC and EDF Energy was established in October 2010. The working group has considered the methodology adopted for the estimation of employment numbers and the consequent impacts on accommodation and public services.

7.4.18 An Environmental Appraisal was produced as part of EDF Energy’s Stage 2 Consultation, which included a socio-economic assessment and individual socio-economic appraisals on the associated development sites. A number of comments were received on the approach to the technical assessment, mainly from Sedgemoor and West Somerset Councils in their consultation responses. EDF Energy has been
working with the Councils since Stage 2 to address these comments, where appropriate.

d) Assessment Methodology

7.4.19 **Volume 1, Chapter 7** of this ES describes the assessment methodology for this EIA. In addition the following specific methodology was applied for the determination of impact magnitude.

i. Value and Sensitivity

7.4.20 The sensitivity of an environmental receptor is a combination of the ‘value’, which for most environmental receptors relates to importance at international, national, regional and local scales. In relation to socio-economics, the ‘higher’ value receptors are dealt with in the HPC Project main site assessment (Volume 2, Chapter 9 of this ES). The remainder of the receptors identified within the associated development assessments (Volumes 3 to 10, Chapter 7 of this ES) are either ‘low’ (i.e. significant at district-level) or ‘very low’ (i.e. not a significant receptor e.g. local labour markets or specific retail outlets/rural economy). In addition, most socio-economic receptors have relatively high tolerance to change as they are not static but subject to constant turnover (e.g. demographics and economy).

7.4.21 The socio-economic receptors that may experience an impact during the construction, operational and post-operational phases of the proposed development have been identified as the resident population of the immediate study area, and the workforce of the immediate study area as described in Section 7.5 (d). In addition, qualitative receptors are identified in terms of the demographic and community profile of the immediate study area, in relation to identified baseline characteristics such as deprivation, and the local business community (in terms of supply chain and the wider economy).

7.4.22 The socio-economic receptors related to agricultural land are identified as the wider sub-regional economy, and site-specific features including individual farm units, in terms of direct economic impact and loss of agricultural land and impact on farming activity.

7.4.23 As such, the value of receptors at the local level, as directed by Table 7.3 of **Volume 1, Chapter 7** of this ES, are identified as low or very low (i.e. of local significance only, and with some tolerance to accommodate change). **Table 7.1** shows the values attributed to each receptor:
<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Receptor</th>
<th>Value and Sensitivity</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment</td>
<td>Labour market and economy of the immediate study area</td>
<td>Low</td>
<td>Based on the sensitivity of the local employment environment to temporary employment opportunities, local importance and tolerance to accommodate the proposed change.</td>
</tr>
<tr>
<td>Local Expenditure</td>
<td>Local economy and specific retailers</td>
<td>Low</td>
<td>Based on the sensitivity of the employment environment to temporary employment opportunities, a very low importance is predicted, although this would be of low sensitivity as there are a limited number of retail outlets in the immediate study area.</td>
</tr>
<tr>
<td>Demographic and Community</td>
<td>Residential population of the immediate study area</td>
<td>Low</td>
<td>The value and sensitivity of the receptor is considered low due to the high annual level of population turnover within the immediate study area (tolerance to change) and the local scale of importance.</td>
</tr>
<tr>
<td>Loss of agricultural land and impact on farming activity</td>
<td>Sub-regional economy</td>
<td>Very low</td>
<td>The agricultural land within the application site is assessed as very low value/sensitivity due to its grade and extent and proportion of total agricultural land of this quality in Somerset.</td>
</tr>
<tr>
<td>Supply Chain</td>
<td>Local economy</td>
<td>Very low</td>
<td>A very low importance receptor as the local economy is not predominantly focused on supply of contract workers.</td>
</tr>
</tbody>
</table>

**ii. Magnitude**

7.4.24 The magnitude of impact has been established by considering the consequences that the proposed development would have upon the local population and economy, and has been considered in terms of high, medium low and very low. Potential impacts have been considered in terms of their propensity to be permanent or temporary, adverse (negative) or beneficial (positive) and cumulative.

7.4.25 Magnitude is a function of the geographical extent of the impact, its duration, permanence and reversibility.

7.4.26 Impacts may arise during all three phases of the proposed development – construction, operational and post-operational phases. Where an impact could reasonably be placed within more than one magnitude rating conservative professional judgement has been used to determine which rating would be applicable.

7.4.27 In adherence with Table 7.2 of Volume 1, Chapter 7 of this ES, magnitude is assessed as low or very low where changes are noticeable and temporary over a partial area affecting key characteristics (in this case the existing resident population and workforce). Magnitude is assessed as medium or high where changes are permanent or irreversible over the majority of the development area or beyond.

7.4.28 Table 7.2, which is derived from Table 9.5 of Volume 2, Chapter 9 of this ES identifies those impacts relevant to this proposed development where magnitude can be defined with reference to the baseline and quantitative indicators.
7.4.29 Other qualitative assessments of magnitude are based on professional judgement. The criteria seek, as far as possible, to identify quantitative criteria as to the level of change in relation to the current capacity of the area.

7.4.30 This recognises the dynamic nature of the environment within which the HPC development would interact. **Table 7.2** sets out where assessments are quantitative or qualitative, and where impacts are not relevant to the proposed development, and shows that due to the local, temporary nature of some impacts, a low or very low magnitude is likely.

<table>
<thead>
<tr>
<th>Employment Impacts</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Very Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Employment</td>
<td>Construction employment at the proposed development is assessed as part of the project-wide Workforce Profile, addressed in <strong>Volume 2, Chapter 9</strong>. An assessment has been made to identify significance at a local level, based on temporary proportional increases against baseline jobs and residents in the immediate study area:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 100% increase in jobs in the immediate study area</td>
<td>50-100% increase in jobs in the immediate study area</td>
<td>10-50% increase in jobs in the immediate study area</td>
<td>&lt; 10% increase in jobs in the immediate study area</td>
</tr>
<tr>
<td>Operational Employment</td>
<td>Elements of operational employment at the Associated Developments related to the project-wide construction workforce are incorporated into the project-wide Workforce Profile, addressed in <strong>Volume 2, Chapter 9</strong>. An element of employment at some of the Associated Developments would be additional (e.g. catering, cleaning and recreation staff where applicable). These have been highlighted and quantified in the relevant assessment. The following significance criteria have been used to identify the impact in the immediate study area, which would be temporary:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 100% increase in jobs in the immediate study area</td>
<td>50-100% increase in jobs in the immediate study area</td>
<td>10-50% increase in jobs in the immediate study area</td>
<td>&lt; 10% increase in jobs in the immediate study area</td>
</tr>
<tr>
<td>Post-operational Employment</td>
<td>Post-operational employment at the proposed development is assessed as part of the project-wide Workforce Profile, addressed in <strong>Volume 2, Chapter 9</strong>. An assessment has been made to identify significance at a local level, based on temporary proportional increases against baseline jobs and residents in the immediate study area:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 100% increase in jobs in the immediate study area</td>
<td>50-100% increase in jobs in the immediate study area</td>
<td>10-50% increase in jobs in the immediate study area</td>
<td>&lt; 10% increase in jobs in the immediate study area</td>
</tr>
<tr>
<td>Business and Supply Chain and Operational Expenditure</td>
<td>Assessed Qualitatively</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Demographic and Community Impacts**

- **Community Impacts**: Assessed Qualitatively in relation to unique sensitive receptors
- **Demographic Impacts**: The demographic impacts of the non-home-based workers during the post-operational phase are assessed as part of the HPC development site employment impact assessment (**Volume 2, Chapter 9** of this ES), as at this scale no impacts are anticipated.

**Local Expenditure Impacts**

- **Construction and Post-operational Employment**: Employment generated represents > 100% increase relative to
- **Construction and Post-operational Employment**: Employment generated represents 50-100% increase relative to local
- **Construction and Post-operational Employment**: Employment generated represents 10-50% increase relative to
- **Construction and Post-operational Employment**: Employment generated represents < 10% increase relative to
### iii. Significance

7.4.31 Within this chapter, the generic descriptions used to define the significance of impacts follow those given in Table 7.5 of Volume 1, Chapter 7 of this ES. An Impact Assessment Matrix (IAM) compares the magnitude of impacts with the value and sensitivity of the receptor to determine the significance of impacts at Table 7.4 of Volume 1, Chapter 7 of this ES.

7.4.32 The significance of the impact is judged on the relationship of the magnitude of impact to the assessed sensitivity and/or importance of the receptor. The methodology by which the predicted significance of the impacts, without mitigation, is outlined in Volume 1, Chapter 7 of this ES.

7.4.33 The assessment of impact significance is the most important step in the EIA process, since it is used to determine whether mitigation is required, and also to determine whether mitigation measures have reduced impacts to an acceptable residual level.

### iv. Cumulative Impacts

7.4.34 As part of the Stage 2 Consultation it was suggested by SDC and WSC in their joint response that the labour market impacts and the consequent impacts on demand for accommodation and public services/community facilities should be considered alongside the wider labour force requirements of the proposed off-site associated developments and the HPC development itself. The interactive cumulative construction employment impacts of the HPC Project (i.e. the HPC development and all the associated developments) are assessed in Volume 2, Chapter 9 of this ES. In addition, an assessment of the cumulative impacts of HPC project-wide development alongside external projects (i.e. construction/development projects elsewhere in the local area and region) is set out in Volume 11, Chapter 6 of this ES.

7.4.35 In common with the other proposed associated developments, the proposed development would have a very small workforce in the context of the overall HPC Project. In addition, the non-home-based construction workforce would be dispersed over a relatively wide area and, therefore, potential impacts on demand for accommodation and public services would be dispersed well beyond the site and associated LSOAs. These impacts are therefore considered as part of the assessment of the HPC project and its cumulative impacts (see Volume 2, Chapter 9 of this ES). In addition, the cumulative community impacts of the overall proposals on Cannington are described in Volume 11 of the ES.
7.4.36 The assessment of impacts has been undertaken against the baseline conditions as defined by the data sources referenced in Section 7.4 of this chapter. As with any dataset, these may be subject to change.

7.4.37 The numbers contained in the assessment of employment represent a peak workforce, but it is assumed that this would be similar to the average number of workers on the site over the construction period. These numbers represent part of the overall associated development workforce histogram contained in Volume 2, Chapter 9 of the ES.

7.4.38 There is inherent uncertainty in predicting the number and distribution of non-home-based construction workers on a project-wide basis for a project of this scale. As the nature of the construction of this associated development would require a comparatively small number of construction worker hours in comparison with the overall HPC project, any variation would not likely change the overall significance of the HPC project-wide assessment, which is provided in Volume 2, Chapter 9 of this ES.

7.5 Baseline Environmental Characteristics

a) Introduction

7.5.1 This section of the ES describes the socio-economic baseline for the proposed development.

b) Study Area Description

7.5.2 As shown in Figure 7.1, the site is located to the immediate south of the village of Cannington, just outside of the settlement boundary. The site is approximately 8km south-east of the HPC development site.

7.5.3 Bridgwater, the largest town within the district of Sedgemoor, lies approximately 3km to the south-east of the proposed development site. The M5 motorway is located to the east of Bridgwater, approximately 5km to the south-east of the proposed development site.

7.5.4 The site lies within a landscape characterised primarily by agricultural activities and as such the existing use has negligible socio-economic impacts. Cannington is surrounded by agricultural land, scattered farms and small settlements.

7.5.5 The site covers an area of approximately 5.2ha. It is bounded to the immediate south by the A39 and the remaining boundaries of the proposed development site are with agricultural land. The closest residential properties to the proposed development site are on Mill Close, 160m to the north of the site, and Oaktree Way and Brownings Road approximately 250m to the east of the site. To the north of the site, separated by agricultural land, there is a further residential building at Denman’s Farm.

7.5.6 The site is currently used for agricultural purposes, largely comprising a single closely grazed grassland field. The site also includes an existing hedgerow within the field to the east of the field in which the park and ride facility would be located to facilitate
landscape mitigation proposals, which are described in Chapter 2 of this volume of
the ES.

7.5.7 There are three Public Rights of Way (PRoW) located in close proximity to the site;
one along the western site boundary; one linking the village of Cannington with
footpaths leading south and west beyond the A39; and one along a short section of
the south-east boundary of the proposed development site, also linking the village of
Cannington with footpaths leading south beyond the A39.

7.5.8 In the SDC publication ‘The Role and Function of Settlements in Sedgemoor’.

7.5.9 (Ref. 7.29), Cannington is described as:

“mixed community, relatively well off for services. Cannington Centre for
Land-Based Studies (part of Bridgwater College) is an important part of the
settlement, providing good employment opportunities, and there is now also
a training centre for the nuclear decommissioning industry”.

7.5.10 Yeo Valley Farms is a major employer in the area. Local employment is also
provided at Brymore School, and some smaller businesses. Other workers commute
to Bridgwater and Taunton, with a smaller number travelling west to Minehead, and
north to the existing power station complex at Hinkley Point.

c) Environmental Baseline

7.5.11 The socio-economic baseline for the HPC project is presented in Volume 2,
Chapter 9 of this ES. The following baseline description focuses on the site and the
immediate study area as outlined in Figure 7.1.

7.5.12 Key socio-economic indicators of relevance to the proposed development are
summarised in Table 7.3 of this chapter.

7.5.13 Baseline information for the immediate study area (i.e. the area covered by LSOAs
007B and 007C) is set out below:

- Population – the population of the area is approximately 2,700, of which
  approximately 1,470 are of working age (i.e. 16 to 64). As shown in Table 7.4,
  the population of the area declined slightly (-1%) between 2001 and 2009
  compared to a population growth across Sedgemoor (6%) and national (4.8%)
scales (Ref. 7.30).

- Housing – there are around 1,150 homes in the immediate study area, the
  majority of which are in the settlement of Cannington (Ref. 7.31).

- Employment – according to ABI/BRES data (2009) (Ref. 7.32), there are 864
  employee jobs in the immediate study area, of which 31% are in manufacturing
  sectors, 30% are in public administration, education and health sectors, and 21%
  are in distribution, hotels and restaurant sectors.

- Business structure – the local business structure currently consists predominantly
  of small businesses in the tourism, food retail and construction sectors. The
  Annual Business Inquiry dataset (Ref. 7.33) shows that the three most common
types of business within the immediate study area are those relating to
accommodation and food services, retail and construction sectors. Smaller
businesses dominate with the majority being comprised of between one and four employees. There are no companies employing more than 300 employees.

- **Land Use** – the proposed development site is currently in agricultural use, for arable farming. None of the land within or adjacent to the proposed development belongs to any agri-environment scheme. Agricultural land accounts for a total of 331,233ha in Somerset, and an estimated 1,738 jobs (ABI, 2008), based on an average of 1.5 self-employment jobs to every employee job in this sector across the South West.

- **Unemployment** – the level of worklessness among working age residents is approximately 11%, well below the average for Sedgemoor (14.6%), the South West Region (15.3%) and the national average (15.2%) (Ref. 7.34).

- **Deprivation** – levels of deprivation are relatively low, with an average rank for the two LSOAs of 20,504 (out of 32,482 LSOAs in England) (Ref. 7.35).

Table 7.3: Summary Baseline Data for the Immediate Study Area (LSOAs Sedgemoor 007B and 007C)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Immediate Study Area (LSOAs Sedgemoor 007B and 007C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population growth (2001-2009)</td>
<td>-1%</td>
</tr>
<tr>
<td>Dwellings (2009)</td>
<td>1,150</td>
</tr>
<tr>
<td>Working-age population (mid-2009)</td>
<td>1,470</td>
</tr>
<tr>
<td>Employment (2009)</td>
<td>864</td>
</tr>
<tr>
<td>Out of work benefit claimants as % of working age population</td>
<td>11% (Sedgemoor = 14.6%; England = 15.2%)</td>
</tr>
<tr>
<td>Average IMD 2010 ranking (out of 32,482 LSOAs in England; 1 = most deprived)</td>
<td>20,504</td>
</tr>
</tbody>
</table>


Table 7.4: Resident Population Growth for the Immediate Study Area and Other Spatial Levels (2001-2009)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LSOA 007B and 007C</td>
<td>2,729</td>
<td>2,701</td>
<td>-1%</td>
</tr>
<tr>
<td>Sedgemoor</td>
<td>106,030</td>
<td>112,136</td>
<td>6%</td>
</tr>
<tr>
<td>West Somerset</td>
<td>35,069</td>
<td>35,383</td>
<td>1%</td>
</tr>
<tr>
<td>Somerset</td>
<td>498,707</td>
<td>523,471</td>
<td>5%</td>
</tr>
<tr>
<td>South West</td>
<td>4,249,433</td>
<td>4,498,556</td>
<td>6%</td>
</tr>
<tr>
<td>England</td>
<td>49,449,746</td>
<td>51,809,741</td>
<td>5%</td>
</tr>
</tbody>
</table>

Source: Office for National Statistics Mid-Year Population Estimates (ONS, 2010) (Ref. 7.36)
7.6 Assessment of Impacts

a) Construction Impacts

7.6.1 This section identifies and assesses the potential impacts of the construction phase on the socio-economic environment of the immediate study area.

i. Employment Impacts

7.6.2 Recruitment of construction workforce is considered as part of the HPC development site construction employment impact assessment (Volume 2, Chapter 9 of this ES), as the anticipated employment associated with proposed development is too small to assess the likely impacts on the local labour market as a ‘stand-alone’ assessment.

7.6.3 Estimates of the potential employment likely to be generated during the construction phase of the proposed development are provided below. Some additional off-site employment could also be supported, for example, in the design and planning of facilities and in overall project management. This is likely to be of a very low magnitude, and would have a very low value. As the sensitive receptor in this case would be the wider (regional) economy, this is likely to lead to a negligible impact and is not included within the figures below.

7.6.4 Construction employment of the proposed development is estimated at a peak of around 25 construction workers. This figure would be the average number of workers on-site for the majority of the construction phase. Estimated start and end-dates are outlined in Chapter 3 of this volume of the ES.

7.6.5 Overall, a short-term increase in local employment opportunity would be expected to arise within the immediate study area and the wider Sedgemoor District. The peak construction employment of 25 workers represents around 2.9% of the baseline workforce level in the immediate study area, and therefore has a very low magnitude. Based on the low sensitivity of the employment environment to short-term employment opportunities, a low importance is predicted. Consequently, a short term negligible impact is expected on labour demand and subsequent accommodation demand in the immediate study area.

ii. Loss of Agricultural Land and Farming Activity

7.6.6 The proposed development would lead to the permanent loss of farming activity, crops and pasture both temporarily and permanently within site boundary. The agricultural land that would be required for the proposed development is described as of ‘moderate’ quality (Grade 3b).

7.6.7 The area of agricultural land affected within the site (5.2ha) represents approximately 0.001% of the total 331,233ha of agricultural land (Grades 1-5) across Somerset as a whole. As a proportion of the total employment in the agricultural sector in Somerset in 2009, this would equate to an average loss of 0.02 jobs in this sector.

7.6.8 Given the relatively low proportion of jobs that would be lost, the magnitude of the impacts would be very low (insignificant in terms of the sub-regional economy) and the sub-regional economy as a receptor would have very low sensitivity to the proposed changes, resulting in a negligible impact in terms of the sub-regional economy.
iii. Direct Economic Impact (Agricultural Land)

7.6.9 None of the land within or adjacent to the proposed development belongs to any agri-environment scheme and as a result there will be no impacts on farm units that receive financial incentives from these schemes. Land owners will be compensated for any loss of land prior to the start of construction of the proposed development, therefore no impact is identified.

iv. Demographic Impacts

7.6.10 The demographic impacts of the non-home-based workers during the construction phase are assessed as part of the wider project-wide HPC development site employment impact assessment (Volume 2, Chapter 9 of this ES), as at this scale a very low magnitude and very low value would be expected to result in negligible impacts.

v. Local Expenditure Impacts

7.6.11 Given the nature of the proposed construction activities for the proposed development, there is considered to be potential for suitably qualified companies based in Somerset and the wider South West region to be involved in the works as contractors or sub-contractors. Around 10,000 construction companies exist in the wider south-west region, predominantly small to medium sized enterprises (SMEs). With current market conditions, positive interest is expected from the medium to large size firms, with further opportunities for small firms and the self-employed as sub-contracted labour.

7.6.12 The presence of 25 construction workers would also provide a small temporary injection of expenditure into the local economy, particularly with local accommodation providers, retail and catering businesses.

7.6.13 The magnitude of the potential impact on local expenditure is assessed as very low given that the maximum number of workers would be only around 1.7% of the population of the immediate study area, and would be temporary. Based on the very low sensitivity of the employment environment to short-term employment opportunities, a very low importance is predicted, although this would be of low sensitivity as there are a limited number of retail outlets in the immediate study area. Consequently, a negligible impact would be expected in the area. As the study area is expanded to include the expenditure for a wider area, a commensurate reduction in the magnitude would occur.

vi. Community Impacts

7.6.14 Residents and businesses in the area and more widely in Sedgemoor would be encouraged and supported to secure economic benefits from the HPC Project – including jobs and supply chain opportunities. At the immediate study area scale, the magnitude of the impact is assessed as very low, and has a low importance in terms of the wider economy, resulting in a negligible impact.

b) Operational Impacts

7.6.15 This section identifies and assesses the potential impacts of the operational phase on the socio-economic environment of the study area.
i. Employment Impacts

7.6.16 There would be a small amount of employment in the operational phase of the proposed development. This is anticipated to amount to ten employment positions equating to a total “headcount” of 20 workers associated with the park and ride element. This would include approximately four full-time security employees at the park and ride site plus six transfer bus drivers.

7.6.17 All of these employment positions created are included within the estimated 5,600 construction workers identified at Volume 2, Chapter 9 of the ES.

7.6.18 The magnitude of employment would be very low in proportion to the immediate study area (2.8% of the existing baseline workforce); the importance and sensitivity of temporary employment would be low. Consequently, a long-term (around eight years) negligible impact is expected.

ii. Local Expenditure Impacts

7.6.19 There is potential for some local and regional companies to be involved in the ongoing operational phase of the proposed development, as contractors and suppliers. However, it cannot be determined whether suppliers are present in the area. Therefore a very low magnitude impact is expected on a very low importance receptor (as the local economy is not predominantly focused on supply of contract workers). A negligible impact is expected.

7.6.20 Additionally, there may be some minor expenditure by operational employees on local goods and services in retail outlets in nearby centres such as Cannington. However, due to the very low magnitude of the operational employment, and the very low sensitivity of the receptor, a negligible impact is expected.

iii. Community Impacts

7.6.21 Residents and businesses in the area and more widely in Sedgemoor would be encouraged and supported to secure economic benefits from the development at HPC – including jobs and supply chain opportunities. At the immediate study area scale, the magnitude of the impact is assessed as very low, and has a low importance in terms of the wider economy, resulting in a negligible impact.

c) Post-operational Impacts

7.6.22 This section identifies and assesses the potential impacts of the post-operational phase on the socio-economic environment of the immediate study area. A description of the post-operational phase and estimated timescales is presented in Chapter 5 of this volume of the ES.

7.6.23 In the post-operational phase the land will be returned to agricultural uses. There is therefore no permanent impact on agricultural activities on the site.

i. Employment Impacts

7.6.24 A lesser number of workers are anticipated in comparison to the construction phase, with an estimated requirement of 15 peak construction employees involved in the removal/reinstatement process.
7.6.25 Overall, a short-term increase (1.7%) in local employment opportunity would be expected to arise within the immediate study area, although as this represents a small scale relative to the workforce profile of the wider HPC project, a very low magnitude would arise. Based on the low sensitivity of the employment environment to short-term employment opportunities, a low importance is predicted. Consequently, a short term negligible impact is expected on labour demand and subsequent accommodation demand in the immediate study area.

ii. Demographic Impacts

7.6.26 The demographic impacts of the non-home-based workers during the post-operational phase are assessed as part of the HPC development site employment impact assessment (Volume 2, Chapter 9 of this ES), as at this scale a very low magnitude and very low value would be expected to result in negligible impacts.

iii. Local Expenditure Impacts

7.6.27 A lesser number of workers and therefore expenditure is anticipated during the post-operational phase in comparison to the construction phase, with a maximum of 15 workers. The presence of a peak headcount of 15 construction workers would also provide a small temporary injection of expenditure into the local economy, particularly with local accommodation providers, retail and catering businesses.

7.6.28 The magnitude of the potential impact on local expenditure is assessed as very low given that the maximum number of workers would be only around 1.0% of the population of the immediate study area, and would be temporary. Based on the very low sensitivity of the employment environment to short-term employment opportunities, a very low importance is predicted, although this would be of low sensitivity as there are a limited number of retail outlets in the immediate study area. Consequently, a negligible impact would be expected in the area. As the study area is expanded to include the expenditure for a wider area, a commensurate reduction in the magnitude would occur.

7.7 Mitigation of Impacts

a) Mitigation and Best Practice Measures During Construction

7.7.1 For the purpose of this assessment, mitigation measures have been proposed where there is an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so.

7.7.2 All impacts during the construction phase on socio-economic aspects are assessed as being of no greater significance than negligible, in terms of employment generation and expenditure. Consequently no mitigation measures are required. However, EDF Energy would adopt best practice to enhance beneficial impacts.

7.7.3 In terms of amenity disruption and community impacts during the construction phase, a series of project-wide measures would be put in place to address minor concerns raised during the consultation process, some of which have the potential to provide socio-economic benefits. These include registration of the site with the United Kingdom's “Considerate Constructors Scheme”. This construction industry initiative commits those companies and sites in the scheme to be considerate and good
neighbours as well as clean, respectful, safe, environmentally conscious, responsible and accountable.

7.7.4 Based on concerns raised in response to EDF Energy’s Stage 2 Update consultation (see Consultation Report for details), EDF Energy is committed to ensuring that the site is operated considerately with 24-hour security and effective management of vehicle flows. EDF Energy would also introduce worker code of conduct practices to ensure that construction workers behave well in the local area, appended to the Community Safety Management Plan.

7.7.5 The Health Impact Assessment also identifies likely effects on local communities’ health and wellbeing.

7.7.6 The requirements of the workforce for the off-site associated developments, including the proposed development, are incorporated into the Construction Workforce Development Strategy, appended to the Economic Strategy to maximise recruitment of Somerset residents. Activities would also be established to maximise the economic benefits of the development. These measures would include:

- business supplier events and skills training;
- engagement with schools and colleges in the local area in order to help them plan the education and training requirements of their students;
- an on-going commitment to local procurement and training to up-skill the workforce;
- a dedicated supply chain representative in the Bridgwater office (undertaking an outreach programme with local businesses); and
- a series of ‘supply chain’ events for local businesses to provide a clear understanding of EDF Energy’s requirements from suppliers.

b) Mitigation Measures during Operational Phase

7.7.7 All operational impacts from the proposed development are assessed as being of negligible significance, therefore no specific mitigation is required.

c) Mitigation Measures during Post-operational Phase

7.7.8 All impacts arising from the post-operational phase of the proposed development are assessed as being of negligible significance, therefore no specific mitigation is required.

7.7.9 In addition, the site would be registered with the Considerate Constructors Scheme for the post-operational phase in line with the approach adopted for the construction phase.

7.8 Residual Impacts

a) Construction Impacts

7.8.1 All residual impacts during the construction phase on socio-economic aspects are assessed as of no greater significance than negligible in terms of employment
generation and expenditure, and would be short term and temporary, and consequently are considered acceptable for the proposed development.

b) Operational Impacts

7.8.2 All residual impacts during the operational phase on socio-economics are assessed as being of negligible significance and are therefore considered acceptable for the proposed development.

c) Post-operational Impacts

7.8.3 All residual impacts during the post-operational phase on socio-economics would be of negligible significance, and are short-term and temporary, and are therefore considered acceptable for the proposed development.

7.9 Summary of Impacts

7.9.1 A summary of impacts is provided in Table 7.5.
### Table 7.5: Summary of Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Potential Magnitude</th>
<th>Description</th>
<th>Value/Sensitivity</th>
<th>Significance</th>
<th>Proposed Mitigation</th>
<th>Residual Impact Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Phase</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment Impacts</td>
<td>Labour market and economy of the immediate study area</td>
<td>2.9% increase in immediate study area workforce</td>
<td>Very low</td>
<td>Site-specific, direct, temporary, short-term</td>
<td>Low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>Demographic Impacts</td>
<td>Residential population</td>
<td>The demographic impacts of the non-home-based workers during the construction phase are assessed as part of the wider project-wide HPC development site employment impact assessment (<a href="#">Volume 2, Chapter 9 of this ES</a>), as at this scale no impacts are anticipated.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Expenditure Impacts</td>
<td>Local economy and specific retailers</td>
<td>1.7% increase in immediate study area working-age population</td>
<td>Very low</td>
<td>Site-specific, direct, temporary, short-term</td>
<td>Low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>Community Impacts</td>
<td>Residential population of the immediate study area</td>
<td>Impact of traffic on local residents/businesses - Residents and businesses secure economic benefits</td>
<td>Very low</td>
<td>Not site-specific, indirect, temporary, short-term</td>
<td>Low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td><strong>Operational Phase</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment Impacts</td>
<td>Labour market and economy of the immediate study area</td>
<td>Total peak “headcount” of 20 workers on-site, incorporated into Workforce Profile (2.8% increase in local workforce)</td>
<td>Very low</td>
<td>Site-specific, direct, temporary, medium-term</td>
<td>Low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>Supply Chain</td>
<td>Local/Regional economy</td>
<td>Businesses secure economic benefits</td>
<td>Very low</td>
<td>Not site-specific, indirect, temporary, short-term</td>
<td>Very low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>Construction Worker Expenditure</td>
<td>Local economy and specific retailers</td>
<td>Demand for goods and services locally</td>
<td>Very low</td>
<td>Indirect, temporary, medium-term</td>
<td>Low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>Community</td>
<td>Residential population of the immediate study area</td>
<td>EDF Energy’s baseline review of community cohesion highlights potential effects on public services, economic impacts, which are assessed in the HPC development site socio-economic assessment (<a href="#">Volume 2, Chapter 9 of this ES</a>) and potential community tensions, the key issues of which appear to be residents’ equal entitlement to employment and services. Although there is no single, quantifiable means of assessing these effects, potential negative effects would be highlighted and mitigation provided.</td>
<td></td>
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</tbody>
</table>
## Impact Analysis

<table>
<thead>
<tr>
<th>Impact</th>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Potential Magnitude</th>
<th>Description</th>
<th>Value/ Sensitivity</th>
<th>Significance</th>
<th>Proposed Mitigation</th>
<th>Residual Impact Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-Operational Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment Impacts</td>
<td>Labour market and economy of the immediate study area</td>
<td>1.7% increase in immediate study area workforce</td>
<td>Very low</td>
<td>Site-specific, direct, temporary, short-term</td>
<td>Low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>Demographic Impacts</td>
<td>Residential population of the immediate study area</td>
<td>The demographic impacts of the non-home-based workers during the post-operational phase are assessed as part of the HPC development site employment impact assessment (Volume 2, Chapter 9 of this ES), as at this scale no impacts are anticipated.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Expenditure Impacts</td>
<td>Local economy and specific retailers</td>
<td>1.0% increase in immediate study area working-age population</td>
<td>Very low</td>
<td>Site-specific, direct, temporary, short-term</td>
<td>Low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td><strong>Construction and Operational Phase (Agriculture)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of Agricultural Land and Farming Activity</td>
<td>Sub-regional economy</td>
<td>0.001% of Somerset agricultural land removed</td>
<td>Very low</td>
<td>Not site-specific, direct, temporary</td>
<td>Very Low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
References


7.23 SDC. Corporate Strategy. 2009 (refreshed in 2010).


7.29 SDC. The Role and Function of Settlements in Sedgemoor. 2010.


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8. TRANSPORT

8.1 Introduction

8.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential transport impacts associated with the construction, operation and post-operational phases of the proposed Cannington park and ride facility, referred to hereafter as the proposed development, on land referred to by EDF Energy as the Cannington park and ride site (the site). Detailed descriptions of the site, proposed development and the construction, operational and post-operational phases are provided in Chapters 1 to 5 of this volume of the ES.

8.1.2 A glossary of the terminology used in this chapter is provided in Volume 1 of this ES.

8.2 Scope and Objectives of Assessment

8.2.1 The scope of the assessment has been determined through a formal Environmental Impact Assessment (EIA) scoping process undertaken with the Infrastructure Planning Commission (IPC). It has also been informed by ongoing consultation with statutory consultees including the Highways Agency (HA), Sedgemoor District Council (SDC), West Somerset Council (WSC), Somerset County Council (SCC), the local community and the general public in response to the Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations. SCC and the HA are the highway authorities for the within the highways that are relevant to this assessment.

8.2.2 The early sections of this chapter provide background on the scope of the assessment, the legislative and planning policy context (Section 8.3), the assessment methodology (Section 8.4) and the key characteristics of the HPC Project which inform the transport assessment as a whole. Section 8.5 describes the baseline transport conditions in the locality of the proposed development and Section 8.6 the anticipated future baseline taking account of developments with planning approval and anticipated future traffic growth (but not the HPC Project).

8.2.3 Section 8.7 onwards then discusses the transport impacts in the locality of the proposed development for the three assessment periods of 2013, 2016 and 2021.

8.2.4 This chapter is based upon the findings of the Transport Assessment (Annex 7 of this ES) that supports the application for Development Consent.

8.2.5 The assessment of transportation impacts has been undertaken adopting the methodologies described in Volume 1, Chapter 7, and Section 8.4.

8.2.6 This chapter focuses on the transportation potential impacts of:

- severance;
- driver delay;
• pedestrian delay;
• pedestrian amenity; and
• accidents and safety.

8.2.7 Other transport issues such as public transport, walking and cycling and travel planning are dealt with in the **Transport Assessment**.

8.2.8 The future baseline traffic conditions are compared with future traffic conditions with the HPC Project to assess the impact of the proposed development, in the context of the HPC Project, on the transport network. The traffic assessments used to inform this analysis assume implementation of the transport strategy and the proposed highway improvements which are both described in the **Transport Assessment**. Any further mitigation measures, where proposed, are described in Section 8.8. An assessment of residual impacts following implementation of these mitigation measures is presented in Section 8.9.

8.2.9 Cumulative transportation impacts arising from the proposed development in combination with other elements of the HPC Project and other relevant projects are identified and assessed in **Volume 2, Chapter 10** of this ES. The traffic flows used are those generated by committed developments and other predicted growth in the area plus those generated by the HPC Project (i.e. the HPC development site and all the associated development sites).

8.2.10 The objectives underlying the assessment are to:

• Identify the potential environmental transport impacts of the proposed development within the context of the HPC Project, taking into account the characteristics of the proposed development and the sensitivities of the local environment.
• Identify and describe measures which would be taken to mitigate any identified adverse environmental impacts.
• Predict and evaluate the extent and significance of residual effects taking into account the mitigation.

**8.3 Legislation, Policy and Guidance**

8.3.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of potential transport environmental impacts associated with the construction, operational and post-operational phases of the proposed development.

8.3.2 As stated in **Volume 1, Chapter 4**, the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (Ref 8.1) when combined with the NPS for Nuclear Power Generation (NPS EN-6) (Ref 8.2) provides the primary basis for decisions by the IPC on applications for nuclear power generation developments that fall within the scope of the NPSs.

8.3.3 Notwithstanding this, the IPC may consider other matters that are both important and relevant to its decision-making. This could include Planning Policy Statements
(PPSs), Planning Policy Guidance Notes (PPGs), regional and local policy documents, although, if there is a conflict between these and the NPS, the NPS prevails for the purposes of IPC decision making.

8.3.4 Further, the Planning Act 2008 provides that the IPC must, in making its decision on an application, have regard to any Local Impact Report (LIR) prepared by relevant local authorities. It is anticipated that the LIRs will rely in part on PPSs, PPGs, regional and local policy to provide a context for their assessment. On this basis, regard has been given to these documents (where relevant to the technical assessment) since they are likely to inform the LIRs prepared by the relevant local authorities.

a) National Planning Policy

i. Planning Policy Statement 1: Delivering Sustainable Development (PPS1) (2005) (Ref. 8.3)

8.3.5 PPS1 was published in January 2005 and sets out the Governments’ overarching planning policies on the delivery of sustainable development through the planning system.

8.3.6 PPS1 includes a number of key principles relating to development plans including the formulation of an integrated approach to development and the formulation of access policies.

8.3.7 Paragraph 27 (Delivering Sustainable Development) sets out the general approach to delivering sustainable development. In preparing development plans, planning authorities should, amongst other things:

“Provide improved access for all to jobs, health, education, shops, leisure and community facilities, open space, sport and recreation, by ensuring that new development is located where everyone can access services or facilities on foot, bicycle or public transport rather than having to rely on access by car, while recognising that this may be more difficult in rural areas.”


8.3.8 Originally published in March 2001 and revised in January 2011, PPG13 sets out the national context for planning for transport.

8.3.9 The objectives of PPG13 are to integrate planning and transport at the national, regional, strategic and local level to:

“Promote more sustainable transport choices for both people and for moving freight;
Promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling; and
Reduce the need to travel, especially by car.”
8.3.10 Paragraph 46 states:

“…Policies need to strike a balance between the interests of local residents and those of the wider community, including the need to protect the vitality of urban economies, local employment opportunities and the overall quality of life in towns and cities. Local authorities, freight operators, businesses and developers should work together, within the context of freight quality partnerships, to agree on lorry routes and loading and unloading facilities and on reducing vehicle emissions and vehicle and delivery noise levels, to enable a more efficient and sustainable approach to deliveries in such sensitive locations.”

8.3.11 Annex C of PPG13 relates to transport infrastructure. It states that care must be taken to minimise the environmental impact of any new transport infrastructure projects, including the impacts which may be caused during construction (paragraph C1). Annex C goes on to state that particular emphasis should be given to the need to explore a full range of alternative solutions to problems, including solutions other than road enhancement (paragraph C4).

b) National Guidance

i. Circular 2/07 - Planning and the Strategic Road Network (Ref. 8.5)

8.3.12 Circular 2/07 ‘Planning and the Strategic Road Network’ published in 2007, details the Highways Agency’s (HA) role and requirements in respect of the control of development in proximity to the Strategic Road Network (SRN), for which they are responsible. The Circular sets out:

- An approach adopted by the HA to encourage sustainable development while avoiding the potential for adverse effects on the SRN.
- A framework for collaborative working coordinating a number of organisations including Government Offices, regional and local planning authorities, local highway authorities, public transport providers and developers.
- How the HA will deal with planning applications. Although the Circular predates the Planning Act 2008, the collaborative approach which it advocates is firmly in line with the ‘front loaded’ approach to DCO applications.

8.3.13 The Circular draws on national policy and guidance and advocates the adoption of a demand management approach to development and promotes Travel Plans as an integral part of managing the capacity of the trunk road network.

ii. Department for Transport - Guidance on Transport Assessment (Ref. 8.6)

8.3.14 The DfT published its ‘Guidance on Transport Assessment’ (GTA) in March 2007. The guidance sets out the following principles:

- Reduce the need to travel, especially by car - thought should be given to reducing the need to travel; consider the types of uses (or mix of uses) and the scale of development in order to promote multi purpose or linked trips.
• Sustainable accessibility - promote accessibility by all modes of travel, in particular public transport, cycling and walking; assess the likely travel behaviour or travel pattern to and from the proposed site; and develop appropriate measures to influence travel behaviour.

• Mitigation measures - ensure as much as possible that the proposed mitigation measures avoid unnecessary physical improvements to highways and promote innovative and sustainable transport solutions.

iii. Highways Agency Protocol for Dealing with Planning Applications (Ref. 8.7)

8.3.15 The HA has produced a protocol to assist developers in working with them when submitting a planning application for a development which could have an impact on the SRN.

8.3.16 The section titled ‘Stage 2: Formal consultation by the Local Planning Authority’ states that:

“For developments generating more than 30 two-way trips to the network during any peak period, a transport assessment and travel plan prepared in accordance with DfT and DCLG’s ‘Guidance on transport assessment’ and meeting the requirements of DfT Circular 02/2007.”

8.3.17 This section also sets out the process that the HA requires regarding the consideration of mitigation measures:

• All reasonable steps shall be taken to minimise the level of physical mitigation required, through the use of measures such as travel plans, development phasing, heavy goods vehicle booking systems and encouraging flexible working.

• Physical measures on the local road network to minimise the impact on the strategic road network shall be utilised as far as is reasonably possible.

• Once all reasonable minimisation and off-network mitigation has been implemented, the HA will consider capacity improvements on the strategic road network. The HA will not accept local capacity improvements where they would overload the wider network.

c) Regional Planning Policy

8.3.18 The Government’s revocation of regional strategies was quashed in the High Court on 10 November 2010. However, on that same date the Government reiterated in a letter to Chief Planners its intention to revoke regional strategies through the Localism Bill. This letter was also challenged but, on 7 February 2011, the High Court held that the Government’s advice to local authorities that the proposed revocation of regional strategies was to be regarded as a material consideration in their planning development control decisions should stand. The decision of the High Court was upheld by the Court of Appeal on 27 May 2011. Therefore, the regional strategies remain in place but in the case of development control decisions it is for planning decision makers to decide on the weight to attach to the strategies (see Volume 1, Chapter 4 for a full summary of the position regarding the status of regional planning policy).

8.3.19 Regional Planning Guidance for the South West (RPG10) sets out a broad strategy for the South West up to 2016.

8.3.20 Section 8 relates specifically to Transport and sets out the Regional Transport Strategy (RTS). The RTS has 5 key objectives:

“To support the spatial strategy of RPG and to service existing and new development efficiently and in an integrated fashion;

To reduce the impact of transport on the environment, by reducing the need to travel, encouraging travel by more sustainable means (especially by walking and cycling) and locating development at accessible locations, particularly by public transport; and to achieve environmental improvements by directing investment to those locations where infrastructure is required to offset the damaging effects arising from the impacts of traffic and transport;

To secure improved accessibility to work, shopping, leisure and services by public transport, walking and cycling;

To create a modern, efficient and integrated transport system that will meet the demands of a dynamic regional economy, help overcome regional peripherality and meet all travel needs; and

To ensure the safe use of regional transport network and its associated facilities.” (Page 83).

8.3.21 Policy TRAN 1 (Reducing the Need to Travel) states that local authorities, developers and other agencies should work towards reducing the need to travel by private motor vehicle through the appropriate location of new development.

8.3.22 Policy TRAN 6 (Movement of Goods) states that local authorities, the business community, transport operators and other agencies should work together to achieve more sustainable patterns of distribution. Amongst other things, they should aim to locate major freight generating development close to the regional rail and road networks.

8.3.23 Policy TRAN10 (Walking, Cycling and Public Transport) states that:

“Local authorities, transport operators and other agencies should aim to increase the share of total travel by these modes and ensure that they provide attractive and reliable alternatives to the private car by:

• Seeking transport assessments and travel plans for all new major developments and encouraging major organisations to prepare and implement such plans, having regard to sustainable transport objectives set by local authorities in the local transport plan; and
• *Ensuring that major new development delivers (or sets out a clear and realistic strategy to deliver) a realistic choice of access by public transport, walking and cycling.*

**d) The Draft Revised Regional Spatial Strategy (RSS) for the South West Incorporating the Secretary of State’s Proposed Changes 2008 – 2026 (July 2008) (Ref. 8.9)**

8.3.24 Chapter 5 sets out the strategy’s regional approach to transport. The main aim of the RTS is to support the RSS and reduce the rate of road traffic growth by:

“Supporting economic development (identified in the RES) by maintaining and improving the reliability and resilience of links from the region’s Strategically Significant Cities and Towns (SSCTs) to other regions, international markets and connectivity within the region;

Addressing social exclusion by improving accessibility to jobs and services;

Making urban areas work effectively and creating attractive places to live by developing the transport network in support of the strategy to concentrate growth and development in the SSCTs; and

Reducing negative impacts of transport on the environment including climate change.” (Page 139).

8.3.25 Policy RTS1 (Corridor Management) states that, in order to improve the reliability and resilience of journey times, to develop opportunities to facilitate a modal shift and support growth at the Strategically Significant Cities and Towns (SSCTs), which include Bridgwater and Taunton, provision will be made to manage the demand for long distance journeys and reduce the impacts of local trips on corridors of national and regional importance.

8.3.26 Policy RTS2 (Demand Management and Sustainable Travel Measures at the SSCTs) states that demand management measures should be introduced progressively at the SSCTs to reduce the growth of road traffic levels and congestion. This should be accompanied by a ‘step change’ in the prioritisation of sustainable travel measures serving these places.

8.3.27 Policy RTS3 (Parking) states that parking measures should be implemented to reduce reliance on the car and encourage the use of sustainable transport modes.


8.3.28 The Somerset and Exmoor National Park Joint Structure Plan was adopted in 2000 with relevant policies saved from 27 September 2007. All policies have been saved with the exception of Policy 53 which is unrelated to landscape/townscape and visual impacts. The Plan provides a strategic base for all land use planning within the plan area for the period up to 2011.
8.3.29 Policy STR1 (Sustainable Development) states that development should, amongst other things, develop a pattern of land use and transport which minimises the length of journeys and the need to travel and maximises the potential for the use of public transport, cycling and walking; and conserve biodiversity and environmental assets, particularly nationally and internationally designated areas.

8.3.30 Policy 39 (Transport and Development) states that proposals for development should be considered having regard to:

- the management of demand for transport;
- achieving a shift in transport modes to alternatives to the private car and lorry wherever possible; and
- the need for improvements to transport infrastructure.

8.3.31 Policy 45 (Bus) states that facilities for buses should be improved. This should include measures to give priority to buses and to introduce park and ride systems where these are the most sustainable option.

8.3.32 Policy 48 (Access and Parking) states that developments which generate significant transport movements should be located where provision may be made for access by walking, cycling and public transport. The level of parking provision in settlements should reflect their functions, the potential for the use of alternatives to the private car and the need to prevent harmful competitive provision of parking. The level of car parking provision associated with new development should first take account of the potential for access and provide for alternatives to the private car, and then, should be no more than is necessary to enable development to proceed.

8.3.33 Policy 49 (Transport Requirements of New Development) states that proposals for development should be compatible with the existing transport infrastructure, or, if not, provision should be made for improvements to infrastructure to enable development to proceed. In particular development should:

- Provide access for pedestrians, people with disabilities, cyclists and public transport.
- Provide safe access to roads of adequate standard within the route hierarchy and, unless the special need for and benefit of a particular development would warrant an exception, not derive access directly from a National Primary or County Route.
- In the case of development which will generate significant freight traffic, be located close to rail facilities and/or National Primary Routes or suitable County Routes subject to satisfying other Structure Plan policy requirements.

8.3.34 Policy 50 (Traffic Management) states that traffic management schemes which improve safety, travel conditions and the environment should be implemented to make the best possible use of the highway network. Such schemes should remove or reduce heavy or unnecessary vehicles from settlements or sensitive environments and improve conditions for pedestrians, cyclists and public transport users.
8.3.35 Policy 52 (Freight Traffic (Lorries in the Environment)) states that traffic, and particularly lorries, should be encouraged to use National Primary Routes wherever possible through appropriate measures such as positive signing and by discouraging the use of unsuitable roads through traffic management schemes.

8.3.36 Policy 54 (Transport Proposals and the Environment) states that new transport proposals and improvements, particularly road schemes must take into account the need to: minimise the impact of proposals through mitigation and compensation measures; improve or conserve the natural and built environment; avoid the risk of pollution to the water environment, including water resources; minimise the consumption of resources both in construction and operation; and, minimise conflict with adjoining land uses.

8.3.37 Policy 58 (Ports and Wharves) states that existing port and wharf facilities should be safeguarded from development which would prejudice their potential in the transport network. Any proposals for new facilities should be within or related to settlements.

f) Local Planning Policy


8.3.38 The Sedgemoor District Local Plan forms part of the Development Plan for Sedgemoor. The Local Plan was adopted in 2004 (with relevant policies 'saved' from 27 September 2007). The Proposals Map (Inset Map No. 14) indicates that the site is not subject to any specific transport designations. The site lies outside of the defined Development Boundary.

8.3.39 The following saved policy is considered to be potentially relevant.

8.3.40 Policy TM1 (Safe and Sustainable Transport) states that safe and sustainable transport will be achieved by the following means:

   “a) Development will not be permitted which would prejudice the construction of cycle and pedestrian routes and bus lanes defined on the Proposals Map, unless suitable alternative routes are provided by the developer.

   b) Development will not be permitted which would reduce the convenience and safety of existing rights-of-way, bridle paths and cycle paths unless suitable alternative routes are provided by the developer.

   c) Development will only be permitted if the design makes adequate and safe provision for access by foot, cycle, public transport and vehicles so long as it’s appropriate to the scale of the development and in accordance with National and County Council design standards and Somerset County Council’s Highway hierarchy.

   d) The Developer shall provide the transport infrastructure required by the development to an agreed phased programme. Where off-site...
works are required, these shall be appropriate to the scale and nature of the development and shall be funded by the developer.

e) Development will not be permitted for proposals which would have a significant impact on the highway network without the prior submission of a Traffic Impact Assessment.”

ii. Sedgemoor Local Development Framework (LDF) Core Strategy (Proposed Submission) (September 2010) (Ref. 8.12)

8.3.41 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from September to November 2010. Changes prior to submission proposed as a result of the consultation process were reported and endorsed by the Council’s Executive Committee on 9 February 2011. The Core Strategy (Proposed Submission) was submitted to the Secretary of State on 3 March 2011 and an Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy will form part of the Development Plan for Sedgemoor.

8.3.42 EDF Energy submitted representations objecting to the Core Strategy (Proposed Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1, MIP2 and MIP3 contained in that chapter) and those sections relating to housing and Hinkley Point. EDF Energy also participated at the relevant EiP hearings. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the Core Strategy.

8.3.43 The following Core Strategy (Proposed Submission) policies are of potential relevance:

- Policy S1 (Spatial Strategy for Sedgemoor) states that development proposals will be expected to support the delivery of required infrastructure, including such things as transport infrastructure.

- Policy S2 (Infrastructure Delivery) states that all new development that generates a demand for infrastructure will only be permitted if the necessary on and off-site infrastructure required to support and mitigate the impact of the development site is either already in place or there is a reliable mechanism in place to ensure that it will be delivered at the time and in the location it is required.

- Policy S3 (Sustainable Development Principles) states that development proposals will be expected to, amongst other things, be located to minimise the need to travel and to encourage any journeys that remain necessary to be possible by alternative modes of travel including maximising opportunities for walking, cycling and the use of public transport.

- Policy S4 (Mitigating the Causes and Adapting to the Effects of Climate Change) states that development should mitigate the cause of climate change through, amongst other things, ensuring development encourages modes of transport other than the car.
• Policy D2 (Promoting High Quality and Inclusive Design) states, amongst other things, that development will need to demonstrate that it is accessible to all potential users using a range of transport modes, be integrated into existing patterns of movement and be permeable. Its design should create good connections to wider areas with a clear network of routes for walking and cycling.

• Policy D9 (Sustainable Transport and Movement) states, amongst other things, that travel management schemes and development proposals that reduce congestion, encourage an improved and integrated transport network and allow for a wide choice of modes of transport as a means of access to jobs, homes, leisure and recreation, services and facilities will be encouraged and supported.

• Policy D10 (Managing the Transport Impacts of Development) states that development proposals that will have a significant transport impact should, amongst other things: be supported by an appropriate Transport Assessment and Travel Plan; ensure inclusive, safe and convenient access for all; provide safe access to roads; ensure that the expected nature and volume of traffic and parked vehicles generated would not compromise road safety and/or function; comprehensively address the transport impact of development and appropriately contribute to the delivery of necessary transport infrastructure; not prejudice safeguarded transport infrastructure; and enhance and develop rights-of-way.

g) Other Relevant Local Documents

i. Hinkley Point C Project Supplementary Planning Document Consultation Draft (February 2011) (Ref. 8.13)

8.3.44 Sedgemoor District Council and West Somerset Council have jointly prepared draft supplementary planning guidance in relation to the HPC Project. Public consultation on the Consultation Draft version of the Hinkley Point C Project Supplementary Planning Document (the draft HPC SPD) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which object to the draft HPC SPD. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the draft HPC SPD.

8.3.45 In relation to the approach to Cannington Park and Ride, Box 32 in the draft HPC SPD states:

“For a temporary Park and Ride site at Cannington to be acceptable, it should form part of a well evidenced and robust HPC project transport strategy and investment package. This should seek to prevent where possible and otherwise minimise as far as possible adverse traffic impacts arising and contribute to the achievement of wider transport objectives in Cannington and along the A39 transport corridor. The overarching objective for the transport strategy should be to minimise the size of the Park & Ride site required at Cannington...”
8.3.46 In relation to transport generally, Box 8 in the draft HPC SPD states that the County Council and District Councils will expect the HPC Project promoter to:

“Align the Transport/Freight Strategy with other Council plans and strategies. The transport proposals for the HPC project during both the construction and operational phases of the power station should integrate with and contribute to the delivery of the approved transport strategies as set out in the Somerset Future Transport Plan and associated transport policies and implementation plan, the Bridgwater, Taunton and Wellington Future Transport Strategy, the Bridgwater Vision, Western Somerset Economic Development and Access Strategy and emerging Williton master-plan.

Minimise the volume of road traffic associated with the development of the new power station at all times, but especially during peak hours and during the peak tourism season between the months of June, July and August. The efficient and safe functioning of key routes, including the M5, A38, A361, A370, A371 and A372 must be protected.

Maximise the safe, efficient and sustainable movement of people and materials required for the proposed nuclear power station.

Provide transport mitigation where additional traffic flows of the project exacerbate or cause highway congestion problems.

Any new highway proposals are to be justified by a full New Approach to Appraisal (NATA) assessment. Appraisals should address potential impacts raised during consultation, such as the potential severance effect to Brymore School of the western by-pass option at Cannington.

All proposed highway works are to be the subject of a full operational analysis and a road safety audit in accordance with then current guidance.

Provide sustainable transport solutions for access to the site that workers and visitors will be required to use. This should include provision of public transport priority measures in the form of bus lanes and other bus priority measures on key routes from associated development sites to the main site for construction and other vehicles, providing a beneficial transport legacy.

Provide sustainable transport linkages to and from all associated development sites to provide access to employment, education, retail, leisure and healthcare facilities.

Ensure the number of parking spaces provided at or near to the site during the construction phase is as close as possible to zero.

Enable effective controls to be put in place to ensure workers and visitors do not park in inappropriate locations.

Ensure as much construction material as possible is delivered by sea.

Minimise the amount of waste materials, including topsoil, transported off-site.
Provide necessary improvements to the transport network to mitigate any adverse impacts on the community; including but not limited to congestion, air quality and road safety impacts. For example, include safety improvements where the additional traffic flows of the project exacerbate existing road safety problems.

Minimise traffic disruption both for the local community and visitors to the area.

Control and manage the flow of any road freight movement associated with the development in order to ensure appropriate routes are used, avoid peak hour movement and to respond to incidents on the transport network.

Agree and enable deployment of robust plans for managing unforeseen incidents on the transport network, including but not limited to traffic management plans, diversionary routes and freight/delivery management systems.

Provide long-term, sustainable legacy benefits for the local community.

Protect the natural and built environment and ensure the image of the area is not adversely affected.

Ensure that public transport services are protected throughout the construction, operation and decommissioning of the Hinkley Point nuclear power stations.

Ensure that the needs of cyclists and pedestrians are protected and enhanced throughout the construction and operation of the proposed nuclear power station. This should include enhanced pedestrian and cycle facilities from associated development sites to the centres of nearby towns and villages, including provision of the Bristol Road/Bath Road link and rail crossing in Bridgwater.

Protect current Public Rights of Way (PRoW) in and around Hinkley Point and associated development sites, and where stop-ups are required, ensure that PRoW are implemented that do not result in significant diversion lengths.

Develop and implement Travel Plans for the proposed power station and associated development that will be monitored during construction and operation of Hinkley Point C.

Monitor all movement associated with the development to ensure agreed mode share targets and thresholds for traffic congestion, air quality and road safety are achieved during construction and operation.

Fully mitigate and compensate for the adverse environmental impact of development related traffic. This should involve providing sufficient funds through appropriate legal agreements to enable the relevant authorities and agencies to implement further mitigation measures should any unforeseen impacts occur during the construction of the development.”
ii. Somerset Future Transport Plan (Ref. 8.14)

8.3.47 Somerset’s Future Transport Plan 2011 – 2026 (FTP) replaced Somerset County Council’s (SCC) Second Local Transport Plan (LTP2) in April 2011 and sets out a long term strategy for helping to deliver transport priorities up until 2026.

8.3.48 The FTP contains the following statements:

“Help communities help themselves with regard to transport improvements;
Assisting people to make smarter travel choices;
Assisting people in being more active by providing more opportunities to travel in a healthy way;
Manage the effect transport-related noise has on communities;
Work with developers to ensure they take in to account the way people travel, and how people travel to access services;
We will help hauliers choose the most appropriate routes and work to improve communication between communities and the hauliers that serve them;
Encourage people to cycle and make more trips on foot.”

iii. Technical Note 4 – Somerset County Council Transport Policies: Transport and Development (Ref. 8.15)

8.3.49 The ‘Technical Note 4 – Somerset County Council Transport Policies: Transport and Development – March 2010’ document is a supporting Technical Document to the FTP.

8.3.50 Section 6 of the document relates specifically to the proposed new nuclear development at Hinkley Point and recognises that it is one of the developments that are likely to have a big impact on transport in Somerset over the next 15 years.

8.3.51 Further planning policy context is provided in the Legislative and Planning Policy Context chapter (Volume 1, Chapter 4) and the Introduction chapter (Volume 6, Chapter 1).

8.4 Methodology

8.4.1 The Institute of Environmental Management and Assessment (IEMA) ‘Guidelines for the Environmental Assessment of Road Traffic’ (Ref. 8.16) have been used to ensure that the environmental impacts arising due to predicted changes in traffic levels are properly and comprehensively addressed. In addition the Design Manual for Roads and Bridges (DMRB) Volume 11 has been referred to in the development of this chapter (Ref. 8.17).

8.4.2 The IEMA guidelines advise the use of a ‘check-list’ of potential effects covering noise, vibration, visual impact, severance, driver delay, pedestrian delay, pedestrian
amenity, accidents and safety, hazardous loads, air pollution, dust and dirt, ecological impact and heritage and conservation areas.

8.4.3 The guidelines acknowledge that for many developments some of the effects listed may not be widely relevant, but suggest that reasons should be provided for any exclusions.

8.4.4 This chapter deals only with the transport related effects, i.e. severance; driver delay; pedestrian delay; pedestrian amenity; accidents and safety. Other transport related effects such as noise and air quality are dealt with in other chapters of this ES.

8.4.5 The sections below describe the different elements of the assessment then provide detail on the application of the IEMA methodology to the transport environmental effects of the proposed development.

a) Study Area

8.4.6 In accordance with the IEMA guidance, the study area has been defined by identifying any link or location where it is felt that significant environmental impacts may occur as a result of the proposed development.

8.4.7 The geographical extent of the study area includes:

- The A39 to the south-east and west of Cannington.
- Cannington village.

8.4.8 The study area is illustrated in Plate 8.1.

Plate 8.1: Cannington Park and Ride Study Area
b) Traffic Assessment

8.4.9 This section summarises the methodology used to derive traffic flows used in the environmental impact assessment. Full details are included within the **Transport Assessment**.

8.4.10 The traffic assessment for the HPC Project has been undertaken using a Paramics model (referred to hereafter as the model). The model has been used to predict changes in flow and junction performance as a result of the traffic generated by committed developments in the area and the HPC Project. It also predicts the effects of changes to the highway network.

8.4.11 The links modelled are shown at **Plate 8.2**. Link locations are identified by a circle symbol, with the relevant link code also shown. Locations where Automatic Traffic Count (ATC) data were collected are identified with a line.

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Plate 8.2: Modelled Links
ii. Assessment Years and Quarters

8.4.12 The following assessment periods have been considered:

- 2009: Base Year.
- Quarter 3 2013.
- Quarter 4 2016.
- 2021.

8.4.13 2009 is the base year selected and is the year when the majority of traffic surveys were undertaken.

8.4.14 Quarter 3 2013 is when the HPC development site construction would have commenced, but the majority of the associated development sites would not be operational. At this stage the proposed development would be under construction and the only associated development that would be operational is the Junction 24 site. The Cannington bypass would not be completed at this stage.

8.4.15 Quarter 4 2016 is the period used in the assessment to represent the peak construction impacts associated with the HPC Project. At this stage the proposed development (and the other associated developments) would be operational and all highway mitigation measures would be in place including the Cannington bypass. Based on the workforce and freight movement profiles, the fourth quarter is the period when traffic impacts are likely to be at their greatest.

8.4.16 In 2021 the HPC development site would be fully operational although some construction activity would still be on-going (mainly the Intermediate Spent Fuel Store). The Junction 24 development and the proposed development would still be operational. The use of the Cannington park and ride site is likely to cease towards the end of 2021 with deconstruction commencing in early 2022. However, in order to provide a robust analysis, the impacts of deconstruction have also been considered in the 2021 assessment. The scenario used for assessment is a combination of the worst case quarter for construction workforce and the worst case quarter for operational staff.

8.4.17 The first assessment in this chapter is for 2016 since this is the anticipated period of peak construction impact at the HPC development site. Following this, an assessment is made of the impacts in 2013 and 2021.

iii. Assessment Periods

8.4.18 The primary assessments have been undertaken on a daily basis (24 hour Annual Average Daily Traffic) since this reflects the impacts on severance, pedestrian amenity and safety. However, the peak network periods have also been assessed since these are relevant for pedestrian and driver delays. Vehicle delays have been assessed for all hours modelled in the model i.e. 06:00 to 10:00 and 13:00 to 20:00.
iv. Baseline Traffic Flows

8.4.19 The baseline year for the purposes of this assessment is 2009.

8.4.20 The Local Model Validation Report (LMVR) appended to the Transport Assessment sets out all of the traffic data that has been collected to build the model.

v. Future Year Baseline Traffic Flows

8.4.21 Baseline traffic models have been developed for 2013, 2016 and 2021. These incorporate the traffic generation from all committed developments i.e. those with planning permission. In addition, other growth has been allowed for by using TEMPRO and NTEM growth factors agreed with the transport authorities. Also included are any committed highway improvement schemes. These are as follows:

- Committed highway schemes implemented by 2013:
  - South Bridgwater Link Road.
  - A39 Silverfish/Crandon Bridge.
- Committed highway schemes implemented by 2016:
  - North East Bridgwater Link Road.
- Committed highway schemes implemented by 2021:
  - Dunball roundabout improvement.

8.4.22 The future year base models for 2013, 2016 and 2021 have been agreed by the transport authorities. These are referred to as the Reference Case scenarios for each assessment year.

vi. Trip Generation

8.4.23 Given the bespoke nature of the proposed HPC development there are no UK Power Station land use trip rates available to determine the likely trip generation of the construction and operational phases of the HPC Project. Instead a first principles trip generation methodology has been employed as summarised below. The details of the methodology are set out in the Transport Assessment. The trip generation methodology covers the proposed development and the remainder of the HPC Project.

Workforce

8.4.24 The construction workforce required to construct the HPC Project has been derived from EDF Energy data collated from constructing similar reactors. It is anticipated it would take approximately nine years to complete the main construction works for the HPC Project when both units would be operational (including preliminary works); during this period it is forecast that the construction workforce would peak at 5,600 in 2016.
8.4.25 A profile of the number of operational workers required to operate the two UK EPR Rector Units has been derived based on data from similar existing UK EDF Energy managed power stations (i.e. Hinkley Point B (HPB) and Sizewell B). It is anticipated an operational workforce of 900 personnel would be required, of which 810 would be present on site on any one day. Operational staff have been included in the workforce profile.

8.4.26 EDF Energy has developed a transport strategy that is described fully in the Transport Assessment. A summary of the strategy for the movement of construction staff is set out below:

- On-site parking at the HPC development site would be heavily constrained with only 200 on-site parking spaces for contractors’ staff. As such, the large majority of the construction workforce would travel to and from site by bus, either from park and ride sites or by direct bus services.

- Park and ride: park and ride facilities would be established near to Junction 23 and Junction 24 of the M5 motorway, and at Cannington and Williton. These would serve both home-based and non-home-based workers who would travel to the park and ride facilities and then be transferred by bus to the HPC development site.

- Direct bus services: direct bus services would be provided from the accommodation campuses in Bridgwater and there would also be buses provided for workers on key routes to the HPC development site. The routes would need to align to the location of workers and would need to be reviewed on a regular basis as part of the travel plan in order to respond to changes in demand.

- Walking and cycling: walking and cycling forms an important element of the strategy for workers who would be encouraged to walk or cycle directly to the HPC development site from suitable locations; to the park and ride sites; and to bus routes. In conjunction with SCC, an audit of relevant cycling and walking routes has been undertaken and improvements have been developed. Measures to encourage walking and cycling would be included in the travel plan.

- Major infrastructure interventions: even with the transport strategy and freight management strategy there would inevitably be an increase in traffic movements (freight; buses and cars) on the local network. After careful consideration and consultation EDF Energy has concluded that a bypass around Cannington should form part of the HPC Project proposals. This is in order to mitigate the impacts of additional traffic and in particular HGVs and buses that would otherwise pass through the village.

- Highway network improvements: a series of highway improvements have been developed. These measures include those that assist safety as well as capacity.

- Travel plans: travel planning forms an integral part of the transport strategy. The Framework Travel Plan requires the use of sustainable modes and seeks to minimise use of the private car where practicable. One of the key features of the transport strategy is that workers would be required to use certain modes. For example, if a worker lived at an accommodation campus they would be required to use a direct bus to get to the HPC development site.
8.4.27 The people trip generation has been based on the workforce profiles and transport strategy described above. The mode assigned to workers (walk, cycle, direct bus, park and ride) has been based on an assessment of the distribution of the staff and the most suitable mode for them. Workers would be prescribed a mode of travel by EDF Energy. For example, workers assigned to a particular park and ride site would be required to use that site for their onward journey to the HPC development site.

8.4.28 The number of buses estimated to use the road network is based on a regular timetable of buses allowing workers to arrive at the pick up point over a period of time. When the detailed bus operations are fixed, the number of buses is likely to reduce significantly since there would be more precise adjustment of buses to match demand.

Freight

8.4.29 The development of the HPC Project would require significant quantities of construction materials to be delivered to the HPC development site and associated development sites including the proposed development. EDF Energy has developed a Freight Management Strategy (FMS) which is appended to the Transport Assessment.

8.4.30 The proposed freight measures aim to reduce and control the use of road freight traffic during the construction phase, especially in the peak hours. A range of options have been investigated and further details are provided in the FMS.

8.4.31 A summary of the measures proposed in the FMS is shown below:

- The re-use and storage of excavated materials on-site to avoid exporting off-site.
- The use of water for delivery of bulk materials and the largest AILs through the construction of a temporary jetty at HPC, the refurbishment and extension of Combwich Wharf and the construction of a new freight laydown facility at Combwich.
- Introducing off-site freight management facilities at Junction 23 and Junction 24, to control incoming freight traffic flow and holding freight vehicles in case of an incident on the local network or on-site.
- Regulating traffic flow by using a project-wide delivery management system (DMS) to regulate flows and move away from peak time congestion.
- Reducing small vehicle movements through consolidation of postal/courier deliveries at the freight management facilities.

8.4.32 EDF Energy is committed to bringing at least 80% of bulk materials required for HPC development site concrete production by sea. In accordance with EDF Energy’s objectives, the use of water would be maximised to what is practicable. However, it must be recognised that there are constraints to the use of water and in particular tides and poor weather can affect use.

8.4.33 The freight generation and material quantities figures are based on EDF Energy’s extensive experience of constructing Pressurised Water Reactors in France as well
as information from the construction of Sizewell B in the UK. It is also augmented by data emerging from the on-going construction of Flamanville 3 in France. Where additional materials are required due to site-specific elements of the HPC Project (e.g. for such items as the construction of the temporary jetty and sea wall) estimates have been made based on the design of the infrastructure.

8.4.34 The quantum of materials required to construct the off-site associated developments including the proposed development has been derived based on the proposed layout and construction specification.

8.4.35 The quantum of waste for the HPC Project has been derived based on the Waste Management Implementation Strategy.

8.4.36 The material and waste quantities have been profiled over the construction phase in accordance with the construction programme. This includes for the construction and deconstruction of the proposed development. The material and waste have then been assigned a mode of transport (i.e. jetty, Combwich Wharf or by road). All materials for the construction and deconstruction of the proposed development are assumed to be delivered by road. Any material or waste to be delivered or removed by road has been converted to freight vehicle movements by applying average vehicle payload assumptions to each type of material and waste.

8.4.37 For the purpose of quantifying freight traffic the freight vehicles associated with the construction of the HPC Project have been categorised as follows:

- Heavy Goods Vehicles - HGVs: all vehicles exceeding a maximum gross weight of 3.5 tonnes (maximum allowable total weight when loaded). These include medium goods vehicles (maximum gross weight between 3.5 and 7.5 tonnes) and heavier more lorries with two or more axles.

- Light Goods Vehicles - LGVs: vans, pickups, 4x4s and cars with a maximum gross weight of 3.5 tonnes.

8.4.38 It has been assumed that the construction materials, plant and equipment for the HPC Project would be transported by HGVs while LGVs would be used for transporting food and consumables, small items and specialist tools/equipment. LGVs would also include contractors’ fleet vehicles.

8.4.39 The definition of HGVs includes Medium Goods Vehicles (MGVs). Therefore when the numbers and impacts of HGVs are discussed later in this chapter they include MGVs.

8.4.40 The number of HGVs per day would fluctuate around the average figure depending on the type of on-site activities and delivery requirements. It is considered that a factor of ±50% applied to the average would provide an adequate range to cater for these variations e.g. an average of 250 HGVs (500 movements) over a quarter may result in the number of HGVs per day varying between 125 (250 movements) and 375 (750 movements).

8.4.41 To construct and decommission the park and ride facility the peak workforce would be 25 people. There would also be a small number of workers to operate the
proposed development. It is anticipated that these workers would primarily travel by EDF Energy provided bus to the site. These numbers are absorbed within the overall traffic generation numbers.

8.4.42 The only freight movements relevant to the Cannington park and ride development are those to construct and deconstruct the facility. For construction it is estimated there would be 20 HGV movements per day on an average day and 31 movements per day on a peak day. However, there would also be days when the number is below the average of 20 per day. Therefore the average figure has been used in the assessment.

8.4.43 Deconstruction of the proposed development is anticipated to commence in Quarter 1 2022 and it is anticipated that there would be about 9% less HGVs generated than for construction. As noted earlier in this chapter, the impact of these HGV movements is considered although they arise outside the 2021 assessment.

**Overall Trip Generation**

8.4.44 In overall terms it is considered that the trip generation for both people and freight is robust for the following reasons:

- Assessment in Quarter 4 2016 is for the peak of the construction phase and that level of activity lasts only approximately five months.
- Traffic using the park and ride sites includes a contingency of 10%.
- HGV movement estimates are based on conservative assumptions on the use of sea for deliveries and on the payloads per HGV.
- HGV estimates for the construction (and, where relevant, de-construction) of the associated developments include a 20% contingency.
- The definition of a HGV used includes MGVs.
- Bus numbers are based on a high frequency timetable. Numbers will reduce when bus timetables are more precisely matched to worker demand and location.
- No allowance has been made for the fact that the Bridgwater A accommodation campus is on land allocated for housing and for which a traffic allowance is already made in the Reference Case flows. Similarly, no reductions have been made for traffic that would cease to be generated as the existing use of the Somerfield Site at Junction 24 has come to an end.

**vii. Trip Distribution**

8.4.45 The detailed methodology for estimating the trip distribution is set out in the Transport Assessment and is summarised in this section.

**Workforce Distribution**

8.4.46 Given the bespoke and complex nature of the HPC Project, there is no historical data that can be used to establish a robust trip distribution for employees who would be
working on the construction of the HPC Project. Instead a gravity model has been built using data from the socio-economics impact assessment.

8.4.47 In terms of skills, the construction workforce can be divided predominantly into civil operatives and mechanical and electrical operatives with the remaining workforce comprising supervisory, managerial and clerical staff, plus site services and security employees.

8.4.48 The existing skills profile in the local area does not fully meet the specialised requirements of the construction of the HPC Project and therefore there would be two types of construction workers, as follows:

- Home-based workers, who would commute to and from work on a daily basis from their home address.
- Non-home-based workers, who cannot feasibly commute to and from work on a daily basis from their home address and would therefore require temporary accommodation in the vicinity of the HPC development site.

8.4.49 The split of home-based and non-home-based workers would change over the course of the construction phase as the nature of the construction evolves. As the construction progresses, a different, more specialised, workforce would be required. These workers would most likely need to be attracted from further afield, resulting in increases in the percentage of workers occupying local temporary accommodation.

8.4.50 Research within the UK construction industry has demonstrated that construction workers will tend to commute daily up to 90 minutes. It has therefore been assumed that the home-based workers would commute up to 90 minutes from their home to the HPC development site. It is considered that the non-home-based workers would tend to live closer to the HPC development site as they are moving into the area primarily for work and the travel time to work will be a material factor when choosing accommodation. It has therefore been assumed that the non-home-based workers would commute up to 60 minutes from their temporary accommodation to the HPC development site.

8.4.51 In order to assist with the housing of the non-home-based workers, EDF Energy proposes to provide campus accommodation both at the HPC development site and within Bridgwater. A total of 1,510 spaces would be provided. In addition to the campus provision, non-home-based workers would live in existing accommodation in the vicinity of the HPC development site.

8.4.52 The workforce for constructing and deconstructing the proposed development is likely to be more locally based than the overall HPC Project workforce, reflecting the more conventional nature of the construction. However, the same distribution as for the main workforce has been used in the analysis.

8.4.53 The workforce for the proposed development is likely to be more locally based and would use similar transport modes. In particular employees would be able to use buses heading to and from the HPC development site.
8.4.54 Full details of the freight distribution are set out in the **Transport Assessment** and appended **Freight Management Strategy**.

8.4.55 It has been assumed that all HGV movements associated with construction at the HPC development site would travel via the M5 motorway and through Bridgwater. HGVs travelling to the HPC development site would pass through freight management facilities at Junction 23 or Junction 24 of the M5 and then use the routes shown below to access the HPC development site. Prior to completion of the Cannington bypass HGVs would pass along High Street, Cannington. After completion of the bypass all HGVs connected with the HPC development site would use the bypass. In the early years, when only the freight management facility at Junction 24 is operational, some HGVs would pass from the freight management facility at Junction 24 via the M5 to Junction 23 and then use the northern HGV route via Bristol Road and the Northern Distributor Road.

8.4.56 The distribution of freight vehicles for construction and deconstruction of the proposed development is likely to be similar to the remainder of the HPC Project. That is, the majority of vehicles would use the two designated HGV routes which are shown in **Plate 8.3** below.

8.4.57 HGVs for the construction of the proposed development would mainly come from the motorway. LGVs would come from a more local area.

**Plate 8.3: Designated HGV Routes to HPC Development Site**
vii. Impact Assessment

8.4.58 The trip generation and distribution has been used to derive vehicular trip origins and destinations. These are then added to the Reference Case models for 2013, 2016 and 2021 to give the with-development models.

8.4.59 Examination of the 2016 Reference Case and 2016 with-development models identified certain capacity issues in both scenarios. Therefore measures are proposed to seek to assist traffic movements. In addition certain safety enhancements are proposed. A list of these highway proposals is shown below. These highway proposals are in addition to accesses provided to the HPC development site and associated development sites. They form a transport mitigation package that is included in the HPC Project.

- M5 Junction 23 roundabout.
- A38 Bristol Road/Wylds Road junction.
- A38 Bristol Road/The Drove junction.
- Wylds Road/The Drove junction.
- A39 Broadway/A38 Taunton Road junction*.
- A39 New Road/B3339 Sandford Hill roundabout*.
- Washford Cross roundabout*.
- Huntworth roundabout*.
- Claylands Corner junction*.
- Cannington Traffic Calming Measures*.
- C182 Farringdon Hill Lane horse crossing*.
- Cannington bypass.
- A38 Bristol Road/A39 Bath Road (Cross Rifles) roundabout (see below).

8.4.60 The improvements at Cross Rifles are not included in the application for development consent. The HPC generated traffic flows are predicted to have a very small impact on Cross Rifles roundabout. Notwithstanding this, an improvement scheme for Cross Rifles, which is contained within the highway boundary, has been introduced into the model for the purpose of the assessment to assist traffic flow at this critical node which currently experiences congestion. However, it is EDF Energy’s understanding that SCC may prefer to implement their own scheme, which goes beyond the highway boundary. It is proposed that EDF Energy would make a contribution to SCC to allow them to promote their own scheme, the modelled scheme or an alternative scheme, using funding from development contributions in the area.

8.4.61 These changes to the highway network were added to the model for 2016 and 2021. In the 2013 model, only the improvements marked with an asterisk (*) were included, although it is EDF Energy’s intention to implement as much as possible of the full mitigation package by the end of 2013.
8.4.62 Adding the proposed highway improvements to the With Development models created the With Development and Mitigation models.

8.4.63 Extensive output can be derived from a run of the model, and this is discussed in detail in the Transport Assessment. For the purposes of this chapter, the outputs used have been the changes in traffic flows on sections of the highway network (known as links) close to the proposed development. Outputs have been shown in this chapter for:

- All vehicles.
- HGVs and buses.

**c) Accidents and Safety**

8.4.64 The road safety assessment carried out for the HPC Project is reported in the Road Safety Strategy that is appended to the Transport Assessment. This section summarises the agreed methodology used for the study to assess the impact of the HPC Project on road safety.

8.4.65 Accident data for the five years up to the end of June 2010 has been obtained from SCC and the HA for the study area.

8.4.66 The accident data has been compared against the national accident rates to determine if any links have rates significantly higher than would otherwise be expected.

8.4.67 The local road network has then been broken down into parishes and accident clusters identified using the definitions developed by the Somerset Road Safety Partnership (SRSP) as follows:

- an accident cluster in an urban location is where at least seven accidents have occurred within a 50 metre radius in a five year period; and
- an accident cluster in a rural location is where at least seven accidents have occurred within a 100 metre radius in a five year period.

8.4.68 An assessment has then been made of the likely impact of the proposed HPC Project on road safety in the study area. This has been done based on the likely changes in traffic flows as a result of the proposed development. However, it is important to note that traffic flows would increase as a result of increases in traffic flows excluding HPC (i.e. due to other committed developments).

8.4.69 Measures to mitigate the impact on road safety in the study area have been identified. These aim to address issues at existing sites that have experienced a higher than average accident rate that could be exacerbated by any increase in traffic flow generated by the HPC Project. However, these measures are in addition to, and assume the provision of, the highway improvements to be brought forward to address capacity issues and SCC’s own safety improvement programme.
d) Consultation

8.4.70 Extensive consultation has been undertaken throughout the EIA process. As a result of the consultation process, comments have been received from the highway authorities and have informed this assessment. In addition, meetings and discussions with the highway authorities have been extensive and ongoing to agree the scope of the assessment. The highway authorities have agreed the methodology for estimating the traffic flows for this assessment, in addition to other traffic data required for the noise and air quality assessments.

e) Assessment Methodology

8.4.71 The following paragraphs provide a detailed methodology of how the IEMA ‘Guidelines for the Environmental Assessment of Road Traffic’ (1992) (Ref. 8.16) have been applied in this ES Chapter.

i. Screening Process

8.4.72 The potential effects of the HPC Project have been determined by comparing the With Development and Mitigation scenario to the Reference Case scenario in the assessment years. Within the IEMA guidance, two broad rules are suggested which can be used as a screening process to limit the scale and extent of the assessment:

- Rule 1: include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%).
- Rule 2: include any other specifically sensitive areas where traffic flows have increased by 10% or more.

8.4.73 Where the predicted increase in traffic flows is lower than the above thresholds, the IEMA guidelines suggest the significance of the effects can be stated to be negligible and further detailed assessments are not warranted. Increases in traffic flows below 10% are generally considered to be insignificant in environmental terms given that daily variations in background traffic flow may vary by this amount.

ii. Sensitivity of Receptors

8.4.74 The sensitivity of a road can be defined by the vulnerability of the user groups who may use it, e.g. elderly people or children. A sensitive area may be where pedestrian activity may be high, for example in the vicinity of a school or where there is already an existing accident issue. It should be noted that the sensitivity of the receptor is judged on the sensitivity of road users (primarily pedestrians). It also takes account of the existing nature of the road e.g. an existing “A” road is likely to have a lower sensitivity than a minor residential road.
8.4.75 **Table 8.1** below provides a summary of the types of receptors and the sensitivity of each, defined as substantial, moderate, minor or negligible.

<table>
<thead>
<tr>
<th>Receptor Type</th>
<th>Receptor Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident clusters, retirement homes, roads without footways that are used by pedestrians.</td>
<td>Substantial</td>
</tr>
<tr>
<td>Traffic flow sensitive receptors: congested junctions, doctors’ surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, recreation facilities</td>
<td>Moderate</td>
</tr>
<tr>
<td>Receptors with some sensitivity to traffic flow: places of worship, public open space, tourist attractions and residential areas with adequate footway provision</td>
<td>Minor</td>
</tr>
<tr>
<td>Receptors with low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

8.4.76 A desktop exercise augmented by a number of site visits has been undertaken to identify the sensitive receptors in the study area. All road links within the study area have been assessed and assigned sensitivity. Recognising the quantity of road links within the study area, for ease of review the assessment narratives have focused on the road links that will lead to highest impact.

8.4.77 The identified links that represent sensitive receptors in the study area, and their assigned sensitivity, are shown in **Table 8.2** below.

<table>
<thead>
<tr>
<th>Link</th>
<th>Link Ref.</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A39 South-east of Cannington</td>
<td>R</td>
<td>Minor</td>
</tr>
<tr>
<td>A39 South of Cannington</td>
<td>P</td>
<td>Minor</td>
</tr>
<tr>
<td>A39 West of Cannington</td>
<td>Q</td>
<td>Minor</td>
</tr>
<tr>
<td>High Street, Cannington</td>
<td>U</td>
<td>Substantial</td>
</tr>
<tr>
<td>Main Road, Cannington</td>
<td>ZD</td>
<td>Substantial</td>
</tr>
<tr>
<td>Rodway South of Bypass</td>
<td>AC</td>
<td>Substantial</td>
</tr>
</tbody>
</table>

**iii. Magnitude**

8.4.78 To assist with the judgement of magnitude of impact, reference has been made to the IEMA guidelines (Ref. 8.16). This guidance sets out consideration and in some cases thresholds with respect to changes in the volume and composition of traffic to facilitate a subjective judgement of traffic impact and significance. These thresholds are guidance only and provide a starting point by which a detailed analysis will inform the assessment of the impact magnitude.

8.4.79 It is important to note that the impacts assessed are temporary, not permanent, and this affects the significance attached to them. In 2016 the maximum workforce assessed would be present at the HPC development site for only five months.
Similarly the peak HGV flows in 2013 occur for only a few months. However, it is also recognised that, whilst it would be below the peaks which have been assessed here, there would be sustained traffic generation arising from the HPC construction phase for a significant number of years and therefore that the temporary effects associated with HPC construction would continue for longer than would normally be the case for the construction phase of most developments. The period of relatively high levels of sustained traffic generation related to the construction of the HPC Project and the operation of the associated developments is approximately 5-6 years and, as a worst case assumption, it can therefore be assumed that the impacts assessed for the 2016 period would persist for that length of time. In reality traffic flows would often be at a somewhat lower level than have been assessed for 2016, and where it is considered that the period for the assessed 2016 impact is likely to be materially shorter or longer, comment is included in the text.

8.4.80 In addition it is also important to note that in the assessment, a HGV is defined as a HGV or MGV. Therefore the actual number of HGVs would be less than used in the assessment.

8.4.81 The modelling has been undertaken on the basis of a peak HGV day within the assessment quarter. Within any quarter the number of HGV movements would vary. Some days the number will be above average and some days below. The tables presented within this report are based on the maximum number of HGVs that would be permitted to travel to and from HPC during a day. However, where there is likely to be a significant impact, the average daily HGV movements are also considered. In any quarter the average HGV movements are two thirds (66%) of the maximum.

iv. Types of Impact

8.4.82 The following paragraphs cover each of the impacts that are considered in this chapter.

Severance

8.4.83 Severance is defined as the perceived division that can occur within a community when it becomes separated by a major traffic artery and describes a series of factors that separate people from places and other people. Such division may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself.

8.4.84 The measurement and prediction of severance is difficult, but relevant factors include road width, traffic flow, speed, the presence of crossing facilities and the number of movements across the affected route.

8.4.85 IEMA guidelines refer to the Department of Transport’s ‘Manual of Environmental Appraisal’ (Ref. 8.16), which suggests that changes in traffic flow of 30%, 60% and 90% would be likely to produce ‘slight’, ‘moderate’ and ‘substantial’ changes in severance, respectively. It is advised that these broad indicators should be used with care and regard paid to specific local conditions.
8.4.86 IEMA guidelines note that changes in the volume, composition and or speed of traffic may affect the ability of people to cross roads. Typically, increases in traffic levels result in increased pedestrian delay, although increased pedestrian activity itself also contributes. The guidelines do not set any thresholds, recommending instead that assessors use their judgement to determine the significance of the impact.

8.4.87 The IEMA guidelines refer to a report published by the Transport Research Laboratory (TRL SR356, Goldschmidt, 1976) as providing a useful approximation for determining pedestrian delay. The TRL research concluded that mean pedestrian delay was found to be 8 seconds at flows of 1,000 vehicles per hour and below 20 seconds at 2,000 vehicles per hour for various types of crossing condition. This research has been reproduced in DMRB Volume 11, Section 3, Part 8. Figure 1 of Part 8 provides predictive mean pedestrian delay based on empirical data taking into account traffic flow and a range of parameters such as crossing width and vehicle speeds.

8.4.88 A two-way flow of 1,400 vehicles per hour has been adopted as a lower threshold (equating to a mean 10 second delay for a link with no pedestrian facilities in the TRL report). It should be noted that for controlled forms of pedestrian crossing the pedestrian delays are less. This is deemed a robust starting point for narrowing down the modelled routes within the study area and ensuring the routes selected exceeded the suggested threshold of analysis in DMRB Volume 11.

8.4.89 IEMA guidelines define pedestrian amenity as the relative pleasantness of a journey, which, as with pedestrian delay, is affected by traffic volumes and composition along with pavement width and pedestrian activity. The guidelines suggest tentative thresholds of significance would be where the traffic flow is halved or doubled.

8.4.90 IEMA guidelines note that driver delay can occur at several points on the network, although the effects are only likely to be significant when the traffic on the highway network predicted to be at or close to the capacity of the system.

8.4.91 A comparison of journey times on key routes in the model has been undertaken to establish the increase in driver delay as a result of the HPC Project. These are reported in full in the Transport Assessment.

8.4.92 IEMA guidelines do not include any definition in relation to accidents and safety, suggesting that professional judgement will be needed to assess the implications of local circumstance, or factors which may increase or decrease the risk of accidents. The full results of the safety assessment contained in the Road Safety Strategy are reported in the Transport Assessment and are summarised in this chapter.
8.4.93 **Table 8.3** summarises the criteria that have been used to determine magnitude of impacts. However, the absolute level of an impact is also important in determining its magnitude e.g. the total flow of traffic or HGVs on a link. Comment is made on this in the analysis.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Magnitude of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negligible</td>
</tr>
<tr>
<td>Severance</td>
<td>Change in total traffic or HGV flows of less than 30%</td>
</tr>
<tr>
<td>Pedestrian Delay</td>
<td>Two way traffic flow &lt; 1,400 vehicles per hour</td>
</tr>
<tr>
<td>Pedestrian Amenity</td>
<td>Change in total traffic or HGV flows &lt; 100%</td>
</tr>
<tr>
<td>Driver Delay</td>
<td>A judgement based on the journey time assessment or on overall traffic flows where not covered by the model</td>
</tr>
<tr>
<td>Accidents and Safety</td>
<td>A judgement based on analysis detailed in the Road Safety Strategy</td>
</tr>
</tbody>
</table>

### v. Significance of Impacts

8.4.94 The significance of the impact is judged on the relationship of the magnitude of impact to the assessed sensitivity and/or importance of the receptor, using the impact significance assessment matrix set out in **Table 8.4** below:

<table>
<thead>
<tr>
<th>Sensitivity of Receptor</th>
<th>Magnitude of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negligible</td>
</tr>
<tr>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Minor</td>
<td>Negligible</td>
</tr>
<tr>
<td>Moderate</td>
<td>Negligible</td>
</tr>
<tr>
<td>Substantial</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

8.4.95 Potential effects are therefore concluded to be of negligible, minor, moderate or substantial significance. For the purpose of this assessment, mitigation measures have been proposed where there is an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so.
vi. Cumulative Impacts

8.4.96 The assessments for each of the elements of the HPC Project, i.e. the main HPC development and associated developments (see Volume 2, Chapter 10 and Chapter 8 in each of Volumes 3 to 10 of this ES), include all flows associated with the overall HPC Project i.e. flows to and from the HPC development site and the associated development sites. Furthermore these assessments include other committed (non-HPC) developments for the area. In addition there are some other developments that have not been included in those assessments. These are dealt with in a qualitative way within Volume 11 of this ES.

f) Limitations, Constraints and Assumptions

8.4.97 The main limitation in baseline traffic flows presented in this chapter concerns the precision of traffic flows. Such flows are recorded over a day or a week and are subject to an accuracy of + or – 10%. However conditions predicted by the model have been validated using standard criteria and are therefore considered to provide a representative estimate.

8.4.98 Traffic generation estimates for HPC are based on a number of assumptions on matters such as materials quantities, number of workers, construction programme etc. Where appropriate, worst case assumptions have been made. For example, the peak quarter of construction activity is analysed and then the peak day for HGV movements within that quarter.

8.5 Baseline Conditions

8.5.1 The proposed development would be located to the north of the A39 between the A39/Main Road and A39/High Street roundabouts.

a) Pedestrian and Cycle Networks

8.5.2 There are no controlled pedestrian or cycle crossings within the vicinity of the proposed development. There are footways around the A39/Main Road roundabout connecting local properties to the south of the junction with the footway network in Cannington. A footway is provided on the eastern side of the A39 between the A39/Main Road roundabout and Sandford Hill. There are no existing footways in the vicinity of the A39/High Street roundabout and no existing footways on either side of the A39 near to the proposed Cannington park and ride facility.

b) Bus Network

8.5.3 The nearest bus stops to the proposed development is a set of bus stops located on Main Road approximately 100m north of the A39 roundabout, in the vicinity of Southbrook. These bus stops are served by Routes 14, 23A and 615.
c) Rail Network

8.5.4 The nearest railway station to Cannington is at Bridgwater, approximately 6km to the south-east of the proposed development. Bridgwater railway station is located on the mainline rail network on the route between Bristol and Exeter.

d) Highway Network

8.5.5 The A39/Main Road roundabout is a three arm roundabout with the A39 forming the southern and western arms and Main Road forming the northern arm, which leads to Cannington village. The A39/High Street roundabout is a three arm roundabout with the A39 forming the eastern and southern arms and High Street forming the northern arm, which leads to Cannington village.

8.6 Future Baseline Conditions

8.6.1 As set out earlier in this chapter, the assessment years selected are 2013, 2016 and 2021. Therefore future baseline conditions have been assessed for these years. Future baseline conditions are referred to as the Reference Case.

8.6.2 For 2016 the Reference Case flows are shown below along with the comparison to the 2009 Base Case flows.

8.6.3 Table 8.5, Table 8.6 and Table 8.7 summarise the 2009 Base Case and 2016 Reference Case flows for the daily (24 hour AADT), AM Peak (08:00 to 09:00) and PM peak (17:00 to 18:00) hours. These are two-way flows. It should be emphasised that the Reference Case flows are flows that are predicted to occur without the HPC Project. The reduction in evening peak traffic flows between 2009 and 2016 is likely to be due to congestion in Bridgwater constraining the volume of traffic that arrives in Cannington.

8.6.4 Changes in predicted flows on a link can take place for a number of reasons. Additional traffic from planned developments will add traffic to a link. However, if congestion and delay on one link increases this could lead to traffic diverting to an alternative route. This could then lead to an increase in flow on the diversion route but a decrease on the congested link from which traffic diverts.

Table 8.5: 2009 Base vs. 2016 Reference Case Two-way Daily Vehicular Traffic Flows

<table>
<thead>
<tr>
<th>Link Ref.</th>
<th>Link</th>
<th>2009 Base</th>
<th>2016 Ref Case</th>
<th>Increase (Numerical)</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>A39 South-east of Cannington</td>
<td>14,468</td>
<td>14,790</td>
<td>322</td>
<td>2%</td>
</tr>
<tr>
<td>P</td>
<td>A39 South of Cannington</td>
<td>6,399</td>
<td>6,638</td>
<td>239</td>
<td>4%</td>
</tr>
<tr>
<td>Q</td>
<td>A39 West of Cannington</td>
<td>7,703</td>
<td>7,969</td>
<td>266</td>
<td>3%</td>
</tr>
<tr>
<td>U</td>
<td>High Street, Cannington</td>
<td>2,151</td>
<td>2,175</td>
<td>24</td>
<td>1%</td>
</tr>
<tr>
<td>ZD</td>
<td>Main Road, Cannington</td>
<td>8,533</td>
<td>8,558</td>
<td>25</td>
<td>0%</td>
</tr>
<tr>
<td>AC</td>
<td>Rodway South of Bypass</td>
<td>6,706</td>
<td>6,779</td>
<td>73</td>
<td>1%</td>
</tr>
</tbody>
</table>
### Table 8.6: 2009 Base vs. 2016 Reference Case Two-way AM Peak Vehicular Traffic Flows

<table>
<thead>
<tr>
<th>Link</th>
<th>Link Ref.</th>
<th>2009 Base</th>
<th>2016 Ref Case</th>
<th>Increase (Numerical)</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A39 South-east of Cannington</td>
<td>R</td>
<td>1,339</td>
<td>1378</td>
<td>39</td>
<td>3%</td>
</tr>
<tr>
<td>A39 South of Cannington</td>
<td>P</td>
<td>579</td>
<td>602</td>
<td>23</td>
<td>4%</td>
</tr>
<tr>
<td>A39 West of Cannington</td>
<td>Q</td>
<td>694</td>
<td>728</td>
<td>34</td>
<td>5%</td>
</tr>
<tr>
<td>High Street, Cannington</td>
<td>U</td>
<td>206</td>
<td>212</td>
<td>6</td>
<td>3%</td>
</tr>
<tr>
<td>Main Road, Cannington</td>
<td>ZD</td>
<td>818</td>
<td>821</td>
<td>3</td>
<td>0%</td>
</tr>
<tr>
<td>Rodway South of Bypass</td>
<td>AC</td>
<td>530</td>
<td>538</td>
<td>8</td>
<td>2%</td>
</tr>
</tbody>
</table>

### Table 8.7: 2009 Base vs. 2016 Reference Case Two-way PM Peak Vehicular Traffic Flows

<table>
<thead>
<tr>
<th>Link</th>
<th>Link Ref.</th>
<th>2009 Base</th>
<th>2016 Ref Case</th>
<th>Increase (Numerical)</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A39 South-east of Cannington</td>
<td>R</td>
<td>1,473</td>
<td>1447</td>
<td>-26</td>
<td>-2%</td>
</tr>
<tr>
<td>A39 South of Cannington</td>
<td>P</td>
<td>576</td>
<td>572</td>
<td>-4</td>
<td>-1%</td>
</tr>
<tr>
<td>A39 West of Cannington</td>
<td>Q</td>
<td>677</td>
<td>677</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>High Street, Cannington</td>
<td>U</td>
<td>209</td>
<td>197</td>
<td>-12</td>
<td>-6%</td>
</tr>
<tr>
<td>Main Road, Cannington</td>
<td>ZD</td>
<td>954</td>
<td>919</td>
<td>-35</td>
<td>-4%</td>
</tr>
<tr>
<td>Rodway South of Bypass</td>
<td>AC</td>
<td>772</td>
<td>749</td>
<td>-23</td>
<td>-3%</td>
</tr>
</tbody>
</table>

#### 8.7 Assessment of Impacts

### 8.7.1 As noted earlier in this chapter the assessments have been undertaken for three assessment periods:

- 2013 (representative of the early phase of the construction of the HPC Project).
- 2016 (representative of peak construction activity for the HPC Project and the operational phase of the proposed development).
- 2021 (representative of the operational phase of the HPC power station and, where applicable, the post-operational phase of the temporary associated developments).

### 8.7.2 The With Development scenario for each assessment assumes that the proposed highway improvement package described earlier in this chapter would be implemented. Each assessment also assumes the implementation of the transport strategy as described in the Transport Assessment.

### 8.7.3 When considering the traffic impacts of the proposed development it is important to distinguish between the traffic impacts of the HPC Project as a whole and the impacts of the proposed development in isolation.
8.7.4 The detailed figures shown below present the outputs from the modelling in the area. These flows include all HPC traffic generated in the vicinity of the site. A separate detailed modelling exercise has not been undertaken of the traffic impacts associated with the construction, operation and post-operation of the proposed development in isolation as the associated traffic movements would be small relative to the HPC Project as a whole. However, a commentary on the impact of the proposed development in isolation is made in some places and this informs the assessment which is made in this chapter as a whole. A more detailed assessment of impacts on severance, pedestrian delay, pedestrian amenity, driver delay and accidents and safety in Cannington associated with all HPC related traffic is considered within Volume 2, Chapter 10 of this ES. The transport assessment for Cannington bypass (Volume 5, Chapter 8) is also relevant in this context.

8.7.5 An assessment of each scenario is presented below.

a) 2016

8.7.6 The tables below show the 2016 With Development scenario compared with the 2016 Reference Case. Daily and network AM and PM peak hour flows are shown for all vehicles. Daily flows are also shown for HGVs and buses only.

8.7.7 It should be noted that some flow changes may be due to vehicle re-routing rather than directly due to HPC traffic.

<table>
<thead>
<tr>
<th>Link</th>
<th>Link Ref.</th>
<th>2016 Ref Case</th>
<th>2016 With Dev</th>
<th>Increase (Numerical)</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A39 South-east of Cannington</td>
<td>R</td>
<td>14,790</td>
<td>18,080</td>
<td>3,291</td>
<td>22.2%</td>
</tr>
<tr>
<td>A39 South of Cannington</td>
<td>P</td>
<td>6,638</td>
<td>13,338</td>
<td>6,700</td>
<td>100.9%</td>
</tr>
<tr>
<td>A39 West of Cannington</td>
<td>Q</td>
<td>7,969</td>
<td>8,589</td>
<td>620</td>
<td>7.8%</td>
</tr>
<tr>
<td>High Street, Cannington</td>
<td>U</td>
<td>2,175</td>
<td>1,879</td>
<td>-296</td>
<td>-13.6%</td>
</tr>
<tr>
<td>Main Road, Cannington</td>
<td>ZD</td>
<td>8,558</td>
<td>5,567</td>
<td>-2,992</td>
<td>-35.0%</td>
</tr>
<tr>
<td>Rodway South of Bypass</td>
<td>AC</td>
<td>6,779</td>
<td>3,446</td>
<td>-3,333</td>
<td>-49.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Link</th>
<th>Link Ref.</th>
<th>2016 Ref Case</th>
<th>2016 With Dev</th>
<th>Increase (Numerical)</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A39 South-east of Cannington</td>
<td>R</td>
<td>1,378</td>
<td>1,569</td>
<td>191</td>
<td>13.9%</td>
</tr>
<tr>
<td>A39 South of Cannington</td>
<td>P</td>
<td>602</td>
<td>1,046</td>
<td>443</td>
<td>73.6%</td>
</tr>
<tr>
<td>A39 West of Cannington</td>
<td>Q</td>
<td>728</td>
<td>770</td>
<td>42</td>
<td>5.8%</td>
</tr>
<tr>
<td>High Street, Cannington</td>
<td>U</td>
<td>212</td>
<td>198</td>
<td>-14</td>
<td>-6.6%</td>
</tr>
<tr>
<td>Main Road, Cannington</td>
<td>ZD</td>
<td>821</td>
<td>597</td>
<td>-224</td>
<td>-27.3%</td>
</tr>
<tr>
<td>Rodway South of Bypass</td>
<td>AC</td>
<td>538</td>
<td>278</td>
<td>-260</td>
<td>-48.4%</td>
</tr>
</tbody>
</table>
Table 8.10: 2016 Reference Case vs. 2016 With Development PM Peak Vehicular Traffic Flows

<table>
<thead>
<tr>
<th>Link</th>
<th>Link Ref.</th>
<th>2016 Ref Case</th>
<th>2016 With Dev</th>
<th>Increase (Numerical)</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A39 South-east of Cannington</td>
<td>R</td>
<td>1,447</td>
<td>1,707</td>
<td>260</td>
<td>18.0%</td>
</tr>
<tr>
<td>A39 South of Cannington</td>
<td>P</td>
<td>572</td>
<td>1,228</td>
<td>657</td>
<td>114.8%</td>
</tr>
<tr>
<td>A39 West of Cannington</td>
<td>Q</td>
<td>677</td>
<td>730</td>
<td>53</td>
<td>7.8%</td>
</tr>
<tr>
<td>High Street, Cannington</td>
<td>U</td>
<td>197</td>
<td>191</td>
<td>-6</td>
<td>-3.2%</td>
</tr>
<tr>
<td>Main Road, Cannington</td>
<td>ZD</td>
<td>919</td>
<td>507</td>
<td>-413</td>
<td>-44.9%</td>
</tr>
<tr>
<td>Rodway South of Bypass</td>
<td>AC</td>
<td>749</td>
<td>334</td>
<td>-415</td>
<td>-55.5%</td>
</tr>
</tbody>
</table>

Table 8.11: 2016 Reference Case vs. 2016 With Development Daily HGV + Bus Flows

<table>
<thead>
<tr>
<th>Link</th>
<th>Link Ref.</th>
<th>2016 Ref Case</th>
<th>2016 With Dev</th>
<th>Increase (Numerical)</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A39 South-east of Cannington</td>
<td>R</td>
<td>641</td>
<td>1,768</td>
<td>1,127</td>
<td>175.8%</td>
</tr>
<tr>
<td>A39 South of Cannington</td>
<td>P</td>
<td>414</td>
<td>1,750</td>
<td>1,336</td>
<td>322.8%</td>
</tr>
<tr>
<td>A39 West of Cannington</td>
<td>Q</td>
<td>455</td>
<td>453</td>
<td>-2</td>
<td>-0.4%</td>
</tr>
<tr>
<td>High Street, Cannington</td>
<td>U</td>
<td>80</td>
<td>114</td>
<td>34</td>
<td>42.2%</td>
</tr>
<tr>
<td>Main Road, Cannington</td>
<td>ZD</td>
<td>242</td>
<td>129</td>
<td>-113</td>
<td>-46.6%</td>
</tr>
<tr>
<td>Rodway South of Bypass</td>
<td>AC</td>
<td>201</td>
<td>137</td>
<td>-64</td>
<td>-31.7%</td>
</tr>
</tbody>
</table>

i. Severance

8.7.8 Only the A39 south of Cannington would experience an increase in daily traffic flows above 30% as a result of the HPC Project. Therefore on the remaining links the impact relating to all traffic flows is judged to be negligible.

8.7.9 The predicted 101% increase in flows on the A39 to the south of Cannington would represent a substantial impact. However, the main reason for the increase in flow is the operation of the Cannington bypass and the consequent diversion of traffic from Main Road, Cannington to the bypass. The increases in flow attributable to the proposed development would be a relatively small proportion of the total increase in flows on this link, namely car movements associated with the construction workforce and visitors to the Public Information Centre at the HPC development site (which would amount to a little over 1,000 movements per day) and bus movements which at 124 buses per day would be insignificant within the context of the total flow. Therefore, in total only around 15-20% of the increase in flows at this link would be attributable to the operation of the proposed development in isolation, relative to the wider impact of the HPC Project and the Cannington bypass associated development.

8.7.10 Considering just HGV and bus flows, the predicted increase of 124 buses to/from the park and ride site represents a 30% increase on existing HGV plus bus flows, which is not significant (an increase of 124 HGVs and buses on a flow of 414 in the Reference Case).
8.7.11 There would be no park and ride buses linked to the proposed development that would use the A39 south-east of Cannington and thus the predicted increase in HGV and bus flows on this road is related to the wider HPC Project rather than the proposed development in isolation.

8.7.12 The A39 south and south-east of Cannington is a minor significance receptor since it has very little if any pedestrian activity (there are no existing pedestrian pavements on most of the link) and there are few properties close or adjacent to the road.

8.7.13 Taking the above matters into account it is considered that the overall significance of the impact on the A39 from the proposed development considered in isolation is minor adverse.

8.7.14 Park and ride buses would generally route along the bypass although a few may use High Street, Cannington to pick up or drop off workers living in the village. These buses would have a negligible impact on severance in the village.

8.7.15 It also should be noted that the reductions in flows for Main Road Cannington and Rodway are attributable to the Cannington bypass development and as such are not considered further in this chapter (see Volume 5, Chapter 8 for further details).

ii. Pedestrian Delay

8.7.16 The A39 south-east of Cannington is the only link that has a predicted two-way flow greater than 1,400 vehicles per hour. However, no park and ride buses would use this link and only a modest number of cars would use it to access the park and ride site. Therefore the change in flow attributable to the proposed development would not be significant. Furthermore the sensitivity of the link is minor. Therefore the impact on pedestrian delay is considered to be of negligible significance.

iii. Pedestrian Amenity

8.7.17 Based on advice in the IEMA Guidelines, the point at which pedestrian amenity changes become material is a doubling or halving in the flow of all traffic or HGVs.

8.7.18 The change in flows attributable to bus flows and car traffic associated with the HPC Project would be well below 100% and therefore the impact would be of negligible significance.

iv. Driver Delay

8.7.19 It is not considered that the addition of the small number of buses in the peak hours (6 in the morning peak and 12 in the evening peak) and a small number of cars accessing the park and ride site during peak hours would have any impact on driver delay. Moreover the links in question are not subject to any existing capacity problems and therefore the impact significance is considered negligible.

v. Accidents and Safety

8.7.20 None of the links in the study area were identified in the safety study (included in the Road Safety Strategy that is appended to the Transport Assessment) as
experiencing significant accident rates and therefore the significance of impact with regard to accidents and safety for the proposed development is considered to be negligent.

b) 2013

8.7.21 In 2013 it is anticipated that the proposed development would still be under construction and the only flows which would be generated by the proposed development in isolation, as opposed to the HPC Project as a whole; would therefore be HGV movements - an average of 20 HGVs per day - plus a very small number of essential car users associated with construction activity. HGVs associated with construction of the proposed development would use main roads and would not pass through Cannington.

8.7.22 On the A39 south of Cannington these HGV movements represent a 5% increase on the Reference Case (20 HGV movements per day against a Reference Case of 414 ‘HGV plus bus’ movements per day, using the 2016 Reference Case daily flows as a proxy for 2013). This would have a negligible impact on any of the criteria considered within this chapter.

8.7.23 In any event, given the very low flows predicted to be associated with the construction of the proposed development in 2013, the impacts for all links, against all criteria considered within this chapter, are assessed as negligible.

8.7.24 Assessments of the traffic flows for 2013 for the links considered in this chapter can be found in Volume 2, Chapter 10 of this ES. As indicated, aside from the 20 HGV movements per day mentioned above these flows are all related to the wider HPC Project and not the proposed development in isolation.

c) 2021

8.7.25 In 2021 it is anticipated that the proposed development would still be operational but it is anticipated that there would be less workers and buses than in the 2016 scenario given the overall decline in the HPC Project construction workforce by 2021. Therefore the impacts of the proposed development at this stage of the HPC Project considered in isolation would either be the same or less as those assessed for 2016. When the proposed development is deconstructed and the site restored there is predicted to be 18 HGVs a day which would have an even smaller impact than in the 2013 scenario when construction is taking place. Therefore all transport impacts of the proposed development in isolation would be negligible.

8.7.26 Assessments of the overall HPC Project traffic flows for 2021 for the links considered in this chapter can be found in Volume 2, Chapter 10.

8.8 Mitigation of Impacts

8.8.1 As stated earlier in this chapter, the main part of the transport mitigation comprises the transport strategy and the highway improvements. The assessment in Section 8.6 takes into account these mitigation measures.

8.8.2 No further mitigation proposals are proposed within the study area.
8.9 Residual Impacts

8.9.1 The residual impacts for the proposed development would be the same as the impacts described in Section 8.6.

8.10 Summary of Impacts

8.10.1 A summary of the impacts and residual impacts is provided in Table 8.12, Table 8.13 and Table 8.14 below.

---

**Table 8.12: Summary of Impacts 2016**

<table>
<thead>
<tr>
<th>Description of Impact</th>
<th>Impact</th>
<th>Mitigation Measure</th>
<th>Residual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severance</td>
<td>Minor Adverse</td>
<td>None proposed</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td>Pedestrian Delay</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
<tr>
<td>Pedestrian Amenity</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
<tr>
<td>Driver Delay</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
<tr>
<td>Accidents and Safety</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

---

**Table 8.13: Summary of Impacts 2013**

<table>
<thead>
<tr>
<th>Description of Impact</th>
<th>Impact</th>
<th>Mitigation Measure</th>
<th>Residual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severance</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
<tr>
<td>Pedestrian Delay</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
<tr>
<td>Pedestrian Amenity</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
<tr>
<td>Driver Delay</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
<tr>
<td>Accidents and Safety</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

---

**Table 8.14: Summary of Impacts 2021**

<table>
<thead>
<tr>
<th>Description of Impact</th>
<th>Impact</th>
<th>Mitigation Measure</th>
<th>Residual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severance</td>
<td>Minor adverse / Negligible</td>
<td>None proposed</td>
<td>Minor adverse / Negligible</td>
</tr>
<tr>
<td>Pedestrian Delay</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
<tr>
<td>Pedestrian Amenity</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
<tr>
<td>Driver Delay</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
<tr>
<td>Accidents and Safety</td>
<td>Negligible</td>
<td>None proposed</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
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9. NOISE AND VIBRATION

9.1 Introduction

9.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential noise and vibration impacts arising from the construction, operational and post-operational phases of the proposed Cannington park and ride site (the site). Detailed descriptions of the site, proposed development, construction, operational and post-operational phases are provided in Chapters 1 to 5 of this volume of the ES.

9.1.2 A glossary of terminology used in this chapter is provided in Volume 1 of the ES. An introduction to the principles of noise and vibration is provided in Appendix 9A.

9.2 Scope and Objectives of Assessment

9.2.1 The scope of the assessment has been determined through a formal Environmental Impact Assessment (EIA) scoping process undertaken with the Infrastructure Planning Commission (IPC). It has also been informed by ongoing consultation with statutory consultees including Sedgemoor District Council (SDC), West Somerset Council (WSC), Somerset County Council (SCC), the local community and the general public in response to the Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations.

9.2.2 The assessment of noise and vibration impacts has been undertaken adopting the methodologies described in Volume 1, Chapter 7, and Section 9.4.

9.2.3 The existing baseline conditions, against which the likely environmental impacts of the proposed development are assessed, have been determined through baseline noise monitoring and calculations of potential future noise levels, and are described in Section 9.5. This section also identifies the existing and future sensitive receptors to noise and vibration levels. The study area for this assessment is illustrated in Figure 9.1, and includes potentially sensitive receptors adjacent to the proposed development boundary and local approach roads.

9.2.4 Noise and vibration impacts are presented in Section 9.6, and appropriate mitigation measures aimed at preventing, reducing or off-setting any potential adverse impacts that are identified to be of significance are identified in Section 9.7. An assessment of residual impacts following implementation of these mitigation measures are identified in Section 9.8.

9.2.5 Cumulative noise and vibration impacts arising from the proposed development in combination with other elements of the Hinkley Point C Project (the HPC Project) and other relevant projects, both consented and proposed, are provided in Volume 11 of this ES. The potential in-combination effects of noise and vibration from different aspects of the construction, operational and post-operational phases of the proposed development has been considered in Section 9.6.
9.2.6 The objectives underlying the noise and vibration assessment were to:

- identify all potentially sensitive receptor locations that may be affected by the construction or operation of the proposed development, or by proposed post-operational work or uses;
- characterise the baseline acoustic climate at representative locations for identified noise sensitive receptors;
- assess noise and vibration impacts on sensitive receptors within the study area;
- recommend mitigation measures, if considered necessary, to prevent, reduce or off-set the noise and vibration impacts on noise sensitive receptors; and
- assess the residual noise and vibration impacts on sensitive receptors.

9.2.7 An assessment of the potential noise and vibration impacts associated with off-site road traffic generated during construction, operation and post-operation of the site is detailed in Volume 2, Chapter 11 of the ES, as this considers all generated traffic associated with the HPC Project.

9.3 Legislation, Policy and Guidance

9.3.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of potential noise impacts associated with the construction, operation and post-operational phases of the proposed development.

9.3.1 As stated in Volume 1, Chapter 4, the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) when combined with the NPS for Nuclear Power Generation (NPS EN-6) provides the primary basis for decisions by the IPC on applications for nuclear power generation developments that fall within the scope of the NPSs.

9.3.2 Notwithstanding this, the IPC may consider other matters that are both important and relevant to its decision-making. This could include Planning Policy Statements (PPSs), Planning Policy Guidance Notes (PPGs), regional and local policy documents, although, if there is a conflict between these and the NPS, the NPS prevails for the purposes of IPC decision making.

9.3.3 Further, the Planning Act 2008 provides that the IPC must, in making its decision on an application, have regard to any Local Impact Report (LIR) prepared by relevant local authorities. It is anticipated that the LIRs will rely in part on PPSs, PPGs, regional and local policy to provide a context for their assessment. On this basis, regard has been given to these documents (where relevant to the technical assessment) since they are likely to inform the LIRs prepared by the relevant local authorities.
a) International

i. World Health Organization (WHO) ‘Guidelines for Community Noise’ (Ref. 9.1)

9.3.4 This document provides health based guidance on suitable noise levels in the form of “guideline values”, intended to avoid or minimise community annoyance by noise. Guidance is provided on noise levels for both indoor and outdoor areas.

9.3.5 Table 4.1 of the WHO guidelines (Ref. 9.1) recommends environmental daytime and evening limits of 55dB $L_{Aeq}$ or less over the 16 hour daytime period (07:00-23:00) to avoid minimal serious annoyance, and 50dB $L_{Aeq}$ to avoid minimal moderate annoyance.

9.3.6 However, it is important to understand that the WHO recommendations represent the onset of health effects such as annoyance and sleep disturbance from noise exposure and that exposure in excess of these is not necessarily indicative of significant adverse impacts.

9.3.7 Rather than applying the WHO guideline values as noise level limits, it is established practice to use them to identify thresholds above which greater attention should be paid to the various possibilities for noise control action.

ii. World Health Organization ‘Night Noise Guidelines for Europe’ (WHO, 2009) (Ref. 9.2)

9.3.8 The ‘Night Noise Guidelines for Europe’ (Ref. 9.2) is again concerned with the potential health effects of environmental night noise, based on a review of available research by a working group of experts.

9.3.9 It recommends a target of 40dB $L_{night, outside}$ ‘at a residential façade (incident noise level) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly’. The $L_{night, outside}$ indicator relates to the annual average night-time noise level and takes account of the varying need to open windows at night throughout the year. An interim target of 55dB $L_{night, outside}$ was also recommended for countries where the 40dB $L_{night, outside}$ guideline is not achievable.

9.3.10 The night noise guidelines assume a sound insulation of 21dB for an average building envelope, allowing for those that wish to sleep with windows slightly open, and acknowledges that, if noise levels increase, people may close their windows.

9.3.11 The guidelines provided indicate, from available research, the levels above which an effect starts to occur or shows itself to be dependent on the exposure level. However, these observed effect thresholds do not establish the significance of effects, which may not become significant unless much higher degrees of noise exposure occur.

9.3.12 A ‘National Noise Incidence Study’ (Ref. 9.3) in 2000 identified through an ambient noise monitoring survey at 1160 locations that 95% of the properties in the UK exceeded the 40dB $L_{night, outside}$. 
b) National

i. Noise Policy Statement for England (NPSE) 2010 (Ref. 9.4)

9.3.13 The Noise Policy Statement for England (NPSE) (Ref. 9.4), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy Aims, as presented within this document, are:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse effects on health and quality of life;
- mitigate and minimise adverse effects on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.”

9.3.14 The NPSE draws on two established concepts from toxicology that are currently being applied to noise effects, for example, by the World Health Organization, namely NOEL – No Observed Effect Level and LOAEL – Lowest Observed Adverse Effect Level. The NPSE extends these concepts and introduces the concept of a Significant Observed Adverse Effect Level (SOAEL). This is the level above which significant adverse effects on health and quality of life are understood to occur.

9.3.15 The second aim of the NPSE refers to the situation where the effect lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8 of the NPSE). This does not mean that such adverse effects cannot occur.

9.3.16 The third aim seeks, where possible, to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

ii. Planning Policy Guidance 24: Planning and Noise (PPG24) (1994) (Ref. 9.5)

9.3.17 PPG24 (Ref. 9.5) was published by the Department of the Environment (now the Department for Communities and Local Government) in 1994. This guidance is intended to provide advice to planners on:

“...how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business ... It outlines some of the main considerations which local planning authorities should take into account in drawing up development plan policies and when determining planning applications for development...”
9.3.18 For new developments that will introduce noise into an area, PPG24 confirms (in Annex 3) that it is appropriate to use previously established assessment methodologies and refers to the relevant assessments and control methods. Further guidance on assessing noise is given in relation to ‘Noise from road traffic’ (Annex 3, paragraph 1), ‘Noise from industrial and commercial developments’ (Annex 3, paragraphs 19-20), and ‘Noise from construction sites’ (Annex 3, paragraph 21). The appropriate assessment methodologies are discussed in Section 9.4.

c) Regional

9.3.19 The Government’s revocation of regional strategies was quashed in the High Court on 10 November 2010. However, on that same date the Government reiterated in a letter to Chief Planners its intention to revoke regional strategies through the Localism Bill. This letter was also challenged but, on 7 February 2011, the High Court held that the Government’s advice to local authorities that the proposed revocation of regional strategies was to be regarded as a material consideration in their planning development control decisions should stand. The decision of the High Court was upheld by the Court of Appeal on 27 May 2011. Therefore, the regional strategies remain in place but in the case of development control decisions it is for planning decision makers to decide on the weight to attach to the strategies (see Volume 1, Chapter 4 for a full summary of the position regarding the status of regional planning policy).

i. Regional Planning Guidance 10 for the South West 2001-2016 (RPG10) (2001) (Ref. 9.6)

9.3.20 RPG10 (Ref. 9.6) sets out the broad development strategy for the period to 2016 and beyond. With specific reference to noise, RPG10 calls for Local Authorities and others to improve the local environment by reducing incidents of noise pollution (paragraph 4.23) and reduce the impact of transport on the environment (which in turn can increase the occurrence of noise) (paragraph 8.5). There are no specific policies for assessing noise for new developments.

ii. Draft Revised Regional Spatial Strategy (RSS) for the South West Incorporating the Secretary of State’s Proposed Changes for Public Consultation (July 2008) (Ref. 9.7)

9.3.21 There are no specific policies relating to noise within the draft RSS.


9.3.22 Chapter 7 deals with transport and identifies noise as an occurrence of greater mobility (paragraph 7.1). There are no specific policies relating to noise within the Structure Plan.
d) Local


9.3.23 The Sedgemoor District Local Plan forms part of the Development Plan for Sedgemoor. The Local Plan was adopted in September 2004 (with relevant policies ‘saved’ policies from 27 September 2007). The Proposals Map (Inset Map No. 14) indicates that the site is not subject to any specific noise designations. The site lies outside the defined Development Boundary.

9.3.24 The following saved policy is considered to be potentially relevant.

9.3.25 Policy PCS15 (Noise Pollution) states:

(a) be liable to unacceptably increase the level or disruptive character of noise experienced in any area to the detriment of its character; or

(b) be liable to unacceptably increase the noise experienced by the users of existing or proposed noise sensitive development to the detriment of those users.

Noise sensitive development will not be permitted if its users will be unacceptably affected by noise generating uses."

ii. Sedgemoor District Council Local Development Framework (LDF) Core Strategy (Proposed Submission) (September 2010) (Ref. 9.10)

9.3.26 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from September to November 2010. Changes prior to submission proposed as a result of the consultation process were reported and endorsed by the Council’s Executive Committee on 9 February 2011. The Core Strategy (Proposed Submission) was submitted to the Secretary of State on 3 March 2011 and an Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy will form part of the Development Plan for Sedgemoor.

9.3.27 EDF Energy submitted representations objecting to the Core Strategy (Proposed Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1, MIP2 and MIP3 contained in that chapter) and those sections relating to housing and Hinkley Point. EDF Energy also participated at the relevant EiP hearings. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the Core Strategy.

9.3.28 The following Core Strategy (Proposed Submission) policies are of potential relevance.

9.3.29 Policy D4 (Renewable and Low Carbon Energy Generation) states that the Council will support such proposals provided that such installations would not have significant adverse impact taking into account, amongst other things, any unreasonable adverse impact on users and residents of the local area including the generation of noise.
9.3.30 Policy D9 (Sustainable Transport and Movement) states that proposals should contribute to reducing adverse environmental issues, including noise pollution and vibration.

9.3.31 Policy D10 (Managing the Transport Impacts of Development) states that development proposals that will have a significant transport impact should be supported by an appropriate Noise and Vibration Assessment.

9.3.32 Policy D16 (Pollution Impacts of Development and Protecting Residential Amenity) states:

“Development proposals that are likely to result in levels of air, noise, light or water pollution (including groundwater) vibration or soil contamination that would be harmful to other land uses, human health, tranquility or the built and natural environment will not be supported.

Where there are reasonable grounds to suggest that a development proposal may result in a significant adverse environmental impact, the Council will require planning applications to be supported by assessments relating to [amongst other things]:

- noise pollution and/or vibration,...

Where it is demonstrated that it is possible to manage the potential adverse impacts of the development proposals through its design or mitigation measures, the Council will, by means of condition or legal agreement, seek to ensure such measures are effective, for example improving limitations on matters including hours of operation, emissions of fumes, noise and light, parking and servicing for both construction and operational stages …

Development proposals that would result in the loss of land of recreational and/or amenity value or unacceptably impact upon the residential amenity of occupants of nearby dwellings and any potential future occupants will not be supported. Particular consideration will be given to the extent that the proposal could result in unacceptable noise and disturbance, overshadowing, overlooking and/or visual dominance.”

e) Supplementary Planning Guidance

9.3.33 Sedgemoor District Council and West Somerset Council have jointly prepared draft supplementary planning guidance in relation to the HPC Project. Public consultation on the Consultation Draft version of the Hinkley Point C Project Supplementary Planning Document (the draft HPC SPD) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which object to the draft HPC SPD. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the draft HPC SPD.

9.3.34 The draft HPC SPD does not set out any specific guidance in relation to noise impacts at the site.
9.3.35 Further planning policy context is provided in the Legislative Planning Policy Context chapter (Volume 1, Chapter 4) and the Introduction chapter (Volume 6, Chapter 1).

9.4 Methodology

9.4.1 The assessment and all supporting surveys have been conducted in accordance with relevant best practice guidance and standard methodologies.

9.4.2 Generic international guidance is provided by the WHO (Ref. 9.1 and 9.2), whilst methodologies specific to the construction, operation and post-operational noise and vibration assessment are described in detail below.

9.4.3 The construction and post-operational phase noise and vibration assessments determine the potential impacts using criteria contained in specific guidance documents. The operational phase noise and vibration assessments consider the potential change in noise and vibration levels due to the proposed development to determine the potential impacts.

a) Study Area

9.4.4 The purpose of the assessment is to determine the potential worst-case impacts associated with the proposed development. Therefore, it has been assumed that the nearest (unscreened) receptor locations to the proposed development are those likely to experience the greatest noise and vibration impacts.

9.4.5 During the baseline assessment, ambient noise measurements were undertaken at locations that represent groups of residential receptors in Cannington. The nearest residential receptors to the proposed development are located on Oak Tree Way, High Street and Mill Close.

9.4.6 The study area is illustrated in Figure 9.1, and the location of assessed amenity and recreation receptors is identified in Figure 17.1 of this volume of the ES.

b) Baseline Assessment

i. Noise Sensitive Receptors

9.4.7 A noise sensitive receptor is identified as a location where significant changes in environmental noise levels have the potential to cause either detrimental or beneficial impacts. Recognised impacts typically include influence to the amenity of an area; potential disturbance to sleep, comfortable conversation or entertainment; degradation of an educational environment; or interruption of a religious ceremony.

9.4.8 Commercial premises at which particularly sensitive activities occur might also be included, but EDF Energy is not aware of any such locations in the area that might be affected by noise and vibration from the proposed development.

9.4.9 Noise sensitive receptors in the study area have been selected principally according to the likelihood of the impacts occurring, and also to represent a group of locations, on a ‘worst-case’ basis, where similar impacts might occur.
ii. Baseline Noise Survey

9.4.10 A baseline noise survey was undertaken at representative receptors between 10 and 11 December 2009 (Locations A – C) and between 17 and 19 January 2011 (Locations D and E) (see Figure 9.1). A combination of continuous unattended and short-term attended measurements were undertaken in order to obtain representative baseline data for noise and vibration levels at nearby residential receptors.

9.4.11 A description of each baseline noise measurement survey location is provided below:

- **Location A** – Approximately 5m north of the northern façade of No.45 Oak Tree Way. This property was considered to be representative of the series of residential properties on Oak Tree Way, with the selected property being 110m to the east of the part and ride site and the closest of those properties to the proposed development boundary. Short-term attended measurements were undertaken during the afternoon of 10 December 2009, and the early morning of 11 December 2009.

- **Location B** – Approximately 50m north-east of Rothay Cottage, High Street, in a field (part of Pridham’s Smallholding). This property was considered to be representative of the small number of residential properties on High Street, with the selected property being closest of those properties to the development boundary, approximately 300m to the west. Short-term attended measurements were undertaken during the afternoon of 10 December 2009, and the early morning of 11 December 2009.

- **Location C** – Approximately 5m to the north of the northern façade of No.17 Mill Close. This property was considered to representative of the series of residential properties on Mill Close, with the selected property being the closest of those properties to the proposed development boundary, approximately 250m to the north. Continuous unattended measurements of ambient noise levels were taken overnight at this location between 14:00 on 10 December 2009 and 11:30 on 11 December 2009.

- **Location D** – Approximately 8m south-west of the rear façade to No.41 Oak Tree Way. Continuous unattended measurements of ambient noise levels were undertaken at this location between the 17 and 19 January 2011.

- **Location E** – Approximately 5m to the north-west of the façade of Rothay Cottage, High Street. Continuous unattended measurements of ambient noise levels were undertaken at this location between the 17 and 19 January 2011.

9.4.12 The baseline noise survey was undertaken to establish the existing acoustic climate at nearby residential receptor locations. Full details are provided in Appendix 9B along with a complete set of monitoring data.

9.4.13 The parameters recorded for each measurement included:

- \( L_{Aeq} \) the equivalent continuous level, providing an average of all noise events and used for planning assessment in PPG24.

- \( L_{A90} \) the level exceeded for 90% of the time, defined as background level.
9.4.14 Baseline noise measurements were undertaken at a height of between 1.2m and 1.5m above ground level, in free-field conditions in accordance with BS 7445: 2003 ‘Acoustics – description and measurement of environmental noise’ – Part 1 ‘Guide to quantities and procedures’ (Ref. 9.10).

9.4.15 At locations A-C, significant rainfall prior to the survey meant that the ground was damp at all locations around Cannington. The sky was clear during monitoring on 10 December 2009 with the ambient temperature averaging 12°C. During the early morning period on 11 December 2009, frosty and foggy conditions prevailed, with an average ambient temperature of 2°C. During all other monitoring periods the conditions were cloudy with clear patches and an average ambient temperature of 8°C. No precipitation occurred during the monitoring, and little wind (<2m/s) was recorded. It was judged that the meteorological conditions did not significantly influence the survey results in accordance with BS 4142: 1997 ‘Method for rating industrial noise affecting mixed residential and industrial areas’ (Ref. 9.11).

9.4.16 At locations D and E, there was rainfall during the day and night-time periods of the 17 December. Therefore these measurements have been excluded from the survey results. During the remaining survey period, meteorological conditions were dry with gusty wind observed during the daytime on 18 January. No significant wind was observed during other periods. The average daytime temperature was 4°C, with a night-time temperature average of -1°C.

9.4.17 All staff involved with noise measurements were either Members of the Institute of Acoustics (IoA) or held the IoA Certificate of Competence in Environmental Noise Measurement.

9.4.18 The measurements were carried out using a Rion NL31 Class I integrating sound level meter which was field-calibrated before and after each set of measurements. No variation of the calibration signal was observed.

9.4.19 Measurements of existing vibration levels at receptor locations have not been undertaken. Annoyance due to vibration is not related to a comparison of pre and post-development vibration levels. Pre-development vibration level measurements are not, therefore, usually necessary to assess the likelihood of vibration damage or annoyance from any new vibration sources.

c) Consultation

9.4.20 In undertaking this assessment, meetings have been held with the appropriate Environmental Health Officer (EHO) of SDC.
At a scoping consultation meeting held with SDC on 1 October 2009 the potential sources of noise and vibration were discussed. The meeting achieved agreement regarding the requirement to determine baseline noise levels during all periods of proposed operation, including early morning and late evening development peak periods. SDC also advised that impacts of operational plant noise (and other operational noise) should be assessed in accordance with BS 4142:1997 (Ref. 9.11), with a target criterion of 5dB above the prevailing background not to be exceeded. For further details refer to the Consultation Report.

d) Assessment Methodology

i. Value and Sensitivity

Sensitivity has been considered in relation to human receptors living in proximity to the proposed development or affected highways. Other noise sensitive receptors in proximity to the proposed development include Public Rights of Way (PRoW) referenced BW5/22, BW5/23, BW5/24, BW5/26, and BW5/27 (see Chapter 17 of this volume of the ES). Other noise sensitive receptors include the Grange and Cannington Primary School playground. However, these are located 250m and 400m from the proposed development respectively and therefore, due to the distance separation, impacts on those receptors are unlikely to be significant. The grassland to the west of Oak Tree Way (public amenity area) is also greater than 250m from the site boundary, and benefits from acoustic screening by properties on Oak Tree Way.

Private residential properties are categorised as ‘Medium’ sensitivity, with ‘High’ sensitivity reserved for locations where very good communication and resting conditions are essential (for example schools, hospitals, care homes for the elderly or people with learning disabilities). This is based upon guidance provided by the WHO (Ref. 9.1). Outdoor public amenity receptor locations such as public footpaths (PRoW) are considered to have ‘Low’ sensitivity due to the transient presence of human receptors in these locations, and the options that such receptors would have available allowing them to select other locations at any given time.

ii. Magnitude

The magnitude of impact has been based on the scale of consequences that the proposed development would have based upon the predicted noise and vibration levels, and has been considered in terms of high, medium, low and very low.

The magnitude criteria used in this assessment is detailed in the methodology sections below for each phase of the proposed development.

Construction-related Noise

Construction site noise is assessed differently from noise associated with permanent installations, as it is recognised that the former is an inevitable by-product of required works and its impacts are defined as temporary. Advice is contained within British Standard BS 5228: 2009 ‘Code of Practice for Noise and vibration control on construction and open sites’ – Part 1 ‘Noise’ (Ref. 9.12). This document contains a database of the noise emissions from individual items of equipment and activities to predict the noise from demolition and construction methods to identified receptors. Guidance is given on the impacts of different types of ground and barrier attenuation.
and on how to assess the impact of fixed and mobile plant. Predictions of noise propagation in accordance with BS 5228-1 were undertaken and are included in Tables 9C.2 to 9C.3 in Appendix 9C. These include predicted construction noise levels at nominal distances (50m, 100m and 200m) from the site boundary in order to assist the assessment of potential impacts to users of nearby PRoW.

9.4.27 Whilst not mandatory, Annex E of BS 5228-1 (Ref. 9.12) provides advice to assist the development of noise assessment criteria based on previous published guidance and methodologies accepted as appropriate in other planning applications.

9.4.28 Therefore, in assessing the requirement for noise limits, or operating period controls relating to construction works, government agencies and local authorities generally give consideration to the following aspects of the planned works, all of which have a bearing on the ‘significance’ of the impact:

- duration of planned activities (weeks, months, years);
- whether activities are planned for the night time period;
- proximity of development to residential areas; and
- predicted source-term noise levels and noise impacts at residential areas.

9.4.29 The noise magnitude criteria for construction works are presented in Table 9.1. The limits are taken from guidance in BS 5228-1 (Ref. 9.12).

9.4.30 It is proposed that the core working hours for the construction phase would be 08:00 to 19:00 Monday to Friday and 08:00 to 13:00 on Saturdays, with no working on Sundays or bank and public holidays (see Chapter 3 of this volume). For the purposes of this assessment, it has been assumed that the construction activities specified in Appendix 9C would only take place during these core working hours.

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Generation of daytime façade noise levels (predicted construction noise plus measured ambient noise) in excess of 75dB(A) $L_{eq,12hr}$.</td>
</tr>
<tr>
<td>Medium</td>
<td>Generation of daytime façade noise levels (predicted construction noise plus measured ambient noise) that are in the range of 65 to 75dB(A) $L_{eq,12hr}$.</td>
</tr>
<tr>
<td>Low</td>
<td>Generation of daytime façade noise levels (predicted construction noise plus measured ambient noise) that are in the range of 55 to 65dB(A) $L_{eq,12hr}$.</td>
</tr>
<tr>
<td>Very Low</td>
<td>Generation of daytime façade noise levels (predicted construction noise plus measured ambient noise) that are below 55dB(A) $L_{eq,12hr}$.</td>
</tr>
</tbody>
</table>

9.4.31 The approach set out above has also been applied for the assessment of noise from activities post-operation of the proposed development. Activities such as demolition and landscape restoration involve the use of similar equipment and methods of working as those employed for construction activities.
Construction Related Vibration Assessment

9.4.32 Guidance on the assessment of the potential vibration impacts associated with construction activities is provided within BS 5228: 2009 ‘Code of practice for the control of noise and vibration on construction and open sites’ – Part 2 ‘Vibration’ (Ref. 9.13). This document refers to the measurement and assessment guidance provided in BS 6472 ‘Guide to evaluation of human exposure to vibration in buildings’ – Part 1: 2008 ‘Vibration sources other than blasting’ (Ref. 9.14) and BS ISO 4866 ‘Mechanical vibration and shock – vibration of fixed structures – guidelines for measurement of vibrations and evaluation of their effects on structures (Ref. 9.15) (supersedes BS 7385-1: 1990), and Part 2: 1993 ‘Guide to damage levels from ground-borne vibration’ (Ref. 9.16).

9.4.33 For the type of development proposed, plant such as compressors, pumps, generators and Heavy Goods Vehicles (HGVs) are likely to be the most significant sources of low frequency noise with the potential to cause resonance in nearby buildings, which is often perceived as vibration by occupants.

9.4.34 Construction works may cause sudden but intermittent vibration. In such events, it is necessary to be able to quickly compare levels against criteria to give an immediate evaluation of the likelihood of a problem without recourse to complex post-processing of results. Under these conditions, assessment criteria based on Peak Particle Velocities (PPV) are most appropriate.

9.4.35 Based on Table B.1 of BS 5228-2 (Ref. 9.13), the proposed PPV magnitude criteria for typical construction activities, measured at a sensitive receptor location, are presented in Table 9.2.

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Vibration Level (mm/s PPV)</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>10</td>
<td>Vibration is likely to be intolerable for any more than a very brief exposure to this level.</td>
</tr>
<tr>
<td>Medium</td>
<td>1.0</td>
<td>It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.</td>
</tr>
<tr>
<td>Low</td>
<td>0.3</td>
<td>Vibration might be just perceptible in residential environments.</td>
</tr>
<tr>
<td>Very Low</td>
<td>0.14</td>
<td>Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.</td>
</tr>
</tbody>
</table>

Operational Noise Assessment – On-site Activities

9.4.36 The methodology for the assessment of operational noise impacts associated with activities within the boundary of the proposed development is described below.

9.4.37 BS 4142: 1997 (Ref. 9.11) provides a method of assessing the likelihood of complaint from a noise source by comparing the rating level of that source with the background noise level $L_{A90}$. The assessment must be undertaken at noise-sensitive receptors.
affected by noise from existing or proposed fixed industrial operations, including factories and commercial/industrial units.

9.4.38 The ‘specific’ noise (dB $L_{Aeq}$) from the site or industrial operation under assessment is compared to the background noise (dB $L_{A90}$) at the receptor in the absence of the specific noise. The specific noise is additionally assessed for the presence of distinguishing or unusual noise characteristics (e.g. contains distinguishable tones or impulses), for which a +5dB ‘penalty’ is added to the specific noise to derive the ‘rating’ (dB $L_{A\text{r,Tr}}$) level.

9.4.39 In Section 9 of BS 4142: 1997 (Ref. 9.11), it is stated that a rating level of around 10dB above the existing background noise level indicates that complaints are likely, whilst a rating level that is around 5dB above the existing background noise level is of ‘marginal significance’. This has been interpreted since the introduction of the Standard in 1967, to mean that a 5dB excess due to new, fixed plant noise sources is, in general, acceptable. For this reason the EHO of SDC recommended these assessment criteria in this study.

9.4.40 Based on this recommendation, the proposed significance criteria for mechanical plant associated with the proposed development during the operational phase, are presented in Table 9.3. In the absence of specific guidance, these criteria are proposed for assessing the potential impact of all other noise sources associated with the site once occupied, where appropriate (including vehicle door slams).

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Rating noise level from operating mechanical plant more than 10dB above the</td>
</tr>
<tr>
<td></td>
<td>existing $L_{A90,T}$ background noise level.</td>
</tr>
<tr>
<td>Medium</td>
<td>Rating noise level from operating mechanical plant between 5dB and 10dB above</td>
</tr>
<tr>
<td></td>
<td>the existing $L_{A90,T}$ background noise level.</td>
</tr>
<tr>
<td>Low</td>
<td>Rating noise level from operating mechanical plant between 0.1dB and 5dB above</td>
</tr>
<tr>
<td></td>
<td>the existing $L_{A90,T}$ background noise level.</td>
</tr>
<tr>
<td>Very Low</td>
<td>Rating noise level from operating mechanical plant below the existing $L_{A90,T}$</td>
</tr>
<tr>
<td></td>
<td>background noise level.</td>
</tr>
</tbody>
</table>

### iii. Significance of Impacts

9.4.41 Within this chapter, the generic descriptions used to define the level of impact significance and the likelihood of occurrence are the same as those provided in Table 7.4, Volume 1, Chapter 7, where an Impact Assessment Matrix (IAM) is presented which compares the magnitude of an impact with the sensitivity of the receptor to determine the level of impact significance.

9.4.42 For the purpose of this assessment, mitigation measures have been proposed where there is an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so.
iv. Cumulative Impacts

9.4.43 The assessments of cumulative noise and vibration impacts from other developments associated with the HPC Project and from other relevant consented and proposed developments have been assessed in Volume 11. The potential in-combination effects of noise and vibration from different aspects of the construction, operational and post-operational phases of the proposed development have been assessed in Section 9.6.

e) Limitations, Constraints and Assumptions

9.4.44 Baseline noise surveys were undertaken at five monitoring locations identified as being representative of groups of sensitive receptors (e.g. residential dwellings in a certain area).

9.4.45 Assumptions have been made about the type of equipment and machinery to be used during the construction works based upon likely methods to be adopted and previous development project experience, but contractors may adopt different working methods to reach the same goals. The assessment presented has therefore adopted a worst-case scenario wherever possible.

9.4.46 Assumptions regarding the site and building layout have been taken from Figure 2.1 of Chapter 2 of this volume of the ES.

9.5 Baseline Environmental Characteristics

a) Introduction

9.5.1 This section presents the baseline environmental characteristics for the proposed site and representative receptors in relation to noise and vibration.

b) Baseline Noise Survey

9.5.2 The main daytime noise sources at the measurement locations (see Figure 9.1) were as follows:

- **Location A** - The dominant noise source at this location was road traffic on the A39. Additional noise from traffic on High Street through Cannington was also audible. During the afternoon monitoring periods, several noise sources at Denman’s Farm were noted, including animal noise (dogs, cows and a cockerel), voices and farm machinery (banging). Additional noise sources identified during the survey included residential activity at properties on Oak Tree Way and birdsong in nearby foliage.

- **Location B** - The dominant noise source at this location was road traffic on the A39 with a lesser contribution from traffic on High Street. During the mid-afternoon monitoring periods, increased traffic (cars and pedestrians) associated with Brymore School was evident. Additional noise sources identified during the survey included birdsong and horses in an adjacent field.

- **Location C** - The dominant noise source at this location was road traffic on the main roads through and near to Cannington, including the A39 to the south.
Additional noise sources identified during the survey included birdsong in nearby foliage and occasional vehicle movements on Mill Close.

- **Location D** – The dominant noise source at this location was road traffic on the A39, south-west of Cannington. Additional noise sources identified during the survey included residential activity at properties on Oak Tree Way and birdsong in nearby foliage.

- **Location E** – The dominant noise source was road traffic on the A39 with a lesser contribution from traffic on High Street. A low flying military aircraft was observed during the afternoon of 18 January 2011.

9.5.3 The results of the baseline monitoring surveys are presented in Table 9.4 (more detailed information from the surveys is set out in Appendix 9B). In addition, the variation in ambient noise level at Locations C, D and E (which are the locations where continuous monitoring was undertaken) are shown in graph form in Appendix 9B.

Table 9.4: Noise Survey Results: Monitoring Locations A – E

<table>
<thead>
<tr>
<th>Location</th>
<th>Monitoring Period (start date)</th>
<th>Start Time</th>
<th>Measurement Duration (T) (hh:mm)</th>
<th>Sound Pressure Level, dB (fast time weighting)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$L_{Aeq, T}$</td>
</tr>
<tr>
<td>A</td>
<td>11 December 2009</td>
<td>05:07</td>
<td>00:30</td>
<td>44.9</td>
</tr>
<tr>
<td></td>
<td>10 December 2009</td>
<td>12:00</td>
<td>00:30</td>
<td>50.6</td>
</tr>
<tr>
<td></td>
<td>10 December 2009</td>
<td>15:00</td>
<td>00:30</td>
<td>50.0</td>
</tr>
<tr>
<td>B</td>
<td>11 December 2009</td>
<td>05:35</td>
<td>00:30</td>
<td>51.1</td>
</tr>
<tr>
<td></td>
<td>10 December 2009</td>
<td>12:46</td>
<td>00:30</td>
<td>50.6</td>
</tr>
<tr>
<td></td>
<td>10 December 2009</td>
<td>15:38</td>
<td>00:30</td>
<td>54.8</td>
</tr>
<tr>
<td>C</td>
<td>10 December 2009</td>
<td>14:00</td>
<td>09:00</td>
<td>47.5</td>
</tr>
<tr>
<td></td>
<td>10 December 2009</td>
<td>23:00</td>
<td>08:00</td>
<td>41.3</td>
</tr>
<tr>
<td></td>
<td>11 December 2009</td>
<td>07:00</td>
<td>05:00</td>
<td>48.2</td>
</tr>
<tr>
<td>D</td>
<td>18 January 2011</td>
<td>06:55</td>
<td>16:00</td>
<td>52.6</td>
</tr>
<tr>
<td></td>
<td>18 January 2011</td>
<td>22:55</td>
<td>08:00</td>
<td>46.8</td>
</tr>
<tr>
<td></td>
<td>19 January 2011</td>
<td>06:55</td>
<td>04:00</td>
<td>55.6</td>
</tr>
<tr>
<td>E</td>
<td>18 January 2011</td>
<td>06:54</td>
<td>16:00</td>
<td>51.8</td>
</tr>
<tr>
<td></td>
<td>18 January 2011</td>
<td>22:54</td>
<td>08:00</td>
<td>46.4</td>
</tr>
<tr>
<td></td>
<td>19 January 2011</td>
<td>06:54</td>
<td>04:15</td>
<td>53.3</td>
</tr>
</tbody>
</table>

*Note: * Average 30-minute value
    # Average 15-minute value

9.5.4 The results of the baseline noise survey are considered typical of noise levels in a rural setting, in proximity to a trunk road.

9.5.5 For the purpose of the construction and post-operational phase noise assessments, in accordance with BS 5228-1 (Ref. 9.12), a typical existing ambient noise level has
been derived from measured data. This was derived from the logarithmic mean of the measured $L_{Aeq, 15\text{min}}$ values during the construction working day periods (08:00 – 19:00 Monday to Friday and 08:00 – 13:00 on Saturday). The typical daytime ambient level at Mill Close, Oak Tree Way and Rothay were determined to be 47.5dB, 53.3dB and 52.5dB $L_{Aeq, \text{day}}$ respectively.

9.5.6 For the purpose of the operational noise impact assessment, in accordance with BS 4142 (Ref. 9.11), the ‘representative’ background noise level at night was defined by the arithmetic mean of measured $L_{A90, 15\text{min}}$ values between 02:00 and 04:00. This approach was agreed through consultation with SDC. This level was determined to be 36.1dB, 31.0dB and 39.9dB $L_{A90, \text{T}}$ at Mill Close, Oak Tree Way and Rothay respectively.

9.6 Assessment of Impacts

a) Introduction

9.6.1 For the proposed development, the impact assessment with respect to noise and vibration on the existing environment covers the following issues:

- potential increase in noise during the construction works;
- potential vibration generated by the construction works;
- potential increase in noise due to use of the park and ride facility and associated amenities; and
- potential increases in noise during post-operation activities.

9.6.2 Due to the typically low vibration levels that are likely to be generated (primarily by on-site vehicle movements), it is expected that on-site operational activities would not result in perceptible vibration impacts on any of the sensitive receptors. Therefore, no further assessment of this operational vibration was undertaken. This was agreed in consultation meetings held with the EHO at SDC.

9.6.3 An assessment of potential impact associated with the operation of the proposed development on users of public footpaths has not been undertaken. During the periods during which predicted impacts are expected to occur (i.e. late evening and early morning), use of this amenity would be limited.

9.6.4 Activities associated with the post-operational phase of the proposed development would not involve any significant earthworks. Therefore, it considered that these activities would not result in perceptible vibration impacts on any of the sensitive receptors. Therefore, no further assessment was undertaken of vibration during post-operation activities.

b) Best Practice

9.6.5 Best practice measures would be undertaken during construction and are considered to form part of the proposed development. They would be based on the principles set out in the Environmental Management and Monitoring Plan (EMMP) with
further information provided within the Noise and Vibration Management. The following measures forming part of the proposed development have been taken into account in the assessment of impacts and would be implemented:

i. Construction and Post-Operational Noise

9.6.6 The standard of good practice outlined in BS 5228-1 (Ref. 9.12) would be followed. This includes:

- continuous noisy plant to be housed in acoustic enclosures;
- use of electrical items of plant instead of diesel plant in especially sensitive locations (where practicable);
- exhaust silencing and plant muffling equipment to be maintained in good working order;
- avoid unnecessary revving of engines and switch off equipment;
- minimise drop heights of materials; and
- start up plant sequentially rather than all together (where practicable).

9.6.7 In addition, a formal system would be put in place during the works which identifies the roles and responsibilities of site staff regarding a noise and vibration complaint action procedure. Site logs would be maintained; detailing all complaints received relating to noise and/or vibration disturbance impacts and the corresponding action taken including the response made to each complainant.

9.6.8 In general, good public relations and extensive consultation with local authorities is necessary to minimise the impact of construction work. Liaison would be undertaken with the local community ensuring they have advance notice of the schedule of works.

ii. Construction Vibration

9.6.9 BS 5228-2 (Ref. 9.13) gives detailed advice on standard good construction practice for minimising impacts from construction vibration. It would be a requirement of contractors to follow this guidance.

iii. Operational Noise

9.6.10 Standard good practice in design and management of the operational site would also be employed to minimise the potential for noise disturbance. This includes:

- no unnecessary idling of vehicle engines (minibuses, shuttle buses, and coaches); and
- training of the workforce who would use the park and ride to ensure noise is minimised during the early and late sensitive periods. This would include no loud radios, excessive slamming of doors, revving of engines or use of horns.
c) Construction Impacts

9.6.11 The assessment of construction activities was undertaken with regard to potential noise and/or vibration impacts at locations C, D and E. An assessment has not been undertaken at A and B as locations D and E respectively are considered representative of these noise sensitive receptors.

9.6.12 The key activities during construction that may cause noise and vibration impacts are:

- earthworks and site preparation;
- fencing and lighting construction;
- building construction; and
- construction of site roads and parking facilities.

i. Construction Related Noise

9.6.13 In order to evaluate the noise generation during the construction phase of the proposed development, it was necessary to define the various activities that would be undertaken. Different construction contractors may use different methods of working and plant. However, it is possible to undertake a generic construction assessment of noise and vibration based on expected methods of working gained from experience of similar development.

9.6.14 For each activity of the construction works, a representative complement of assumed plant, associated sound power level ($L_w$) and prediction routines (to the requirements of BS 5228-1 (Ref. 9.12)) are included in Appendix 9C.

9.6.15 The BS 5228-1 (Ref. 9.12) prediction method uses the shortest distance from the receptor to the construction activities. The nearest boundary of respective working areas was used as the calculation point for equipment/plant classed as ‘mobile’ (including excavators and bulldozers) and from equipment/plant classed as ‘fixed’ (including generators).

9.6.16 Predicted noise levels, detailed in Appendix 9C and summarised in Table 9.5, are therefore conservative and in practice the actual noise levels may not attain those predicted.

9.6.17 Prediction of construction activity noise levels at each receptor took into account features that may affect propagation, such as ground absorption and screening by natural and/or formed topography. Other factors, such as the length of the working traverse and the machinery ‘on-time’, were also included within the calculations.
Table 9.5: Summary of Worst-case Predicted Construction Noise Levels at the Nearest Noise Sensitive Receptor Locations of the Construction Works, Based on BS 5228-1 Calculation (excluding ambient noise)

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Receptor</th>
<th>Predicted Worst-case Noise Levels, Closest Approach dB $L_{Aeq, 12h}$</th>
<th>Earthworks and Site Preparation</th>
<th>Fencing and Lighting Construction</th>
<th>Building Construction</th>
<th>Construction of Site Roads and Parking Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>17 Mill Close</td>
<td>56</td>
<td>45</td>
<td>54</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>41 Oak Tree Way</td>
<td>53</td>
<td>45</td>
<td>53</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Rothay, High Street</td>
<td>49</td>
<td>41</td>
<td>54</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>50m*</td>
<td>66</td>
<td>58</td>
<td>69</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>100m*</td>
<td>59</td>
<td>51</td>
<td>61</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>200m*</td>
<td>51</td>
<td>43</td>
<td>54</td>
<td>51</td>
<td></td>
</tr>
</tbody>
</table>

Note: * Free-field locations

9.6.18 The predicted construction noise levels presented in the table above do not include existing ambient noise levels at the sensitive receptor locations and are not, therefore comparable with the proposed noise magnitude criteria presented in Table 9.1. Table 9.6 below shows the effect of adding measured ambient noise level to these values and, therefore, provides an indication of potential impacts.

Table 9.6: Summary of Worst-case Predicted Construction Noise Levels at the Nearest Noise Sensitive Receptor Locations of the Construction Works, Based on BS 5228-1 Calculation

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Receptor</th>
<th>Predicted Worst-case Noise Levels, closest approach dB $L_{Aeq, 12h}$</th>
<th>Earthworks and Site Preparation</th>
<th>Fencing and Lighting Construction</th>
<th>Building Construction</th>
<th>Construction of Site Roads and Parking Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>17 Mill Close</td>
<td>57</td>
<td>50</td>
<td>55</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>41 Oak Tree Way</td>
<td>56</td>
<td>54</td>
<td>56</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Rothay, High Street</td>
<td>54</td>
<td>53</td>
<td>56</td>
<td>56</td>
<td></td>
</tr>
</tbody>
</table>

Note: Predicted noise levels include relevant measured ambient noise levels:
17 Mill Close = 48 dB $L_{Aeq, day}$
41 Oak Tree Way = 53 dB $L_{Aeq, day}$
Rothay, High Street = 53 dB $L_{Aeq, day}$

9.6.19 Table 9.6 and the detailed calculations in Appendix 9C show that the highest predicted noise levels during the construction phase fall within either the low or very low magnitude criterion, on receptors of medium value and sensitivity. Therefore, as a result of the conservative assessment, with all plant working at the closest approach, the impacts of these works are predicted to be of minor adverse significance in the short-term. The duration of the construction works is expected to be 11 months.
9.6.20 Users of public footpaths (BW5/22, BW5/23, BW5/24, BW5/26, and BW5/27) in proximity to the proposed development are receptors of low sensitivity and would potentially be exposed to higher noise levels for a short period if construction works are ongoing nearby at that time. The overall noise impact on these footpaths during site construction works, based on predicted construction noise levels presented in Table 9.5, is therefore assessed to be of minor to moderate adverse significance. However, the exposure period will be limited due to the transient nature of users of the footpaths (i.e. walkers) who will not be subject to the same exposure duration as defined for fixed property receptor locations. Therefore, whilst the predicted noise levels might result in short-term disturbance, the impact on a person’s enjoyment of the amenity is likely to be less significant than has been assessed.

9.6.21 The nature of the construction phase means that the conservative situation predicted may exist for only a matter of days, or even hours. There would be regular periods, even during the course of a single day, when the assumed plant would not be in operation, for example during breaks or changes of working routine.

ii. Construction Related Vibration

9.6.22 Surface plant such as cranes, compressors and generators are not recognised sources of high levels of environmental vibration. Reference to Figure 1 of the British Steel document ‘Control of Vibration and Noise during Piling’ (Ref. 9.17) confirms that, even at a closest distance of 10m, PPV levels significantly less than 5mm/s are generated by such plant. For example, a bulldozer may generate a PPV of approximately 0.6mm/s and a ‘heavy lorry on poor road surface’ a PPV of less than 0.1mm/s at 10m. These values are below the threshold of 15mm/s stated in BS 5228-2 at which cosmetic building damage becomes likely (Ref. 9.13).

9.6.23 Typical construction and demolition working routines are unlikely to generate levels of vibration at local receptors above which cosmetic damage would be expected to be sustained.

9.6.24 Due to the distance to the nearest sensitive receptor, Mill Close (over 160m), and the very low level of vibration likely to be caused, the magnitude of any impact is assessed as very low (refer to Table 9.2). The receptors are of medium value and sensitivity. Hence the significance of the impact is predicted to be minor adverse.

d) Operational Impacts

9.6.25 The assessment of operational activities was undertaken with regard to potential noise and vibration impacts at locations C, D and E. An assessment has not been undertaken at A and B as locations D and E respectively are considered representative of these noise sensitive receptors. An assessment of users of public footpaths during the operational phase has not been undertaken as use of this amenity would generally take place outside the periods in which noise impacts are predicted to occur (i.e. early morning and late evening).

9.6.26 The key activities during the operation phase of the park and ride site that may cause noise and/or vibration impacts are:
• vehicle movements on the site including cars parking, door slamming and engine start up; and
• workers and visitors using the site.

i. Operational Noise - On-site Activities

9.6.27 The proposed shift patterns that would be operated by the HPC construction contractors are described in Chapter 4 of this volume of the ES.

9.6.28 During the day the acoustic climate at the nearest noise sensitive receptors is dominated by road traffic noise from the A39 and, to a lesser degree, the main roads through Cannington. The early morning and late evening periods, when traffic volumes and subsequently background noise levels have subsided, would represent the most sensitive periods with respect to potential noise impacts.

9.6.29 The principal noise sources associated with the operation of the proposed development include vehicle movements (cars and buses) and car doors being slammed shut. In view of the dominance of road traffic noise from the A39, noise from on-site vehicle movements is unlikely to be discernible, and would be no more significant than the predicted impact of road traffic generation on public highways assessed below.

9.6.30 Based on measurements, the noise emitted from a car door being slammed shut is approximately 79 dB $L_{A\text{max}}$ and 71 dB $L_{AE}$ at a distance of 3m. As a worst-case assessment, it is assumed that 25 car door slams occur (10% of available parking) close to the proposed development car park boundary in a single 5-minute period.

9.6.31 In Section 9.5, the ‘representative’ background noise level at night was determined to be 36.1dB, 31.0dB and 39.9dB $L_{A90,T}$ at Mill Close, Oak Tree Way and Rothay respectively.

9.6.32 Table 9.7 details the specific noise level at the façade of the closest noise sensitive receptors. BS 4142 (Ref. 9.11) recommends that an acoustic feature correction of +5 dB be applied for sources that emit distinct impulses (thumps). This is the Rating Level.

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Receptor</th>
<th>Specific Noise Level dB ($L_{Aeq,5\text{min}}$)</th>
<th>Rating Level dB ($L_{Ar,5\text{min}}$)</th>
<th>Representative Background Noise Level dB ($L_{A90,15\text{min}}$) at night</th>
<th>Difference $L_{Ar,5\text{min}} - L_{A90,15\text{min}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Mill Close</td>
<td>22</td>
<td>27</td>
<td>37$^a$</td>
<td>-10</td>
</tr>
<tr>
<td>D</td>
<td>Oak Tree Way</td>
<td>21</td>
<td>26</td>
<td>36</td>
<td>-10</td>
</tr>
<tr>
<td>E</td>
<td>Rothay, High Street</td>
<td>18</td>
<td>23</td>
<td>40</td>
<td>-17</td>
</tr>
</tbody>
</table>

Note: $^a$ Measured background noise level dB $L_{A90,30\text{min}}$

9.6.33 Table 9.7 shows that the highest predicted noise levels from the operation of the proposed development fall within the very low magnitude criterion presented in Table...
9.3, on receptors of medium value and sensitivity. The noise impacts of use of the proposed park and ride facility is assessed to be of minor adverse significance.

e) Post-Operational Impacts

9.6.34 Following the completion of the construction of HPC, the proposed development will cease to be operational, and will be removed and the site restored to its existing agricultural use.

9.6.35 The assessment of activities associated with the post-operational phase was undertaken with regard to potential noise impacts at locations D, E and C. An assessment has not been undertaken at A and B as locations D and E respectively are considered representative of these noise sensitive receptors.

9.6.36 The key activities during the post-operational phase that may cause noise and vibration impacts are:

- dismantling, including removal of hard surfacing and built structures; and
- landscape restoration, including levelling and infilling of ponds.

9.6.37 It is likely that dismantling activities would be less intensive than construction, using fewer items of plant over a longer period, and would take advantage of the least environmentally sensitive time periods.

<table>
<thead>
<tr>
<th>Table 9.8: Summary of Worst-case Predicted Dismantling and Restoration Noise Levels at the Nearest Noise Sensitive Receptor Locations, Based on BS 5228-1 Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ref.</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>D</td>
</tr>
<tr>
<td>E</td>
</tr>
<tr>
<td>-</td>
</tr>
<tr>
<td>-</td>
</tr>
<tr>
<td>-</td>
</tr>
</tbody>
</table>

Note: * Free-field locations

<sup>1</sup> Predicted noise levels include typical measured ambient daytime noise level:

- 17 Mill Close = 48 dB \( L_{Aeq, day} \)
- 41 Oak Tree Way = 53 dB \( L_{Aeq, day} \)
- Rothay, High Street = 53 dB \( L_{Aeq, day} \)

9.6.38 Table 9.8 and the detailed calculations contained in Appendix 9C show that the predicted noise levels during dismantling are of low magnitude on receptors of medium value and sensitivity. Predicted noise levels during landscape restoration
works are predicted to be of very low to low magnitude on receptors of medium value and sensitivity.

9.6.39 Therefore, as a result of the conservative assessment, with all plant working at the closest approach, the impact of these short-term activities is predicted to be of **minor adverse** significance.

9.6.40 Users of public footpaths (BW5/22, BW5/23, BW5/24, BW5/26, and BW5/27) in proximity to the proposed development are receptors of low sensitivity and would potentially be exposed to higher noise levels for a short period if post-operational works are ongoing nearby at that time. The overall noise impact on these footpaths during site construction works, based on predicted construction noise levels presented in **Table 9.8**, is therefore assessed to be of **minor to moderate adverse** significance. However, the exposure period will be limited due to the transient nature of users of the footpaths (i.e. walkers) who will not be subject to the same exposure duration as defined for fixed property receptor locations. Therefore, whilst the predicted noise levels might result in short-term disturbance, the impact on a person’s enjoyment of the amenity is likely to be less significant than has been assessed.

9.6.41 The post-operational works are expected to take 12 months to complete. The nature of post-operational phase means that the conservative situation predicted may exist for only a matter of days, or even hours, and there would be regular periods, even during the course of a single day, when the assumed noise generating plant would not be in operation during breaks or changes of working routine.

9.7 **Mitigation of Impacts**

9.7.1 Restricted operational hours and good working practices, including the operation of plant and machinery (for which further information is provided within the **Noise and Vibration Management Plan**), have been taken into account within the assessments set out above.

9.8 **Residual Impacts**

9.8.1 Although noise residual impacts of minor to moderate significance are predicted at public footpaths within the site boundary (BW 5/22), no specific noise mitigation is proposed. The residual impacts would therefore remain as those assessed in Section 9.6.

9.9 **Summary of Impacts**

9.9.1 **Table 9.9** presents a summary of the impacts predicted with respect to noise and vibration and the subsequent residual impacts.
## Table 9.9: Summary of Impacts

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Potential Magnitude</th>
<th>Description</th>
<th>Value/Sensitivity</th>
<th>Significance</th>
<th>Proposed Mitigation</th>
<th>Residual Impact Assessment</th>
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<tbody>
<tr>
<td><strong>Construction Phase</strong></td>
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<tr>
<td>Residential receptors</td>
<td>Noise</td>
<td>Low/very low</td>
<td>Localised Direct Adverse Temporary Short-term Reversible</td>
<td>Medium</td>
<td>Minor</td>
<td>n/a</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td>Public Footpaths</td>
<td>Noise</td>
<td>High</td>
<td>Localised Direct Adverse Temporary Short-term Reversible</td>
<td>Low</td>
<td>Minor/Moderate</td>
<td>None proposed</td>
<td>Minor/Moderate Adverse</td>
</tr>
<tr>
<td>Residential receptors</td>
<td>Vibration</td>
<td>Low</td>
<td>Localised Direct Adverse Temporary Short-term Reversible</td>
<td>Medium</td>
<td>Minor</td>
<td>n/a</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td>Receptor</td>
<td>Potential Impact</td>
<td>Potential Magnitude</td>
<td>Description</td>
<td>Value/Sensitivity</td>
<td>Significance</td>
<td>Proposed Mitigation</td>
<td>Residual Impact Assessment</td>
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<td><strong>On-site Operational Phase</strong></td>
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<tr>
<td>Residential Receptor</td>
<td>Noise</td>
<td>Very low</td>
<td>Localised Direct Adverse Temporary Long-term Reversible</td>
<td>Medium</td>
<td>Minor</td>
<td>n/a</td>
<td>Minor Adverse</td>
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<td><strong>Post-Operational Phase</strong></td>
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<tr>
<td>Residential receptors</td>
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</tr>
<tr>
<td>Public Footpaths</td>
<td>Noise</td>
<td>High</td>
<td>Localised Direct Adverse Temporary Short-term Reversible</td>
<td>Low</td>
<td>Minor/Moderate</td>
<td>None proposed</td>
<td>Minor/Moderate Adverse</td>
</tr>
</tbody>
</table>
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Appendix 10B: Air Quality Guidelines, Target Values, Standards and Objectives
Appendix 10C: Air Quality Significance Criteria
Appendix 10D: Input Parameters and Results for ADMS Roads Assessments
10. AIR QUALITY

10.1 Introduction

10.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential air quality impacts associated with the construction, operational and post-operational phases of the proposed Cannington park and ride facility (the proposed development). Detailed descriptions of the site, proposed development, construction, operational and post-operational phases are provided in Chapters 1 to 5 of this volume of the ES.

10.1.2 An introduction to air quality pollution is provided in Appendix 10A and a glossary of the terminology used in this chapter is provided in Volume 1 of the ES.

10.2 Scope and Objectives of Assessment

10.2.1 The scope of the assessment has been determined through a formal Environmental Impact Assessment (EIA) scoping process undertaken with the Infrastructure Planning Commission (IPC). It has also been informed by ongoing consultation with statutory consultees, including Sedgemoor District Council (SDC), West Somerset Council (WSC) and Somerset County Council (SCC), the local community and the general public in response to the Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations.

10.2.2 The assessment of air quality impacts has been undertaken adopting the methodologies described in Volume 1, Chapter 7 and in Section 10.4 of this chapter.

10.2.3 The existing and future baseline conditions, against which the likely environmental impacts of the proposed development are assessed, have been determined through baseline air quality monitoring and predictive modelling, and are described in Sections 10.5 and 10.6.

10.2.4 The study area with respect to potential fugitive dust and particulate impacts and on-site construction plant and machinery exhaust emissions impacts is shown on Figure 10.1. Figure 10.2 shows the study area and road sources considered in the vehicular exhaust emissions impact assessment. The locations of the assessed sensitive receptors are also presented on each figure.

10.2.5 Air quality impacts are presented in Section 10.6, and appropriate mitigation measures aimed at preventing, reducing or off-setting any potential adverse impacts that are identified to be potentially significant are identified in Section 10.7. An assessment of residual impacts following implementation of these mitigation measures is presented in Section 10.8.

10.2.6 The assessment of cumulative impacts of the proposed development with other elements of the HPC Project, and other proposed projects, is presented in Volume 11 of this ES.
10.2.7 The objectives underlying the air quality assessment are to:

- identify all potentially sensitive receptor locations that may be affected by the construction, operational or post-operational phases of the proposed development;
- determine baseline air quality;
- assess air quality impacts of the proposed development on sensitive receptors;
- recommend mitigation measures, if considered necessary, to prevent, reduce or off-set the air quality impacts on sensitive receptors; and
- assess the residual air quality impacts on sensitive receptors.

10.3 Legislation, Policy and Guidance

10.3.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of potential air quality impacts associated with the construction, operation and post-operational phases of the proposed development.

10.3.2 As stated in Volume 1, Chapter 4, the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) when combined with the NPS for Nuclear Power Generation (NPS EN-6) provides the primary basis for decisions by the IPC on applications for nuclear power generation developments that fall within the scope of the NPSs.

10.3.3 Notwithstanding this, the IPC may consider other matters that are both important and relevant to its decision-making. This could include Planning Policy Statements (PPSs), Planning Policy Guidance Notes (PPGs), regional and local policy documents, although, if there is a conflict between these and the NPS, the NPS prevails for the purposes of IPC decision making.

10.3.4 Further, the Planning Act 2008 provides that the IPC must, in making its decision on an application, have regard to any Local Impact Report (LIR) prepared by relevant local authorities. It is anticipated that the LIRs will rely in part on PPSs, PPGs, regional and local policy to provide a context for their assessment. On this basis, regard has been given to these documents (where relevant to the technical assessment) since they are likely to inform the LIRs prepared by the relevant local authorities.

a) International Legislation

i. The World Health Organization (WHO) Air Quality Guidelines (AQGs) (Ref. 10.1 and Ref. 10.2)

10.3.5 WHO AQGs (Ref. 10.1 and Ref. 10.2) offer global guidance to policy-makers on reducing the health impacts of air pollution. The guidelines, first produced in 1987 and updated in 1997, previously adopted a European scope, whilst the current 2005 guidelines are applied globally. They recommend revised limits for the concentration of selected air pollutants including particulate matter (PM), ozone (O₃), nitrogen dioxide (NO₂) and sulphur dioxide (SO₂) applicable across all WHO regions.
10.3.6 In addition to the guideline values, the AQGs give interim targets (ITs) related to outdoor air pollution, for each air pollutant, aimed at promoting a gradual shift from higher to lower concentrations. If these ITs are achieved, reductions in risks for acute and chronic health impacts from air pollution would be expected, but the ultimate objective should be progress towards the guideline values.

10.3.7 Although these guidelines are neither standards nor legally binding criteria, they are designed to offer guidance in reducing the health impacts of air pollution based on expert evaluation of current scientific evidence. The WHO AQGs and ITs are summarised in Appendix 10B, Table 1.

b) European Legislation


10.3.8 European Union (EU) policy on air quality aims to develop and implement appropriate instruments to improve air quality within the EU member states. EU Directive 2008/50/EC (Ref. 10.3), which came into force in June 2008, merges most of the existing air quality legislation into a single directive (the exception is the fourth "Daughter Directive" under the 1996 Framework Directive (96/62/EC)) (Ref. 10.4). This reorganisation of the legislation did not include a change to the existing air quality Limit Values. It introduces a new framework for PM$_{2.5}$ (fine particles), including the limit value and exposure related targets with a period of two years provided to all EU Member States to transpose the new Directive. The introduction of this framework was based on increasing evidence that this size of particle can be more closely associated with observed adverse health impacts than PM$_{10}$. The EU air quality Limit Values are summarised in Appendix 10B, Table 2.

10.3.9 The air quality Limit Values relate to ambient pollutant concentrations in the air and the limits are set on the basis of medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the WHO as to how each pollutant affects human health. Above these limits, sensitive members of the public (e.g. children, the elderly and the infirm) may experience adverse health impacts.

10.3.10 Other European Directives relate to equipment standards such as the control of emissions of gaseous and particulate pollutants from internal combustion engines and on the quality of petrol and diesel fuels. These are discussed in greater detail in Section 10.6.

c) National Legislation and Guidance

i. The Environment Act 1995 (Ref. 10.5)

10.3.11 The Environment Act 1995 (Ref. 10.5) required the preparation of a national Air Quality Strategy to set air quality standards and objectives for specified pollutants. The Act also outlined measures to be taken by local authorities (LAs) in relation to meeting those standards and objectives (the Local Air Quality Management (LAQM) framework).
ii. The Air Quality Standards Regulations 2010 (Ref. 10.6)

10.3.12 The Air Quality Standards Regulations 2010 (Ref. 10.6) transpose into UK legislation the European Directives (Ref. 10.3 and Ref. 10.4), the Council’s decision on exchange of information (Ref. 10.7), as well as replacing the Air Quality Standards Regulations 2007 (Ref. 10.8). The Air Quality Standards Regulations 2010 came into force in the UK on 11 June 2010. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards with attainment dates in line with the European Directives.

iii. The Air Quality Regulations 2000 (Ref. 10.9), the Air Quality Regulations 2002 (Ref. 10.10) and the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Ref. 10.11)

10.3.13 In the UK, action on air quality is driven by the health-based objectives for key air pollutants, which have been made statutory through the Air Quality Regulations 2000 (Ref. 10.9), as amended in 2002 (Ref. 10.10) and set out in the 2007 Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) (Ref. 10.11). The Air Quality Objectives (AQOs) are based on the Air Quality Standards/Air Quality Limit Values, with interim target dates to help the UK move toward the achievement of the EU Air Quality Limit Values. The AQOs in the AQS are a statement of policy intentions or policy targets and as such, there is no legal requirement to meet these objectives, except in so far as they mirror any equivalent legally binding Limit Values in EU legislation.

10.3.14 The AQOs incorporate dates by which each standard is to be achieved. These are policy based targets set by the Government which take into account economic efficiency, practicability and technical feasibility. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance (i.e. a limited number of permitted exceedences of the standard over a given period).

10.3.15 The AQOs for each pollutant in the AQS and the Air Quality Regulations set out above are summarised in Appendix 10B, Table 3. For some pollutants (e.g. NO₂), there is both a long-term (annual mean) and a short-term standard. In the case of NO₂, the short-term objective is for a 1-hour averaging period, whereas for fine particles (PM₁₀) it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants, for example temporary exposure of persons on the pavement adjacent to a busy road, compared with the exposure of occupiers of residential properties adjacent to a road.

10.3.16 The 2007 AQS replaced the previous Air Quality Strategy for England, Scotland, Wales and Northern Ireland (January 2000) and Addendum (February 2003). The majority of the AQOs set out in this previous version of the Air Quality Strategy were retained; however, the provisional objectives previously proposed for PM₁₀ were replaced in England, Wales and Northern Ireland with a new framework for considering the impacts of PM₂.₅. The Air Quality Standards Regulations 2010 (Ref. 10.6) incorporated into statute the annual mean PM₂.₅ AQO limit value of 25μg/m³ as previously set out in the AQS (to be achieved by 2015), and also defined exposure reduction targets for PM₂.₅. However, these PM₂.₅ objectives/reduction
targets have not been incorporated into LAQM Regulations and local authorities have no statutory obligation to review and assess air quality against them.

10.3.17 Of the pollutants included in the AQS, NO$_2$, PM$_{10}$ and PM$_{2.5}$ are particularly relevant to this assessment, as road traffic is a major source of these pollutants. Where road traffic is the dominant source of air pollution, the objectives for these pollutants tend to be the most difficult to achieve according to the experience of local authorities undertaking review and assessments of air quality. Further, it is generally considered that where the AQOs for the concentrations of NO$_2$ and PM$_{10}$ are achieved, and where there are no other significant local sources of air pollution, such as from industrial processes, the AQOs for the other pollutants included within the Air Quality Standards Regulations 2010 (Ref. 10.6) should also be achieved.

iv. Local Air Quality Management Technical Guidance LAQM.TG(09) (Ref. 10.12)

10.3.18 The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their review and assessment work. Local Air Quality Management Technical Guidance LAQM.TG(09) (Ref. 10.12) is designed to support local authorities in carrying out their duties under the Environment Act 1995 (Ref. 10.5) and subsequent Air Quality Regulations (Ref. 10.9 and Ref. 10.10).

10.3.19 LAQM.TG(09) provides guidance to local authorities on when to declare an Air Quality Management Area (AQMA) should exceedences of AQOs occur. In setting an AQMA, a local authority must then formulate an Air Quality Action Plan (AQAP) to seek to reduce pollution concentrations to values below AQO levels. Progression towards this goal is managed through the on-going LAQM review and assessment process.

10.3.20 The guidance, referred to in this chapter as LAQM.TG(09), has been used where appropriate to inform the assessment presented herein.

v. The Environmental Protection Act 1990 (EPA) (Ref. 10.13)

10.3.21 The EPA 1990 (Ref. 10.13) makes provision within England, Wales and Scotland for the improved control of pollution arising from certain industrial and other processes. Part of the EPA applies to the control of dust and particulates associated with construction.

10.3.22 The EPA (Ref. 10.13) defines statutory nuisances. Definitions of statutory nuisance relevant to dust and particles are:

- “Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance”; and

- “Any accumulation or deposit which is prejudicial to health or a nuisance”.
10.3.23 Section 79 of the EPA states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

10.3.24 There are no statutory limit values for dust deposition above which ‘nuisance’ or ‘annoyance’ is deemed to exist. Nuisance/annoyance is a subjective concept and its perception is highly dependent upon the existing conditions and the change to air quality conditions which has occurred (i.e. increase in pollutant concentrations or dust deposition rates relative to background levels).

10.3.25 However, research carried out on behalf of the former Department of the Environment (DoE) (Ref. 10.14) provides some guidance as to the determination of annoyance from fugitive dust and suggests that complaints are likely when the rate of dust deposition is two to three times the normal background level of dust deposition in the area. The report suggests that it is preferable that continuous sources with a high or medium dust emission potential are separated by a stand-off distance from sensitive uses, and goes on to recommend a distance of between 100-200m separation from a significant dust emitting source (with the qualification that these distances can be reduced if appropriate, and if effective mitigation measures are identified and implemented).

d) National Planning Policy

i. Planning Policy Statement 23: Planning and Pollution Control (PPS23) (2004) (Ref. 10.15)

10.3.26 National policy for local planning authorities in England regarding local air quality and new development is provided in PPS23 (Ref. 10.15). This statement provides advice on the policies and practices that should be taken into account by those involved in the planning of any development that has the potential to cause pollution.

10.3.27 With regard to emissions to air, and specifically LAQM, PPS23 states, in Paragraph 8, that:

- “any consideration of the quality of air and potential impacts arising from development, possibly leading to an impact on health, is capable of being a material planning consideration, in so far as it arises or may arise from any land use.”

10.3.28 This is most likely to be the case in situations where the proposed development could produce an exceedence of the AQOs and result in an AQMA designation, where development is proposed in an AQMA, or where a proposed development renders a local authority’s AQAP unworkable.

10.3.29 PPS23 also states that the presence of an AQMA should not result in the sterilisation of a site from development.
e) Regional Planning Policy

10.3.30 The Government’s revocation of regional strategies was quashed in the High Court on 10 November 2010. However, on that same date the Government reiterated in a letter to Chief Planners its intention to revoke regional strategies through the Localism Bill. This letter was also challenged but, on 7 February 2011, the High Court held that the Government’s advice to local authorities that the proposed revocation of regional strategies was to be regarded as a material consideration in their planning development control decisions should stand. The decision of the High Court was upheld by the Court of Appeal on 27 May 2011. Therefore, the regional strategies remain in place but in the case of development control decisions it is for planning decision makers to decide on the weight to attach to the strategies (see Volume 1, Chapter 4 for a full summary of the position regarding the status of regional planning policy).


10.3.31 RPG 10 (Ref. 10.16) sets out the broad development strategy for the South West for the period to 2016 and beyond. Paragraph 4.9 explains that reducing the need to travel by concentrating development in and around urban areas and placing a greater emphasis on movement by foot, cycle and public transport will be important in helping to reduce air pollution overall. Policy EN2: Air Quality states:

10.3.32 “Local authorities should:

- include in their development plans and proposals policies on the location of potentially polluting developments and of sensitive developments in the vicinity of existing polluting developments, in line with guidance in PPS23 (as and when it is updated) and in Air Quality and Land Use Planning LAGM.G3(00);
- designate air quality management areas where required as part of the local air quality management process;
- ensure that air quality considerations are properly considered along with other material considerations in the planning process, particularly where any air quality management areas have been designated.”

ii. Draft Revised Regional Spatial Strategy (RSS) for the South West Incorporating the Secretary of State’s Proposed Changes for Public Consultation (July 2008) (Ref. 10.17)

10.3.33 Chapter 7 sets out the strategy’s approach to environmental quality. Within this chapter, Policy RE9: Air Quality states:

- “The impacts of development proposals on air quality must be taken into account and Local Authorities should ensure, through LDD’s that new development will not exacerbate air quality problems in existing and potential AQMA’s
- This should include considerations of the potential impacts of new developments and increased traffic levels on internationally designated
Chapter 4 provides a framework for protection, conservation and management for the natural and built environment. There are no specific policies relating to air quality within the Structure Plan.

f) Local Planning Policy


10.3.35 The Sedgemoor District Local Plan forms part of the Development Plan for the Sedgemoor. The Local Plan was adopted in September 2004 (with relevant policies ‘saved’ from 27 September 2007). The Proposals Map (Inset Map No. 14) indicates that the site is not subject to any specific air quality designations. The site lies outside of the defined Development Boundary.

10.3.36 There are no specific policies relating to air quality within the Local Plan.

10.3.37 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from September to November 2010. Changes prior to submission proposed as a result of the consultation process were reported and endorsed by the Council’s Executive Committee on 9 February 2011. The Core Strategy (Proposed Submission) was submitted to the Secretary of State on 3 March 2011 and an Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy will form part of the Development Plan for Sedgemoor.

EDF Energy submitted representations objecting to the Core Strategy (Proposed Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1, MIP2 and MIP3 contained in that chapter) and those sections relating to housing and Hinkley Point. EDF Energy also participated at the relevant EiP hearings. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the Core Strategy.

10.3.38 The following Core Strategy (Proposed Submission) policies are of potential relevance:

- Policy S3 (Sustainable Development Principles) states that development proposals will be expected to, amongst other things, protect and enhance the quality of the natural, built and historic environment.
- Policy D4 (Renewable and Low Carbon Energy Generation) states that the Council will support such proposals provided that such installations would not have significant adverse impact taking into account, amongst other things, any
unreasonable adverse impact on users and residents of the local area including the generation of emissions.

- Policy D9 (Sustainable Transport and Movement) states that proposals should contribute to the reduction of adverse environmental issues, including air pollution, through appropriate mitigation measures.

- Policy D10 (Managing the Transport Impacts of Development) states that development proposals that will have a significant transport impact should be supported by an appropriate Air Quality Assessment.

- Policy D16 (Pollution and Impacts Development and Protecting Residential Amenity) states:

  “Development proposals that are likely to result in levels of air, noise, light or water pollution (including groundwater) vibration or soil contamination that would be harmful to other land uses, human health, tranquillity or the built and natural environment will not be supported.

  Where there are reasonable grounds to suggest that a development proposal may result in a significant adverse environmental impact, the Council will require planning applications to be supported by assessments relating to [amongst other things]:

  - air pollution; and
  - carbon emissions.

  Where it is demonstrated that it is possible to manage the potential adverse impacts of the development proposals through its design or mitigation measures, the Council will, by means of condition or legal agreement, seek to ensure such measures are effective, for example improving limitations on matters including hours of operation, emissions of fumes, noise and light, parking and servicing for both construction and operational stages.”

g) Supplementary Planning Guidance

10.3.40 Sedgemoor District Council and West Somerset Council have jointly prepared draft supplementary planning guidance in relation to the HPC Project. Public consultation on the Consultation Draft version of the Hinkley Point C Project Supplementary Planning Document (the draft HPC SPD) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which object to the draft HPC SPD. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the draft HPC SPD.

10.3.41 The draft HPC SPD does not set out any specific guidance in relation to air quality impacts at the site. In relation to transport generally, Box 8 of the draft HPC SPD states that the County Council and District Councils will expect the HPC Project promoter to, amongst other things, provide necessary improvements to the transport network to mitigate against any adverse impacts on the community; including but not limited to congestion, air quality (page 19).
10.3.42 Further planning policy context is provided in the Legislative Planning Policy Context chapter (**Volume 1, Chapter 4**) and the Introduction chapter (**Volume 6, Chapter 1**).

**i. Air Quality Strategy for Somerset 2008 (Ref. 10.21)**

10.3.43 The Air Quality Strategy for Somerset 2008 (Ref. 10.21) sets out strategic recommendations for working towards improved air quality and protecting existing air quality across Somerset. The Strategy represents the culmination of air quality management work over recent years, incorporating input from all six Councils that form the administrative region of Somerset (i.e. SCC and the five local authorities of Mendip District Council, South Somerset District Council, Taunton Deane Borough Council, SDC and WSC).

10.3.44 The Strategy recognises the need to provide an integrated response to air quality management, and sets out a view to facilitating future improvements. The Strategy aims to complement the LAQM process, and the actions within the document provide a framework for how these improvements can be facilitated within Somerset.

**ii. 2010 Air Quality Progress Report (Ref. 10.22)**

10.3.45 The 2010 Air Quality Progress Report, (Ref. 10.22) prepared by SDC, forms part of the LAQM system introduced by the Environment Act 1995 (Ref. 10.5) and subsequent Air Quality Regulations (Ref. 10.9 and Ref. 10.10). This report follows on from the Council's Updating and Screening Assessment Report in 2009 (Ref. 10.23), which concluded that a detailed assessment would not be required for any pollutant. There are currently no AQMAs declared within the authority area.

10.3.46 The report identifies that ambient NO₂ pollutant concentrations were highest in Bridgwater owing to high traffic flows, reduced speed (congestion) and narrowing of the A38, with properties close to the main highway.

10.3.47 The 2010 Air Quality Progress Report concluded that no exceedences of either the annual mean or 1-hour mean NO₂ objectives were identified within the authority area. Forward projection of the NO₂ monitoring results (the only pollutant monitored by the Council) to 2010 suggested that the NO₂ annual mean AQO would likely be met.

10.3.48 SDC plans to continue with existing NO₂ monitoring and to provide an Air Quality Progress Report in 2011.

10.4 Methodology

10.4.1 The assessment and the supporting surveys have been conducted in accordance with relevant best practice guidance and standard methodologies.

10.4.2 With the exception of emissions from vehicular movements associated with the proposed development, this assessment does not consider operational phase emissions because they are considered to be insignificant.
10.4.3 The study area with respect to potential fugitive dust and particulate impacts and on-site construction plant and machinery exhaust emissions impacts is shown on Figure 10.1. Figure 10.2 shows the study area and road sources considered in the vehicular exhaust emissions impact assessment. The locations of the assessed sensitive receptors are also presented on each figure.

10.4.4 The geographical extent of the study area for the fugitive dust and particulate assessment and the on-site construction plant and machinery exhaust emissions assessment (see Figure 10.1) includes:

- sensitive receptors located within 200m of the site (distance consistent with scoping guidance provided in the Design Manual for Roads and Bridges (DMRB) (Ref. 10.24)); and
- further receptors located beyond 200m of the site which have been included based on professional judgement.

10.4.5 The geographical extent of the study area for the vehicular exhaust emissions assessment (see Figure 10.2) includes:

- the roads affected by the proposed development as identified by traffic modelling;
- sensitive receptors located within 200m of the affected roads (distance consistent with scoping guidance provided in the Design Manual for Roads and Bridges (DMRB) (Ref. 10.24));
- further receptors located beyond 200m of the affected roads which have been included based on professional judgement.

10.4.6 The receptors that have been selected have ensured that the potential worst-case impacts associated with the proposed development have been assessed. It has been assumed that the nearest (unscreened, i.e. with no current barriers between the source and receptor which would reduce air quality impacts, e.g. dense woodland) receptor locations to the proposed development or affected roads are those likely to experience the greatest air quality impacts.

10.4.7 There are no ecological receptors (i.e. statutory designated sites, including Special Areas of Conservation, Sites of Community Importance, candidate Special Areas of Conservation, Special Protection Areas, potential Special Protection Areas, Sites of Special Scientific Interest and Ramsar sites) located in close proximity to (i.e. within 200m of) the site or the affected road network, and consequently no such receptors have been considered in the assessment (see Chapter 14, Volume 6). This approach is consistent with Highways Agency guidance published in the Design Manual for Roads and Bridges (DMRB) (Ref.10.24) for the scoping of ecological receptors within air quality assessments of vehicular emissions. The site location and potential receptors to fugitive dust and particulates are shown in Figure 10.1. The site location, sensitive receptors and sources considered in the vehicular exhaust emissions assessment are shown in Figure 10.2.
b) Baseline Assessment

10.4.8 Baseline air quality characteristics for the site and surrounding areas have been identified through:

- a baseline air quality monitoring campaign;
- review of desk based information; and
- consultation with officers of WSC and SDC.

10.4.9 With respect to air quality, the nearest sensitive receptor locations comprise residential dwellings in Cannington located approximately 40m (taken from the proposed footway on the A39) from the site and approximately 8km south-east of the HPC development site. Despite the separation distance between the proposed development and the main HPC development site, given the similar characteristics of the proposed sites (i.e. both being of a rural nature), the background air quality at both locations is considered to be very similar following a comparison of background concentrations using Defra’s UK Air Quality Information Resource (UK-AIR) (Ref. 10.25) (see Section 10.5 for more information). Therefore, in order to determine the existing background air quality at the site, a baseline air quality monitoring programme was undertaken in the vicinity of the HPC development site.

10.4.10 The monitoring programme was undertaken for the pollutants (NO₂, PM₁₀ and SO₂) of primary concern (SO₂ being included in order to assess the impact of future diesel exhaust emissions from HPC construction plant and machinery (Ref. 10.26 and Ref. 10.27)). A baseline air quality monitoring survey for these pollutants was undertaken, commencing on 25 February 2009 and finishing on 15 September 2009.

10.4.11 Desk based studies carried out for the assessment included the identification and evaluation of:

- local industrial pollution emission sources within the district of Sedgemoor; and
- existing air quality - an evaluation of estimated background pollutant concentrations provided in UK-AIR (Ref. 10.25).

10.4.12 When the annual mean background pollutant concentrations obtained during this monitoring programme were compared with the pollutant background concentrations available in the desk based assessment literature, the decision was taken to use the background concentrations as determined from the baseline monitoring programme for assessment purposes (see Section 10.5 and the Air Quality Modelling Report – Ref. 10.28), because this would provide a worst-case approach in terms of evaluation of total concentrations against the AQOs.

c) Consultation

10.4.13 Meetings have been held with Environmental Health Officers (EHOs) of West Somerset Council (WSC) and Sedgemoor District Council (SDC). At a scoping consultation meeting held with both Councils on 9 December 2008, the specific requirements for the air quality assessment were discussed and agreements reached regarding the methodologies to be adopted.
10.4.14 The following advice and direction was provided by WSC and SDC, which has been taken into account within this assessment:

- baseline monitoring of NO₂ along potential vehicular routes to/from HPC is not required;
- use of UK-AIR background pollutant concentrations (Ref. 10.25) is acceptable; and
- use of Environmental Protection UK (EPUK) significance criteria (Ref. 10.29) would provide a robust assessment of potential air quality impacts.

10.4.15 A second consultation meeting was held with the above councils and Arup (representing WSC) on 1 October 2009, where the main findings of the assessment work undertaken by that time were presented. No substantial changes to the scope or assessment methodology were requested.

10.4.16 A third consultation meeting was held with Arup on 22 February 2011. The purpose of this meeting was to present additional work undertaken since the Stage 2 consultation, and to review consultation comments received at Stage 2 and consider how to address them. The following key points were agreed during the meeting:

- with regards to the vehicular emissions dispersion modelling studies, there was no need to consider varying queue lengths at junctions for each scenario modelled, but there was, however, a need to consider varying vehicle average speed for junctions within each scenario modelled; and
- exclusion of car park area sources within the vehicular dispersion modelling study should be acceptable, depending upon the size and intended usage of the car parks.

d) Assessment Methodology

i. Introduction

10.4.17 For this chapter of the ES, the generic descriptions used to define the impact and its likelihood of occurrence (probability) are those given in Volume 1, Chapter 7. However, specific assessment criteria that define the magnitude and significance of air quality impacts have been developed and are used in this assessment. These specific criteria are described below.

10.4.18 Beneficial impacts are identified, but not quantitatively assessed.

10.4.19 For the purpose of this assessment, mitigation measures have been proposed where there is an adverse impact of greater than minor (or equivalent) significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so.

10.4.20 Given the difference in the potential air quality impacts and assessment methodologies applied to fugitive dust and particulates, and vehicular/plant exhaust pollutant emissions to air, two separate assessment criteria have been developed and applied, based upon current published best practice guidance:
• vehicular/plant exhaust pollutant emissions to air – assessment criteria applied to vehicular emissions and on-site exhaust emissions to air from construction plant and machinery have been developed from guidance published in the EPUK document entitled ‘Development Control: Planning for Air Quality (2010 Update)’ (Ref. 10.29); and

• fugitive dust and particulates – best practice guidance issued by the Greater London Authority (GLA) and London Councils (Ref. 10.30), Building Research Establishment (BRE) (Ref. 10.31) and Quality of Urban Air Review Group (QUARG) (Ref. 10.32) provide guidelines that allow the evaluation of the risk of air quality impacts occurring during demolition and/or construction, and these have been adapted for consideration of fugitive dust and particulates.

ii. Assessment Criteria Applied to Vehicular Emissions and Exhaust Emissions from Construction Plant

10.4.21 The descriptors presented in Table 10.1 for the magnitude of change in pollutant concentrations have been either taken directly or developed from guidance published by EPUK (Ref. 10.29). Although criteria detailed in Table 10.1 are designed for developments producing a permanent change, it is applied in the case of the Cannington park and ride facility to a development producing a temporary change (i.e. removal of the Cannington park and ride would commence in 2022 and the site would then be restored to its existing use as agricultural land). For long-term pollutant emissions, the magnitude of change is determined based upon the magnitude of increase of the annual mean concentration of NO₂, PM₁₀ or PM₂.₅. For short-term pollutant emissions, the magnitude of change is determined based upon the number of exceedences of the short-term AQO limit concentration for PM₁₀, NO₂ or SO₂. The specific magnitude criteria for the ‘other pollutants’ which are relevant to this assessment, in relation to their defined objective and limit value, are presented in Appendix 10C.

Table 10.1: Definition of Impact Magnitude Developed for Vehicular Emissions and Exhaust Emissions to Air from Construction Plant and Machinery

<table>
<thead>
<tr>
<th>Magnitude of change a</th>
<th>Annual mean NO₂/PM₁₀ b</th>
<th>Number of days with PM₁₀ &gt; 50µg/m³ b</th>
<th>Other Pollutants b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>Increase &gt;4µg/m³</td>
<td>Increase &gt;4 days</td>
<td>Increase &gt;10%</td>
</tr>
<tr>
<td>Medium</td>
<td>Increase 2 to 4µg/m³</td>
<td>Increase 2 to 4 days</td>
<td>Increase 5-10%</td>
</tr>
<tr>
<td>Small</td>
<td>Increase 0.4 to 2µg/m³</td>
<td>Increase 1 to 2 days</td>
<td>Increase 1-5%</td>
</tr>
<tr>
<td>Imperceptible</td>
<td>Increase &lt;0.4µg/m³</td>
<td>Increase &lt;1 day</td>
<td>Increase &lt;1%</td>
</tr>
</tbody>
</table>

a The magnitude of change descriptors as provided in the EPUK guidance have been retained for the Air Quality Impact Assessment. Comparing these descriptors to the magnitude ratings used in other Chapters (Volume 1, Chapter 7), ‘imperceptible’ equates to ‘very low’, ‘small’ equates to ‘low’, ‘medium’ equates to ‘medium’, and ‘large’ equates to ‘high’.
b Taken from EPUK guidance.

10.4.22 The magnitude criteria have been applied to pollutant concentrations predicted by the modelling of vehicular emissions to air, and in addition the prediction of exhaust emissions to air from on-site construction plant and machinery.
10.4.23 Once the magnitude of the potential impact is established, the actual pollutant concentration at the receptor is then taken into account, in combination with the magnitude of change, using the approach set out below in Table 10.2.

| Absolute Concentration in Relation to relevant Objective/Limit Value | Change in Concentration or Number of Exceedences \(a, b, c\) |
|---|---|---|
| **Above objective/limit value with scheme** | | |
| Annual mean PM\(_{10}/\text{NO}_2\) concentration >40µg/m\(^3\) | Slight adverse | Moderate adverse | Substantial adverse |
| 24-hour PM\(_{10}\) objective >35 exceedences | | | |
| Other pollutants >100% objective/limit value | | | |
| **Just below objective/limit value with scheme** | | | |
| Annual mean PM\(_{10}/\text{NO}_2\) concentration 36 to 40µg/m\(^3\) | Slight adverse | Moderate adverse | Moderate adverse |
| 24-hour PM\(_{10}\) objective 32 to 35 exceedences | | | |
| Other pollutants 90-100% objective/limit value | | | |
| **Below objective/limit value with scheme** | | | |
| Annual mean PM\(_{10}/\text{NO}_2\) concentration 30 to 36µg/m\(^3\) | Negligible | Slight adverse | Slight adverse |
| 24-hour PM\(_{10}\) objective 26 to 32 exceedences | | | |
| Other pollutants 75-90% objective/limit value | | | |
| **Well below objective/limit value with scheme** | | | |
| Annual mean PM\(_{10}/\text{NO}_2\) concentration <30µg/m\(^3\) | Negligible | Negligible | Slight adverse |
| 24-hour PM\(_{10}\) objective <26 exceedences | | | |
| Other pollutants <75% objective/limit value | | | |

\(a\) The impact descriptors as provided in the EPUK guidance have been retained for the Air Quality Impact Assessment. Comparing these descriptors to the impact significance criteria used in other ES Chapters (see Volume 1, Chapter 7), ‘negligible’ equates to ‘negligible’, ‘slight adverse’ equates to ‘minor adverse’, ‘moderate adverse’ equates to ‘moderate adverse’, and ‘substantial adverse’ equates to ‘major adverse’. However, the above air quality impact descriptors are only used as a tool to describe predicted impacts; whether air quality impacts are assessed as significant or not significant is based upon the professional judgement of the air quality expert performing the assessment (as is recommended in the EPUK guidance).

\(b\) See Table 10.1.

\(c\) An imperceptible change (see Table 10.1) would be described as ‘negligible’.

10.4.24 The criteria presented in Table 10.1 and Table 10.2 have been used for describing the impact at each specific receptor. This has then been used to inform the evaluation of the overall significance of impacts. The latest EPUK guidance (Ref. 10.29) allows for the greater application of professional judgement when assessing impact significance than was prescribed in earlier versions. Impacts are therefore assessed as significant or not significant using the professional judgement of the air quality assessor. The EPUK guidance (Ref. 10.29) states that considerations in making these decisions should include:
• the number of properties affected by slight, moderate or substantial air quality impacts;

• the number of people exposed to poor air quality when a development introduces new exposure into an existing area of poor air quality;

• the magnitude of the changes and descriptions of the impacts at receptors;

• the exceedence of an objective or limit value predicted to arise where none existed before or size of an exceedence area is substantially increased as a result of the development;

• where existing air quality in the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced as a result of the development;

• where development interferes significantly with or prevents the implementation of actions within an AQAP;

• where development interferes significantly with the implementation of a local air quality strategy;

• uncertainty of the results; and

• the extent to which an objective or limit value is exceeded.

10.4.25 The specific impact descriptor criteria for the ‘other pollutants’ which are relevant to this assessment, in relation to their defined objective and limit values, are presented in Appendix 10C.

iii. Assessment Criteria Applied to Fugitive Dust and Particulates

10.4.26 As previously noted, best practice guidance (Ref. 10.30, 10.31, 10.32) has been adapted for consideration of fugitive dust and particulates generated by construction works associated with the proposed development. The guidance consolidates existing best practice used in London, the UK and other countries in order to provide a consistent approach in reducing emissions from construction activities. The evaluation criteria used to define risk are presented in Table 10.3.

<table>
<thead>
<tr>
<th>Risk Categories</th>
<th>Criteria</th>
</tr>
</thead>
</table>
| Low Risk Site     | • development of up to 1,000m$^2$ of land; and  
                    • potential for emissions and dust to have an infrequent impact on sensitive receptors. |
| Medium Risk Site  | • development between 1,000 and 15,000m$^2$ of land; and  
                    • potential for emissions and dust to have an intermittent or likely impact on sensitive receptors. |
| High Risk Site    | • development of greater than 15,000m$^2$ of land; and  
                    • major Development as defined by the Local Planning Authority (LPA); and  
                    • potential for emissions and dust to have a significant or likely impact on sensitive receptors. |
10.4.27 The above classifications are proposed in the absence of specific fugitive dust and particulates mitigation measures. They are used in combination with site specific conditions to inform the assessment of the significance of the potential impact of fugitive dust and particulates from the proposed development.

10.4.28 Once the risk category has been established by following the above methodology, the degree of significance of an adverse impact is then determined for each potential impact from the Impact Assessment Matrix shown below in Table 10.4. The impact criteria in Table 10.4 have been developed specifically for assessment of the construction impacts of fugitive dust and particulates based on best practice guidance issued by the GLA and London Councils (Ref. 10.30).

Table 10.4: Impact Significance Assessment Matrix for Fugitive Dust and Particulates

<table>
<thead>
<tr>
<th>Distance to Human Receptors (m)</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-200</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Minor</td>
</tr>
<tr>
<td>50-100</td>
<td>Minor</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>0-50</td>
<td>Minor</td>
<td>Moderate</td>
<td>Major</td>
</tr>
</tbody>
</table>

*a Distance to a human receptor of greater than 200m is assessed as ‘negligible’.

10.4.29 The 200m distance to receptor criterion is based on the distance beyond which no significant impacts are expected for road traffic emissions (Ref. 10.24). The 100m distance to receptor criterion is based on guidance which assumes that the majority of dust is deposited within 100m of the emissions sources (Ref. 10.33). The 50m criterion allows the identification of properties which are close to the source and therefore likely to experience a greater magnitude of impact during construction activities. Figure 10.1 illustrates these respective distance criteria in relation to the site boundary.

iv. Assessment of Impacts from Vehicular Emissions

10.4.30 The proposed development forms part of an overall mitigation strategy proposed to alleviate construction traffic impacts associated with the development of the HPC Project. As well as limiting traffic congestion and other potential environmental impacts, such as impacts on noise and vibration, these mitigation measures are intended to help reduce local air quality impacts from road traffic during the construction phase of the HPC Project.

10.4.31 Given the wide geographical extent of the proposed HPC Project and the potential area over which receptors may be impacted due to HPC Project related vehicular emissions, the potential impacts have been spatially disaggregated. Therefore, this assessment focuses upon the potential air quality impacts of vehicular emissions from HPC Project-related traffic at the identified worst-case sensitive receptor group locations along those routes closest to the proposed site. Volume 2, Chapter 12 discusses the overall wider context of the HPC Project and provides a summary of the overall air quality impacts predicted at all identified worst-case sensitive receptor group locations within the HPC Project study area as a whole.
10.4.32 Air quality impacts associated with HPC Project related vehicular emissions have been determined by comparing the magnitude of change between the air quality predicted for the future assessment year with the HPC Project (the ‘with development’ scenario) against the air quality predicted for the future assessment year in the absence of the HPC Project (the ‘without development’ scenario). This information has been used in combination with an evaluation of the air quality predicted for the ‘with development’ scenario against the relevant UK AQOs in order to determine the significance of the potential air quality impacts. The approach taken to this assessment is explained in the following paragraphs of this chapter (see section 10.4iv).

10.4.33 This assessment of the air quality impacts of vehicular emissions from HPC Project-related traffic on sensitive receptors located on routes in the vicinity of the proposed Cannington park and ride site (that is presented in this Chapter) forms part of a wider assessment of HPC Project-related vehicular emissions which is presented in Volume 2, Chapter 12 and Chapter 10 in each of Volumes 3 to 10.

10.4.34 Within the UK, assessments of air quality impacts related to emissions from road traffic tend to focus only upon NO₂ and fine particulate matter (PM₁₀ and PM₂.₅) concentrations in the atmosphere. This is because exhaust emissions of the other air pollutants associated with road traffic (SO₂, carbon monoxide (CO) and hydrocarbons, including benzene and 1,3-butadiene) are only released in relatively small quantities and urban roadside concentrations are all well within the relevant UK AQOs. It is only NO₂, PM₁₀ and PM₂.₅ that currently pose a human health concern where road traffic is the dominant source of air pollution, and which are close to and, in some traffic-congested urban areas, above AQOs. All the AQMAs in the UK that have been declared as a result of road traffic emissions have been declared either for NO₂ or for both NO₂ and PM₁₀. In this way, local authority review and assessment can be cost-effectively targeted at the pollutants of real concern and the insignificant pollutants can be scoped out of the assessment. This applies equally to the EIA process.

10.4.35 Consequently, detailed dispersion modelling and subsequent assessment of NO₂, PM₁₀ and PM₂.₅ emissions to air arising from road traffic has been undertaken.

10.4.36 For the prediction of air quality impacts due to emissions arising from road traffic associated with the HPC Project, the air pollutant dispersion model ADMS-Roads has been used. This model, developed by Cambridge Environmental Research Consultants (CERC), uses detailed information regarding traffic flows and composition on the local road network, combined with local meteorological conditions, to predict pollution concentrations at specific locations selected by the user. ADMS-Roads version 3.0 with Surfer version 9 was used for this study.

10.4.37 Full details of the ADMS-Roads dispersion modelling study which has been undertaken are presented in the Air Quality Modelling Report (Ref. 10.28). In summary, the traffic data used for the road traffic air quality impact assessment has been taken from the validated Paramics micro-simulation traffic model built to assess the effect of the HPC Project proposals. For each modelling scenario the output traffic data from the Paramics model were factored using Automatic Traffic Count data to provide 24-hour Annual Average Daily Traffic (AADT) data for Light Duty
Vehicles (LDVs) and Heavy Duty Vehicles (HDVs). The 24-hour AADT traffic input data relevant to the assessment is presented in Appendix 10D.

10.4.38 Given the large spatial extent of the road network to be considered within the modelling domain (which includes all the proposals for the HPC Project), three ADMS-Roads models were set-up and run, encompassing the three main geographical areas within the overall HPC Project study area; one for the road network around Cannington (the ‘Cannington model’), one for the road network around Bridgwater (the ‘Bridgwater model’) and one for the road network around Williton (the ‘Williton model’). The Cannington park and ride site was included within the ‘Cannington model’ (Ref. 10.28).

10.4.39 Annual mean pollutant concentrations (NO\textsubscript{2}, PM\textsubscript{10} and PM\textsubscript{2.5}) were predicted for discrete human receptors, which include locations adjacent, or near, to the routes that are likely to experience a change in traffic flow or composition as a result of the proposed development. These discrete human receptors have been selected to be representative of the likely worst-case impacts and benefits which may occur in the area surrounding the road network where traffic flows and/or composition may be affected by the proposed development (see Figure 10.2).

10.4.40 The number of potential exceedences of the short-term relevant AQOs were estimated using published relationships between the annual mean and short-term pollutant concentrations. LAQM.TG(09) (Ref. 10.12) advises that it is valid to assume that exceedences of the 1-hour mean AQO for NO\textsubscript{2} are only likely to occur where annual mean concentrations are 60\(\mu\text{g/m}^3\) or greater.

10.4.41 An empirical relationship between the annual mean and the number of exceedences of the 24-hour mean AQO for PM\textsubscript{10} is also provided within LAQM.TG(09) (Ref. 10.12):

\[
\text{Number of 24-hour mean exceedences} = -18.5 + 0.00145 \times \text{annual mean}^3 + \frac{206}{\text{annual mean}}
\]

10.4.42 This relationship was used to determine whether exceedences of short-term PM\textsubscript{10} AQO are likely, based upon the annual PM\textsubscript{10} concentrations predicted by the model.

10.4.43 The model-predicted pollutant concentrations were verified against available monitoring data, following the methodology published in LAQM.TG(09) (Ref. 10.12), in order to minimise modelling uncertainty and systematic error. This involved correcting modelled results by an adjustment factor to gain greater confidence in the final results. Full details of the verification procedure are presented in the Air Quality Modelling Report (Ref. 10.28). However, in summary, an adjustment factor of 6.589 was applied to the modelled road NO\textsubscript{x} contributions predicted by the Cannington model. In the absence of roadside monitoring data for particulate matter and in line with the recommendations provided in LAQM.TG(09) (Ref. 10.12), the same verification factor was also applied to PM\textsubscript{10} and PM\textsubscript{2.5} modelled road contributions. The impact assessment was undertaken using these verified results, and all discussion herein therefore refers to verified model outputs.
10.4.44 Quantitative assessment of the impacts on local air quality from vehicular emissions associated with traffic generated by the proposed HPC Project was then completed through a comparison to modelled pollutant concentrations with the current statutory standards and objectives set out in Appendix 10B.

10.4.45 For the assessment, five scenarios have been modelled:

- 2009 ‘model verification/baseline’;
- 2013 ‘without development’;
- 2013 ‘with development’;
- 2016 ‘without development’; and
- 2016 ‘with development’.

10.4.46 2009 was selected as the model verification/baseline year (model verification is discussed in detail within the Air Quality Modelling Report (Ref. 10.28)), as, at the time the assessment was undertaken, this was the most recent year for which monitoring data, meteorological data, traffic data and emissions factors were all available.

10.4.47 2013 was selected as an assessment year as it represents the year with peak HDV movements relating to the proposed HPC Project, prior to operation of (i.e. during the construction of) the various associated developments, which are specifically intended to minimise adverse impacts on the highway network during the construction of HPC. The 2013 scenario has been used to represent the period in which the proposed development (and other off-site associated developments) would be in the construction phase.

10.4.48 The 2013 ‘without development’ scenario represents the future 2013 baseline scenario, and includes forecast traffic growth with committed development (unrelated development with extant planning permission) only (see Chapter 8 of this volume for information on what committed development has been included).

10.4.49 The 2013 ‘with development’ scenario includes:

- forecast traffic growth including committed development;
- construction of the proposed HPC power station (preliminary works traffic associated with peak heavy duty vehicles (HDV) movements in Quarter 3 2013);
- construction of the proposed development; and
- construction of the other proposed off-site associated developments.

10.4.50 2016 was selected to represent the year with peak construction related traffic movements associated with the HPC Project (peak workforce at the HPC development site), following the commencement of operation of the other proposed associated developments. The 2016 scenario has been used to represent the period in which the proposed development (and other off-site associated developments) would be operational.
10.4.51 The 2016 ‘without development’ scenario represents the future 2016 baseline scenario and includes forecast traffic growth with only committed development (see Chapter 8 of this volume for information on what committed development has been included).

10.4.52 The 2016 ‘with development’ scenario includes:

- forecast traffic growth including committed development;
- construction of the proposed HPC power station (peak workforce at the HPC development site);
- operation of the proposed development (i.e. the Cannington park and ride site); and
- operation of the other proposed off-site associated developments.

10.4.53 Car parks have not been included within the ADMS model on the basis of their size and intended usage. Car parking spaces (including van/mini-bus spaces) have been limited to 252 at the Cannington park and ride facility (132 for HPC construction workers; 120 for visitors to the HPC site).

10.4.54 A detailed description of the traffic data scenarios used in the assessment are contained within the Transport Chapter (Chapter 8 of this volume). Provision for a car sharing scheme and further travel plan measures (including the proposed highways improvement plans) to mitigate traffic impacts was made in the impact assessment presented herein. Consideration has also been given to non-work (i.e. leisure) vehicle movements of the HPC construction staff using the road network, and the impacts associated with such movements are included within the presented assessment.

v. Assessment of Impacts from Fugitive Dust and Particulates

10.4.55 A qualitative assessment of the potential air quality impacts due to the generation and dispersion of fugitive dust and particulates during construction of the proposed development has been undertaken using information in guidance documents produced by the following organisations:

- Building Research Establishment (BRE) (Ref. 10.31).
- Quality of Urban Air Review Group (QUARG) (Ref. 10.32).
- GLA and London Councils (Ref. 10.30).

10.4.56 As there are no formal assessment criteria for fugitive dust and particulates generation and dispersion, the significance of impacts associated with the construction of the proposed development has been determined qualitatively by:

- Identifying the site construction works activities that could generate fugitive dust and particulates and their likely duration.
• Identifying sensitive receptors (e.g. schools, residential properties, statutory designated ecological sites) within 200m of the defined site boundary or closest area of site construction activity (or receptors located at greater distance from the site which have been included based on professional judgement).

• Taking account of the prevailing wind direction and wind speed.

10.4.57 The potential impact of fugitive dust and particulates on the closest human receptors to the proposed development site has been considered. As described above, these human receptors are illustrated in Figure 10.1.

ti. Assessment of Impacts from Exhaust Emissions from Construction Plant

10.4.58 Emissions to air from the exhausts of construction plant and machinery were also assessed qualitatively, based on the assumed likely items of equipment and plant expected to be used during the site construction works and their likely duration of use. The significance of these emissions was then determined against the criteria described in Section 10.4ii above.

ti. Cumulative Impacts

10.4.59 Volume 1 Chapter 7 of this ES sets out the methodology used to assess cumulative impacts. The only exception is cumulative air quality impacts from vehicle emissions, which are presented within this chapter, as the traffic data used for the assessment includes both development-related traffic associated with all aspects of the HPC Project and other committed development in the study area. The assessment of cumulative impacts of the proposed development with other elements of the HPC Project, and other proposed projects, is presented in Volume 11 of this ES.

e) Limitations, Constraints and Assumptions

10.4.60 Whilst average speeds of queuing traffic specific to each link and scenario have been applied to each ADMS-Roads modelled scenario, queuing distances determined for the 2009 scenario were applied to all of the ADMS-Roads modelled scenarios. However, sensitivity analysis which has been undertaken indicates that queuing distances do not substantially impact the model predicted pollutant concentration results obtained (Ref. 10.27).

10.4.61 The entire modelled road network was input within the ADMS-Roads models at an elevation of 0m. This is consistent with recommendations made by CERC, which state that terrain effects need only be included where the gradient exceeds 1 in 10. ADMS-Roads does not allow road cuttings (which may reduce impacts at receptors located in immediate proximity to the road within the cutting) to be entered within the model. However, sensitivity analysis which has been undertaken indicates that this does not significantly impact the model predicted pollutant concentration results obtained and is likely to represent a worst-case approach as a receptor on the edge of a cutting is likely to be more exposed and therefore subject to increased turbulence and so greater dispersion (Ref. 10.27).

10.4.62 Assumptions have been made about the type of equipment and machinery to be used during the construction works based upon likely methods to be adopted and previous development project experience, but contractors may adopt different
working methods to reach the same goals. The assessment presented herein has therefore adopted a worst-case approach, wherever possible.

10.4.63 Despite the limitations, constraints and assumptions noted above, the approach and methodology adopted for this chapter is both transparent and consistent with relevant legislation (Volume 1, Chapter 7) and key guidance. The assessment is considered to give an appropriate representation of the assessment scenarios, and the approach has been discussed and agreed with the local authorities.

10.5 Baseline Environmental Characteristics

a) Introduction

10.5.1 This section describes the baseline environmental characteristics for the site and surrounding areas with specific reference to air quality.

b) Study Area Description

i. Environmental Setting

10.5.2 The site is located in a rural setting immediately to the south of Cannington village and approximately 8km to the south-east of the proposed HPC development site.

10.5.3 The site lies within a landscape characterised primarily by activities of an agricultural nature. The main arterial road in the study area is the A39 which lies immediately to the south of the site.

ii. Local Emission Sources

10.5.4 SDC has not identified any industrial sources of emission which may substantially impact air quality (Ref. 10.22 and Ref. 10.23) within the Sedgemoor district. This was confirmed by an Environment Agency ‘What’s in your backyard?’ search, carried out in August 2011 (Ref. 10.34).

10.5.5 The main existing source of air pollutants within the study area is road traffic. In addition to the M5 motorway, SDC has identified the A38 and A39 as the most substantial sources of vehicle emissions to air in the district. SDC currently undertakes air quality monitoring for NO₂ at ten roadside locations within Bridgwater. SDC’s diffusion tube monitoring identified in 2009 annual mean NO₂ concentrations at these locations to be below the annual mean NO₂ AQO limit concentration of 40µg/m³.

10.5.6 Fugitive dust and particulates also arise in the site locality, both as a natural consequence (wind turbulence and subsequent suspension) and due to agricultural operations such as ploughing. The significance of these existing sources will increase during periods of continuous dry weather and increased wind speeds. Furthermore, due to the site’s proximity to the coast, the presence of marine aerosols may also constitute a substantial natural local source of particulates.
iii. Existing Air Quality

*UK-Air Quality Information Resource*

10.5.7 Estimated ambient background pollutant concentrations are provided in Defra’s UK-AIR (Ref. 10.25). Concentrations are provided for each 1km x 1km grid square for the entire UK. These background concentrations have been calculated from a base year of 2008 (or 2001 in the case of some pollutants, including SO2), with projections provided for all years up to and including 2020, using the National Atmospheric Emissions Inventory (NAEI) and associated projections.

10.5.8 Estimated background concentrations from Defra’s UK-AIR are available for PM10, PM2.5, NO2, NOx, SO2, CO, benzene and 1,3-butadiene. Table 10.5 below summarises the NO2, PM10, PM2.5 and SO2 background concentrations obtained for 2009 from Defra’s UK-AIR for the four grid squares located closest to the site (for the purposes of this assessment, data are only required for these pollutants - see Section 10.4 of this chapter).

<table>
<thead>
<tr>
<th>OS National Grid Reference</th>
<th>2009 Annual Mean Background Concentration (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO2</td>
</tr>
<tr>
<td>325500, 138500</td>
<td>7.2</td>
</tr>
<tr>
<td>326500, 138500</td>
<td>7.9</td>
</tr>
<tr>
<td>325500, 139500</td>
<td>10.6</td>
</tr>
<tr>
<td>326500, 139500</td>
<td>7.8</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>8.4</strong></td>
</tr>
</tbody>
</table>

*In the absence of annual adjustment factors for SO2, the 2001 background concentrations for SO2 obtained from Defra’s UK Air Quality Information Resource have been taken to represent the 2009 background SO2 concentration.*

10.5.9 Averaging the concentrations for these four squares provides 2009 annual mean background concentrations for NO2, PM10 and PM2.5 of 8.4µg/m³, 13.9µg/m³ and 8.4µg/m³ respectively. In the absence of annual adjustment factors for SO2, the background SO2 annual mean concentration from 2001 has been taken to represent the 2009 background, with an average value of 2.1µg/m³. This value for SO2 is likely to be an overestimate of the current background concentration, in light of tighter restrictions being imposed regarding the sulphur content of fuels since 2001, thus decreasing SO2 emissions to air. The UK annual mean NO2 and PM10 AQOs are both set at 40µg/m³, whilst the annual mean PM2.5 AQO is set at 25µg/m³. There is no annual mean UK AQO for SO2.

10.5.10 In relation to the ‘without development’ scenarios for 2013 and 2016, the future baseline conditions over what would be the duration of the Project (but in the absence of the Project) would be expected to marginally improve year on year. Minor improvements to baseline air quality conditions are anticipated with time as a result of technological improvements (to vehicle engines and industrial processes), legislative measures and government incentives to improve air quality.
10.5.11 SDC's 2010 Air Quality Progress Report (Ref. 10.22) provides the latest published review and assessment of air quality in the district. SDC currently undertakes passive diffusion tube monitoring for NO\textsubscript{2} at 22 locations within the towns of Bridgwater, Highbridge, Cheddar, and at a number of bridges along the M5 motorway. These represent roadside, urban centre and background locations. No other air pollutants are monitored.

10.5.12 The 2009 annual mean (bias adjusted) NO\textsubscript{2} concentrations for the 22 monitoring sites ranged between 9.2\(\mu\text{g/m}^3\) and 39.2\(\mu\text{g/m}^3\). Study of the diffusion tube results has not identified any locations within the district that are expected to exceed the annual mean NO\textsubscript{2} AQO of 40\(\mu\text{g/m}^3\). There are also therefore no potential exceedences of the 1-hour mean NO\textsubscript{2} AQO of 200\(\mu\text{g/m}^3\).

10.5.13 The SDC NO\textsubscript{2} diffusion tube monitoring data from three roadside monitoring locations in Bridgwater was used for ADMS-Roads model output verification purposes (Ref. 10.28).

c) Baseline Air Quality Monitoring Campaign

10.5.14 Full details and results of the air quality monitoring programme are presented in the 'Final Air Quality Monitoring Report' (Ref. 10.27). In summary, following the methodology provided in LAQM.TG(09) (Ref. 10.12) to calculate annual background concentrations from monitoring data of less than a full year, background baseline pollutant concentrations of 6.8\(\mu\text{g/m}^3\), 18.2\(\mu\text{g/m}^3\) and 1.8\(\mu\text{g/m}^3\) were obtained for the year 2009 at Hinkley Point, for NO\textsubscript{2}, PM\textsubscript{10} and SO\textsubscript{2} respectively.

10.5.15 Comparison of the 2009 pollutant background concentrations obtained from the monitoring results with the 2009 pollutant background concentrations obtained for the locality of the site from Defra’s UK-AIR, show that the NO\textsubscript{2} monitoring derived 2009 background concentration is 19.0% lower, and the PM\textsubscript{10} monitoring derived 2009 background concentration 30.9% higher, than Defra derived background pollutant levels. The monitoring derived SO\textsubscript{2} value confirms the earlier conclusion that actual 2009 values are less (in this case 16.7% lower) than those estimated for 2001.

10.5.16 This comparison confirms that use of the baseline pollutant concentrations, as determined from the baseline air quality monitoring programme, constitutes a worst-case approach for assessment purposes within the Cannington ADMS-Roads model (see Air Quality Modelling Report (Ref. 10.28)).

10.5.17 The baseline air quality monitoring programme confirmed that the ambient background air quality in the immediate vicinity of Hinkley Point can be generally categorised as good, with both annual mean NO\textsubscript{2} and PM\textsubscript{10} background concentrations well below the 40\(\mu\text{g/m}^3\) annual mean UK AQO limits. As discussed previously in Section 10.4, given the similar characteristics of the proposed Cannington park and ride facility site and the area in the vicinity of HPC, the background concentrations derived from the baseline monitoring are considered to be representative of background concentrations in the locality of the Cannington site.
10.5.18 The baseline air quality monitoring campaign confirmed that the air quality in the immediate vicinity of Hinkley Point can be generally categorised as good, with both annual mean NO₂ and PM₁₀ concentrations well below the 40µg/m³ annual mean UK AQO limits.

d) Receptors and Identified Value and Sensitivity

10.5.19 The human receptors considered in this assessment, i.e. those residents local to the site (as illustrated in Figure 10.1) and those residents located along the affected road network, as illustrated in Figure 10.2, are all of high value and high sensitivity in terms of local air quality impacts.

10.5.20 Table 10.6 below provides a summary of the sensitivity of the receptors that have been considered in this assessment to potential air quality impacts from the proposed development.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Exposure</th>
<th>Sensitivity</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human receptors at residential locations near to the site boundary (as</td>
<td>Continuous long-term</td>
<td>High</td>
<td>Potential adverse health impacts may be possible as a result of continuous long-term exposure to potentially elevated air pollutant concentrations</td>
</tr>
<tr>
<td>illustrated in Figure 10.1) and along the affected road network (as</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>illustrated in Figure 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Users of footpaths and Public Rights of Way (PRoW) (human receptors -</td>
<td>Transient short-term</td>
<td>Low</td>
<td>Potential adverse health impacts are not expected as a result of transient short-term exposure to potentially elevated air pollutant concentrations</td>
</tr>
<tr>
<td>casual walkers and hikers)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10.5.21 Due to the low sensitivity assigned to users of PRoW and the confidence with which it can be concluded that the magnitude of impact will be no greater than medium (given the nature of the activities associated with the proposed development that could lead to impacts upon air quality) it is considered that there will be no circumstance where significant air quality impacts will occur to users of PRoW. On this basis the consideration of impacts upon users of PRoW is scoped out of further assessment.

10.6 Assessment of Impacts

a) Introduction

10.6.1 For the proposed development, the impact assessment with respect to air quality on the existing environment covers the following issues:

- qualitative assessment of fugitive dust and particulate emissions during the construction works;
- qualitative assessment of exhaust emissions of on-site plant and machinery, during the construction works;
quantitative assessment of road traffic emissions along effected routes during the construction and operation of the proposed development; and

qualitative assessment of potential air quality impacts during the post-operational activities of the proposed development.

10.6.2 EDF Energy is committed to implementing best practice measures to minimise dust impacts, especially in the vicinity of sensitive receptors. These measures would be used during construction and in this sense are part of the "design". However, the risk based methodology for assessing dust impacts requires that such measures must be taken into account as mitigation. These measures are described in the mitigation section below.

b) Construction Impacts

iv. Fugitive Dust and Particulate Matter Generated by Construction Activities

10.6.3 The extent to which dust and particulate matter generation and possible nuisance arising from construction activities might occur is difficult to assess quantitatively. Dust and particulate levels due to emissions directly from the site and any roadways including haulage roads (if dry), would depend upon various factors at any one time, including:

- nature of work being undertaken;
- wind direction;
- wind speed;
- precipitation;
- type and quantity of material being handled;
- particle size distribution of the material being handled; and
- moisture content of the material being handled.

10.6.4 Although dust levels would be greatest when there is a plentiful supply of fine, dry particles, the majority of these influencing factors are dependent upon both site working methods and weather conditions. As a consequence, the uncertainties associated with estimated emission factors are too great for meaningful numerical predictions to be made. A qualitative approach has therefore been taken. Assessment of the potential implications of contaminated dust arising from the construction activities is presented within Chapter 12 of this volume.

Assumed Construction Plant

10.6.5 In order to evaluate fugitive dust and particulate generation during the phase it is necessary to define the various activities that would be undertaken. Construction contractors may use different working methods and plant. However, it is possible to undertake a generic assessment of air quality impacts based on expected methods of working gained from experience with previous similar developments. In undertaking this assessment, a worst-case approach has been taken by considering the upper range estimates for required plant numbers, which therefore provides a
conservative basis for the assessment of potential air quality impacts. This assessment also considers all combined elements of construction at the site, as opposed to each in isolation, i.e. consideration has been given to any potential overlap as a result of multiple activities being undertaken at the same time.

10.6.6 Chapter 3 of this volume provides a breakdown of the likely type of plant (Non-Road Mobile Machinery - NRMM) and equipment associated with the construction phase of the proposed development.

Local Climate Conditions

10.6.7 Meteorological data covering the period 1 January 2005 to 31 December 2009 were obtained for the Hinkley Point site from the United Kingdom Meteorological Office (UKMO) Numerical Weather Prediction model to provide an indication of prevailing wind directions and the frequency of moderate to strong winds. These wind data and accompanying precipitation rate data are considered representative of the meteorological conditions prevalent at the Cannington park and ride site and were therefore used to assess the likelihood of receptors located in the vicinity of the site being affected by fugitive dust and particulate emissions.

10.6.8 Wind sectors have been assigned for the hourly meteorological data for Hinkley Point (covering the period 2005 to 2009), based upon the reported wind direction (degrees). Each wind sector category represents the mid-point of each wind sector ±11.25°, e.g. the mid-point of north north-west (NNW) is 337.50°, and therefore any winds with a bearing ranging from 326.25° to 348.75° have been classified as NNW. Each of the 16 wind sectors thus represents 22.5°.

10.6.9 The wind rose for 2005 to 2009 (see Figure 10.3) illustrates a predominant wind direction from the west north-west (WNW) at 18.0% of the time, with winds from the west also occurring frequently at 10.5% of the time. These are followed by southerly and west-south-westerly (WSW) winds, both at a frequency of 7.2%. Wind directions from the north and NNW occur relatively infrequently (2.4% and 2.6% of the time, respectively).

10.6.10 Table 10.7 presents the frequency of winds as a percentage of all winds at Hinkley Point between 2005 and 2009, for each wind direction within specified wind speed categories. Calm conditions (<0.5m/s) occur for only 0.4% of the time. Wind speeds between 0.5 and 5.0m/s occur for approximately 45.7% of the time, whilst winds of above 5m/s occur for around 53.9% of the time.
Table 10.7: Frequency of Winds as a Percentage of all Winds at Hinkley Point between 2005 and 2009

<table>
<thead>
<tr>
<th>Wind speed (m/s)</th>
<th>Wind direction (°)</th>
<th>N</th>
<th>NNE</th>
<th>NE</th>
<th>ENE</th>
<th>E</th>
<th>ESE</th>
<th>SE</th>
<th>SSE</th>
<th>S</th>
<th>SSW</th>
<th>SW</th>
<th>WSW</th>
<th>W</th>
<th>WNW</th>
<th>NW</th>
<th>NNW</th>
<th>TOTAL (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-0.5</td>
<td></td>
<td>0.02</td>
<td>0.03</td>
<td>0.04</td>
<td>0.01</td>
<td>0.03</td>
<td>0.02</td>
<td>0.03</td>
<td>0.03</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5-5.0</td>
<td></td>
<td>1.47</td>
<td>1.90</td>
<td>2.61</td>
<td>2.65</td>
<td>2.30</td>
<td>2.69</td>
<td>3.10</td>
<td>3.42</td>
<td>3.95</td>
<td>3.69</td>
<td>2.95</td>
<td>2.27</td>
<td>2.38</td>
<td>5.36</td>
<td>3.27</td>
<td>1.68</td>
<td>45.69</td>
</tr>
<tr>
<td>5.0-7.5</td>
<td></td>
<td>0.60</td>
<td>1.25</td>
<td>1.68</td>
<td>1.70</td>
<td>0.99</td>
<td>0.83</td>
<td>1.20</td>
<td>1.32</td>
<td>2.14</td>
<td>2.05</td>
<td>2.35</td>
<td>2.39</td>
<td>3.10</td>
<td>6.65</td>
<td>2.25</td>
<td>0.60</td>
<td>31.10</td>
</tr>
<tr>
<td>7.5-10.0</td>
<td></td>
<td>0.21</td>
<td>0.45</td>
<td>0.80</td>
<td>0.64</td>
<td>0.19</td>
<td>0.24</td>
<td>0.33</td>
<td>0.50</td>
<td>0.85</td>
<td>0.83</td>
<td>0.99</td>
<td>1.73</td>
<td>2.87</td>
<td>3.97</td>
<td>1.15</td>
<td>0.18</td>
<td>15.93</td>
</tr>
<tr>
<td>&gt;10.0</td>
<td></td>
<td>0.10</td>
<td>0.11</td>
<td>0.17</td>
<td>0.14</td>
<td>0.06</td>
<td>0.03</td>
<td>0.07</td>
<td>0.12</td>
<td>0.28</td>
<td>0.27</td>
<td>0.23</td>
<td>0.78</td>
<td>2.12</td>
<td>1.96</td>
<td>0.35</td>
<td>0.10</td>
<td>6.89</td>
</tr>
<tr>
<td>TOTAL %</td>
<td></td>
<td>2.40</td>
<td>3.75</td>
<td>5.28</td>
<td>5.17</td>
<td>3.56</td>
<td>3.80</td>
<td>4.72</td>
<td>5.38</td>
<td>7.24</td>
<td>6.87</td>
<td>6.54</td>
<td>7.20</td>
<td>10.49</td>
<td>17.96</td>
<td>7.04</td>
<td>2.59</td>
<td>100.00</td>
</tr>
</tbody>
</table>
10.6.11 Although the critical wind speed for raising particles into the air would be dependent upon the physical condition of the surface and the size range of particles present, the potential for the generation of airborne dust would increase with elevated wind speed.

10.6.12 A wind rose showing the frequency of winds of a speed greater than 5m/s is presented in Figure 10.4 (wind-blown dust arising, for example as a result of erosion of stockpiled material, typically occurs with winds in excess of 5.4m/s (Ref. 10.30)). Wind directions from the WNW and westerly sectors occur most frequently for the higher wind speeds, accounting for 23.3% and 15.0% of winds above 5m/s, respectively.

10.6.13 Airborne dust levels are also more likely to be elevated during periods of prolonged warm, dry weather. During periods of wetter weather, precipitation not only minimises the amount of fugitive dust and PM$_{10}$ that becomes airborne, but also removes existing airborne dust and PM$_{10}$ from the atmosphere via washout and rainout. Analysis of precipitation rate data between 2005 and 2009 for Hinkley Point indicates that dry conditions are prevalent for 67.0% of time. Thus, for the remaining 33.0% of the time, airborne fugitive dust and PM$_{10}$ levels are not likely to be significant and thereby cause annoyance.

Receptor Location Relative to Source

10.6.14 The distance from the dust source to the sensitive receptor location is also critical. Both airborne dust and particle concentrations, and dust deposition rates, decrease rapidly with distance from the source. This is primarily due to dispersion and dilution effects, but is also enhanced by the rapid deposition of the larger particles. The very largest particles usually only travel 10 to 20m before being deposited. PM$_{10}$ particles, on the other hand, are not readily deposited and can travel for longer distances, although some is deposited within 100m of the source. Hence, it is in the 100m zone from the source of dust generation where the impact from dust and particles would be greatest.

10.6.15 The worst-case (nearest) sensitive human receptors to the site were identified. Distance and bearing from potential dust generating construction activities, direction and frequency of winds carrying airborne particles from construction activities to the receptor, and the frequency of dry days were calculated. Distance has been calculated from the receptor to the closest point of site activity, as the effective management of construction related dust generation should prevent re-suspension of dust from carriageways becoming a source.

10.6.16 Table 10.8 presents a summary of these results.
Table 10.8: Distance and Bearing of Human Health Receptors to the Site, and Frequency of Occurrence of Meteorological Conditions that are Likely to Lead to Increased Likelihood of Fugitive Dust.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Grid Reference</th>
<th>Bearing from site (o)</th>
<th>Distance to receptor from site boundary (m)</th>
<th>Dominant wind sector affecting each receptor</th>
<th>Frequency of occurrence (% of hourly values)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>All weather conditions</td>
</tr>
<tr>
<td>32 Brownings Road, Cannington</td>
<td>325856</td>
<td>139004</td>
<td>106</td>
<td>WNW</td>
<td>35.5</td>
</tr>
<tr>
<td>17 Mill Close, Cannington</td>
<td>325503</td>
<td>139372</td>
<td>3</td>
<td>S</td>
<td>19.5</td>
</tr>
<tr>
<td>45 Oak Tree Way, Cannington</td>
<td>325808</td>
<td>139165</td>
<td>80</td>
<td>W</td>
<td>35.6</td>
</tr>
</tbody>
</table>

1. 'Bearing from site' calculated based upon the angle from the closest point of the proposed site boundary to the receptor.

2. Distance to receptor from construction site’ calculated by measuring the minimum distance from the receptor to the proposed site boundary, and therefore represents a worst-case approach.

3. Dominant wind sector affecting each receptor’ derived assuming that the wind originating from opposite each receptor (i.e. ‘Bearing from construction site’ ±180°) is most likely to affect that particular receptor.

4. 'Frequency of occurrence' values calculated based upon the sum of the frequency of particular weather conditions within the hourly meteorological dataset, for the 'Dominant wind sector affecting each receptor' plus the two adjacent wind sectors, e.g. if the dominant wind sector affecting a receptor is NNW, then 'frequency of occurrence' represents the total frequency of the particular weather condition occurring within the hourly meteorological dataset, for the wind sectors NW, NNW, and N, calculated as a percentage of all 43,848 hourly meteorological data values).
10.6.17 The human receptors closest to the proposed Cannington site are located at the south-east corner of the site (see Figure 10.1).

10.6.18 Table 10.8 shows that the receptor '32 Brownings Road', located 44m from the proposed site, is affected by predominantly west-north-westerly winds, with meteorological conditions that may lead to fugitive dust and PM$_{10}$ at this location prevalent for 17.1% of the time (wind with speed greater than 5m/s and no precipitation). The receptor '45 Oak Tree Way' is located 108m from the proposed site boundary, and is affected by predominantly westerly winds, with meteorological conditions that may lead to fugitive dust and PM$_{10}$ at this location prevalent for 16.4% of the time. However this figure of 108m relates to the distance from the receptor to a strip of land that extends out from, and is located 50m to the east of, the main part of the site, and in which only hedgerow planting would be carried out (see Figure 10.1). No substantial construction activity would take place in that area. The separation distance between ‘45 Oak Tree Way’ and the eastern boundary of the main area of the site to the west (where the main construction activities would take place) is greater than 200m (see Figure 10.1). The receptor ‘17 Mill Close’, located 162m from the proposed site, is principally affected by southerly winds, with meteorological conditions that may lead to fugitive dust and PM$_{10}$ prevalent for only 3.5% of the time.

10.6.19 Applying the criteria as defined in Table 10.3 rigidly, the site would be classified as high risk with respect to fugitive dust and PM$_{10}$ generation, as the proposed development covers greater than 15,000m$^2$ of land. However, given the intensity and type of construction activities expected on site, it is considered that the potential for emissions and dust from the site would have only an intermittent or likely impact on sensitive receptors. Therefore, the site has been classified as medium risk with respect to fugitive dust and PM$_{10}$ generation (see Table 10.3).

10.6.20 Two of the identified human receptors are located over 100m from the proposed construction activities. Following the methodology presented in Section 10.4, the significance of fugitive dust and PM$_{10}$ impacts at receptors ‘17 Mill Close’ and ‘45 Oak Tree Way’ are predicted to be negligible.

10.6.21 Applying the methodology presented in Section 10.4 rigidly, the significance of fugitive dust and PM$_{10}$ impacts at receptor ‘32 Brownings Road’ would be predicted to be moderate. However, the separation distance of 44m between ‘32 Brownings Road’ and the site boundary is measured at the south-east corner of the site where a narrow section of the site extends along the side of the A39 (see Figure 10.1). This narrow section of the site is to allow for the widening of the A39 and provision of footway between the site access and the A39 main road eastern roundabout. Construction activity at this section of the site would be very short-term and would not generate substantial levels of dust. The separation distance between ‘32 Brownings Road’ and the eastern boundary of the main area of the site to the west (where the main construction activities would take place) is greater than 100m (see Figure 10.1), and thus for the majority of the construction phase dust impacts are predicted to be negligible at this receptor location.

10.6.22 Meteorological conditions that may lead to elevated fugitive dust and PM$_{10}$ at these locations from on-site construction activities are prevalent for a maximum of only 17.1% of the time. The potential frequency that fugitive dust and PM$_{10}$ may be
experienced at these receptors is therefore limited by the reduced occurrence of meteorological conditions that are conducive to elevated dust levels. The impact from dust at these receptors would be local, direct, adverse, possible and temporary, lasting at most for the 11-month duration of the proposed construction activities.

10.6.23 Measures would be applied to minimise airborne fugitive dust and PM$_{10}$ generation. These are set out in the Air Quality Management Plan (AQMP). The application of best practice guidance and control measures employed on construction sites would minimise dust generation and mitigation measures ensuring that any potential impacts would be at an acceptable level at the identified human receptor locations (see Section 10.7).

v. Exhaust Emissions from On-site Plant and Machinery Utilised during Construction

10.6.24 Diesel powered off-road construction plant and machinery (NRMM) are not currently subject to the same stringent controls as normal road vehicles. It is therefore appropriate to assess the potential air quality impacts associated with exhaust emissions from NRMM used during construction. However, there are various European Directives which have been implemented to control NRMM emissions and progressively reduce their potential impact.

10.6.25 European Directive 2002/88/EC (Ref. 10.35) relates to measures to control the emission of gaseous and particulate pollutants from internal combustion engines to be installed in NRMM, and implements two stages of emission limit values for compression ignition engines. The two stages of emissions limits for new diesel engines set the maximum allowable emissions of NO$_X$, particulate matter, hydrocarbons and carbon monoxide. Stage I is already in force for all engine categories and Stage II has now been implemented for almost all engines.


10.6.27 All engines installed that are not already available in the market would have to comply with the emission limits before 2015 (with the exception of Stage IV for engines other than constant speed engines with a production date prior to 31 December 2013 and 30 September 2014, where the compliance date may be postponed by two years).

10.6.28 Directive 98/70/EC (Ref. 10.38) (as amended by Directive 2003/17/EC (Ref. 10.39)) relating to the quality of petrol and diesel fuels establishes minimum specifications for petrol and diesel to be placed on the market in the EU, including gas oils intended for use by NRMM. These were required to contain less than 2,000mg/kg of sulphur decreasing to 1,000mg/kg by 1 January 2008 at the latest.

10.6.29 For small engines (37-75kW), the predicted technology required to meet Stage IIIA controls includes engine modifications, adoption of electronic engine control, improved fuel pumps and limited, un-cooled Exhaust Gas Recirculation (EGR). For larger engines which already utilise electronic engine control, the predicted
technologies required are engine modifications, common rail injection, air-air charge cooling and limited, un-cooled EGR. Further reductions for small engines (i.e. 18 - 37kW) are considered impractical (Ref. 10.40).

10.6.30 For engines to meet Stage IIIIB controls it is expected that Diesel Particulate Filters (DPFs) would be fitted. To ensure reliable operation of DPFs, the use of low sulphur content fuels would be needed (approximately 10mg/kg sulphur, whilst gas oil has 2,000mg/kg sulphur, decreasing to 1,000mg/kg from 2008) (Ref. 10.40).

10.6.31 Stage IV controls are expected to force the adoption of Selective Catalytic Reduction (SCR) de-NO\textsubscript{x} after-treatment systems in addition to DPFs.

10.6.32 A summary of the implementation dates for the emission standards is presented in Table 10.9.

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10.6.33 Chapter 3 of this volume provides a breakdown of the assumed NRMM to be used within the construction phase. However, for the purposes of this assessment, given the plant and machinery required on site and the short-term nature of the construction (11 months), a qualitative assessment of NRMM emissions to air of principal concern (NO\textsubscript{x}, PM\textsubscript{10} and SO\textsubscript{2}) is considered appropriate. The adopted qualitative approach considers the likely quantities and type of NRMM to be used during the construction works, combined with the locations of sensitive receptor groups.

10.6.34 Given the likely numbers of plant working on-site, their frequency and anticipated duration of operation, the magnitude of increase in pollutant concentrations associated with exhaust emissions from the numbers of NRMM operating would likely be imperceptible, even at the nearest receptor ‘32 Brownings Road, located approximately 44m from the site boundary (works at this separation distance to the receptor would be less frequent and of an intermittent nature – see 10.6.21 above). Therefore, there are no human receptors that have the potential to be significantly impacted by NRMM emissions generated by the construction works for the proposed development.
10.6.35 Background pollutant concentrations in the site locality are well below the relevant AQOs; there is therefore a substantial amount of headroom before any of the relevant short-term and long-term AQOs would potentially be exceeded (see Section 10.5 and Appendix 10B). Given the above, on-site exhaust emissions to air as a result of NRMM associated with construction are predicted to be of imperceptible or small magnitude, and thus negligible in terms of impact at the assessed human receptors. This impact is therefore considered to be not significant. Impacts from on-site exhaust emissions from NRMM would be local, adverse, direct, unlikely and temporary in nature.

c) Operational Impacts

10.6.36 With the exception of emissions from vehicular movements associated with the operation of the proposed Cannington park and ride facility (which are covered in the following section), this assessment does not consider any other operational phase emissions. All other potential air quality impacts as a result of the operation of the Cannington park and ride site are considered to be insignificant and therefore have not been subject to detailed assessment.

i. Vehicular Exhaust Emissions

10.6.37 The impacts on human receptors of exhaust emissions to air resulting from vehicle movements associated with the combined HPC Project during the 2013 (construction of the proposed Cannington park and ride development) and 2016 (operation of the proposed Cannington park and ride development) scenarios were predicted using the air pollutant dispersion model ADMS Roads. The traffic input data, obtained from the transport consultant working on behalf of EDF Energy, and further information used in the ADMS Roads assessment is presented in Appendix 10D. Additional information regarding the modelling methodology is provided in the Air Quality Modelling Report (Ref. 10.28).

10.6.38 Estimates of vehicle pollutant concentrations (NO₂, PM₁₀ and PM₂·₅) were predicted and assessed for the 2013 and 2016 scenarios identified in Section 10.4, for ‘with development’ (i.e. with all road traffic associated with the HPC Project) and ‘without development’ (i.e. future baseline without HPC) scenarios. Pollutant concentrations were also predicted for the 2009 model verification/baseline scenario. Comparison of these modelled scenarios allowed the specific impacts of exhaust emissions to air generated by vehicle movements associated with the proposed development to be assessed, and also evaluated against the existing and future baseline air quality in the study area.

10.6.39 The purpose of the proposed park and ride facility at Cannington is to minimise adverse effects on the local highway network during the construction of the HPC nuclear power station. This will assist in minimising vehicular air quality impacts at sensitive receptors along the affected highways.

10.6.40 A full set of results from all dispersion modelling undertaken, along with detailed discussion of the outputs, are available in the Air Quality Modelling Report (Ref. 10.28). A summary of the main results at human receptors located adjacent to the affected roads near to the Cannington park and ride site are provided below in Table 10.10, whilst pollutant concentrations predicted at all of the identified worst-case
A discussion of the results and determination of impact significance is presented below for each pollutant.

**NO₂ Annual Mean Concentrations**

During the construction and operational periods of the Cannington park and ride facility (i.e. 2013 and 2016 scenarios), annual mean NO₂ concentrations are predicted to increase by up to 90.8% as a result of combined HPC Project development related traffic, at the sixteen selected discrete human health receptor locations in proximity to the proposed Cannington park and ride site.

The highest predicted concentration for the 2013 ‘with development’ scenario occurs at ‘Grange Lodge’ where a concentration of 23.78µg/m³ is observed. This figure represents a 30.2% (5.51µg/m³) increase when compared to the 2013 ‘without development’ scenario (Appendix 10D, Table 8).

The largest predicted increase relative to the 40µg/m³ NO₂ annual mean AQO for the 2013 ‘with development’ scenario occurs at ‘41 High Street’ where a concentration of 16.50µg/m³ is observed. This figure represents a 90.8% (7.85µg/m³) increase when compared to the 2013 ‘without development’ scenario (Appendix 10D, Table 8). Therefore, following the impact assessment methodology described in Section 10.4, with regard to potential impact on the specific discrete human health receptors located along those routes closest to the Cannington park and ride site, vehicular emissions of NO₂ associated with traffic generated by the combined HPC Project during the 2013 (construction of the Cannington park and ride site) scenario are of up to a large magnitude.

This large increase is not entirely due to the construction of the Cannington park and ride site, but also considers traffic associated with the construction of the proposed Cannington bypass (which is in close proximity to the Cannington park and ride site) and the wider overall HPC Project. Construction of the Cannington bypass is likely to be complete by Quarter 4 2014, after which the potential air quality impacts at the
majority of these receptors are likely to decrease. Full details of the air quality assessment of the Cannington bypass can be found in Volume 5, Chapter 10. The potential impact of these emissions on the discrete human health receptors is local, adverse, direct, likely and medium term. Without mitigation, the potential impact is assessed as slight adverse and is therefore determined to be not significant.

10.6.46 The highest predicted concentration for the 2016 ‘with development’ scenario occurs at ‘Grange Lodge’ where a concentration of 19.54µg/m³ is observed. This figure represents a 28.0% (4.27µg/m³) increase when compared to the 2016 ‘without development’ scenario (Appendix 10D, Table 10). The 4.27µg/m³ increase at ‘Grange Lodge’ is also the largest predicted increase relative to the 40µg/m³ NO2 annual mean AQO for the sixteen selected discrete human health receptor locations in proximity to the proposed Cannington park and ride site.

10.6.47 Therefore, following the impact assessment methodology described in Section 10.4, with regard to potential impact on the specific discrete human health receptors located along those routes closest to the Cannington park and ride site, vehicular emissions of NO2 associated with traffic generated by the combined HPC Project during the 2016 (operation of the Cannington park and ride site) scenario are of large magnitude. The potential impact of the emissions on the discrete human health receptors is local, adverse, direct, likely and long-term but temporary in nature, i.e. they only occur throughout the duration of the HPC construction programme, prior to the removal of the Cannington park and ride facility structures and ancillary infrastructure to restore the site to a state which is capable of re-estabishing its existing agricultural use. Without mitigation, the potential impact is assessed as slight adverse and is therefore determined to be not significant.

**NO2 1-hour Mean Concentrations**

10.6.48 The empirical relationship given in LAQM.TG(09) (Ref. 10.12) states that exceedences of the 1-hour mean objective for NO2 are only likely to occur where annual mean concentrations are 60µg/m³ or above. Although it is not possible to determine with precision the number of potential exceedences of the short-term air quality objective limit concentration, it is evident that annual mean NO2 concentrations at all the discrete human health receptor locations located in the proximity of the Cannington park and ride site (see Figure 10.2) are well below this limit, for both the assessed 2013 and 2016 development scenarios.

10.6.49 Therefore, following the impact assessment methodology described in Section 10.4 ii, with regard to potential impact on all specific human health discrete receptor locations located in proximity to the Cannington park and ride site, short-term vehicle emissions of NO2 associated with traffic generated by the combined HPC Project during either the 2013 (construction of the Cannington park and ride site) and 2016 (operation of the Cannington park and ride site) scenarios are of imperceptible magnitude. The potential impact of these emissions on the human health discrete receptors is local, adverse, direct, and likely. Potential impacts will be short-term during the construction of the Cannington park and ride site, and long-term but temporary during the operation of the Cannington park and ride site. Without mitigation, the potential impact is assessed as negligible and is therefore determined to be not significant.
10.6.50 During the operational periods of the Cannington park and ride site (i.e. 2013 and 2016 scenarios), annual mean PM$_{10}$ concentrations are predicted to increase by no more than 3.1% as a result of combined HPC project development related traffic, at the sixteen selected discrete human health receptor locations in proximity to the proposed Cannington park and ride site.

10.6.51 The highest predicted concentration for the 2013 ‘with development’ scenario occurs at ‘Grange Lodge’ where a concentration of 19.95µg/m$^3$ is observed. This figure represents a 2.3% (0.45µg/m$^3$) increase when compared to the 2013 ‘without development’ scenario (Appendix 10D, Table 12).

10.6.52 The largest predicted increase relative to the 40µg/m$^3$ PM$_{10}$ annual mean AQO for the 2013 ‘with development’ scenario occurs at ‘41 High Street’ where a concentration of 18.53µg/m$^3$ is observed. This figure represents a 3.1% (0.55µg/m$^3$) increase when compared to the 2013 ‘without development’ scenario (Appendix 10D, Table 12).

10.6.53 The highest predicted concentration for the 2016 ‘with development’ scenario occurs at ‘Grange Lodge’ where a concentration of 19.35µg/m$^3$ is observed. This figure represents a 2.7% (0.51µg/m$^3$) increase when compared to the 2016 ‘without development’ scenario (Appendix 10D, Table 13). The 0.51µg/m$^3$ increase at ‘Grange Lodge’ is also the largest predicted increase relative to the 40µg/m$^3$ PM$_{10}$ annual mean AQO for the sixteen selected discrete human health receptor locations in proximity to the proposed Cannington park and ride site.

10.6.54 Therefore, following the impact assessment methodology described in Section 10.4 ii, with regard to potential impact on the specific human health discrete receptors located along those routes closest to the Cannington park and ride site, long-term vehicle emissions of PM$_{10}$ associated with traffic generated by the combined HPC Project development during both the 2013 (construction of the Cannington park and ride site) and 2016 (operation of the Cannington park and ride site) scenarios are of small magnitude. The potential impact of these emissions on the discrete human health receptors is local, adverse, direct, and likely. Potential impacts will be short-term during the early operation of the Cannington park and ride site and long-term but temporary during the operation of the Cannington park and ride site. Without mitigation, the potential impact is assessed as negligible and is therefore determined to be not significant.

10.6.55 The empirical relationship between the annual mean and the number of exceedences of the PM$_{10}$ 24-hour mean objective given in LAQM.TG(09) (Ref. 10.12) was used to determine the increase in the number of days exceeding the 1-hour mean PM$_{10}$ air quality objective, at receptor locations located in proximity to the proposed Cannington park and ride site, as a result of traffic generated by the combined HPC Project. There was a maximum of three predicted days exceeding the 50µg/m$^3$ objective limit, for both the 2013 and 2016 ‘with’ and ‘without development’ scenarios. For both the 2013 and 2016 assessment years, at the discrete human health receptor locations located in proximity to the Cannington park and ride site there was
a maximum increase of one day in the number of days exceeding the short-term PM$_{10}$ objective limit as a result of traffic generated by the combined HPC Project during the 2013 (construction of the Cannington park and ride) and 2016 (operation of the Cannington park and ride site) scenarios.

10.6.56 Therefore, following the impact assessment methodology described in Section 10.4, with regard to potential impact on all specific human health discrete receptor locations located in proximity to the Cannington park and ride, short-term vehicle emissions of PM$_{10}$ associated with traffic generated by the combined HPC Project development during either the 2013 (construction of the Cannington park and ride site) and 2016 (operation of the Cannington park and ride site) scenarios are of imperceptible magnitude. The potential impact of the emissions on the human health discrete receptors is local, adverse, direct and likely. Potential impacts will be short-term during the construction of the Cannington park and ride site, and long-term but temporary during the operation of the Cannington park and ride site. Without mitigation, the potential impact is assessed as negligible and is therefore determined to be not significant.

PM$_{2.5}$ Annual Mean Concentrations

10.6.57 During the operational periods of the Cannington park and ride site (i.e. 2013 and 2016 scenarios), annual mean PM$_{2.5}$ concentrations are predicted to increase by no more than 5.1% as a result of combined HPC project development related traffic, at the sixteen selected discrete human health receptor locations in proximity to the proposed Cannington park and ride site.

10.6.58 The highest predicted concentration for the 2013 ‘with development’ scenario occurs at ‘Grange Lodge’ where a concentration of 9.22µg/m$^3$ is observed, this figure represents a 3.7% (0.33µg/m$^3$) increase when compared to the 2013 ‘without development’ scenario (Appendix 10D, Table 14).

10.6.59 The largest predicted increase relative to the 25µg/m$^3$ PM$_{2.5}$ annual mean AQO for the 2013 ‘with development’ scenario occurs at ‘41 High Street’ where a concentration of 8.17µg/m$^3$ is observed. This figure represents a 5.1% (0.40µg/m$^3$) increase when compared to the 2013 ‘without development’ scenario (Appendix 10D, Table 14).

10.6.60 The highest predicted concentration for the 2016 ‘with development’ scenario occurs at ‘Grange Lodge’ where a concentration of 8.72µg/m$^3$ is observed. This figure represents a 4.2% (0.35µg/m$^3$) increase when compared to the 2016 ‘without development’ scenario (Appendix 10D, Table 15). The 0.35µg/m$^3$ increase at ‘Grange Lodge’ is also the largest predicted increase relative to the 25µg/m$^3$ PM$_{2.5}$ annual mean AQO for the sixteen selected discrete human health receptor locations in proximity to the proposed Cannington park and ride site.

10.6.61 Therefore, following the impact assessment methodology described in Section 10.4ii, with regard to potential impact on the specific human health discrete receptors located along those routes closest to the Cannington park and ride site, long-term vehicle emissions of PM$_{2.5}$ associated with traffic generated by the combined HPC Project development during both the 2013 (construction of the Cannington park and ride site) and 2016 (operation of the Cannington park and ride site) scenarios are of
small magnitude. The potential impact of these emissions on the discrete human health receptors is local, adverse, direct, and likely. Potential impacts will be short-term during the construction of the Cannington park and ride site and long-term but temporary during the operation of the Cannington park and ride site. Without mitigation, the potential impact is assessed as negligible and is therefore determined to be not significant.

Uncertainty in Future Year NO\textsubscript{x} and NO\textsubscript{2} Predictions

10.6.62 The Defra LAQM helpdesk (Ref. 10.41) has identified analyses of historical monitoring data within the UK that show a disparity between measured NO\textsubscript{2} concentration data and the projected decline in concentrations associated with emission forecasts for future years. Trends in ambient concentrations of NO\textsubscript{x} and NO\textsubscript{2} in many urban areas of the UK have generally shown two characteristics; a decrease in concentration from about 1996 to 2002-2004, followed by a period of more stable concentrations from 2002-2004 up until 2009. The main regions showing evidence of a consistent downward trend in either NO\textsubscript{x} or NO\textsubscript{2} concentrations that would be supported by UK-AIR and emission inventory estimates are more rural, less densely trafficked, parts of the UK.

10.6.63 The reason for this disparity is currently not fully understood, but it is thought to be related to the actual on-road performance of diesel road vehicles when compared with calculations based on the Euro emission standards. Preliminary studies suggest the following:

- NO\textsubscript{x} emissions from petrol vehicles appear to be in line with current projections and have decreased by 96% since the introduction of 3-way catalysts in 1993.
- NO\textsubscript{x} emissions from diesel cars, under urban driving conditions, do not appear to have declined substantially, up to and including Euro 5. There is limited evidence that the same pattern may occur for motorway driving conditions.
- NO\textsubscript{x} emissions from HDVs equipped with SCR are much higher than expected when driving at low speeds.

10.6.64 This disparity in the historical national data highlights the uncertainty of future year projections of both NO\textsubscript{x} and NO\textsubscript{2}. At this stage however, there is no robust evidence upon which to base any revised road traffic emissions projections.

10.6.65 Defra and the devolved administrations are currently investigating these issues, and once the reasons are fully understood updated guidance will be published.

10.6.66 To take account of this uncertainty, for the purposes of this assessment, a worst-case approach was taken through the application of emission factors and background concentrations for 2009 (i.e. base year levels) for all future years. This is in addition to the above assessment approach, for which the currently published guidelines have been followed (i.e. emission factors and background concentrations reduce in future years). This approach to assessing sensitivity provides a means by which to assess the extreme worst-case upper concentrations that may prevail in future years.
During the construction and operational periods of the Cannington park and ride facility (i.e. 2013 and 2016 scenarios), worst case annual mean NO₂ concentrations are predicted to increase by up to 102.5% as a result of combined HPC Project development related traffic, at the sixteen selected discrete human health receptor locations in proximity to the proposed Cannington park and ride facility.

The highest predicted concentration for the worst case 2013 ‘with development’ scenario occurs at ‘Grange Lodge’ where a concentration of 29.79µg/m³ is observed. This figure represents a 31.8% (7.18µg/m³) increase when compared to the 2013 ‘without development’ scenario (Appendix 10D, Table 9).

The largest predicted increase relative to the 40µg/m³ AQO for the worst case 2013 ‘with development’ scenario occurs at ‘41 High Street’ where a concentration of 21.55µg/m³ is observed. This figure represents a 102.5% (10.91µg/m³) increase when compared to the worst case 2013 ‘without development’ scenario (Appendix 10D, Table 9). Therefore, following the impact assessment methodology described in Section 10.4, with regard to potential impact on the specific discrete human health receptors located along those routes closest to the Cannington park and ride site, vehicular emissions of NO₂ associated with traffic generated by the combined HPC Project during the worst case 2013 (construction of the Cannington park and ride site) scenario are of up to large magnitude.

As discussed above in Section 10.6.45, this large increase is only partly due to the construction of the Cannington park and ride site, with traffic associated with the construction of the wider overall HPC Project mostly attributable to this increase. Construction of the Cannington bypass is likely to be complete by Quarter 4 2014, after which the potential air quality impacts at the majority of these receptors are likely to decrease. Full details of the air quality assessment of the Cannington bypass can be found in Volume 5, Chapter 10. The potential impact of these emissions on the discrete human health receptors is local, adverse, direct, likely and medium term. Without mitigation, the potential impact would still be assessed as slight adverse. This does not affect the judgement of significance as presented in Section 10.6.45, i.e. the potential impacts are still determined to be not significant.

The highest predicted concentration for the worst case 2016 ‘with development’ scenario occurs at ‘Grange Lodge’ where a concentration of 30.48µg/m³ is observed. This figure represents a 34.4% (7.80µg/m³) increase when compared to the worst case 2016 ‘without development’ scenario (Appendix 10D, Table 11). The 7.80µg/m³ increase at ‘Grange Lodge’ is also the largest predicted increase relative to the 40µg/m³ AQO for the sixteen selected discrete human health receptor locations in proximity to the proposed Cannington park and ride site.

Therefore, following the impact assessment methodology described in Section 10.4, with regard to potential impact on the specific discrete human health receptors located along those routes closest to the Cannington park and ride site, vehicular emissions of NO₂ associated with traffic generated by the combined HPC Project during worst case 2016 (operation of the Cannington park and ride site) scenario are of up to large magnitude. The potential impact of the emissions on the discrete human health receptors is local, adverse, direct, likely and long-term but temporary in
nature. Without mitigation, the potential impact would still be assessed as slight adverse. This does not affect the judgement of significance as presented in Section 10.6.47, i.e. the potential impacts are still determined to be not significant.

10.6.73 Therefore, regardless of which of the two assessments methodologies are adopted, with regard to potential impact on the specific discrete human health receptors located along those routes closest to the Cannington park and ride site, vehicular emissions of NO₂ during the construction and operational periods of the Cannington park and ride site (i.e. 2013 and 2016 scenarios), are not significant.

Worst Case NO₂ 1-hour Mean Concentrations

10.6.74 The empirical relationship given in LAQM.TG(09) (Ref. 10.12) states that exceedences of the 1-hour mean objective for NO₂ are only likely to occur where annual mean concentrations are 60μg/m³ or above. Although it is not possible to determine with precision the number of potential exceedences of the short-term AQO limit concentration, it is evident that annual mean NO₂ concentrations at all discrete human health receptor locations located in the proximity of the Cannington park and ride site are well below this limit, for both the assessed 2013 and 2016 worst case development scenarios.

10.6.75 Therefore, adopting the worst case approach (i.e. assuming 2009 emission factors and background pollutant concentrations for future assessment years) and following the impact assessment methodology described in Section 10.4, with regard to potential impact on all specific human health discrete receptor locations located in proximity to the Cannington park and ride site, worst case short-term vehicle emissions of NO₂ associated with traffic generated by the combined HPC Project during either the 2013 (construction of the Cannington park and ride site) and 2016 (operation of the Cannington park and ride site) scenarios are of an imperceptible magnitude. Without mitigation, the potential impact for the 2013 and 2016 scenarios would therefore still be assessed as negligible and not significant.

d) Post-Operational Impacts

10.6.76 Following the completion of the construction of the HPC Project, the Cannington park and ride facility will cease to be operational. The development structures and ancillary infrastructure will be removed to facilitate the restoration of the site to its existing use as agricultural land (see Volume 6, Chapter 5). It is estimated that the post-operational phase will commence in Quarter 4 2021.

10.6.77 It is likely that activities post-operation would be less intensive than during construction, using fewer items of plant over a period of 12 months, with fewer numbers of vehicles (both HDVs and LDVs) required on the affected road network, and would take advantage of the least environmentally sensitive time periods.

10.6.78 On this basis, post-operational air quality impacts are considered to be less, and certainly no worse, than those impacts discussed in Section 10.6b. As the Post-operational phase would not include the removal of the footway along the A39, the separation distance between any post-operational activity and the '32 Browning Road' receptor would be greater than 100m. Therefore, all potential air quality impacts are considered to be negligible or not significant.
10.7 Mitigation of Impacts

10.7.1 A summary of the potential air quality impacts during the construction, operational and post-operational phases of the proposed development is presented in Section 10.9. All potential air quality impacts have been assessed to be negligible or not significant and therefore no mitigation is considered to be required.

10.7.2 The following section provides best practice methods and mitigation measures to be implemented to minimise the predicted air quality impacts.

a) Mitigation of Impacts during Construction

10.7.3 Environmental impacts and disturbance arising from construction activities would be managed through a range of control measures and monitoring procedures which are outlined in the Environmental Management and Monitoring Plan (EMMP) and detailed in associated Subject-Specific Management Plans (SSMPs) for the Cannington Park and Ride site. The control measures for the protection of the air quality environment, including minimisation of fugitive dust and particulate generation from the site, are set out in the Air Quality Management Plan (AQMP).

i. Fugitive Dust and PM$_{10}$ Generated by Construction Activities

10.7.4 Best practice guidance control methods and mitigation measures that will be implemented to manage fugitive dust and PM$_{10}$ emissions during the construction works, and to ensure associated impacts are prevented in areas in proximity to the site, are presented within the AQMP.

10.7.5 The AQMP makes reference to current best practice guidance and other supporting documentation, including:

- BRE publication ‘Control of dust from construction and demolition activities’ (2003) (Ref. 10.31).
- CIRIA ‘Environmental good practice on site guide’ (third edition) (Ref. 10.42).
- Defra Secretary of State’s Guidance for Mobile Crushing and Screening - Process Guidance Note 3/16(04) (Ref. 10.43).

10.7.6 The AQMP would be implemented throughout the duration of construction of the site, ensuring that dust and fugitive particulate emissions are kept to a minimum. Examples of typical good construction practice methods and dust mitigation that may
be implemented to control fugitive dust and PM$_{10}$ generation during the construction works include:

- vehicles carrying loose aggregate and workings to be sheeted during periods of dry and windy weather, or if dust emissions become a problem;
- implementation of design controls for construction equipment and vehicles and use of appropriately designed vehicles for materials handling;
- completed earthworks/stockpiles to be covered or seeded as soon as is practicable in order to stabilise surfaces (finished platforms would be covered, external slopes would be seeded and therefore eventually vegetated);
- use of mobile or fixed spray units to dampen surfaces as dictated by weather conditions;
- provision and use of wheel washing facilities at all exits as well as procedures for effective cleaning and inspection of vehicles, which should include total vehicle washing and ticketing of vehicles;
- regular inspection and, if necessary, cleaning and repair of local highways and site boundaries to check for dust deposits (and removal if necessary);
- use of dust-suppressed tools for all operations, and use of dust extraction techniques where available;
- ensuring that all construction plant and equipment are maintained in good working order and not left running when not in use; and
- restricting all on-site movements and dust generating activities to a minimum.

10.7.7 A formal system would need to be put in place during the works which identifies the roles and responsibilities of site staff regarding the procedures to be applied to respond to any complaints relating to air quality. Site logs will be maintained, detailing all complaints received relating to air quality, and the corresponding action taken including the response made to each complainant.

10.7.8 The extent of which dust mitigation would be implemented on site during the construction works would be flexible and responsive, with additional recommendations and measures introduced when required during particularly dust generating activities, sensitive periods, or upon receipt of valid annoyance dust complaints. Working practices would be systematically audited and revised where necessary in order to ensure fugitive dust impacts are mitigated to an acceptable level at the identified sensitive receptor locations.

### ii. Exhaust Emissions from On-site Plant and Machinery

10.7.9 Best practice guidance control methods and mitigation measures that will be implemented to control on-site exhaust emissions from plant and machinery (NRMM) during the construction of the proposed development site include:

- minimising idling times of plant and machinery;
- ensuring all equipment is in good working order and working efficiently;
• use of ultra low sulphur diesel (ULSD) in all equipment and plant, where practicable;
• ensuring that all equipment is fitted with appropriate particulate filters or any other appropriate exhaust after-treatments, where practicable; and
• use of the newest equipment that meets the latest emission standards.

b) Mitigation of Impacts from Road Traffic Emissions to Air

10.7.10 The **Freight Management Strategy** and the **Framework Travel Plan**, appended to the **Transport Assessment** have been developed to minimise vehicle movements during the construction and operational phases of the Cannington park and ride facility and the wider HPC Project, hence reducing the associated impacts from vehicle exhaust emissions to air relative to the worst-case assessment detailed herein. Such measures would include, but would not be limited to, car sharing schemes and provision of bus transport for the workforce, plus other highway improvement schemes. Full details of the proposed traffic mitigation measures are provided within **Volume 6, Chapter 8**.

c) Mitigation of Impacts during Post-operation

10.7.11 Best practice measures and further mitigation measures during post-operational activities would be similar to those detailed above for the construction phase.

10.8 Residual Impacts

10.8.1 All potential air quality impacts during the construction and post-operational phases were assessed as **negligible** or **not significant** prior to the implementation of any mitigation (with the exception of the impact of fugitive dust and particulate matter on the receptor ‘32 Brownings Road’ during the construction phase).

10.8.2 Construction activities of the proposed Cannington park and ride development would require careful dust management to minimise impacts to neighbouring dwellings, specifically at the receptor ‘32 Brownings Road’. The imposition of the mitigation measures described above, in addition to the application of standard good practice in construction operations, would result in a residual impact from fugitive dust and particulate matter impacts at the receptors ‘32 Brownings Road’, generated by construction activities, of no more than **minor** significance.

10.9 Summary of Impacts

10.9.1 **Table 10.11** presents a summary of the predicted air quality impacts. As stated above, the methodology applied to the assessment of impacts from fugitive dust and **PM_{10}** is different to the methodology applied to the assessment of other air quality impacts. Therefore, the descriptors given in the “magnitude/risk and method of determination”, “impact descriptor”, “impact significance” and “residual impact significance” columns for dust/PM_{10} impacts and other air quality impacts are not directly comparable. Full details of the assessment methodologies employed for the air quality impact assessment are provided in Section 10.4 of this chapter of the ES.
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Potential Magnitude/Risk and Method of Determination</th>
<th>Description</th>
<th>Impact Descriptor</th>
<th>Significance</th>
<th>Proposed Mitigation</th>
<th>Residual Impact Assessment</th>
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<tbody>
<tr>
<td>Construction Phase</td>
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<tr>
<td>Local air quality and amenity at assessed human receptors – 32 Brownings Road</td>
<td>Fugitive dust and PM$_{10}$ originating from construction activities</td>
<td>Medium Risk (qualitative fugitive dust and PM$_{10}$ assessment)</td>
<td>• Local • Adverse • Direct • Possible • Short-term • Temporary</td>
<td>N/A</td>
<td>Moderate</td>
<td>Detailed measures to minimise fugitive dust and PM$_{10}$ generation would be provided in the AQMP, and would follow best practice guidance and measures typically employed on construction sites</td>
<td>Minor</td>
</tr>
<tr>
<td>Local air quality and amenity at assessed human receptors – 45 Oak Tree Way and 17 Mill Close</td>
<td>Fugitive dust and PM$_{10}$ originating from construction activities</td>
<td>Medium Risk (qualitative fugitive dust and PM$_{10}$ assessment)</td>
<td>• Local • Adverse • Direct • Possible • Short-term • Temporary</td>
<td>N/A</td>
<td>Negligible</td>
<td>Detailed measures to minimise fugitive dust and PM$_{10}$ generation would be provided in the AQMP, and would follow best practice guidance and measures typically employed on construction sites</td>
<td>Negligible</td>
</tr>
<tr>
<td>Local air quality at assessed human receptors</td>
<td>Exhaust emissions (PM$_{10}$, NO$_x$ and SO$_2$) from on-site plant and machinery (NRMM) associated with construction activities</td>
<td>Imperceptible/Small Magnitude (qualitative on-site exhaust emissions assessment)</td>
<td>• Local • Adverse • Direct • Unlikely • Short-term • Temporary</td>
<td>Negligible</td>
<td>Not significant</td>
<td>Detailed measures to reduce emissions to air would be provided in the AQMP, and would follow best practice guidance and measures typically employed on construction sites, construction traffic management</td>
<td>Not significant</td>
</tr>
<tr>
<td>Receptor</td>
<td>Potential Impact</td>
<td>Potential Magnitude/Risk and Method of Determination</td>
<td>Description</td>
<td>Impact Descriptor</td>
<td>Significance</td>
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<tr>
<td>Local air quality at assessed human receptors</td>
<td>Long-term NO$_2$ emissions associated with traffic during construction (2013) of the Cannington park and ride facility</td>
<td>Large Magnitude (quantitative assessment of vehicular emissions)</td>
<td>• Local • Adverse • Direct • Likely • Short-term</td>
<td>Slight Adverse</td>
<td>Not significant</td>
<td>phasing of construction activities, and use of plant and vehicles compliant with current emissions standards.</td>
<td>Not significant</td>
</tr>
<tr>
<td>Local air quality at assessed human receptors</td>
<td>Long-term PM$<em>{10}$ and PM$</em>{2.5}$ emissions associated with traffic during construction (2013) of the Cannington park and ride facility</td>
<td>Small Magnitude (quantitative assessment of vehicular emissions)</td>
<td>• Local • Adverse • Direct • Likely • Short-term</td>
<td>Negligible</td>
<td>Not significant</td>
<td>The Freight Management Strategy and the Framework Travel Plan would be implemented to minimise vehicular movements, and use of vehicles compliant with emissions standards</td>
<td>Not significant</td>
</tr>
<tr>
<td>Local air quality at assessed human receptors</td>
<td>Short-term NO$<em>2$, and PM$</em>{10}$ emissions associated with traffic during construction</td>
<td>Imperceptible Magnitude (quantitative assessment of vehicular emissions)</td>
<td>• Local • Adverse • Direct • Likely • Short-term</td>
<td>Negligible</td>
<td>Not significant</td>
<td>The Freight Management Strategy and the Framework Travel Plan would be implemented to minimise vehicular movements, and use of vehicles compliant with emissions standards</td>
<td>Not significant</td>
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<tr>
<td>Receptor</td>
<td>Potential Impact</td>
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</tbody>
</table>
| Local air quality at assessed human receptors     | Long-term NO$_2$ emissions associated with traffic during the operation (2016) of the Cannington park and ride facility | Medium Magnitude (quantitative assessment of vehicular emissions) | ● Local  
● Adverse  
● Direct  
● Likely  
● Long-term  
● Temporary | Negligible                                                                                                          | Not significant | The Freight Management Strategy and the Framework Travel Plan would be implemented to minimise vehicular movements, and use of vehicles compliant with emissions standards | Not significant |
| Local air quality at assessed human receptors     | Long-term PM$_{10}$ and PM$_{2.5}$ emissions associated with traffic during the operation (2016) of the Cannington park and ride facility | Small Magnitude (quantitative assessment of vehicular emissions) | ● Local  
● Adverse  
● Direct  
● Likely  
● Long-term  
● Temporary | Negligible                                                                                                          | Not significant | The Freight Management Strategy and the Framework Travel Plan would be implemented to minimise vehicular movements, and use of vehicles compliant with emissions standards | Not significant |
| Local air quality at assessed human receptors     | Short-term NO$_2$ and PM$_{10}$ emissions associated with traffic during the      | Imperceptible Magnitude (quantitative assessment of vehicular emissions) | ● Local  
● Adverse  
● Direct  
● Likely | Negligible                                                                                                          | Not significant | The Freight Management Strategy and the Framework Travel Plan would be implemented to minimise vehicular movements, and use of vehicles compliant with emissions standards | Not significant |
<table>
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<tr>
<th>Receptor</th>
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<tr>
<td>operation (2016) of the Cannington park and ride facility.</td>
<td></td>
<td></td>
<td></td>
<td>Long-term</td>
<td>Temporary</td>
<td>implemented to minimise vehicular movements, and use of vehicles compliant with emissions standards</td>
</tr>
</tbody>
</table>

**Post-operational Phase**

| Local air quality and amenity at assessed human receptors – 32 Brownings Road | Fugitive dust and PM$_{10}$ originating from post-operational activities | Medium Risk (qualitative fugitive dust and PM$_{10}$ assessment) | • Local           | Adverse          | Direct       | Possible      | Short-term | Temporary | N/A | Moderate | Detailed measures to minimise fugitive dust and PM$_{10}$ generation would be provided in the AQMP, and would follow best practice guidance and measures typically employed on construction/demolition sites | Minor |

<p>| Local air quality and amenity at assessed human receptors – 45 Oak Tree Way and 17 Mill Close | Fugitive dust and PM$<em>{10}$ originating from post-operational activities | Medium Risk (qualitative fugitive dust and PM$</em>{10}$ assessment) | • Local           | Adverse          | Direct       | Possible      | Short-term | Temporary | N/A | Negligible | Detailed measures to minimise fugitive dust and PM$_{10}$ generation would be provided in the AQMP, and would follow best practice guidance and measures typically employed on construction/demolition sites | Negligible |</p>
<table>
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<tr>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Potential Magnitude/Risk and Method of Determination</th>
<th>Description</th>
<th>Impact Descriptor</th>
<th>Significance</th>
<th>Proposed Mitigation</th>
<th>Residual Impact Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local air quality at assessed human receptors</td>
<td>Exhaust emissions (PM$_{10}$, NO$_x$ and SO$_2$) from on-site plant and machinery (NRMM) associated with post-operational activities</td>
<td>Imperceptible/Small Magnitude (qualitative on-site exhaust emissions assessment)</td>
<td>• Local &lt;br&gt; • Adverse &lt;br&gt; • Direct &lt;br&gt; • Unlikely &lt;br&gt; • Short-term &lt;br&gt; • Temporary</td>
<td>Negligible</td>
<td>Not significant</td>
<td>Detailed measures to reduce emissions to air would be provided in the AQMP, and would follow best practice guidance and measures typically employed on construction/demolition sites, post-operational traffic management, phasing of post-operational activities, and use of plant and vehicles compliant with current emissions standards.</td>
<td>Not significant</td>
</tr>
<tr>
<td>Local air quality at assessed human receptors</td>
<td>Long-term NO$_2$ emissions associated with traffic during post-operation of the Cannington park and ride facility</td>
<td>Large Magnitude (quantitative assessment of vehicular emissions)</td>
<td>• Local &lt;br&gt; • Adverse &lt;br&gt; • Direct &lt;br&gt; • Likely &lt;br&gt; • Short-term</td>
<td>Slight Adverse</td>
<td>Not significant</td>
<td>The Freight Management Strategy and the Framework Travel Plan would be implemented to minimise vehicular movements, and use of vehicles compliant with emissions standards.</td>
<td>Not significant</td>
</tr>
<tr>
<td>Receptor</td>
<td>Potential Impact</td>
<td>Potential Magnitude/Risk and Method of Determination</td>
<td>Description</td>
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<tr>
<td>Local air quality at assessed human receptors</td>
<td>Long-term PM$<em>{10}$ and PM$</em>{2.5}$ emissions associated with traffic during post-operation of the Cannington park and ride facility</td>
<td>Small Magnitude (quantitative assessment of vehicular emissions)</td>
<td>• Local • Adverse • Direct • Likely • Short-term</td>
<td>Negligible</td>
<td>Not significant</td>
<td>A The Freight Management Strategy and the Framework Travel Plan would be implemented to minimise vehicular movements, and use of vehicles compliant with emissions standards</td>
<td>Not significant</td>
</tr>
<tr>
<td>Local air quality at assessed human receptors</td>
<td>Short-term NO$<em>2$ and PM$</em>{10}$ emissions associated with traffic during post-operation of the Cannington park and ride facility</td>
<td>Imperceptible Magnitude (quantitative assessment of vehicular emissions)</td>
<td>• Local • Adverse • Direct • Likely • Short-term</td>
<td>Negligible</td>
<td>Not significant</td>
<td>The Freight Management Strategy and the Framework Travel Plan would be implemented to minimise vehicular movements, and use of vehicles compliant with emissions standards</td>
<td>Not significant</td>
</tr>
</tbody>
</table>
References


10.13 HMSO. Environmental Protection Act 1990.


10.17 Draft Revised Regional Spatial Strategy (RSS) for the South West Incorporating the Secretary of State’s Proposed Changes for Public Consultation 2008.


11. **SOILS AND LAND USE**

11.1 **Introduction**

11.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential soil, land use and agricultural impacts associated with the construction, operational and post-operational phases of the proposed Cannington park and ride development, referred to hereafter as the proposed development on land referred to by EDF Energy as the Cannington park and ride site (the site). Detailed descriptions of the site, proposed development, construction, operational and post-operational phases are provided in Chapters 1 to 5 of this volume of the ES.

11.2 **Scope and Objectives of Assessment**

11.2.1 The scope of the assessment has been determined through a formal Environmental Impact Assessment (EIA) scoping process undertaken with the Infrastructure Planning Commission (IPC). It has also been informed by ongoing consultation with statutory consultees (including Sedgemoor District Council (SDC) and Somerset County Council (SCC)), the local community and the general public in response to the Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations.

11.2.2 The assessment of impacts on soil, land use and agricultural receptors has been undertaken adopting the methodologies described in Volume 1, Chapter 7 and Section 11.4 below.

11.2.3 The existing baseline conditions, against which the likely environmental impacts of the proposed development are assessed, have been determined through a review of desk based information and field surveys, and are described in Section 11.5. The study area for this assessment, as illustrated in Figure 11.1, comprises all land within the proposed development site, together with immediately adjacent agricultural and other land within 25m of the proposed development site boundary. The extent of this zone of land adjacent to the site boundary is based on consideration of the scale of development earthworks, the nature of site boundaries, and the type of adjacent land uses. Also included within the study area are any contiguous agricultural drainage ditches and field drainage systems.

11.2.4 Impacts to soils, land use and agriculture are presented in Section 11.6, and appropriate mitigation measures aimed at preventing, reducing or offsetting any potential adverse impacts that are identified to be of significance are identified in Section 11.7. Assessment of within-site cumulative impacts on soil and land use is included. An assessment of residual impacts following implementation of these mitigation measures is presented in Section 11.8.

11.2.5 Cumulative impacts to soils, land use and agriculture arising from the proposed development in combination with other elements of the Hinkley Point C (HPC) Project and other relevant projects are identified and assessed in Volume 11 of this ES.
11.2.6 The objectives of the assessment are to:

- identify all soils and agricultural land use receptors within and adjacent to the application site that may be affected by the works;
- characterise the baseline environmental conditions for soils and agricultural land use within the study area;
- assess the impacts of the works, if required, their removal and site restoration on soils, land use and agriculture;
- recommend mitigation measures, if determined necessary, to reduce the impacts of the works on soils, land use and agriculture; and
- assess the residual impacts of the works on soils, land use and agriculture.

11.2.7 Due to the fact that many environmental aspects are interrelated there may be a degree of overlap with other ES Chapters, particularly that concerning geology and land contamination (Volume 6, Chapter 12), surface water (Volume 6, Chapter 13) and terrestrial ecology and ornithology (Volume 6, Chapter 14). Where impacts are identified in the assessment that are addressed in greater depth in relation to other environmental aspects (e.g. potential impacts from contaminated land, alterations to drainage regimes and impacts on biodiversity) these impacts are considered in this chapter but only in so far as how they may result from changes to land use and soils.

11.2.8 Issues relating to severance of farm holding or fields, or interruption to the operation of current land management units or viability of farm units or farm enterprises, is addressed in Chapter 7 (Socio-economics) of this volume of the ES.

11.3 Legislation, Policy and Guidance

11.3.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of impacts to soils, land use and agriculture associated with the construction, operation and post-operational phases of the proposed development.

11.3.2 As stated in Volume 1, Chapter 4, the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) when combined with the NPS for Nuclear Power Generation (NPS EN-6) provides the primary basis for decisions by the IPC on applications for nuclear power generation developments that fall within the scope of the NPSs.

11.3.3 Notwithstanding this, the IPC may consider other matters that are both important and relevant to its decision-making. This could include Planning Policy Statements (PPSs), Planning Policy Guidance Notes (PPGs), regional and local policy documents, although, if there is a conflict between these and the NPS, the NPS prevails for the purposes of IPC decision making.

11.3.4 Further, the Planning Act 2008 provides that the IPC must, in making its decision on an application, have regard to any Local Impact Report (LIR) prepared by relevant local authorities. It is anticipated that the LIRs will rely in part on PPSs, PPGs, regional and local policy to provide a context for their assessment. On this basis, regard has been given to these documents (where relevant to the technical assessment) since they are likely to inform the LIRs prepared by the relevant local authorities.
a) International Legislation


11.3.5 The European Commission adopted a Thematic Strategy for Soil Protection (COM (2006) 231) (the Thematic Strategy) in September 2006, in order to provide a comprehensive common framework for protecting soils across the European Union (EU). The Thematic Strategy includes a proposed legislative framework for the protection and sustainable use of soil that integrates national and EU policies, measures to improve knowledge of soil function, and measures to increase public awareness. It seeks to establish rational land use planning practices at all levels of Government to ensure the sustainability of soils, consistent with a “precautionary principle” used by the EU in establishing environmental policy.

11.3.6 The Thematic Strategy includes proposals for an EU Soil Framework Directive requiring Member States to adopt a systematic approach to identifying and combating soil degradation and integrating soil protection into other policies – especially with respect to agriculture, regional development, transport, and research. This proposed Directive has not yet been passed by the European Parliament and Council of Ministers.

b) National Legislation

i. The Wildlife and Countryside Act 1981 (as amended) (Ref 11.2)

11.3.7 The Wildlife and Countryside Act 1981 restricts the introduction of certain animals and plants. For example Japanese knotweed (*Reynoutria japonica*) and giant hogweed (*Heracleum mantegazzianum*) are listed under Schedule 9 of the Act, and subject to Section 14 of the Act which makes it an offence to plant, or cause these species to grow in the wild.

ii. The Environmental Protection Act 1990 (Ref. 11.3)

11.3.8 Japanese knotweed and giant hogweed are regarded as a controlled waste under the Environmental Protection Act 1990 and must be disposed at licensed sites or by burning on site.

iii. The Environmental Stewardship (England) Regulations 2005 and the Countryside Stewardship Regulations 2000 (Ref 11.4)

11.3.9 Countryside Stewardship was introduced as a pilot scheme in 1991 to encourage farmers and land managers to enhance and conserve English landscapes, their wildlife and history. That scheme is now closed to new applicants and has been superseded by the Environmental Stewardship Scheme, which was introduced by the 2005 Regulations. The Environmental Stewardship Scheme is an agri-environment scheme that provides funding to farmers and other land managers in England who deliver effective environmental management on their land.

11.3.10 The Environmental Stewardship Scheme comprises three elements: Entry Level Stewardship (ELS), Organic Entry Level Stewardship (OELS) and Higher Level Stewardship (HLS). The ELS Scheme is open to all farmers and land managers who want to deliver a basic level of environmental management as part of their operations. ELS requires, at minimum, a basic level of environmental management and participants can choose from a wide range of management options to commit to.
These cover all farming types and include matters such as hedgerow management, stone wall maintenance, low nutrient input grassland, buffer strips, and arable options. OELS is the strand of ELS that applies to organic farming and is open to farmers who manage all or part of their land organically. HLS aims to deliver significant environmental benefits in high priority situations and areas. It involves more complex environmental management and the preparation of a Farm Environment Plan.

c) National Planning Policy


11.3.11 The first Soils Action Plan for England 2004-2006 was published by the Department for Environment, Food and Rural Affairs (Defra) in 2004. This has been developed into “Safeguarding Our Soils: A Strategy for England” which was published by Defra in 2009. The strategy outlines the Government’s approach to safeguarding England’s soils for the long-term. It provides a guide to future policy development across a range of areas and sets out the practical steps that need to be taken to prevent further degradation of soils, to enhance, restore and ensure soils resilience, and to improve understanding of the threats to soil and best practice in responding to those threats.

11.3.12 The purpose of the strategy is to support the Thematic Strategy and to achieve Defra’s goals of a thriving farming sector and a sustainable, healthy food supply. A supplementary purpose is to increase the value placed on soil and to set a framework for safeguarding the amount and quality of England’s soil resource for the future.


11.3.13 PPS7 sets out the Government policy on development within the countryside. It sets out policy for promoting development in rural areas whilst conserving the character of the countryside and protecting the best and most versatile agricultural land, defined as Grade 1, 2 and 3a of the Agricultural Land Classification (ALC) (paragraph 28).

11.3.14 Paragraph 28 of PPS7 states:

“The presence of best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the ALC), should be taken into account alongside other sustainability considerations (e.g. biodiversity... including soil quality) when determining planning applications.”

11.3.15 In this regard, paragraph 28 goes on to state that it is for local planning authorities to decide whether best and most versatile agricultural land can be developed having carefully weighed the options in the light of competent advice.

iii. Consultation Paper on a New Planning Policy Statement: Planning for a Natural and Healthy Environment (March 2010) (Ref. 11.7)

11.3.17 At the outset, the document makes clear that in its final form, the PPS will replace PPS7 in so far as it relates to, amongst others, soils and agricultural quality (paragraphs 28 and 29).

11.3.18 With specific reference to agricultural land, proposed Policy NE8.9 states:

“When considering applications involving significant areas of agricultural land, local planning authorities should take account of the presence of best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the ALC) alongside other sustainability considerations. Where significant development of agricultural land is unavoidable, local planning authorities should seek to develop areas of poorer quality land (grades 3b, 4 and 5) in preference to that of a higher quality, except where this would be inconsistent with other sustainability considerations. Little weight should be given to the loss of agricultural land in grades 3b, 4 and 5, except in areas (such as uplands) where particular agricultural practices may themselves contribute to the quality and character of the environment or the local economy.”

iv. Design Manual for Roads and Bridges (DMRB) – Volume 11 Section 3, Part II: Geology and Soils (1993) (Ref. 11.8)

11.3.19 The Highway Agency’s ‘Design Manual for Roads and Bridges’ Volume 11 Section 3 Part II, published in 1993, provided very basic guidance on impact assessment on geology and soils. Since then understanding of the role and importance of soil in the environment has improved greatly and key policy and guidance has been published, including the European Commission’s Thematic Strategy for Soil Protection and soil strategies in both England and Scotland.

11.3.20 DMRB Volume 11, Section 3 Part II states: ‘...where soils are excavated and stored for reuse the level of damage and deterioration in soil quality will depend upon the types of earthmoving machinery employed, method of handling, weather conditions and provision of storage. In addition to any deterioration in soil quality there may be a loss of valuable seed banks, for example, when soil is taken from a site of nature conservation interest...’.

11.3.21 DMRB Volume 11, Section 3 Part II is currently being updated.

d) Regional Planning Policy

11.3.22 The Government’s revocation of regional strategies was quashed in the High Court on 10 November 2010. However, on that same date the Government reiterated in a letter to Chief Planners its intention to revoke regional strategies through the Localism Bill. This letter was also challenged but, on 7 February 2011, the High Court held that the Government’s advice to local authorities that the proposed revocation of regional strategies was to be regarded as a material consideration in their planning development control decisions should stand. The decision of the High Court was upheld by the Court of Appeal on 27 May 2011. Therefore, the regional strategies remain in place but in the case of development control decisions it is for planning decision makers to decide on the weight to attach to the strategies (see Volume 1, Chapter 4 for a full summary of the position regarding the status of regional planning policy).
i. Regional Planning Guidance 10 for the South West 2001 – 2016 (RPG10) (2001) (Ref. 11.9)

11.3.23 RPG10 sets out the broad development strategy for the period to 2016 and beyond. With specific reference to soils, land use and agriculture, paragraph 3.76 explains that land quality is considered in various ways including its value for agricultural production. It goes on to refer to the ALC system which is used to grade agricultural land which forms the basis for classifying best and most versatile agricultural land. It also refers to further guidance contained within PPG7, which as explained above, has now been replaced by more recent guidance contained within PPS7.

11.3.24 Policy SS20 relates to Rural Land (including Urban Fringe) Uses. It states that local authorities and other agencies, in their plans, policies and proposals should, amongst others:

“Conserve the region’s best and most versatile agricultural land and associated soils in accordance with the guidance in PPG7; land of a poorer quality should be used in preference to higher quality except where other sustainability criteria suggest otherwise.

Development Plans should set out policies on the level of protection from development, to be afforded to the best and most versatile agricultural land and associated soils in relation to other considerations such as landscape character, biodiversity and sustainability.”

ii. Draft Revised Regional Spatial Strategy (RSS) for the South West Incorporating the Secretary of State’s Proposed Changes for Public Consultation (2008) (Ref. 11.10)

11.3.25 Chapter 7 deals with Enhancing Distinctive Environments and Cultural Life. Paragraph 7.13.17 relates to Best and Most Versatile (BMV) land and states:

“Best and Most Versatile (BMV) land needs to be taken into account alongside other sustainability considerations when deciding between sites. The BMV agricultural soils need to be protected from development because these are the most flexible in terms of the range of crops or produce that can be grown, and therefore the most valuable for current and future agricultural production. Given changes to Common Agricultural Policies (CAP) and the fact that this is driving businesses to become more economically efficient, it is important that the best land is protected, for possible future agricultural needs. In some circumstances, BMV land may be subject to development pressures, particularly in areas identified for growth in Sections 3 and 4.”


11.3.26 The Somerset and Exmoor National Park Joint Structure Plan was adopted in 2000 with saved policies from 27 September 2007. All policies have been saved with the exception of Policy 53 which is unrelated to soils, land use and agriculture. The Plan provides a strategic base for all land use planning within the plan area for the period up to 2011.
11.3.27 Policy 7 relates to Agricultural Land and states:

“Subject to the overall aims of the strategy, provision should not be made for permanent development, excluding forestry and agricultural, involving the best and most versatile agricultural land (Grades 1, 2 and 3a) unless there are no alternative sites on lower quality agricultural land and there is on overriding need for development in that location. Where land in Grades 1, 2 and 3a does need to be developed there is a choice between different grades, development should be diverted towards land of the lowest grade.”

11.3.28 The supporting text to Policy 7 explains that better quality agricultural land can be significantly more productive than other land, whatever the intensity of production, and that its protection from development is a material consideration in assessing proposals. Paragraph 4.31 goes on to state:

“Where provision has to be made for permanent development, it should preferably involve land falling into one of the lower grades of the ALC (Grades 3b, 4 or 5), as defined by the Ministry of Agriculture, Fisheries and Food. It must be recognised that this lower quality land can often be the richest in terms of biodiversity, archaeology and its contribution to the quality of the landscape. Where land in Grades 1, 2 and 3a has to be developed, the development should be directed towards land of the lowest grade. Provision for permanent development involving the best and most versatile agricultural land should only be made where there are no alternative sites available on lower quality land and where there is an overriding need for development in that location. Consideration may also need to be given to the ecological value and nature conservation issues, particularly habitat and species protection, which affects lower grade agricultural land. This could inhibit or restrict its development potential and thus increase pressure for development on agricultural land of a higher grade. Where this occurs, a balance will need to be sought between the requirements of this policy and those of Policy 1: Nature Conservation, where the lower grade agricultural land has had a nature conservation designation applied to it.”

e) Local Planning Policy


11.3.29 The Sedgemoor District Local Plan forms part of the Development Plan for Sedgemoor. The Local Plan was adopted in 2004 (with relevant policies ‘saved’ from 27 September 2007). The Proposals Map (Inset Map No. 14) indicates that the site is not subject to any specific soils and land use designations.

11.3.30 There are no relevant saved policies relating to soils and land use impacts at the site.

ii. Sedgemoor Local Development Framework (LDF) Core Strategy (Proposed Submission) (September 2010) (Ref. 11.13)

11.3.31 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from September to November 2010. Changes prior to submission proposed as a result of the consultation process were reported and endorsed by the Council’s Executive
Committee on 9 February 2011. The Core Strategy (Proposed Submission) was submitted to the Secretary of State on 3 March 2011 and an Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy will form part of the Development Plan for Sedgemoor.

11.3.32 EDF Energy submitted representations objecting to the Core Strategy (Proposed Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1, MIP2 and MIP3 contained in that chapter) and those sections relating to housing and Hinkley Point. EDF Energy also participated at the relevant EiP hearings. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the Core Strategy.

11.3.33 The following Core Strategy (Proposed Submission) policies are of potential relevance:

11.3.34 Policy S3 (Sustainable Development Principles) states that development proposals will be expected to minimise the impact on natural resources, avoid pollution and incorporate the principles of sustainable construction to contribute to, amongst other things, soil protection.

11.3.35 Policy S4 (Mitigating the Causes and Adapting to the Effects of Climate Change) states that development should adapt to the effects of climate change through, amongst other things, protection of soils in order to ensure that they are resilient to the effects of climate change.

11.3.36 Policy D16 (Pollution Impacts of Development and Protecting Residential Amenity) states that development proposals that are likely to result in soil contamination that would be harmful to other land uses, human health, tranquillity, or the built and natural environment will not be supported.

iii. Supplementary Planning Guidance

11.3.37 Sedgemoor District Council and West Somerset Council have jointly prepared draft supplementary planning guidance in relation to the HPC Project. Public consultation on the Consultation Draft version of the Hinkley Point C Project Supplementary Planning Document (the draft HPC SPD) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which object to the draft HPC SPD. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the draft HPC SPD.

11.3.38 The draft HPC SPD provides advice in relation to the HPC proposals, expanding upon the policy context for the proposals. This includes associated development.

11.3.39 The draft HPC SPD does not set out any specific guidance in relation to soils and land use impacts at the site.

11.3.40 Further planning policy context is provided in the Legislative Planning Policy Context chapter (Volume 1, Chapter 4) and the Introduction (Volume 6, Chapter 1).
11.4 Methodology

11.4.1 The assessment and all supporting soil and land use surveys, have been conducted in accordance with standard guidance for England and Wales as detailed below. This chapter addresses the likely impacts of the development during the construction, operational and post-operational phases of the proposed development.

a) Study Area

11.4.2 The geographical extent of the study area for the assessment includes:

- the area of the site;
- surrounding land within 25m of the proposed development site as, given the scale of proposed earthworks, surrounding land use and boundary hedgerows and trees, it is within this area that any potential impacts associated with soil erosion or dust emissions on soil, land use or agricultural receptors are considered likely to occur; and,
- agricultural drainage ditches and field drainage systems which are contiguous with drainage ditches and drainage systems within the site.

11.4.3 The study area is illustrated in Figure 11.1.

b) Baseline Assessment

11.4.4 The baseline assessment has been compiled from three types of data generation:

- desk-based studies of web-based resources, published maps and documents;
- field surveys of soils and land use commissioned specifically for this assessment; and
- consultation with appropriate statutory and non-statutory bodies.

11.4.5 Desk-based studies and field surveys were carried out in accordance with best practice and standard methodologies where applicable.

i. Desk-based Review

11.4.6 Baseline information on the following subjects was obtained from existing published literature and from web-based information:

- Preliminary ALC grades (information obtained from mapping provided on the Multi-Agency Geographic Information for the Countryside (MAGIC) website (www.magic.defra.gov.uk)) and accessed on 8 January 2011 (Ref. 11.16)).
- Agri-environment schemes (Environmental Stewardship Agreements and Countryside Stewardship schemes) (information obtained from mapping provided on the MAGIC website (www.magic.defra.gov.uk)) and accessed on 8 January 2011) (Ref 11.16).


ii. Field Survey

11.4.7 A field survey was carried out by Reading Agricultural Consultants Ltd. (RAC Report: ‘Land at Cannington Southern By-pass, Somerset, Agricultural Land Classification’, November 2010 (Appendix 11A) to determine the following soils and land use baseline conditions:

Soil Survey

11.4.8 Soil type, soil profile descriptions and overall soil conditions were determined in situ, following the Soil Survey Field Handbook (Hodgson (1976) Soil Survey Technical Monograph No 5) (Ref. 11.19). A series of observations were made across the proposed development site through sampling using soil augers and spades, to allow the examination of soil profiles. At each observation point, the following characteristics were assessed for each soil horizon, up to a maximum depth of 120cm, or any impenetrable layer:

• soil texture;
• significant stoniness;
• colour (including local grey and mottle colours);
• consistency;
• structural condition;
• free carbonate; and
• depth.

Agricultural Land Classification

11.4.9 ALC involves grading agricultural land quality into five different classes (see Appendix 11B). Grade 1 is the highest quality land with no or very limited restriction to agricultural use. Grade 5 is of least agricultural value, usually only of limited grazing use. Under PPS 7, Grades 1, 2 and 3a are defined as the ‘best and most versatile’ land (BMVL) and are a national resource to be protected.

11.4.10 ALC was determined from field survey data and meteorological data (RAC Report 2010, Appendix 11A), following the methodology described in MAFF (1988) (Ref. 11.20). To establish the ALC, results from the soil surveys were combined with data on the topography and climate of the area (taken from the Meteorological Office (1989) (Ref. 11.21)) to provide an assessment of the land classification. Land Grade 1s determined by a combination of soils types, drainage status, climatic factors and
topography (land gradient) according to the methodology provided in MAFF (1988) (Ref. 11.20).

11.4.11 Soil Wetness Class (WC) (the Soil Wetness Classes are described in Appendix 11C) was inferred from the matrix colour, presence or absence of, and depth to, greyish and ochreous gley mottling and/or poorly permeable subsoil layers at least 15cm thick.

11.4.12 Soil droughtiness was investigated by the calculation of moisture balance equations. Crop-adjusted Available Profile Water (AP) is estimated from texture, stoniness and depth, and then compared to a calculated moisture deficit (MD) for the standard crops, wheat and potatoes.

\[\text{Land Use, Crops and Stock}\]

11.4.13 Land use, including agricultural cropping and stocking was determined from direct observation and photographic evidence at the time of field soil survey in 2010 (Appendix 11A).

\(\text{c) Consultation}\)

11.4.14 Consultation has been undertaken throughout the EIA process and further information may be found in the Consultation Report. Consultation on soil, land use and agriculture issues has formed part of the overall consultation process, particularly as there is an interaction with (a) terrestrial ecology, (b) surface water and (c) landscape issues. Specific consultation has taken place with the Animal Health Division of Defra with regard to the potential presence of animal burial pits and with Natural England with regard to agri-environment schemes and ALC data. Responses from consultees during both formal and informal consultation have been taken into account.

\(\text{d) Assessment Methodology}\)

11.4.15 While soil loss and land degradation can have adverse consequences for example in relation to agricultural production, water quality and biodiversity, there are no established or published methods for assessing the impacts of development upon soils or agricultural receptors. The criteria used in this assessment are the ALC Grades as set out by MAFF (1988) (Ref. 11.20), together with professional knowledge of soil conditions and quality.

11.4.16 The impact assessment therefore follows the approach set out in Volume 1, Chapter 7, involving three key steps: impact assessment (including assessment of cumulative impacts), provision of mitigation measures and re-assessment of residual impacts. The magnitude of impacts and receptor value/sensitivity are assessed using criteria that are specific for soil, land use and agriculture (set out below); then the their significance is assessed using the impact assessment matrix (IAM) provided in Volume 1, Chapter 7 which combines the magnitude of impact and receptor value/sensitivity assessments specific for soil, land use and agriculture as well as professional judgment. As explained in Volume 1, Chapter 7, impacts rated as negligible or minor are considered to be acceptable without further mitigation.

11.4.17 This assessment addresses likely impacts of the proposed development during the construction, operational and post-operational phases. As with the assessment of
the potential construction phase impacts, there is no formal assessment methodology that can be applied to potential changes that may occur during the operational phase and the assessment needs to rely on the professional judgement of both engineers and environmental scientists.

i. Receptor Value and Sensitivity

11.4.18 All of the soil, land use and agricultural receptors that may be impacted by the proposed development have been assigned a level of importance in accordance with the quality of the soil and the ALC grade of land. These are described in Table 11.1. Where a receptor could reasonably be placed within more than one value and sensitivity rating, conservative professional judgement has been used to determine which rating would be applicable.

Table 11.1: Guidelines for the Assessment of Receptor Value and Sensitivity

<table>
<thead>
<tr>
<th>Value and Sensitivity</th>
<th>Guidelines</th>
</tr>
</thead>
</table>
| High                  | **ALC and agricultural productivity:**  
  Grade 1 agricultural land and specialised agricultural activity such as horticultural crops, soft fruit, etc.  
  Irrigated agriculture.  
  Higher level Agri-environment scheme lands.  
  **Soil Conditions:**  
  (i) Value for Agriculture  
  Soils with low or no wetness limitation affecting workability (wetness class I or II), where drought is not also a limitation.  
  (ii) Vulnerability to damage  
  Soils with a high susceptibility to structural damage and soil erosion throughout the year, including heavy textured, poorly structured soils, Grade 1. |
| Medium                | **ALC and agricultural productivity:**  
  Grades 2 and 3a agricultural land.  
  Annual horticultural cropping (non-irrigated).  
  Entry level Agri-environment scheme lands.  
  **Soil Conditions:**  
  (i) Value for Agriculture  
  Soils with low wetness limitation affecting workability (wetness class II), where drought is not a limitation.  
  (ii) Vulnerability to damage  
  Soils with some seasonal susceptibility to structural damage and soil erosion. |
| Low                   | **ALC and agricultural productivity:**  
  Grades 3b and lower agricultural land.  
  Arable or grassland areas.  
  **Soil Conditions:**  
  (i) Value for Agriculture  
  Soils with moderate wetness limitation affecting workability (wetness class III or IV); or  
  (ii) Vulnerability to damage  
  Soils with medium to coarse textures and some resistance to soil structural damage for most of the year. |
### Value and Sensitivity

<table>
<thead>
<tr>
<th>Value and Sensitivity</th>
<th>Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low</td>
<td><strong>ALC and agricultural productivity:</strong> Agricultural land of Grades 4 or 5 Arable or grassland areas. <strong>Soil Conditions:</strong> (i) Value for Agriculture Soils with high wetness limitation affecting workability (wetness class V or VI); Soils in which droughtiness is a limitation to crop growth; or (ii) Vulnerability to damage Coarse textured and stony soils with little potential for soil structural damage.</td>
</tr>
</tbody>
</table>

#### 11.4.19
In addition to the receptors described in Table 11.1, agricultural stock (off-site grazing animals) and pets have been identified as possible receptors in relation to the very specific issue of potential (unrecorded) animal burial pits within the site and the risk of exposure to disease from these pits, if present and accidentally disturbed. This is also addressed in Volume 6, Chapter 12, with regard to human receptors. Stock animals and pets are considered to be high value/sensitivity receptors.

#### 11.4.20
The sensitivity of a soil to stripping, handling and stockpiling has been taken into consideration, specifically where particular soil types or soil Wetness Classes make them especially vulnerable to damage and loss of viability when handled. In such cases the sensitivity of a soil may be assessed as high, even though its value as an agricultural soil may be medium.

### ii. Magnitude of Impact

#### 11.4.21
The magnitude of impact has been based on the consequences that the proposed development would have upon soil, land use and agricultural receptors and has been considered in terms of high, medium and low. Table 11.2 provides a guide to the assessment of magnitude of impact for soils, land use and agriculture. Where an impact could reasonably be placed within more than one magnitude rating, conservative professional judgement has been used to determine which rating would be applicable.

#### 11.4.22
There is no published guidance on thresholds for assessing what scale of loss of agricultural land is a significant loss of such land, but the presence of BMVL is a factor in the consideration of the sustainability of development proposals as set out in paragraph 28 of PPS7 (Ref. 11.6). PPS7 promotes the creation of a sustainable countryside framework and places the loss of BMVL within the context of meeting wider sustainability objectives. The assessment of magnitude of change provided in Table 11.2 is based on (a) generic guidelines used throughout this assessment (Volume 1, Chapter 7, Table 7.5), (b) timescales of permanent or temporary (both long and short-term) loss of agricultural land and (c) land area loss thresholds previously adopted by MAFF when considering proposals involving more than 20ha of BMVL, and also land not classified as BMVL, but still given over to agricultural use.
Table 11.2: Guidelines for the Assessment of Impact Magnitude

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Permanent or long-term (&lt;10 years) loss of over 50ha of BMVL, or entire regional resource of BMVL (ALC Grades 1, 2, 3a). (50ha being the size of a moderate to large sized land holding according to Defra statistics for Somerset)*. Existing land use would not be able to continue.</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium to long term (5-10 years) loss of 20 – 50ha of BMVL, or large proportion of local resource of BMVL. (20-50ha being the size of a moderate sized land holding according to Defra statistics for Somerset)*. Existing land use would be able to continue but noticeable changes (such as a measureable loss of yield, additional land management or increased fertilising would occur.</td>
</tr>
<tr>
<td>Low</td>
<td>Temporary (&lt;5 years) loss of 10 – 20ha of BMVL, or large proportion of local resource of BMVL. (10-20ha being the size of a small to moderate sized land holding according to Defra statistics for Somerset)*. Existing land use would be able to continue but noticeable changes (such as the need for additional land management, increased fertilising, or reduced cropping choices) would occur.</td>
</tr>
<tr>
<td>Very low</td>
<td>Temporary short term (&lt;two years) loss of &lt;10ha of BMVL. 0-10ha being the size of a small sized land holding according to Defra statistics for Somerset)*. Short term adverse changes to the value of the receptor but recovery is expected in the short term (0 – one years), and there would be no impact on its integrity. No material change to existing land use. Loss or degradation of area of BMVL but a small proportion of local resources. No impact on overall agricultural land availability for wider area/region.</td>
</tr>
</tbody>
</table>

*Data taken from the Defra website (Ref. 11.18) at: http://www.defra.gov.uk/statistics/foodfarm/landuselivestock/junesurvey/junesurveyresults/

11.4.23 Potential impacts have been considered in terms of permanent or temporary, adverse (negative) or beneficial (positive) and cumulative.

11.4.24 A permanent impact is considered irreversible and, consequently, often represents an impact of high magnitude. The sources of impact may arise during construction or operation of the development or during post-operational restoration of the site.

iii. Significance of Impacts

11.4.25 The significance of the impact is judged on the relationship of the magnitude of impact to the assessed receptor sensitivity and/or importance. The method for assessing the significance of the impacts, without mitigation, is outlined in Volume 1, Chapter 7. An IAM is provided for this purpose, to assist professional judgement. The assessment of impact significance is the most important step in the EIA process, since it is this which is used to determine whether mitigation is required and also to determine whether mitigation measures have reduced the impact to an acceptable residual level.

iv. Residual Impacts

11.4.26 The final step in the EIA process is the assessment of the residual impacts after the implementation (where necessary) of the proposed mitigation measures. In this assessment, residual impacts assessed as minor or negligible are considered to be acceptable.
v. Cumulative Impacts

11.4.27 Volume 1 Chapter 7 of this ES refers to the methodology used to assess cumulative impacts. Additive and interactive effects between impacts generated within the site boundary and study area are assessed within this chapter. Cumulative impacts that consider activities and impacts generated at distance from the site and study area are considered in Volume 11 of this ES; this assesses the project-wide cumulative impacts and in-combination impacts with other proposed, or reasonably foreseeable projects.

e) Limitations, Constraints and Assumptions

11.4.28 ALC and soil survey fieldwork was carried out on land shown in Figure RAC 4547b-2: of Appendix 11A. Since the survey took place (in November 2010) there has been a slight change to the site boundary. ALC grades and soil types within the current site boundary but not included in the original ALC survey and ALC grades and soil types within the study area but beyond the site boundary (Figure 11.1) have been interpreted from the following published sources:

11.4.29 ALC and soil survey fieldwork was carried out across the site, but did not extend to land outside the site shown on Figure 11.1. It has been assumed for the purposes of the assessment that soil quality, type and ALC Grade immediately outside the development site boundary follows that described in the following published sources:

- MAGIC website accessed 5 August 2011 (Ref. 11.16).
- Envirocheck Report no 29026125_1_1 (Ref. 11.22).

11.4.30 The information relating to Countryside Stewardship and Environmental Stewardship Schemes has been obtained from the ‘indicative’ map information provided in the online MAGIC interactive map system.

11.4.31 Information and mapping of agricultural field drainage was not available at the time of writing.

11.4.32 Defra has no records of animal burial pits within the proposed development site; however, this does not eliminate the possibility that unrecorded pits may be present.

11.5 Baseline Environmental Characteristics

a) Introduction

11.5.1 This section of the ES describes the soil, land use and agriculture baseline for the proposed development. Descriptions of baseline conditions with respect to contaminated land, groundwater and surface water are provided within Volume 6, Chapters 12 and 13 respectively.
b) Study Area Description

i. Site Overview

11.5.2 The proposed development site is a single parcel of land of approximately 5.2ha in size, lying to the immediate south of Cannington village. The study area includes this and a 25m wide strip of land around the development site boundary. The site is bounded to the south by the Cannington Southern Bypass (A39) and on all other sides by other agricultural land. Existing use of the agricultural land within the site and immediately adjacent to it is permanent pasture. Non-agricultural land forms semi-mature tree belt along the southern margin of the proposed development site, adjacent to the A39. The site is currently used for agricultural purposes, largely comprising a single closely grazed grassland field.

11.5.3 The land forms a flat low-lying plain over most of the proposed development site, with ditches along the southern margin and around the principal northern fencelines (see Envirocheck Report No 29026125_1_1 (Ref. 11.22). The altitude of the proposed development site falls mostly within 13m to 17m above Ordnance Datum (AOD). Microtopography is usually smooth. The Cannington Brook flows from west to east just beyond the northern and western limits of the site. The western most corner of the proposed development site lies adjacent to land identified by the Environment Agency as being subject to flooding by Cannington Brook (see Envirocheck Report no 29026125_1_1) (Ref. 11.22).

11.5.4 The land within the proposed development site consists entirely of agricultural grassland. The corner of the farmyard and barn belonging to Denman’s Farm lies within the study area to the north.

ii. Soil Types

11.5.5 The geology of the proposed development site has been derived from the Taunton geological map, Sheet 295 at 1:50,000 scale (Ref 11.23). The principal underlying geology is the Mercia Mudstone Formation (formerly Keuper Marl), of Permian and Triassic age. The Mercia Mudstone Formation typically comprises red cuboidally fractured mudstones and silty mudstones that weather to calcareous clay or marl. Greenish grey mudstones and greenish mottling are common.

11.5.6 The soils at the proposed development site were found to be non-calcareous stony clay loams with the stones being of mixed types and rounded by the action of water, with impenetrable large stones at moderate depth. As such they are not concordant with the Mercia Mudstone.

11.5.7 The level low lying site and its location near the Cannington Brook, together with the rounded and mixed lithology of the stones, indicate that the proposed development site lies on a terrace deposit probably formed during peak flow events on the Cannington Brook. It is not unusual for geological maps to omit minor terraces and to only map drift deposits where they are of substantial thickness.

11.5.8 Broad scale indicative mapping of soil types by the SSEW (Ref. 11.15) indicates that there are several different soil types in and around the proposed development site. However, field survey by Reading Agricultural Consultants (RAC) (Appendix 11A) has shown that there is only one main type of soil present within the proposed development site boundary. Brockhurst 1 Association soils are generally slowly
permeable, seasonally waterlogged, fine silty soils developed over mudstones. However, at the location of the site the soils would appear to be formed from a minor included unit in the Brockhurst 1 Association, namely Salop series soils developed on river terrace gravels. The soils are predominantly of WCI and WCII (well drained to moderately well drained) at this location, but may be subject to occasional flooding in this low-lying location.

11.5.9 Brockhurst 1 soils within the proposed development site are described by RAC (Appendix 11A) as being dark reddish brown to dark brown medium clay loams with 25% stones up to about 10cm in size in the topsoil. The stone content increases with depth to 35% or more and becomes impenetrable to auger from 23cm to 49cm depth. The soils have some ochreous mottles.

11.5.10 In summary, surveyed soils within the proposed development site are described as being medium clay loams and generally stony and freely draining.

iii. Agricultural Field Drainage

11.5.11 Artificial drainage is usually required for agricultural use of the soil types found within the proposed development site (Soil Survey of England and Wales, 1984) (Ref. 11.15).

iv. Historic Land Use

11.5.12 The proposed development site is currently in agricultural land use and there is no indication from any of the reviewed documentation (Ref. 11.22) that the current agricultural areas of the site have, in the past, been used for any purpose other than greenfield agricultural land.

v. Agricultural Land Classification

11.5.13 In order to assess accurately the impacts to land use and soils resulting from the construction, operation and post-operational phases of the proposed development, the baseline land use and soil conditions in the area must be defined. The agricultural value of the land, based on the 1988 MAFF definitions (Ref. 11.20), has been mapped, based on a field survey and assessment carried out in 2010. The results of the ALC field assessment are provided in Appendix 11A.

11.5.14 The ALC grade is determined by a combination of soils types, drainage status, climatic factors and topography (land gradient) as per MAFF guidelines (MAFF 1988) (Ref. 11.20). The ALC system classifies land into five main categories (Grade 1 to 5) and two subdivisions within Grade 3 (i.e. Classes a, and b) (see ALC Grade definitions in Appendix 11B).

11.5.15 Grade 1 is the highest quality land with very limited restriction to agricultural use. Grade 5 is of least agricultural value, usually only of limited grazing use. Under PPS7, Grades 1, 2 and 3a are defined as the BMVL and are a national resource to be protected. Grade 3b land is classed as being of only moderate quality.
vi. ALC Site and Climatic Characteristics

General Features, Land Form and Drainage

11.5.16 The land forms a flat low-lying plain at around 13m to 17m AOD, with ditches along the southern margin and the main field boundary of the proposed development site. The soils fall into a single drainage group being of Wetness Class I, well drained, as defined in the MAFF (1988) (Ref. 11.20) and ALC guidelines (Appendix 11B).

Climatic Factors

11.5.17 Local climatic factors have been interpolated from the Meteorological Office’s standard 5km grid point long-term averaged climate data set for the centre of the survey area at a representative altitude (Ref. 11.21). Climatic factors for the proposed development site are given in Table 11.3

11.5.18 The local climate has slightly higher rainfall than is average for lowland England and the area can be considered moist. Temperatures are warm compared to other parts of the UK. The moisture deficits are moderately large. The Field Capacity Day (FCD) regime is very slightly longer than the average for lowland England and can be considered to be slightly unfavourable for providing opportunities for landworks. In summary the climate is warm and moist, though fairly typical for lowland western England.

Table 11.3: Local climatic factors (according to The Meteorological Office, 1989 (Ref 11.21))

<table>
<thead>
<tr>
<th>ALC Climatic Factor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average annual rainfall (AAR)</td>
<td>755mm</td>
</tr>
<tr>
<td>Accumulated temperature &gt; 0°C (AT0)</td>
<td>1,554 days</td>
</tr>
<tr>
<td>Field Capacity Day regime (FCD)</td>
<td>165 days</td>
</tr>
<tr>
<td>Average moisture deficit, wheat (MDw)</td>
<td>108mm</td>
</tr>
<tr>
<td>Average moisture deficit, potatoes (MDp)</td>
<td>101mm</td>
</tr>
</tbody>
</table>

ALC Assessment

11.5.19 The main factor affecting the classification of the land at the proposed development site is a droughtiness limitation due to the high stone content of the soils which reduces their moisture-holding capacity. The reduced moisture holding capacity prevents the stored soil moisture from adequately buffering against the impacts of a Summer drought to the point where the land can be graded no better than Grade 3b, which is moderate quality agricultural land, as shown in Table 11.4.

Table 11.4: Approximate Areas of ALC Grades

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Area (ha)</th>
<th>Area (% of agricultural land)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3b</td>
<td>Moderate quality</td>
<td>5.6</td>
<td>100</td>
</tr>
<tr>
<td>Total agricultural land</td>
<td>5.6</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Non agricultural land</td>
<td>0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total area</td>
<td>6.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11.5.20 In summary, all land within the proposed development site is classified as ALC Grade 3b and hence is not classified as BMVL.

vii. Agricultural Land Use and Cropping

11.5.21 Information on current land use and cropping patterns was obtained during a field walk-over survey on 11 and 12 August 2009.

11.5.22 The land use and crop type within the proposed development site is permanent grazing for dairy cattle, with some small areas of copse, species-poor hedgerow and ditches which provide drainage and field boundaries.

11.5.23 The proposed development site includes two large fields and part of a third field of permanent pasture, amounting to a total area of 5.2ha of grassland and includes a semi-mature tree belt on the north side of the A39.

11.5.24 There are no existing agricultural buildings within the proposed development site. There is an existing stock crossing point of the A39 immediately south of the site, used to move dairy cattle from pastures on the northern side of the A39 to the milking parlour on the southern side (Rice’s farm).

viii. Environmental Stewardship and Countryside Stewardship

11.5.25 Based on information obtained from the web-based MAGIC map (Ref. 11.16) there are no land areas within or adjacent to the proposed development site that are part of an Environmental Stewardship Scheme or Countryside Stewardship Agreement.

ix. Other Environmental Designations

11.5.26 There are no other environmental designations for soils, land use and agriculture within the proposed development site.

x. Common Land

11.5.27 There are no areas of common land within or adjacent to the proposed development site.

xi. Invasive and Alien Weed Species

11.5.28 Invasive weed species such as Japanese knotweed are not currently considered to be widespread or invasive within the proposed development site. The baseline habitat surveys undertaken for the proposed development did not identify the presence of Japanese knotweed and, although these surveys were not primarily concerned with identifying invasive species, their presence would normally be recorded if observed.

xii. Animal Burial Pits

11.5.29 The Animal Health Division of Defra has been consulted about the potential presence of any animal burial pits relating to foot and mouth or other disease outbreaks. No such pits are recorded within the proposed development site (see Appendix 11D).

11.5.30 Burial pits were not registered before 1972, and individual animals could still be buried without registration up to the early 1990s. The potential for unrecorded burials being present within the proposed development site, although low, cannot be
completely discounted. This issue is assessed further within Volume 6, Chapter 12, Geology, Land Contamination and Groundwater.

c) Identification and Description of Soil, Land Use and Agricultural Receptors

11.5.31 The value and sensitivity of soil, land use and agricultural receptors identified within or immediately adjacent to the proposed development site are described below in Table 11.5.

11.5.32 There is no generic guidance for attributing value and sensitivity criteria to soil and agricultural receptors. That provided in Table 11.5 is based on (a) professional judgement of the quality (for agriculture) and sensitivity (to structural damage) of in situ, pre-development topsoil and (b) the need (or otherwise) for good quality topsoil for post-operational restoration.

Table 11.5: Value and Sensitivity of Soil, Land Use and Agricultural Receptors at the Proposed Development Site

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Value/Sensitivity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALC grade On-site and off-site land</td>
<td>Low</td>
<td>Determined in relation to the potential of the land, in terms of its ALC, for productive farming activity. Only ALC grades 1, 2 and 3a are considered to be BMVL.</td>
</tr>
<tr>
<td>Topsoil in situ quality and condition On-site and off-site soils</td>
<td>Medium</td>
<td>Determined in relation to identified soil type and wetness class and vulnerability to damage through physical disturbance. Once stripped, soils on site are considered to be vulnerable to structural damage.</td>
</tr>
<tr>
<td>Agricultural crops On-site and off-site grassland and crops</td>
<td>Medium</td>
<td>Determined in relation to the ALC grade of the land and the fact that surrounding areas are permanent grassland for cattle grazing.</td>
</tr>
<tr>
<td>Agricultural stock, working animals and pets Off-site grazing animals, working animals and pets</td>
<td>High</td>
<td>Determined in relation to the sensitivity of stock, working dogs and (potentially) household pets to diseases from disturbed animal burial pits.</td>
</tr>
<tr>
<td>Agricultural field drainage system</td>
<td>High</td>
<td>Determined in relation to the need to maintain continuity and efficacy of drainage systems in adjacent agricultural fields.</td>
</tr>
</tbody>
</table>

d) Summary

11.5.33 Historic and current land use within the study area and the development site is primarily agricultural, comprising arable or grazing use. There is no BMVL within the proposed development site; however land of Grade 3b is present. The topsoil value is assessed as medium. None of the land within the development site is in any agri-environment scheme. The value/sensitivity of the agricultural land (ALC) within the study area and the development site is considered to be low overall.
11.6 Assessment of Impacts

a) Introduction

11.6.1 This chapter addresses those aspects of the construction or operation of the development and the post-operational restoration of the site which would impact upon soil, land use and agricultural receptors.

11.6.2 Impacts are assessed in relation to development activities, identified soil, land use and agricultural receptors and relevant legislation and policy as described in Section 11.2. Hence, impacts affecting BMVL (Grades 1, 2 and 3a) and other Grades present, soil quality, agri-environment schemes and animal health are considered in line with PPS7, the Environmental Stewardship (England) and Countryside Stewardship (Amendment) Regulations, the Sedgemoor District Local Plan and Sedgemoor District Council Local Development Frameworks Core Strategy (Proposed Submission). The potential for the proposed development to cause a breach of the WCA (as amended) in relation to the spread of noxious and invasive weeds is also assessed.

11.6.3 A description of the proposed park and ride development is provided in Volume 6, Chapter 2. Salient elements of the development with the potential to cause impacts on soil, land use and agricultural receptors are described below.

11.6.4 During the construction phase, which would take approximately 11 months, site clearance involving vegetation removal and soils stripping would take place, followed by earthworks to level the site and create required ground levels.

11.6.5 The perimeter of the proposed development site would be dedicated to landscaping, including supplemental and additional hedgerow planting. An additional landscaped screen including additional hedgerow trees and reptile habitat would be provided to east of the proposed park and ride site, to help provide screening to nearby residential properties.

11.6.6 The average existing topsoil depth is approximately 225mm. Topsoil will be stripped to an approximate average depth of 280mm and stored in the north-west part of the proposed development site. Soils will be removed from the excavated areas and transported to storage mounds. Where possible, conventional equipment such as bulldozers and scrapers will be used. Where careful stripping is appropriate, 360° excavators will be used. Topsoil would be stripped, handled and stored separately from other materials. Topsoil material will also be used to create a bund across the western edge of the proposed development site to facilitate additional screening of development from sensitive receptors.

11.6.7 Subsoil will not be stripped across the site prior to development. Subsoil will be excavated to form a balancing pond which will provide attenuation of surface water runoff prior to its discharging to the local drainage network. Where subsoil is excavated to create balancing the pond and foundations, it will be stockpiled separately from topsoil in the north of the site. Approximately 5,934m$^3$ of topsoil and 1320m$^3$ of subsoil will be stripped and stored in four separate stockpiles (between 1.5m and 2m high), with topsoils and subsoil in segregated stockpiles.

11.6.8 Bulldozers will be required for grading and sealing of the topsoil and subsoil stockpiles.
11.6.9 The constructed site will incorporate landscaping around its perimeter, including supplemental hedgerow planting.

11.6.10 A drainage scheme incorporating Sustainable Drainage Systems (SuDS) techniques has been developed to manage surface water run-off associated with the proposed development. The provision of the SuDS features would ensure that the off-site impacts of the surface runoff from the proposed development would be minimal.

11.6.11 The proposed development is expected to be operational for approximately eight years. Once the proposed development is no longer required to support the construction of the Hinkley Point C power station, the proposed development site would be restored to its current agricultural use.

11.6.12 The post-operational phase is expected to last for approximately 12 months. Stored topsoil and subsoil will be used to infill the detention pond and topsoil will be used on site as part of the planned restoration to agriculture.

11.6.13 This chapter assesses those aspects of the proposed development which would impact upon soil, land use and agricultural receptors within the study area, including:

- damage to in situ soils (impacts on soil quality and profiles) due to trafficking, handling and storage associated with vegetation removal, soil stripping and landscape restoration activities;
- temporary and permanent loss of agricultural land;
- damage to soils and agricultural land within the study area which are adjacent to the site, but are off-site, due to soil erosion, surface runoff or dust deposition;
- loss of land currently managed under Countryside Stewardship Agreements and Environmental Stewardship schemes;
- disruption of agricultural field drainage systems; and
- spreading of noxious weeds.

11.6.14 Potential impacts arising from development would occur primarily during the vegetation removal, site clearance and earthworks phase, when topsoils are stripped and stockpiled.

11.6.15 Potential impacts on buried archaeology or cultural heritage are addressed in Volume 6, Chapter 16, on Historic Environment.

11.6.16 Potential soil, land use and agricultural receptors have been identified as follows:

- Good quality agricultural land both on and off-site.
- Good quality soil both on and off-site.
- Agricultural crops and pasture off site.
- Common Land adjacent to the site.
- Agri-environment schemes.
- Agricultural field drainage systems both onsite and adjacent to the site.
- Health of agricultural stock and domestic pets.
b) Construction Impacts

i. ALC and Loss of Agricultural Soils

11.6.17 Land take during construction would involve permanent and temporary loss of agricultural land and changes in cropping and farming activity. Construction activities with the potential to cause an adverse effect on ALC and loss of agricultural land and associated soils are vegetation removal and the stripping of topsoils and subsoils. The development area would comprise approximately 1.9ha (including buildings, structures, hardstanding, infrastructure, spoil bunds and drainage infrastructure). Other areas within the development site would be required only temporarily and would be restored to ‘soft’ landscaped areas after the construction period has been completed. The land take impact would be medium term (approximately 23 months for construction and post-operational phases plus approximately eight years for the operational phase). Land would be restored to agricultural use post-construction. It is anticipated that the land would be available for agricultural use by Quarter 4, 2025.

11.6.18 Topsoil stripping and storage would cause a loss of soils within the construction area and a loss of land with potential for agricultural use. The stripping of topsoil does not affect any land defined as BMVL (Grades 2 and 3a). It does affect land defined as Grade 3b, of ‘moderate’ quality.

11.6.19 The area of Grade 3b land affected within the proposed development site (approximately 5.2ha) represents approximately 0.003% of the total (204,108ha Grade 3 undifferentiated) area of Grade 3b land across Somerset as a whole (Table 11.4, approximate hectare area). ALC data made available from Natural England does not differentiate between Grades 3a and 3b, i.e. Grade 3 areas across Somerset are presented as a total of both Grade 3a and Grade 3b. However, from Table 11.3 and Table 11.4, it can be seen that the amount of Grade 3b land directly impacted by the development is an extremely small proportion of the overall available Grade 3 (undifferentiated) agricultural land in Somerset.

11.6.20 Using the criteria set out in Section 11.3, the agricultural land quality within the application site is assessed as low value/sensitivity due to its grade and extent (Table 11.5). The impact of direct land take and removal/storage of soils on agricultural land use and quality is certain to occur, but would be reversed on restoration to agricultural land use post-operation. The magnitude of impact is assessed as low given the overall area of Grade 3b and lack of BMVL affected within the proposed development site, and as a proportion of Grade 3 (undifferentiated) land across Somerset as a whole (Table 11.3 and Table 11.4).

11.6.21 Given that the sensitivity/importance of the agricultural land receptor is low, and the magnitude of impact is low, the significance of unmitigated land take impact on agricultural soils within the development site as a whole is assessed as minor adverse.

11.6.22 There would be no soil stripping or stockpiling of soil beyond the proposed development area, hence, there would be no impact (direct, off-site) on the agricultural quality of adjoining land.
ii. Soil Quality and Profiles

11.6.23 During the construction phase adverse effects on soil quality and soil profiles would arise as a result of: vegetation removal and the stripping and stockpiling of topsoils. Impacts would occur on site within the footprint of construction activity as soils are excavated, handled and stored for later re-use. These works would disturb soil profiles and may adversely affect soil quality and its future value as ‘topsoil’, depending on the care with which the soil handling and storage processes are carried out and whether soil handling activities take place in appropriate weather (and hence soil moisture) conditions.

11.6.24 Soil stripping and subsequent car park construction would impact upon soils considered to be a receptor of medium value (see Table 11.5). The impact would arise from damage to soil structure, integrity and profiles during stripping and storage. Topsoil compaction, loss of soil structure and creation of impermeable soil conditions could occur as topsoils are excavated, handled and stored for later re-use. The proposed works would disturb soil profiles and, without suitable mitigation, may adversely affect topsoil quality and its future value as topsoil for restoration activities. Adverse impacts would also arise as a result of tracking of machinery and other short-term site clearance and earthworks related activities over un-excavated areas, causing localised compaction of topsoils. Since subsoil would not be stripped across the site prior to construction, apart from where the balancing pond would be formed, it is certain that both during the construction phase and post-construction, once the car park has been laid, subsoils beneath will become compacted and anaerobic through loss of structure and the presence of covering infrastructure.

11.6.25 Topsoil will be stripped to a depth of approximately 225mm which is the average depth of topsoil assessed during the field survey (RAC, 2010; Appendix 11A). Approximately 3,402m³ of topsoil will be stripped and stored in bunds within the proposed development area.

11.6.26 The impact on soil quality and soil profiles due to soil stripping, movement and storage would be limited to land within the proposed development area and would be adverse and direct. There would be no soil strip or stockpiling or other soil disturbance outside the development site, and, hence, there would be no (direct off-site) impact from these activities on soil quality.

11.6.27 Overall, the magnitude of the on-site impact is assessed as medium given the duration of the development (approximately eight years), the extent of soils affected (approximately 5.2ha) and the fact that the subsoil will not be stripped before development. The soil type affected (Brockhurst 1) is a receptor of medium value/sensitivity, being subject to seasonal waterlogging but well drained and hence is only moderately vulnerable to damage if handled when dry, so stored topsoils, assuming they are stockpiled in a dry condition, should remain in relatively good condition during stockpiling. The significance of this impact is assessed as moderate adverse without mitigation measures in place, but at a local geographic scale, i.e. in terms of impacts on soils within the development site itself.
iii. Agricultural Crops and Grazed Grassland

On site Crops and Grazed Grassland

11.6.28 Farming activity (including crops and other vegetation, and livestock) will be directly affected by the proposed development, with all farming activity ceasing once the site clearance and construction phase has begun. This impact would last for the duration of the construction, operation and post-operation of the proposed development site. The value/sensitivity of the receptor is assessed as medium, consisting primarily of grazed grassland on Grade 3b. The magnitude of impact on crops and grassland within the proposed development site is assessed as low and the impact significance is assessed as minor adverse.

Off-site Crops and Grazed Grassland

11.6.29 Agricultural land beyond the boundaries of the development site could be indirectly affected by disturbance during site clearance and construction, including dust generation/deposition during earthworks and soil erosion, surface run-off and sediment deposition. Dust can be generated from machinery movements on exposed, dry soils, soil stockpiles and excavation activities. If dust becomes airborne it could be transported and then deposited on nearby agricultural land and thereby taint or adversely affect stock pasture or crops. It should be noted, however, that due to the relatively short distance that dust would travel before it is deposited, this impact is only a risk to land immediately adjacent to active working locations within the study area (see Volume 6, Chapter 10, Air Quality). Such impacts are considered to be unlikely and would be highly localised and restricted to agricultural land immediately adjacent (within tens of metres) to the application site. Any impacts would also be short term and reversible.

11.6.30 Similarly, there is potential for localised changes to surface runoff (e.g. from stripped areas, haul roads and soils/materials stockpiles) and deposition on adjacent land of transported sediments in runoff. Such impacts are considered to be unlikely, since a surface water drainage system, and a Water Management Plan (WMP) would be put in place as part of the development design (see Volume 6, Chapter 13). If any impact did occur, it would be highly localised and restricted to land adjacent to working areas.

11.6.31 The value/sensitivity of the agricultural receptor, including crops and grazed grassland both on-site and off-site is considered to be medium. Dust, drainage and similar indirect impacts are expected to be of a very low magnitude and, hence, the impact is assessed as being of minor adverse significance in relation to land adjacent to the proposed development site.

iv. Agri-Environment Schemes

11.6.32 None of the land within or adjacent to the proposed development belongs to any agri-environment scheme and as a result there will be no impacts on agri-environment schemes.

v. Adjoining Land from Invasive and Noxious Weed Species

11.6.33 The areas of bare ground created during soil stripping and site levelling provide opportunities for colonisation by a variety of plant species, including potentially noxious and invasive weeds. If left uncontrolled, these could potentially spread...
beyond the application site on to adjacent land areas, and cause an offence under the WCA (see Section 11.3). The likelihood of such an impact is possible, but due to the pattern of weed dispersal, would affect a relatively small area of land in close proximity to working areas. Such an impact is readily reversible and short term. It is both a legal requirement and standard construction good practice to implement prevention and control measures (such as regular site inspection) to avoid the establishment and spread of invasive and noxious weed species.

11.6.34 The magnitude of impact is assessed as low, affecting adjacent receptors assessed as being of low value/sensitivity. The impact significance is assessed as being minor adverse.

vi. Animal Health from Exposed Animal Burial Sites

11.6.35 No records of animal burials are recorded within the proposed development site and the potential impact magnitude is assessed as very low. The likelihood of encountering or accidentally disturbing unrecorded old burial sites is considered to be unlikely. The potential impacts on humans should previously unrecorded burial sites be discovered are addressed in Volume 6, Chapter 12. With regard to non-human receptors (including livestock, pets and working dogs), the value/sensitivity of animals exposed to disease from disturbed burial pits is considered to be high. Livestock and other animals would not be present within working areas, but may be present on public paths and on adjacent land and hence there is the possibility (albeit unlikely) of exposure to disease from burial sites should an unrecorded pit be accidently disturbed during works. The significance of impact is, therefore, assessed as minor adverse.

vii. Changes to Agricultural Field Drainage Systems

11.6.36 During soil stripping and earthworks activities, existing agricultural field drainage systems within the proposed development area would be disrupted or lost. This could result in temporary flooding or at least waterlogging of parts of the site or adjacent (off-site) agricultural land. This impact would be direct, localised and reversible, through reinstatement of artificial drainage. The magnitude of the impact is assessed to be low on an agricultural field drainage receptor of high value (Table 11.5). The significance of damage to agricultural field drainage systems is assessed as being moderate adverse.

c) Cumulative Construction Impacts

11.6.37 There will be no within-development cumulative construction impacts on soil, land use and agricultural receptors.

d) Operational Impacts

11.6.38 As a result of construction, topsoils will have been removed and stored and there will be no remaining agricultural land on-site by the time the proposed development becomes operational. Therefore, during the operation of the park and ride facility, there will be no additional impacts on agricultural land use within the development area other than those already assessed as part of the construction phase.

11.6.39 The operation of the site for a seven year period will not cause any further impact to in situ agricultural subsoil other than that already assessed as part of the construction phase.
phase, other than maintenance of anaerobic subsoil conditions over the entire operational period.

11.6.40 The operation of the site has the potential to cause indirect adverse impacts off-site on soils, agricultural land use and agricultural activities as a result of dust generation and deposition, surface water runoff and sediment deposition. These will however be very limited in scale and extent as the design of the operating site will include runoff and sediment capture and control measures. Dust generation from the park and ride facility will have no impact on adjoining agricultural land.

11.6.41 In summary, the operational phase of the development is not expected to have any further impact on land use and soils beyond those caused during construction.

i. Off-site Agricultural Land Quality, Crops and Grazed Grasslands

11.6.42 This impact is indirect, and during operation of the facility is assessed as being very low, as none of the adjacent fields belong to agri-environment schemes. This agricultural receptor is considered to be of medium value/sensitivity. Impact significance is assessed as minor adverse.

e) Cumulative Operational Impacts

11.6.43 There will be no cumulative operational impacts on soil, land use and agricultural receptors.

f) Post-operational Impacts

11.6.44 It is proposed that the park and ride facility would be temporary, operating for a period of approximately eight years. Following construction of the Hinkley Point C nuclear power station the development would be removed, and the land restored to its former use as agricultural land. This will involve post-operation breaking up and removal of concrete structures, hardstanding and associated infrastructure, followed by land and soil restoration followed by grassland seeding for agriculture, as described in Chapter 5 of this volume of the ES.

i. Soil Quality and Soil Profiles

11.6.45 The land will be restored using stored topsoils after operational activity has ended. Where subsoil has been excavated to create balancing ponds and other subsurface structures, the subsoil and topsoil will be replaced in sequence (i.e. subsoil before topsoil) to re-establish natural soil profiles, as part of the site restoration strategy (Chapters 5 and 15 of this volume of the ES).

11.6.46 The re-use of topsoil material as part of restoration works would be the principal activity where further impacts on the topsoil resource may occur, and would primarily arise from removing soils from stockpiles, soil handling and re-placement on-site.

11.6.47 On-site impacts due to site restoration would arise due to the handling and removal of topsoils from stockpiles, soil transport, deposition and grading on previously stripped areas. Without mitigation in place, the structure and integrity of stored topsoil and its future value as reinstated topsoil may be adversely impacted due to this handling, movement and in situ grading.
11.6.48 Activities required to breakup and remove hardstanding materials from the freight parking area and the removal of the permeable surface from the car parking area have the potential to further damage the *in situ* subsoil by trafficking and puddling, and potentially contamination through incorporation of broken-up infrastructure material. Depending on the soil and weather conditions at the time of dismantling and removal, subsoils could become heavily compacted and rutted. This in turn affects the viability of any topsoil replaced over subsoils. Impacts could also arise as a result of tracking of machinery over topsoil stockpiles and re-deposited topsoils, causing localised topsoil compaction.

11.6.49 The magnitude of overall impact on agricultural soil quality is assessed as medium, due to the agricultural land area affected (approximately 5.2ha) and because subsoils will have been compacted, with anaerobic conditions lasting throughout the entire operational phase (approximately seven years). Break-up and removal activities could further exacerbate subsoil damage through puddling and rutting, particularly if weather conditions are wet at the time of the works. In addition, topsoils are being replaced on-site from temporary and artificially created stockpiles and have, therefore, already experienced a degree of disruption to their ‘natural’ condition and structure. For the purposes of this assessment, the value/sensitivity of the soils is considered to remain as medium, despite the topsoils having been stripped and stored, to reflect the relative value of these soils to agriculture. The significance of impact is, therefore, assessed as *moderate adverse* without mitigation.

**ii. Agricultural Crops and Grazing Grassland Off-site**

11.6.50 Farming activity (including crops and other vegetation, and livestock) and soils outside the development site could be indirectly affected by disturbance during restoration works in a similar way to that previously described for the construction phase, with the potential for dust generation/deposition during earthworks and soil erosion, surface run-off and sediment deposition. The impacts would also be short term and reversible. The value/sensitivity of the agricultural receptor plants, including crops and grazed grassland off-site is considered to be medium. Such impacts are considered to be of a very low magnitude, potentially affecting this localised receptor of medium sensitivity; hence, the impact is assessed as *negligible adverse* significance in relation to agricultural land use adjacent to the site.

**iii. Changes to Off-site Agricultural Field Drainage Systems**

11.6.51 Soil handling and restoration of soils and final landscaping works could result in impacts on the field drainage of adjacent (off-site) agricultural land. This impact would be localised and reversible, through reinstatement of artificial or field drainage systems and connections. The magnitude of impact is assessed to be low on an agricultural field drainage receptor of high value/sensitivity, and the impact significance before mitigation is assessed as being *moderate adverse*.

**g) Cumulative Post-operational Impacts**

11.6.52 By the time post-operation works take place, there will have been three phases of impact upon subsoil: a) compaction due to trafficking of plant and vehicles during construction; b) compaction and creation of anaerobic conditions during operation; and c) further compaction and potential contamination from broken up hardstanding during post-operation removal of park and ride and freight infrastructure. This will result in within-development additive impacts on subsoils. Repeat trafficking and...
potential contamination of subsoil has the potential to further damage soil which has already been damaged during the construction and operational phases. Since this impact was identified as being of moderate significance both during construction and restoration, the cumulative impact before mitigation is also of moderate adverse significance.

11.7 Mitigation of Impacts

a) Introduction

11.7.1 This section describes the proposed mitigation measures to manage and reduce the identified effects on soil resources and current land uses within and in the immediate vicinity of the proposed development during the construction, operational and post-operational phases.

11.7.2 For the purpose of this assessment, mitigation measures have been proposed where there is an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so.

11.7.3 Environmental impacts and disturbance arising from construction activities will be managed through a range of control measures and monitoring procedures the principles of which are outlined in the Environmental Management and Monitoring Plan (EMMP) and developed in associated Subject-Specific Management Plans (SSMPs) for the site (see Chapter 3 of this volume of this ES). Where impact significance levels have been assessed as being greater than minor, general good practice measures implemented as part of the EMMP are relevant in addition to the measures described below.

b) Mitigation of Impacts during Construction

11.7.4 To protect the physical condition of and reduce disturbance to on-site soils during vegetation removal, access routes and working areas will be clearly delimited. This will ensure that compaction by vehicles and equipment of in-situ topsoils is reduced as far as practicable.

11.7.5 As part of general good working practice, procedures will be implemented as part of the SMP to ensure appropriate biosecurity (disease and pest control) and weed control to protect both on-site soils and adjacent land holdings. Standard procedures will be developed in line with published Defra and Environment Agency guidance to control the spread of invasive/alien plants or disease. In addition, the design includes a wide buffer zone created by a soil bund on the western part of the site (see Volume 6, Chapter 3).

11.7.6 The proposed mitigation in relation to impacts on soils, land use and agriculture during the construction phase (specifically in relation to site clearance and associated topsoil stripping) is provided in a Soil Management Plan (SMP) (see below) to preserve surface soils in a viable condition suitable for re-use as described in Chapters 5 and 15 of this volume of the ES.

11.7.7 Measures to manage and treat site drainage and run-off, and prevent erosion and dust generation will also be set in place through a range of specific control measures and monitoring procedures, the principles of which are outlined in the Environmental Management and Monitoring Plan (EMMP) and developed in associated Subject-
Specific Management Plans (SSMPs) for the site, described in Volume 6, Chapter 10, Air Quality, and Volume 6, Chapter 13, Surface Water. This will include any necessary measures to maintain agricultural field drainage function on adjoining land if affected by changes within the proposed development site. There will be localised drainage below the topsoil stockpiles to ensure that the upper surfaces of the soil are suitably drained, especially of water caused by the consolidation of the ground during loading. The temporary drainage facilities will help to maintain soil contained in stockpiles in a viable condition for re-use.

11.7.8 An outline of the measures that will underpin the mitigation provided by the Soil Management Plan is set out below.

**Soil Management Plan (SMP)**

11.7.9 A Soil Management Plan (SMP) has been prepared to address impacts on soil quality as a result of carrying out construction activities on site. It includes a number of measures that are set out below:

- measures of *in situ* topsoil protection ahead of stripping;
- measures for ensuring that 280mm deep topsoil is stripped and stored separately from other excavated materials;
- methods of topsoil stockpiling;
- quality control and auditing measures;
- criteria for cessation of works; and
- use of Tool Box Talks.

11.7.10 The detailed implementation of these measures would be developed before, and as, the construction works proceed.

11.7.11 The SMP provides procedures for soil stripping, handling, transporting, storing, and reinstatement (or re-use) of topsoils so as to maintain as far as practicable, their viability and biological activity.

11.7.12 The SMP follows Defra’s Code of Practice on Sustainable Soils (Ref. 11.24) and would comply with the MAFF Good Practice Guide for Handling Soils by Machine (2000) (Ref. 11.25). The term Soil Management Plan is synonymous with the term ‘Soil Resource Plan’ which is described in the Defra Code of Practice. Since subsoil will not be stripped prior to construction of the site, special measures for *in situ* treatment of subsoil during site restoration, after break-up and removal of the infrastructure, are included in the SMP.

**Measures of In Situ Soil Protection Ahead of Stripping**

11.7.13 The construction works will be phased to ensure that topsoils are stripped in each part of the site ahead of earthworks activities, and access routes and working areas will be clearly delimited to ensure that soil compaction on areas not directly involved in the works will be avoided. This will minimise the total area impacted and will, as far as possible, protect topsoil structure so that stripped topsoils can be used in later restoration landscaping programmes.
Measures for Storage of Topsoil

11.7.14 To ensure that the correct depth of topsoil is stripped and stockpiled according to the conditions laid out below, guidance for topsoil stripping will be provided for each section of the site and will be supervised by an appropriately qualified person. The sources of all topsoil stockpiled will be logged as part of the auditing process described in ‘Quality control and auditing measures’ below.

11.7.15 Topsoil will be stored to the west of the site in two stockpiles. Where subsoil is excavated to create the balancing pond and any other structures, it will be stored separately to the north of the site in two stockpiles. Documentation and control measures will be set in place to prevent accidental mixing of topsoil and subsoil. Topsoil will be appropriately stored in accordance with its value for planting and future reuse for agricultural land use, as described in Chapters 5 and 15 of this volume of the ES.

Methods of Topsoil Stockpiling

11.7.16 The viability of topsoil reuse after storage depends on how appropriately the soil has been stored. Accordingly the SMP will provide clear guidance on topsoil storage, including regular inspection of stockpile conditions.

11.7.17 Key issues for topsoil handling and storage are soil moisture and soil consistency (plastic or non-plastic). These characteristics are used to determine size and height of stockpiles and their method of formation. During the construction works, this would be determined *in-situ* at the weekly work planning stage, in relation to each geographical part of the site and reviewed daily with adjustments provided by an appropriately qualified person.

11.7.18 There would be two principal methods for forming topsoil stockpiles, based on the soil moisture and consistency of stripped soil:

- **Method 1** would be applied to topsoil that is in a dry and non-plastic state when stripped. The aim would be to create a large core of dry soil, and to restrict the amount of water that can get into the stockpile during the storage period. Dry soil that is stored in this manner can remain so for a period of years and it is re-used within days of re-spreading.

- **Method 2** would be applied if the programme or prevailing weather conditions result in topsoil having to be stockpiled when wet and/or plastic in consistency. This method minimises the amount of compaction, while at the same time maximising the surface area of the stockpile to enable the soil to dry out further. It also allows the soil to be heaped up into a ‘Method 1’ type stockpile, once it has dried out.

11.7.19 Good methods of topsoil stockpiling are required to prevent loss of soil structure and the development of anaerobic conditions. Particular care is required to maintain their viability for future use in restoration. Space has been designated to (a) allow for appropriate topsoil stockpiling, and, should this be necessary, (b) include areas for drying very wet topsoils in windrows before stockpiling to minimise damage to soil structure and viability.
11.7.20 The general principles in relation to stockpile location and stability are as follows:

- stockpiles will not be positioned within the root or crown spread of trees, or adjacent to ditches, watercourses or existing or future excavations;
- both topsoil and subsoil stockpiles will be seeded with a neutral grassland seed mix to maintain slope stability and to prevent erosion or dust generation;
- grass seeded and maintained stockpiles will have a maximum side slope of 1 in 2 (25°); and
- topsoil and subsoil stockpiles will be managed and inspected throughout their lifetime to ensure maintenance of stockpile stability and integrity.

**Quality Control and Auditing Measures**

11.7.21 The SMP contains measures to manage and document the topsoil stripping and stockpiling process. There will be an associated written procedure and paper trail for each stripped earthworks area/soil type and associated.

11.7.22 Locations and quality of *in situ* topsoils, methods of stripping, stockpiling and spreading, location, size and content of stockpiles together with schedules of volumes of topsoil, expected after-use, identification of the person responsible for supervising soil management during the works, will form part of the audit process. It will also include drawings showing areas to be protected from soil stripping activities and showing locations of haul roads, compounds etc.

11.7.23 In addition, subsoil will be excavated and stockpiled. Some of this subsoil material may be required for the recreation of the subsurface parts of soil profiles in certain parts of the site should deeper soil be required during site restoration.

11.7.24 The SMP provides measures to be implemented at removal/restoration to ensure topsoil quality and integrity is maintained during the process of handling and transporting topsoils and their replacement across the previously stripped areas. This would include matching documented stockpiles to appropriate areas of restoration, defined movement routes for vehicles and machinery to minimise tracking over replaced topsoils and specific measures for grading and reinstatement of soils across the site.

11.7.25 The SMP includes measures for the practical implementation, administration and day to day auditing of soil management activities.

**Criteria for Cessation of Works**

11.7.26 To ensure that topsoil structure is protected, appropriate weather and soil moisture criteria will be used to provide thresholds beyond which topsoil stripping, handling and stockpiling activities would cease. These criteria would be agreed with relevant stakeholders by the contractor in advance of any site operations.

**Use of Tool Box Talks**

11.7.27 Regular Tool Box talks will be used to ensure all site staff are aware of the SMP and applicable procures. The Tool Box Talks will be based on guidance provided by Defra: (http://www.defra.gov.uk/environment/quality/land/soil/builtenviron/documents/toolbox-talks.pdf).
c) Post-operation Mitigation of Impacts

11.7.28 The post-operational site restoration will include the re-use of stockpiled topsoils and subsoils to create suitable conditions for restoration to agricultural land use. Good practice regarding topsoil removal and reinstatement requires that soils should be returned as closely as possible to their original state after disturbance. Appropriate restoration techniques and the use of well-managed and viable soil materials will mean that site restoration planting establishes more quickly and is sustained.

11.7.29 The origin of stripped topsoils will be tracked and documented in the SMP as part of stripping, handling and stockpiling activities, such that they can be returned to their original locations during the restoration of agricultural land. It is anticipated that the restored ALC grades will be the same as those existing prior to the commencement of the construction works, as soil types, soil depths and site topography within restored land will be the same.

11.7.30 Since subsoils will not be stripped ahead of constructing the car park and freight park, they will be inspected after breakup and removal of the hard standing areas to determine what post-removal \textit{in situ} treatment is required to reinstate appropriate subsoil conditions for agriculture. Measures available for subsoil restoration, depending on their state, include:

- removal of any remaining concrete, tarmac, hardstanding or aggregate residue from the break-up and removal of car park infrastructure;
- deep ripping to loosen soil, alleviate compaction and aerate the soil;
- cross ripping to ensure adequate coverage and connectivity between lines of ripping; and
- artificial drainage, should it be necessary to replace any agricultural field drainage and to connect with any adjacent drainage ditches or field drainage systems.

11.7.31 Best results from deep ripping are obtained during dry soil conditions. Accordingly, the ripping activities which precede restoration works will take place during dry summer months to ensure that restoration is successful.

11.7.32 Subsoil material excavated for the detention pond and subsurface structures will be re-used where it is of suitable quality. The methodology for moving soils from stockpiles and re-using topsoil and other suitable materials across the application site is set out in the SMP.

11.7.33 During the post-operational restoration works mitigation is required to reduce any damage to soils due to the handling and removal of topsoils from stockpiles, soil transport, deposition, placement and grading on treated subsoil areas. Mitigation measures during this phase of work would closely follow those to be used during the initial topsoil strip and stockpiling, including the implementation of the SMP.

11.7.34 Measures to manage and treat site runoff, and prevent erosion and dust generation during restoration works will also be set in place through a series of specific control measures. These are more fully described in Volume 6, Chapters 10, 12 and 13 and developed in the SSMPs for the restoration works. Procedures will be implemented as part of the SMP for the restoration works to ensure appropriate
biosecurity (disease and pest control) and weed control to protect both on-site soils and adjacent land holdings during post-operational restoration.

11.7.35 Despite deep ripping of *in situ* subsoil prior to post-operational restoration and implementation of methods stated in the SMP to ensure correct handling and placement of topsoils, there will remain the potential for soils to be in poorer conditions once restored compared to the condition of agricultural soils prior to construction. To ensure that the original soil conditions are correctly achieved, the site will be sown with a hay seed mix and both soil and herbage monitored over three growing season to ensure that specified soil and herbage criteria are achieved and the initial agricultural soil conditions are correctly restored. The monitoring scheme and acceptability criteria are specified in the SMP. Should either subsoil or topsoil conditions fail to meet acceptability criteria during these three growing seasons, a suitably qualified agronomist will advise on appropriate remedial treatment and further monitoring will be prescribed, until required soil criteria are met and soil conditions are signed off.

11.8 Residual Impacts

11.8.1 Potential impacts on soil quality during construction, and post-operational restoration, can readily be addressed and reduced through appropriate mitigation measures. The identified mitigation mainly relates to potential impacts on soils during soil stripping, movement, stockpiling, and re-use as part of the restoration of the site to agricultural use.

11.8.2 After implementation of the proposed mitigation, namely to implement the measures in the SMP during construction and post-operational restoration activities, and implementation of landscape restoration to agriculture, the residual impact significance upon soil quality and profiles, drainage infrastructure, and subsoil quality and viability is assessed as being reduced from moderate adverse to minor adverse. Hence, no residual impacts are assessed as significant during the construction, operational or post-operational phases of the park and ride facility.

11.8.3 The cumulative impacts on subsoil quality and soil profiles identified at the post-operation phase of works will be mitigated through implementation of the measures in the SMP, through *in situ* treatment of subsoil and through monitoring of soil and herbage conditions for a minimum of three years, until required soil acceptability conditions are achieved. Once this mitigation has been implemented, there will be no significant cumulative impacts on soils.

11.9 Summary of Impacts

11.9.1 A summary of identified residual impacts and mitigation measures is provided in Table 11.6
### Table 11.6: Summary of Impacts and Mitigation Measures

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Potential</th>
<th>Description</th>
<th>Value/Sensitivity</th>
<th>Significance</th>
<th>Proposed Mitigation/Best Practices</th>
<th>Residual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site ALC or agricultural land quality (agricultural land use potential).</td>
<td>Site clearance and earthworks including vegetation removal, topsoil stripping and stockpiling and excavation of the balancing pond.</td>
<td>Low</td>
<td>Site Specific Direct Adverse Permanent and Temporary</td>
<td>Low</td>
<td>Minor</td>
<td>No specific mitigation required. Soil Management Plan as part of the EMMP. Reuse and reinstatement of soils.</td>
<td>Minor</td>
</tr>
<tr>
<td>Soil quality and soil profiles – within application site.</td>
<td>Site clearance and earthworks including vegetation removal, topsoil stripping and stockpiling and excavation of the balancing pond.</td>
<td>Medium</td>
<td>Site Specific Direct Adverse Permanent and Temporary</td>
<td>Medium</td>
<td>Moderate</td>
<td>Minimise soil damage through planned access routes as specified in the Soil Management Plan as part of the EMMP. Specific mitigation for restoration of in situ subsoils prior to restoration to agriculture. Reuse of soils.</td>
<td>Minor</td>
</tr>
<tr>
<td>Agricultural crops and grazed grassland on site</td>
<td>Indirect disturbance/dust/run-off impact within site boundaries.</td>
<td>Low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor</td>
<td>No specific mitigation required. As part of standard good working practice – controls on working as part of the EMMP.</td>
<td>Minor</td>
</tr>
<tr>
<td>Agricultural crops and grazed grassland off site</td>
<td>Indirect disturbance/dust/run-off impact on adjoining land.</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor</td>
<td>No specific mitigation required. As part of standard good working practice – controls on working as part of the EMMP.</td>
<td>Minor</td>
</tr>
<tr>
<td>Agri-environment Schemes</td>
<td>No Agri-Schemes present within or adjacent to proposed development</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Receptor</td>
<td>Potential Impact</td>
<td>Potential</td>
<td>Description</td>
<td>Value/Sensitivity</td>
<td>Significance</td>
<td>Proposed Mitigation/Best Practices</td>
<td>Residual Impact</td>
</tr>
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</tr>
<tr>
<td>Agricultural land – on and off-site.</td>
<td>Accidental introduction or spread of noxious or invasive weeds and diseases.</td>
<td>Low</td>
<td>Direct and Indirect Adverse Temporary</td>
<td>Low</td>
<td>Minor</td>
<td>No specific mitigation required. As part of standard good working practice – implement MAFF procedures for the control of soil transfer as part of the EMMP.</td>
<td>Minor</td>
</tr>
<tr>
<td>Animal health – off-site.</td>
<td>Disturbance of old animal burial pits.</td>
<td>Very low</td>
<td>Site Specific Direct Adverse Temporary</td>
<td>High</td>
<td>Minor</td>
<td>No specific mitigation required. As standard good practice, include contingency measures in the EMMP to contact Defra Animal Health Division if previously undiscovered burial is encountered.</td>
<td>Minor</td>
</tr>
<tr>
<td>Field drainage.</td>
<td>Disruption to or loss of drainage infrastructure.</td>
<td>Low</td>
<td>Site Specific Direct Adverse Temporary</td>
<td>High</td>
<td>Moderate</td>
<td>Scheme design will include installation of on-site drainage management systems. Mitigation measures to protect adjacent land drains will be included in the SMP.</td>
<td>Minor</td>
</tr>
<tr>
<td>Operational Phase</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural crops and grazed grassland off site</td>
<td>Indirect disturbance/dust/run-off impact on adjoining land.</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor</td>
<td>No specific mitigation required. As part of standard good working practice – controls on working as part of the EMMP.</td>
<td>Negligible</td>
</tr>
<tr>
<td>Post-operational Phase</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil quality and profiles.</td>
<td>Removal of infrastructure, Handling and placement of topsoil during restoration.</td>
<td>Medium</td>
<td>Site Specific Direct Adverse Temporary</td>
<td>Medium</td>
<td>Moderate</td>
<td>Implementation of the Soil Management Plan as part of the EMMP.</td>
<td>Minor</td>
</tr>
<tr>
<td>Receptor</td>
<td>Potential Impact</td>
<td>Potential</td>
<td>Description</td>
<td>Value/ Sensitivity</td>
<td>Significance</td>
<td>Proposed Mitigation/ Best Practices</td>
<td>Residual Impact</td>
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<td>-------------------------------------------------------------------------</td>
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<td>-----------------</td>
</tr>
<tr>
<td>Agricultural crops and grazed grassland off-site.</td>
<td>Indirect disturbance/dust/run-off impact on adjoining land.</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Negligible</td>
<td>No specific mitigation required. Soil Management Plan as part of the EMMP.</td>
<td>Negligible</td>
</tr>
<tr>
<td>Field Drainage.</td>
<td>Disruption to or loss of drainage infrastructure</td>
<td>Low</td>
<td>Site Specific Direct Adverse Temporary</td>
<td>High</td>
<td>Moderate</td>
<td>Scheme design will include installation of on-site drainage management systems. Mitigation measures to protect adjacent land drains will be included in the SMP.</td>
<td>Minor</td>
</tr>
<tr>
<td>Cumulative Impacts within-development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Implementation of the Soil Management Plan as part of the EMMP. Specific mitigation for restoration of in situ subsoils prior to restoration to agriculture. Reuse of soils.</td>
<td>Minor</td>
</tr>
<tr>
<td>Subsoil quality and viability.</td>
<td>Within-development cumulative compaction, contamination and loss of quality</td>
<td>Medium</td>
<td>Site Specific Direct Adverse Temporary</td>
<td>Medium</td>
<td>Moderate</td>
<td></td>
<td>Minor</td>
</tr>
</tbody>
</table>
References


11.3 Environmental Protection Act. HMSO, 1990.


CHAPTER 12: GEOLOGY, LAND CONTAMINATION AND GROUNDWATER
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APPENDICES

Appendix 12A: Landmark Envirocheck Report (Order Number 29026125_1_1)

12. GEOLOGY, LAND CONTAMINATION AND GROUNDWATER

12.1 Introduction

12.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential geology, land contamination and groundwater impacts associated with the construction, operational and post-operational phases of the proposed Cannington park and ride site, referred to hereafter as the proposed development, on land referred to by EDF Energy as the Cannington park and ride site (the site). Detailed descriptions of the site, proposed development, construction, operational and post-operational phases are provided in Chapters 1 to 5 of this volume of the ES.

12.1.2 A glossary of the terminology is provided in the Volume 1 of this ES.

12.2 Scope and Objectives of Assessment

12.2.1 The scope of the assessment has been determined through a formal Environmental Impact Assessment (EIA) scoping process undertaken with the Infrastructure Planning Commission (IPC). It has also been informed by ongoing consultation with statutory consultees, including the Environment Agency, Sedgemoor District Council (SDC) and Somerset County Council (SCC), the local community and the general public in response to the Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations.

12.2.2 The assessment of geology, land contamination and groundwater impacts has been undertaken adopting the methodologies described in Volume 1, Chapter 7, and Section 12.4 of this chapter.

12.2.3 This chapter discusses impacts on soil from contamination only; refer to Chapter 11 of this volume for a detailed assessment of the impacts of the proposed development on soil as a result of physical disturbance and handling.

12.2.4 The existing baseline conditions, against which the likely environmental impacts of the proposed development are assessed, have been determined through desk based assessments (DBA) and intrusive site investigations, and are described in Section 12.5.

12.2.5 Geology, land contamination and groundwater impacts are presented in Section 12.6 of this chapter, and appropriate mitigation measures aimed at preventing, reducing or off-setting any potential adverse impacts that are identified to be of significance are identified in Section 12.7 of this chapter. An assessment of residual impacts following implementation of these mitigation measures is presented in Section 12.8 of this chapter.

12.2.6 Cumulative geology, land contamination and groundwater impacts arising from the proposed development in combination with other elements of the Hinkley Point C
12.2.7 The objectives underlying the geology, land contamination and groundwater impact assessment were to:

- identify the extent and value/type of geology, groundwater and likelihood of land contamination within the study area which may be affected by, or be relevant to, the proposed development;
- characterise the baseline geological, groundwater and land contamination conditions for the site and surrounding area (i.e. the ‘study area’);
- assess the potential impacts of the proposed development on geology, groundwater and land contamination within the study area;
- recommend mitigation measures, if considered necessary, to reduce potential negative impacts of the proposed development on geology, land contamination and groundwater; and
- assess the residual impacts of the construction, operational and post-operational phases of the proposed development on geology, land contamination and groundwater.

12.3 Legislation, Policy and Guidance

12.3.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of potential geology, land contamination and groundwater impacts associated with the construction, operational and post-operational phases of the proposed development.

12.3.2 As stated in Volume 1, Chapter 4 of this chapter, the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) when combined with the NPS for Nuclear Power Generation (NPS EN-6) provides the primary basis for decisions by the IPC on applications for nuclear power generation developments that fall within the scope of the NPSs. The need to assess the impact of nationally significant energy infrastructure on geological sites and groundwater is referred to in NPS EN-1, sections 5.3 and 5.15. This is repeated in section 3.9 of NPS EN-6.

12.3.3 In addition, the IPC may consider other matters that are both important and relevant to its decision-making. This could include Planning Policy Statements (PPSs), Planning Policy Guidance Notes (PPGs), regional and local policy documents, although, if there is a conflict between these and the NPS, the NPS prevails for the purposes of IPC decision making.

12.3.4 Further, the Planning Act 2008 provides that the IPC must, in making its decision on an application, have regard to any Local Impact Report (LIR) prepared by relevant local authorities. It is anticipated that the LIRs would rely in part on PPSs, PPGs, regional and local policy to provide a context for their assessment. On this basis, regard has been given to these documents (where relevant to the technical assessment) since they are likely to inform the LIRs prepared by the relevant local authorities.
a) International Legislation

12.3.5 The only European Union (EU) legislation which is directly relevant to the subjects of geology and land contamination is the Environmental Liability Directive (2004/35/EC) (Ref. 12.1). There are various pieces of EU Legislation which are relevant to groundwater quality, and indirectly relevant to land contamination. The most relevant of these to the proposed development are the:


i. Environmental Liability Directive (Ref. 12.1)

12.3.6 The Environmental Liability Directive is based on the "polluter pays" principle and requires EU member states to impose obligations and liabilities on operators whose activities cause or threaten environmental damage. Environmental damage specifically includes land contamination where there is a significant risk of adverse effects to human health.

12.3.7 The Environmental Liability Directive requires an operator to take preventative, as well as remedial, measures. It applies both to damage that has occurred and where there is an imminent risk of it occurring, but does not apply to damage that occurred prior to 30 April 2007. The Environmental Liability Directive is implemented in England by the Environmental Damage (Prevention and Remediation) Regulations 2009 (SI 2009/153) (Ref. 12.5)

ii. Water Framework Directive (Ref. 12.2)

12.3.8 The overall purpose of the Water Framework Directive (WFD) is to establish a framework for the protection of surface fresh water, estuaries, coastal water and groundwater. The objectives of the WFD are to enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands, promote the sustainable use of water, reduce pollution of water (especially by ‘priority’ and ‘priority hazardous’ substances), and ensure progressive reduction of groundwater pollution.

12.3.9 The main features of the WFD are:

- member states should take all necessary measures to ensure that groundwater quality does not deteriorate and to prevent the input of pollutants to groundwater;
- discharges of hazardous substances must cease or be phased out within 20 years of their identification as a priority hazardous substance; and
- all inland and coastal waters within defined river basin districts must reach at least good status by 2015. The directive defines how this should be achieved through the establishment of environmental objectives and ecological targets for surface waters.
12.3.10 The WFD incorporates an associated annex which comprises a list of 33 priority substances including 13 priority hazardous substances. This annex has now been replaced by the Directive on Priority Substances (2008/105/EC) (Ref. 12.6) which also includes a list of substances for which it should be investigated whether they should be included in the list of priority substances or priority hazardous substances. In July 2006 the European Commission published a proposal for a directive on environmental quality standards in the field of water policy (COM 2006 397) (Ref. 12.7), which would set limits on concentrations in surface waters for priority substances.

12.3.11 The WFD will ultimately lead to the repeal of several other long standing key directives including on the Protection of Groundwater from Dangerous Substances (80/68/EEC) (Ref. 12.3) and Substances Discharged into the Aquatic Environment (76/464/EEC) (Ref. 12.8).

12.3.12 In England and Wales, the WFD is primarily implemented through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (Ref. 12.9). The Regulations establish a system of river basin management planning. The water bodies of England and Wales have been allocated to river basin areas depending on catchment areas and a plan drawn up for each. The plans contain a programme of measures tailored to each catchment designed to ensure its water bodies achieve and maintain the appropriate status in accordance with the timelines set out in the WFD.

12.3.13 As part of the ongoing implementation of the WFD, the Environment Agency has recently been given the power to apply environmental standards to individually defined WFD water bodies via the River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) Directions 2010 (Ref. 12.10). The thresholds and descriptions of water body typology within these Directions are largely based upon the research work by the United Kingdom Technical Advisory Group (UKTAG).

iii. Groundwater Directive (Ref. 12.3)

12.3.14 The Groundwater Directive aims to protect groundwater against pollution caused by dangerous substances. The Directive requires the prevention of the discharge of List I substances (now ‘Hazardous’ substances) to groundwater, and the investigation of List II substances (now ‘Non-Hazardous’ substances) prior to direct or indirect discharge. The Directive is due to be repealed in 2013 by the WFD (2000/60/EC) (Ref. 12.2). The Directive is primarily implemented in England and Wales by the Environmental Permitting (England and Wales) Regulations 2010 (SI 2010/675) (Ref. 12.11).

12.3.15 The EU has also adopted the Directive on the Protection of Groundwater Against Pollution and Deterioration (2006/118/EC) (Ref.12.12). The aim of this Directive is to ensure good groundwater quality by 2015, in line with the requirements of the WFD. The Directive sets out specific measures for preventing and controlling groundwater against pollution and deterioration.
iv. Nitrates Directive (Ref. 12.4)

12.3.16 The Nitrates Directive requires member states to identify waters which are or could become polluted by nitrates and to designate as Nitrate Vulnerable Zones (NVZs) all land draining to those waters and contributing to pollution.

12.3.17 The following criteria are laid down in the Directive for use in identifying polluted waters:

- surface freshwaters which contain or could contain, if preventative action is not taken, nitrate concentrations greater than 50mg/l;
- groundwaters which contain or could contain, if preventative action is not taken, nitrate concentrations greater than 50mg/l; and
- natural freshwater lakes, or other freshwater bodies, estuaries, coastal waters and marine waters which are eutrophic or may become so in the near future if protective action is not taken.

b) National Legislation

i. Geology

The Wildlife and Countryside Act 1981 (Ref. 12.13)

12.3.18 The Wildlife and Countryside Act (WCA), as amended by the Countryside and Rights of Way Act 2000 (Ref.12.14) covers the protection of wildlife, the countryside, National Parks and the designation of protected areas, and Public Rights of Way (PRoW). It provides the designation of Sites of Special Scientific Interest (SSSIs), which are areas of special scientific interest by way of their flora, fauna, or geological or geophysical features, as well as National Nature Reserves (NNRs) or Marine Nature Reserves (MNRs).

12.3.19 Specific guidelines have been produced for SSSIs to protect their special interest from damage or deterioration. Consultation with the appropriate conservation agencies must be made prior to any development or activities which could impact these sites. They are subject to legal protection and are managed to conserve their habitats or to provide special opportunities for scientific study.

ii. Land Contamination

12.3.20 There are several items of legislation and/or guidance that aim to deal with the prevention of land and groundwater contamination and those which aim to address and remediate or rectify contamination once it has occurred. As with EU legislation, several of these regulations are more relevant indirectly to the control and prevention of contaminated land. Examples of indirectly relevant regulations are listed here for reference but are not discussed in detail within this report:

- Control of Pollution (Oil Storage) (England) Regulations 2001 (SI 2001/2954); (Ref. 12.15).
- Nuclear Installations Act 1965 (Ref. 12.16).
Environmental Protection Act 1990 Part 2A (Ref. 12.17)

12.3.21 The key piece of legislation which is directly relevant to contaminated land in the UK is Part 2A of the Environmental Protection Act (EPA) 1990 and associated Contaminated Land Regulations (England) 2006 (SI 2006/1380) (Ref. 12.18). The Environment Act 1995 added Part 2A to the Environment Protection Act 1990 and Part 2A came into force in 2000. This contains the primary legislation in relation to identifying, assessing and where necessary determining liability for the remediation of contaminated land and groundwater in the England and Wales. Part 2A (as it is more commonly known) created a statutory definition of ‘Contaminated Land’ as:

“Any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

a) significant harm is being caused or there is a significant possibility of such harm being caused; or

b) pollution of controlled waters is being, or is likely to be, caused.”

12.3.22 Further to the legislation described above, a consultation report was issued by Defra in 2010 (Ref. 12.19), which stated proposals for updating and revising the Statutory Guidance (Ref. 12.17). The consultation also includes proposed minor amendments to the Contaminated Land (England) Regulations 2006 (Ref. 12.18). The proposed updates and revisions provide guidance on how the Local Authority should go about deciding whether significant pollution of controlled waters is being caused, or whether there is a significant possibility of such pollution being caused. The consultation period for the consultation report was held between December 2010 and March 2011.

12.3.23 Part 4 A.37 of Defra guidance circular 01/2006 (Ref.12.20) states that land should not be designated as contaminated land where:

- a substance is already present in controlled waters;
- entry into controlled waters of that substance from the land has ceased; and
- it is not likely that further entry would take place.

12.3.24 Section 86 of the Water Act 2003 (Ref.12.21) sets out an amendment to this definition by introducing the thresholds of "significant pollution of controlled waters" and "significant possibility of significant pollution of controlled waters". However, this section is not yet in force and the Government has not announced an anticipated commencement date.

12.3.25 Tables A and B of the statutory guidance provided in Department of Environment Food and Rural Affairs (Defra) circular 01/2006 (Ref.12.20) define statutory receptors under Part 2A, which include:

- human beings;
- various ecological systems and designated ecological sites;
• property including crops, produce, livestock and wild animals which are the subject of shooting or fishing rights; and
• buildings.

12.3.26 The Radioactive Contaminated Land (Modification of Enactments) (England) Regulations 2006 (SI 2006/1379) (Ref.12.22) extended Part 2A to include some, but not all, land contaminated by radioactive substances. The regulations only apply to radioactivity arising from historical practice or works activity not naturally occurring (e.g. radon). The regulations grant to the Health and Safety Executive (HSE) the power to deal with radioactive contaminated land on a site licensed under the Nuclear Installations Act 1965 (Ref.12.16). The Radioactive Contaminated Land (Modification of Enactments) (England) (Amendment) Regulations 2007 (SI 2007/3245) (Ref.12.23) add the category of radioactive contaminated land caused by off-site nuclear occurrences. Radioactive Contaminated Land (Modification of Enactments) (England) (Amendment) Regulations 2010 (SI 2010/2147) (Ref.12.24) extended Part 2A further again to include radon and radionuclides present as a result of radioactive decay, where they are the result of the after-effects of a radiological emergency or a past activity.

12.3.27 The application of Part 2A to radioactive contamination differs in some respects from its application to non-radioactive contamination. In particular, in relation to radioactive contamination, the definition of 'Contaminated Land' is modified such that it only covers harm to human health and not pollution of controlled waters, and there is no requirement for such harm to be 'significant' as for non-radioactive contamination.

Environmental Damage (Prevention and Remediation) Regulations 2009 (Ref. 12.5)

12.3.28 The Environmental Damage (Prevention and Remediation) Regulations 2009 (Ref. 12.5) implement the provisions of the Environmental Liability Directive (Ref 12.1) in England. The Regulations follow the provisions of the Directive closely and accordingly impose obligations and liability on operators for environmental damage caused or threatened by their activities, specifically including damage to land by contamination by substances, preparations, organisms or micro-organisms that results in a significant risk of adverse effects on human health. The Regulations only apply to damage that takes place after the Regulations come into force on 1 March 2009.

Environment Agency Pollution Prevention Guidelines (Ref.12.25)

12.3.29 A number of Pollution Prevention Guidelines (PPG) (Ref. 12.25) have been produced by the Environment Agency, covering a range of subject areas. They aim to provide practical advice to industry and the public on legal responsibilities and good environmental practice and management to prevent pollution of surface water, groundwater and land from activities such as storage of oils and fuels, refuelling activities, construction and demolition, fire water management and vehicle washing.

Environment Agency Contaminated Land Report (CLR) 11, Model
Procedures for the Management of Land Contamination (Ref. 12.26)

12.3.30 Environment Agency CLR 11 provides the technical framework for applying a risk management process when dealing with land impacted by contamination. The technical approach presented in the Model Procedures is designed to be applicable to a range of non-regulatory and regulatory contexts. These include:

- development or redevelopment of land under the planning regime;
- regulatory intervention under Part 2A of the Environment Protection Act 1990;
- voluntary investigation and remediation; and
- managing the potential liabilities of those responsible for individual sites or a portfolio of sites.

UK Best Practice Guidance

12.3.31 In addition to the above legislation and policies, there is a large amount of UK best practice guidance which is relevant to geology and land contamination. Key guidance documents are summarised below (this list is not intended to be exhaustive):

- BS10175:2001 Investigation of Potentially Contaminated Sites – Code of Practice (Ref. 12.27). This guidance was superseded in March 2011; however, this version of the guidance was current and applicable at the time of the intrusive investigations.
- Department of Environment. Prioritisation and categorisation procedure for sites that may be contaminated. Contaminated Land Report 6 (Ref. 12.31).

iii. Groundwater

12.3.32 The WFD, Groundwater Directive and Nitrates Directive are implemented in the UK through a series of primary (Acts) and secondary legislation (Regulations), including those detailed below.
12.3.33 The Groundwater Regulations 1998 (SI 1998/2746) (Ref. 12.34) came into force in 1999 and implemented the 1980 EU Groundwater Directive (Ref. 12.3). The Regulations are designed to protect groundwater from pollution arising mainly from industrial and agricultural activities. These were replaced from 31 October 2009 by the Environmental Permitting (England and Wales) Regulations 2010 (Ref. 12.11) which harmonise the regulations with the Groundwater Directive (2006/118/EC) (Ref. 12.12).

12.3.34 Activities likely to lead to a direct or indirect discharge of hazardous substances (formerly List I) or non-hazardous pollutants (formerly List II) require formal authorisation. Direct discharges of hazardous substances are prohibited. Activities which may result in indirect discharges (from tipping or disposal) or hazardous substances may only be authorised if prior investigation shows the groundwater is permanently unsuitable for other uses. Such authorisation should contain conditions to ensure that necessary technical precautions are taken to prevent an indirect discharge of hazardous substances. Non-hazardous discharges would only be authorised with conditions if prior investigation can demonstrate that groundwater pollution can be prevented. Where a discharge is authorised, the authorisation would specify the details of the discharge. Authorisations (permits) may be reviewed at any time.

12.3.35 A discharge may be leachate from waste materials or leakage from an above or below ground storage tank, a soakaway and other sources.

12.3.36 It is an offence to “cause or knowingly permit” the discharge of hazardous substances or non-hazardous pollutants which might lead to their entering groundwater without an authorisation (permit).

**Water Resources Act 1991 (Ref. 12.35)**

12.3.37 Part II of the Water Resources Act 1991 (WRA) covers the licensing of water abstractions, including groundwater. Section 29 of the WRA covers the exemption of “construction dewatering” from the abstraction licensing regime by stating in 29(2) that:

> “The restriction on abstraction shall not apply to any abstraction of water from a source of supply in so far as the abstraction…is necessary:

(a) to prevent interference with any mining, quarrying, engineering, building or other operations (whether underground or on the surface); or

(b) to prevent damage to works resulting from any such operations.”

12.3.38 The WRA also empowers the Environment Agency to undertake anti-pollution works in relation to controlled waters (including groundwater) and recover the expenses involved from the person who caused or knowingly permitted polluting substances to
be present or pollution to have occurred. The Environment Agency may also serve a works notice upon such persons requiring them to undertake anti-pollution works.

*Environment Agency Groundwater Protection: Policy and Practice (GP3) 2008 (Ref. 12.36)*

12.3.39 This guidance document provides a framework for the regulation and protection of groundwater resources. It comprises a number of parts. Part 1 outlines the Environment Agency’s approach to the management and protection of groundwater. Part 2 provides a technical framework which sets out key principles and concepts. Part 3 provides guidance in the tools available for analysing and assessing the risks to groundwater. Part 4 provides the Environment Agency’s position and policies in respect to developments and other activities which may present a risk to groundwater. It also provides guidance on the key groundwater legislation and how to interpret it.

12.3.40 The GP3 policy is risk based. To assist in this, the Environment Agency has developed a series of Groundwater Vulnerability Maps and Source Protection Zones (SPZs). Vulnerability maps identify where a groundwater resource is at risk from pollution (should a pollution source exist) due to the nature of the soil, unsaturated zone or inherent characteristics of the aquifer. SPZs show the level of risk for water quality at an abstraction due to activity on or in the ground. The zones have three divisions, with SPZ1 closest to the source showing the area of highest risk.

12.3.41 The document contains a series of general and specific policies relevant to the proposed development, including:

- general approach to groundwater protection (including storage of pollutants);
- solid waste management;
- discharge of liquid effluents into the ground;
- diffuse sources;
- management of groundwater resources;
- river augmentation from groundwater;
- land contamination; and
- groundwater flooding.

**c) National Planning Policy**


12.3.42 PPS1 was published in 2005 and sets out the Government’s overarching planning policies on the delivery of sustainable development through the planning system.

12.3.43 Paragraph 5 states that planning should facilitate and promote sustainable and inclusive patterns of urban and rural development by, amongst other things:
protecting and enhancing the natural and historic environment, the quality and character of the countryside, and existing communities.


12.3.44 PPS9 was published in 2005 and sets out planning policies on the protection of biodiversity and geological conservation through the planning system. The broad aim of the policy is to ensure that planning, construction, development and regeneration should have minimal impacts on biodiversity and geology and enhance it wherever possible.

12.3.45 Key objectives of PPS9 include (page 2 of the policy):

“To promote sustainable development by ensuring that biological and geological diversity are conserved and enhanced as an integral part of social, environmental and economic development, so that policies and decisions about the development and use of land integrate biodiversity and geological diversity with other considerations.

To conserve, enhance and restore the diversity of England's wildlife and geology by sustaining, and where possible improving, the quality and extent of natural habitat and geological and geomorphological sites; the natural physical processes on which they depend; and the populations of naturally occurring species which they support.”


12.3.46 PPS23 is intended to complement the pollution control framework under the Pollution Prevention and Control Act 1999 and the Pollution Prevention and Control Regulations 2000. The policy sets out the importance of the planning system in determining the location of development which may give rise to pollution, either directly or indirectly. The policy also seeks to ensure that other uses and developments are not, as far as possible, affected by major existing or potential sources of pollution.

12.3.47 Paragraph 23 of PPS23 states that, in considering individual planning applications, the potential for contamination to be present must be considered in relation to the existing use and circumstances of the land, the proposed new use and the possibility of encountering contamination during development. Local Planning Authorities (LPAs) should satisfy themselves that the potential for contamination and any risks arising are properly assessed and that the development incorporates any necessary remediation and subsequent management measures to deal with unacceptable risks.

12.3.48 Paragraph 24 of PPS23 states that LPAs should pay particular attention to development proposals for sites where there is a reason to suspect contamination. If the potential for contamination is confirmed, further studies to assess the risks and identify and appraise the options for remediation should be required. Paragraph 25 of PPS23 advises that the remediation of land affected by contamination through the granting of planning permission (with the attachment of the necessary conditions)
should secure the removal of unacceptable risk and make the site suitable for its new use.

12.3.49 PPS23 also states that, amongst other things, the following matters may be material in the consideration of individual planning applications where pollution considerations arise:

“…the need to ensure that land, after development, is not capable of being determined as contaminated land under Part 2A of the EPA 1990 and that all unacceptable risks have been addressed;

…the possible adverse impacts on water quality and the impact of any possible discharge of effluent or leachates which may pose a threat to surface or underground water resources directly or indirectly through surrounding soils; (page 12 of the policy)


12.3.50 In its final form, it is intended that this PPS will replace PPS9. The draft PPS contains policies to maintain and enhance, restore or add to biodiversity and geodiversity through the planning system. It includes policies to promote opportunities for the incorporation of beneficial biodiversity and geological features within the design of development, and to maintain networks of natural habitats by avoiding their fragmentation and isolation.

12.3.51 A key objective of this PPS is to bring together related policies on the natural environment and on open space and green spaces in rural and urban areas to ensure that the planning system delivers healthy sustainable communities which adapt to and are resilient to climate change and gives the appropriate level of protection to the natural environment (page 10 of the policy).

d) Regional Planning Policy

12.3.52 The Government’s revocation of regional strategies was quashed in the High Court on 10 November 2010. However, on that same date the Government reiterated in a letter to Chief Planners its intention to revoke regional strategies through the Localism Bill. This letter was also challenged but, on 7 February 2011, the High Court held that the Government's advice to local authorities that the proposed revocation of regional strategies was to be regarded as a material consideration in their planning development control decisions should stand. The decision of the High Court was upheld by the Court of Appeal on 27 May 2011. Therefore, the regional strategies remain in place but in the case of development control decisions it is for planning decision makers to decide on the weight to attach to the strategies (see Volume 1, Chapter 4 of this ES for a full summary of the position regarding the status of regional planning policy).

12.3.53 RPG 10 sets out the broad development strategy for the period to 2016 and beyond. Policy EN1 (Landscape and Biodiversity) seeks the protection and enhancement of the region’s internationally and nationally important landscape areas and nature conservation sites. The protection and, where possible, enhancement of the landscape and biodiversity should be planned into new development.

12.3.54 Policy RE1 (Water Resources and Water Quality) states that to achieve the long term sustainable use of water, water resources need to be used more efficiently. The policy also states that local authorities, the Environment Agency, water companies and other agencies should seek to, amongst other things, protect groundwater resources.

ii. The Draft Revised Regional Spatial Strategy (RSS) for the South West Incorporating the Secretary of States Proposed Changes 2008 – 2026 (July 2008) (Ref. 12.42)

12.3.55 Chapter 7 deals with Enhancing Distinctive and Cultural Life. Policy ENV1 states:

“The quality, character, diversity and local distinctiveness of the natural and historic environment in the South West will be protected and enhanced, and developments which support their positive management will be encouraged. Where development and changes in land use are planned which would affect these assets, Local Authorities will first seek to avoid loss of or damage to the assets, then mitigate any unavoidable damage, and compensate for loss or damage through offsetting actions. Priority will be given to preserving and enhancing sites of international or national landscape, nature conservation, geological, archaeological or historic importance. Tools such as characterisation and surveys will be used to enhance local sites, features and distinctiveness through development, including the setting of settlements and buildings within the landscape and contributing to the regeneration and restoration of the area.”

12.3.56 Policy RE6 (Water Resources) states that the region’s network of ground, surface and coastal waters and associated ecosystems will be protected and enhanced. It also advises that surface and groundwater pollution risks must be minimised so that environmental quality standards are achieved and where possible exceeded.


12.3.57 The Somerset and Exmoor National Park Joint Structure Plan was adopted in 2000 with relevant policies saved from 27 September 2007. All policies have been saved with the exception of Policy 53 which is unrelated to geology, land contamination or groundwater impacts. The Plan provides a strategic base for all land use planning within the plan area for the period up to 2011.

12.3.58 Policy 1 (Nature Conservation) states that the biodiversity of Somerset and the Exmoor National Park should be maintained and enhanced. The greatest protection
will be afforded to nature conservation sites of international and national importance. In addition, Local Plans should include policies to maintain and enhance sites and features of local nature conservation importance including landscape features which provide wildlife corridors, links or stepping stones between habitats.

12.3.59 Policy 59 (Safeguarding Water Resources) states that protection will be afforded to all surface, underground and marine water resources from development which could harm their quality or quantity.

e) Local Planning Policy


12.3.60 The Sedgemoor District Local Plan forms part of the Development Plan for Sedgemoor. The Local Plan was adopted in 2004 (with relevant policies ‘saved’ from 27 September 2007). The Proposals Map (Inset Map No. 14) indicates that the site is not subject to any specific soils and land use designations.

12.3.61 There are no relevant saved policies relating to geology, land contamination or groundwater impacts at the site.

12.3.62 Policy PCS16 (Contaminated Land) outlines the policy for contaminated land. However, Policy PCS16 was not saved as part of the Secretary of State’s Direction and therefore expired on 24 September 2007. The Council’s schedule and reasoning for not saving Policy PCS16 confirms that this is superseded by more recent guidance contained within PPS23 (paragraphs 23 to 25).

ii. Sedgemoor District Local Development Framework Core Strategy Proposed Submission (incorporating the Council’s recommended changes) (March 2011) (Ref. 12.45)

12.3.63 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from September to November 2010. Changes prior to submission proposed as a result of the consultation process were reported and endorsed by the Council’s Executive Committee on 9 February 2011. The Core Strategy (Proposed Submission) was submitted to the Secretary of State on 3 March 2011 and an Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy will form part of the Development Plan for Sedgemoor.

12.3.64 EDF Energy submitted representations objecting to the Core Strategy (Proposed Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1, MIP2 and MIP3 contained in that chapter) and those sections relating to housing and Hinkley Point. EDF Energy also participated at the relevant EiP hearings. See Volume 1, Chapter 4 of this ES for a full summary of the position regarding the status of the Core Strategy.

12.3.65 The following Core Strategy (Proposed Submission) policies are of potential relevance:
12.3.66 Policy S3 (Sustainable Development Principles) states that, amongst other objectives, development proposals will be supported where they contribute to meeting the following:

“Minimise the impact on natural resources, avoid pollution and incorporate the principles of sustainable construction to contribute to energy efficiency, renewable energy, waste reduction/recycling, the use of sustainably sourced materials, sustainable drainage, reduced water use, water quality and soil protection.”

12.3.67 Policy D16 (Pollution Impact of Development) states that development proposals that are likely to result in levels of air, noise, light or water pollution (including groundwater), vibration or soil contamination that would be harmful to other land uses, human health, tranquillity, or the built and natural environment will not be supported.

iii. Supplementary Planning Guidance

12.3.68 SDC and WSC have jointly prepared draft supplementary planning guidance in relation to the HPC Project. Public consultation on the Consultation Draft version of the Hinkley Point C Project Supplementary Planning Document (Ref. 12.46) (the draft HPC SPD) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which object to the draft HPC SPD. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the draft HPC SPD.

12.3.69 The draft HPC SPD provides advice in relation to the HPC proposals, expanding upon the policy context for the proposals. This includes associated development.

12.3.70 The draft HPC SPD does not set out any specific guidance in relation to geology, land contamination and groundwater impacts at the site.

12.3.71 Further planning policy context is provided in the Legislative Planning Policy Context chapter (Volume 1, Chapter 4 of this ES) and the Introduction chapter (Chapter 1 of this volume).

12.4 Methodology

12.4.1 The baseline environmental studies, surveys and impact assessment for geology, land contamination and groundwater have been conducted in accordance with relevant best practice and standard methodologies, as identified under Section 12.3 of this chapter.

12.4.2 Many environmental aspects are interrelated; for example impacts from land contamination have the potential to impact a number of other environmental components (e.g. land contamination may impact upon groundwater, surface waters and/or ecology). For the purposes of this chapter, the impact assessment related to contamination will be generally restricted to human health, ecology, crops/livestock, soils, groundwater resources and groundwater quality. Surface waters are only assessed in the context of impact to on-site surface water from actual or potential soil
contamination. Chapter 13 of this volume presents a detailed assessment of the risks and mitigation measures associated with surface waters.

a) Study Area

12.4.3 The geographical extent of the study area for the assessment of geology, land contamination and groundwater includes:

- the site (for the purposes of this assessment ‘the site’ does not include road improvements or the eastern hedgerow improvements (see Figure 12.1));
- all land within 500m of the site area (as referred to above), in order to scope in any potential off-site sources of contamination as well as identify any off-site receptors at risk from any contamination migrating off-site; and
- groundwater receptors up to 1km from the site area (as referred to above).

12.4.4 The site is illustrated in Figure 1.1 in Chapter 1 of this volume of the ES. (Figure 12.1) shows the study area including the 500m search area buffer. The site covers an area of approximately 5.2ha. It is bounded to the immediate south by the A39 and the remaining boundaries of the site are with agricultural land. The closest residential properties to the site are on Mill Close 160m to the north, and Oak Tree Way and Brownings Road approximately 250m to the east of the site. To the north of the site, separated by agricultural land, there is a further residential building at Denmans Farm.

b) Baseline Assessment

12.4.5 The baseline assessment for geology, land contamination and groundwater is based upon:

- review of desk based information and ‘gap’ analysis;
- design and undertaking of intrusive investigations and surveys;
- reporting and risk assessment; and
- consultation with appropriate bodies (e.g. Local Authority, Environment Agency and Natural England).

12.4.6 The following information sources have been used to establish the baseline environmental characteristics within the study area when undertaking this assessment:

- Environment Agency ‘What's In Your Backyard?’ website (Ref. 12.48).
- British Geological Survey (BGS) 1:50,000 Sheet 295: Taunton (Ref. 12.49).
Natural England Interactive map of SSSI Locations (Ref. 12.50).

Somerset Geology Group – List of Local Geology (formerly RIG) sites (Ref. 12.51).

Mott MacDonald (December 2010). Hinkley Point C Associated Development – Geotechnical and Geo-environmental Phase 1 Desk Study Report (Ref.12.79).


AMEC Walkover survey (October 2009) (Ref. 12.53).


12.4.7 In addition to the above sources and in accordance with accepted best practice (as detailed in Section 12.3), the baseline conditions with respect to land contamination and groundwater have been determined through the development and subsequent validation of a Conceptual Site Model (CSM). A CSM has been produced to identify potential risks posed to human health and other receptors within the study area by soil contamination which may be present on or close to the site.

12.4.8 A CSM is developed as an initial step in the process of assessing risk related to contaminated land and groundwater. A CSM is defined within the British Standard BS 10175 – Investigation of Potentially Contaminated Sites – Code of Practice (2011) (Ref. 12.56) as follows:

“characteristics of a site that are relevant to the occurrence and potential effects of ground contamination that describe the nature and sources of contamination; the ground, groundwater, surface water, ground gases and volatile organic compounds (VOCs) that could be present; the environmental setting; potential migration pathways; and potential receptors.”

12.4.9 The CSM provides a three-dimensional picture of a site, presenting and illustrating the potential pollutant linkages that may exist at the site. A pollutant linkage may exist where a source of contamination is present that may interact with a receptor (target) via a pathway. The source, pathway and receptor are defined as follows:

• source – location from which contamination is, or was, derived;

• pathway – mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor; and

• receptor (target) – persons, living organisms, ecological systems, controlled waters, atmosphere, structures and utilities that could be adversely affected by the contaminant(s).
12.4.10 The CSM is intended to evolve through the various phases of an investigation as more detailed information becomes available, allowing potential pollutant linkages to be validated or discounted. A site specific CSM has been produced and the results of this are presented in Section 12.5 of this chapter.

c) Consultation

12.4.11 Consultation has been undertaken throughout the EIA process and further information may be found in the Consultation Report.

12.4.12 Consultation meetings were held with SDC, WSC and the Environment Agency to discuss all stages of the assessment including specific aspects of the associated development (e.g. intrusive investigation requirements).

12.4.13 The Animal Health Division of Defra has also been consulted about the potential presence of animal burial pits relating to ‘foot and mouth’ or other disease outbreaks (detailed in a letter dated 19 October 2009 (Ref. 42/01E/05)) (Ref. 12.57).

d) Assessment Methodology

12.4.14 Volume 1, Chapter 7 of this ES describes the assessment methodology for this EIA. In addition the following specific methodology was applied for the determination of receptor value and sensitivity (see Table 12.1) and impact magnitude (see Table 12.2) for geology, land contamination and groundwater.

ii. Value and Sensitivity

12.4.15 All of the geology, land contamination and groundwater receptors that may be impacted by the proposed development have been assigned a level of importance in accordance with those definitions set out in Volume 1, Chapter 7 of this ES and with the definitions given in Table 12.1.

12.4.16 The assessment of potential impacts to soil quality as a result of physical disturbance and handling, and the impact of the loss of agricultural land, is presented within Chapter 11 of this volume.

12.4.17 Where a receptor could reasonably be placed within more than one value and sensitivity rating, conservative professional judgement has been used to determine which rating would be applicable.

<table>
<thead>
<tr>
<th>Value and Sensitivity</th>
<th>Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Geology</td>
</tr>
<tr>
<td></td>
<td>Geology has a national designation (e.g. SSSI) and/or geology has very low capacity to accommodate any change.</td>
</tr>
<tr>
<td></td>
<td>Land Contamination</td>
</tr>
<tr>
<td></td>
<td>Receptors of high sensitivity and high intrinsic value (e.g. humans, or habitats and ecology within area designated for conservation importance, groundwater abstraction).</td>
</tr>
<tr>
<td>Value and Sensitivity</td>
<td>Guidelines</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Principal Aquifer with significant public water supply abstractions. Site is within Inner or Outer Source Protection Zones.</td>
</tr>
<tr>
<td>Medium Geology</td>
<td>Geology has a local or regional designation (e.g. Local Geological Site) and/or has low capacity to accommodate any change.</td>
</tr>
<tr>
<td></td>
<td>Land Contamination</td>
</tr>
<tr>
<td></td>
<td>Receptor of medium sensitivity and value (i.e. possesses key distinctive characteristics).</td>
</tr>
<tr>
<td></td>
<td>Groundwater</td>
</tr>
<tr>
<td></td>
<td>Principal Aquifer with significant public water supply abstractions. Site is within Catchment Source Protection Zone; or Minor Aquifer with significant water supply abstractions. Site is within Inner or Outer Source Protection Zone.</td>
</tr>
<tr>
<td>Low Geology</td>
<td>Geology not designated but possesses key characteristics which may be locally important and/or has a high capacity to accommodate change.</td>
</tr>
<tr>
<td></td>
<td>Land Contamination</td>
</tr>
<tr>
<td></td>
<td>Receptor of low sensitivity and value (i.e. possesses some distinctive characteristics).</td>
</tr>
<tr>
<td></td>
<td>Groundwater</td>
</tr>
<tr>
<td></td>
<td>Secondary A Aquifer with water supply abstraction. Site is within Catchment Source Protection Zone.</td>
</tr>
<tr>
<td>Very Low Geology</td>
<td>Geology not designated and is non distinctive and/or is likely to tolerate the proposed change.</td>
</tr>
<tr>
<td></td>
<td>Land Contamination</td>
</tr>
<tr>
<td></td>
<td>Receptor of low sensitivity and value i.e. possesses no distinctive characteristics (e.g. subsoil used for engineering fills).</td>
</tr>
<tr>
<td></td>
<td>Groundwater</td>
</tr>
<tr>
<td></td>
<td>Secondary A/B Aquifer without abstractions in area of activity; or Unproductive.</td>
</tr>
</tbody>
</table>

12.4.18 The potential sensitivity of a human health receptor can be reduced through the application of standard good practices/control measures, as detailed in Section 12.6 of this chapter.

iii. Magnitude

12.4.19 The magnitude of impact has been based on the consequences that the proposed development would have upon geology, land contamination and groundwater, and has been considered in terms of high, medium, low and very low (see Table 12.2). Potential impacts have been considered in terms of permanent or temporary, adverse (negative) or beneficial (positive) and cumulative.
12.4.20 Where impact magnitude could reasonably be placed within more than one magnitude rating, conservative professional judgement has been used to determine which rating would be applicable.

### Table 12.2: Guidelines for the Assessment of Magnitude

<table>
<thead>
<tr>
<th>Magnitude of Impact</th>
<th>Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td><strong>Geology</strong>&lt;br&gt;Very significant permanent change to solid geology over the whole site so that it is unrecognisable when compared to the baseline conditions down to substantial depths below the ground surface.</td>
</tr>
<tr>
<td></td>
<td><strong>Land Contamination</strong>&lt;br&gt;Soil contamination is considered to pose a high risk to potential receptors with one or more pollutant linkage certain to be present. Site certain to be deemed as Part 2A and/or considered unsuitable for use.</td>
</tr>
<tr>
<td></td>
<td><strong>Groundwater</strong>&lt;br&gt;Very significant certain or likely change to key groundwater regime characteristics to the extent that UK and European legislation is contravened. Change in groundwater level, quality or available resource usefulness is chronic, permanent or prolonged significantly beyond the activity causing the change, and irreversible. Permanent loss of aquifer as useful groundwater resource. Changes are spatially extensive beyond the area in which the impact may occur (e.g. drawdown into adjoining areas or contamination down gradient of site into adjoining areas).</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td><strong>Geology</strong>&lt;br&gt;Significant permanent changes to solid geology over the majority of the site so that it is unrecognisable when compared to the baseline conditions down to substantial depths.</td>
</tr>
<tr>
<td></td>
<td><strong>Land Contamination</strong>&lt;br&gt;Soil contamination is considered to pose a moderate risk to potential receptors with one or more pollutant linkages likely to be present. Site likely to be deemed as Part 2A and/or considered unsuitable for use.</td>
</tr>
<tr>
<td></td>
<td><strong>Groundwater</strong>&lt;br&gt;Significant likely change to key groundwater regime characteristics to the extent that UK and European legislation may be contravened. Groundwater quality may be affected permanently or at least for ten years. Change in groundwater level, quality or available resource usefulness is prolonged more than two years beyond the activity causing the change, and only reversible after significant remediation activity. Permanent or long term loss of aquifer as useful groundwater resource. Changes are spatially extensive beyond the area in which the effect may occur (e.g. drawdown into adjoining areas or contamination down gradient of site into adjoining areas).</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td><strong>Geology</strong>&lt;br&gt;Noticeable but not significant changes to the near surface geology (weathered material) covering a partial area of the site or a number of isolated locations.</td>
</tr>
</tbody>
</table>
|                     | **Land Contamination**<br>Soil contamination is considered to pose a low risk to potential receptors with one or more pollutant linkages possibly present. Site possibly deemed as Part 2A and/or
iv. Significance of Impacts

12.4.21 The significance of the impact is judged on the relationship of the magnitude of impact to the assessed sensitivity and/or importance of the receptor. The methodology to assess the predicted significance of impacts, without mitigation, is outlined in Volume 1, Chapter 7 of this ES.

12.4.22 For the purpose of this assessment, mitigation measures have been produced where there is an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so.

v. Cumulative Impacts

12.4.23 Volume 1, Chapter 7 of this ES refers to the methodology used to assess cumulative impacts. Additive and interactive effects between impacts within the study area, generated by the proposed development are assessed within this chapter. Cumulative impacts that consider activities and impacts generated at distance from the site and study area are considered in Volume 11 of this ES; this assesses the project-wide cumulative impacts and in-combination impacts with other proposed projects.

vi. Residual Impacts

12.4.24 The final step in the EIA process is the assessment of the residual impacts after the implementation (where necessary) of proposed mitigation measures.
vii. Assessment Criteria

12.4.25 In addition to the qualitative assessment criteria defined above, where relevant, the description of baseline conditions and the assessment of the significance of potential impacts for land contamination have also included comparison to relevant generic environmental assessment criteria as identified in Table 12.3. The assessment criteria have been selected in order to assess the potential impacts which may be caused to receptors on-site and off-site as a result of land contamination and groundwater quality impacts, based on those receptors identified within the DBA (see Section 12.5 of this chapter for details).

<table>
<thead>
<tr>
<th>Environmental Media</th>
<th>Generic Screening Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>Human Health Risk</td>
</tr>
</tbody>
</table>
| | Internally derived EDF Energy Soil Screening Values (SSV) using the Environment Agency’s Contaminated Land Exposure Assessment (CLEA) model (v1.06), which has adopted all the same standard parameters the Environment Agency used to derive standard UK Soil Guideline Values (SGV) for commercial and industrial end use, with the exception of soil organic matter which has been set to 1% (low SOM increases contaminant mobility and availability, and 1% SOM is generally accepted as a typical ‘low’ SOM, having been adopted in previous CLEA SGVs).
| | BS3882:2007 Specification for topsoil requirements for use.
| | Built Environment Risk |
| | Wessex Water Soil Survey Guidance.
| | Phytotoxic Risk |
| | Former Inter Departmental Committee for the Redevelopment of Contaminated Land (UK) (ICRCL) 59/83 (N.B. Paper withdrawn by Defra in 2004).
| | Ecological Risk |
e) Limitations, Constraints and Assumptions

12.4.26 At the beginning of the EIA process, available desk-based information relating to geology and land contamination (including maps and surveys) were collated in order to undertake an initial desk-based assessment. Where appropriate, and following this assessment, site investigations and surveys were then undertaken in order to supplement this information.

12.4.27 Intrusive investigations (i.e. boreholes, trial pits), were carried out in line with BS5930:1999 (Ref. 12.28) and BS10175:2001 (Ref.12.27) on the site to collect site specific data to establish robust baseline conditions.

12.4.28 Laboratory analysis has been carried out by suitably accredited laboratories which have certified standards of quality control and assurance. The chemical analysis was undertaken by a MCERTS (Environment Agency’s Monitoring Certification Scheme) and UKAS accredited laboratory. However, there may be some parameters within the testing suite for which accreditation is not currently available. The chemical analytical data, provided within Appendix D of the SSL report (Ref. 12.52) (Appendix 12B), presents details of the accreditation status for each of the analytical parameters. All sampling and analysis has been carried out in accordance with BS5930:1999 (Ref. 12.28) and BS10175:2001 (Ref.12.27) including appropriate quality assurance methods. As such the analysis undertaken is considered to be reliable and representative of the baseline conditions.

12.4.29 The approach and methodology adopted for this chapter are considered to be consistent with relevant guidance (as identified under Section 12.3 of this chapter). The assessments made represent best professional judgement at the time of writing.

12.5 Baseline Environmental Characteristics

a) Introduction

12.5.1 This section of the ES describes the baseline environmental characteristics for the site, with specific reference to geology, land contamination and groundwater. Distances stated to off-site features are from the site boundary.

b) Study Area Description

12.5.2 The general location is described in Chapter 1 of this volume.
i. Geology

Made Ground

12.5.3 No Made Ground is indicated on the geological maps (Ref. 12.49) for the site. Intrusive investigations comprising the advancement of eight boreholes and three trial pits were undertaken in October 2009, by SSL on behalf of EDF Energy (Ref. 12.52) (Appendix 12B), to establish the status of land contamination at the site. The investigations have not identified the presence of any Made Ground on-site.

Superficial Geology

12.5.4 The geological map (Ref. 12.49) indicates that the area to the north of the site is underlain by drift deposits consisting of Alluvium, associated with the Cannington Brook. The site itself is underlain by Head deposits. Head deposits are the youngest sediments in the geological sequence, deposited during periglacial conditions, and generally comprise a clay matrix with a wide range of sizes of angular rock fragments.

12.5.5 The intrusive investigations indicate the superficial geology of the site generally comprises red-brown slightly sandy gravelly silty clay to depths ranging between 1.30m and 3.55m below ground level (bgl). The gravels are noted as subangular, fine to coarse sandstone. Occasional mudstone and limestone gravels were also identified. Detailed logs produced during the intrusive investigation are presented within Appendix B of the SSL factual report (Ref. 12.52) (Appendix 12B).

Solid Geology

12.5.6 The geological map (Ref. 12.49) indicates that the solid geology of the area comprises Mercia Mudstone Group (MMG) dipping at 2° to the south-east, underlain by the Otter Sandstone Formation. The Otter Sandstone Formation does not outcrop over the site.

12.5.7 The undifferentiated component of the MMG generally comprises 10m to 35m of grey and green mudstones and siltstones, above approximately 350m of reddish brown fissured mudstone and silty mudstones, often with greenish grey mottling. The mudstones and siltstones are generally weak to strong and the siltstones are generally thickly laminated to medium bedded with localised calcareous and occasional gypsum veining and/or anhydrite. The lower section of the MMG (i.e. the lower 60m to 100m), consists of sandy silts. These are transitional in composition between the MMG and the underlying Otter Sandstone.

12.5.8 The intrusive investigations undertaken on behalf of EDF Energy (Ref. 12.52) (Appendix 12B) confirm the presence of MMG underlying the superficial deposits on-site. The MMG was generally recovered as stiff red-brown slightly gravelly clay. The gravels were noted as subrounded to subangular of mudstone. Mudstone deposits were noted to extend to the maximum depth of excavation (10.0m bgl within BHA07). Occasional grey gypsum and black speckles were also noted as present. A siltstone was recorded at a depth of 4.0m bgl in BHA01 to the maximum extent of the borehole (5.0m bgl). Logs produced during the intrusive investigation are
presented within Appendix B of the SSL factual report (Ref. 12.52) (Appendix 12B), whilst a borehole location plan is presented within Appendix A of the same report.

12.5.9 There are two BGS boreholes located approximately 150m north (Borehole Ref. ST23/NE/1) and 100m west (Borehole Ref. ST23/NE/17) of the site. These boreholes, drilled in 1973 and 1948, indicate that the alluvium associated with the Cannington Brook (this watercourse is discussed further within the hydrology section of this report and in Chapter 13 of this volume) consists of approximately 2.5m of soft clay and gravel overlying stiff clay/red mudstone (interpreted as the MMG). The BGS borehole log for borehole reference ST23/NE/17, located 100m to the west of the site, records the presence of red marl (Keuper Marl), now described as the MMG, from a depth of 9ft to 84ft bgl, or approximately 2.7m bgl to 25.6m bgl.

**Mineral Extraction**

12.5.10 The Somerset Minerals Local Plan (2004) (Ref. 12.58) indicates that the site does not lie within a Mineral Consultation Area (MCA) and is not impacted by any current approved Area of Permission for mine workings. There are no BGS recorded mineral sites located within the study area.

**Statutory Designations**

12.5.11 There are no geological SSSIs, Local Geological Sites (formerly RIGS) or locally designated geological sites within the study area.

**ii. Land Contamination**

**Desk Based Assessment Findings**

12.5.12 Historical maps were assessed at the British Library and through information provided by Mott MacDonald (Ref. 12.79) to review the history of the study area. The information obtained from the British Library is detailed in Table 12.4:.

<table>
<thead>
<tr>
<th>Date</th>
<th>Site Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1887 (1:2,500)</td>
<td>The site is occupied by agricultural fields. Several watercourses pass to the north and west of the proposed development boundary and a drainage ditch passes through the site, linking to a “Mill Stream”. Cannington Brook is the main watercourse, passing approximately 50m to the west and 200m to the north. Two man-made “Mill Streams” join and branch-off from the main channel, one of which passes along the north-west boundary of the site. The associated flour mills are located upstream and downstream of the site. One footpath passes through the site and another footpath passes along the western boundary of the proposed development. Orchards occupy small sections of land to the north, east and west of the site. The western boundary is defined by a Mill Stream and open fields. The northern and eastern boundaries are also defined by fields. The southern boundary is undefined. Within 500m of the site boundaries are a small orchard, a very small quarry, a cemetery and a congressional chapel (northern boundary), Pridham’s Farm (western boundary) and Denman’s Farm, a small orchard and a Town Mill (flour) (eastern boundary). The further surrounding area is generally in agricultural use.</td>
</tr>
</tbody>
</table>
### Table 1: Site Details

<table>
<thead>
<tr>
<th>Date</th>
<th>Site Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>The site and surrounding areas remains unchanged.</td>
</tr>
<tr>
<td>(Not to Scale)</td>
<td></td>
</tr>
<tr>
<td>1962</td>
<td>The site and the majority of the surrounding area remains unchanged. A small orchard to the north of the site boundary has been felled and comprises an agricultural field. The small quarry previously located to the north of the development site boundary is no longer shown. Two small buildings have been constructed on the former quarry site.</td>
</tr>
<tr>
<td>(Not to Scale)</td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>The site remains unchanged. A small building has been constructed adjacent to the Mill Stream 250m north of the site boundary, with another small building located adjacent to a road 250m north of the site boundary. The two small buildings that have been constructed upon the in-filled quarry have been labelled as a Scout Hall. Poultry houses are indicated on the opposite side of Cannington Brook, within a small field 200m to the north of the site. Several small housing developments have occurred around Cannington to the north and east of the development site.</td>
</tr>
<tr>
<td>(1:2,500)</td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>The site and surrounding area remains unchanged. A garage is indicated approximately 250m to the east of the development site.</td>
</tr>
<tr>
<td>(1:10,000)</td>
<td></td>
</tr>
</tbody>
</table>

12.5.13 The Mott MacDonald desk study report (Ref. 12.79) contains further historical maps at both the 1:2,500 and 1:10,000 scales. They detail that allotment gardens were present in the south-eastern corner of the site between 1904 and 1930. Two small ponds were also marked in the south-eastern corner of the site between 1889 and 1993. The A39 is first shown on the plans from 1994 in its current location. Associated drainage for the A39 including culverts and a strip of woodland running parallel to the road is shown on the map produced in 2006.

12.5.14 In summary, the site has remained in agricultural use from 1887 to the present day. Orchards have occupied the land to the north, east and west of the site since 1887, but not within the site boundary. A small quarry was located approximately 300m to the north of the site boundary until at least 1930, which had been in-filled and developed to scout huts by 1962.

12.5.15 A site walkover was carried out on 12 October 2009 (Ref.12.53) in order to identify indicators of the existence of hazardous substances and the general conditions on or in the vicinity of the site. The survey was carried out from public footpaths crossing the site and the A39 bypass road.

12.5.16 The topography of the site was identified as flat and low lying. The site was occupied by predominantly grazing land, with fields bounded by hedges, tree lines, drainage ditches and one stream. The stream borders the site from south-west to north-east and is bounded by hedges. This stream is linked to a drainage ditch running north-west to south-east through the site and contains an old bridge crossing and a sluice structure.

12.5.17 No evidence of fly tipping or contamination was visible during the walkover.

12.5.18 The area surrounding the site was identified as farmland (including farm buildings) and contains residential properties and roads.
12.5.19 There are no records of Control of Major Accident Hazards sites (COMAH), Notification of Installations Handling Hazardous Substances sites (NIHHS), Registered Radioactive Substances Sites (RRS), hazardous substances or Local Authority Integrated Pollution Prevention and Control (IPPC) consents within a 500m radius of the site.

12.5.20 An IPPC permit is held by Yeo Valley Farms (Production) Limited approximately 450m to the west of the proposed development site. The permit (Ref. LP3738XP) relates to the treating of greater than 200 tonnes (T) of milk per day and the disposal of non-hazardous waste (greater than 50T per day) by biological treatment.

12.5.21 A fuel station is located approximately 600m to the north-east of the site.

12.5.22 There are 11 current and former entries listed within the Trade Directory within a 500m radius of the site. The closest active entry is Natural Choice Ltd, listed under pet foods and animal feeds, located 84m north-west of the site. The majority of entries are listed on the High Street or on Main Road in the village of Cannington to the north-east.

12.5.23 No records of operational landfill sites, IPPC registered waste sites, licensed waste management facilities, waste transfer sites or waste treatment sites within a radius of 500m of the site. One historical landfill, listed as Field No. 8191, Manor Farm, is recorded approximately 40m beyond the south-eastern boundary of the site. This landfill closed in 1993 and was permitted to accept soil, subsoil and naturally occurring excavated material only. It is thought that this landfill was used during the construction of the A39 Cannington bypass.

12.5.24 Historical planning applications held by SDC were reviewed to determine any potential contaminative impact. The majority of the applications relate to residential development, or light agricultural uses. All were considered to have a low potential contaminative impact.

**Animal Burial Pits**

12.5.25 No animal burial pits relating to foot and mouth or other disease outbreaks are recorded within the study area according to a consultation response letter issued by Defra Animal Health on 19 October 2009 (Ref. 42/01E/05).

12.5.26 However, it should be noted that burial pits were not registered before 1972, and individual animals could still be buried without registration up to the early 1990s. The potential for unrecorded burials being present within the site, although low, cannot be completely discounted.

**Statutory Designations**

12.5.27 There are no sensitive land uses or relevant statutory ecological designations within the study area.
Intrusive Investigation Findings

12.5.28 Intrusive investigations on the site were conducted, by SSL on behalf of EDF Energy, in October 2010. The factual report (Ref. 12.52) (Appendix 12B) details the methodologies and drilling techniques used as well as presenting the analytical results and logs.

12.5.29 The works relating to land contamination were as follows:

- advancement of eight boreholes to depths ranging from 4.7m to 10m bgl;
- advancement of three trial pits to 3.5m bgl; and
- analysis of nine natural soil samples for metals and metalloids, polyaromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH) with an aromatic/aliphatic split, benzene, toluene, ethylbenzene and xylene (BTEX), pH, organochlorine pesticide (OCP), organophosphorous pesticides (OPP) and atrazine and simazine herbicides.

12.5.30 An exploratory hole location plan is provided as Figure 2 with Appendix A of the SSL factual report (Ref. 12.52) (Appendix 12B).

12.5.31 The intrusive investigations confirmed the geology detailed within Section 12.5 as superficial clays and gravels overlying weathered Mercia Mudstone. No Made Ground was identified during the intrusive investigations.

12.5.32 A generic Tier 1 risk assessment has been completed for human health, phytotoxic, ecotoxic and built development receptors. Observed concentrations of contaminants in soil have been compared against relevant and applicable soil guideline values (SGVs) or other generic assessment (or screening) criteria as appropriate. The methodology for each assessment is detailed below.

Human Health Risk Assessment

12.5.33 In October 2009 the Environment Agency released a new version of the CLEA Model (version 1.06) and also published revised toxicological and exposure methodologies (Technical Review 1 - A review of body weight and height data used within in the CLEA Model SC050021, Environment Agency/J. Jeffries 2009 (Ref. 12.59)) and has commenced a programme of updating existing SGVs and producing new guideline values.

12.5.34 The Environment Agency intends to publish revised SGVs and Toxicological (TOX) reports for a list of priority substances identified by the SGV taskforce which includes many of the most commonly occurring contaminants. However, at the time of the data assessment presented herein, the Environment Agency has published SGV reports and associated TOX reports for only the following substances (2010): arsenic, nickel, mercury, selenium, cadmium, phenol, dioxins, furans and dioxin-like PCBs, benzene, xylenes, toluene and ethyl benzene.

12.5.35 The published SGVs are based on a sandy loam soil type with a Soil Organic Matter (SOM) of 6%. As the SOM of the site soils is unknown and the Tier 1 Soil Screening
Values (SSVs) are more conservative than the SGVs, a series of internally derived human health SSVs have been generated using the CLEA model (v1.06) using identical input parameters and assumptions to those adopted by the Environment Agency in the published SGVs for commercial and industrial end use (which is appropriate given the site), with the exception that the SOM has been reduced from 6% to 1% to provide a more conservative SOM.

12.5.36 The Land Quality Management Ltd (LQM) and Chartered Institute of Environmental Health (CIEH) (Ref. 12.60) and Contaminated Land: Applications in Real Environments (CL:AIRE) (Ref. 12.61) documents present Generic Assessment Criteria (GAC) for a number of metals and organic contaminants, including the 16 EPA priority PAHs and TPH. LQM/CIEH have used the CLEA model v1.04 to derive their GACs, with CL:AIRE utilising the current CLEA model v1.06. The Tier 1 values derived by EDF Energy internally for these substances have been generated using the CLEA model (v1.06) and the same input criteria and assumptions as the LQM/CIEH and CL:AIRE input parameters.

12.5.37 For the purpose of the human health risk assessment, internally derived Tier 1 SSVs have been used for all metals (with the exception of lead), PAHs and speciated TPHs. In the absence of published Tier 1 SSVs for the remaining contaminants the following alternative sources have been used:

- for lead, the 2002 Environment Agency SGV (Ref. 12.62) has been used in the absence of a published UK alternative (the SGV has been withdrawn, however the toxicology report and methodology are still valid);
- for Total/Sum TPH, the Hazardous Waste (England and Wales) Regulations 2005 (Ref. 12.63), inert waste threshold has been applied;
- for pH, the value within the BS3882:2007 Specification for Topsoil and Requirements for Use has been applied (Ref. 12.64); and
- for asbestos, the significance threshold is the presence or absence of detectable fibres in soil.

Phytotoxicity Risk Assessment

12.5.38 Contaminated land may pose a risk to plant establishment and growth (phytotoxicity). As there are no published UK screening values for assessing phytotoxic risk, in order to undertake a Tier 1 assessment of risks to plants the thresholds recommended in the Sludge (Use in Agriculture) Regulations 1989 – Statutory Instrument 1989 No. 1263 (Ref. 12.65) for potentially phytotoxic contaminants copper, nickel and zinc have been used. Water soluble boron is also a potential phytotoxic contaminant and in lieu of any other available guidelines the value provided by the former ICRCL Guidance Note 59/83 (paper withdrawn by Defra in 2004) has been used.

12.5.39 To assess the risk of pH impacts on plants the pH value presented within the BS3882:2007 Specification for Topsoil and Requirements for Use (Ref. 12.64) has been adopted as the Tier 1 assessment criteria.
**Built Environment Risk Assessment**

12.5.40 Contamination may pose risks to the built environment (e.g. buried water pipes and concrete). The thresholds used within this assessment have been taken from the Water Regulations Advisory Scheme (WRAS) Guidance Note 9-04-03 (Ref.12.66). The WRAS Guidance Note has recently been withdrawn and WRAS intends to prepare and publish a replacement Guidance Note making reference to UK Water Industry Research Ltd (UKWIR) guidance (Ref.12.67) which was issued in March 2011.

12.5.41 It is not considered that potential changes to risk thresholds which may result from the updated Guidance Note would change the built environment impact assessment ratings or overall conclusions and recommendations of this ES chapter.

12.5.42 The WRAS Guidance Note (Ref.12.66), the Wessex Water Soil Survey Guidance (WWSSG) (Ref. 12.68) and the British Research Establishment (BRE) Special Digest 1:2005, Concrete in Aggressive Ground (Ref. 12.69) have been used, in order to undertake a Tier 1 assessment of the risk to built environment receptors.

12.5.43 The comparison of the analytical results with the above guidance has enabled an initial assessment of the risk posed by the site soils to buried water services and concrete. Note that in terms of assessing the potential for soil contaminants to attack/degrade buried concrete, this assessment only provides an initial screening analysis on the basis of the total sulphate concentration and pH conditions. A full assessment of the potential impact from the site materials on buried concrete (i.e. a full BRE Special Digest 1 assessment), is beyond the scope of this assessment.

**Ecological Risk Assessment**

12.5.44 Criteria for assessing risk to ecological systems are currently less well developed in the UK. In October 2008 the Environment Agency published an ecological risk assessment (ERA) framework for contaminated soils (Ref. 12.70) in collaboration with Defra, Natural England, Welsh Assembly Government, the Countryside Council for Wales, local authorities and industry. The ERA framework (Ref. 12.70) contains guidance on the use of ecological/ecotoxicological Soil Screening Values (SSVs). Table 17 of the framework provides proposed SSVs for selected contaminants. For those contaminants not covered by the Environment Agency document, the framework suggests using alternative sources such as US EPA Eco SSLs (Ref. 12.71), Canadian Soil Quality Guidelines (Ref. 12.72), Oak Ridge National Laboratory Screening Benchmarks (Ref. 12.73) and/or Dutch RIVM Serious Risk Concentrations for Ecosystems (SRCeco) (Ref. 12.74).

12.5.45 The proposed SSVs given in the Environment Agency Guidance document (Ref. 12.70) and the other sources have been used as a Stage 1 screening tool to assess whether the concentrations of existing soil contaminants may pose a risk to ecology and ecosystems. The risks posed by contamination in soil are chiefly determined on the basis of soil environment specific receptors (i.e. invertebrates), however these may also include higher animals (i.e. mammals, avian receptors). These Stage 1 ecological SSVs are very conservative (i.e. highly precautionary). It should be noted that there are no statutory designated ecosystems within the site area.
12.5.46 A staged approach to the assessment of ecological risk has been adopted, whereby contaminant concentrations have initially been compared with the ecological SSVs described above. Where concentrations exceed the relevant SSVs a further Stage 2 assessment has been carried out where contaminant concentrations have been compared to the background concentrations recorded in rural soils in England as published by the Environment Agency in the UK Soil and Herbage Pollutant Survey Reports (Ref. 12.75 and 12.76).

Findings and Discussion of Chemical Analysis

12.5.47 The results of the chemical analysis have been summarised and compared against relevant and applicable soil assessment (or screening) criteria as appropriate. The laboratory data are presented in full within Appendix D of the SSL factual report (Ref. 12.52) (Appendix 12B). The results are presented within Table 12.5 and Table 12.6 below.
### Table 12.5: Soil Data Summary for Site (Human Health, Phytotoxic and Built Development Risk)

<table>
<thead>
<tr>
<th>Determinand</th>
<th>Range of Concentrations</th>
<th>Tier 1 Human Health SSV</th>
<th>Tier 1 Phytotoxic SSV</th>
<th>Tier 1 Built Environment SSV (WRAS Threshold Value unless stated)</th>
<th>Exceedence of Tier 1 Human Health SSV (number of samples)</th>
<th>Exceedence of Tier 1 Phytotoxic SSV (number of samples)</th>
<th>Exceedence of Tier 1 Built Environment SSV (number of samples)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Arsenic</td>
<td>12-21</td>
<td>635&lt;sup&gt;1&lt;/sup&gt;</td>
<td>-</td>
<td>50&lt;sup&gt;*&lt;/sup&gt;</td>
<td>0 (9)</td>
<td>-</td>
<td>0 (9)</td>
</tr>
<tr>
<td>Total Cadmium</td>
<td>&lt;0.5</td>
<td>230&lt;sup&gt;1&lt;/sup&gt;</td>
<td>-</td>
<td>3</td>
<td>0 (9)</td>
<td>-</td>
<td>0 (9)</td>
</tr>
<tr>
<td>Total Chromium (III)</td>
<td>14-25</td>
<td>30,400&lt;sup&gt;1&lt;/sup&gt;</td>
<td>-</td>
<td>600</td>
<td>0 (9)</td>
<td>-</td>
<td>0 (9)</td>
</tr>
<tr>
<td>Total Lead</td>
<td>22-517</td>
<td>750&lt;sup&gt;2&lt;/sup&gt;</td>
<td>-</td>
<td>500</td>
<td>0 (9)</td>
<td>-</td>
<td>1 (9)</td>
</tr>
<tr>
<td>Total Mercury</td>
<td>&lt;0.17</td>
<td>3,640&lt;sup&gt;1&lt;/sup&gt;</td>
<td>-</td>
<td>1</td>
<td>0 (9)</td>
<td>-</td>
<td>0 (9)</td>
</tr>
<tr>
<td>Total Copper</td>
<td>9-18</td>
<td>71,700&lt;sup&gt;1&lt;/sup&gt;</td>
<td>200&lt;sup&gt;8&lt;/sup&gt;</td>
<td>-</td>
<td>0 (9)</td>
<td>0 (9)</td>
<td>-</td>
</tr>
<tr>
<td>Total Nickel</td>
<td>9-15</td>
<td>1,790&lt;sup&gt;1&lt;/sup&gt;</td>
<td>110&lt;sup&gt;8&lt;/sup&gt;</td>
<td>-</td>
<td>0 (9)</td>
<td>0 (9)</td>
<td>-</td>
</tr>
<tr>
<td>Total Zinc</td>
<td>36-90</td>
<td>665,000&lt;sup&gt;1&lt;/sup&gt;</td>
<td>450&lt;sup&gt;8&lt;/sup&gt;</td>
<td>-</td>
<td>0 (9)</td>
<td>0 (9)</td>
<td>-</td>
</tr>
<tr>
<td>Total Selenium</td>
<td>&lt;1-2</td>
<td>13,000&lt;sup&gt;1&lt;/sup&gt;</td>
<td>-</td>
<td>3</td>
<td>0 (9)</td>
<td>-</td>
<td>0 (9)</td>
</tr>
<tr>
<td>Boron (water soluble)</td>
<td>&lt;1.0</td>
<td>192,000&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3&lt;sup&gt;4&lt;/sup&gt;</td>
<td>-</td>
<td>0 (9)</td>
<td>0 (9)</td>
<td>-</td>
</tr>
<tr>
<td>Fraction of organic carbon</td>
<td>0.0129-0.0189</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Barium</td>
<td>90-197</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Beryllium</td>
<td>&lt;1-1</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Iron</td>
<td>14500-20600</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<td>23-39</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>pH (pH units)</td>
<td>6.0-7.1</td>
<td>5.5 – 8.5&lt;sup&gt;3&lt;/sup&gt;</td>
<td>5.5 – 8.5&lt;sup&gt;3&lt;/sup&gt;</td>
<td>&lt;5 - &gt;8</td>
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<td>0 (9)</td>
<td>0 (9)</td>
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<td>Asbestos</td>
<td>ND</td>
<td>Presence of fibres&lt;sup&gt;3&lt;/sup&gt;</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>PAH (EPA 16 total)</td>
<td>0.16-0.51</td>
<td>100&lt;sup&gt;5&lt;/sup&gt;</td>
<td>-</td>
<td>50</td>
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<tr>
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<td>-</td>
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</tr>
<tr>
<td>Acenaphthylene</td>
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<td>86.1&lt;sup&gt;1&lt;/sup&gt;</td>
<td>-</td>
<td>50</td>
<td>0 (4)</td>
<td>-</td>
<td>0 (4)</td>
</tr>
<tr>
<td>Determinand</td>
<td>Range of Concentrations</td>
<td>Tier 1 Human Health SSV</td>
<td>Tier 1 Phytotoxic SSV</td>
<td>Tier 1 Environment SSV Threshold Value unless stated</td>
<td>Built Environment SSV (WRAS Threshold Value unless stated)</td>
<td>Exceedence of Tier 1 Human Health SSV (number of samples)</td>
<td>Exceedence of Tier 1 Phytotoxic SSV (number of samples)</td>
</tr>
<tr>
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<td>-------------------------</td>
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<td>Fluoranthene</td>
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<td>54,200^1</td>
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<td>0 (4)</td>
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<td>Chrysene</td>
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<td>0 (4)</td>
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<td>0 (4)</td>
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<td>Indeno(1,2,3-cd)pyrene</td>
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<td>60^1</td>
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<td>&lt;0.01</td>
<td>613^A¹,7</td>
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<td>TPH Aromatic C₁₀-C₁₂</td>
<td>&lt;0.1</td>
<td>364^A¹</td>
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<td>TPH Aromatic C₁₂-C₁₆</td>
<td>&lt;0.1</td>
<td>169^A¹</td>
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<tr>
<td>TPH Aromatic C₁₆-C₂₁</td>
<td>&lt;0.1</td>
<td>28,200^1</td>
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<tr>
<td>TPH Aromatic C₂₁-C₃₅</td>
<td>&lt;0.1</td>
<td>28,200^1</td>
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<td>50</td>
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<td>0 (4)</td>
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<td>TPH Aliphatic C₅-C₆</td>
<td>&lt;0.01</td>
<td>304^A¹</td>
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<td>0 (4)</td>
<td></td>
<td>0 (4)</td>
</tr>
<tr>
<td>Determinand</td>
<td>Range of Concentrations</td>
<td>Tier 1 Human Health SSV</td>
<td>Tier 1 Phytotoxic SSV</td>
<td>Tier 1 Environment SSV Threshold Value unless stated</td>
<td>Exceedence of Tier 1 Human Health SSV (number of samples)</td>
<td>Exceedence of Tier 1 Phytotoxic SSV (number of samples)</td>
<td>Exceedence of Tier 1 Built Environment SSV (number of samples)</td>
</tr>
<tr>
<td>-------------</td>
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<tr>
<td>TPH Aliphatic C₆-C₈</td>
<td>&lt;0.01</td>
<td>144&lt;sup&gt;¹&lt;/sup&gt;</td>
<td>-</td>
<td>50</td>
<td>0 (4)</td>
<td>-</td>
<td>0 (4)</td>
</tr>
<tr>
<td>TPH Aliphatic C₈-C₁₀</td>
<td>&lt;0.01</td>
<td>78&lt;sup&gt;¹&lt;/sup&gt;</td>
<td>-</td>
<td>50</td>
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<td>-</td>
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</tr>
<tr>
<td>TPH Aliphatic C₁₀-C₁₂</td>
<td>&lt;0.1</td>
<td>48&lt;sup&gt;¹&lt;/sup&gt;</td>
<td>-</td>
<td>50</td>
<td>0 (4)</td>
<td>-</td>
<td>0 (4)</td>
</tr>
<tr>
<td>TPH Aliphatic C₁₂-C₁₆</td>
<td>&lt;0.1</td>
<td>24&lt;sup&gt;¹&lt;/sup&gt;</td>
<td>-</td>
<td>50</td>
<td>0 (4)</td>
<td>-</td>
<td>0 (4)</td>
</tr>
<tr>
<td>TPH Aliphatic C₁₆-C₂₁</td>
<td>&lt;0.1</td>
<td>1,590,000&lt;sup&gt;¹&lt;/sup&gt;</td>
<td>-</td>
<td>50</td>
<td>0 (4)</td>
<td>-</td>
<td>0 (4)</td>
</tr>
<tr>
<td>TPH Aliphatic C₂₁-C₃₅</td>
<td>&lt;0.1</td>
<td>1,590,000&lt;sup&gt;¹&lt;/sup&gt;</td>
<td>-</td>
<td>50</td>
<td>0 (4)</td>
<td>-</td>
<td>0 (4)</td>
</tr>
<tr>
<td>Total TPH (Sum C₆-C₄₀)</td>
<td>&lt;10</td>
<td>500&lt;sup&gt;⁵&lt;/sup&gt;</td>
<td>-</td>
<td>50</td>
<td>0 (4)</td>
<td>-</td>
<td>0 (4)</td>
</tr>
</tbody>
</table>

All units mg/kg unless otherwise stated

< - Value below laboratory limit of detection;
* - Wessex Water revised threshold for arsenic. Wessex Water Soil Survey Guidance
<sup>¹</sup> - In line with the Environment Agency approach in the published SGVs, the GAC presented has been capped at the soil saturation limit.
ND - None detected

1. Internally Derived EDF Energy SSV using CLEA model v1.06 using all the same standard input parameters that the Environment Agency used to derive standard SGVs for commercial and industrial end use with the exception that SOM has been set to 1%.
6. Benzene Tier 1 Risk Assessment concentration used for Aromatic TPH C₅-C₇
7. Toluene Tier 1 Risk Assessment concentration used for Aromatic TPH C₇-C₈
9. Tier 1 Assessment for asbestos is based presence or absence of fibres
Table 12.6: Ecological Risk Assessment for the Site Soils

<table>
<thead>
<tr>
<th>Determinand</th>
<th>Range of Concentrations</th>
<th>Number of Samples</th>
<th>Ecological Stage 1 SSV</th>
<th>Stage 1 Exceedence of SSV</th>
<th>Range of Stage 2 Rural England Background Concentrations</th>
<th>Stage 2 – Exceedence of Rural England Background Concentrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Arsenic</td>
<td>12-21</td>
<td>9</td>
<td>18&lt;sup&gt;2a&lt;/sup&gt;/43&lt;sup&gt;2c&lt;/sup&gt;/46&lt;sup&gt;2d&lt;/sup&gt;</td>
<td>1&lt;sup&gt;2b&lt;/sup&gt;/0&lt;sup&gt;2c&lt;/sup&gt;/0&lt;sup&gt;2d&lt;/sup&gt;</td>
<td>1.37 – 143&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0</td>
</tr>
<tr>
<td>Total Cadmium</td>
<td>&lt;0.5</td>
<td>9</td>
<td>1.15&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0</td>
<td>0.1 - 1.78&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0</td>
</tr>
<tr>
<td>Total Chromium (III)</td>
<td>14-25</td>
<td>9</td>
<td>21.1&lt;sup&gt;1&lt;/sup&gt;</td>
<td>1</td>
<td>3.89 - 236&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0</td>
</tr>
<tr>
<td>Total Lead</td>
<td>22-517</td>
<td>9</td>
<td>167.9&lt;sup&gt;1&lt;/sup&gt;</td>
<td>2</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Total Mercury</td>
<td>&lt;0.17</td>
<td>9</td>
<td>0.06&lt;sup&gt;1&lt;/sup&gt;</td>
<td>9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.07 - 1.22&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0</td>
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<tr>
<td>Total Copper</td>
<td>9-18</td>
<td>9</td>
<td>88.4&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0</td>
<td>4.8 – 75.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0</td>
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<tr>
<td>Total Nickel</td>
<td>9-15</td>
<td>9</td>
<td>25.1&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0</td>
<td>2.13 – 88.9&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0</td>
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<tr>
<td>Total Zinc</td>
<td>36-90</td>
<td>9</td>
<td>90.1&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0</td>
<td>17.7 – 442&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0</td>
</tr>
<tr>
<td>Total Selenium</td>
<td>&lt;1-2</td>
<td>9</td>
<td>0.52&lt;sup&gt;2a&lt;/sup&gt;/4.1&lt;sup&gt;2b&lt;/sup&gt;/1.2&lt;sup&gt;2c&lt;/sup&gt;/0.63&lt;sup&gt;2d&lt;/sup&gt;</td>
<td>9&lt;sup&gt;2a&lt;/sup&gt;/0&lt;sup&gt;2b&lt;/sup&gt;/1&lt;sup&gt;2c&lt;/sup&gt;/0&lt;sup&gt;2d&lt;/sup&gt;</td>
<td>0.2 – 1.8&lt;sup&gt;b1&lt;/sup&gt;</td>
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<td>Boron (water soluble)</td>
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<td>Beryllium</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>Iron</td>
<td>14500-20600</td>
<td>9</td>
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</tr>
<tr>
<td>Vanadium</td>
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<td>9</td>
<td>-</td>
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<td>pH (pH units)</td>
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<td>Asbestos</td>
<td>ND</td>
<td>4</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>PAH (EPA 16 total)</td>
<td>0.16-0.51</td>
<td>4</td>
<td>29&lt;sup&gt;2b&lt;/sup&gt;&lt;sub&gt;LM&lt;/sub&gt;/100&lt;sup&gt;2d&lt;/sup&gt;&lt;sub&gt;LM&lt;/sub&gt;/&lt;sub&gt;18&lt;/sub&gt;2b&lt;sub&gt;HM&lt;/sub&gt;/1.1&lt;sup&gt;2d&lt;/sup&gt;&lt;sub&gt;HM&lt;/sub&gt;</td>
<td>0&lt;sup&gt;2b&lt;/sup&gt;&lt;sub&gt;LM&lt;/sub&gt;/0&lt;sup&gt;2d&lt;/sup&gt;&lt;sub&gt;LM&lt;/sub&gt;/0&lt;sup&gt;2b&lt;/sup&gt;&lt;sub&gt;HM&lt;/sub&gt;/0&lt;sup&gt;2d&lt;/sup&gt;&lt;sub&gt;HM&lt;/sub&gt;</td>
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<td>-</td>
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<tr>
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<td>17&lt;sup&gt;3&lt;/sup&gt;</td>
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<tr>
<td>Determinand</td>
<td>Range of Concentrations</td>
<td>Number of Samples</td>
<td>Ecological Stage 1 SSV</td>
<td>Stage 1 - Exceedence of SSV</td>
<td>Range of Stage 2 - Exceedence of Rural England Background Concentrations</td>
<td>Stage 2 - Exceedence of Rural Background Concentrations</td>
</tr>
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<td>-------------------------</td>
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<td>-----------------------------</td>
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<td>&lt;0.01</td>
<td>4</td>
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<tr>
<td>Phenanthrene</td>
<td>&lt;0.01-0.03</td>
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<td>31&lt;sup&gt;3&lt;/sup&gt;</td>
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<td>Anthracene</td>
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<td>1.6&lt;sup&gt;3&lt;/sup&gt;</td>
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<td>2.5&lt;sup&gt;3&lt;/sup&gt;</td>
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<tr>
<td>Chrysene</td>
<td>0.02-0.13</td>
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<td>35&lt;sup&gt;3&lt;/sup&gt;</td>
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<td>38&lt;sup&gt;3&lt;/sup&gt;</td>
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<tr>
<td>Benzo (a) Pyrene</td>
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<td>4</td>
<td>0.15&lt;sup&gt;3&lt;/sup&gt;</td>
<td>0</td>
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<tr>
<td>Indeno(1,2,3-cd)pyrene</td>
<td>0.01-0.03</td>
<td>4</td>
<td>1.9&lt;sup&gt;3&lt;/sup&gt;</td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td>Dibenzo(a,h)anthracene</td>
<td>&lt;0.01-0.04</td>
<td>4</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Benzo(ghi)perylene</td>
<td>&lt;0.01-0.04</td>
<td>4</td>
<td>33&lt;sup&gt;3&lt;/sup&gt;</td>
<td>0</td>
<td></td>
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</tr>
<tr>
<td>TPH Aromatic C&lt;sub&gt;5&lt;/sub&gt;-C&lt;sub&gt;7&lt;/sub&gt;</td>
<td>&lt;0.01</td>
<td>4</td>
<td>-</td>
<td>-</td>
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<tr>
<td>TPH Aromatic C&lt;sub&gt;7&lt;/sub&gt;-C&lt;sub&gt;8&lt;/sub&gt;</td>
<td>&lt;0.01</td>
<td>4</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>TPH Aromatic C&lt;sub&gt;8&lt;/sub&gt;-C&lt;sub&gt;10&lt;/sub&gt;</td>
<td>&lt;0.01</td>
<td>4</td>
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<tr>
<td>TPH Aromatic C&lt;sub&gt;10&lt;/sub&gt;-C&lt;sub&gt;12&lt;/sub&gt;</td>
<td>&lt;0.1</td>
<td>4</td>
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<tr>
<td>TPH Aromatic C&lt;sub&gt;12&lt;/sub&gt;-C&lt;sub&gt;16&lt;/sub&gt;</td>
<td>&lt;0.1</td>
<td>4</td>
<td>-</td>
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</tr>
<tr>
<td>TPH Aromatic C&lt;sub&gt;16&lt;/sub&gt;-C&lt;sub&gt;21&lt;/sub&gt;</td>
<td>&lt;0.1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>TPH Aromatic C&lt;sub&gt;21&lt;/sub&gt;-C&lt;sub&gt;35&lt;/sub&gt;</td>
<td>&lt;0.1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TPH Aliphatic C&lt;sub&gt;5&lt;/sub&gt;-C&lt;sub&gt;6&lt;/sub&gt;</td>
<td>&lt;0.01</td>
<td>4</td>
<td>-</td>
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</tr>
</tbody>
</table>
### Table: Determinant Concentrations

<table>
<thead>
<tr>
<th>Determinand</th>
<th>Range of Concentrations</th>
<th>Number of Samples</th>
<th>Ecological Stage 1 SSV</th>
<th>Stage 1 Exceedance of SSV</th>
<th>Range of Stage 2 Rural England Background Concentrations</th>
<th>Stage 2 – Exceedence of Rural England Background Concentrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPH Aliphatic C₆-C₈</td>
<td>&lt;0.01</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TPH Aliphatic C₈-C₁₀</td>
<td>&lt;0.01</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TPH Aliphatic C₁₀-C₁₂</td>
<td>&lt;0.1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TPH Aliphatic C₁₂-C₁₆</td>
<td>&lt;0.1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TPH Aliphatic C₁₆-C₂₁</td>
<td>&lt;0.1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TPH Aliphatic C₂₁-C₃₅</td>
<td>&lt;0.1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total TPH (Sum C₆-C₄₀)</td>
<td>&lt;10</td>
<td>4</td>
<td>3080⁴</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**All units mg/kg unless otherwise stated**

- `< - Value below laboratory limit of detection`
- `^ - Limit of detection is greater than screening value`
- `* - Note comparison of soil concentrations with English background concentrations has been undertaken only on those determinands exceeding the Stage 1 SSV, as part of a staged risk assessment approach.`

2. Ecological Soil Screening Levels, US EPA.
2a SSL for Plants
2b SSL for Soil Invertebrates
2c SSL for Wildlife (Avian)
2d SSL for Wildlife (Mammalian)
LM Low molecular weight
HM High Molecular Weight
3. Dutch RIVM Serious Risk Concentrations for Ecosystems - Ecotoxicological SRCeco Soil Values
12.5.48 The concentration of contaminants are all below the Tier 1 criteria for both assessing risk to human health, and phytotoxic risk, based on a commercial and industrial end use.

12.5.49 One sample marginally exceeded the SGV for lead of 500mg/kg as part of the built environment risk assessment. This sample recorded a value of 517mg/kg. As the concentration is marginal and found to be very shallow (0.2m bgl), it is unlikely that the potable water services would come into contact with this material.

12.5.50 Concentrations of the majority of chemical determinands were below Stage 1 ecological screening criteria and as such are not considered to pose a threat to ecological systems. However, the following contaminants were present above Stage 1 screening criteria:

- one sample for total arsenic, above the SSV for soil invertebrates only;
- one sample for total chromium;
- selenium: one sample exceeds the wildlife (avian), wildlife (mammalian) and plants Stage 1 SSVs.

12.5.51 All nine samples analysed for mercury were below the laboratory LoD, however this value (0.17mg/kg) is greater than the Stage 1 screening value. Similarly the LoD for selenium (1mg/kg) was greater than the relevant Stage 1 wildlife (mammalian) and plants SSVs.

12.5.52 As a staged approach to the assessment of ecological risk, and to accommodate the highly conservative nature of the published ecological screening values, the concentrations of those contaminants which exceed the Stage 1 screening values have been compared with ranges of concentrations which were identified in rural soils in England in Environment Agency published soil and herbage pollutant surveys (Ref. 12.75 and 12.76).

12.5.53 Comparison of the concentrations recorded in site soils with the Environment Agency published data shows only one determinand to be above the secondary screen (selenium, in the sample from BHA07 at 0.2m bgl, for location see Appendix A of the SSL report (Ref. 12.52) (Appendix 12B)). However, this concentration (2.0mg/kg compared with an upper England rural soil concentration of 1.8mg/kg) is only a very marginal exceedence, and was taken from naturally occurring soils with no evidence of contamination or other anthropogenic influence. As such, no ecological risk is considered to be posed by site soils.

12.5.54 Soil samples were also taken and analysed for OCP, OPP and atrazine and simazine herbicides. One sample, taken from TPA01 at 0.2m bgl had a detectable concentration of para-dichlorodiphenyldichloroethylene (p,p-DDE) (1.34 µg/kg). As this is marginally above the detectable limit of detection (1 µg/kg) and is an isolated detectable concentration it is not considered to pose a risk to human health or the ecology of the site.
Soil Leachability Analysis

12.5.55 Soil leachability testing was undertaken on two samples, both from a depth of 0.2m bgl. The samples were analysed for metals and metalloids, pH and PAH. One sample was analysed for speciated TPH and BTEX whilst the other was tested for total TPH only.

12.5.56 To assess the risks to groundwater and surface waters, concentrations have been compared to appropriate Drinking Water Standards (DWS) (Ref. 12.77) and Environmental Quality Standards (EQS) for freshwater and transitional and coastal waters/other surface waters (saline water). In accordance with the requirements of the WFD (Ref. 12.2), the published Tier 1 screening values taken from the document, ‘The River Basin Districts Typology, Standards and Groundwater threshold values (WFD) (England and Wales) Directions 2010’ (Ref. 12.10) have been used where available. All EQS values have been revised in line with the WFD (where applicable).

12.5.57 Table 12.7 summarises the results of the leachate testing. The complete leachate testing results are presented within Appendix D of the SSL factual report (Ref. 12.52) (Appendix 12B).
<table>
<thead>
<tr>
<th>Determinand</th>
<th>Range of Concentrations (µg/l Unless Stated)</th>
<th>Number of Samples</th>
<th>Drinking Water Standard (DWS)</th>
<th>Water</th>
<th>Exceedences of DWS</th>
<th>Environmental Quality Standard (EOS)</th>
<th>Exceedences of EQS Transitional and Coastal Waters/Other Surface Waters</th>
<th>Exceedences of EQS Transitional and Coastal Waters/Other Surface Waters</th>
<th>Environmental Quality Standard Freshwater</th>
<th>Exceedences of EQS Freshwater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic (leachable)</td>
<td>5-11</td>
<td>2</td>
<td></td>
<td>10</td>
<td>1</td>
<td>25 3 A GC</td>
<td></td>
<td></td>
<td>50 3 A/G15</td>
<td>0</td>
</tr>
<tr>
<td>Cadmium (leachable)</td>
<td>&lt;1</td>
<td>2</td>
<td></td>
<td>5</td>
<td>0</td>
<td>0.2 3 A/1.5 3 MAC</td>
<td>2 * LOD / 2 * LOD</td>
<td></td>
<td>0.15 3 A/C4/1.5 3 MAC</td>
<td>2 * LOD / 2 * LOD</td>
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<tr>
<td>Chromium (leachable)</td>
<td>1-8</td>
<td>2</td>
<td></td>
<td>50</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>4.7 3 A/32 P G15 3</td>
<td></td>
</tr>
<tr>
<td>Lead (leachable)</td>
<td>17-21</td>
<td>2</td>
<td></td>
<td>25</td>
<td>0</td>
<td>7.2 3 A</td>
<td>2</td>
<td></td>
<td>7.2 3 A</td>
<td></td>
</tr>
<tr>
<td>Mercury (leachable)</td>
<td>&lt;0.1-0.2</td>
<td>2</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0.05 3 A/0.07 MAC</td>
<td>2 * LOD / 2 * LOD</td>
<td></td>
<td>0.05 3 A/0.07 3 MAC</td>
<td>2 * LOD / 2 * LOD</td>
</tr>
<tr>
<td>Copper (leachable)</td>
<td>19-25</td>
<td>2</td>
<td></td>
<td>2000</td>
<td>0</td>
<td>5 3 A GC</td>
<td>2</td>
<td></td>
<td>10 3 A G15#</td>
<td></td>
</tr>
<tr>
<td>Nickel (leachable)</td>
<td>4-6</td>
<td>2</td>
<td></td>
<td>20</td>
<td>0</td>
<td>20 3 A</td>
<td>0</td>
<td></td>
<td>20 3 A</td>
<td></td>
</tr>
<tr>
<td>Zinc (leachable)</td>
<td>24-29</td>
<td>2</td>
<td></td>
<td>5000</td>
<td>0</td>
<td>40 3 D</td>
<td>0</td>
<td></td>
<td>75 3 A# G15</td>
<td></td>
</tr>
<tr>
<td>Selenium (leachable)</td>
<td>&lt;1</td>
<td>2</td>
<td></td>
<td>10</td>
<td>0</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Iron (leachable)</td>
<td>2070-5870</td>
<td>2</td>
<td></td>
<td>200</td>
<td>2</td>
<td>1000 A3 GC</td>
<td>2</td>
<td></td>
<td>1000 A3 G15</td>
<td></td>
</tr>
<tr>
<td>Boron (leachable)</td>
<td>21-58</td>
<td>2</td>
<td></td>
<td>1000</td>
<td>0</td>
<td>7000 2 AT</td>
<td>0</td>
<td></td>
<td>2000 2 AT</td>
<td></td>
</tr>
<tr>
<td>pH (pH units)</td>
<td>7.7-7.8</td>
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<td>6.5-9.5</td>
<td>1</td>
<td>6.8-5 2 P</td>
<td>0</td>
<td></td>
<td>6 3 (P95)</td>
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<tr>
<td>Total Petroleum Hydrocarbons (C8-C35)</td>
<td>11666</td>
<td>1</td>
<td></td>
<td>10^4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>50 5</td>
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</tr>
<tr>
<td>PAH (EPA 16 total)</td>
<td>&lt;0.02-0.03</td>
<td>2</td>
<td></td>
<td>0.1</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Naphthalene</td>
<td>&lt;0.02</td>
<td>2</td>
<td></td>
<td></td>
<td>-</td>
<td>1.2 3 A</td>
<td>0</td>
<td></td>
<td>2.4 3 A</td>
<td></td>
</tr>
<tr>
<td>Acenaphthylene</td>
<td>&lt;0.02</td>
<td>2</td>
<td></td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Acenaphthene</td>
<td>0.03</td>
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NOT PROTECTIVELY MARKED
<table>
<thead>
<tr>
<th>Determinand</th>
<th>Range of Concentrations (µg/l Unless Stated)</th>
<th>Number of Samples</th>
<th>Drinking Water Standard (DWS)</th>
<th>Exceedences of DWS</th>
<th>Environmental Quality Standard (EOS) Transitional and Coastal Waters/Other Surface Waters</th>
<th>Exceedences of EOS Transitional and Coastal Waters/Other Surface Waters</th>
<th>Environmental Quality Standard Freshwater</th>
<th>Exceedence of EOS Freshwater</th>
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<tbody>
<tr>
<td>Fluorene</td>
<td>&lt;0.02</td>
<td>2</td>
<td></td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Phenanthrene</td>
<td>&lt;0.02</td>
<td>2</td>
<td></td>
<td></td>
<td>0.1 A/0.4 MAC</td>
<td>0</td>
<td>0.1 A/0.4 MAC</td>
<td>0</td>
</tr>
<tr>
<td>Anthracene</td>
<td>&lt;0.02</td>
<td>2</td>
<td></td>
<td></td>
<td>0.1 A/0.4 MAC</td>
<td>0</td>
<td>0.1 A/0.4 MAC</td>
<td>0</td>
</tr>
<tr>
<td>Fluoranthene</td>
<td>&lt;0.02</td>
<td>2</td>
<td></td>
<td></td>
<td>0.1 A/3 MAC</td>
<td>0</td>
<td>0.1 A/3 MAC</td>
<td>0</td>
</tr>
<tr>
<td>Pyrene</td>
<td>&lt;0.02</td>
<td>2</td>
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<tr>
<td>Benzo(a)anthracene</td>
<td>&lt;0.02</td>
<td>2</td>
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<td>-</td>
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<tr>
<td>Chrysene</td>
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<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Benzo(b)fluoranthene</td>
<td>&lt;0.02</td>
<td>2</td>
<td>0.1 AAA</td>
<td></td>
<td>Σ0.03 A</td>
<td>0</td>
<td>Σ0.03 A</td>
<td>0</td>
</tr>
<tr>
<td>Benzo(k)fluoranthene</td>
<td>&lt;0.02</td>
<td>2</td>
<td>0.1 AAA</td>
<td></td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Benzo (a) Pyrene</td>
<td>&lt;0.02</td>
<td>2</td>
<td>0.01</td>
<td></td>
<td>0.05 A/0.1 MAC</td>
<td>0</td>
<td>0.05 A/0.1 MAC</td>
<td>0</td>
</tr>
<tr>
<td>Indeno(1,2,3-cd)pyrene</td>
<td>&lt;0.02</td>
<td>2</td>
<td>0.1 AAA</td>
<td></td>
<td>Σ0.002 A</td>
<td>2 * LOD</td>
<td>Σ0.002 A * LOD</td>
<td>2 * LOD</td>
</tr>
<tr>
<td>Benzo(ghi)perylene</td>
<td>&lt;0.02</td>
<td>2</td>
<td>0.1 AAA</td>
<td></td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dibenzo(a,h)anthracene</td>
<td>&lt;0.02</td>
<td>2</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

If no value is presented in bold then no samples exceeded the screening criteria.

# Corrected based on the hardness of Cannington Brook at the Blackmoor Farm monitoring point in 2003 as provided by the Environment Agency.
- No current threshold value available.
D Dissolved
T Total
A Annual Average
P 95-percentile (defined as a standard that is failed if the measured value of the parameter to which the standard refers (e.g. concentration of a pollutant) is greater than the standard for 5% of the time or more).
P5 5-percentile (defined as a standard that is failed if the measured value of the parameter to which the standard refers (e.g. concentration of a pollutant) is less than the standard for 5% of the time or more).
MAC Maximum Allowable Concentration
C4  Cadmium EQS based on class 4 hardness (100 to <200 mg/l CaCO$_3$), corrected based on the hardness of Cannington Brook at the Blackmoor Farm monitoring point in 2003 as provided by the Environment Agency.

GC  Threshold value based on 'good standard' for transitional and coastal waters to meet objective of WFD for Bridgwater Bay to achieve good ecological status by 2027 (no chemical criteria target thresholds specified).

G15  Threshold value based on 'good standard' to meet objective of WFD for Cannington Brook to achieve good status by 2015

I  Imperative Value

As  Threshold value assumed to be total concentration as not defined in the directive and based on percentage of current DWS values.

H  Threshold value for high standard based on current WFD Status

^  LOD  Exceedences of the annual average EQS have occurred due to the limit of detection (LOD) not being low enough. This is a consequence of the current methodologies of analysis for these parameters. However, these ‘exceedences’ are not considered to be environmentally significant.

^  Guideline Value – Non statutory/proposed EQS, but EQS never adopted in UK

^^  The parametric value applies to the sum of the concentrations of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene detected and quantified in the monitoring process.

^^^^  The individual concentrations are based on the 0.1 µg/l quoted for the sum of the four PAH compounds. By virtue of the total Tier 1 concentration being reported as 0.1 µg/l the Tier 1 concentration for each individual compound has been applied at this value.

1. The Water Supply (Water Quality) Regulations 2000


3. The River Basin Districts Typology, Standards and Groundwater threshold values (WFD) (England and Wales) Directions 2010

4. The Water Supply (Water Quality) Regulations 1989. N.B These Regulations were superseded by the 2000 regulations therefore there is currently no UK DWS for zinc and/or Total Petroleum Hydrocarbons.

5. The Surface Waters (Abstraction) for Drinking Water (Classification) Regulations 1996. DW1 treatment (i.e. simple physical treatment and disinfection) limit.
12.5.58 The analysis results for the soil leachate tests undertaken indicate exceedences of the transitional and coastal waters/other surface waters and freshwater EQS for copper (5µg/l and 10µg/l respectively) in both samples (i.e. 25µg/l in BHA02 (0.2m bgl) and 19 µg/l in TPA01 (0.2m bgl)). Both samples also exceed the transitional and coastal waters/other surface waters and freshwater EQS for lead (both 7.2µg/l) with concentrations of 21µg/l and 17µg/l respectively. Due to the distance of the saltwater receptor, and the degree of dilution/attenuation that would occur during movement of the groundwater to this receptor, the elevated copper is not considered to pose a risk to controlled waters. No source of lead contamination has been noted during the intrusive works (i.e. no Made Ground was encountered) and therefore the concentrations are considered to reflect naturally elevated ground conditions. It is therefore considered that the risk posed to freshwater controlled waters is not significant.

12.5.59 Elevated iron concentrations were identified in the site groundwater (up to 29 times the drinking water standard and six times the freshwater and transitional and coastal waters/other surface waters EQS). This is likely to be derived from naturally occurring mineralisation rather than an anthropogenic source; the development history of the site and surrounding area are not indicative of a source of contamination which may cause widespread iron contamination of groundwater. It is therefore not considered that the iron concentrations pose a significant risk to controlled waters.

12.5.60 The sample analysed from BHA02 exceeds the freshwater EQS annual average for chromium (4.7µg/l), with a concentration of 8µg/l. This sample also marginally exceeds the DWS for arsenic (10µg/l) with a recorded concentration of 11µg/l. As there are currently no water abstractions at the site the marginal exceedence of arsenic is not considered to pose a risk to controlled waters. As no Made Ground has been identified on the site the exceedence of chromium is also not considered to pose a risk to controlled waters.

12.5.61 Only one polyaromatic hydrocarbon (PAH) had a detectable concentration of acenapthene (0.03µg/l). All other concentrations did not exceed the laboratory limit of detection (0.01µg/l), however, the LoD for PAH compounds indeno(123-cd)pyrene and benzo(ghi)perylene are greater than the respective EQS (0.002 µg/l for the sum of the two compounds). As only one PAH compound recorded a detectable concentration, marginally above the LoD, PAHs are not considered to pose a significant risk to controlled waters.

12.5.62 Leachate analysis for aromatic and aliphatic hydrocarbons in BHA02 indicates that no detectable concentrations are present within the soils at this location. The LoD for total TPH is above the DWS of 10 µg/l (15 µg/l). However, as no detectable concentrations have been identified (all results are below the LoD) it is not considered that it poses a risk to controlled waters. One sample, taken from TPA01 at 0.20m bgl, was analysed for total TPH only (C_6-C_40). The concentration recorded (1166µg/l) significantly exceeds both the DWS and freshwater EQS Tier 1 screening values, indicating that this contamination within TPA01 poses a potential leachable risk to controlled waters. However, the results of soil analysis undertaken on the same sample from TPA01 at 0.2m bgl yielded no TPH above the LoD (10mg/kg), and no visual or olfactory evidence of contamination were noted within the sampled
horizon (logs provided within Appendix B of the SSL report (Ref. 12.52) (Appendix 12B).

12.5.63 LoD values for total mercury (LoD 0.1µg/l) and cadmium (LoD 1µg/l) also exceed one or more of the relevant screening criteria, however, in the absence of any concentrations of these contaminants above the LoD it is not considered that they pose a risk to controlled waters.

12.5.64 Leachate analysis for BTEX was scheduled on one sample. No leachable concentrations of BTEX were identified in exceedence of the laboratory limit of detection (1µg/l).

12.5.65 No detectable concentrations of pesticides and herbicides were detected during leachate analysis. It is therefore not considered that these pose a risk to controlled waters.

12.5.66 With the exception of the localised hotspot of hydrocarbon contamination in the vicinity if TPA01 (location is presented in Appendix A of the SSL report (Ref. 12.52) (Appendix 12B)), no other mobile contaminant soil source term has been identified within the exploratory holes advanced during the intrusive investigations. General contaminant concentrations within soils on-site do not indicate the presence of gross contamination or a significant potential source of leachable contamination.

12.5.67 The exception to this is the localised hotspot of hydrocarbon contamination at TPA01 where leachate analysis results indicate that hydrocarbons pose a moderate leachable risk to controlled waters. However, this sample was taken from TPA01 at 0.2m bgl and as such the hotspot is likely to be restricted to a shallow depth and is potentially caused by a small leak from agricultural machinery. As this is thought to be a highly localised hotspot the overall risk to controlled waters is low.

**Ground Gas**

12.5.68 According to current BGS data (Appendix 12A), the site is not located within an area where full or basic measures with regards to radon should be installed within new buildings.

12.5.69 On completion of the intrusive investigations detailed within Section 12.5, three 50mm gas and groundwater monitoring standpipes were installed to between 3.0 and 5.0m bgl. Details of the installation are presented on the logs, BHA04, BHA07 and BH08A, in Appendix B of the SSL factual report (Ref. 12.52) (Appendix 12B).

12.5.70 Ground gas monitoring was undertaken by SSL over three weekly monitoring rounds. Readings were undertaken each round over a three minute period. The results are summarised in Table 12.8. All monitoring results along with temporal conditions are presented within Appendix E of the SSL factual report (Ref. 12.52) (Appendix 12B).
## Table 12.8: Summary of Ground Gas Monitoring on the Site

<table>
<thead>
<tr>
<th>Borehole</th>
<th>Borehole Pressure (mb)</th>
<th>Atmospheric Pressure (mb)</th>
<th>Gas Flow (l/hr)</th>
<th>Water Depth (m bgl)</th>
<th>Carbon Dioxide (% vol.)</th>
<th>Methane (% vol.)</th>
<th>Oxygen (% vol.)</th>
<th>Carbon Monoxide (ppm)</th>
<th>Hydrogen Sulphide (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHA04</td>
<td>997-1019</td>
<td>997-1162</td>
<td>-6.1-22.0 (I)</td>
<td>1.07-1.08</td>
<td>&lt;0.1-0.8</td>
<td>0.0</td>
<td>20.0-20.8</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.1 (SS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHA07</td>
<td>996-1019</td>
<td>996-1019</td>
<td>&lt;0.1 (I)</td>
<td>1.56-1.58</td>
<td>&lt;0.1-1.6</td>
<td>0.0</td>
<td>17.5-20.8</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.1 (SS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHA08</td>
<td>996-1019</td>
<td>996-1019</td>
<td>&lt;0.1 (I)</td>
<td>1.31-1.32</td>
<td>&lt;0.1-0.5</td>
<td>0.0</td>
<td>18.1-20.8</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.1 (SS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(I) Initial reading

(SS) Steady state reading
12.5.71 No elevated concentrations have been recorded in any of the boreholes and steady state flow rates are negligible.

12.5.72 Based on the information obtained by SSL (Ref. 12.52) (Appendix 12B), the historical and current land use of the site, and that no Made Ground was encountered during the intrusive investigation, it is considered that the risk posed by ground gas is very low.

12.5.73 Although the site is located within 75m of a historical landfill (Appendix 12A), landfill records indicate that the site accepted soil, subsoil and naturally occurring excavated materials only. As no gas generating materials were deposited at this location it is not expected that there is a ground gas risk posed to the site from the landfill. The information obtained by SSL (Ref. 12.52) (Appendix 12B) confirms that the site is not affected by the presence of this landfill.

12.5.74 Given the proposed end use of the site, no special precautions or gas protection measures are required to protect the end users.

### iii. Groundwater

**Hydrology**

12.5.75 The Cannington Brook flows to the north-west of the site. A Flood Relief Channel flows along the western and eastern boundaries of the site.

12.5.76 Details of the hydrology of the development site are described in Chapter 13 of this volume.

**Aquifers and Aquifer Characteristics**

12.5.77 The Environment Agency has classified the Mercia Mudstone Group (MMG) underlying the site as a Secondary B Aquifer. The lower horizons (which comprise sandy silts) are typically considered to be in hydraulic conductivity with the underlying Otter Sandstone and pumping tests generally yield low quantities of water (0.1 to 1.5 litres per second). However, the MMG deposits identified within the site are not considered to be consistent with the lower horizon deposits of the MMG (sandy silt), comprising primarily mudstone with rare siltstone. Mudstone deposits were proven on-site to a depth of at least 10.0m bgl which was the maximum depth of exploratory works (BHA07), and to a greater depth approximately 100m to the west of the site (BGS borehole ST23/NE/17, which recorded MMG deposits to approximately 25.6m bgl). As such the underlying MMG deposits are not likely to be in hydraulic continuity with the underlying Otter Sandstone. The thin band of Alluvium, associated with the Cannington Brook, north of the site, has been classified as a Secondary A Aquifer.

12.5.78 The main hydro-geological significance of the MMG is that it functions as an aquitard that confines the regionally important Sherwood Sandstone (Permo-Triassic) aquifer. The permeability of the group will be influenced by the extent of weathering and the number of fissures present. The occurrence of groundwater is unpredictable and permeability is generally dominated by fractures.
Groundwater Levels and Flows

12.5.79 Based on the observed topography of the site and surrounding area (walkover undertaken 12 October 2009, Ref: 12.53), it would be reasonable to assume that, with the Cannington Brook to the north of the development site and an associated Flood Relief Channel on the north-western boundary of the development site, water levels would be within 2.0m or less of the existing ground surface.

12.5.80 On completion of the intrusive investigations previously described in this chapter, three 50mm gas and groundwater monitoring standpipes were installed to between 3.0 and 5.0m bgl. Details of the installation are presented on the logs, BHA04, BHA07 and BH08A, in Appendix B of the SSL factual report (Ref. 12.52) (Appendix 12B). The response zone of all three targeted the superficial deposits and very shallow weathered clays associated with the MMG. Groundwater levels monitored over the same three week period as the gas monitoring programme indicate levels vary from 1.07m to 1.58m bgl.

12.5.81 During drilling, water strikes were encountered at depths ranging from 1.2 to 4.7m bgl. Where the deeper water strike was noted at 4.7m bgl within BHA08 (for location see Appendix A within the SSL report (Ref. 12.52) (Appendix 12B), the water rose to 1.3m bgl within 30 minutes.

12.5.82 Water strikes during drilling and the levels monitored subsequently indicate that the resting groundwater level is as expected based on the location of Cannington Brook and the low lying topography of the immediate area.

12.5.83 There are two BGS boreholes within 150m of the site. Borehole Reference ST23/NE/1 recorded a shallow water strike at 1.7m bgl (i.e. within the Tidal Flat Deposits associated with the Cannington Brook). Two small water strikes were recorded within the MMG but standing water, (i.e. groundwater) was not recorded. Borehole Reference ST23/NE/17 did not record any water strike, although standing water was recorded at 3.3m bgl.

12.5.84 There is no existing information for the study area relating to groundwater flows.

12.5.85 The groundwater flow within the superficial alluvium deposits north of the site boundary is likely to be towards the nearby River Parrett (i.e. an easterly groundwater flow). The direction of groundwater flow within the MMG is uncertain.

Groundwater Use

12.5.86 The closest Source Protection Zone (Inner Zone) is located approximately 7.5km to the west of the site.

12.5.87 There are four groundwater abstraction licences within the study area. These do not lie within a currently defined Source Protection Zone (Inner Zone, Outer Zone or Total Catchment). The details of the abstraction licences are supplied below in Table 12.9. The abstractions are for spray irrigation and dairies (general use).
Table 12.9: Groundwater Abstraction Licences Within 1km Radius of the Site

<table>
<thead>
<tr>
<th>Operator</th>
<th>Licence No.</th>
<th>National Reference</th>
<th>Grid</th>
<th>Distance From Site (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgwater College (Cannington Campus)</td>
<td>16/52/007/G/043</td>
<td>325830 139610</td>
<td></td>
<td>500 (north-east)</td>
</tr>
<tr>
<td>Yeo Valley Farms Ltd</td>
<td>16/52/007/G/081 (A)</td>
<td>324820 138930</td>
<td></td>
<td>550 (south-west)</td>
</tr>
<tr>
<td>Bridgwater College (Cannington Campus)</td>
<td>16/52/007/G/043</td>
<td>326190 139630</td>
<td></td>
<td>550 (north-east)</td>
</tr>
<tr>
<td>Yeo Valley Farms Ltd</td>
<td>16/52/007/G/081 (B)</td>
<td>324740 138870</td>
<td></td>
<td>620 (south-west)</td>
</tr>
</tbody>
</table>

12.5.88 Given the distance to Yeo Valley Farm (550m to the south-west) and the anticipated direction of shallow groundwater flow to the north-east, it is not anticipated that the proposed development would impact the water supply for the farm.

12.5.89 There are no records of private abstraction boreholes within the study area.

**Groundwater Chemistry**

12.5.90 On completion of the intrusive investigations, one set of groundwater samples was taken from the three boreholes installed to a depth of 5.0m bgl. Details of the installation are presented on the logs, BHA04, BHA07 and BH08A, in Appendix B of the SSL factual report (Ref. 12.52) (Appendix 12B).

12.5.91 The groundwater samples were analysed for metals and metalloids, pH, speciated TPH, BTEX, OCP and OPP pesticides and atrazine and simazine herbicides.

12.5.92 A Tier 1 assessment of the analysis results has been undertaken which has involved the comparison of groundwater samples concentrations against relevant screening values.

**Tier 1 Assessment Methodology**

12.5.93 A potential pollutant linkage is anticipated to exist between the shallow groundwater and the surface water systems present on and adjacent to the site. These include the Flood Relief Channel running adjacent to the north-western boundary of the development site and Cannington Brook (both freshwater receptors).

12.5.94 The concentrations recorded in the groundwater samples have been compared to the UK Drinking Water Standards (DWS) (Ref. 12.77) and Transitional and Coastal Waters/Other Surface Waters and Freshwater Environmental Quality Standards (EQS) published in ‘The River Basin Districts Typology, Standards and Groundwater Threshold Values (WFD) (England and Wales) Directions 2010’ (Ref. 12.10).

12.5.95 The freshwater EQSs utilised in the assessment are based on the water body status objective for Cannington Brook reaching and maintaining a ‘good’ status by 2015 as stated in Appendix B of the River Basin Management Plan for the South West River Basin District (Ref. 12.78).
12.5.96 The freshwater EQS values for the Protection of other Aquatic Life (e.g. salmonid fish) have been used based on the National Environmental Quality Standards – for List II substances (Ref. 12.10). The River Basin Management Plan South West River Basin District, Annex D (Ref. 12.78) details Cannington Brook as supporting salmonid fish.

12.5.97 The transitional and coastal waters/other surface waters EQS values have been selected based on the water body status objectives for the Bridgwater Bay coastal waters established under the WFD and the River Basin Management Plan (Ref. 12.78). The objective set for Bridgwater Bay is to achieve good ecological status by 2027.

12.5.98 Where no EQS values exist for certain contaminants, the EQS values which were available prior to the publication of the 2010 Directions (Ref. 12.10) have been used. In the absence of UK standards for certain parameters, other published guideline concentrations such as the EQS values for Groundwater Drinking Water Protected Areas specified in the 2010 Directions (Ref. 12.10) and those recommended by the World Health Organisation (WHO) for drinking water (2004) have been adopted. This approach will essentially provide a conservative Tier 1 assessment.

12.5.99 The study area does not lie within a Groundwater Drinking Water Protected Area and as a consequence the water body status objectives (for groundwater impacts on surface waters in accordance with Part 7 of the WFD (Ref. 12.2)) have not been specified for the aquifer underlying the study area. Therefore, the EQS values are based on those relating to values of ‘good’ standard for freshwater rivers (Part 4 specific pollutants).

12.5.100 Where appropriate, the relevant freshwater EQS values have been adjusted to account for site specific conditions (i.e. hardness and alkalinity). The following provides details relating site specific EQS:

- The freshwater EQS for copper is based on freshwater receptors containing an annual mean concentration of calcium carbonate (alkalinity) of greater than 100 and less than 200mg/l CaCO$_3$ based on the last reported hardness of Cannington Brook at the Blackmoor Farm monitoring point (2003) according to the Environment Agency.

- The EQS for cadmium is based on the freshwater receptors being classed as Class 4 due to the hardness value being greater than 100mg/l and less than 200mg/l CaCO$_3$.

- The EQS for total zinc is based on the corresponding value for freshwater receptors containing an annual mean hardness concentration of greater than 100mg/l and less than 250mg/l CaCO$_3$.

12.5.101 Where no EQS value (transitional and coastal waters/other surface waters or freshwater) exists in the WFD (Ref. 12.10), the previous EQS values (i.e. pre-WFD) have been used as screening criteria.

12.5.102 As there is currently no drinking water standard for petroleum hydrocarbons, the value of 10µg/l, which was previously provided in the 1989 version of the Water
Supply Regulations has been used. Furthermore, in lieu of any fresh/saline water EQS standards for petroleum hydrocarbons, the value of 50ug/l for DW1 treatment from the Surface Water (Abstraction for Drinking Water) (Classification) Regulations 1996 has also been adopted.

12.5.103 A summary of the results of the analysis are presented within Table 12.11 below.
Table 12.10: Summary of Groundwater Analysis Results

<table>
<thead>
<tr>
<th>Determinand</th>
<th>Range of Concentrations (µg/l Unless Stated)</th>
<th>Number of Samples</th>
<th>Drinking Water Standard (DWS)</th>
<th>Exceedences of DWS</th>
<th>Environmental Quality Standard (EQS) Transitional and Coastal Waters/Other Surface Waters</th>
<th>Exceedences of EQS Transitional and Coastal Waters/Other Surface Waters</th>
<th>Environmental Quality Standard Freshwater</th>
<th>Exceedence of EQS Freshwater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved Arsenic</td>
<td>&lt;1-7</td>
<td>3</td>
<td>10^T</td>
<td>0</td>
<td>25 3 A GC</td>
<td>3 + LOD / 0</td>
<td>50 3 A/G15</td>
<td>0</td>
</tr>
<tr>
<td>Dissolved Cadmium</td>
<td>&lt;1</td>
<td>3</td>
<td>5^T</td>
<td>0</td>
<td>0.2 3A 1.5 3 MAC</td>
<td>0.15 3 A/C4 1.5 3 MAC</td>
<td>3 * LOD / 0</td>
<td>0</td>
</tr>
<tr>
<td>Dissolved Chromium</td>
<td>&lt;1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>15 2 AD</td>
<td>0</td>
<td>50 2 AD</td>
<td>0</td>
</tr>
<tr>
<td>Dissolved Lead</td>
<td>&lt;1</td>
<td>3</td>
<td>25^T</td>
<td>0</td>
<td>7.2 3 A</td>
<td>0</td>
<td>7.2 3 A</td>
<td>0</td>
</tr>
<tr>
<td>Dissolved Mercury</td>
<td>&lt;0.1-0.1</td>
<td>3</td>
<td>1^T</td>
<td>0</td>
<td>0.05 3 A/0.07 MAC</td>
<td>0.05 3 A/0.07 3 MAC</td>
<td>1 (3 * LOD / 1 (3 * LOD))</td>
<td>1 (3 * LOD / 1 (3 * LOD))</td>
</tr>
<tr>
<td>Dissolved Copper</td>
<td>&lt;1-3</td>
<td>3</td>
<td>2000^T</td>
<td>0</td>
<td>5 3 A GC</td>
<td>0</td>
<td>10 3 A G15#</td>
<td>0</td>
</tr>
<tr>
<td>Dissolved Nickel</td>
<td>&lt;1-2</td>
<td>3</td>
<td>20^T</td>
<td>0</td>
<td>20 3 A</td>
<td>0</td>
<td>20 3 A</td>
<td>0</td>
</tr>
<tr>
<td>Dissolved Iron</td>
<td>&lt;10-13</td>
<td>3</td>
<td>-</td>
<td>0</td>
<td>1000 3 AD</td>
<td>0</td>
<td>1000 3 AD</td>
<td>0</td>
</tr>
<tr>
<td>Dissolved Zinc</td>
<td>&lt;1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>40 3 A GC</td>
<td>0</td>
<td>75 3 A T #G15</td>
<td>0</td>
</tr>
<tr>
<td>Dissolved Vanadium</td>
<td>&lt;1-2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>100 2 AT</td>
<td>0</td>
<td>60 2 A#</td>
<td>0</td>
</tr>
<tr>
<td>pH (pH units)</td>
<td>7.6-8.0</td>
<td>3</td>
<td>6.5-9.5^1</td>
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<td>6-8.5 2 P</td>
<td>0</td>
<td>6 3 (P5)H</td>
<td>0</td>
</tr>
<tr>
<td>Ammoniacal Nitrogen</td>
<td>&lt;0.1</td>
<td>3</td>
<td>0.29 3 P DPA</td>
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<td>-</td>
<td>-</td>
<td>0.6 9D 3 T7 G15</td>
<td>0</td>
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<tr>
<td>Naphthalene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>1.2 3 A</td>
<td>0</td>
<td>2.4 3 A</td>
<td>0</td>
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<tr>
<td>Acenaphthylene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Acenaphthene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Determinand</td>
<td>Range of Concentrations (µg/l)</td>
<td>Number of Samples</td>
<td>Drinking Water Standard (DWS)</td>
<td>Exceedences of DWS</td>
<td>Exceedences of EQS Transitional and Coastal Waters/Other Surface Waters</td>
<td>Exceedences of EQS Transitional and Coastal Waters/Other Surface Waters</td>
<td>Environmental Quality Standard Freshwater</td>
<td>Exceedence of EQS Freshwater</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------</td>
<td>-------------------</td>
<td>-------------------------------</td>
<td>-------------------</td>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Fluorene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Phenanthrene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Anthracene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>0.1 A/0.4 MAC</td>
<td>0</td>
<td>0</td>
<td>0.1 A/0.4 MAC</td>
<td>0</td>
</tr>
<tr>
<td>Fluoranthene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>0.1 3 A/1 3 MAC</td>
<td>0</td>
<td>0</td>
<td>0.1 3 A/1 3 MAC</td>
<td>0</td>
</tr>
<tr>
<td>Pyrene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Benzo(a)anthracene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chrysene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Benzo(b)fluoranthene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>0.1 1 AAA</td>
<td>0</td>
<td>Σ0.03 3 A</td>
<td>0</td>
<td>Σ0.03 3 A</td>
<td>0</td>
</tr>
<tr>
<td>Benzo(k)fluoranthene</td>
<td>&lt;0.01-0.02</td>
<td>3</td>
<td>0.1 1 AAA</td>
<td>0</td>
<td>Σ0.003 3 A</td>
<td>0</td>
<td>Σ0.003 3 A</td>
<td>0</td>
</tr>
<tr>
<td>Benzo (a) Pyrene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>0.01</td>
<td>0</td>
<td>0.05 3 A/0.1 3 MAC</td>
<td>0</td>
<td>0.05 3 A/0.1 3 MAC</td>
<td>0</td>
</tr>
<tr>
<td>Indeno(1,2,3-cd)pyrene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>0.1 1 AAA</td>
<td>0</td>
<td>Σ0.002 3 A</td>
<td>3 LOD</td>
<td>Σ0.002 3 A</td>
<td>3 LOD</td>
</tr>
<tr>
<td>Benzo(ghi)perylene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>0.1 1 AAA</td>
<td>0</td>
<td>Σ0.002 3 A</td>
<td>3 LOD</td>
<td>Σ0.002 3 A</td>
<td>3 LOD</td>
</tr>
<tr>
<td>Dibenzo(a,h)anthracene</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Banded TPH:</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C6-C8</td>
<td>&lt;50</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;C8-C10</td>
<td>&lt;50</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>&gt;C10-C12</td>
<td>&lt;50</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>&gt;C12-C16</td>
<td>&lt;50</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;C16-C21</td>
<td>&lt;50</td>
<td>3</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<tr>
<td>Determinand</td>
<td>Range of Concentrations (µg/l Unless Stated)</td>
<td>Number of Samples</td>
<td>Drinking Water Standard (DWS)</td>
<td>Exceedences of DWS</td>
<td>Environmental Quality Standard (EQS) Transitional and Coastal Waters/Other Surface Waters</td>
<td>Exceedences of EQS Transitional and Coastal Waters/Other Surface Waters</td>
<td>Environmental Quality Standard Freshwater</td>
<td>Exceedence of Freshwater</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;C₂₁–C₄₀</td>
<td>&lt;50</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TPH (C₆ – C₄₀)</td>
<td>&lt;50</td>
<td>3</td>
<td>10⁴</td>
<td>3* LOD</td>
<td>-</td>
<td>-</td>
<td>50 A³</td>
<td>-</td>
</tr>
<tr>
<td>Benzene</td>
<td>&lt;1/&lt;5</td>
<td>3</td>
<td>1¹</td>
<td>1* LOD</td>
<td>8 A³</td>
<td>0</td>
<td>10 A³</td>
<td></td>
</tr>
<tr>
<td>Toluene</td>
<td>&lt;1/&lt;5</td>
<td>3</td>
<td>-</td>
<td>3* LOD</td>
<td>40 A³/370 P³</td>
<td>0</td>
<td>50 A³ G15/380 G₁5 P₁</td>
<td></td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>&lt;1/&lt;5</td>
<td>3</td>
<td>-</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>M &amp; P- Xylene</td>
<td>&lt;1/&lt;5</td>
<td>3</td>
<td>-</td>
<td></td>
<td>Σ30 A³ T³</td>
<td>0</td>
<td>Σ30 A³ T³</td>
<td></td>
</tr>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MTBE</td>
<td>&lt;1/&lt;5</td>
<td>3</td>
<td>-</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Atrazine</td>
<td>&lt;1</td>
<td>3</td>
<td>-</td>
<td></td>
<td>0.6 A³/2 A³ MAC</td>
<td>3* LOD / 0</td>
<td>0.6 A³/2 A³ MAC</td>
<td>3* LOD / 0</td>
</tr>
<tr>
<td>Simazine</td>
<td>&lt;1</td>
<td>3</td>
<td>-</td>
<td></td>
<td>1 A³/4 A³ MAC</td>
<td>0</td>
<td>1 A³/4 A³ MAC</td>
<td>0</td>
</tr>
<tr>
<td>Dichlorvos</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td></td>
<td>0.04 A³</td>
<td>0</td>
<td>0.001 A³</td>
<td>3* LOD</td>
</tr>
<tr>
<td>Malathion</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td></td>
<td>0.02 A³</td>
<td>0</td>
<td>0.01 A³</td>
<td>0</td>
</tr>
<tr>
<td>Fenitrothion</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td></td>
<td>0.01 A³</td>
<td>0</td>
<td>0.01 A³</td>
<td>0</td>
</tr>
<tr>
<td>Alpha-Hexachlorocyclohexane</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td></td>
<td>0.002 A³/0.02 A³ MAC</td>
<td>3* LOD / 0</td>
<td>0.02 A³/0.04 A³ MAC</td>
<td>0</td>
</tr>
<tr>
<td>Beta-Hexachlorocyclohexane</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td></td>
<td>0.002 A³/0.02 A³ MAC</td>
<td>3* LOD / 0</td>
<td>0.02 A³/0.04 A³ MAC</td>
<td>0</td>
</tr>
<tr>
<td>Gamma-Hexachlorocyclohexane</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td></td>
<td>0.002 A³/0.02 A³ MAC</td>
<td>3* LOD / 0</td>
<td>0.02 A³/0.04 A³ MAC</td>
<td>0</td>
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<tr>
<td>Endosulphan I</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td></td>
<td>0.0005 A³/0.004</td>
<td>3* LOD / 3* LOD</td>
<td>0.005 A³/0.01 A³</td>
<td>3* LOD / 0</td>
</tr>
<tr>
<td>Determinand</td>
<td>Range of Concentrations (µg/l Unless Stated)</td>
<td>Number of Samples</td>
<td>Drinking Water Standard (DWS)</td>
<td>Exceedences of DWS</td>
<td>Environmental Quality Standard (EQS) Transitional and Coastal Waters/Other Surface Waters</td>
<td>Exceedences of EQS Transitional and Coastal Waters/Other Surface Waters</td>
<td>Environmental Quality Standard Freshwater</td>
<td>Exceedence of EQS Freshwater</td>
</tr>
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</tr>
<tr>
<td>Endosulphan II</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>0.0005&lt;sup&gt;3 A&lt;/sup&gt;/0.004&lt;sup&gt;3 MAC&lt;/sup&gt;</td>
<td>3&lt;sup&gt;3 LOD&lt;/sup&gt;</td>
<td>0.005&lt;sup&gt;3 A&lt;/sup&gt;/0.01&lt;sup&gt;3 MAC&lt;/sup&gt;</td>
<td>3&lt;sup&gt;3 LOD&lt;/sup&gt;</td>
</tr>
<tr>
<td>p,p-DDT</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>0.01&lt;sup&gt;3 A&lt;/sup&gt;</td>
<td>0</td>
<td>0.01&lt;sup&gt;3 A&lt;/sup&gt;</td>
<td>0</td>
</tr>
<tr>
<td>Aldrin</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dieldrin</td>
<td>&lt;0.01</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>Σ0.005&lt;sup&gt;3 A&lt;/sup&gt;</td>
<td>3&lt;sup&gt;3 LOD&lt;/sup&gt;</td>
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</tr>
<tr>
<td>Endrin</td>
<td>&lt;0.01</td>
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<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If no value is presented in bold then no samples exceeded the screening criteria.

# Corrected based on the hardness of Cannington Brook at the Blackmoor Farm monitoring point in 2003 as provided by the Environment Agency.

- No current threshold value available.

DPA River Basin Districts Typology, Standards and Groundwater threshold values (WFD) (England and Wales) Directions 2010 Part 7 Groundwater Threshold Values for Groundwater Drinking Water Protected Areas.

D Dissolved
T Total
A Annual Average
P 95-percentile (defined as a standard that is failed if the measured value of the parameter to which the standard refers (e.g. concentration of a pollutant) is greater than the standard for 5% of the time or more).
P90 90-percentile (defined as a standard that is failed if the measured value of the parameter to which the standard refers (e.g. concentration of a pollutant) is greater than the standard for 10% of the time or more).
P5 5-percentile (defined as a standard that is failed if the measured value of the parameter to which the standard refers (e.g. concentration of a pollutant) is less than the standard for 5% of the time or more).
MAC Maximum Allowable Concentration
C4 Cadmium EQS based on class 4 hardness (100 to <200 mg/l CaCO₃), corrected based on the hardness of Cannington Brook at the Blackmoor Farm monitoring point in 2003 as provided by the Environment Agency..
GC Threshold value based on 'good standard' for transitional and coastal waters to meet objective of WFD for Bridgwater Bay to achieve good ecological status by 2027 (no chemical criteria target thresholds specified).
G15  Threshold value based on 'good standard' to meet objective of WFD for Cannington Brook to achieve good status by 2015

As  Threshold value assumed to be total concentration as not defined in the directive and based on percentage of current DWS values.

H  Threshold value for high standard based on current WFD Status

* LOD  Exceedences of the annual average EQS have occurred due to the limit of detection (LOD) not being low enough. This is a consequence of the current methodologies of analysis for these parameters. However, these 'exceedences' are not considered to be environmentally significant.

^  Guideline Value – Non statutory/proposed EQS, but EQS never adopted in UK

^^  The parametric value applies to the sum of the concentrations of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene detected and quantified in the monitoring process.

^^^  The individual concentrations are based on the 0.1 µg/l quoted for the sum of the four PAH compounds. By virtue of the total Tier 1 concentration being reported as 0.1 µg/l the Tier 1 concentration for each individual compound has been applied at this value.

1. The Water Supply (Water Quality) Regulations 2000
3. The River Basin Districts Typology, Standards and Groundwater threshold values (WFD) (England and Wales) Directions 2010
4. The Water Supply (Water Quality) Regulations 1989. N.B These Regulations were superseded by the 2000 regulations therefore there is currently no UK DWS for zinc and/or Total Petroleum Hydrocarbons.
5. The Surface Waters (Abstraction) for Drinking Water (Classification) Regulations 1996. DW1 treatment (i.e. simple physical treatment and disinfection) limit.
6. The Surface Waters (Dangerous Substances) (Classification) Regulations 1998.
12.5.104 The analytical results indicate that there are no contaminants above any of the Tier 1 screening criteria with the exception of one sample for mercury. As this sample recorded a concentration at the detectable limit (0.1µg/l) it is not considered to be significant and therefore does not pose a risk to controlled waters.

12.5.105 However, the laboratory limit of detection (LoD) is greater than one or more of the Tier 1 screening criteria for the following contaminants:

- dissolved cadmium (freshwater and transitional and coastal waters/other surface waters annual average EQS);
- dissolved mercury (freshwater and transitional and coastal waters/other surface waters EQS);
- indeno(1,2,3-cd)pyrene and benzo(g,h,i)perylene (the LoD for these contaminants individually exceeds the freshwater and transitional and coastal waters/other surface waters EQS for both);
- benzene (drinking water standard);
- atrazine (freshwater and transitional and coastal waters/other surface waters annual average EQS);
- dichlorvos (freshwater annual average EQS);
- alpha-hexachlorocyclohexane (coastal waters/other surface waters annual average EQS);
- beta-hexachlorocyclohexane (coastal waters/other surface waters annual average EQS);
- gamma-hexachlorocyclohexane (coastal waters/other surface waters annual average EQS);
- endosulphan I (freshwater and transitional and coastal waters/other surface waters annual average EQS, transitional and coastal waters/other surface waters maximum allowable concentration EQS);
- endosulphan II (freshwater and transitional and coastal waters/other surface waters annual average EQS, transitional and coastal waters/other surface waters maximum allowable concentration EQS);
- aldrin (coastal waters/other surface waters annual average EQS);
- dieldrin (coastal waters/other surface waters annual average EQS); and
- endrin (coastal waters/other surface waters annual average EQS).

12.5.106 Where the LoD represents a greater concentration than a relevant Tier 1 groundwater screening criterion, the contaminant is not considered to be environmentally significant as there is no positive confirmation of the presence of the contaminant.

12.5.107 No detectable concentrations of pesticides and herbicides were detected during groundwater analysis.
12.5.108 As no source of contamination has been identified, the groundwater on-site is not considered to pose a risk to either human health, or surface water courses close to the site.

**iv. Conceptual Site Model**

12.5.109 Following a review of the above information, a CSM has been produced to identify potential risks posed to human health and other receptors by soil and groundwater contamination that may be present on and adjacent to the site. A description of the identified and potential sources, pathways and receptors (targets) is provided below.

**Potential Sources of Contamination**

12.5.110 The environmental baseline information has shown that the site has remained undeveloped with no significant historical contaminative land uses.

12.5.111 The environmental baseline information has identified the presence of a historical landfill (Field No. 8191, Manor Farm) located approximately 40m to the south of the site. The landfill is believed to have received soil, subsoil and naturally occurring excavated material, including inert waste. All other wastes were prohibited. The landfill operations are believed to have ceased in 1993 (information provided within the Envirocheck report, Appendix 12A). The landfill site would not be impacted by the proposed works and, given its distance from the site, the landfill is not considered to present a potential source of contamination for the proposed development (i.e. no gas risk).

12.5.112 Concentrations of contaminants within soils on the site are all below the Tier 1 criteria for human health and phytotoxicity, based on a commercial and industrial end use.

12.5.113 One sample marginally exceeded the Tier 1 screening criteria for the built environment, however the risk posed to the built development is considered to be very low.

12.5.114 Concentrations of some heavy metals were recorded above the Stage 1 ecological screening criteria, however, these are consistent with Stage 2 natural background concentrations. One sample analysed for selenium marginally exceeded the background concentration. This is a marginal exceedence and therefore the ecological risk is considered to be very low.

12.5.115 The Phase 1 (Ref.12.79) and Phase 2 (Ref.12.52) investigations have indicated that the likelihood of significant soil contamination being present on the site is ‘unlikely’. Desk study information together with the proven physical extent indicates that contamination on the site is likely to be very limited and localised. Therefore the magnitude of land contamination on the site is considered to be ‘very low’.

12.5.116 The data from the ground gas monitoring indicates that there is no significant sustained source of ground gas on the site. There is therefore no significant risk posed to human health or buildings by ground gas given its current land use.

12.5.117 Concentrations of contaminants within the groundwater underlying the site were all below the Tier 1 screening values. On the basis of this assessment, the likelihood of
significant groundwater contamination being present on the site is currently assessed as ‘unlikely’ and the potential magnitude of groundwater contamination is considered to be ‘very low’.

**Potential New Sources of Contamination during Construction/Operation**

12.5.118 During the proposed works, ‘new’ potential sources of contamination (which is intended to be indicative and is not exhaustive) could be present, such as those associated with:

- the contractor’s compound (e.g. oil tanks/generators);
- wheel washing facilities;
- fuel and storage areas for plant and generators;
- plant and machinery;
- temporary and permanent spoil stockpiles; and
- excavated, reused soils and fills (should these be contaminated).

**Potential Pathways and Exposure Mechanisms**

12.5.119 The following potential pathways/exposure mechanisms (which is intended to be indicative and is not exhaustive) may exist on-site during the proposed construction works, operational phase and post-operational phase works. The pathways identified with an asterisk are not considered to be active during the operational phase, as the site would be generally covered with hard standing, and no works involving ground disturbance would take place:

- Human uptake pathways (derived from the CLEA model for commercial/industrial landuse);
  - ingestion of soil*;
  - ingestion of outdoor dust*;
  - dermal contact with soil*;
  - contact with outdoor dust*;
  - inhalation of vapours outside; and
  - inhalation of vapour inside.
- direct contact with and/or ingestion of soils;
- inhalation of gases and vapours;
- infiltration and leaching through areas of exposed soil and bedrock*;
- windborne transport of soil and dust from areas of exposed soils and rock;
- root uptake by plants and trees on the site;
- ingestion, inhalation, dermal contact by ecological fauna;
- predation/bioaccumulation by ecological fauna;
- migration of contamination via permeable soils and bedrock*;
- migration via man made conduits (pipes, sewers, service trenches etc.);
- migration via groundwater flow; and
- surface water run-off (see Chapter 13 of this volume).

12.5.120 The following activities (which are intended to be indicative and is not exhaustive) may create and/or introduce new pathways and/or disturb and mobilise contamination during the construction and post-operational phase works:

- excavation and filling operations particularly using granular and permeable soils and fills (construction phase only);
- general earthworks/re-grading (construction phase only); and
- installation (construction phase) and removal (post-operational phase) of drainage network.

**Potential Receptors and Identified Value and Sensitivity**

12.5.121 The following are considered to be potential receptors for soil contamination during the proposed development works and operation of the site:

- humans (on-site – construction and maintenance workers, and end users of the proposed development);
- humans (off-site – users of local footpaths and local residents);
- controlled waters (i.e. groundwater (see below) and terrestrial surface water (See Chapter 13 of this volume));
- crops and livestock (for details of value and sensitivity see Chapter 11 of this volume);
- terrestrial ecological systems including plants, trees and other vegetation (excluding crops). For details of value and sensitivity see Chapter 14 of this volume;
- built environment (i.e. construction materials); and
- soil environment.
12.5.122 On-site humans (i.e. construction workers): Construction workers are considered to have high value and sensitivity to contaminants. However, health, safety and environmental legal requirements, and good practices which would be adopted specifically those relating to the use of appropriate personal protective equipment (PPE) and hygiene, would reduce this. Therefore, the overall rating for value and sensitivity of on-site humans is considered to be low, as possible exposure to land contamination should be prevented or minimised through normal good practice.

12.5.123 On-site humans (i.e. users of the proposed development): On-site end users are considered to have high value and sensitivity to contaminants, and would not necessarily adopt PPE and hygiene practices (as would construction and maintenance workers) which would reduce potential exposure.

12.5.124 Off-site humans (i.e. users of local footpaths and local residents): Off-site humans are considered to be of high value and sensitivity as they would not be using appropriate PPE and are clearly of high intrinsic value.

12.5.125 Potential risks posed to on and off-site plants, trees, crops and livestock. This is primarily through phytotoxic/toxic effects from exposure to soil and/or groundwater contamination. For the purposes of this ES, the value and sensitivity for crops and livestock has been based on the agricultural land classification (ALC) as detailed in Chapter 11 of this volume.

12.5.126 Potential risks posed to terrestrial ecological systems (flora and fauna) from direct pathways such as ingestion, inhalation and direct contact with soil and/or groundwater contamination but also indirectly through predation and bioaccumulation of contamination. The assessment of the value and sensitivity of ecological receptors on-site and off-site has been determined on the basis of the findings of the ecology chapter, Chapter 14 of this volume.

12.5.127 On-site soil environment: The value and sensitivity of the on-site uncontaminated soils is assessed as high, on the basis that the most valuable and sensitive soil which would be present at the site (i.e. existing soils proposed to be stockpiled at the site during the operational phase for subsequent re-use in the restoration of the site to agricultural use).

12.5.128 Off-site soil environment: The value and sensitivity of the off-site soil environment is assessed as high in adjacent areas, due to significant agricultural land use in the majority of the surrounding area.

12.5.129 On the basis of this assessment, the likelihood of significant soil contamination being present on the site is currently assessed as ‘unlikely’ and the risk of any contamination is considered to be ‘very low’. However, the potential for isolated areas of contamination related to previous agricultural activities (such as the isolated TPH noted during the site investigation) cannot be completely discounted.

12.5.130 Controlled waters (surface waters): Impacts to surface water on-site and off-site are discussed within (Chapter 13 of this volume).
12.5.131 Controlled waters (groundwaters): The primary receptor for groundwater contamination with respect to the works proposed is groundwater within the underlying MMG. The MMG at the site is classified as a Secondary B Aquifer and there are no abstraction boreholes located within 500m of the site. Although the lower horizons of the MMG are known to be in hydraulic continuity with the underlying Otter Sandstone Principal Aquifer, the exploratory works have demonstrated that the MMG deposits underlying the site do not exhibit the typical characteristics of these lower horizons. Therefore with respect to site itself, the MMG would also act as an aquitard, preventing groundwater migration into the deeper Otter Sandstone (Principal Aquifer). As a result groundwater sensitivity is considered to be very low (see Table 12.1); and the Yeo Valley Farms’ boreholes are considered to be at too great a distance from the site to be adversely impacted.

12.5.132 Geology: As the geology of the site does not lie within a SSSI, Local Geological Sites (formerly RIGS) or locally designated geological site, it is deemed that the geology of the study area can accommodate any minor changes as these would have no unacceptable effects to the character or value. The geology of the study area is therefore considered to be of very low importance.

12.5.133 Buried concrete structures and buried potable water services may be at risk from chemical attack by site soils and groundwater. The value and sensitivity of these receptors is assessed as ‘low’. The proposed development comprises the construction of car parking and internal roadway infrastructure, security and welfare buildings and associated services and ancillary infrastructure. The value of the development is therefore relatively low, as the structures to be built are not of such a contaminant or geotechnically sensitive nature (e.g. bridges, multi-storey buildings or tunnels).

12.5.134 Potential impacts to the environment (i.e. reduction in soil quality as a result of disturbance during the works rather than the impact of soil contamination) are described and assessed within the section relating to soils and land use (Chapter 11 of this volume).

12.5.135 A summary of the value and sensitivity of the receptors at the proposed development is provided in Table 12.11. Value and sensitivity of some receptors (e.g. ecology and plants, trees, crops and other vegetation) can range from very low to high. In accordance with other chapters in this volume, the most valuable and sensitive receptor has been used for the purposes of the impact assessment in order to make the overall impact assessment conservative in its approach.
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Value/Sensitivity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site (e.g. construction workers)</td>
<td>Low</td>
<td>Determined in relation to standard site working practices and procedures (including the application of appropriate PPE and hygiene standards) significantly reducing the risk of exposure to otherwise high sensitivity/value receptors.</td>
</tr>
<tr>
<td>Humans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site (i.e. development site end users)</td>
<td>High</td>
<td>Determined in relation to the absence of PPE and as such reduced protection against exposure to contamination.</td>
</tr>
<tr>
<td>Humans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-site</td>
<td>High</td>
<td>Determined in relation to the absence of PPE and as such reduced protection against exposure to contamination.</td>
</tr>
<tr>
<td>Soil Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site</td>
<td>High</td>
<td>Determined on the basis of the most valuable and sensitive soils to be present at the site (i.e. those to be used for agricultural restoration in the post-operational phase). Note that this value and sensitivity rating differs from that given in Chapter 11 of this volume, as the assessment therein is based on the effects of physical disturbance, not chemical contamination.</td>
</tr>
<tr>
<td>Soil Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-site</td>
<td>High</td>
<td>Determined on the basis of the use of the off-site soil environment (i.e. agricultural land use).</td>
</tr>
<tr>
<td>Crops and Livestock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site</td>
<td>High</td>
<td>Determined in relation to the ALC grade of the land and the fact that surrounding areas are permanent grassland for cattle grazing. Refer to Chapter 11 of this volume for more details on agricultural practices.</td>
</tr>
<tr>
<td>Crops and Livestock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-Site</td>
<td>High</td>
<td>Determined in relation to the ALC grade of the land and the fact that surrounding areas are permanent grassland for cattle grazing. Refer to Chapter 11 of this volume for more details on agricultural practices.</td>
</tr>
<tr>
<td>Ecological Systems (including plants, trees and other vegetation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-Site</td>
<td>Medium</td>
<td>Determined on the basis of the presence of significant vulnerable ecological systems (habitats or species). Refer to Chapter 14 of this volume for further details.</td>
</tr>
<tr>
<td>Ecological Systems (including plants, trees and other vegetation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-Site</td>
<td>Medium</td>
<td>Determined on the basis of the presence of significant vulnerable ecological systems (habitats or species). Refer to Chapter 14 of this volume for further details.</td>
</tr>
<tr>
<td>Buried Concrete Structures/Built Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site</td>
<td>Low</td>
<td>Determined in relation to the potential for soils and groundwater to cause chemical deterioration of buried concrete structures, and based on the worst case value and sensitivity (i.e. most conservative), relating to the concrete built environment.</td>
</tr>
<tr>
<td>Groundwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site and Off-site</td>
<td>Very low</td>
<td>Determined in relation to the Secondary B Aquifer present on the site.</td>
</tr>
<tr>
<td>Geology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site</td>
<td>Very low</td>
<td>Determined in relation to the lack of a geological designation on-site.</td>
</tr>
</tbody>
</table>
12.6 Assessment of Impacts

a) Introduction

12.6.1 The subject of this section is the potential impacts linked to geology, and the potential impacts to identified receptors that could result from the disturbance of contaminated soils and groundwater. Receptors that could be impacted include human health, groundwater, ecology, crops and livestock and the built and soil environments. Potential impacts to surface waters (terrestrial) are addressed in Chapter 13 of this volume.

12.6.2 Potential impacts to the soil environment, i.e. reduction in soil quality as a result of physical disturbance and handling during the works, are described and assessed within the soils and land use chapter (see Chapter 11 of this volume). However, the potential impacts to soils or impairment of soil functionality as a result of contamination (either existing or as a result of spillages and leakages from mechanised plant or equipment during the works have been assessed within this chapter.

i. Environmental Management and Protection Measures

12.6.3 The following impact assessment has been undertaken assuming that legislative compliance and the implementation of standard good practice working methods which are typically employed on UK development sites would be implemented. It should be noted that the application of minimum legislative requirements and standard good construction practices are not considered as formal mitigation (i.e. specific additional mitigation to reduce assessed moderate or major adverse impacts) for this ES.

12.6.4 Environmental impacts and disturbance arising from construction activities would be managed through a range of control measures and monitoring procedures, the principles of which are outlined in the Environmental Management and Monitoring Plan (EMMP) and Land Contamination Management Plan (LCMP).

12.6.5 Protection measures include those relating to the control of release of potentially contaminated materials into the environment from the original source location. Certain standard control measures which are typically applied on construction sites where substantive earthworks are undertaken are also effective at controlling the dispersion and creation of contamination.

12.6.6 The following impact assessment assumes legislative compliance and the implementation of standard good practice working methods which are typically employed on UK development sites.

12.6.7 Excavated materials are to be screened against acceptability criteria as they arise during the works and how their chemical and geotechnical suitability would be determined for re-use on the site. Procedures for the tracking and recording of the placement of different material types on-site would describe how any unforeseen ground conditions are to be addressed. Typical requirements include the quarantining of any unexpected material and subjecting it to representative sampling
and analysis to inform appropriate decision making with respect to the fate of the material.

12.6.8 Examples of standard good practice control measures include the following (although note that the list is not intended to be exhaustive):

- Dust control: dust control measures are described and presented in the section concerned with air quality, and which would manage contaminated dust (Chapter 10 of this volume) would include:
  - covering of soils during transportation;
  - regular inspection and, if necessary, cleaning and repair of local highways and site boundaries to check for the soil/dust deposits (and removal if necessary);
  - use of mobile or fixed spray units to dampen surfaces of soil as indicated by weather conditions; and
  - keeping soil stockpiles or mounds away from the site boundary and, where possible, enclosing soil stockpiles or keeping them securely sheeted.

- Run-off: mitigation measures related to run-off are described and presented in the Surface Water section (Chapter 13 of this volume); and

- Land contamination: measures which are likely to be employed on construction sites to minimise the potential for land contamination include:
  - refuelling of vehicles and other plant to only be carried out within a designated area or, where that is not possible, under the supervision of a suitably qualified and trained site foreman;
  - only well maintained equipment and vehicles to be permitted on site (the earthworks contractor/plant and equipment contractor shall provide inspection certificates of the plant/equipment’s ‘fitness for purpose’ and would be regularly inspected and check plant and vehicles throughout the project to ensure that they remain ‘fit for purpose’);
  - any item of plant that leaks fuel or oil onto any surface would be considered unfit for use and would be repaired;
  - any spillages of contaminating liquids or other materials would be reported to the site manager immediately. Stocks of oil absorbent materials would be kept on-site to deal with small spillages;
  - all personnel on-site would be made aware of all of the above standard good practice measures and would be instructed to implement them; and
  - a combination of material characterisation and removal, where appropriate, prior to stockpiling and construction control measures would be employed on site in order to ensure that the risk to off-site humans is minimised as far as is practicable.
Material Characterisation

12.6.9 In order to comply with PPS23 (Ref. 12.39), a site investigation has been undertaken at the site. The results of site investigation and chemical analysis are not indicative of the presence of significantly elevated concentrations of soil contaminants.

12.6.10 Any unidentified contamination which may be encountered during the construction earthworks would be removed off-site immediately and would not be stockpiled prior to removal. On this basis, there is a very low likelihood of contaminated soils being present within the stockpiles on-site. Materials handling of contaminated soils would be restricted to areas where these have been identified and, therefore, would not be transported across the site. This would minimise the risk for further disturbance and release of contaminated dust/vapours which could potentially migrate off-site.

Re-use of Materials

12.6.11 All materials re-use should be supported by appropriate classification of materials and confirmation that they are deemed suitable for use (both chemically and geotechnically) for their intended purpose. This may also need to be supported by appropriate licence agreements or exemptions.

Construction of Buildings and Services

12.6.12 Elevated soil pH and sulphate concentrations have been identified in site soils which pose a low potential risk to buried concrete structures and potable water services. These risks would be effectively mitigated by the use of sulphate resistant concrete in subsurface structures within areas affected by these contaminants, and by the use of chemical resistant potable water pipeline construction materials and/or clean service trench infill materials.

Mitigation of Animal Burial Pits

12.6.13 A watching brief for potential sources of contamination which have not been identified during intrusive investigations would be maintained in accordance with the LCMP. Any animal burial pits which may be encountered during the ground works would be delineated and removed.

Ecological Mitigation Measures

12.6.14 In accordance with the recommendations made in Chapter 14 of this volume, a range of standard non-receptor specific mitigation measures would be implemented during the construction phase and removal and restoration works during the post-operational phase of the development, including:

- provision of an Ecological Clerk of Works (ECoW) during all site clearance activities;
- ecological supervision by the ECoW of any activities that have the potential to adversely affect wildlife; and
• general measures such as providing an escape route for animals in deep trenches.

12.6.15 Any relevant pre-commencement surveys would be carried out as required; and any additional species specific (e.g. bats, breeding birds, badgers, water vole, great crested newts and grass snake) management plans would be implemented during the construction and re-instatement/restoration stages as necessary (see Chapter 14 of this volume for details).

b) Construction Impacts

12.6.16 This section identifies and assesses the potential impacts of the construction phase on geology, land contamination (or its disturbance) and groundwater in the study area. A description of the site, and the proposed construction, operational and post-operational phases of the proposed development is presented in Chapters 1 to 3 of this volume.

12.6.17 Key construction activities that may impact the environment are as follows:

• Preparation (topsoil stripping/stockpiling using mechanised plant);
• Excavation works associated with the construction of a detention pond, access roads, services and site infrastructure; and
• Dewatering works (if required).

i. Geology

Construction Phase Works

12.6.18 Activities during the construction phase which may impact on geology comprise soil stripping, excavation works and stockpiling.

12.6.19 Limited/localised topsoil stripping and stockpiling would take place as part of the construction phase as part of levelling works. The topsoil stripping would not include the removal of shallow geology and as the site has no identified features of geological interest identified, topsoil stripping and stockpiling would have no impact upon the underlying geology of the site.

12.6.20 The exploratory works undertaken at the site (Ref. 12.52) (Appendix 12B) demonstrate the presence of superficial deposits to depths ranging from 1.3 to 3.55 metres below ground level. There is therefore a potential for the excavation of ponds and service trenches to extend into the underlying solid geology of the site. As the site has no identified features of geological interest identified, the underlying geology has been assigned a very low value and sensitivity. Given that the geological sequence of deposits would be disturbed/removed locally, this impact would be direct and permanent but would only affect a very small area of the site; hence the activity is likely to be of low magnitude. As such, the significance of the impact is assessed to be negligible.
ii. Land Contamination

12.6.21 This chapter considers potential impacts posed to human health, ecology (including plants, trees and other vegetation but not crops), crops and livestock, the soil (as a result of any leakages from mechanised plant during the works only) and built environments. Impacts from land contamination to crops/amenity vegetation, surface water and, ecological receptors (flora and fauna) are discussed and presented within Chapters 11, 13 and 14 of this volume respectively. Groundwater is assessed further on in this chapter in Section iii of this chapter below.

12.6.22 Construction phase impacts relating to land contamination can principally arise from:

- The potential for existing contamination on and/or off-site to be mobilised, by construction activities, e.g. soil disturbance and dust generation during earthworks.
- The potential for contamination of the soils to occur during construction works (e.g. from escape of fuels and oils from plant and storage tanks).

Construction Phase Works to Human Health, Ecology, Crops/Livestock and Soil Environment and Built Environment – On-site

12.6.23 Activities to take place during the construction phase which may impact upon human health, the soil and built environments comprise the following: soil stripping, excavation works, and the impact of uncontrolled emissions from contaminated material exposed during excavations and stockpiling.

12.6.24 Soil stripping would take place at the site as part of the construction works and would be limited to the main development area (e.g. car parking, road, buildings). Excavations would be required in areas where subsurface structures would be built (e.g. drainage system, balancing pond). Material fit for re-use would be stored in stockpiles located to the west and north of the car park area.

12.6.25 No animal burials are recorded within the study area. The likelihood of encountering or accidentally disturbing unrecorded old burial pits is also considered to be unlikely. Due to this very low probability of occurrence and the fact that any health risk is likely to be temporary, the magnitude is assessed as very low.

12.6.26 The results of chemical analysis undertaken on soils from the site do not show the presence of contaminants at concentrations which may pose a risk to human health. As such, the magnitude from existing land contamination is considered to be very low. The overall magnitude associated with the exposure of unidentified soil contamination and/or buried animals is therefore assessed as very low. Potential impacts to construction workers could occur via direct contact, inhalation and/or ingestion and could be adverse, temporary or possibly (depending on the nature of the health impact) permanent, direct and indirect.

12.6.27 The value/sensitivity of workers on-site is high and therefore the theoretical significance of this impact is predicted to be minor to moderate adverse. However, no worker would be permitted to work at the site without adequate training in, and use of, appropriate PPE, and adoption of good site hygiene practices; this would
reduce the overall value/sensitivity to low. Accordingly the significance of this impact (i.e. the effects of contamination from soil or buried animals on workers during the topsoil stripping and excavation works and the effects of uncontrolled emissions and leached contaminated materials from stockpiled soil) at the site is assessed as negligible.

12.6.28 Soil analysis has demonstrated that with the exception of a single concentration of selenium marginally above Stage 1 and Stage 2 ecological screening values, the concentrations of ecotoxic and phytotoxic contaminants in the site soils are very low and below the Tier 1 screening criteria. The risk from the slightly elevated concentrations of certain potentially ecotoxic contaminants in the site soils, given standard good construction practice and materials management, are considered to be very low. Therefore the magnitude of potential impacts arising from the disturbance of potentially contaminated soils on-site during the construction works is considered to be very low. Assuming that some of the baseline ecology is still present on-site during the construction works (i.e. not all would be removed by ecological mitigation plans or as part of site stripping and preparation works), the value and sensitivity of the on-site ecology (including plants, trees, and other vegetation) is assessed for the worst case as medium. Consequently the significance of this potential impact is assessed as minor adverse.

12.6.29 It is assumed that any crops and livestock would have been removed from the on-site development area ahead of construction works or as part of the site stripping/preparation works. As such, these receptors are not considered to be present on site during the construction phase and therefore no impact to these receptors would occur.

12.6.30 No exceedences of Tier 1 soil screening criteria have been recorded for built environment sensitive contaminants (e.g. pH and sulphate). Stockpiling of materials on the study site (and the leaching or emission of dust from such stockpiled materials) would not impact upon buildings and services. It is expected that these activities would take place either before the installation of buildings/services, or in designated spaces away from potentially sensitive built environment receptors. In addition, the overall site area in which stockpiling would take place is likely to be low compared to the overall site area (the total excavated material volume is estimated at 7,193m$^3$). There is the potential that any impact could be temporary or permanent (depending on the contaminant) and direct. The magnitude of the impact is therefore assessed as very low.

12.6.31 As part of standard good construction practice, the built environment (e.g. concrete structures and potable water supply pipes) will be appropriately designed and constructed to minimise sensitivity to any low levels of contamination which may be present on-site. For example, risk to potable water supply pipes (where present) from soil and water contamination would be managed with the use of contaminant resistant materials and clean service trenches, as required.

12.6.32 The value and sensitivity to contamination of built environment receptors is considered to be low, on the basis that the potential for contaminants to chemically attack/damage/infiltrate concrete foundations, potable water services and the relative economic value of the built environment receptors to be constructed is low.
12.6.33 Accordingly, the significance of this impact (i.e. the effects of contamination from soil on built environment receptors) is considered to be negligible.

12.6.34 The results of analysis are indicative of generally low contaminant concentrations in the soils on the site. Furthermore, no evidence of vegetation stress due to potential soil contamination was observed at the site (refer to Chapter 14 of this volume), and good site practices would ensure that any unidentified contamination which may be present at the site would be segregated from site won/imported soils, therefore a very low magnitude is considered to be applicable to soil contamination. The potential impacts of contamination upon the uncontaminated soil environment are likely to be adverse, temporary and/or permanent. The on-site soil environment is classified as high value and sensitivity on the basis of the most valuable and sensitive soil receptor type which would be present at the site during the construction phase (soils for subsequent use in agricultural restoration following the operational phase of the site). The significance of this impact (construction phase works to the soil environment) is considered be minor adverse.

_Potential Contamination Due to Spills and Leaks from Mechanised Plant to Human Health, Ecology, Crops/Livestock, the Soil and Built Environments – On-site_

12.6.35 For all activities requiring the use of mechanised plant, there is the potential for spillage or leakages of contaminating liquids (e.g. diesel or hydraulic oil/fluids) to impact site soils (especially during refuelling operations). Unmitigated, such spillages could also seep through the unsaturated zone and contaminate the groundwater. However, any accidental spillage or leakage would be localised, of limited volume and the impact associated with contaminated soils would be reduced further by the adoption of standard good practices, good hygiene practices, practices relating to vehicles and equipment maintenance and dealing with associated leaks or accidental spills. The magnitude of impact is therefore assessed as very low.

12.6.36 The impact of spills or leaks to soil and then to humans is likely to be indirect, as a result of inhalation or ingestion of the potentially contaminated soils, or direct contact with the soil and could be temporary or permanent, depending upon the specific contaminant. The value and sensitivity of on-site humans is high and therefore the initial significance of this impact is minor adverse. However, no worker would be permitted on-site without adequate training in, and use of, appropriate full personal protective equipment (PPE); which would reduce the overall value and sensitivity to low. Accordingly the significance of this impact (i.e. the effects, both direct and indirect, of spills or leaks to human health from contaminated soil as a result of using mechanised plant) is assessed as negligible.

12.6.37 Any remaining on site ecology (including trees, plants and other vegetation) could be impacted by such leaks and spills. However, the magnitude is predicted to be very low. The value and sensitivity of any remaining on-site ecology is assessed as a worst case as medium. Accordingly, the significance of the potential impact from contamination resulting from spills and leaks from using mechanised plant is minor adverse.
12.6.38 As stated in paragraph 12.6.29 it is assumed that any crops and livestock would have been removed from the on-site development area ahead of construction works or as part of the site stripping/preparation works. As such, these receptors are not considered to be present on site during the construction phase and therefore **no impact** from spills and leaks to these receptors would occur.

12.6.39 Built environment receptors are unlikely to be impacted by spills or leakages of contamination from mechanised plant under the provisions of good site practice and procedures outlined above. The magnitude of impact is therefore assessed as very low. The value and sensitivity to contamination of built environment receptors is considered to be low, on the basis of the potential for contaminants to chemically attack/damage/infiltrate concrete foundations and potable water services. There is the potential that any impact could be temporary or permanent (depending on the contaminant) and direct. Accordingly the significance of this impact (i.e. the effects of contamination from spills or leaks from mechanised plant to the built environment) is considered to be **negligible**.

12.6.40 Good site practices would ensure that spills or leakages of contamination from mechanised plant would be largely prevented, and managed where they do occur, therefore a very low magnitude is considered to be applicable to the soil environment. The potential impact of contamination upon the uncontaminated soil environment is likely to be adverse, temporary and/or permanent, direct and indirect. The on-site soil environment is classified as high value and sensitivity on the basis of the most valuable and sensitive soil receptor type which would be present at the site during the construction phase (soils for subsequent use in agricultural restoration following the operational phase of the site). The significance of this impact (i.e. the effects of contamination from spills or leaks to the soil environment) is considered be **minor adverse**.

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**Construction phase works to human health, ecology, crops/livestock, the soil and built environments – Off-site**

12.6.41 Activities to take place during the construction phase which may impact upon human health, ecology, crops/livestock, the soil environment and built environment include soil stripping, excavation works and the impact of uncontrolled emissions from contaminated materials resulting from stockpiling and excavation works.

12.6.42 Risk to human health for off-site receptors could only occur in the event that contamination migrates off-site as a result of the soil stripping, excavation and stockpiling. The most probable mechanism for such off-site migration would be via uncontrolled contaminated dust and/or odour generation and wind transport during the soil stripping and excavation works. This could occur if existing contaminated soils are disturbed during the topsoil stripping, stockpiling and excavation.

12.6.43 The results of chemical analysis undertaken on soils from the site do not show the presence of concentrations of contaminants at concentrations which may pose a risk to human health. The potential for the presence of buried animals to be present at the site is unlikely and the potential for significant contamination to be encountered which may pose a risk to off-site human receptors is assessed as very low to low. As such, given the dust control measures which would be adopted under good site practice, the potential magnitude of impact to off-site human receptors is therefore
assessed as very low. Potential impacts to human receptors could occur via direct contact, inhalation and/or ingestion or airborne contaminated dust and could be adverse, temporary or possibly (depending on the nature of the health impact) permanent, and indirect. The significance of the impact (i.e. the effects of construction phase works to human health off-site) is considered to be minor adverse.

12.6.44 Soil analysis has demonstrated that with the exception of a single, marginal exceedence of selenium, the concentrations of toxic, ecotoxic and phytotoxic contaminants in the site soils are very low and below Tier 1 screening criteria. The risk from the slightly elevated concentrations of certain potentially ecotoxic contaminants in the localised areas of Made Ground given standard good construction practice and materials management are considered to be very low. Therefore the magnitude of potential impacts to off-site ecology, crops and livestock arising from the disturbance of potentially contaminated soils on-site during the construction works is considered to be very low.

12.6.45 The value and sensitivity of off-site ecology (including plants, trees, and other vegetation) is assessed in the worst case as medium. Consequently the significance of potential impacts to off-site ecology from the potential disturbance and mobilisation of on-site contamination is assessed as minor adverse.

12.6.46 The value and sensitivity of off-site crops/livestock is assessed as a worst case as high. Consequently the significance of potential impacts to off-site crops/livestock from the potential disturbance and mobilisation of on-site contamination is assessed as minor adverse.

12.6.47 Off-site built environment receptors (i.e. buried concrete and services) would not be impacted by the proposed soil stripping and excavation works as the impacts of these works would be largely limited to the vicinity of the site. Off-site impacts by these activities which may occur would be restricted to wind-blown contaminated dust, which would have no impact on the off-site built environment.

12.6.48 Risk to the off-site soil environment could only occur in the event that contamination migrates off-site as a result of the ground preparation works. The most probable mechanism for such off-site migration would be via uncontrolled contaminated dust generation and wind transport and/or surface run-off. Good site practices would ensure that the emission of contamination from the site during the soil stripping and excavation works would be minimised. On the basis of these practices a very low magnitude is considered to be applicable. Any impact would be adverse, temporary and/or permanent and indirect. The off-site soil environment is classified as high value and sensitivity on the basis that the majority of the surrounding area has an agricultural land use. The significance of this impact (the effects of construction phase works on the off-site soil environment) is considered to be minor adverse.
Potential Contamination Due to Spills and Leaks from mechanised Plant during Site Preparation to Human Health, Ecology, Crops/Livestock, the Soil and Built Environments – Off-site

12.6.49 For all activities requiring the use of mechanised plant, there is the potential for spillage or leakages of contaminating liquids, such as diesel or hydraulic oil/fluids, to contaminate site soils, especially during refuelling operations. However, such spillages or leaks would be limited and managed by standard good practice and, in the event that such a spillage or leakage occurs, would be localised, of limited volume and the impact would be reduced further by the adoption of standard good practices, particularly the dampening down of soils, practices relating to vehicles and equipment maintenance and dealing with associated leaks or accidental spills. There would therefore be no impact from the effects of contamination to off-site human health, ecology, crops/livestock, built environment and/or soil receptors as a result of spillages or leakages from mechanised plant.

iii. Groundwater

Construction Phase Works to Groundwater Quality – On-site and Off-site

12.6.50 Activities which may impact groundwater quality during the construction phase include soil stripping, excavation works and the impact of leached contaminated materials as a result of stockpiling.

12.6.51 Storage of excavated soil, subsoil and superficial geology in stockpiles could, during rainfall events, result in the leaching and mobilisation of contaminated material into the groundwater during the construction phase. No evidence of significant contaminated material in the topsoil, subsoil or superficial geology to be stripped and excavated has been identified.

12.6.52 In the event that any unidentified contaminated soils are identified during construction works, these would be segregated from clean soils and subjected to appropriate management, which may involve remediation to render the soils suitable for re-use or off-site disposal. Any potential effects would therefore be confined to the location of the stockpiles and their immediate vicinity and a very low magnitude effect would be expected.

12.6.53 In addition, the groundwater body concerned is designated as a Secondary B Aquifer, and there is no significant local use or existence of SPZs at or adjacent to the site or in the likely area of influence. The leachate and groundwater testing at the site also indicates that the baseline groundwater quality at the site is good, with no significant source of contamination identified in the leachate. Consequently, the value and sensitivity of the receptor is assessed as very low. The significance of this potential impact (the effects of mobilised contamination to groundwater as a result of construction phase works on groundwater quality) is assessed as negligible.
Potential Contamination Due to Spills and Leaks from Mechanised Plant to Groundwater Quality – On-site and Off-site

12.6.54 As detailed above, the groundwater body is designated as a Secondary B Aquifer, and there is no apparent current use of the resource at or adjacent to the site or in the likely area of influence. The value and sensitivity of the on-site groundwater receptor is therefore identified as very low. Spillages or leaks from the use of mechanised plant on-site would be limited and managed by standard good practice. In addition, in the event that such a spillage or leakage occurs, the effects would be localised, of limited volume and the impact would be reduced further by the adoption of standard good practices, the dampening down of soils in particular, practices relating to vehicles and equipment maintenance and dealing with associated leaks or accidental spills. The impact would be adverse, direct or indirect and temporary. As a result the magnitude of the impact is assessed as very low.

12.6.55 The significance of this impact (i.e. the effect of spillages or leakages from mechanised plant on groundwater quality) is assessed as negligible.

Construction Phase Works on Groundwater Levels – On-site and Off-site

12.6.56 Activities that would take place during the construction phase which may impact upon groundwater levels and recharge include soil stripping, excavations, stockpiling and dewatering.

12.6.57 In source areas where soil is stripped, there could be some impact on groundwater recharge and groundwater levels as recharge is enhanced due to the removal of soil moisture retention characteristics. This is unlikely to be discernable over and above the normal seasonal variations, given the short timescale for this stage and because the effect would be confined to the location of the soil stripping (i.e. approximately 2.35ha of the 5.26ha site, or 45% of the total site area) and its immediate vicinity. Consequently, the effect would be very low in magnitude.

12.6.58 Typical construction for the park and ride facility would comprise a layer of granular material up to 300mm thick (sub-base) completed with a granular base course and bituminous base and wearing course. Services, site drainage and foundation works would be installed at a formation level below the sub-base level. In addition, a detention pond is proposed to be built as part of the scheme to capture surface water run-off and to provide settlement for sediments during the operation of the development.

12.6.59 Groundwater levels recorded at the site ranged from 1.07m bgl to 1.58m bgl. As such, groundwater is expected to be encountered at shallow depth, and localised dewatering would potentially be necessary. Due to the nature of the development proposal (the construction of areas of hardstanding and small welfare and security buildings), no significant deep excavation is anticipated and therefore dewatering which may be required is expected to be of shallow depth.

12.6.60 Should dewatering be undertaken it would result in localised drawdown of groundwater in the vicinity of the excavations. There are a number of mechanisms by which this reduction could be achieved, including the provision of drains to
undertake shallow passive (gravity) dewatering and active pumping from sub-surface sumps. In either case the depth of dewatering required is likely to be shallow and very localised and would only occur for the duration of the excavation and related works.

12.6.61 The scale of the effect of dewatering would be confined to the location of the excavation works and their immediate vicinity, and would extend only for the duration of excavation and infill (until dewatering ceases); consequently, a low magnitude effect is predicted. The impact would be adverse, direct and temporary.

12.6.62 The overall impact magnitude from the activities described above is assessed as low. The groundwater body concerned is designated as a Secondary B Aquifer and there is no apparent use of the resource at, or adjacent to, the site. Consequently, the value and sensitivity of the receptor is identified as very low.

12.6.63 The significance of this potential impact (i.e. the effect of construction phase works on groundwater levels) is considered to be negligible.

c) Cumulative Construction Impacts

12.6.64 All construction impacts on geology, land contamination and groundwater receptors have been assessed as insignificant (either negligible or minor). The only minor impacts were on the following contaminated land receptors: ecology, soil, human health, and off-site crops. These impacts were from construction phase activities and potential spills and leaks. There is little potential for interactive or additive impacts from spills and leaks and construction activities on the named receptors due to the implementation of standard good practices on the site. Therefore no cumulative impacts during construction are predicted on geology, land contamination, and groundwater at the site.

d) Operational Impacts

12.6.65 This section identifies and assesses the potential impacts of the operation of the proposed park and ride facility on geology, land contamination and groundwater. It is anticipated that the site would be operational from Quarter 4 2013 until Quarter 4 2021. A detailed description of the proposed operation of the site is provided in Chapter 4 of this volume.

i. Geology

12.6.66 Since impacts to below formation level soils/geology would only occur during the construction phase (i.e. no excavation into the underlying geology would occur during the operational phase), it is considered that there would be no impact on geology as a result of the operation of the proposed park and ride facility.
ii. Land Contamination

Operation of Site to Human Health – On-site

12.6.67 The site would be generally surfaced with hard-standing and therefore any users of the proposed development would not be exposed to any potential soil contamination via the direct contact or ingestion exposure routes.

12.6.68 The intrusive site investigations have not identified any significant source of soil or groundwater contamination within the site, and any material which might be identified as contaminated during the construction phase would be segregated, and remediated to make suitable for re-use on-site or removed from the site for off-site disposal. There is therefore a very low likelihood of residual contaminated soils being present on the site.

12.6.69 As a result of site infrastructure, regulatory controls and good practice measures, no impacts to human health are expected to arise as a result of the operation of the park and ride facility.

Operation of Site to Ecology, Crops and Livestock – On-site

12.6.70 Certain lower value and sensitivity existing ecological receptors (e.g. some hedgerows, water courses and bodies and habitat networks) would be retained during the operational phase and as such would be present on-site. However, higher value and sensitivity and legally protected receptors such as badgers would be permanently excluded from the operational site area by exclusion fencing (see Chapter 14 of this volume for details). Likewise crops and livestock would not be present on the operational site. As a result of the above and of site infrastructure and protective measures, no impacts would occur to any on-site ecology and/or crops and livestock from soil contamination during the operational use of the site.

Operation of Site to Soil and Built Environments – On-site

12.6.71 Following the completion of the construction works, only soils which are suitable for use would be present on-site, i.e. all unacceptable contaminated soils would have been removed from site or remediated to render them suitable.

12.6.72 The discharge of foul and surface water drainage associated with the operation of the proposed development would be to a controlled and contained system. Similarly the site would be encapsulated with hard-standing (surfaced) and, therefore, any spillage from vehicles would be intercepted before it reaches any soils. Also, no potentially aggressive chemicals are proposed to be stored/used on-site that would impact the built environment. As a result of site infrastructure, regulatory controls and good practice measures, no impacts are expected to arise as a result of the operation of the site on the on-site soil environment or built environment.
12.6.73 No impacts to on-site receptors with relation to land contamination during the operational phase have been identified and as such no impacts are anticipated to off-site receptors (i.e. human health, soil or built environment). No significant source of contamination has been identified within the proposed development by the intrusive site investigation, and any significant contamination identified during the construction phase would be remediated and/or removed from site prior to the operation of the site. Furthermore, during the operational phase of the proposed development no operations which would cause soil disturbance would take place, and the operational parts of the site would be encapsulated beneath hardstanding. As such, site soils would not affect off-site receptors.

iii. Groundwater

Potential Contaminated Site Drainage/Run-off on Groundwater Quality – On-site and Off-site

12.6.74 The proposed development would include drainage and appropriate sediment traps and oil interceptors, in order to remove any contamination prior to release to the local drainage ditches via the detention pond. These interceptors would be appropriately maintained. However, where discharge to the local drainage system occurs, percolation into the groundwater system can occur if water levels within the drainage ditches are above that of the surrounding groundwater. If this occurs, there is a potential for hydrocarbons and other potential contaminants present in surface water run-off from the site to enter the groundwater system. The potential scale of the impact is considered to be low given the proposed presence of maintained oil interceptors and the detention pond, and because this could only occur when the water levels rise above that of the surrounding groundwater (likely only to occur during extreme rainfall events and hence infrequently). Consequently, the magnitude of the effect is assessed as low.

12.6.75 The impact is predicted to be medium term (for the duration of the use of the park and ride facility, which is anticipated to be approximately eight years) and localised to the site and its vicinity (direct).

12.6.76 The groundwater body concerned is designated as a Secondary B Aquifer and there is no apparent use of the resource at, or adjacent to, the site. Consequently, the value and sensitivity of the receptor is identified as very low.

12.6.77 The significance of this potential impact (i.e. the effect of contaminated surface water drainage entering groundwater) is considered to be negligible.

Reduced Recharge on Groundwater Levels – On-site and Off-site

12.6.78 The presence of impermeable surfaces across the proposed development would prevent rainwater percolating through the soil and recharging the groundwater. However, the proposed development plan comprises both permeable gravel and impermeable asphalt and therefore the potential reduction in groundwater recharge is
considered to be of a scale where any change would be minimal and, consequently, is assessed as being of a very low magnitude.

12.6.79 The impact is predicted to be of medium term (i.e. during the operational lifetime of the development (predicted to be eight years)) and would be likely to affect groundwater levels on the site only. Furthermore, approximately 1.9ha of the site area (5.2ha) would be developed and 1.42ha of this (approximately 27%) would be impermeable... The groundwater body concerned is designated as a Secondary B Aquifer and there is no apparent use of the resource at, or adjacent to, the site. Consequently, the value and sensitivity of the receptor is identified as very low.

12.6.80 The significance of this potential impact (i.e. the effect of reduced recharge on groundwater levels) is considered to be negligible.

e) Cumulative Operational Impacts

12.6.81 No impacts to any geological, land contamination or groundwater receptors have been identified during the operation of the proposed development, and therefore there is no potential for any associated cumulative impacts.

f) Post-Operational Impacts

12.6.82 This section identifies and assesses the potential effects associated with the removal of the park and ride facility and the restoration of the site to agricultural land, on geology, land contamination and groundwater. A detailed description of the methods and activities of the post-operative phase are presented in Chapter 5 of this volume.

12.6.83 All hard-standing, buildings and surface and foul water drainage and other utilities associated with the proposed park and ride facility would be removed and any original surface material and soil stored on site reused in the restoration, where practical. The removal and restoration works during the post-operative phase are likely to require the use of mechanised plant and dumper trucks.

i. Geology

Post-operational Works on Geology

12.6.84 The removal and restoration works to be undertaken during the post-operative phase would include the excavation and removal of buildings, services and other infrastructure installed during the construction phase. The works involved in the removal of this infrastructure would involve excavation up to, and beyond, the extent of excavation during the construction phase. As such the works would impact upon geology, albeit only in those locations and areas where subsurface structures were installed during the construction phase. The magnitude of the effect is assessed as low, as the works would affect approximately the same area and depth as the works during the construction phase. Any impacts would be localised to the site, direct, and permanent.

12.6.85 The value and sensitivity of geology at the site is assessed as very low, due to the absence of geological designation at the site. Consequently, the significance of this
impact (i.e. the effect of post-operational works on geology) is assessed as **negligible**.

### ii. Land Contamination

*Post-operational Works on Human Health, Ecology, Crops/Livestock, the Soil and Built Environments – On-site*

12.6.86 When agricultural land is restored, material present within the temporary stockpiles on-site would be re-deposited across the site, with the original topographical levels being reinstated where practical. The exception to this would be the removal of any contaminated material which has been identified during the construction works. This material would be taken off-site and disposed of at a suitably licensed facility and would not be returned to site during any restoration works. Any contaminated soils that are identified during the construction phase (i.e. soil stripping and excavation) would be removed off-site or remediated prior to stockpiling. Therefore, stockpiled soils for re-use in the restoration works would be suitable for use as reinstated agricultural land. Furthermore, no contamination of soils is anticipated to occur during the operational phase, and as such no new contamination is predicted to be present during the post-operational phase.

12.6.87 As stated in paragraph 12.6.70, certain ecological receptors would be retained on-site during the operational phase and therefore would potentially be at risk from any residual contamination that may be mobilised during the post-operational works. In addition, as part of the restoration plans hedgerows, water courses and bodies and habitat networks would be re-established and the exclusion fencing would be removed thereby allowing re-colonisation/habitation of the site by other ecological receptors.

12.6.88 No crops and livestock would be present on-site during the removal and restoration works taking place as part of the post-operational phase. As such no impacts would take place to these receptors during the post-operational phase.

12.6.89 As a result, any material present within the stockpiles on-site would be suitable for use and would not pose a risk to human health, ecology, crops/livestock or the soil environment. In this case, site restoration would represent a minor benefit with respect to contaminated soils, since the contaminated soils (if any) within this area would have been removed. On this basis, the disturbance of contaminated soils across the site during any post-operational phase works would have **no impact** on site humans, ecology, crops/livestock, the soil and built environment, and the good practice methods which would be implemented (as described above).

*Potential Contamination Due to Spills and Leaks from Mechanised Plant to Human Health, Ecology, Crops/Livestock, the Soil and Built Environments – On-site*

12.6.90 As detailed for the construction phase, for all activities requiring the use of mechanised plant, there is the potential for spillage or leakages of contaminating liquids, such as diesel or hydraulic oil, to contaminate site soils, especially during refuelling operations during the post-operational works. However, standard good
practice would be observed and, under these circumstances, the risk of possible impact would be reduced to a minimum.

12.6.91 The impact would be temporary but direct, confined to the location of the plant activity and its immediate vicinity and with good practice measures in place the magnitude would be very low.

12.6.92 The value and sensitivity of people on-site is high and therefore the initial significance of this impact is minor adverse. However, no worker would be permitted on-site without adequate training in, and use of, appropriate full personal protective equipment (PPE); which would reduce the overall value and sensitivity to low. Accordingly the significance of this impact (i.e. the effects of spills or leaks to soil and subsequently human health as a result of using mechanised plant) is assessed as negligible.

12.6.93 There is the potential for ecology to be present on the site during the post-operational works. The value and sensitivity of these receptors is assessed as medium. The magnitude of any spills and leaks would be very low. Consequently the significance of any impact is assessed as minor adverse at worst.

12.6.94 Crops and livestock would not be present on the site during the post-operational phase; consequently no impacts to these receptors as a result of contamination due to spills and leaks from mechanised plant would occur.

12.6.95 The magnitude of impact to buildings and services on-site would be very low, due to the control measures identified above. The park and ride facility is to be removed and reinstated to agricultural land following the operational stage. As a result, no built environment would be present within the site, and therefore no sensitive receptor would exist by the completion of the post-operational works. These would be removed from the site progressively with much of the materials comprising hardstanding and concrete which would be of use only as fill material. On this basis the value and sensitivity of these receptors is assessed as very low. Any impacts would be highly localised, temporary and/or permanent depending upon the contaminant and direct.

12.6.96 The significance of this impact (i.e. the effect of contamination due to spills and leaks from mechanised plant to the built environment) is assessed as negligible.

12.6.97 The post-operational works at the proposed development would involve substantial use of mechanised plant, and would result in the restoration to agricultural land use, and therefore the potential for impact would be present. Good site practices would ensure that spills or leakages of contamination from mechanised plant would be largely prevented and managed where they do occur, therefore a very low magnitude is considered to be applicable to the soil environment. Potential impacts could be site specific, temporary and/or permanent, and direct adverse. The on-site reinstated soil environment is classified as high value and sensitivity to contamination on the basis of the intended use of the site following handover for agricultural purposes. The significance of this impact (the effects of contamination from spills or leaks to the soil environment) is considered be minor adverse.
Post-operational Works to Human Health, Ecology, Crops/Livestock, Soil Environment and Built Environment – Off-site

12.6.98 As stated above, the removal and restoration of the site would comprise the removal of the hardstanding and other temporary infrastructure on the site, followed by the spreading and restoration of the soil materials stored in temporary stockpiles, with the original topographical levels being reinstated, where practical. The exception to this would be the removal of any contaminated material which has been identified during the construction works. This material would be taken off-site and disposed of at a suitably licensed facility and would not be returned to site during any restoration works. In this case, site restoration would result in the removal of contaminated soils (if any) within this area. Therefore, there is no potential for contaminated dust generation which may impact off-site human health, ecology, crops/livestock, soil environment or built environment receptors, and therefore this activity would result in no impact to these receptors.

Potential Contamination Due to Spills and Leaks from Mechanised Plant to Human Health, Ecology, Crops/Livestock, Soil and Built Environments – Off-site

12.6.99 For all activities requiring the use of mechanised plant, there is the potential for spillage or leakages of contaminating liquids, such as diesel or hydraulic oil/fluids, to contaminate site soils, especially during refuelling operations. However, such spillages or leaks would be limited and managed by standard good practice and, in the event that such a spillage or leakage occurs, would be localised, of limited volume and the impact would be reduced further by the adoption of standard good practices, particularly practices relating to vehicles and equipment maintenance and dealing with associated leaks or accidental spills. There would therefore be no impact from the effects of contamination to off-site human health, ecology, crops/livestock, built environment or soil receptors.

iii. Groundwater

Potential Contamination Due to Spills and Leaks from Mechanised Plant to Groundwater Quality – On-site and Off-site

12.6.100 As detailed for the construction phase, for all activities requiring the use of mechanised plant, there is the potential for spillage or leakage of contaminating liquids, such as diesel or hydraulic oil/fluids, to contaminate the site soils, especially during refuelling operations. Any such spillage or leakage if unmitigated could seep through the unsaturated zone and contaminate the groundwater. However, although the impact would be direct it would be localised, standard good practice would be observed and, under these circumstances, the risk of possible impact would be reduced to a minimum. The effect would be temporary, confined to the location of the plant activity and its immediate vicinity and, with good practice measures in place its magnitude would be very low. As previously discussed, the value and sensitivity of the groundwater body in the vicinity of the site is identified as very low. The potential significance of the impact (i.e. the effect of spills/leaks from mechanised plant on groundwater quality) is assessed as negligible.
Leached Contaminated Material from Soil Spread During the Post-Operational Works to Groundwater Quality – On-site and Off-site

12.6.101 The stored topsoil that would be spread across the site could provide an opportunity for contaminants to be leached and mobilised into the groundwater during the post-operational phase works. The results of chemical analysis of the soils are not indicative of the presence of a significant source of contamination which may pose a leachable risk. Furthermore, any currently unknown contaminated soils that may be encountered would be segregated from clean soils and removed (or appropriately managed) from the site during the construction phase. Only soils which have been determined as suitable for use would be replaced/reused.

12.6.102 Consequently, any potential source of contamination would be highly localised and limited in volume. This combined with no evidence of contaminated soils or leachate leads to the prediction of a very low magnitude effect. The impact would be direct and/or indirect, and temporary.

12.6.103 As detailed above, the groundwater body concerned is a Secondary B Aquifer, with no significant local use, and hence is of very low value and sensitivity. The significance of the impact (i.e. the effect of the leaching of contaminated materials from soil spreading as part of the post-operational phase) is predicted to be negligible.

Post-operational Works to Groundwater Levels and Recharge – On-site and Off-site

12.6.104 Activities taking place during the post-operational works which may affect groundwater levels and recharge comprise the removal of buildings and hardstanding from the site, drainage and other infrastructure removal (and dewatering if required) and soil placement (restoration).

12.6.105 It is anticipated that during the post-operational phase, the structures and both the impermeable asphalt and permeable gravel pavement would be stripped and removed from site, along with any subsurface drainage features and site services. There could be some effect on groundwater levels as recharge is enhanced due to the removal of soil. However, this is unlikely to be discernible over and above normal seasonal variations, given the relatively small area of the site. Consequently, the effect is expected to be low in magnitude. Moreover, it would return groundwater recharge to pre-development levels. As restoration of the site would return groundwater recharge to pre-development levels, the effect on this receptor would be positive. However, a benefit is not predicted in this case, as the negligible adverse impact predicted in the operational phase would be corrected.

12.6.106 The removal of drainage systems and services as part of the post-operational phase works may require some dewatering to take place. However, any such dewatering would be to shallow depth as the materials to be removed would comprise drainage channels and buried services. The relative area of the site within which such dewatering would be required would also be low. As such, the magnitude of the impact of dewatering which may be required on groundwater levels during the on
groundwater levels is assessed as very low. Dewatering would cause a temporary, localised decrease in groundwater levels.

12.6.107 The overall impact magnitude from the post-operational works is subsequently assessed as low.

12.6.108 As detailed above, the groundwater body concerned is a Secondary B Aquifer with no significant local use, and hence is of very low value and sensitivity. The potential significance of the impact (i.e. the effect of post-operational works on groundwater levels) is assessed as **negligible**.

**g) Cumulative Post-Operational Impacts**

12.6.109 The only post-operational impacts identified were minor impacts on ecology and soil receptors from potential spills or leaks. There is little potential for interactive or additive impacts from spills and leaks on ecological or soil receptors due to the implementation of standard good practices on the site. Therefore no cumulative impacts during post-operation are predicted on geology, land contamination, or groundwater at the site.

12.7 Mitigation of Impacts

12.7.1 For the purpose of this assessment, mitigation measures have been proposed where there is an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so. No moderate or major adverse impacts to geology, land contamination, or groundwater receptors have been identified and no mitigation is proposed.

12.8 Residual Impacts

12.8.1 As no mitigation is proposed the residual impacts to geology, land contamination and groundwater receptors will remain as those assessed above in Section 12.6 of this chapter.

12.9 Summary of Impacts

12.9.1 **Table 12.12**, **Table 12.13** and **Table 12.14** present a summary of the impacts predicted with respect to geology, land contamination (or its disturbance) and groundwater for the construction, operation and post-operational phases of the proposed development.
Table 12.12: Summary of Impacts Relating to Geology

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Magnitude</th>
<th>Description</th>
<th>Value/ Sensitivity</th>
<th>Significance</th>
<th>Proposed Mitigation</th>
<th>Residual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Phase</strong></td>
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</tr>
<tr>
<td>On-site geology</td>
<td>Construction phase works</td>
<td>Low</td>
<td>Site specific, Permanent, Direct adverse</td>
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<td>Negligible</td>
<td>None Proposed</td>
<td>Negligible</td>
</tr>
<tr>
<td><strong>Operational Phase</strong></td>
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</tr>
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<td>N/A</td>
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<td><strong>Post-Operational Phase</strong></td>
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Table 12.13: Summary of Impacts Relating to Land Contamination

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<th>Receptor</th>
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<th>Magnitude</th>
<th>Description</th>
<th>Value/Sensitivity</th>
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<th>Proposed Mitigation</th>
<th>Residual Impact</th>
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<tr>
<td>Human health on-site</td>
<td>Impacts of construction phase works</td>
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<td>Site specific, Temporary and/or permanent, Direct and/or indirect adverse</td>
<td>Low (worker with full PPE)</td>
<td>Negligible</td>
<td>None Proposed</td>
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</tr>
<tr>
<td>Human health on-site</td>
<td>Potential contamination due to spills and leaks from mechanised plant</td>
<td>Very low</td>
<td>Site specific, Temporary and/or permanent, Direct and/or indirect adverse</td>
<td>Low (worker with full PPE)</td>
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</tr>
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<td>Residual Impact</td>
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**Post-Operational Phase**

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<td>Value/Sensitivity</td>
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<td>Proposed Mitigation</td>
<td>Residual Impact</td>
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<td>Post-operational works</td>
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### Table 12.14: Summary of Impacts Relating to Groundwater

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<td>Potential contamination due to spills and leaks from mechanised plant</td>
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<td>Site and vicinity of site, Temporary, Indirect and/or direct adverse</td>
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<td>Groundwater levels on-site and off-site</td>
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<tr>
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<td>Negligible</td>
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<td>Potential Impact</td>
<td>Magnitude</td>
<td>Description</td>
<td>Value/Sensitivity</td>
<td>Significance</td>
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<td>Groundwater quality on-site and off-site</td>
<td>Potential contamination due to spills and leaks from mechanised plant</td>
<td>Very low</td>
<td>Site and vicinity of site, Temporary, Direct adverse</td>
<td>Very low</td>
<td>Negligible</td>
<td>None Proposed</td>
<td>Negligible</td>
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<tr>
<td>Groundwater quality on-site and off-site</td>
<td>Leached contaminated material from soil spread during the post-operational works</td>
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<td>Negligible</td>
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<td>Very low</td>
<td>Negligible</td>
<td>None Proposed</td>
<td>Negligible</td>
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</table>
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12.45 SDC. Sedgemoor District Local Development Framework Core Strategy (Proposed Submission), September 2010.

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CHAPTER 13: SURFACE WATER
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FIGURES

Figure 13.1: Surface Water Features
13. SURFACE WATER

13.1 Introduction

13.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential surface water (water quality, hydrology and drainage) impacts associated with the construction, operational and post-operational phases of the proposed park and ride facility at Cannington referred to hereafter as the proposed development on land referred to by EDF Energy as the Cannington park and ride site (the site). Detailed descriptions of the site, proposed development, construction, operational and post-operative phases are provided in Chapters 1 to 5 of this volume of the ES.

13.1.2 A glossary of the terminology used in this chapter is provided in Volume 1 of the ES.

13.2 Scope and Objectives of Assessment

13.2.1 The scope of the assessment has been determined through a formal Environmental Impact Assessment (EIA) scoping process undertaken with the Infrastructure Planning Commission (IPC). It has also been informed by ongoing consultation with statutory consultees (including the Environment Agency, Sedgemoor District Council (SDC), Somerset County Council (SCC) and Somerset Drainage Boards Consortium (SDBC)), the local community and the general public in response to the Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations.

13.2.2 The assessment of surface water impacts has been undertaken adopting the methodologies described in Volume 1, Chapter 7 of the ES, and Section 13.4 of this chapter.

13.2.3 The existing baseline conditions, against which the likely environmental impacts of the proposed development are assessed, have been determined through desk-based environmental searches and analysis and walkover surveys, and these are described in Section 13.5 of this chapter. The study area for this assessment is illustrated in Figure 13.1.

13.2.4 Section 13.6 of this chapter assesses the potential water quality, hydrology and drainage impacts on all surface water features within the study area, including: local ditches, culverts, ponds. The study will also consider the potential hydrological impacts of the proposed development upon man-made drainage systems connected to the site.

13.2.5 Appropriate mitigation measures aimed at preventing, reducing or off-setting potential adverse impacts that are identified to be of significance are identified in Section 13.7 of this chapter. An assessment of residual impacts following implementation of these mitigation measures is presented in Section 13.8 of this chapter.

13.2.6 Volume 1, Chapter 7 of this ES sets out the methodology used to assess cumulative impacts. Additive and interactive effects between site-specific impacts are considered within this chapter. The assessment of cumulative impacts with other...
elements of the HPC Project and other proposed and reasonably foreseeable projects are considered in Volume 11 of this ES.

13.2.7 The objectives underlining the surface water impact assessment were to:

- identify all terrestrial surface water features within the study area that may be affected by the proposed development;
- characterise baseline surface water characteristics of these features;
- assess the impacts of the proposed development on surface water;
- recommend mitigation measures, if determined necessary, to prevent, reduce or off-set the proposed development’s impacts on surface water; and
- assess the residual impacts of the proposed development on surface water.

13.3 Legislation, Policy and Guidance

13.3.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of surface water quality impacts associated with the construction, operational and post-operational phases of the proposed development.

13.3.2 As stated in Volume 1, Chapter 4 of this ES, the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) when combined with the NPS for Nuclear Power Generation (NPS EN-6) provides the primary basis for decisions by the IPC on applications for nuclear power generation developments that fall within the scope of the NPSs. NPS EN-1 sections 5.7 and 5.15 state that there should be an assessment of the impact of nationally significant energy infrastructure on flood risk and the water environment respectively. This is repeated in sections 3.6 and 3.7 of NPS EN-6.

13.3.3 In addition, the IPC may consider other matters that are both important and relevant to its decision-making. This could include Planning Policy Statements (PPSs), Planning Policy Guidance Notes (PPGs), regional and local policy documents, although, if there is a conflict between these and the NPS, the NPS prevails for the purposes of IPC decision making.

13.3.4 Further, the Planning Act 2008 provides that the IPC must, in making its decision on an application, have regard to any Local Impact Report (LIR) prepared by relevant local authorities. It is anticipated that the LIRs will rely in part on PPSs, PPGs, regional and local policy to provide a context for their assessment. On this basis, regard has been given to these documents (where relevant to the technical assessment) which are likely to inform the LIRs prepared by the relevant local authorities.

a) International Legislation

13.3.5 The scope of work is not affected by relevant international legislation beyond that within the European Union (EU).
13.3.6 Many of the standards and methodologies relating to surface waters are regulated at EU level through a range of environmental directives. The most relevant of these with respect to water quality, flood risk and to the proposed development are the:


i. Water Framework Directive (Ref. 13.1)

13.3.7 The WFD is a key piece of legislation relating to the protection of water quality and ecological status of freshwaters and coastal waters.

13.3.8 The WFD provides a mechanism by which disparate regulatory controls on human activities that have the potential to impact on water quality may be managed effectively and consistently. In addition to a range of inland surface and groundwater, the WFD covers transitional waters (estuaries and lagoons) and coastal waters up to one nautical mile from mean low water (baseline from which territorial waters are measured). Existing regulations that will eventually be subsumed by the WFD include the Freshwater Fish Directive (78/659/EEC as consolidated in 2006) (Ref. 13.3) and the Dangerous Substances Directive (76/464/EEC) (Ref. 13.2). The WFD is implemented in England and Wales primarily through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (the Water Framework Regulations) (Ref. 13.5).

13.3.9 United Kingdom (UK) surface waters have been divided into a number of discrete units termed ‘water bodies’, with meaningful typologies that relate to physical and ecological characteristics. Based upon ecology and water quality, these water bodies have been classified as falling into different status classes. The WFD requires that all inland and coastal waters must reach at least ‘good status’ by 2015 or set alternative standards and/or a timetable for the achievement of these by 2027 and that the status of all surface water bodies should not deteriorate. Individual water bodies that have been modified by man to the extent that it will not be possible for them to meet the WFD targets are categorised as Heavily Modified Water Bodies.

13.3.10 Implementation of the WFD is primarily achieved through a system of river basin management planning. The water bodies of England and Wales have been allocated to river basin areas depending on catchment areas and a plan drawn up for each. The plans contain a programme of measures tailored to each catchment designed to ensure its water bodies achieve and maintain the appropriate status in accordance with the timelines set out in the WFD.

13.3.11 As part of the ongoing implementation of the WFD, the Environment Agency has recently been given the power to apply environmental standards to individually defined WFD water bodies via the ‘River Basin Districts Typology, Standards and Groundwater Threshold Values’ (Water Framework Directive) (England and Wales) Directions 2010 (Ref. 13.6), and the ‘River Basin Districts Surface Water and Groundwater Classification’ (Water Framework Directive) (England and Wales) Direction 2009 (Ref. 13.7).
ii. Dangerous Substances Directive (76/464/EEC) (Ref. 13.2)  

13.3.12 The Dangerous Substances Directive (76/464/EEC) (Ref. 13.2) is implemented through the Surface Waters (Dangerous Substances) (Classification) Regulations 1989 (Ref. 13.8), 1992 (Ref. 13.9), 1997 (Ref. 13.10) and 1998 (Ref. 13.11). It sets Environmental Quality Standards (EQS) for a range of substances in water. The regulation of ‘Priority Substances’ under the WFD effectively supersedes many of these standards, although standards for some substances remain in force. The 2010 Directions referred to above complete the transposition of the Priority Substances Directive (Ref. 13.12).

13.3.13 The Dangerous Substances Directive and its ‘daughter’ directives are concerned with controlling the level of discharges that may contain dangerous substances that may reach inland, coastal and territorial waters. List I substances – black list, covers substances that are regarded as particularly toxic and persistent and may accumulate in the environment. Pollution by these substances must be eliminated. List II substances – grey list, cover substances which are less serious but still toxic. Pollution by grey list should be reduced wherever possible.

iii. Fish Directive (Ref. 13.3)  

13.3.14 The Fish Directive (Ref. 13.3) is concerned with protecting and improving the quality of rivers and lakes to encourage self sustaining healthy fish populations. It sets out physical and chemical water quality objectives, and monitoring requirements for designated areas.

13.3.15 The original Directive was adopted in 1978 (Ref. 13.13) and was consolidated in 2006. It will be replaced in 2013 by provisions of the WFD (Ref. 13.1).

iv. The Floods Directive 2007 (Ref. 13.4)  

13.3.16 The Floods Directive (2007/60/EC) (Ref. 13.4) requires all Member States to determine if watercourses and coastlines are at flood risk, map flood extent and assets and people at risk form flood, and take appropriate measures to reduce the flood risk. Delivery of the Floods Directive is coordinated with the Water Framework Directive (13.1) through flood risk management plans and river basin management plans.

13.3.17 The Flood Risk Regulations 2009 (Ref. 13.14), which came into force on 10 December 2009, are the statutory instrument which transposes Directive 2007/60/EC (Ref. 13.4) of the European Parliament on the assessment and management of flood risks for England and Wales. These regulations place a new duty upon the Environment Agency and local authorities to prepare preliminary flood risk assessment (PFRA) maps/reports about past floods in defined river basins and the possible harmful consequences of future floods from the sea, main rivers and reservoirs.

13.3.18 Although the outputs of the Flood Risk Regulations 2009 (Ref.13.14) process are more strategic in nature, the regulations also set a legislative obligation for relevant authorities to provide information where reasonable to fulfil the requirements of the regulations. The named authorities in the regulations including the lead local flood authority, a district council for an area, an internal drainage board(s), a highway authority, water company, reservoir undertakers, navigation authority, Natural

13.3.19 For this Environment Statement, it should be noted that the lead local flood authority is SCC. SCC has also developed a strategic business plan to address the issues arising from the Floods Directive. This is discussed fully later in this section.

b) National Legislation

13.3.20 The key pieces of national legislation relevant to the control and mitigation of surface water risks are:

- Environmental Protection Act 1990 (Ref. 13.16).
- Environmental Permitting (England and Wales) Regulations 2010 (EPR) (Ref. 13.17).
- Flood and Water Management Act 2010 (Ref. 13.20).

i. Environment Act 1995 (Ref. 13.15)

13.3.21 This Act established basic terms of reference for the Environment Agency. The Act provides the Environment Agency with a duty to take action as it considers necessary to conserve, enhance and secure the proper use of water resources in England and Wales. In respect of land drainage and flood defence functions, the Act places a duty on the Environment Agency with respect to conservation of natural beauty and sustainable development.

ii. Environmental Protection Act (EPA) 1990 (Ref. 13.16)

13.3.22 Part 2A of the Environmental Protection Act 1990 describes a regulatory role for Local Authorities in dealing with contaminated land, including assessment for any resulting pollution of controlled waters.

iii. Environmental Permitting (England and Wales) Regulations 2010 (Ref. 13.17)

13.3.23 The Environmental Permitting Regulations 2010 (Ref 13.17) provide a consolidated system for environmental permits and exemptions for activities which include discharges to surface waters. It also sets out the powers, functions and duties of the regulators. The Environmental Permitting Regulations repeal parts of the Water Resources Act, 1991 (Ref. 13.18).

iv. Water Resources Act 1991 (Ref. 13.18)

13.3.24 The Water Resources Act 1991 (Ref 13.18) (as amended by the Water Act, 2003 (Ref. 13.21) sets out the regulatory controls and restrictions that provide protection to the water environment through controls on abstraction, impounding and discharges
as well as identifying water quality and drought provisions. This Act sets the framework for surface water management over the past two decades in the UK, but elements of the Water Resources Act have now been superseded by the Environmental Permitting (England and Wales) Regulations 2010 (Ref. 13.17).


13.3.25 These Regulations make provision for the purpose of implementing the WFD (Ref. 13.1). The Environment Agency is required to carry out detailed monitoring and analysis in relation to each river basin district. The results of the Agency's technical work, the environmental objectives and proposals for programmes of measures are brought together in a River Basin Management Plan (RBMP) for each river basin district. The South West RBMP covers the Cannington park and ride site.

vi. Land Drainage Act 1991 (Ref. 13.19)

13.3.26 This Act consolidates enactments relating to internal drainage boards and the functions of these boards and of local authorities in relation to land drainage. Internal drainage boards (IDB) exercise a general supervision and perform powers relating to the drainage of land within their district.

13.3.27 Sections 23 to 27 of the Act address the requirements associated with obstructing flow in watercourses and culverting watercourses. Internal Drainage Board (IDB) powers to serve notice on persons with respect to remedying the condition of watercourses are outlined in Section 25. Sections 28 to 31 are also of relevance to flood risk as they outline the requirements for the restoration and improvement of ditches.

vii. Flood and Water Management Act 2010 (Ref. 13.20)

13.3.28 The Flood and Water Management Act 2010 (Ref. 13.20) sets out proposals for a new framework to help improve flood risk management, manage water more sustainably and improve water related services for the public in England and Wales. The Act received Royal Assent on 8 April 2010 and implementation of the first parts of the Act began on the 1 September 2010.

13.3.29 The Act prescribes a number of changes to the assessment and management of flood risk in England and Wales. These changes include defining new roles and responsibilities for flood risk management (including clarifying the Environment Agency’s overview role on flood risk management); continuation of the Environment Agency’s role in producing and maintaining the main river map; assignment of lead responsibility for local flood risk management to county and unitary local authorities; encouragement of national design and performance standards for Sustainable Drainage Systems (SuDS); and implementation of the Pitt Review (Ref. 13.22) recommendation to place a duty on relevant organisations to co-operate and share information.
c) National Planning Policy


13.3.30 PPS1 was published in 2005 and sets out the Government’s overarching planning policies on the delivery of sustainable development through the planning system.

13.3.31 Paragraph 22 of PPS1 advises that regional planning authorities and local authorities should promote, amongst other things, the sustainable use of water resources; and the use of sustainable drainage systems in the management of run-off.


13.3.32 The supplement to PPS1 sets out how planning should contribute to reducing emissions and stabilising climate change (mitigation) and take into account the unavoidable consequences (adaptation).

13.3.33 Paragraph 42 advises that planning authorities in their consideration of the environmental performance of a site, taking particular account of the climate the development is likely to experience over its expected lifetime, should expect new development to, amongst other things,

“…give priority to the use of sustainable drainage systems, paying attention to the potential contribution to be gained to water harvesting from impermeable surfaces and encourage layouts that accommodate waste water recycling…”


13.3.34 PPS23 is intended to complement the pollution control framework under the Pollution Prevention and Control Act 1999 and the Pollution Prevention and Control Regulations 2000 (now replaced by the Environmental Permitting (England and Wales) Regulations 2010 (Ref. 13.17). The statement advises of the importance of the planning system in determining the location of development which may give rise to pollution, either directly or indirectly. The statement also ensures that other uses and developments are not, as far as possible, affected by major existing or potential sources of pollution.

13.3.35 PPS23 advises that, amongst other things, the following matters may be material in the consideration of individual planning applications where pollution considerations arise:

- “…the possible adverse impacts on water quality and the impact of any possible discharge of effluent or leachates which may pose a threat to surface or underground water resources directly or indirectly through surrounding soils; and
- the need to make suitable provision for the drainage of surface water…” (Page 12).
(Ref. 13.26)

13.3.36 PPS25 sets out the Government’s policies on development and flood risk. The aim of this PPS is to ensure that flood risk is taken into account at all stages in the planning process, to avoid inappropriate development in areas at risk of flooding. Where exceptionally, development is necessary in areas of flood risk, this policy intends to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.

13.3.37 Paragraph 8 states that local planning authorities should, in determining planning applications:

- “have regard to the policies in this PPS and, as relevant, in the RSS for their region, as material considerations which may supersede the policies in their existing development plan, when considering planning applications for developments in flood risk areas before that plan can be reviewed to reflect this PPS;

- ensure that planning applications are supported by site-specific flood risk assessments (FRAs) as appropriate;

- apply the sequential approach (see paras. 13–17) at a site level to minimise risk by directing the most vulnerable development to areas of lowest flood risk, matching vulnerability of land use to flood risk;

- give priority to the use of SuDS; and

- ensure that all new development in flood risk areas is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed.”

d) Regional Policy

13.3.38 The Government’s revocation of regional strategies was quashed in the High Court on 10 November 2010. However, on that same date the Government reiterated in a letter to Chief Planners its intention to revoke regional strategies through the Localism Bill. This letter was also challenged but, on 7 February 2011, the High Court held that the Government's advice to local authorities that the proposed revocation of regional strategies was to be regarded as a material consideration in their planning development control decisions should stand. The decision of the High Court was upheld by the Court of Appeal on 27 May 2011. Therefore, the regional strategies remain in place but in the case of development control decisions it is for planning decision makers to decide on the weight to be attached to the strategies (see Volume 1, Chapter 4 of this ES for a full summary of the position regarding the status of regional planning policy).


13.3.39 RPG10 sets out the broad development strategy for the period to 2016 and beyond. Policy RE 1 (Water Resources and Water Quality) states that to achieve the long term sustainable use of water, water resources need to be used more efficiently. The policy also states that the quality of inland and coastal water environments must be conserved and enhanced.
13.3.40 Policy RE 2 (Flood Risk) states that local authorities, the Environment Agency, other agencies and developers should seek to:

- “protect land liable to river and coastal flooding from new development, by directing development away from river and coastal floodplains;
- promote, recognise and adopt the use of sustainable drainage systems for surface water drainage; and
- adopt a sequential approach to the allocation and development of sites, having regard to their flood risk potential.”

ii. The Draft Revised Regional Spatial Strategy for the South West Incorporating the Secretary of State’s Proposed Changes 2008 – 2026 (July 2008) (Ref. 13.28)

13.3.41 Chapter 7 deals with Enhancing Distinctive Environments and Cultural Life. Policy F1 (Flood Risk) states that, taking account of climate change and the increasing risk of coastal and river flooding, the priority is to:

- “defend existing properties and, where possible, locate new development in places with little or no risk of flooding;
- protect flood plains and land liable to tidal or coastal flooding from development;
- follow a sequential approach to development in flood risk areas;
- use development to reduce the risk of flooding through location, layout and design;
- relocate existing development from areas of the coast at risk, which cannot be realistically defended; and
- identify areas of opportunity for managed realignment to reduce the risk of flooding and create new wildlife areas.”

13.3.42 Policy RE6 (Water Resources) states that the region’s network of ground, surface and coastal waters and associated ecosystems will be protected and enhanced; surface and groundwater pollution risks must be minimised so that environmental quality standards are achieved and where possible exceeded; and local planning authorities must ensure that rates of planned development do not exceed the capacity of existing water supply and waste water treatment systems and do not proceed ahead of essential planned improvements to these systems.


13.3.43 The Somerset and Exmoor National Park Joint Structure Plan was adopted in 2000 with relevant policies saved from 27 September 2007. The Plan provides a strategic base for all land use planning within the plan area for the period up to 2011.

13.3.44 Policy 15 (Coastal Development) states that provision for any development along the coast, including the Exmoor Heritage Coast, should be made within towns, rural centres and villages. Where development requires an undeveloped coastal location
it should respect the natural beauty, biodiversity and geology of the coast and be essential in that location. New coastal developments should minimise the risk of flooding, erosion and landslip.

13.3.45 Policy 59 (Safeguarding Water Resources) states that protection will be afforded to all surface, underground and marine water resources from development which could harm their quality or quantity.

13.3.46 Policy 60 (Floodplain Protection) states that areas vulnerable to flooding should continue to be protected from development which would cause a net loss of flood storage area or interrupt the free flow of water or adversely affect their environmental or ecological value. In allocating land for development in local plans, consideration must be given to measures to mitigate the impact on the existing land drainage regime to avoid exacerbating flooding problems.

13.3.47 Policy 61 (Development in Areas Liable to Marine Flooding) states that provision should only be made for development in areas vulnerable to marine or tidal flooding where the development is needed in that location, no alternative location exists for the development, and adequate measures exist or can be readily provided to protect the development.


13.3.48 The River Basin Management Plan (RBMP) has been prepared for the South West River Basin District’s rivers and coastal areas under the requirements of the Water Framework Directive (Ref. 13.1). The plan describes the river basin district, and the pressures that the water environment faces. It shows what this means for the current state of the water environment, and what actions will be taken to address the pressures. It sets out what improvements are possible by 2015 and how the actions will make a difference to the local environment – the catchments, the estuaries, coasts and groundwater.

13.3.49 The plan states that development planning plays a key role in sustainable development and that the Environment Agency will continue to work closely with planning authorities to ensure that planners understand the objectives of the Water Framework Directive and area able to translate them into planning policy (page 29).

13.3.50 The plan presents current and future water body status objectives (Annex B) and thus site specific Environmental Quality Standards (EQS) are able to be derived.

v. Somerset County Council, Flood and Water Management, Strategic Business Plan 2010-2016 (Ref. 13.31)

13.3.51 The SCC Flood and Water Management, Strategic Business Plan 2010-2016 (Ref. 13.31) sets out key programmes and projects within Somerset to reduce flood risk to people and property from ordinary watercourses, surface water run-off and groundwater flooding. In addition the plan sets out the long term vision for flood risk management within Somerset. The plan is consistent with the recommendations within the Flood and Water Management Act 2010 (Ref. 13.20).

13.3.52 The consultation sets out the Environment Agency’s strategy to manage flood risk on the Severn Estuary.

13.3.53 Specifically in relation to the HPC Project, the consultation explains that the Environment Agency’s proposals may be amended to complement other projects planned for this area, including the proposed power station at Hinkley Point which would have some impact on flood defences.

vii. Regional Flood Risk Appraisal (RFRA) (Ref. 13.33)

13.3.54 In accordance with PPS25 (Ref. 13.26), the South West Regional Assembly published their Regional Flood Risk Appraisal (RFRA) in February 2007 (Ref. 13.33). The document is a high level review of flood risk and strategy. In this document, concerns over the potential effects of climate change are identified across Bridgwater and the wider south-west region.

viii. River Parrett Catchment Flood Management Plan (CFMP) (Ref. 13.34)

13.3.55 The Environment Agency published its River Parrett Catchment Flood Management Plan (CFMP) in December 2009 (Ref. 13.34). This document identifies the scale and extent of flooding both currently and in the future and sets policies for managing flood risk within the catchment. The Cannington park and ride site is located within Sub-area 3 Upper and North West Parrett and Upper Isle, where the policy is “we are generally managing existing flood risk effectively”. Proposed actions from the CFMP are as follows:

- Work with communities to increase flood awareness, pre-flood planning and promote flood warning.
- Review maintenance activities to ensure best value for money.
- Work with the farming community to encourage best practice farming and soil management. Pay particular attention to water/run-off management on a farm scale and water quality.
- Investigate ways to support flood resistance and resilience methods to individual properties where other options are not practical. Communities may include Martock, Merriott, Ilminster, Ilton, and surrounding villages, Cannington and surrounding villages.

e) Local Planning Policy and Local Strategy


13.3.56 The Sedgemoor District Local Plan forms part of the Development Plan for Sedgemoor. The Local Plan was adopted in 2004 with relevant policies saved from 27 September 2007. The Proposals Map (Inset Map No.20) indicates that the site is not subject to any specific surface water designations. The site is outside of the defined settlement boundary.
13.3.57 Policy CNE14A (Flood Risk Assessment) outlines the policy for flood risk. However, this policy was not saved as part of the Secretary of State’s Direction and therefore expired on 27 September 2007. The Council’s schedule and reasoning for not saving this policy confirms that it is superseded by more recent guidance contained within PPS25 (paragraph 21).

ii. Sedgemoor Local Development Framework Core Strategy (LDF) (Proposed Submission) (September 2010) (Ref. 13.36)

13.3.58 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from September to November 2010. Changes prior to submission proposed as a result of the consultation process were reported and endorsed by the Council’s Executive Committee on 9 February 2011. The Core Strategy (Proposed Submission) was submitted to the Secretary of State on 3 March 2011 and an Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy will form part of the Development Plan for Sedgemoor.

13.3.59 EDF Energy submitted representations objecting to the Core Strategy (Proposed Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1, MIP2 and MIP3 contained in that chapter) and those sections relating to housing and Hinkley Point. EDF Energy also participated at the relevant EiP hearings. See Volume 1, Chapter 4 of this ES for a full summary of the position regarding the status of the Core Strategy.

13.3.60 The following Core Strategy (Proposed Submission) policies are of potential relevance:

- **Policy S1 (Spatial Strategy for Sedgemoor)** states, amongst other things, that all development will take into account flood risk and vulnerability and be located at lower risk wherever possible. Where it is sequentially demonstrated that this is not possible, the benefits of development will need to outweigh the flood risk and be safe for its lifetime taking into account long-term flood defence strategies.

- **Policy S3 (Sustainable Development Principles)** states that development proposals will be expected to, minimise the impact on natural resources, avoid pollution and incorporate the principles of sustainable construction to contribute to, amongst other things, sustainable drainage, reduced water use and water quality.

- **Policy S4 (Mitigating the Causes and Adapting to the Effects of Climate Change)** states that development should adapt to the effects of climate change by, amongst other things:

  “…minimising the risk of flooding and ensuring appropriate management of land within areas vulnerable to flooding…”.

- **Policy D1 (Managing Flood Risk)** states:

  “All development proposals in Flood Zones 2 and 3 as defined by the Environment Agency’s Flood Map will only be permitted where the Sequential Test is passed as outlined in PPS25, unless:

  - PPS25 or subsequent replacement makes specific exception for the type of development proposed; or
• The site is allocated or identified for development of the same type, scale and character in this Core Strategy or any subsequent document of the Local Development Framework as that proposed.

In undertaking the Sequential Test it is the responsibility of the applicants to demonstrate that there are no reasonably available alternative sites at lower flood risk within a defined area of search where the proposed development could be sited.

For the purposes of the Sequential Test the area of search will be the Sedgemoor District area unless:

• It can be demonstrated that the development has a specific locational requirement based on functional requirements or to meet a demonstrable specific local need, in which case the area of search should reflect this;
• The site is located within or physically adjoining the urban area of Bridgwater, in which case that will be the search area;
• The site is located within or physically adjoining the Burnham-on-Sea and Highbridge urban area, in which case that will be the search area; or
• The site is located within a settlement boundary of an identified Key Rural Settlement, in which case that will be the search area.

For the purposes of the Sequential Test, reasonably available alternative sites are those that are within the relevant area of search, can accommodate the requirements of the proposed development and are deliverable.

For residential proposals such sites should be identified in the Council’s SHLAA. Sites identified in the Council’s SHLAA will be deemed to have passed the Sequential Test but will still need to pass the Exception Test where required. Sites not identified will need to demonstrate why they perform sequentially better.

Where the Exception Test is required by PPS25, development proposals will need to demonstrate how they meet these requirements.”

• Policy D9 (Sustainable Transport and Movement) states that transport proposals should contribute to reducing adverse environmental issues including surface water run-off.
• Policy D20 (Green Infrastructure) states that Green Infrastructure will be safeguarded, maintained, improved, enhanced and added to, as appropriate, to form a multi-functional resource which, amongst other things, contributes to climate change adaptation through, for example, sustainable drainage systems.
iii. Sedgemoor District Council Level 1 Strategic Flood Risk Assessment and Level 2 Strategic Flood Risk Assessment (Ref. 13.37 and 13.38)

13.3.61 SDC published their Level 1 Strategic Flood Risk Assessment (SFRA) in August 2008 (Ref. 13.37). This document presented a review of available flood risk related policy and data across Sedgemoor. This information informed the hydraulic modelling in the Level 2 SFRA (Ref.13.38). The Level 1 report included flood probability maps consistent with the requirements of PPS25 (Ref. 13.26). The Level 1 SFRA reports “The Level 1 SFRA mapping provides the tools for Sedgemoor District Council to undertake the PPS 25 Sequential Test.” In addition to generic national policies taken directly from PPS25, district specific policies were recommended in the Sedgemoor Level 1 SFRA including flood risk strategies and flood mitigation strategies. More detail on these policies can be found in the Overarching Flood Risk Assessment Report (OFRAR).

iv. Supplementary Planning Guidance

13.3.62 WSC Sedgemoor District Council and West Somerset Council have jointly prepared draft supplementary planning guidance in relation to the HPC Project. Public consultation on the Consultation Draft version of the Hinkley Point C Project Supplementary Planning Document (the draft HPC SPD) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which object to the draft HPC SPD. See Volume 1, Chapter 4 of this ES for a full summary of the position regarding the status of the draft HPC SPD.

13.3.63 In relation to climate change adaptation and flood risk, Box 3 of the draft HPC SPD sets out the following approach:

“…In addition to demonstrating general compliance with PPS 25: Development and Flood Risk, the HPC project promoter will be expected to contribute towards the Bridgwater Strategic Flood Defence solution where the development specifically occurs within Sedgemoor District Council.

For associated development proposals elsewhere, including Williton, Cannington and Combwich, the HPC project promoter will be expected to demonstrate general compliance with PPS 25 and contribute towards long term flood risk management solutions and show, following a PPS 25 assessment and with mitigation as necessary, that proposed development will not accentuate flood risk to existing properties or land.

HPC project development should also be sited and designed to with consideration for other potential effects arising from climate change, such as more frequent summer ‘heat waves’ and generally warmer summers.”

(Page 12)

13.3.64 Further planning policy context is provided in the Legislative Planning Policy Context chapter (Volume 1, Chapter 4 of this ES) and the Introduction chapter (Chapter 1 of this volume of the ES).
f) **Best Practice Guidance**

13.3.65 A range of best practice guidance is of relevance to this assessment including the following (only those specifically referred to in the assessment of impacts are included in the reference list):

- Environment Agency Pollution Prevention Guidance Notes (PPG) (Ref. 13.40, including:
  - PPG 1 general guide to the prevention of water pollution;
  - PPG 2 above ground oil storage tanks;
  - PPG 3 use and design of oil separators in surface water drainage systems;
  - PPG 4 disposal of sewage where no mains drainage is available;
  - PPG 5 works in, near or liable to affect watercourses;
  - PPG 6 working at construction and demolition sites;
  - PPG 8 safe storage and disposal of used oils; and
  - PPG 21 pollution incident response planning.
- Construction Industry Research and Information Association (CIRIA) Report C532: Control of Water Pollution from Construction Sites (Ref. 13.41).
- CIRIA Report C502: Environmental Good Practice on Site (Ref. 13.42).
- CIRIA Culvert Design and Operation Guide (C689) (Ref. 13.43).
- Good Practice Guide for Handling Soils (MAFF, 2000); (Ref. 13.46).
- Local and Regional Land Drainage Byelaws.

13.4 **Methodology**

13.4.1 The methodology adopted for assessing potential impacts to surface water is consistent with the general approach and methodologies adopted across all technical study areas.

13.4.2 The assessment presented in this chapter addresses only surface water issues associated with the proposed development. An assessment of potential groundwater impacts is presented in **Chapter 12** of this volume of the ES. Potential impacts on the ecological resources are addressed in **Chapter 14** of this volume of the ES.
a) Study Area

13.4.3 The geographical extent of the study area for this assessment includes:

- the site;
- surface water receptors near to the site (water features within 250m of the site), given that there is potential for these features to be affected by the proposed development;
- surface water receptors within an extended study area (where a particular type of surface water feature is not found to be present within the 250m study area, the study area is extended to a distance of 500m from the site); and
- identified watercourses to their downstream extent, where appropriate.

13.4.4 The study area is illustrated in Figure 13.1.

b) Baseline Assessment

13.4.5 Baseline environmental characteristics for the study area were identified by utilising the following key data sources:

- South West River Basin Management Plan (Ref. 13.30).
- Sedgemoor District Council Level 1 Strategic Flood Risk Assessment (Ref. 13.37).
- Sedgemoor District Council Level 2 Strategic Flood Risk Assessment (Ref. 13.38).
- Envirocheck Report (Ref. 13.48).
- Environment Agency “What’s In Your Backyard” website (Ref. 13.49).
- Aerial photography (public access internet resources) (Ref. 13.50).
- Cannington Park and Ride Flood Risk Assessment.
- Walkover survey of the site (January 2010).
- Consultation with appropriate Statutory Bodies (i.e. Environment Agency and Somerset Drainage Boards Consortium).

13.4.6 The desk-based assessments and walkover surveys listed above did not identify the need for further survey data. No specific physical surveys were carried out in relation to the assessment of impacts to surface water.

13.4.7 A description of the site is provided in Chapter 2 of this volume of the ES. Details regarding the baseline surface water conditions are provided in Section 13.5 of this chapter.
c) Consultation

13.4.8 Consultation has been undertaken throughout the EIA process and further detail is provided in the Consultation Report.

13.4.1 Written correspondence was exchanged with the Environment Agency from August 2009. Meetings were held with the Environment Agency, SDC and WSC in October 2009 and February 2010. Stage 1 consultation responses for the site were provided by the Environment Agency and Highways Agency.

13.4.2 Meetings were held with the Environment Agency, SDC and WSC in April 2010 to discuss sequential test; overview of campus masterplans; site specific Flood Risk Assessment (FRA) for all associated developments. A meeting was held with the Somerset Drainage Boards Consortium in April 2010 to discuss FRA for all associated developments.

13.4.3 Surface water related Stage 2 consultation responses were provided by the Cannington Parish Council, Environment Agency; members of the public, Somerset Drainage Boards Consortium and a joint response from SDC and WSC.

13.4.4 Meetings were held with the Environment Agency, SDC and WSC in April 2010 to discuss sequential test; overview of campus masterplans; site specific Flood Risk Assessment (FRA) for all associated developments. A meeting was held with the Somerset Drainage Boards Consortium in April 2010 to discuss FRA for all associated developments.

13.4.5 Volume 1, Chapter 7 of this ES describes the assessment methodology for this EIA. In addition the following specific methodology was applied for the determination of receptor value and sensitivity (see Table 13.1) and impact magnitude (see Table 13.2) for surface water.

i. Value and Sensitivity

13.4.6 All of the surface water receptors that may be impacted by the proposed development have been assigned a level of value/sensitivity in accordance with those definitions set out in Volume 1, Chapter 7 and with the definitions given in Table 13.1.

13.4.7 Where a receptor could reasonably be placed within more than one value and sensitivity rating, conservative professional judgement has been used to determine which rating would be applicable.
<table>
<thead>
<tr>
<th>Value and Sensitivity</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>High</strong></td>
<td><em>Water Quality Specific Definition:</em> Water quality of receptor site supports or contributes towards the designation of a feature of national (or international) importance. Very low capacity to accommodate any change to current water quality status, compared to baseline conditions. Water quality of receptor site classified under the WFD as high or good ecological status/potential. The receptor environment is likely to have natural ecosystems and make very good salmonid and cyprinid fisheries. They may be used for any type of water abstraction including potable supply. <em>Hydrology and Drainage Specific Definition:</em> Receptor identified as having no capacity to adapt to, or recover from, proposed form of change, i.e. fluvial watercourse will not naturally realign and erode to optimise flow conveyance such that impact will persist.</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td><em>Water Quality Specific Definition:</em> Water quality of receptor site supports high biodiversity (not designated). Receptor has low capacity to accommodate change to water quality status. Water quality of receptor site classified under WFD as good ecological status/potential. These rivers are suitable for coarse fisheries. <em>Hydrology and Drainage Specific Definition:</em> Receptor identified as having low capacity to accommodate proposed form of change i.e. fluvial watercourse will only partially reconfigure to optimise flow conveyance such that impact may persist or will be transposed to another location.</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td><em>Water Quality Specific Definition:</em> Baseline conditions define an environment that has a high capacity to accommodate proposed change to water quality status due, for example, to the large relative size of receiving water feature and effect of dilution. Baseline water quality status generally poor. Water quality of receptor site could be expected to be classified under the WFD as moderate ecological status/potential. Receptor site is likely to be capable of supporting only limited fish populations. <em>Hydrology and Drainage Specific Definition:</em> Receptor identified as having moderate capacity to accommodate proposed form of change i.e. fluvial watercourse will reconfigure to optimise flow conveyance such that change will, after time, return to approaching baseline conditions.</td>
</tr>
<tr>
<td><strong>Very Low</strong></td>
<td><em>Water Quality Specific Definition:</em> Specific water quality conditions of receptor water feature likely to be able to tolerate proposed change with very little or no impact upon the baseline conditions. Water quality of receptor site could be expected to be classified under the WFD as poor or bad ecological status/potential. These rivers have severely restricted ecosystems and are very polluted. <em>Hydrology and Drainage Specific Definition:</em> Receptor identified as being generally tolerant to the proposed change.</td>
</tr>
</tbody>
</table>
ii. **Magnitude**

13.4.8 The magnitude of impact has been based on the consequences that the proposed development would have on the local surface water features and has been considered in terms of high, medium, low and very low (see Table 13.2). Potential impacts have been considered in terms of permanent or temporary, adverse (negative) or beneficial (positive) and cumulative.

13.4.9 Where an impact could reasonably be placed within more than one magnitude rating, conservative professional judgement has been used to determine which rating would be applicable.

13.4.10 All of the surface water impacts identified as a result of the proposed development have been assigned a level of magnitude in accordance with those definitions set out in Volume 1, Chapter 7 of this ES, and with the surface water specific definitions given in Table 13.2.

13.4.11 The following impact assessment has been undertaken which assumes that standard good practice working methods have been implemented on site and compliance with all rules and regulations governing the site. It should be noted that compliance with rules and regulations and standard good construction practices are not considered as formal mitigation (i.e. specific additional mitigation to reduce assessed moderate or major adverse impacts) within this ES.

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Description</th>
</tr>
</thead>
</table>
| High      | **Water Quality Specific Definition:**
            | Very significant change to key characteristics of the water quality status of the receiving water feature. Water quality status degraded to the extent that a permanent change and inability to meet EQS, for example, is likely. |
|           | **Hydrology and Drainage Specific Definition:**
            | Very significant change to key hydrological/hydraulic characteristics of the receiving water body to the extent that UK and European legislation is contravened. |
| Medium    | **Water Quality Specific Definition:**
            | Significant changes to key characteristics of the water quality status taking account of the receptor volume, mixing capacity, flow rate, etc. Water quality status likely to take considerable time to recover to baseline conditions. |
|           | **Hydrology and drainage specific definition:**
            | Significant changes to key run-off characteristics such that hydrological/hydraulic characteristics of the controlled water body are impacted to the extent that UK and European legislation is contravened. Changes are limited in time to the duration of the hydrological event that initiated the change (i.e. normal period of time over which water levels in watercourse receptors would be expected to rise and fall). |
| Low       | **Water Quality Specific Definition:**
            | Noticeable but not considered significant changes to water quality status of receptor water feature. Activity not likely to alter local status to the extent that water quality characteristics change considerably or EQS are compromised. Activities are likely to have an impact for a short time scale (e.g. relative to turnover of water feature) and baseline water quality conditions are maintained. |
|           | **Hydrology and drainage specific definition:**
            | Noticeable but insignificant changes to key run-off characteristics such that hydrological/hydraulic characteristics of receptor controlled water bodies would not contravene UK and European legislation. |
### iii. Significance of Impacts

13.4.12 The significance of the impact is judged on the relationship of the magnitude of impact to the assessed sensitivity and/or importance of the receptor. The methodology to assess the predicted significance of impacts, without mitigation, is outlined in **Volume 1, Chapter 7** of the ES.

13.4.13 This chapter describes the proposed mitigation measures to manage and reduce the identified effects on surface water within and in the immediate vicinity of the proposed development during the construction, operational and post-operational phases. For the purpose of this assessment, mitigation measures have been proposed where there is an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so.

### iv. Cumulative Impacts

13.4.14 **Volume 1, Chapter 7** of this ES sets out the methodology used to assess cumulative impacts. Additive and interactive effects between site-specific impacts are considered within this chapter. The assessment of cumulative impacts with other elements of the HPC Project and other proposed and reasonably foreseeable projects are considered in **Volume 11** of this ES.

#### e) Limitations, Constraints and Assumptions

13.4.15 Characterisation of surface water quality conditions has been based primarily on a desk-based exercise. It is assumed that the water quality data for the Cannington Brook presented on the Environment Agency's website (Ref. 13.49) is representative for this water body.

13.4.16 The hydrological and flood risks at the site were assessed using a hydrodynamic 1D-2D ISIS-TUFLOW model. This model was constructed in order to identify an initial flood extent on the floodplain and to provide necessary information such as flows, velocities, water depths and hazard ratings within the study area. The outputs from the model were used to evaluate the magnitude of flood risk and assess possible options for the sites. Specific limitations and constraints of the model are detailed in the **Cannington Park and Ride Flood Risk Assessment**.
13.5 Baseline Environmental Characteristics

a) Introduction

13.5.1 This section of the ES describes the baseline environmental characteristics for the site and surrounding areas with specific reference to water quality, hydrology and drainage.

13.5.2 Further information (including photographs and figures) relevant to the baseline and environmental characteristics of the proposed development are provided in the Cannington Park and Ride Flood Risk Assessment.

b) Study Area Description

13.5.3 The site covers a total area of 5.2ha, and is located on agricultural land, to the south-west of the village of Cannington. The site is bounded to the north, east and west by agricultural land; and to the south by the existing A39.

c) Environmental Overview

13.5.4 An overview of surface watercourses is provided as background information relevant to surface water quality, hydrology and drainage/flood risk. Additional background information on the site topography, geology, hydrogeology, and soils are discussed in Chapters 12 and 11 of this Volume.

i. River Parrett

13.5.5 The River Parrett is a tidal watercourse and is located approximately 2.5km to the north-east of the site.

13.5.6 The River Parrett rises at Cheddington, Dorset and flows westerly discharging into the Bristol Channel. The contributing catchment area (approximately 1,690km\(^2\)) of the River Parrett is predominantly rural. However there are a number of major settlements located in the low lying coastal zones. The tributary watercourses are characterised by a dense network of drainage channels with generally shallow slopes. The catchment within the low lying zone is characterised by a series of interconnecting field drains, known locally as rhynes.

13.5.7 Defences along the River Parrett are stated to offer protection against flood events with an annual exceedence probability (AEP) of 0.5% (1 in 200 year) (Ref. 13.51). However, due to the revised guidance on extreme tidal waters levels issued early in 2011 (Ref. 13.52), it has been identified that the River Parrett defences may not provide the previously anticipated standard of protection.

ii. Cannington Brook

13.5.8 The Sedgemoor Level 1 SFRA (Ref. 13.37) identifies that to the north-west of Bridgwater, several smaller catchments drain into the tidal River Parrett including the Cannington Brook, Currypool Stream and Durleigh Brook and that these may be a source of localised fluvial flooding.

13.5.9 The Cannington Brook flows in a north-easterly direction, to the west of the site. At its closest, the brook is approximately 25m from the site (beyond the Flood Relief Channel, FRC). The Cannington Brook has its headwaters in the Quantock Hills.
approximately 10km west of Cannington and merges with the River Parrett at approximate NGR 327765 140880. The contributing catchment (35km$^2$) is predominantly rural.

13.5.10 Two reservoirs lie on the Cannington Brook namely the Hawkridge Reservoir and Ashford Reservoir. The Cannington Brook has its confluence with the Currypool Stream approximately 2km west of Cannington. The Currypool Stream has a contributing catchment of 16.4km$^2$.

iii. Flood Relief Channel

13.5.11 The Cannington flood alleviation scheme was completed in 1984 and comprises a FRC around the village of Cannington. The FRC diverges from the Cannington Brook at approximate NGR 324955 139045 located to the west of the village and rejoins the Cannington Brook upstream of the sewage treatment works to the east of Cannington at approximate NGR 326220 139400.

13.5.12 The FRC forms the western and eastern boundary to the site, a sluice is located at approximate NGR 325348 139079 on the western boundary of the site, that can divert flow from the FRC back to the Cannington Brook.

13.5.13 The Cannington Flood Defence Scheme Pre-Feasibility Study (Ref. 13.53) identifies that with the existing FRC in place flooding of properties can be expected during a 10% AEP event. This includes overtopping of the banks in the fields immediately upstream of the village. The Pre-Feasibility Study (Ref. 13.53) also identified a number of potential scheme options including maintenance, flood warning and increasing the capacity of the FRC so that it can convey various peak flows up to the 1% AEP.

iv. Mill Stream

13.5.14 The Mill Stream runs adjacent to Brymore School access road, before passing under the High Street, approximately 220m north of the site. The Mill Stream is classed as an Ordinary Watercourse and SDC do not carry out any maintenance works to the watercourse. Therefore day to day maintenance is the responsibility of the riparian owners along its length.

13.5.15 No flood risk mitigation measures have been identified along this reach of watercourse, until the point where the watercourse enters the culvert under the High Street.

v. Drainage Ditches

13.5.16 Field drains were observed within the site and the surrounding area including along the A39 during the walkover surveys. The field drains contained either slow flowing or standing water at approximately 1-2m below the ground level of the surrounding flat-lying area. It is considered likely that this represents the groundwater level. The walkover surveys also highlighted that stands of vegetation in and around the field drains were abundant. However, many drains had a total or partial covering of algae on the water surface, which is often a visual indication of nutrient enrichment.
vi. Existing Surface and Foul Water Drainage Arrangements

13.5.17 Information on the existing surface water and sewer systems in the vicinity of the site was obtained from Wessex Water. This information is presented in the Cannington Park and Ride Flood Risk Assessment and shows that there is limited formalised surface water drainage within the village of Cannington. The information shows that there are no surface water drains running along either the High Street (to the north of the site) or the A39 (to the south of the site).

13.5.18 The closest formal surface water drainage is located within Mill Close where a 225mm pipe discharges directly into Cannington Brook. Additionally, there is a 225mm pipe within the residential development located to the east of the site which is understood to flow into the FRC upstream of the culverts under the A39 roundabout.

13.5.19 Due to the current greenfield nature of the site, there is no foul water drainage network from the site.

vii. Gauging Station Data

13.5.20 The Environment Agency provided gauge information for a number of gauges that are located in the vicinity of the site. Table 13.3 provides a summary of the gauges.

<table>
<thead>
<tr>
<th>Name</th>
<th>Station No.</th>
<th>Location</th>
<th>NGR</th>
<th>Record</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currypool</td>
<td>520710</td>
<td>Currypool Farm</td>
<td>322100</td>
<td>1/1/1992 - present</td>
<td>Flow/Level</td>
</tr>
<tr>
<td>Brymore School</td>
<td>404580</td>
<td>Cannington</td>
<td>324400</td>
<td>1/5/1999 – 1/9/2010</td>
<td>Storage Rain</td>
</tr>
<tr>
<td>Rivers House</td>
<td>403538</td>
<td>Bridgwater</td>
<td>330100</td>
<td>4/12/1994 - present</td>
<td>Storage/TBR Rain</td>
</tr>
</tbody>
</table>

13.5.21 The only flow gauging station in the vicinity of the site is located at Currypool Farm which monitors surface water volume for the Currypool Stream at Currypool Farm. The gauging station is 2.5km to the west of the site, and as such is not closely linked to the site and the immediate watercourse (i.e. Cannington Brook). The Currypool stream is a tributary of Cannington Brook downstream of the outfall from Ashford Reservoir. The mean flow rate reported in the UK Hydrometric Register (Ref 13.54) for the period 1971 to 2005 was 0.21m$^3$/s. Flow varies seasonally with a summer low flow (Q95) of 0.06m$^3$/s and a winter high flow (Q10) of 0.6m$^3$/s. The 30 year (1961 to 1990) average annual rainfall for the Currypool Stream catchment is 957mm.

13.5.22 The gauging station datasheet describes the river catchment as agricultural land with its headwaters predominantly in an Old Red Sandstone geological setting, draining the Quantock Hills from 384m AOD to 49m AOD at the gauging station.
viii. Water Quality

Parrett WFD Water Body

13.5.23 Surface water quality of the tidal River Parrett has not historically been monitored by the Environment Agency, as part of the River Ecosystem Classification Scheme (which is the largest dataset of surface water quality collected nationwide).

13.5.24 As part of the WFD South West River Basin Management Plan the Environment Agency has characterised and published data on the current ecological status of the tidal River Parrett.

13.5.25 The WFD transitional water body description table for the local stretch of the River Parrett is presented in Annex B of the South West RBMP (Ref. 13.30). The RBMP defines the River Parrett as a ‘Heavily Modified’ watercourse (designated due to flood protection structures) with a current ecological potential status of ‘Moderate’. Chemistry data has been used to define several chemical supporting elements and the collective chemical status (a single element that contributes to the overall status definition) is defined as ‘Good’. The current ecological status and the status objectives for this water body are based on expert judgement. The current moderate ecological potential classification resulting from a mitigation measures assessment has been attributed to a lack of implemented mitigation measures deemed necessary for this type of heavily modified water body (Ref. 13.30). It is judged to be technically infeasible to put all these required mitigation measures (such as managed realignment of flood defences) in place by 2015, hence the predicted status by 2015 remains at ‘Moderate’ (target status is good by 2027).

Cannington Brook WFD Water Body

13.5.26 Surface water quality of the Cannington Brook has been monitored by the Environment Agency in 2009, (Ref. 13.49) as part of the General Quality Assessment (GQA) Scheme for biology, chemistry and nutrients. The Bradley Green-Cannington monitoring point is located on the Cannington Brook on the eastern edge of Cannington; upstream of the confluence between the FRC and the Cannington Brook. The results of this assessment were A (very good) for chemistry, biology was not measured, nitrate was ‘3’ and phosphate was ‘4’ (using a 1-6 scale representing very low levels to very high levels).

13.5.27 As part of the WFD South West River Basin Management Plan the Environment Agency has characterised and published data on the current ecological status of the Cannington Brook WFD water body.

13.5.28 The WFD surface water body description table for the Cannington Brook is presented in Annex B of the South West RBMP (Ref. 13.30). The RBMP defines the Cannington Brook as a ‘Heavily Modified’ watercourse (designated due to flood protection structures) with a current ecological potential status of ‘Poor (Uncertain)’. Although no assessment of chemical status was made for this water body, chemistry data has been used to define several chemical supporting elements and the collective chemical status (a single element that contributes to the overall status definition) is defined as ‘Moderate’ due to phosphate. All other supporting chemical elements were judged to be either ‘High’ or ‘Good’.
13.5.29 The current poor ecological potential classification resulting from a mitigation measures assessment has been attributed to the ecological assessment for fish, although this is predicted to attain ‘Good’ status by 2015 because the Mitigation Measures that defined the ecological potential are all in place (Ref. 13.30). It is judged to be disproportionately expensive to bring about improvements necessary to achieve good status for invertebrates and chemical supporting elements (specifically phosphate) by 2015. Therefore, an alternative target of 2027 has been put forward for attainment of overall good ecological status.

13.5.30 No Environment Agency monitoring data are available for the FRC, the Cannington Brook downstream of the FRC or the drainage ditches adjacent to or close to the site (search area of 500m).

**Abstraction and Discharge Consents**

13.5.31 There are four groundwater abstraction licences within an approximate 1km radius of the site. The nearest two abstraction licences are from boreholes located approximately 500m to 550m to the north-east at Bridgwater College, Cannington. The abstractions are for general farming and domestic use.

13.5.32 The remaining two groundwater abstraction licences are held by Yeo Valley Organic Company Limited at locations approximately 550m to 620m to the south-west of the site. The abstractions are for general dairy use and/or spray irrigation.

13.5.33 There are no records of private abstraction boreholes within a 500m radius of the site.

13.5.34 Records exist for four discharge consents for discharges to bodies of surface water within 1km of the site. Three of these have been revoked. The remaining active consent is located on the Mill Stream approximately 670m to the north-west of the site for discharge of treated sewage effluent.

**ix. Hydrology and Flood Risk**

13.5.35 This section considers the baseline flood risk characteristics for the site. Further details are provided in the **Cannington Park and Ride Flood Risk Assessment**.

**Tidal Flood Risk**

13.5.36 The Environment Agency’s flood map (Ref. 13.55) indicates that the site is located within Flood Zone 1, which is the zone with low probability of flooding. This zone comprises land assessed as having <0.1% (less than 1 in 100 year) Annual Exceedence Probability (AEP) of river or sea flooding in any year.

13.5.37 However, the Sedgemoor Level 1 SFRA (Ref. 13.37) reports a number of locations that are susceptible to the effects of coastal and tidal flooding. Potential flooding to the site would be from the tidal River Parrett which is approximately 2.5km to the north-east. The Draft Parrett Estuary Flood Risk Management Strategy (Ref. 13.51) also states that the flood defence along the River Parrett provide a 0.5% AEP (1 in 200 year event) level of protection.

13.5.38 Details of the flood risk proposed to the site from tidal flooding were investigated as part of the **Cannington Park and Ride Flood Risk Assessment**.
13.5.39 The hydraulic modelling presented in the **Cannington Park and Ride Flood Risk Assessment** combined low order fluvial return period events (e.g. 50% AEP) with high order tidal events (e.g. 0.5% and 0.1% AEP) and vice versa.

13.5.40 The modelling concluded there was no flooding to the site from scenarios that included high order tidal events, namely the 0.5% AEP tidal event, 0.5% AEP tidal event including an allowance for climate change and the 0.1% AEP tidal events. In addition, no flooding was reported to the site as a result of overtopping or breaching of the River Parrett tidal defences.

**Fluvial Flood Risk**

13.5.41 The site is located within the Cannington Brook catchment which flows into the tidal River Parrett. The Environment Agency’s flood map (Ref. 13.55) indicates that the site is located within Flood Zone 1 which is the zone with low probability of flooding. This zone comprises land assessed as having <0.1% AEP of river or sea flooding in any year.

13.5.42 However, the Level 1 SFRA report (Ref 13.37) covering the site identified that the Cannington Brook, among a series of other small catchments, may be a source of localised fluvial flooding. Further to this the Pre-Feasibility Study (Ref 13.53) identified that Cannington village is susceptible to flooding from the Cannington Brook with the main cause of flooding being the limited capacity of the Brook and controlling structures.

13.5.43 Details of the flood risk to the proposed development site from fluvial flooding were investigated as part of the **Cannington Park and Ride Flood Risk Assessment**.

13.5.44 The results of the modelling in the **Cannington Park and Ride Flood Risk Assessment** found that the site lies within Flood Zone 2 as a result of fluvial flooding from the FRC. The modelling showed there to be no flooding to the site during the 1% AEP (1 in 100 year) fluvial event when combined with a 100% AEP (1 in 1 year) tidal event. Flooding was identified to the north east corner and the eastern boundary during a 1% AEP (1 in 100 year) fluvial event including an allowance for climate change and across the majority of the site during the extreme 0.1% AEP (1 in 100 year) fluvial event when combined with a 100% AEP (1 in 1 year) tidal event.

13.5.45 Depths of water across the site would be generally less than 50mm for the 1% AEP (1 in 100 year) fluvial event including an allowance for climate change and the 0.1% AEP (1 in 100 year) fluvial.

**Combined Fluvial and Tidal Flood Risk**

13.5.46 The modelling included in the **Cannington Park and Ride Flood Risk Assessment** assesses the flood risks arising from a combined fluvial and tidal event. The hydraulic model runs presented in the **Cannington Park and Ride Flood Risk Assessment** included low order fluvial return period events (e.g. 50% AEP) with high order tidal events (e.g. 0.5% and 0.1% AEP) and vice versa.

13.5.47 The results of the modelling indicated that there was no risk to the proposed development under existing conditions from the combined scenarios that combined high order tidal events with low order fluvial events. However, the modelling did highlight the potential risk of flooding for modelling scenarios that combined 1% AEP...
(1 in 100 year) fluvial event with an allowance for climate change with a low order tidal event and the extreme 0.1% AEP (1 in 1000 year) fluvial event with a low order tidal event as discussed above.

**Groundwater Flood Risk**

13.5.48 The Level 1 SFRA report indicates minimal risk of groundwater flooding with only one recorded incidence of groundwater flooding, which was not within the Cannington area. Additionally, reference was made to the Groundwater Vulnerability Map and Source Protection Zones produced by the Environment Agency. These indicate that Sedgemoor District is predominantly underlain by low permeability aquifers and therefore is not a source of significant groundwater flood risk. There may be a limited risk of groundwater flooding across the site as the soil types present may be subject to seasonal water-logging.

13.5.49 The Environment Agency comments regarding the Hinkley Point C Pre-Application Consultation – Stage 1 Document identified a potential groundwater contamination issue in the vicinity of the water filled dormant quarry, approximately 1.2km to the north-west of the site. Due to the distance of the proposed development from the dormant quarry, it is anticipated that there will be no or limited groundwater hydraulic connectivity that would allow significant migration of contaminated groundwater between the sites.

13.5.50 Additionally, key licensed groundwater abstractions have been identified in the vicinity of the Cannington Creamery site and Bridgwater College. As part of the management and attenuation of surface water drainage from the proposed development, it will be necessary to ensure that run-off is treated appropriately to protect groundwater in this location. In addition, surface water will be conveyed towards the east, away from the groundwater abstractions.

**Surface Water (Pluvial) Flood Risk**

13.5.51 Extreme rainfall events can cause localised flooding at sites located far from fluvial or tidal sources. Such flooding, known as surface water flood events, can be the result of, or exacerbated by, poor drainage designs of new or existing developments.

13.5.52 The Sedgemoor Level 1 SFRA (Ref 13.37) highlighted historical flooding incidents within Cannington from surface water flooding.

13.5.53 Using Light Detection and Ranging (LiDAR) data, it has been possible to establish that existing ground levels in the developed areas to the south-east of Cannington (close to Main Road and Southbrook Close) are lower compared with the surrounding area (i.e. between approximately 8.4m AOD and 11.0m AOD). It is noted that these are locations where surface water flooding has occurred and therefore may be partially a result of localised ponding of water.

13.5.54 In comparison, analysis of the LIDAR data across the site found that ground levels are approximately 14.1m AOD at the lowest point in the south-east corner with the remainder of the site rising to a maximum ground level of approximately 17.0m AOD. The site is therefore elevated relative to adjacent land and is therefore unlikely to be affected by any surface water flooding and ponding occurring in these areas.
13.5.55 The proposed development will be provided with an adequate drainage system by means of SuDS to drain surface run-off from the built up area. It is therefore unlikely that the area will be affected by surface water flooding from the proposed development.

**Sewer Flood Risk**

13.5.56 Details of sewer flooding within the study area have been obtained from the Level 1 SFRA report (Ref. 13.37) which provides evidence taken from the Wessex Water DG5 Asset Register. According to the Level 1 SFRA report, there has been one recorded incidence of sewer flooding in the village of Cannington.

13.5.57 The sewer flooding incident in Cannington was located within the village close to the junction of the High Street and Chads Hill. This location is approximately 375m from the northernmost point of the site, and located beyond both the FRC and Cannington Brook. As stated above, the site is currently greenfield land and contains no formalised surface water or foul water sewers. It is therefore considered that the risk of sewer flooding to the proposed development is negligible.

**Flood Risk from Reservoirs and Other Artificial Sources**

13.5.58 Flooding from artificial sources includes reservoirs, canals and lakes where water is retained above the natural ground level. Two reservoirs are located upstream of the site; the Hawkridge Reservoir located at NGR 321128 136390 approximately 6km upstream of the site and the Ashford Reservoir at NGR 323553 138335 approximately 2km upstream. The reservoirs collect and store water from the Cannington Brook to provide drinking water for the town of Bridgwater. A review of the Environment Agency ‘Risk of Flooding from Reservoirs Map’ (Ref. 13.49) indicates that in the event of a breach in either or both reservoirs, flows would be conveyed down the Cannington Brook and present a flood risk to the site. There are no other artificial sources affecting the site.

**Summary of Flood Risk**

13.5.59 A PPS25 compliant FRA has been prepared for the proposed development. The *Cannington Park and Ride Flood Risk Assessment* report has a more detailed description of the flood risks and proposals for management of drainage on the site. The aim of the *Cannington Park and Ride Flood Risk Assessment* is to ensure that development occurs in a safe manner, such that new development is not located in flood risk areas, and that flood risk and consequence to surrounding areas is not increased as a result of the development.
13.5.60 **Table 13.4** summarises the potential flooding mechanisms to the site at present.

<table>
<thead>
<tr>
<th>Flood Mechanism</th>
<th>Potentially Affecting the Proposed Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tidal</td>
<td>Low probability</td>
</tr>
<tr>
<td>Fluvial</td>
<td>Would affect the proposed development - but mitigation and residual risk addressed in the accompanying FRA</td>
</tr>
<tr>
<td>Combined tidal and fluvial</td>
<td>Low probability</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Low probability</td>
</tr>
<tr>
<td>Surface water resulting from rainfall (pluvial)</td>
<td>Low probability</td>
</tr>
<tr>
<td>Sewer</td>
<td>Low probability</td>
</tr>
<tr>
<td>Non-natural water bodies</td>
<td>Low probability</td>
</tr>
</tbody>
</table>

d) **Potential Receptor/Sensitivity**

13.5.61 The proposed development has the potential to directly affect those watercourses and drainage ditches rising within the site boundary and/or in the vicinity of the site boundary, either though discharges from the site, or through removal or morphological alteration of the watercourses themselves.

13.5.62 The two main surface water receptors identified in the study are:

- the Cannington Flood Relief Channel; and
- the A39 field drain.

13.5.63 The Mill Stream is not considered to be a potential receptor for surface water impacts from the proposed development, as there is no surface water pathway between the proposed development and this receptor.

13.5.64 The River Parrett is not considered to be a potential receptor for surface water impacts because of the distance from the proposed development and because any impacts will be avoided by protection of the upstream watercourses that flow into the River Parrett.

13.5.65 The Cannington Brook is located close to (approximately 25m at its closest point) the site boundary; however it is located beyond the Cannington FRC which runs approximately along the eastern and western edges of the site. The Cannington Brook is therefore physically removed from direct water quality status influences. The sensitivity score of the FRC has been increased to take account of the downstream water quality status of Cannington Brook (see below).

13.5.66 None of the abstractions identified are considered to be affected by surface water management at the proposed development. This is because they are not situated within the surface water catchments affected by proposed development, and because there is unlikely to be significant groundwater flow from the site area, due to the low permeability of the underlying geology.
13.5.67 The FRC on the west and east side of the site:
- is not a designated WFD water body;
- does not have an assigned Chemical Grade;
- does not have a River Eco-system Classification Grade; and
- is not used for licensed abstraction.

13.5.68 By considering these properties of the drain, the sensitivity of the FRC receptor would be considered to be very low in relation to water quality.

13.5.69 The FRC connects to the Cannington Brook. Cannington Brook is designated as a WFD water body, with a current ecological status of ‘Poor (Uncertain)’ (Ref. 13.30); however, the chemical classification provided by the GQA Scheme was ‘very good’ for chemistry. The supporting chemical elements for the WFD classification were classed as ‘moderate’ due to the phosphate status. The restricting factor, preventing Cannington Brook achieving a good chemical status is phosphate. It is possible that the phosphate concentrations may be influenced by run-off from the proposed development and therefore this receptor may be viewed as potentially sensitive to run-off impacts. A sensitivity score of medium is appropriate for Cannington Brook, however this rating is applied to the FRC receptor, which subsequently flows or is directed into Cannington Brook. The FRC has thus been given a proxy sensitivity of medium, in order to protect the downstream Cannington Brook.

13.5.70 The Cannington Brook and the FRC have each been assigned a medium value/sensitivity in relation to hydrology and drainage. This rating reflects their importance in the drainage of the wider catchment area; their assignment of Main River status, and their conveyance of surface water through and near the village of Cannington.

13.5.71 The final receptor considered is the drainage ditch running parallel to the A39 which discharges to the Cannington FRC. This drainage ditch receives road drainage from the A39 and is expected to exhibit poor water quality conditions. Flows within this drainage ditch are variable and expected to approximate zero during occasions of prolonged dry weather. The ditch is not subject to water quality monitoring and there are no surface water abstractions reliant upon it. There are no planned discharges to the A39 drainage ditch and therefore although the ditch flows into the Cannington FRC, it is not appropriate to upgrade its sensitivity based upon the downstream Cannington Brook. The A39 drainage ditch is retained as a potential receptor in this assessment because it is adjacent to the site and it has been determined to have a value/sensitivity of very low.

13.5.72 Together, the receptors listed above, comprise the non-population surface water receptors that could be potentially affected by the proposed development of the site.

13.5.73 It is also important to acknowledge the potential (although unlikely) surface water impacts of the proposed development upon nearby population and properties.

13.5.74 The nearest major development is the village of Cannington which is located east and immediately adjacent to the site. The extent of the village is shown on Figure 13.1.
13.5.75 This receptor has been assigned a high level of sensitivity, for hydrology and drainage considerations.

**e) Potential Receptor/Sensitivity**

13.5.76 **Table 13.5** summarises the value and sensitivity of surface water receptors near to the site, which have been used within the impact assessment stage of this study (Section 13.6).

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Value and Sensitivity</th>
<th>Rating</th>
<th>Summary Explanation</th>
</tr>
</thead>
</table>
| Cannington FRC | Medium | Medium | **Water quality** Increased sensitivity given to this receptor in order to afford protection for the downstream Cannington Brook (see discussion above).  
**Hydrology** The FRC is classified as a Main River. A key flood alleviation scheme for the village of Cannington. The FRA for the Cannington Bypass has indicated that the route is not at risk of flooding from the FRC. |
| Cannington Brook | n/a | n/a | Afforded protection via the Cannington FRC, which is the direct receptor. |
| The open drainage ditch adjacent to the A39 | Very Low | Very Low | **Water quality** Poor water quality status.  
**Hydrology** Receptor considered as being tolerant to the proposed change. |
| Nearby population and properties - Cannington Off-site | n/a | High | **Water quality** Not required.  
**Hydrology** Existing population located in area protected by existing flood defences. Sensitivity relates to any changes to relative flood risk protection caused by the Cannington Bypass development. |

**13.6 Assessment of Impacts**

13.6.1 In this section, potential impacts on surface water conditions associated with the proposed development are assessed. The assessment has been undertaken in line with methodology detailed in Section 13.4 of this chapter and assumes legislative compliance and the adoption of standard good practice.

**a) Development Description**

13.6.2 The site is approximately 5.2ha of which 1.42ha would be impermeable. The proposed development would provide two separate car parks to manage the flow of
The proposed development includes a number of design features which are relevant to the assessment of surface water impacts. These features are:

- bespoke drainage strategy for the proposed development; and
- design height for the proposed development close to existing ground levels.

These specific design elements are discussed in detail below:

**b) Proposed Drainage Strategy**

The proposed development has the potential to increase the volume of run-off and reduce the time in which surface water reaches the receiving watercourses if not controlled. This has implications for channel stability, aquatic habitats and flooding.

A drainage strategy has been prepared for the site and is a key element of the design of the site, with respect to surface water management. The drainage strategy is included in full in the *Cannington Park and Ride Flood Risk Assessment*.

The Environment Agency requires that flow attenuation measures be incorporated such that discharge to the receiving watercourses is no greater than the Greenfield run-off rates. The proposed development site is approximately 5.2ha of which 1.42ha would be impermeable. The Greenfield run-off rate has been calculated using the IOH124 method as recommended in the Interim Code of Practice for SuDS (Ref. 13.56) and by the Environment Agency’s guidance ‘Preliminary Rainfall Runoff Management for Developments’ (Ref. 13.57). Using these methods the mean (Q_{BAR}) Greenfield run-off rate has been calculated to be 5.3l/s/ha for the site. This equates to a permittable discharge rate of 12.5l/s in order to meet Greenfield run-off rates.

The proposed development has been divided into two areas for the purposes of the surface water drainage design and the development of a SuDS based strategy. The two areas are the parking area and the bus stops area including the access road from the A39 highway. Although the two areas would comprise individual elements for the drainage design, they would combine to discharge via a detention pond into the FRC. It is proposed to facilitate the use of a detention pond, primarily for the storage/control of storm water in order to alleviate flood risk.

The parking area would use permeable pavement areas in order to allow storm water to infiltrate into the sub-base. Ground investigations have revealed that ground conditions are not suitable for soakaways. Therefore, the sub-base would be used to convey and store water prior to discharge through a surface water drainage pipe. This surface water drainage pipe would convey storm water to the detention pond and ultimately into the FRC.

Storm water from the proposed bus stops area and access road from the A39 highway would be drained by a system of channels and gullies. All drainage flows...
would be transferred into carrier drains, conveying flow to the detention pond, prior to discharging by gravity, to the proposed outfall into the FRC.

13.6.11 Assuming that the drainage infrastructure will be in place ready to receive run-off during the majority of the construction phase, then the design features of the proposed drainage system will limit the impact of any pollutants. The gravel-based permeable parking areas/sub-base and the Petrol Interceptor would provide primary treatment for non-aqueous phase hydrocarbons. The detention basin would allow sedimentation of suspended solids from construction activities.

13.6.12 The provision of the SuDS features (including detention basins, permeable pavements and petrol interceptors) will ensure that the off-site impacts of the surface run-off from the proposed development are managed effectively. An appropriate maintenance plan will be included in the detailed design phase to ensure the continued effectiveness of the SuDS features over the operational life of the facility.

13.6.13 The operational foul drainage system for the site will comprise a small package waste water treatment plant, which would be located to the north of the site access in the vicinity of the main welfare building. The treatment works will accept flows from each of the proposed buildings, and will be built in order to accept an average flow of 0.0285l/s, equating to a daily flow rate of 2,462l, or 2.5m$^3$, assuming a 24 hour day.

13.6.14 For grey and blackwater discharges from the welfare buildings, the proposed package waste water treatment plant would be designed to comply with the standards as dictated by an Environmental Permit issued by the Environment Agency. The treated water would then discharge into the proposed surface water drains for conveyance and attenuation via the detention pond.

13.6.15 It is expected that development of the surface water drainage infrastructure would be completed early on in the construction phase. Prior to the completion of the drainage infrastructure, surface water drainage will need to be collected in temporary lagoons as a means of primary treatment for waters containing significant quantities of suspended solids. Foul drainage during the construction phase would be collected and stored in sealed storage tanks prior to off-site disposal.

Design Measures which will Reduce Surface Water Impacts

13.6.16 Drainage elements and management plans will adhere to the Environment Agency’s pollution prevention guidance, drainage control measures and other environmental measures. These may include:

- minimising the stockpiling of materials and locating essential stockpiles as far away as possible from drainage networks;
- oil storage and refuelling facilities;
- use of biodegradable lubricants;
- oil/water separators prior to discharge to remove hydrocarbon contaminants;
- strict control of concrete use;
- measures to reduce the generation of sediment-laden drainage at source within construction areas;
• use of temporary drainage systems developed to cover interim periods during the construction of the permanent drainage system;
• use of temporary foul water drainage storage tanks to cover interim periods before the waste water treatment works is operational;
• use of storage lagoons to attenuate flows and settle sediment out of suspension; and
• drainage control to ensure run-off does not exceed the agreed rates.

13.6.17 EDF Energy would directly appoint a suitable experienced contractor for construction and maintenance works. During the tendering process the expected environmental requirements would be included in the tender documents, so that all contractors allow for standard environmental control measures in their method statements and staffing and budgetary provisions.

c) Construction Impacts

13.6.18 A description of the construction area, methods and materials to be used for the proposed development is described in Chapter 3 of this volume of the ES. This section identifies and assesses the potential impacts of the construction phase on water quality, hydrology and drainage related receptors.

13.6.19 Environmental impacts and disturbance arising from construction activities will be managed through a range of control measures and monitoring procedures, the principles of which are outlined in the Environmental Management and Monitoring Plan (EMMP) with further details provided in the Water Management Plan (WMP).

13.6.20 The assessment of potential impacts to surface waters assumes good construction methodologies and pollution prevention guidance is adhered to. The drainage design and the implementation of the EMMP give due regard to good working practices and these have been considered in deriving impact magnitude ratings. Some key elements of the protective design and construction practices to be implemented are discussed in this section.

13.6.21 The identified impacts have been based upon the existing drainage strategy included in the Cannington Park and Ride Flood Risk Assessment.

i. Water Quality

13.6.22 Routine construction activities can result in impacts upon receiving surface waters.

13.6.23 Construction activities that can generate potentially polluted surface water discharge include the following:

• earthworks and stockpiled materials;
• fuel storage and refuelling areas; and
• car parking and plant machinery storage areas.

13.6.24 The principal pollutants of concern that could affect surface waters during the construction phase would be suspended solids, hydrocarbons and their additives, and concrete leachate. The design features of the drainage strategy and adoption of best practice construction techniques and surface water management will effectively
reduce the magnitude of potential water quality impacts arising through all phases of
the scheme.

13.6.25 The definition of water quality construction impacts has assumed that good
construction site practice will be adopted. Due regard for the Environment Agency
PPGs will be made. The WMP sets out the principles and measures which would
ensure the careful management and monitoring of construction practices at
Cannington Park and Ride, with respect to surface water and sediment control.

13.6.26 The potential construction related activities which may affect the two water quality
receivers as described in Table 13.5 are:

- sediment laden run-off;
- run-off contaminated with hydrocarbons;
- run-off contaminated with concrete leachate; and
- grey and blackwater discharges.

**Sediment Laden Run-off**

13.6.27 Increased suspended sediment concentrations can have a negative impact on the
water quality within a water feature. Impacts are generally related to:

- changes in temperature regime resulting from shallowing of the water body
  caused by siltation;
- physical disturbance effects;
- increases in turbidity; or
- mobilisation of sediments that are contaminated or are rich in organic matter or
  nutrients.

13.6.28 Two water quality receptors have been identified which may be directly impacted by
sediment-laden run-off, i.e. the Cannington Flood FRC, particularly during
construction of the drainage discharge point and headwall, and the A39 drainage
ditch. The value/sensitivity of each of these receptors is presented in Table 13.5.

13.6.29 The potential impact of sediment laden run-off, after taking account of the various
project design measures, which are specifically designed to reduce environmental
impacts from the scheme, is found to be local in extent, temporary in nature, a direct
result of the scheme and to have a likelihood of possible on each of the two surface
water quality receptors.

13.6.30 In addition to project design measures, the detention pond will help to remove
sediment from suspension. The potential magnitude of potential construction phase
sediment laden run-off impacts on the Cannington FRC is assessed to be low. The
lack of a pathway for discharges to impact upon the A39 drainage ditch further
reduces the potential magnitude to very low in relation to this offsite receptor.

13.6.31 The potential impact significance from sediment laden run-off is determined to be
**minor adverse** on the Cannington FRC and **negligible** with regards to the A39
drainage ditch.
13.6.32 The primary source of potential hydrocarbons at the proposed development, during the construction phase is the use of heavy plant and equipment.

13.6.33 Construction practices will follow best practice guidance and discharges to surface watercourses will take place under Environmental Permit (or other conditions). Design measures that form part of the drainage infrastructure, i.e. petrol interceptors, will remove hydrocarbons. These factors reduce any potential magnitude of hydrocarbon impacts on the Cannington FRC to low. Because there is a lack of pathway by which the A39 drainage ditch may receive discharges the potential magnitude on this receptor is determined to be very low.

13.6.34 Any potential impacts that are caused will be local and temporary in nature.

13.6.35 The significance of potential impact caused by run-off contaminated with hydrocarbons to the Cannington FRC is assessed to be minor adverse. The similar impact upon the A39 drainage ditch receptor (when the sensitivity ratings presented in Table 13.5 are considered) is determined to be negligible.

13.6.36 Run-off contaminated with concrete leachate if allowed to enter watercourses can cause rapid changes to pH.

13.6.37 A limited number of construction phase works elements may include the pouring of concrete in-situ. Potential tasks which may include the use of concrete in-situ include:

- construction of footings and foundations associated with new buildings;
- concrete associated with road construction, e.g. for kerb areas; and
- concrete associated with headwall or discharge structures where necessary.

13.6.38 Factors that have been considered in the assessment of potential impact magnitude include the local (spatial scale) and temporary (temporal scale) nature of impact extent. The likelihood of potential impacts is considered to be unlikely with regards to the two identified receptors (see Table 13.5 and Table 13.6) given the limited necessity for concrete use and the best practice methodologies which are integrated into the construction working procedures. The magnitude for potential concrete leachate impacts is assessed to be very low in each case. The value/sensitivity of those water quality receptors that may be affected by concrete leachate impacts are presented in Table 13.5. The significance of potential concrete leachate impacts are found to be minor adverse with respect to the Cannington FRC and negligible in relation to the A39 drainage ditch.

Grey and Blackwater Discharges

13.6.39 Prior to the commissioning of the waste water treatment plant and the associated drainage infrastructure, foul drainage during the construction phase will be collected and stored in sealed storage tanks and tankered off-site for disposal at a licensed facility. There will be therefore be no discharge of grey or blackwaters to surface waters prior to the commissioning of the package treatment plant.
13.6.40 A waste water treatment plant will treat grey and blackwater before discharging treated effluent into the detention pond and the surface water drainage system. The development proposals include provision for a waste water treatment plant that will achieve effluent quality of 5mg/l ammoniacal nitrogen, 20mg/l BOD and 30mg/l suspended solids (on a 95 percentile basis). In dry conditions the discharge is likely to receive little, if any, dilution from the surface water drainage system prior to release into the Cannington FRC. There may be potential for dilution and natural biological treatment within the detention pond and the Cannington FRC, depending on flow conditions.

13.6.41 The discharge of all grey and blackwater effluents will comply with effluent quality and discharge volume limits that will be specified in the Environmental Permit for the site. In setting the conditions on the Environmental Permit, the Environment Agency will have due regard for upstream and downstream users and the water quality status of the receiving watercourse to ensure there is no significant water quality or resource impact.

13.6.42 The project design dictates that the grey and blackwater effluent quality limits (which have yet to be defined) contained within the associated Environmental Permit will be met and this has been taken into account within the assessment of potential surface water quality impacts.

13.6.43 As the Environmental Permit conditions by definition will ensure there is no degradation to the downstream surface water environment, the magnitude of potential impact on the Cannington FRC is assessed to be low. Any potential impact will be direct (a direct result of the scheme), localised, temporary in nature and likely to occur (foul waters will definitely be generated and therefore it is accepted that some level of impact is likely to occur). The value/sensitivity of those water quality receptors that may be affected by grey and blackwater impacts are presented in Table 13.5. The significance of potential grey and blackwater discharge impacts is found to be minor adverse.

ii. Hydrology and Drainage

13.6.44 The four hydrology and drainage related construction impacts that have been identified are:

- increase in flood risk due to a reduction in flood plain storage;
- alteration to the Cannington FRC at the proposed outfall location;
- impact upon the catchment areas of the existing A39 drainage ditch; and
- increase in surface water run-off due to construction activities.

*Increase in Flood Risk due to a Reduction in Flood Plain Storage*

13.6.45 Modelling results undertaken in the Cannington Park and Ride Flood Risk Assessment have shown that the site is located within Flood Zone 1 and Flood Zone 2 with respect to flooding from the FRC. Flood Zone 1 represents the zone with a low probability of flooding. This zone comprises land assessed as having a less than 0.1% AEP of river or sea flooding in any year. Flood Zone 2 represents the zone with a medium probability of flooding. This zone comprises land assessed as
having between 1% -0.1% AEP of river flooding in any year. As a result there may be a small amount of displacement of flood water and loss of floodplain storage.

13.6.46 The impact of this flood risk has been mitigated as part of the design whereby the change in ground level post-development is minimal and therefore the displacement of water is considered to be minimal. With these measures in place, it is expected that the magnitude of potential impact is very low. The value and sensitivity of the receptor concerned is high. The significance of impact to residents of Cannington is therefore assessed as minor adverse.

Alteration to the Cannington FRC at the Proposed Outfall Location

13.6.47 The drainage strategy for the site proposes discharge of surface water from the proposed development into the Cannington FRC. This is illustrated in Figure 13.1

13.6.48 It is expected that any construction activities required to develop a connection near to the FRC would be short term and be limited in geographical extent. As a result the magnitude of potential impact is assessed as low. The value and sensitivity of the receptor concerned is assessed as medium. The significance of impact on the drainage ditch is therefore assessed, as minor adverse.

Impact on the Catchment Area of the Existing A39 Drainage Ditch.

13.6.49 Excavation activities within the catchment area of the A39 drainage ditch could result in a small loss of area contributing run-off, which may lead to some local change in flow regime in the immediate vicinity of the site. However, given the small areas involved, the magnitude of the potential impact is assessed as very low. The value and sensitivity of the receptor concerned is assessed as very low. The significance of impact on the drainage ditch is therefore assessed as negligible.

Increase in Surface Water Run-off due to Construction Activities

13.6.50 Changes in permeability have the potential to increase surface water run-off and as a result increase flows in the surrounding watercourses/ditches if not controlled.

13.6.51 It is proposed to facilitate the use of a detention pond located in the south-east corner of the site that will discharge into the FRC, the SuDS feature would be for the storage/control of highway storm water during operation as well as during construction.

13.6.52 It is intended to build the pond early in the construction scheme in order to collect and control surface water run-off from construction activities. Until the detention pond is commissioned, it is expected that any excess surface run-off would be channelled to an appropriate temporary soakaway area.

13.6.53 The detention pond would attenuate surface water generated by the proposed development to allow surface water run-off to discharge at the greenfield run-off rate, this would be regulated by a suitable control mechanism (such as a Hydrobreak).

13.6.54 Results presented in the drainage strategy in the Cannington Park and Ride Flood Risk Assessment show that the detention pond requires a capacity of 800m$^3$ in order to accommodate the run-off generated for the 1% AEP event (1 in 100 year event) including a 10% allowance for climate change.
Drainage control measures being considered for the proposed development include permeable pavements, gullies, surface water drainage pipes and a detention pond. In line with SuDS principles (Ref. 13.44), these would be designed to attenuate run-off at source where possible, prior to discharging to the FRC.

With these measures in place, it is expected that the magnitude of potential impact would be very low. The value and sensitivity of the receptor concerned has been assessed as high. The significance of impact to residents of Cannington is therefore assessed as minor adverse.

d) Cumulative Construction Impacts

i. Water Quality

Any cumulative impacts that may occur within the study area are no greater in magnitude than the individual, component impacts that have already been identified.

ii. Hydrology and Drainage

Any cumulative impacts that may occur within the study area are no greater in magnitude than the individual, component impacts that have already been identified.

As stated above, the drainage system is designed to collect surface drainage from the entire site and discharge at a two locations and therefore the assessment that has been carried out above may be viewed to some extent, as cumulative in nature.

e) Operational Impacts

i. Water Quality

During the operational phase, the main source of potential impacts to surface water quality will be associated with surface drainage which may become contaminated in areas used by vehicles.

Drainage from the hardstanding areas of the proposed development will be discharged, through a petrol separator into the surface drainage system and detention pond.

During the operational phase grey and black waste water will be directed to the on-site waste water treatment plant for subsequent discharge into the surface drainage system.

Operational Surface Water Drainage

The types of contaminants that may be expected within surface drainage water from the operational site will tend to be grit and hydrocarbons. During winter months the use of salt for de-icing of areas and roads used by vehicles may increase the salinity of surface run-off, depending on the type of de-icing materials used.

The use of the detention pond within the operational drainage system will provide an element of treatment through settlement of suspended solids to ensure that the quality of water meets conditions (as required) for off-site discharges. Routine inspection and maintenance of the operational drainage system will ensure water quality in the local watercourses is afforded protection and this system is performing optimally.
13.6.65 Discharge of contaminated surface waters (i.e. low level contamination related to salt, hydrocarbons and grit) to the two potential surface water quality receptors may impact upon the water quality status of these receiving waters. The magnitude of this potential impact on the Cannington FRC is assessed to be low given good practices and operational infrastructure which will collect and remove contaminants (oil separators, permeable parking areas and lagoons). Given that no operational discharges will take place to the A39 drainage ditch, the magnitude of potential impact on this receptor has been found to be very low.

13.6.66 By considering the magnitude assessment above and the receptor sensitivity scores presented in Table 13.5, the potential significance of impacts from operational surface water drainage discharging to the Cannington FRC is found to be minor adverse. The assessment of impacts upon the off-site A39 drainage ditch has found the impact to be negligible.

13.6.67 All potential operational impacts on water quality from surface drainage discharges have thus been assessed to be negligible or minor prior to the implementation of mitigation measures and therefore acceptable for the scheme to proceed (Table 13.6).

13.6.68 Grey and blackwater discharges from the amenity, welfare and security buildings would be treated by the package waste water treatment plant, prior to discharge into the proposed surface water drains for conveyance and attenuation via the detention pond. In dry conditions, the treated effluent will receive little if any dilution in the surface water drainage system prior to discharge into the FRC. During long dry periods the FRC may not offer any dilution of discharged treated effluent. The discharge of all grey and blackwater effluents would comply with effluent quality and discharge volume limits that would be specified in the Environmental Permit for the site. In setting the conditions on the Environmental Permit, the Environment Agency would have due regard for upstream and downstream users and the water quality status of the receiving watercourse to ensure there is no significant water quality or resource impact. The proposals include provision for a waste water treatment plant that will achieve effluent quality of 5mg/l ammoniacal nitrogen, 20mg/l BOD and 30mg/l suspended solids (on a 95 percentile basis).

13.6.69 The project design dictates that the grey and blackwater effluent quality limits (which have yet to be defined) contained within the associated Environmental Permit would be met and this has been taken into account within the assessment of potential surface water quality impacts.

13.6.70 As the Environmental Permit conditions by definition would ensure there is no degradation to the downstream surface water environment, the magnitude of potential impact on the Cannington FRC is assessed to be low. Consideration of the value of the Cannington FRC (Table 13.5) and the magnitude above, determines that the significance of the potential impact on water quality during the operational phase is minor adverse (Table 13.6).

ii. Hydrology and Drainage

13.6.71 The five hydrology and drainage related operational impacts considered are:

- increase in the flood risk in Cannington due to increased surface run-off;
- increase in flood risk in Cannington due to loss of floodplain storage arising from ground raising;
- surface water flooding arising from extreme rainfall events;
- flooding due to blockages within the drainage network; and
- alterations to the morphology of the FRC used to convey discharge flows from the site.

**Increase in the Flood Risk in Cannington due to Increased Surface Run-off**

13.6.72 The proposed development will result in the creation of 2.36ha of hardstanding.

13.6.73 The drainage strategy has been developed to ensure that surface water discharges will be managed using SuDS methods and conveyed east to the FRC. The drainage system will also inspected on a regular basis to ensure continued effectiveness of the SuDS features over the lifetime of the proposed development. The likelihood of a direct impact upon Cannington is therefore considered unlikely. As a result the magnitude of potential impact is assessed as very low. The value and sensitivity of the receptor concerned is assessed as high. The significance of impact is therefore assessed as **minor adverse**.

**Increase in Flood Risk in Cannington due to Loss of Floodplain Storage**

13.6.74 The design of the proposed development includes an element of ground raising; generally less than 0.1m. As a result there may be a small amount of displacement of flood water and loss of floodplain storage in the south eastern sector of the site.

13.6.75 Overall the magnitude of potential impact is assessed as very low. The value and sensitivity of the primary receptor (i.e. residents in Cannington) is assessed as high. The significance of impact is therefore assessed as **minor adverse**.

**Surface Water Flooding Arising from Extreme Rainfall Events**

13.6.76 The drainage strategy for this proposed development has been designed to manage the surface water discharges arising from rainfall events up-to and including a 1% AEP storm event. Although this is adequate to deal with a majority of storm events, there remains a very low residual risk that a more extreme intense rainfall event could occur which would exceed the drainage capacity of the proposed system.

13.6.77 Overall the magnitude of potential impact is assessed as very low. The value and sensitivity of the primary receptor (i.e. residents in Cannington) is assessed as high. The significance of impact is therefore assessed as **minor adverse**.

**Flooding due to Blockages within the Drainage Network**

13.6.78 It is possible that sections of the surface water drainage system might become blocked such that the system becomes surcharged with flow occurring, for example, through manholes and gullies. It is anticipated that such incidences will be addressed at the detailed design stage by designing the development landform to safely convey and store excess flows.
13.6.79 As a result the magnitude of impact is assessed as very low. The value and sensitivity of the receptor concerned is assessed as high. The significance of impact is therefore assessed as minor adverse.

Impact on the Morphology of the Existing FRC used to Convey Discharge Flows from the Site

13.6.80 The drainage system for the proposed development will discharge into the FRC which ultimately discharges into the River Parrett via the Cannington Brook. As described earlier in this section, the design for the site includes a drainage strategy which would ensure that discharge flows are limited to existing greenfield run-off rates.

13.6.81 As a result, the magnitude of potential impact is assessed as low. The value and sensitivity of the receptor is assessed as medium. The significance of impact is therefore assessed as minor adverse.

f) Cumulative Operational Impacts

i. Water Quality

13.6.82 Any cumulative impacts that may occur within the study area are no greater in magnitude than the individual, component impacts that have already been identified.

13.6.83 No additional cumulative operational impacts have been identified with respect to water quality within the study area.

ii. Hydrology and Drainage

13.6.84 Any cumulative impacts that may occur are assessed to be no greater in magnitude than the individual, component impacts that have already been identified. The drainage system for the operational phase is designed to collect surface drainage from the entire site and discharge at a single location and therefore the assessment that has been carried out above may be viewed to some extent, as cumulative in nature.

13.6.85 No additional cumulative operational impacts have been identified with respect to hydrology and drainage.

g) Post-Operational Impacts

13.6.86 Following the construction of the HPC power station, it is anticipated that the site would be restored to agricultural land. Details are provided in the Post-operational Strategy.

13.6.87 It is therefore assumed that the developed drainage infrastructure will be removed and replaced with an agricultural field drainage system. The restoration of the site to greenfield agricultural land is anticipated to invoke similar types of impacts to those identified for the construction phase. The following two impacts have been identified which may affect water quality receptors during the post-operational works:

- sediment laden run-off; and
- run-off contaminated with hydrocarbons.
13.6.88 The magnitude of potential impacts may be expected to be reduced (less intrusive works and earthworks are likely to be required), however adopting a precautionary approach, similar impact scores have been assigned, as for the construction phase.

13.6.89 The assessment of the two impact types above on the two surface water quality receptors identified is presented within Table 13.6. A discussion of these impacts may be found in the construction impact section of this chapter.

**h) Cumulative Post-operational Impacts**

13.6.90 If the site is reinstated to productive agricultural land, the resultant impacts will be very similar to those that have been identified for the construction phase. There are no cumulative post-operational on surface waters associated with the site.

13.7 **Mitigation of Impacts**

13.7.1 No specific additional mitigation is required with respect to potential impacts on surface water receptors.

13.7.2 This assessment is based on the implementation of best practice measures, good construction methodologies, pollution prevention guidance and maintenance regimes. The design of the drainage solution and the WMP (and overarching EMMP) have due regard for good working practices and these have been considered within impact magnitude ratings. The key elements of the protective design and construction practices to be implemented are summarised in section 13.6 of this chapter and within the WMP.

13.8 **Residual Impacts**

a) **Construction Impacts**

13.8.1 No residual impacts above minor adverse on surface water quality, hydrology or drainage receptors have been identified in this assessment.

b) **Operational Impacts**

13.8.2 No residual impacts above minor adverse on surface water receptors have been identified for the operational phase.

13.8.3 This assessment is based upon the assumption that a regular and appropriate maintenance programme is maintained for on-site drainage system throughout the lifetime of the proposed development. This maintenance programme would consider the proposed on-site drainage infrastructure, detention pond and outflow point to ensure that they are maintained effectively and thereby ensure the effective management of surface water on and from the proposed development is maintained.

13.9 **Summary of Impacts**

13.9.1 Table 13.6 provides a summary of potential surface water impacts.
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Magnitude</th>
<th>Description</th>
<th>Value/Sensitivity</th>
<th>Impact Significance</th>
<th>Proposed Mitigation</th>
<th>Residual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Water Quality Impacts</strong></td>
<td></td>
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</tr>
<tr>
<td>Cannington FRC</td>
<td>Sediment laden run-off associated with excavations and drainage infrastructure installations</td>
<td>Low</td>
<td>Detention pond will remove some sediment. Good working practices will reduce magnitude to at least low</td>
<td>Medium</td>
<td>Minor</td>
<td>None required</td>
<td>Minor</td>
</tr>
<tr>
<td>A39 drainage ditch</td>
<td>Sediment laden run-off associated with excavations and drainage infrastructure installations</td>
<td>Very low</td>
<td>No pathway for discharges to reach this receptor. Good working practices will reduce magnitude to at least low</td>
<td>Very low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>Cannington FRC</td>
<td>Hydrocarbon contaminated run-off deriving from plant activities</td>
<td>Low</td>
<td>Good practice design measures including oil interceptors and SuDS</td>
<td>Medium</td>
<td>Minor</td>
<td>None required</td>
<td>Minor</td>
</tr>
<tr>
<td>A39 drainage ditch</td>
<td>Hydrocarbon contaminated run-off deriving from plant activities</td>
<td>Very low</td>
<td>No drainage pathway exists. Protected against through oil interceptors, SuDS and good practice</td>
<td>Very low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>Cannington FRC</td>
<td>Concrete leachate from in situ works</td>
<td>Very low</td>
<td>Best practice as set out in the WMP</td>
<td>Medium</td>
<td>Minor</td>
<td>None required</td>
<td>Minor</td>
</tr>
<tr>
<td>Receptor</td>
<td>Potential Impact</td>
<td>Magnitude</td>
<td>Description</td>
<td>Value/Sensitivity</td>
<td>Impact Significance</td>
<td>Proposed Mitigation</td>
<td>Residual Impact</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>------------------------------------------</td>
<td>-----------</td>
<td>------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>A39 drainage ditch</td>
<td>Concrete leachate from in situ works</td>
<td>Very low</td>
<td>Local Adverse Temporary Unlikely Direct</td>
<td>Very low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>Off-site (Prior to completion of drainage infrastructure)</td>
<td>Grey and blackwater discharges</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Cannington FRC</td>
<td>Grey and blackwater discharges</td>
<td>Low</td>
<td>Local Adverse Temporary Likely Direct</td>
<td>Medium</td>
<td>Minor</td>
<td>None required</td>
<td>Minor</td>
</tr>
</tbody>
</table>

**Hydrology and Drainage Impacts**

<p>| People and property near to site                 | Increase in the flood risk at Cannington due to reduction in floodplain storage | Very low | Local Adverse Temporary Indirect Unlikely                                      | High              | Minor               | None required      | Minor            |
| Cannington FRC                                   | Impact on the morphology of the existing FRC at the proposed outfall location | Low      | Local Adverse Temporary Direct Possible                                       | Medium            | Minor               | None required      | Minor            |</p>
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Magnitude</th>
<th>Description</th>
<th>Value/Sensitivity</th>
<th>Impact Significance</th>
<th>Proposed Mitigation</th>
<th>Residual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>A39 drainage ditch</td>
<td>Impact upon the catchment area of the existing A39 drain</td>
<td>Very low</td>
<td>Local Adverse Temporary Direct Possible</td>
<td>Very low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>People and property near to site</td>
<td>Increase in the surface water run-off due to construction activities</td>
<td>Very low</td>
<td>Local Adverse Temporary Indirect Unlikely</td>
<td>High</td>
<td>Minor</td>
<td>None required</td>
<td>Minor</td>
</tr>
</tbody>
</table>

**Operational**

**Water Quality Impacts**

<table>
<thead>
<tr>
<th>Cannington FRC</th>
<th>Contaminated surface waters (low level contamination related to salt, hydrocarbons, grit)</th>
<th>Low (SuDS principles and good practice)</th>
<th>Local Adverse Temporary Direct Unlikely</th>
<th>Medium</th>
<th>Minor</th>
<th>None required</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>A39 drainage ditch</td>
<td>Contaminated surface waters (low level contamination related to salt, hydrocarbons, grit)</td>
<td>Very low (No pathway planned. SuDS principles and good practice also work to reduce the potential magnitude)</td>
<td>Local Adverse Temporary Direct Unlikely</td>
<td>Very low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>Cannington FRC</td>
<td>Grey and blackwater discharges</td>
<td>Low (Waste Water Treatment Plant, adherence to mandatory Environmental Permit limits and good practice)</td>
<td>Local Adverse Temporary Direct Unlikely</td>
<td>Medium</td>
<td>Minor</td>
<td>None required</td>
<td>Minor</td>
</tr>
</tbody>
</table>

2011

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Magnitude</th>
<th>Description</th>
<th>Value/ Sensitivity</th>
<th>Impact Significance</th>
<th>Proposed Mitigation</th>
<th>Residual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>People and property near to site</td>
<td>Increase in the flood risk in Cannington due to an increase in surface water run-off</td>
<td>Very low</td>
<td>* Potential risks managed through development of a drainage strategy in the design of site</td>
<td>Local Adverse Temporary Indirect Unlikely</td>
<td>High</td>
<td>Minor</td>
<td>None required</td>
</tr>
<tr>
<td>People and property near to site</td>
<td>Increase in the flood risk in Cannington due to loss of floodplain storage</td>
<td>Very low</td>
<td>* Potential risks managed through development of a drainage strategy in the design of site</td>
<td>Local Adverse Temporary Indirect Unlikely</td>
<td>High</td>
<td>Minor</td>
<td>None required</td>
</tr>
<tr>
<td>People and property near to site</td>
<td>Surface water flooding arising from extreme rainfall events</td>
<td>Very low</td>
<td>* Potential risks managed through development of a drainage strategy in the design of site</td>
<td>Local Adverse Temporary Indirect Unlikely</td>
<td>High</td>
<td>Minor</td>
<td>None required</td>
</tr>
<tr>
<td>People and property near to site</td>
<td>Increase in flood risk due to blockages within the drainage network</td>
<td>Very low</td>
<td>* Potential risks managed through development of a drainage strategy in the design of site</td>
<td>Local Adverse Temporary Indirect Unlikely</td>
<td>High</td>
<td>Minor</td>
<td>None required</td>
</tr>
<tr>
<td>Cannington FRC</td>
<td>Impact on the morphology of the existing FRC at the proposed outfall location</td>
<td>Low</td>
<td>* Potential risks managed through development of a drainage strategy in the design of site</td>
<td>Local Adverse Temporary Direct Unlikely</td>
<td>Medium</td>
<td>Minor</td>
<td>None required</td>
</tr>
<tr>
<td>Receptor</td>
<td>Potential Impact</td>
<td>Magnitude</td>
<td>Description</td>
<td>Value/Sensitivity</td>
<td>Impact Significance</td>
<td>Proposed Mitigation</td>
<td>Residual Impact</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------------------------------------------------------</td>
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<td>-----------------------------------------------------------------------------</td>
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<td>---------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Post-operational</td>
<td>Water Quality Impacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cannington FRC</td>
<td>Sediment laden run-off associated with excavations and drainage infrastructure removal.</td>
<td>Low</td>
<td>Local Adverse Temporary Possible Direct (Detention pond will remove some sediment. Good working practices will reduce magnitude to at least low)</td>
<td>Medium</td>
<td>Minor</td>
<td>None required</td>
<td>Minor</td>
</tr>
<tr>
<td>A39 drainage ditch</td>
<td>Sediment laden run-off associated with excavations and drainage infrastructure removal.</td>
<td>Very low</td>
<td>Local Adverse Temporary Possible Direct (No pathway for discharges to reach this receptor. Good working practices will reduce magnitude to at least low)</td>
<td>Very low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
<tr>
<td>Cannington FRC</td>
<td>Hydrocarbon contaminated run-off deriving from plant activities</td>
<td>Low</td>
<td>Local Adverse Temporary Unlikely Direct (Good practice design measures including oil interceptors and SuDS)</td>
<td>Medium</td>
<td>Minor</td>
<td>None required</td>
<td>Minor</td>
</tr>
<tr>
<td>A39 drainage ditch</td>
<td>Hydrocarbon contaminated run-off deriving from plant activities</td>
<td>Very low</td>
<td>Local Adverse Temporary Unlikely Direct (No drainage pathway exists. Protected against through oil interceptors, SuDS and good practice)</td>
<td>Very low</td>
<td>Negligible</td>
<td>None required</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
## References


13.8 Surface Waters (Dangerous Substances) (Classification) Regulations. HMSO, 1989.

13.9 Surface Waters (Dangerous Substances) (Classification) Regulations. HMSO, 1992.

13.10 Surface Waters (Dangerous Substances) (Classification) Regulations. HMSO, 1997.


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| 13.50 | Google maps website. (Online) Available at: http://www.google.co.uk/ (Accessed 13th April 2011). |
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14. TERRESTRIAL ECOLOGY AND ORNITHOLOGY

14.1 Introduction

14.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential terrestrial ecology and ornithology impacts (collectively referred to as biodiversity) associated with the construction, operational and post-operational phases of the proposed Cannington park and ride development referred to hereafter as the proposed development on land referred to by EDF Energy as the Cannington park and ride site (the site). Detailed descriptions of the site, proposed development, construction, operational and post-operational phases are provided in Chapters 1 to 5 of this volume of the ES.

14.2 Scope and Objectives of Assessment

14.2.1 The scope of the assessment has been determined through a formal Environmental Impact Assessment (EIA) scoping process undertaken with the Infrastructure Planning Commission (IPC). It has also been informed by ongoing consultation with statutory consultees including the Environment Agency, Natural England, Sedgemoor District Council (SDC) and Somerset County Council (SCC), the local community, Somerset Wildlife Trust and the general public in response to the Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations.

14.2.2 The assessment of impacts on biodiversity has been undertaken adopting the methodologies described in Section 14.4 of this chapter.

14.2.3 The existing baseline conditions, against which the likely environmental impacts of the proposed development are assessed, have been determined through desk-based data collection and field surveys, and are described in Section 14.5 of this chapter.

14.2.4 Section 14.6 of this chapter sets out the assessment of the impacts on biodiversity of the proposed development, incorporating various measures that avoid or reduce impacts that are not classed as mitigation given that they are an integral part of the scheme. Where potentially significant impacts are identified, measures have been proposed in order to mitigate (i.e. to prevent, reduce or offset) these impacts. Any such mitigation measures are identified in Section 14.7 of this chapter. An assessment of the residual impacts following the implementation of these mitigation measures is presented in Section 14.8 of this chapter.

14.2.5 The objective of this chapter is to meet the requirements of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (Ref. 14.1) in relation to flora and fauna. This has been achieved through the:

- collection of baseline information on biodiversity;
- identification of biodiversity receptors that could be significantly affected by the proposed development, and the definition of potential impacts on these receptors (i.e. ‘scoping’);
14.3 Legislation, Policy and Guidance

14.3.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of biodiversity impacts associated with the construction, operation and post-operational phases of the proposed development.

14.3.2 As stated in Volume 1, Chapter 4 of this ES, the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (Ref. 14.2) when combined with the NPS for Nuclear Power Generation (NPS EN-6) (Ref. 14.3) provides the primary basis for decisions by the IPC on applications for nuclear power generation developments that fall within the scope of the NPSs. NPS EN-1 section 5.3 states that there should be an assessment of the impacts of nationally significant energy infrastructure on designated sites of ecological conservation importance, protected species, habitats and other species of importance. This is repeated in section 3.9 of NPS EN-6.

14.3.3 In addition, the IPC may consider other matters that are both important and relevant to its decision-making. This could include Planning Policy Statements (PPSs), Planning Policy Guidance Notes (PPGs), and regional and local policy documents. However, if there is a conflict between these and the NPS, the NPS prevails for the purposes of IPC decision making.

14.3.4 Furthermore, the Planning Act 2008 provides that the IPC must, in making its decision on an application, have regard to any Local Impact Report (LIR) prepared by relevant local authorities. It is anticipated that the LIRs will rely in part on PPSs, PPGs, and regional and local policy to provide a context for their assessment. On this basis, regard has been given to these documents (where they are relevant to the technical assessment), since they are likely to inform the LIRs prepared by the relevant local authorities.

a) International Conventions

i. The Convention on Biological Diversity 1992 (Ref. 14.4)

14.3.5 The Convention on Biological Diversity (the Convention) focuses on the conservation of all species and ecosystems. It requires the development of national strategies, plans or programmes for the conservation and sustainable use of biodiversity. In accordance with this, the UK has developed Biodiversity Action Plans (BAPs), which provide guidance for the conservation and management of biodiversity. In 2010, the parties to the Convention agreed the Nagoya Protocol. This provides a transparent legal framework for the effective implementation of one of the three objectives of the
Convention, namely the fair and equitable sharing of benefits arising out of the utilisation of genetic resources.

14.3.6 At Nagoya, the parties to the Convention adopted the Strategic Plan for Biodiversity 2011-2020 (Ref. 14.5) with the purpose of inspiring broad-based action in support of biodiversity over the next decade by all countries and stakeholders. The Strategic Plan, which includes 20 targets, known as the Aichi Targets, serves as a flexible framework for the establishment of national and regional targets, and promotes the coherent and effective implementation of the three objectives of the Convention on Biological Diversity.

ii. The Convention on Wetlands 1971 (Ref. 14.6)

14.3.7 The Convention on Wetlands (commonly referred to as the Ramsar Convention) originally focused on the conservation and wise use of wetlands, primarily as habitat for waterbirds. However, the scope of implementation of the Convention has been broadened to cover all aspects of wetland conservation in recognition of the importance of wetland ecosystems for biodiversity conservation. Under the Convention, each country is required to designate sites (‘Ramsar sites’) that meet the Criteria for Identifying Wetlands of International Importance, which are based on Article 2.2 of the Convention.

b) European Legislation


14.3.8 The EU Birds Directive requires Member States to take the requisite measures to maintain the population of all species of naturally occurring wild birds in the States’ European territory at a level that corresponds to various requirements. Member States shall take special conservation measures concerning the habitat of species mentioned in Annex I of the Directive, and shall take similar measures for regularly occurring migratory species that are not listed in Annex I. Under the Directive, the most suitable areas for the conservation of these species (whether on land or at sea) are classified as Special Protection Areas (SPAs). In England and Wales the Directive is implemented under the Wildlife and Countryside Act 1981 (as amended) (Ref. 14.8) and the Conservation of Habitats and Species Regulations 2010 (Ref. 14.9).


14.3.9 The EU Habitats Directive requires Member States to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest (i.e. those listed in Annexes I, II, IV and/or V of the Directive). Member States are also required to contribute to a coherent European ecological network of protected sites by designating Special Areas of Conservation (SACs) for the natural habitat types listed in Annex I and habitats of the species listed in Annex II.

14.3.10 Under the Directive, the conservation status of a habitat is defined as favourable when: its natural range, and the areas it covers within that range, are stable or increasing; the species structure and functions which are necessary for its long-term
maintenance exist and are likely to continue to exist for the foreseeable future; and the conservation status of its typical species is favourable. The conservation status of a species is defined as favourable when: population dynamics data indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; its natural range is neither being reduced nor is likely to be reduced for the foreseeable future; and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

14.3.11 In England and Wales, the Directive is implemented through the Conservation of Habitats and Species Regulations 2010 (Ref. 14.9).

c) National Legislation

i. The Conservation of Habitats and Species Regulations 2010 (the Habitats and Species Regulations) (Ref. 14.9)

14.3.12 The Habitats and Species Regulations, which replace the Conservation (Natural Habitats, &c.) Regulations 1994 (Ref. 14.11), are the principal means by which the EU Habitats Directive and EU Birds Directive are transposed into national law for England, Wales and the territorial seas. The Habitats and Species Regulations, *inter alia*, provide for the designation and protection of European sites, and the protection of European protected species.

14.3.13 Under the Habitats and Species Regulations, a person who does any of the following in respect to a European protected animal species (those listed in Schedule 2) is guilty of an offence:

- deliberately captures, injures or kills any wild animal of a European protected species;
- deliberately disturbs wild animals of any such species;
- deliberately takes or destroys the eggs of such an animal; or
- damages or destroys a breeding site or resting place of such an animal.

14.3.14 It is also an offence under the Habitats and Species Regulations deliberately to pick, collect, cut, uproot or destroy a wild plant of a European protected species (those listed in Schedule 5 to those regulations).

14.3.15 However, these actions can be made lawful through the granting of licences by the appropriate authorities. Licences may be granted for a number of purposes (such as science and education, conservation, preserving public health and safety), but only after the appropriate authority is satisfied that there are no satisfactory alternatives and that such actions would have no detrimental effect on the maintenance of the conservation status of the species concerned.

ii. The Wildlife and Countryside Act 1981 (the WCA) (Ref. 14.8)

14.3.16 The WCA (as amended, including by the Countryside and Rights of Way Act 2000 (Ref. 14.12)) strengthens provisions under the National Parks and Access to the Countryside Act 1949 (Ref. 14.13) to designate, protect and manage Sites of Special Scientific Interest (SSSIs) and to establish National Nature Reserves (NNRs) in
England and Wales. These sites can be established on land down to the low water mark. SSSIs and NNRs can be designated for their flora, fauna or geological interests.

14.3.17 The WCA (subject to specified exceptions) makes it an offence to:

- intentionally kill, injure or take any wild animal included in Schedule 5;
- intentionally or recklessly:
  - damage or destroy any structure or place which any wild animal specified in Schedule 5 uses for shelter or protection; or
  - disturb any such animal while it is occupying a structure or place which it uses for shelter or protection; or
  - obstruct access to any structure or place which any such animal uses for shelter or protection.
- intentionally:
  - kill, injure or take any wild bird; or
  - take, damage or destroy the nest of a wild bird included in Schedule ZA1; or
  - take, damage or destroy the nest of any wild bird while that nest is in use or being built; or
  - take or destroy an egg of any wild bird.
- intentionally or recklessly:
  - disturb any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or
  - disturb dependent young of such a bird.
- intentionally pick, uproot or destroy any wild plant included in Schedule 8.


14.3.18 Under the Protection of Badgers Act, it is an offence (subject to specified exceptions) to:

- wilfully kill, injure or take, or attempt to kill, injure or take, a badger; or
- cruelly ill-treat a badger; or
- interfere with a badger sett by doing any of the following things:
  - damage a badger sett or any part of it; or
  - destroy a badger sett; or
  - obstruct access to, or any entrance of, a badger sett; or
– cause a dog to enter a badger sett; or
– disturb a badger when it is occupying a badger sett.

iv. The Hedgerows Regulations 1997 (Ref. 14.15)

14.3.19 The Hedgerows Regulations make it an offence to remove or destroy certain hedgerows without the permission of the local planning authority.

v. The Natural Environment and Rural Communities (NERC) Act 2006 (Ref. 14.16)

14.3.20 Section 40 of the NERC Act sets out a requirement for every public authority (including local authorities), in exercising their functions, to have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.

14.3.21 Section 41 of the NERC Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the purpose of conserving biodiversity in England. The list, which includes 56 habitats and 943 species, has been drawn up in consultation with NE, as required by the NERC Act.


14.3.22 The CRoW Act provides for public access on foot to certain types of land, amends the law for public rights of way, increases protection for SSSIs, strengthens wildlife enforcement legislation and provides for better management of Areas of Outstanding Natural Beauty (AONB).

d) National Planning Policy


14.3.23 PPS1 was published in 2005 and sets out the Government’s overarching planning policies on the delivery of sustainable development through the planning system.

14.3.24 Paragraph 5 states that planning should facilitate and promote sustainable and inclusive patterns of urban and rural development by, amongst other things: protecting and enhancing the natural and historic environment, the quality and character of the countryside, and existing communities.


14.3.25 PPS9 was published in 2005 and sets out planning policies on the protection of biodiversity and geological conservation through the planning system. The broad aim of the policies is to ensure that planning, construction, development and regeneration should have minimal impacts on biodiversity and enhance it wherever possible.

14.3.26 Key objectives of PPS9 include (page 2):
“to promote sustainable development by ensuring that biological and geological diversity are conserved and enhanced as an integral part of social, environmental and economic development, so that policies and decisions about the development and use of land integrate biodiversity and geological diversity with other considerations.

- conserve, enhance and restore the diversity of England’s wildlife and geology by sustaining and where possible improving the quality and extent of natural habitat and geological and geomorphological sites; and to conserve, enhance and restore the diversity of England’s wildlife and geology by sustaining, and where possible improving, the quality and extent of natural habitat and geological and geomorphological sites; the natural physical processes on which they depend; and the populations of naturally occurring species which they support.”

14.3.27 Paragraph 8 states that, 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), planning permission should not normally be granted. Where an adverse effect on the site’s notified special interest features is likely, an exception should only be made where the benefits of the proposed 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.

14.3.28 Paragraph 9 states that sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Sites, have a fundamental role to play in meeting overall national biodiversity targets; contributing to the quality of life and the well-being of the community; and in supporting research and education.

14.3.29 Paragraph 10 states that planning authorities should not grant planning permission for any development that would result in the loss or deterioration of ancient woodland, unless the need for, and benefits of, the development in that location outweigh the loss of the woodland habitat.

14.3.30 Paragraph 12 states that networks of natural habitats provide a valuable resource and should be protected from development, and, where possible, strengthened by or integrated within it.

14.3.31 Paragraph 16 states that planning authorities should ensure that protected species are protected from the adverse effects of development and refuse permission where harm to the species or their habitats would result, unless the need for, and benefits of, the development clearly outweigh that harm.


14.3.32 In its final form, it is intended that this PPS will replace PPS9. The draft PPS contains policies to maintain and enhance, restore or add to biodiversity and geodiversity through the planning system. It includes policies to promote opportunities for the incorporation of beneficial biodiversity and geological features
within the design of development, and to maintain networks of natural habitats by avoiding their fragmentation and isolation.

14.3.33 A key objective of this PPS is to bring together related policies on the natural environment and on open space and green spaces in rural and urban areas to ensure that the planning system delivers healthy, sustainable communities which adapt to and are resilient to climate change and gives the appropriate level of protection to the natural environment (page 10).

iv. The UK Biodiversity Action Plan (BAP) (Ref. 14.20)

14.3.34 The UK Government signed the Convention on Biological Diversity at the Earth Summit in Rio de Janeiro in 1992 (Ref. 14.4). Following this, the Prime Minister announced an eight point plan for the UK which included the production of the UK BAP. The UK BAP identifies the means by which the UK should contribute to the global conservation of biodiversity over the following 20 years. As part of the UK BAP, a list of priority species and habitats was developed, the conservation of which requires specific actions to be implemented.

e) Regional Planning Policy

14.3.35 The Government’s revocation of regional strategies was quashed in the High Court on 10 November 2010. However, on that same date the Government reiterated in a letter to Chief Planners its intention to revoke regional strategies through the Localism Bill. This letter was also challenged but, on 7 February 2011, the High Court held that the Government's advice to local authorities that the proposed revocation of regional strategies was to be regarded as a material consideration in their planning development control decisions should stand. The decision of the High Court was upheld by the Court of Appeal on 27 May 2011. Therefore, the regional strategies remain in place but in the case of development control decisions it is for planning decision-makers to decide on the weight to attach to the strategies (see Volume 1, Chapter 4 of this ES for a full summary of the position regarding the status of regional planning policy).


14.3.36 RPG10 sets out the broad development strategy for the period to 2016 and beyond. Policy EN1 (Landscape and Biodiversity) seeks the protection and enhancement of the region’s internationally and nationally important landscape areas and nature conservation sites. The protection and, where possible, enhancement of landscape and biodiversity should be planned into new development.

ii. The Draft Revised Regional Spatial Strategy (RSS) for the South West Incorporating the Secretary of State’s Proposed Changes 2008 – 2026 (July 2008) (Ref. 14.22)

14.3.37 The draft Revised RSS for the South West looks forward to 2026 and sets out the Government’s policies in relation to the development of land within the region. Chapter 7 deals with Enhancing Distinctive and Cultural Life. Policy ENV1 (Protecting and Enhancing the Region’s Natural and Historic Environment) states the following.
“The quality, character, diversity and local distinctiveness of the natural and historic environment in the South West will be protected and enhanced, and developments which support their positive management will be encouraged. Where development and changes in land use are planned which would affect these assets, Local Authorities will first seek to avoid loss of or damage to the assets, then mitigate any unavoidable damage, and compensate for loss or damage through offsetting actions. Priority will be given to preserving and enhancing sites of international or national landscape, nature conservation, geological, archaeological or historic importance. Tools such as characterisation and surveys will be used to enhance local sites, features and distinctiveness through development, including the setting of settlements and buildings within the landscape and contributing to the regeneration and restoration of the area.”

14.3.38 Policy ENV4 (Nature Conservation) states the following.

“The distinctive habitats and species of the South West will be maintained and enhanced in line with national targets and the South West Regional Biodiversity Action Plan. Local Authorities should use the Nature Map to help map local opportunities for biodiversity enhancement in LDDs, taking into account the local distribution of habitats and species, and protecting these sites and features from harmful development. Priority will be given to meeting targets for maintenance, restoration and recreation of priority habitats and species set out in Appendix 1, focusing on the Nature Map areas identified in Map 7.3. Proposals which provide opportunities for the beneficial management of these areas and habitats and species generally, should be supported, including linking habitats to create more functional units which are more resilient to climate change.”


14.3.39 The Somerset and Exmoor National Park Joint Structure Plan was adopted in 2000, with relevant policies saved from 27 September 2007. All policies have been saved with the exception of Policy 53, which is unrelated to impacts on biodiversity. The Plan provides a strategic base for all land use planning within the plan area for the period up to 2011.

14.3.40 Policy STR1 (Sustainable Development) states that development in Somerset and the Exmoor National Park should, amongst other things, conserve biodiversity and environmental assets, particularly nationally and internationally designated areas.

14.3.41 Policy 1 (Nature Conservation) states that the biodiversity of Somerset and the Exmoor National Park should be maintained and enhanced. The greatest protection will be afforded to nature conservation sites of international and national importance. In addition, Local Plans should include policies to maintain and enhance sites and features of local nature conservation importance including landscape features which provide wildlife corridors, links or stepping stones between habitats.
iv. The South West Biodiversity Implementation Plan (SW BIP) (Ref. 14.24)

14.3.42 The SW BIP sets out a framework of policies, priorities and actions to assist in achieving a more integrated approach to the delivery of biodiversity aims within the South West. It contributes towards the Biodiversity Strategy for England (Ref. 14.25) and aims to influence regional strategies, plans and policies.

14.3.43 The overall aims of the SW BIP are to:

- help to meet biodiversity targets for priority habitats and species in the South West;
- ensure regional strategic plans incorporate biodiversity issues for the South West;
- provide a strategic framework for the work undertaken by regional and local biodiversity partnerships in conserving biodiversity and promoting the sustainable use of biological resources; and
- develop wider support and active engagement by increasing awareness and understanding of the importance of biodiversity to the region’s health, quality of life and economic productivity.


14.3.44 The Somerset Biodiversity Strategy is intended to represent a long term blueprint for successful biodiversity conservation in Somerset. It proposes a vision for biodiversity conservation locally and sets out a series of objectives and actions aimed at making significant progress towards achieving them. It also identifies those organisations that are best placed to implement the actions, either through their own endeavours or working in partnership with others.

vi. Somerset Local BAP (LBAP) (Ref. 14.27) and Sedgemoor LBAP (Ref. 14.28)

14.3.45 The Somerset LBAP has been produced in conjunction with the Somerset Biodiversity Strategy and identifies targets and actions for the following biodiversity receptors across Somerset:

- ditches and ponds;
- gardens and urban greenspace;
- hedgerows and hedgerow trees;
- road verges and green lanes;
- traditional orchards;
- water and wetlands;
- wood pasture, parkland and veteran trees;
- bats;
otter (*Lutra lutra*); and

lapwing (*Vanellus vanellus*).

14.3.46 The Sedgemoor LBAP incorporates targets and actions identified in the Somerset LBAP and specifies the following ecological receptors as requiring particular biodiversity targets within Sedgemoor:

- woodland;
- coastal and marine;
- heathland; and
- calcareous and neutral grassland.

**f) Local Planning Policy**


14.3.47 The Sedgemoor District Local Plan forms part of the Development Plan for Sedgemoor. The Local Plan was adopted in 2004 (with relevant policies 'saved' from 27 September 2007). The Inset Map (Map No. 14) indicates that the northern part of the proposed development site ('the site') is identified as Green Wedge, Edge or Strategic Gap (Policy CNE4). The site also adjoins a Locally Important Nature Conservation Site (Policy CNE9). The site is outside of the defined Development Boundary.

14.3.48 The following saved policies are potentially relevant to the proposed development:

- Policy CNE4 (Countryside Around Settlements), which states:

  "Areas of land which have particular importance as Green Wedge, Green Edge or Strategic Gap are defined on the Proposals Map. Whatever their individual character and function, these are predominantly open areas, mostly outside development boundaries, which retain a largely rural character and appearance. Positive land management which benefits the landscape, countryside access, amenity, nature conservation or urban area containment/enhancement functions of these areas will be encouraged and developments which would have a detrimental effect on these functions will not be permitted."

- Policy CNE9 (Interest on Other Sites), which states:

  "The nature conservation value of land outside nationally designated sites will be a material consideration. Development which would damage:

  a) the nature conservation interest of a County Wildlife Site, County Geological Site, Local Nature Reserve or non-statutory Nature Reserve, or

  b) natural features such as watercourses, hedgerows, trees, copses and ponds which provide wildlife corridors, links or stepping stones from
one habitat to another, will not be permitted unless the need for the
development in that location is unavoidable and of overriding
importance.

Where planning permission is sought for development which would
damage the nature conservation value of a site, such damage should be
kept to a minimum and mitigation or compensation measures provided.

Developers are encouraged to make positive provision for wildlife through
appropriate habitat creation/restoration and subsequent management. If
appropriate opportunities arise, the District Council will establish additional
Local Nature Reserves and/or support other bodies in establishing
additional nature reserves.”

ii. Sedgemoor District Local Development Framework Core Strategy (Proposed
Submission) (September 2010) (Ref. 14.30)

14.3.49 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from
September to November 2010. Changes prior to submission, which were proposed
as a result of the consultation process, were reported and endorsed by the Council’s
Executive Committee on 9 February 2011. The Core Strategy (Proposed
Submission) was submitted to the Secretary of State on 3 March 2011 and an
Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy
will form part of the Development Plan for Sedgemoor.

14.3.50 EDF Energy submitted representations objecting to the Core Strategy (Proposed
Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1,
MIP2 and MIP3 contained in that chapter) and those sections relating to housing and
Hinkley Point. EDF Energy also participated at the relevant EiP hearings. Volume 1, Chapter 4 of this ES provides a full summary of the position regarding the
status of the Core Strategy.

14.3.51 The following Core Strategy (Proposed Submission) policies are of potential
relevance to the proposed development.

- Policy S1 (Spatial Strategy for Sedgemoor) states that development must not
  adversely affect sites of international importance for nature conservation.

- Policy S3 (Sustainable Development Principles) states that development
  proposals will be expected to, amongst other things, protect and enhance the
  quality of the natural environment.

- Policy S4 (Mitigating the Causes and Adapting to the Effects of Climate Change)
  states, amongst other things, that development should not affect the ability of
  habitats and species to adapt to the adverse effects of climate change, and, if
  required, compensatory habitat should be provided.

- Policy D4 (Renewable or Low Carbon Energy Generation) states that the Council
  will support proposals that maximise the generation of energy from renewable or
  low carbon sources, provided that the installation would not have significant
  adverse impact taking into account the impact of the scheme, together with any
  cumulative impact on, amongst other things, biodiversity.
Policy D10 (Managing the Transport Impacts of Development) states that development proposals that will have a significant transport impact should be supported by, amongst other things, Ecological Surveys.

14.3.52 Policy D14 (Natural Environment) deals with terrestrial ecology and ornithology impacts more generally. It states:

“All development proposals should contribute to enhancing and maintaining biodiversity, taking into account climate change and the need for habitats and species to adapt to it. Particular regard should be had to:

- The targets set out in the Somerset and Sedgemoor Biodiversity Action Plans.
- The presence of, or potential impact on, European Protected Species.
- Potential impact on internationally and nationally designated sites of nature conservation importance.
- Enhancement opportunities within the Strategic Nature Areas identified in the South West Nature Map.

Ecological Impact Assessments will be required where it is reasonably likely that species and/or habitats of nature conservation significance may be impacted on by the proposed development. In addition, a Construction Environmental Management Plan will be required where there is potential for significant environmental effects during the construction stage.

Development will be supported where:

- As well as ensuring the protection of internationally and nationally designated sites, it protects the nature conservation interest of local sites designated for their nature conservation value.
- It retains or enhances features such as wetlands, watercourses, coastal features, hedgerows, trees, copses and ponds which provide wildlife corridors, links or stepping stones from one habitat to another.
- It makes positive provision for wildlife through appropriate urban and rural habitat creation/restoration (having particular regard to BAP habitats and Strategic Nature Areas), including tree and hedgerow planting, and subsequent management.

In exceptional circumstances, where development is necessary and could result in significant indirect or direct adverse impacts to nature conservation appropriate mitigation and compensation measures should be provided.”

14.3.53 Policy D15 (Bats in the Landscape) states that planning applications for development on sites within the Bat Consultation Zone will require a ‘test of significance’ under the Habitats Regulations to be carried out, including consultation with Natural England. Applicants must provide all necessary information to enable such a test to be conducted, including any necessary survey work, reports and avoidance/mitigation measures with the application.
14.3.54 Policy D20 (Green Infrastructure) states that Green Infrastructure will be safeguarded, maintained, improved, enhanced and added to, as appropriate, to form a multi-functional resource.

iii. Supplementary Planning Guidance

14.3.55 Sedgemoor District Council and West Somerset Council have jointly prepared draft supplementary planning guidance in relation to the HPC HPC Point C Project Supplementary Planning Document (the ‘draft HPC SPD’) (Ref. 14.31) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which object to the draft HPC SPD. Volume 1, Chapter 4 of this ES provides a full summary of the position regarding the status of the draft HPC SPD.

14.3.56 Specifically in relation to the proposed development site, the draft HPC SPD states that the HPC Project promoter should prepare a Masterplan for a park and ride facility at Cannington which should address, amongst other things, the linking of landscaping and open spaces with surrounding features to serve multiple functions including habitat enhancement (Paragraph 9.20).

14.3.57 Further planning policy context is provided in the Legislative Planning Policy context chapter (Volume 1, Chapter 4 of this ES).

14.4 Methodology

a) Introduction

14.4.1 Volume 1, Chapter 7 of this ES describes the generic assessment methodology for this EIA. The subject specific methodology that has been used for the assessment in this chapter draws upon the Institute of Ecology and Environmental Management’s (IEEM’s) guidelines on ecological impact assessment (Ref. 14.32), but also reflects the standardisation of aspects of the assessment across all of the topics that are covered in this ES. The main elements of the impact assessment methodology for this chapter are listed in Section 14.2.5 of this chapter.

14.4.2 The remainder of this section outlines the methodologies that were adopted for baseline data gathering, consultation, scoping the assessment and assessment methodology. The section concludes with information about limitations, constraints and assumptions.

b) Baseline Data Gathering

14.4.3 A desk study was undertaken in order to identify any requirement for further surveys and to inform the assessment process. The area¹ for which baseline biodiversity data were collected (the study area) is illustrated in Figure. 14.1.

14.4.4 Outlines of the desk study and survey methodologies that were used to obtain information about potential biodiversity receptors are provided below. The detailed methodologies are provided in the Baseline Report in Appendix 14A.

¹ The study areas were defined to reflect the likely spatial scope of the impacts that would be caused by the proposed development, using information about the development proposals, knowledge of the local area and professional judgement.
i. Desk Study

14.4.5 For the desk study, data were collected for the site and a 2km area around the site. Data for the 2km area had the potential to highlight notable species that could be present on the site as well as indicating off-site ecological resources that could be affected by the proposed development. The desk study area was extended to 10km around the site in relation to European designated nature conservation sites².

14.4.6 During February 2009, information about statutory nature conservation sites within the 2km area (and 10km area for European sites) was obtained through the use of the following websites:

- www.magic.gov.uk;
- www.jncc.gov.uk; and
- www.naturalengland.org.uk.

14.4.7 Also during February 2009, information about non-statutory nature conservation sites, and pre-existing biological records was obtained from the Somerset Environmental Records Centre (SERC). Information relating to designated sites was updated in April 2011. Of the large number of biological records that were received, only post-1990 records have been used to inform the assessment, as these are likely to be most relevant to the current conditions at the site. The Somerset Otter Group was also contacted in 2010 for any records of otter occurring within the study area.

14.4.8 1:25,000 Ordnance Survey maps were studied in order to identify any water bodies located within 500m of the site, given the possibility that any great crested newts (Triturus cristatus) that breed in such water bodies could utilise terrestrial habitats on the site. The Great Crested Newt Mitigation Guidelines recommend that surveys of ponds up to 500m from a development may be required to determine the impact of the development on this species (Ref. 14.33).

14.4.9 The Nature Map created by Biodiversity South West (Ref. 14.34) was also reviewed to determine if the site lies within an identified Strategic Nature Area (SNA).

ii. Extended Phase 1 Habitat Survey

14.4.10 An extended Phase 1 habitat survey of the site was undertaken on 24 February 2010 and updated in June 2010. The survey methodology was based on the Joint Nature Conservation Committee’s (JNCC’s) Phase 1 habitat survey methodology (Ref. 14.35). This involved habitats, together with notable features of biodiversity conservation interest, being identified and mapped; each notable feature of biodiversity conservation interest was described in a target note. The survey was extended (Ref. 14.36) to collect additional information on the presence/potential presence of legally protected and other notable species, and interest features such as hedgerows and water bodies.

² Under The Conservation of Habitats and Species Regulations 2010 (SI 2010 No. 490), European sites are defined as Special Areas of Conservation (SACs), candidate SACs, Sites of Community Importance and Special Protection Areas (SPAs). However, UK policy extends the requirements pertaining to European sites to include Ramsar sites and potential SPAs, and this would include proposed extensions or alterations to existing SPAs.
### iii. Other Surveys

14.4.11 Based on the results of the desk study and the extended Phase 1 habitat survey, it was concluded that further ecological surveys were required to inform this assessment. These are summarised in Table 14.1, with the detailed methods contained within Appendix 14A.

<table>
<thead>
<tr>
<th>Survey</th>
<th>Summary Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hedgerow</td>
<td>A hedgerow survey was conducted on 8 June 2010 and 3 August 2010. All hedgerows within the site that were considered to be at least 30 years’ old were assessed to determine if they met the criteria for being ecologically ‘important’ in respect to Paragraph 7 of Schedule 1 of The Hedgerows Regulations 1997 (Ref. 14.15).</td>
</tr>
<tr>
<td>Birds</td>
<td>To characterise the breeding bird community at the site and surrounding land (up to 100m away), a breeding bird survey was carried out, involving three visits between April and June 2010. The design of the survey method drew upon the British Trust for Ornithology’s Common Bird Census (CBC) methodology (Ref. 14.37).</td>
</tr>
<tr>
<td>Badger</td>
<td>The site and land within 100m was surveyed on the 7 April 2010. The surveys recorded any evidence of badgers, such as setts, footprints and latrines.</td>
</tr>
<tr>
<td>Bats</td>
<td>On 8 and 9 April 2010 an external roost assessment survey was carried out of four trees identified on or adjacent to the site boundary as having the potential to support bat roosts. Two bat activity surveys, aimed at establishing how bats use the study area, were conducted in July and September 2010. All survey work was designed with reference to the Bat Conservation Trust’s Guidance (Ref. 14.38).</td>
</tr>
<tr>
<td>Dormouse (Muscardinus Avellanarius)</td>
<td>A dormouse survey was undertaken between April 2010 and November 2010. The survey methodology was designed with reference to the guidance provided in the Dormouse Conservation Handbook (Ref. 14.39).</td>
</tr>
<tr>
<td>Otter and Water Vole (Anicola Amphibius)</td>
<td>The watercourses within the site were surveyed on 13 May 2010 for evidence of the presence of otter and water vole. The survey methodologies were designed with reference to Monitoring the Otter (Ref. 14.40) and the Water Vole Conservation Handbook (Ref. 14.41).</td>
</tr>
<tr>
<td>Reptiles</td>
<td>A reptile survey was undertaken between May to early October 2010. The survey methodology was designed with reference to guidance in Froglife’s Advice Sheet 10 (Ref. 14.42) and additional guidance provided by the Herpetofauna Workers’ Manual (Ref. 14.43) and Reptiles: Guidelines for Developers (Ref. 14.44). The survey involved undertaking 20 survey visits.</td>
</tr>
</tbody>
</table>

c) Consultation

14.4.12 Consultation has been undertaken throughout the EIA process and further information may be found in the Consultation Report. Consultation was undertaken with the organisations that are listed in Table 14.2. In order to discuss the scope of and approach to be taken to biological surveys, the results of these surveys and the scope of any potential mitigation required.
### Table 14.2: Consultation Undertaken to Inform the Assessment of Impacts on Biodiversity

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Date of Meeting</th>
<th>Primary Subject of Meeting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural England</td>
<td>07 October 2009</td>
<td>Survey programme and results.</td>
</tr>
</tbody>
</table>
|                                     | 11 December 2009| Survey programme and results.  
|                                     |                 | Likely scope of the supporting ecological information for the ES. |
|                                     | 14 April 2010   | Preliminary survey results and potential mitigation measures. |
|                                     | 17 March 2011   | Full survey results and proposed mitigation measures |
| Somerset Wildlife Trust             | 01 October 2009 | Survey programme and results. |
|                                     | 17 March 2011   | Full survey results and proposed mitigation measures |
| Somerset County Council             | 01 April 2010   | Survey programme and results. |
|                                     | 14 April 2010   | Preliminary survey results and potential mitigation measures. |
|                                     | 17 March 2011   | Full survey results and proposed mitigation measures |
| Environment Agency                  | 27 October 2010 | Preliminary survey results and potential mitigation measures. |
| West Somerset Council/Sedgemoor     | 17 March 2011   | Full survey results and proposed mitigation measures |
| District Council (represented by Arup) |                 | |

**d) Scoping the Assessment**

**14.4.13** The first part of the assessment process was to undertake a scoping exercise. This involved differentiating the biodiversity receptors (i.e. designated sites, habitats and species' populations) that could be significantly affected by the proposed development and that therefore required more detailed assessment, from those receptors that are not likely to be significantly affected and did not require further assessment (i.e. They were ‘scoped-out’ of the assessment).

**14.4.14** The first stage of the approach that was used for determining which receptors have the potential to be significantly affected by the proposed development involved using baseline data (collected by the desk study and field surveys) for the site and up to 2km away (up to 10km away for European designated nature conservation sites)\(^3\) to determine:

- which, if any of the species that have been recorded are legally protected or controlled (see Appendix 14B, Box 14B.2); and/or
- which, if any, sites, areas of habitat and species that have been recorded are of importance for biodiversity conservation, notwithstanding any legal protection that they may have (see Appendix 14B, Box 14B.1).

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\(^3\) There was also the possibility that other receptors could be identified as potentially being affected, based on the study team’s experience of the local area.
14.4.15 Use of these categories provides a robust and objective basis for focusing the assessment on receptors that are widely recognised to be important for the conservation of biodiversity in addition to those that are legally protected. It should be noted, however, that legally protected species may be protected for reasons other than for biodiversity conservation (e.g. badger).

14.4.16 For sites/habitats/species that are important for biodiversity conservation, the next stage of the scoping assessment was to determine whether the receptors are likely to be of sufficient ‘value’ that an impact upon them could be significant. In this context, value refers to a receptor being of sufficient quality (for sites and habitats) or size (for sites, habitats or species’ populations). The distinction between importance and value can be illustrated by the great crested newt, which, as well as being legally protected, is important at a national level because it is a species of principal importance for biodiversity (Ref 14.16). However, depending on the local abundance of this species, a small affected population might be anywhere between low or high biodiversity value.

14.4.17 The findings of the valuation of important receptors, together with information about whether receptors are legally protected, are set out in Table 14C.1 in Appendix 14C. For those receptors that are assessed as being of insufficient value for impacts to be significant, this Appendix provides a justification for this conclusion.

14.4.18 Important receptors that are of sufficient value that an impact upon them could be significant together with all legally protected species were then taken through to the next stage of the scoping assessment. This involved identifying, for each receptor, any environmental changes that are likely to be caused by the proposed development, which have the potential to lead to a significant impact. Then the area was determined within which the environmental change could cause a significant impact on the receptor; this area is referred to as an ‘ecological zone of influence’. The area where the receptor occurs was then compared with the ecological zone of influence. If the receptor occurs or is likely to occur within the zone of influence it was ‘scoped in’ to further assessment (Table 14C.2 in Appendix 14C).

14.4.19 The ecological zone of influence that is the most straightforward to define is the area affected by land take and land cover change associated with the development. This zone is the same for all affected receptors. By contrast, for each environmental change that can extend beyond the area affected by land take and land cover changes (e.g. changes in noise), the zone of influence may vary between receptors dependent upon the receptors’ sensitivity to the change and the precise nature of the change.

14.4.20 For example, one bird species might be unaffected by noise unless the noise is generated very close to where the bird nests, whilst another bird species might be disturbed at much greater distances; other species (e.g. of invertebrate) may be unaffected by changes in noise. A further complication is that the response of a receptor to a change associated with one development may differ to the response of the same receptor to a similar change on another development. This can occur as a result of the wide range of variables that influences the precise nature of any change (e.g. for noise this can include differing baseline noise conditions, specific magnitude, timing or other characteristics of the noise; and the effects of screening and topography).
14.4.21 In view of these complexities, the definition of the zones of influence that extend beyond the land take area was generally based upon professional judgement, informed by discussions with the technical specialists who were working on other chapters of the ES. These specialists provided information about the environmental changes that they assessed in their ES chapter. This information was then combined with available ecological information about different receptors’ sensitivity to different environmental changes in order to define the extent of each ecological zone of influence.

14.4.22 Having defined the ecological zones of influence, there was a need to review the original list of ‘important’ receptors that had been scoped-out because they were likely to be of insufficient value for an impact upon them to be significant. This requirement reflects the potential for a zone of influence to be so extensive that a larger than expected species population or area of habitat could be affected, which could lead to the potential for a significant impact. In this event, any relevant receptor was scoped back into the assessment.

14.4.23 Each relevant receptor (i.e. that is of sufficient value or is legally protected, as described above), which was located wholly or partly within one or more zones of influence, was then subject to further scoping assessment in relation to the relevant environmental change(s). The spatial extent of this assessment reflected the area occupied by the receptor. Thus, if part of a designated nature conservation site was located within a zone of influence, an assessment was made of the impacts on the site as a whole. A similar approach was taken for areas of notable habitat. For species that occur within an ecological zone of influence, an assessment was carried out on the total area that is used by the affected individuals of the species (e.g. for foraging or as a breeding territory).  

14.4.24 This final stage of the scoping assessment involved drawing upon available information about the magnitude and other characteristics of the environmental changes and the sensitivity of each relevant receptor to these changes, to arrive at a conclusion about the potential for a significant impact to occur. Where there was the potential for a significant impact, or contravention of protected species legislation, the receptor was taken forward for further assessment (see sub-section (d) below) as identified in the final column of Table 14C.2 in Appendix 14C.

14.4.25 In undertaking the sequence of steps that are described above, it was recognised that if the environmental changes could significantly affect biodiversity resources further than 2km from the site (or 10km for European designed sites), the data-collection area would need to be extended. Further data collation would also be required if there were insufficient biological data for any receptor that could be significantly affected by the proposed development. However, neither scenario arose.

14.4.26 For each receptor, the impacts that are assessed arise as a result of a combination of the environmental changes (e.g. changes in noise, lighting etc. that could contribute to a significant impact. In this sense, the impacts are already ‘cumulative’

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4 The affected individuals may, for example, be a pair of birds, a badger clan associated with a main sett or the population of great crested newts in a pond. Where appropriate, the area for which data were required was extended (e.g. To include other pairs of birds in a discrete subpopulation, or a metapopulation of newts).
and consequently, no further cumulative assessment is required in this section (recognising that wider cumulative impacts are assessed in Volume 11 of this ES).

**e) Assessment Methodology**

14.4.27 The assessment of potentially significant biodiversity impacts in this ES draws upon:

- the results of desk study and field survey work;
- relevant published information on potential biodiversity receptors’ status, distribution, biology and sensitivity to environmental changes (referenced in the text where used); and
- professional knowledge of ecological processes and functions.

14.4.28 Throughout the assessment process, the findings of the assessment were used to inform the design of the proposed development and identify requirements for any additional baseline data. As a result of this iterative process, environmental measures to avoid, reduce or offset impacts on potential biodiversity receptors were incorporated into the scheme design or identified as mitigation.

14.4.29 The remainder of this section outlines the approach that has been adopted to assessing the significance of impacts, which draws upon information about biodiversity value and the magnitude of impacts. It should be noted that the assessment has been undertaken in relation to each biodiversity receptor that could be significantly affected and/or that is legally protected (as identified in the final column of Table 14C.2 in Appendix 14C), considering that the impact on each receptor could be the result of more than one type of environmental change caused by the development. For example, a receptor might be affected by land take and construction noise.

**i. Value of Receptor**

14.4.30 Sites, species’ populations and areas of habitats have been valued as shown in Table 14.3. It should be noted that, in respect of species, the approach taken is to determine the value of the site for the species under consideration, rather than the biodiversity conservation importance of the species itself (as discussed above in relation to scoping).

<table>
<thead>
<tr>
<th>Definition</th>
<th>Value Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>International/National designations - SACs, SPAs, Ramsar sites and SSSIs. Cited features of internationally/nationally designated sites. Species populations or habitat areas that are of major importance because of the quality/size of the habitat or the size of the species population in relation to the wider habitat resource/population - species/habitats are most likely to be species/habitats of principal importance under Section 41 of the NERC Act (and UK BAP priority habitats/species) or, for species, nationally rare and/or legally protected. The regular occurrence of internationally/nationally important numbers of waterfowl (i.e. 1% or more of the relevant international or national population respectively).</td>
</tr>
</tbody>
</table>
Medium

County Wildlife Sites (CWSs).
Features for which CWSs have been designated.
Species populations or habitat areas that are of moderate importance because of the quality/size of the habitat or the size of the species population in relation to the wider habitat resource/population - species/habitats are most likely to be species/habitats of principal importance under Section 41 of the NERC Act (and UK BAP priority habitats/species), priority species/habitats in the Local BAP or rare at regional/county level and/or legally protected species.

Low

Other designated sites of District or Local importance including Local Nature Reserves (LNRs), except where these have a higher additional designation.
Species populations or habitat areas that are of some biodiversity value because of the quality/size of the habitat or the size of the species population in relation to the wider habitat resource/population - species/habitats are most likely to be species/habitats of principal importance under Section 41 of the NERC Act (and UK BAP priority habitats/species), priority species/habitats in the Local BAP or rare at district/local level and/or legally protected species.

Very low

Species populations or habitat areas that are of very low biodiversity value, typically because they are common and/or are not species/habitats of principal importance under Section 41 of the NERC Act, UK BAP priority habitats/species, priority species/habitats in the Local BAP or rare at district/local level and/or legally protected species.

### ii. Magnitude of Impact

14.4.31 Using information about the way in which sites/habitats/species are likely to be affected by the proposed development, each impact that is assessed has been assigned a level of ‘magnitude’, based on the definitions that are set out in Table 14.4.

**Table 14.4: Guidelines for the Assessment of Impact Magnitude**

<table>
<thead>
<tr>
<th>Magnitude of Impact</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td>The change permanently (or over the long term) adversely affects the conservation status of a habitat/species, reducing the ability to sustain the habitat or population level of the species within a given geographic area. Relative to the wider habitat resource/species population, a large area of habitat or large proportion of the wider species population is affected. For designated sites, integrity is compromised. There may be a decrease in the level of nature conservation value of the receptor.</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td>The change permanently (or over the long-term) adversely affects the conservation status of a habitat/species reducing the ability to sustain the habitat or population level of the species within a given geographic area. Relative to the wider habitat resource/species population, a small-medium area of habitat or small-medium proportion of the wider species population is affected. There may be a decrease in the level of nature conservation value of the receptor.</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>The quality or extent of designated sites or habitats, or the size of species populations experience some small scale reduction. These impacts are likely to be within the range of natural variability and there is not expected to be any permanent change in the conservation status of the species/habitat or integrity of the designated site. The change is unlikely to modify the evaluation of the receptor in terms of its nature conservation value.</td>
</tr>
</tbody>
</table>
### Magnitude of Impact

<table>
<thead>
<tr>
<th>Magnitude of Impact</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low</td>
<td>Although there may be some impacts on individuals or parts of a habitat area or designated site, the quality or extent of sites and habitats, or the size of species populations would experience little or no reduction. Any impacts are likely to be within the range of natural variability and there would be no short-term or long-term effects on the conservation status of habitat/species receptors or the integrity of designated sites.</td>
</tr>
<tr>
<td>Beneficial</td>
<td>Improvement in the quality or extent of habitats, the size of species populations or the integrity of a designated site. This improvement must be achieved without compromising the integrity of the site or conservation status of the habitat/species that is present prior to development. Criteria for assessing the magnitude of beneficial effects can be derived from the definitions of adverse impacts.</td>
</tr>
</tbody>
</table>

14.4.32 The criteria in Table 14.4 refer to the terms ‘integrity’ and ‘conservation status’. The ‘integrity’ of a site, as referred to in Table 14.4, 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 the species for which it was classified” (Ref. 14.32).

14.4.33 Conservation status is defined differently for habitats and species (Ref. 14.32), as:

“For habitats, conservation status is determined by the sum of the influences acting on the habitat and its typical species that may affect its long-term distribution, structure and functions, as well as the long-term survival of its typical species within a given geographical area.

For species, conservation status is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area.”

### iii. Significance of Impacts

14.4.34 The significance of an impact is established with reference to Table 7.4 in Volume 1, Chapter 7 of this ES, which sets out how, subject to moderation informed by professional judgement, the level of significance is derived from information about the magnitude of the impact and the value of the receptor. The only exception to this is for legally protected species, for which any contravention of the law is assessed as an impact of major significance irrespective of the magnitude of the impact or the biodiversity conservation value of the population that is affected. The terminology ‘legally protected’ (LP) is used in the summary impact assessment table (Table 14.7) to reflect this exception.

14.4.35 For the purpose of this assessment, mitigation measures have been proposed where there is an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so.
iv. Cumulative Impacts

14.4.36 **Volume 1 Chapter 7** of this ES refers to the methodology used to assess cumulative impacts. Additive and interactive effects between impacts generated within the site boundary and study area are assessed within this chapter. Cumulative impacts that consider activities and impacts generated at distance from the site and study area are considered in **Volume 11** of this ES; this assesses the project-wide cumulative impacts and in-combination impacts with other proposed or reasonably foreseeable projects.

f) Limitations, Constraints and Assumptions

14.4.37 No limitations, constraints or assumptions have been identified that would have a bearing on the assessment of likely significant impacts on biodiversity.

14.5 Baseline Environmental Characteristics

a) Introduction

14.5.1 This section of the ES describes the biodiversity baseline of the study area (**Figure. 14.1**), which includes desk study information obtained for a 2km radius around the site (10km for European designated nature conservation sites) and field survey results from within the site and the immediate surrounding area (up to 100m from the site boundary, see **Table 14.1**). The detailed results of each survey undertaken are described in the Baseline Report in **Appendix 14A**. A full list of records of notable species (as defined in **Appendix 14B**), which was provided by SERC, is contained within **Appendix 14D**.

b) Study Area Description

i. Designated Sites

14.5.2 There are no statutory designated sites within 2km of the site. However there are four non-statutory designated nature conservation sites (County Wildlife Sites – CWSs) within 2km of the site (see **Table 14.5** and **Figure. 14.2**). There are four European designated nature conservation sites within 10km of the site (**Figure. 14.3**).
<table>
<thead>
<tr>
<th>Site</th>
<th>CWS Reference Number</th>
<th>Location in Relation to the Site</th>
<th>Reason for Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Statutory Designated Sites</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severn Estuary SAC</td>
<td>N/A</td>
<td>2.35km to the North</td>
<td>This site has been designated for the following habitats and species:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Estuaries.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Intertidal mudflats and sandflats.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Atlantic salt meadows.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Sandbanks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Reefs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Three species of migratory fish: sea lamprey (<em>Petromyzon marinus</em>); river lamprey (<em>Lampetra fluviatilis</em>); and twaite shad (<em>Alosa fallax</em>).</td>
</tr>
<tr>
<td>Severn Estuary SPA</td>
<td>N/A</td>
<td>2.35km to the North</td>
<td>This site has been designated for its wintering populations of Bewick’s swan (<em>Cygnus columbianus</em>), white-fronted goose (<em>Anser albifrontis</em>), shelduck (<em>Tadorna tadorna</em>), gadwall (<em>Anas strepera</em>), dunlin (<em>Calidris alpina</em>) and redshank (<em>Tringa totanus</em>) and its wintering waterfowl assemblage.</td>
</tr>
<tr>
<td>Severn Estuary Ramsar site</td>
<td>N/A</td>
<td>2.35km to the North</td>
<td>This site has been designated for the following habitats and species:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* All SAC Features (see above).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Unusual estuarine communities associated with reduced productivity and diversity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Migratory fish, including salmon (<em>Salmo salar</em>), sea trout (<em>Salmo trutta</em>), allis shad (<em>Alosa alosa</em>) and eel (<em>Anguilla anguilla</em>) in addition to cited SAC species.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Migratory birds in spring and autumn.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Wintering waterfowl assemblage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Internationally important wintering numbers of Bewick’s swan, white-fronted goose, gadwall, shelduck, dunlin and redshank.</td>
</tr>
<tr>
<td>Exmoor and Quantock Oakwoods SAC</td>
<td>N/A</td>
<td>7.7km to the West</td>
<td>The site has been designated for the following habitats and species:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Old sessile oak woods in conjunction with heath.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Alluvial forests with alder (<em>Alnus glutinosa</em>) and ash (<em>Fraxinus excelsior</em>);</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Barbastelle bat (<em>Barbastella barbastellus</em>).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Bechstein’s bat (<em>Myotis bechsteinii</em>).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Otter.</td>
</tr>
<tr>
<td><strong>Non-statutory Designated Sites</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cannington Brook CWS</td>
<td>ST23/090</td>
<td>Adjacent to Site</td>
<td>Site with legally protected species (otter).</td>
</tr>
<tr>
<td>Cannington Park CWS</td>
<td>ST24/009</td>
<td>1.4km to the North-West</td>
<td>Old parkland with unimproved limestone grassland, scrub, broad-leaved woodland and old hill fort</td>
</tr>
</tbody>
</table>
### ii. Habitats

14.5.3 The results of the Phase 1 habitat survey are presented in Figure 14.4 and the detailed results of each survey undertaken are described in the Baseline Report in Appendix 14A.

14.5.4 The site is dominated by a large field of improved grassland pasture, in addition to further small areas of improved grassland, a planted tree belt, a network of hedgerows and a flood relief channel, along the eastern and western site boundaries.

14.5.5 The improved grassland areas, which are closely grazed by cattle and sheep, are species-poor and support only a low diversity of common and widespread species, such as perennial rye grass (*Lolium perenne*), white clover (*Trifolium repens*), creeping thistle (*Cirsium arvense*), yarrow (*Achillea millefolium*) and ribwort plantain (*Plantago lanceolata*). These fields are screened from the A39 by a planted belt of shrubs and even-aged semi-mature trees, with species present including hawthorn (*Crataegus monogyna*), field maple (*Acer campestre*), alder (*Alnus glutinosa*), pedunculate oak (*Quercus robur*), ash (*Fraxinus excelsior*) and willow (*Salix spp*). Within the tree-belt, the ground-flora, which is densely over-shaded by the canopy, is species-poor and dominated by common and widespread species such as common nettle (*Urtica dioica*) and bramble (*Rubus fruticosus agg.*). The verge of the A39 supports a mosaic of grassland, ruderal vegetation and scrub, including species such as cock’s-foot (*Dactylis glomerata*), false oat-grass (*Arrhenatherum elatius*), teasel (*Dipsacus fullonum*), oxeye daisy (*Leucanthemum vulgare*), Himalayan balsam (*Impatiens glandulifera*).

14.5.6 The flood relief channel, which represents the only watercourse within the site boundary, is narrow and linear, with the banks to the east of the site having been artificially reinforced. The banks of the flood relief channel are lined by hedgerows and/or improved grassland (as is consistent with the nature of the adjoining habitats) but some of its banks support a greater diversity of plants, with species including hart’s-tongue fern (*Asplenium scolopendrium*). However, in the summer months the vegetation throughout the flood relief channel is dominated by dense stands of Himalayan balsam (*Impatiens glandulifera*).

14.5.7 The Cannington Brook, which flows within 20m of the western boundary of the site, is a sinuous fast-flowing watercourse that is lined with numerous tall, mature standard trees, including a large number of alder and willow trees. A tributary of the Cannington Brook abuts the western boundary of the site.

14.5.8 There are hedgerows along the majority of field boundaries within the site. All but two of these hedgerows are stock-proof and regularly managed, with most kept to a height of 1-1.5m. The majority of hedgerows on the site (with the exception of those on the southern boundary, which are likely to have been established at the time of
the creation of the A39 Cannington southern bypass) incorporate, or are adjacent to, a hedge bank or a ditch. The hedgerows are generally quite species-rich, dominated by hawthorn and blackthorn (*Prunus spinosa*), with other shrubs, which occur less frequently, including hazel (*Corylus avellana*), guelder rose (*Viburnum opulus*), field maple, elm (*Ulmus* sp.), elder (*Sambucus nigra*), dog-rose (*Rosa canina* agg.), dogwood (*Cornus sanguinea*), spindle (*Euonymus europaea*), pedunculate oak and ash. Several of the hedge-banks also support a moderately species-rich hedge-bottom flora, with lords and ladies (*Arum maculatum*) occurring frequently.

14.5.9 Only one of the three hedgerows on-site is assessed as being of ecological importance under Paragraph 7 of Schedule 1 of the Hedgerows Regulations, 1997 (Ref. 14.15). This is the hedgerow that is located along the eastern edge of the field to the east of the main part of the site.

### iii. Breeding Birds

14.5.10 Fifteen notable bird species have been recorded from the study area, but SERC held no records of birds from within the site itself.

14.5.11 During the survey that was undertaken to inform this ES, 25 species were recorded holding territory within the survey area, of which 15 are likely to have bred within or partly within the site boundary. Of these, only two, song thrush (*Turdus philomelos*), and dunnock (*Prunella modularis*) are Species of Principle Importance for Biodiversity/UKBAP listed species; a single song thrush territory and six dunnock territories were recorded within the site. A single kingfisher (*Alcedo atthis*) territory was recorded within the survey area (along the Cannington Brook), but outside the site boundary. This species is listed on Schedule 1 of the Wildlife and Countryside Act 1981 (Ref. 14.8)

### iv. Badger

14.5.12 SERC held one record of badger, located at Cannington Park approximately 1.8km to the north of the site.

14.5.13 Two badger setts were recorded within the site during the survey. Further details, including sett locations, are provided in Confidential Appendix 14E. There was also abundant evidence of badgers foraging within the fields on and surrounding the site, as evidenced by the locations of latrines, hairs, trails and foraging pits, predominantly at field boundaries.

### v. Bats

14.5.14 SERC held single records of brown long-eared (*Plecotus auritus*) and common pipistrelle (*Pipistrellus pipistrellus*) bats occurring 0.5km and 0.7km from the site respectively.

14.5.15 The mature hedgerow boundaries and screen planting around the site provide good commuting and foraging habitat for bats (particularly where associated with watercourses and less managed vegetation), and provide links to further linear features off-site, including the Cannington Brook. Potentially suitable roost locations...
are limited to three mature oak trees along the site’s boundaries. However, no evidence of bats roosting in these trees was observed during the surveys.

14.5.16 A minimum of six bat species were recorded during the activity surveys, namely: common pipistrelle; soprano pipistrelle (*Pipistrellus pygmaeus*); noctule (*Nyctalus noctula*); serotine (*Eptesicus serotinus*); *Myotis* spp.; and probable barbastelle. The most frequently recorded species was soprano pipistrelle, noted on 30 occasions over the two survey events, with common pipistrelle recorded 16 times. *Myotis* spp. were recorded on 12 occasions, mostly along the trees and scrub to the north of the A39 in the southern part of the site. Noctule bats were recorded on six occasions and serotine once. Two probable barbastelle calls were recorded in quick succession during the survey in September 2010. Bats were recorded throughout the site, with most associated with linear features such as the hedgerows and ditches.

vi. Dormouse

14.5.17 SERC held no records of dormice within the study area.

14.5.18 No dormice were found in any of the nest tubes that were used for the purpose of the survey that was undertaken to inform this ES and no other signs of dormouse, such as opened hazel nuts or nests, were found during the survey. The survey effort score is 20 and, as such, in line with NE guidance (Ref. 14.39), it is likely that dormice are not present on the site.

vii. Reptiles

14.5.19 SERC held one record of slow-worm (*Anguis fragilis*) and three records of grass snake (*Natrix natrix*) from within the study area. The closest record is approximately 0.4km from the site.

14.5.20 The only reptile species that was recorded during the survey that was undertaken to inform this ES was slow-worm, of which a maximum of 37 adults and nine juveniles were recorded during any one survey. Slow-worms were found to be present both throughout the network of hedgerows and in the mosaic of habitats associated with the northern verge of the A39. Based on the Froglife population assessment criteria (Ref. 14.42), this represents an ‘exceptional’ population of slow-worm, although based on the more recent Reptile Mitigation Guidelines this represents a medium population size class (Ref. 14.45).

viii. Great Crested Newt

14.5.21 SERC held one record of great crested newt from approximately 1.5km to the north-west of the site (at Cannington Quarry).

14.5.22 Four water bodies were identified within 500m of the site, the closest of which are 270m from the site. All of these water bodies are located on the far side of the A39.

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5 It is not possible to separate the *Myotis* species based on the calls recorded from the frequency division bat detector.
from the site, which represents a significant barrier to the movement of great crested newts. Consequently, even if great crested newts are present in these water bodies, it is very unlikely that they would access the site. As such, no further survey work in respect to great crested newts was considered necessary.

ix. Otter

14.5.23 SERC held 33 records of otter from the study area, the majority of which were from the Cannington Brook. The closest record was from 200m to the north of the site boundary. Consultation with the Somerset Otter Group confirmed that otters regularly use the entire watercourse network to the east of Cannington Village, using Cannington Brook to get from the east of Cannington to other watercourses west of the village. The Group also reported that it believes that a single female otter holds a territory along the length of the Cannington Brook (i.e. from the River Parrett, through Cannington and to the west) and cubs are regularly seen.

14.5.24 During the survey undertaken to inform this ES, otter presence was confirmed on Cannington Brook, which lies within 20m of the western site boundary at its closest point. However, no evidence of otter was found on the flood relief channel that runs adjacent to and within the site. This channel is unlikely to be used extensively by otter as it provides limited feeding and resting opportunities, and because it does not connect the Cannington Brook to other suitable watercourses (due to a small and long culvert at the eastern end).

14.5.25 The River Parrett is approximately 2.5km north-east of the site (as the crow flies or approximately 3.5km following the watercourse network) and the Cannington Brook provides connectivity for otter between the site and the River Parrett and the network of watercourses to the east of Cannington, which are reported to be well used by otters.

x. Water Vole

14.5.26 SERC held one record of water vole from within the study area, at Cannington Brook, 0.4km west of the site.

14.5.27 Evidence of water vole (including latrines, burrows and runs) was found evenly spread along the stretch of the Cannington Brook that was surveyed. Evidence of water vole was also found along the flood relief channel within the site. The small section of ditch partly within the north-eastern part of the site is, however, sub-optimal for water voles as it is unconnected to other watercourses, and provides limited burrowing opportunities due to it having vertical banks and dense vegetation.

xi. Other Notable Species

14.5.28 There is a single record of annual knawel (\textit{Scleranthus annuus}), a local BAP species, occurring 1.1km from the site. SERC also provided a single record of common toad (\textit{Bufo bufo}) in Cannington, 0.4km north of the site.

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6 This barrier was first identified during the pond identification study, and later verified during the extended Phase 1 habitat survey.
14.6 Assessment of Impacts

a) Introduction

14.6.1 The starting point in this section is to define those biodiversity receptors that could be significantly affected by the proposed development and/or are legally protected (as concluded in Table 14C.2 in Appendix 14C). In subsequent sections these receptors are then taken forward for assessment in relation to the construction and operational phases of the proposed development. The assessment reflects the final footprint of the proposed development. The assessment also reflects the following aspects of the proposed development that were incorporated as part of the iterative design process and that are relevant to the ecological impact assessment:

- All existing sections of watercourse and hedgerow within the site would be retained (except for a section of hedgerow to be removed for the construction of the access road). Furthermore, all retained habitat features would have a 10m wide ‘no construction’ buffer on each side, which would be managed as species-rich grassland. The buffer zones would be demarcated using fencing to protect them from accidental damage during all phases of the development.

- The habitat corridor provided by the retained hedgerows along the field boundary watercourse would be strengthened by planting designed to permanently infill existing gaps in these hedgerows. The management of these, and all other, retained hedgerows would also be subject to an altered management regime for the duration of the development, which would be designed to enhance their value for biodiversity, including by strengthening their function as habitat corridors.

- An ecological zone would be established along the eastern boundary in the main part of the site. This would involve hedgerow planting that would fill the large gap in the existing hedgerow on this field boundary. Immediately to the west of this boundary hedgerow, an area of rough grassland would be created, which would be suitable as a receptor site for translocated slow-worms (it is linked to existing areas of habitat supporting slow-worm along the A39). This hedgerow planting and a strip of hedge-bottom rough grassland would be retained in the post-operational phase and, as such, would maintain habitat connectivity between this area and the habitats that would be restored in the verge of the A39 during this phase of development.

- Temporary landscape planting would be established along the eastern edge of the park and ride area. This would be partly on bunds and would comprise native, fast-growing species such as willow. The hedgerow boundary to the east of the main site area would also be reinforced with additional native tree-planting.

- A 600mm diameter badger tunnel would be installed underneath the internal access road. This would ensure connectivity around the site and allow safe access for badgers to retained foraging habitats, avoiding the risk of harm from traffic collisions.

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7 Some of these measures avoid or reduce impacts, but, as they form an integral part of the scheme, are not considered to be mitigation.
Badger exclusion fencing would be installed around the perimeter of the
developed site, including the spoil mounds, temporary landscape planting and the
internal access road. This would prevent badgers from accessing the site and
minimise the opportunities for new setts to be constructed that would
subsequently require closure during the post-operational phase of the
development.

The lighting strategy for the site has been designed with reference to the Bat
Conservation Trust's (BCT) Bats and Lighting publication (Ref. 14.46). It involves
lighting being directional with minimal upwards or backwards light spill and
minimising light spill onto all retained habitat features likely to be used by bats
(such as hedgerows). The lighting strategy has also been designed to deter bats
from crossing the access road from the A39 at the southern boundary of the site.

Measures have been incorporated into the scheme that are designed to avoid
contravention of the legislation relating to legally protected species. These
measures are outlined in this chapter.

Best practice measures would be implemented to minimise dust deposition (see
Chapter 10 of this volume of the ES), polluted surface water run-off (see
Chapter 13 of this volume of the ES) and noise (see Chapter 9 of this volume of the ES).

b) Identification of Receptors that could be Significantly Affected

14.6.2 The method described in Section 14.4 c) of this chapter has been used to determine
whether any of the valued nature conservation sites, habitat areas or species' populations that have been recorded within the study area could be significantly
affected by the proposed development and therefore need to be subject to further
assessment. The environmental changes that are likely to be caused by the
development, which have the potential to cause significant impacts, are:

- land take/land cover change;
- noise and visual disturbance; and
- lighting disturbance.

14.6.3 The latter two changes only apply outside the land take/land cover change zone. Within this zone, it is only necessary to assess impacts caused by land take/land
cover change. This is because, although there would be changes in lighting and
noise within this zone, land take/land cover change is the dominant factor influencing
biodiversity receptors.

14.6.4 For receptors of sufficient value and/or that are legally protected, Appendix 14C sets
out the ecological zones of influence relating to these three changes. Based on
these zones of influence, the following biodiversity receptors require further
assessment because there is a mechanism by which they could be significantly
affected by the proposed development and/or they are legally protected.

- hedgerows;
- habitat networks;
- badger (in relation to legal protection only);
- bat assemblage;
- kingfisher (in relation to legal protection only);
- other breeding birds (in relation to legal protection only); and
- slow-worm (in relation to legal protection only).

14.6.5 Four of the above receptors require further assessment only because they are legally protected. They do not require further assessment in relation to biodiversity conservation value, because they are of insufficient value for impacts to be significant (see Appendix 14C).

14.6.6 The Exmoor and Quantock Oakwoods SAC was identified in Appendix 14C as having the potential to be significantly affected by the proposed development but is not included in the above list as impacts upon it are assessed in the Habitats Regulations Assessment.

c) Valuation of Receptors

14.6.7 In order to inform the assessment of impacts, the biodiversity receptors that have been identified as requiring further assessment, excluding those identified as requiring assessment only in relation to legal protection, have been valued on the scale high, medium, low and very low. The conclusions of this valuation are set out in Table 14.6. The Table sets out a rationale for the values that have been assigned based on the criteria that are set out in Table 14.4.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Applicable Legislation</th>
<th>Policy Implications</th>
<th>Value</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hedgerows</td>
<td>Hedgerow Regulations 1997</td>
<td>UK BAP</td>
<td>Low</td>
<td>The hedgerows on the site are relatively diverse and associated with ditches and banks. Despite this, only one meets the criteria to be categorised as ecologically 'important' under The Hedgerows Regulations (Ref. 14.15). The valuation reflects this, together with the local abundance of hedgerow habitat and the lack of diversity in the hedgerow ground flora.</td>
</tr>
<tr>
<td>Habitat networks</td>
<td>N/A</td>
<td>PPS9</td>
<td>Low</td>
<td>The hedgerows and watercourse within the site provide good habitat linkage to the Cannington Brook corridor and off-site hedgerows. However, the habitat network within the site is typical of that in the wider landscape.</td>
</tr>
</tbody>
</table>
d) Other Constraints

14.6.8 In addition to the potential biodiversity receptors listed in Table 14.6, the site also supports Himalayan balsam, which is listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) (Ref. 14.8). The Act makes it an offence to plant or otherwise cause to grow in the wild any plant listed on Schedule 9.

14.6.9 As a result, any works in areas of the site that support Himalayan balsam (i.e. the flood relief channel) would need to include measures to prevent the spread of this species. No works are proposed to the flood relief channel and as such no such measures are required.

e) Construction Impacts

i. Hedgerows

14.6.10 Only one small section of hedgerow would be removed (the section removed would be a maximum of 35m) to enable the construction of the access road and this hedgerow does not meet the criteria for classification as being ‘ecologically important’ under the Hedgerows Regulations (the only such hedgerow within the site is being retained and enhanced). New hedgerow planting would be undertaken during this phase of development to fill the existing gap in the hedgerow on the eastern boundary of the main part of the site and the management of the retained hedgerows would be changed to allow the development of a better hedgerow structure. It would, however, take time for the full benefits of this habitat creation/enhancement to be realised. As such, the construction phase is assessed to have a low magnitude adverse impact on hedgerows, a receptor of low value, which results in a minor adverse impact.

ii. Habitat Networks

14.6.11 No watercourses would be crossed by the proposed development and although the access road would necessitate the loss of a single section of the hedgerow and

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8 This only applies to five UK species, barbastelle, greater and lesser horseshoe bats, Bechstein’s bat and greater mouse-eared bat (the latter is particularly rare). This legalisation requires sites to be designated in member states for the protection of these species.
planted tree-belt bordering the A39, the width of vegetation clearance at this location has been restricted to a maximum of 35m. A badger underpass would be provided under this access road, which would be suitable for use by other terrestrial species, such as reptiles, and wildlife would still be able to move around the site utilising the retained habitat networks. As such, the impact of permanently severing the habitat network in one location during this phase of development is assessed to be of low magnitude. As the habitat networks are of low biodiversity value, this represents a minor adverse impact during construction.

iii. Kingfisher

14.6.12 There is no evidence that kingfisher was nesting within 100m of the site boundary, although it is possible that it could nest within this area in future. If it were to nest within 25m of the area where construction activity would take place there would be the potential for the nest to be disturbed, which would be in contravention of the WCA (Ref. 14.8). If construction activity is required in the period during which kingfisher breeds, March to August, a survey for evidence of breeding kingfisher would be undertaken prior to commencement of the works. In the event that a kingfisher nest is located within a distance that it could be disturbed by construction (likely to be less than 25m dependent upon site-specific conditions), the construction method and timing would be reviewed and, if necessary, amended to ensure that there is no disturbance to the nest thereby avoiding the potential for contravention of the WCA. With the adoption of these measures, there would be no impact on kingfisher in relation to legal protection.

14.6.13 In relation to biodiversity conservation value, the kingfisher population that would be affected is not of sufficient value for impacts to be significant (see Appendix 14C).

iv. Other Breeding Birds

14.6.14 If undertaken during the breeding bird season, site clearance activities would have the potential to destroy active bird nests, which would be in contravention of the WCA (Ref. 14.8). To avoid this, vegetation clearance and/or management would, wherever possible, be completed outside of the breeding bird season (which is generally considered to be March to August inclusive). Should vegetation clearance be required during this period, a suitability qualified ecologist would survey the vegetation prior to its removal in order to check for the presence of active nests. If an active nest is found, it would be left undisturbed until the young have fledged. With the adoption of these measures, there would be no impact on breeding birds in relation to legal protection.

14.6.15 In relation to biodiversity conservation value, the bird populations that would be affected are not of sufficient value for impacts to be significant (see Appendix 14C).

v. Badger

14.6.16 The scheme has been designed to ensure that there would be no direct impacts on any existing badger sett as a result of the proposed development. Nevertheless, if badgers were to excavate a new sett within the construction footprint prior to the start of construction, there is a risk that construction activity could contravene the Protection of Badgers Act 1992 (Ref. 14.14). To avoid this, at least three months prior to the commencement of construction, a re-survey of the site would be completed to determine the current status of the badger setts recorded during the
baseline surveys and to identify any newly constructed setts that could be affected by the works. Should any active setts be located sufficiently close to the construction footprint that they could be damaged or disturbed by the works and if there is no opportunity to avoid these impacts, a licence would be obtained from NE to enable the works, and any required mitigation measures, to proceed. With the adoption of these measures, there would be no impact on badgers in relation to legal protection.

14.6.17 In relation to biodiversity conservation value, the badger population that would be affected is not of sufficient value for impacts to be significant (see Appendix 14C).

vi. Bat Assemblage

14.6.18 No roosts would be directly affected as a result of the proposed development. The trees with potential to support bat roosts would be retained and remain unaffected by the development (including remaining unlit). The removal of the 35m section (maximum value) of the hedgerow along the southern boundary would result in the temporary severance (until it is reinstated during the post-operational phase), of a linear habitat feature that is used by bats, including a single record of barbastelle. However, the retention of all other boundary hedgerows with an adjacent habitat ‘buffer’, which is a minimum of 10m wide, would ensure that there is a continued provision of commuting routes and foraging areas around the site during the construction phase. Furthermore, the existing west-east habitat corridor along the northern boundary watercourse would be strengthened by infilling the existing gaps in the hedgerows on the banks of this watercourse with planting and by altering the management of these hedgerows to provide greater height and structure.

14.6.19 The 1.31ha of habitats that would be created or enhanced within the site during the construction phase have been designed, and would be managed, to provide good quality foraging habitat for the local bat assemblage. This contrasts with the 1.22ha of open improved grassland pasture that would be directly impacted by land-take for construction activity, as this does not provide good quality foraging habitat for bats. The overall result is that at the end of the construction phase there would be a greater extent of good quality foraging habitat within the site than in the absence of development. However, although bats are likely to begin to forage within the created habitats before the end of the construction phase, the full benefits of this temporary habitat creation are unlikely to be realised until the later phases of development.

14.6.20 In addition, the lighting strategy has been designed to ensure that all retained, enhanced and created foraging and commuting habitats are not adversely affected by light spill during construction, which would ensure that they are suitable for use by all species within the local bat assemblage, including those that are light-sensitive.

14.6.21 Overall, notwithstanding the habitat creation works, the habitats that would be lost are common both in the immediate vicinity of the construction site and in the wider local landscape. The hedgerow/tree-belt along the southern boundary that would be affected by the construction of the access road is used by bats, but is unlikely to be an important feature in the landscape, given that connectivity to the east of the site is constrained by built development and the lack of connectivity across the A39/Main Road intersection, particularly for light sensitive species. The strengthened corridor along the boundary watercourse would maintain habitat connectivity around the site, whilst, off-site, east-west connectivity along the Cannington Brook and to the south of the A39 would remain unaffected by the proposed development. Consequently, the
overall impact on bats during the construction phase is assessed to be of low magnitude on a receptor of medium value, resulting in a **minor adverse** impact.

**vii. Slow-worm**

14.6.22 The potential impacts on slow-worms have been reduced by the scheme design, as the land take within the A39 road verge has been minimised and a maximum section of 35m of hedgerow would be affected by the construction work. Phased vegetation clearance would be carried out within these areas during the period April - early October, under the supervision of a suitably qualified ecologist. This clearance work would encourage slow-worms to move, of their own accord, into adjoining retained sections of hedgerow outside of the construction footprint. Any reptiles observed during the supervision of the vegetation clearance would be relocated by hand to the retained receptor habitats. In addition to the phased clearance, a trapping/exclusion exercise would be undertaken within these areas (the road verge and hedgerow section). With the adoption of these measures, designed with reference to the Reptile Mitigation Guidelines (Ref. 14.45), contravention of the WCA (Ref. 14.8) would be avoided and there would be **no impact** on slow-worm in relation to legal protection.

14.6.23 In relation to biodiversity conservation value, the slow-worm population that would be affected is not of sufficient value for impacts to be significant (see Appendix 14C).

**f) Operational Impacts**

i. **Hedgerows**

14.6.24 The hedgerows and the adjacent 10m ‘buffer zone’ that were retained during construction would also be retained and fenced throughout the operational phase. The temporary species-rich hedgerow planted during the construction phase would continue to establish and the changed hedgerow management regime would continue to encourage the development of a better structure for the hedgerows within the site. Whilst it would take time for the full benefits of the hedgerow planting and improved hedgerow management to be realised, the operational phase is assessed to have a low magnitude beneficial impact on hedgerows, a receptor of low value, resulting in a **minor beneficial** impact.

ii. **Habitat Networks**

14.6.25 The habitat networks retained during the construction phase would also be retained during the operational phase and the design of the lighting strategy would, as during the construction phase, ensure that these habitats are not adversely affected by light spill. Furthermore, the retained 10m habitat ‘buffer’ around each hedgerow and watercourse would reduce any disturbance impacts on species using the corridors. Nonetheless, the habitat network within the site would remain partly severed by the internal access road and, as such, the impact on habitat networks during the operational phase of the proposed development is assessed to be of low magnitude on a receptor of low value, resulting in a **minor adverse** impact.

iii. **Kingfisher**

14.6.26 During the operation of the site, the spoil bund along the western boundary of the site which is up to 2m in height would screen the Cannington Brook from noise and visual
disturbance arising from the operation of the development. Any kingfishers that do nest along the brook are therefore unlikely to be disturbed and there would therefore be no contravention of the legislation in respect to kingfisher during the operational phase. Therefore, no impact is predicted.

iv. Other Breeding Birds

Habitat maintenance work, if completed during the breeding bird season, has the potential to destroy active nests of other bird species. To ensure compliance with the legislation in respect to breeding birds, vegetation management would, wherever possible, be completed outside of the breeding bird season (which is generally considered to be March to August inclusive). Should vegetation management be required during this period, a suitability qualified ecologist would survey all vegetation in advance of the works in order to check for the presence of active nests. If an active nest is found, this would be left undisturbed until the young had fledged. With the adoption of these measures, there would be no impact on breeding birds in relation to legal protection.

v. Badger

The badger underpass under the access road would maintain connectivity with the retained habitats around the operational site and, consequently, badgers would continue to have access to a large area of retained habitat that is suitable for foraging in all directions from the sett. As such, the operational phase of the proposed development is unlikely to affect the welfare of the local badger population, thereby avoiding contravention of the Protection of Badgers Act 1992 (Ref. 14.14) and no impact is predicted.

vi. Bat Assemblage

The foraging and commuting habitats retained during the construction phase would also be retained during the operational phase and the lighting strategy would, as during the construction phase, minimise the effects of light spill to these habitats. However, in contrast, lighting would be used to deter bats from attempting to cross the 35m gap in the southern field boundary created by the access road from the A39. Lighting the access road at this location would minimise the likelihood of any accidental/incidental traffic mortality during this phase of development, whilst habitat connectivity around the site would be maintained by the unlit habitat corridor along the boundary watercourse (which would have been enhanced through planting during the construction phase).

Although there would remain a loss of improved grassland habitat within the development footprint, the planting during the construction phase would continue to establish and provide new foraging opportunities. Overall, the impact on bats during the operational phase is assessed to be of very low magnitude on a receptor of medium value, resulting in a minor adverse impact.

vii. Slow-worm

Habitat management of retained and created habitats that has the potential to affect reptiles would be completed either using a method that avoids affecting reptiles (e.g. hand strimming of grassland or allowing the grassland sward to remain high) or at a time of year when reptiles would not be present (e.g. grassland management
during the winter when reptiles would be in hibernation). With the adoption of these measures, there would be no impact on slow-worm in relation to legal protection.

**g) Post-Operational Impacts**

**i. Hedgerows**

14.6.32 All hedgerows and adjacent buffer zones would be retained and fenced throughout the post-operational phase. The section of hedgerow that was removed during the construction phase would be replanted with a species-rich mix of native hedgerow species. The replanted hedgerow would be more diverse than that removed during the construction phase and, although it would take time for the full benefits of the hedgerow planting to be realised, the post-operational phase is assessed to have a very low magnitude beneficial impact on hedgerows, a receptor of low value, resulting in a negligible impact.

**ii. Habitat Networks**

14.6.33 There would be no direct impact on hedgerows or watercourses during the post-operational phase, other than to reinstate the 35m hedgerow section that was removed during the construction phase. As during construction and operation, the lighting design would ensure that habitat networks are not adversely affected by light spill, whilst the retained 10m habitat ‘buffer’ would reduce any disturbance impacts on species using the corridors. Given that the habitat network would be restored during post-operational, the overall impact of this phase of development on habitat networks is assessed to be beneficial and of low magnitude on a receptor of low value, resulting in a minor beneficial impact.

**iii. Kingfisher**

14.6.34 If kingfisher was to nest within 25m of the area where post-operational activity would take place there would be the potential for the nest to be disturbed, which would be in contravention of the WCA (Ref. 14.8). If post-operational activity is required in the period during which kingfisher breeds (i.e. March to August), a survey for evidence of breeding kingfisher would be undertaken prior to commencement of the works. In the event that a kingfisher nest is located within a distance that it could be disturbed by construction (likely to be less than 25m dependent upon site specific conditions), then the works’ method and timing would be reviewed and, if necessary, amended to ensure that there is no disturbance to the nest thereby avoiding the potential for contravention of the WCA. With the adoption of these measures, there would be no impact on kingfisher in relation to legal protection.

**iv. Other Breeding Birds**

14.6.35 If undertaken during the breeding bird season, site post-operational activities would have the potential to destroy active bird nests, which would be in contravention of the WCA (Ref. 14.8). To avoid this, vegetation clearance and/or management would, wherever possible, be completed outside of the breeding bird season (which is generally considered to be March to August inclusive). Should vegetation clearance be required during this period, a suitability qualified ecologist would survey the vegetation prior to its removal in order to check for the presence of active nests. If an active nest is found, it would be left undisturbed until the young have fledged. With
the adoption of these measures, there would be no impact on breeding birds in relation to legal protection.

v. Badger

14.6.36 Due to the badger exclusion fencing around the site, the removal and reinstatement of the site would be unlikely to affect any badger setts. However, there is the potential that a new sett could be constructed in close proximity to the works’ area, resulting in contravention of the Protection of Badgers Act 1992 (Ref. 14.14). To avoid this, at least three months prior to the commencement of construction, a re-survey of the site would be completed to determine the current status of the badger setts recorded during the baseline surveys and to identify any newly constructed setts that could be affected by the works. Should any active setts be located sufficiently close to the construction footprint that they could be damaged or disturbed by the works and if there is no opportunity to avoid these impacts, a licence would be obtained from NE to enable the works, and any required mitigation measures, to proceed. With the adoption of these measures, there would be no impact on badgers in relation to legal protection.

vi. Bat Assemblage

14.6.37 The foraging and commuting habitats that were retained during construction and operation would continue to be retained throughout the post-operational phase. This together with the fact that the habitats lost during the construction phase would be reinstated during this phase, would result in a very low magnitude beneficial impact on bats, a receptor of medium value, resulting in a minor beneficial impact.

vii. Slow-worm

14.6.38 It is likely that the majority of the slow-worms that would be present within the site would be within habitats that would be retained (for example, the field boundary hedgerow network). However, some slow-worms are likely to be present within areas where vegetation would be cleared. To avoid contravention of the WCA (Ref. 14.8), a programme of phased vegetation clearance of these areas would be undertaken during the period April - early October, under the supervision of a suitably qualified ecologist. This would encourage slow-worms to move from the areas being cleared, of their own accord, into adjacent retained habitats and to re-colonise areas of restored habitat, such as those within the verge of the A39. With the adoption of these measures, there would be no impact on slow-worm in relation to legal protection.

14.7 Mitigation of Impacts

14.7.1 Impacts rated as negligible or minor adverse are considered to be generally acceptable without the requirement for further mitigation, however a range of standard good practice measures, which are not receptor-specific, would be implemented including:

- provision of an Ecological Clerk of Works (ECoW) during all site clearance activities;
• ecological supervision by the ECoW of activities that have been incorporated into the proposed development in order to avoid or reduce adverse impacts on wildlife; and

• provision of an escape route for animals in any deep trenches excavated.

14.7.2 Environmental control measures described in this chapter are reflected in the Ecological Management and Monitoring Plan (EcMMP).

14.8 Residual Impacts

14.8.1 The residual impacts at each phase of the scheme would be identical to the impacts that are set out in Sections 14.6d - 14.6f of this chapter.

14.9 Summary of Impacts

14.9.1 Table 14.7 provides summary information about the impacts that have been assessed.
Table 14.7: Summary of Environmental Measures Incorporated into the Scheme and likely Significance of Residual Impacts

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Magnitude</th>
<th>Description</th>
<th>Value/Sensitivity</th>
<th>Significance</th>
<th>Proposed Mitigation/Best Practices</th>
<th>Residual Impact</th>
</tr>
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<tr>
<td><strong>Construction Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td>Adverse</td>
<td>Low</td>
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<td>None required (measures within scheme design).</td>
<td>Minor</td>
</tr>
<tr>
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<td>Reduction in habitat connectivity</td>
<td>Low</td>
<td>Adverse</td>
<td>Low</td>
<td>Minor</td>
<td>None required (measures within scheme design).</td>
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<td>Disturbance to active nests</td>
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<td>No impact</td>
<td>LP</td>
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<td>None required (measures within scheme design).</td>
<td>No Impact</td>
</tr>
<tr>
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<td>Destruction of active nests</td>
<td>No impact</td>
<td>No impact</td>
<td>LP</td>
<td>No impact</td>
<td>None required (measures within scheme design).</td>
<td>No Impact</td>
</tr>
<tr>
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<td>No impact</td>
<td>LP</td>
<td>No impact</td>
<td>None required (measures within scheme design).</td>
<td>No Impact</td>
</tr>
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<td>Bat assemblage</td>
<td>Loss/disturbance of foraging/commuting habitat.</td>
<td>Low</td>
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</tr>
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<td>No impact</td>
<td>LP</td>
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<td>Beneficial Temporary</td>
<td>Low</td>
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<td>None required (measures within scheme design).</td>
<td>Minor beneficial</td>
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</tr>
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<td>No impact</td>
<td>LP</td>
<td>No impact</td>
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<td>LP</td>
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<td>No Impact</td>
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<td>Disturbance to setts</td>
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<td>No impact</td>
<td>LP</td>
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<td>Receptor</td>
<td>Potential Impact</td>
<td>Magnitude</td>
<td>Description</td>
<td>Value/Sensitivity</td>
<td>Significance</td>
<td>Proposed Mitigation/Best Practices</td>
<td>Residual Impact</td>
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<td>No impact</td>
<td>LP</td>
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<td>No Impact</td>
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<td>Hedgerows</td>
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<td>Beneficial</td>
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<td>Negligible l</td>
<td>None required (measures within scheme design).</td>
<td>Negligible</td>
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<td>Habitat change</td>
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<td>Beneficial</td>
<td>Low</td>
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<td>None required (measures within scheme design).</td>
<td>Minor beneficial</td>
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<td>Disturbance to active nests</td>
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<td>No impact</td>
<td>LP</td>
<td>No impact</td>
<td>None required (measures within scheme design).</td>
<td>No Impact</td>
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<tr>
<td>Other breeding birds</td>
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<td>LP</td>
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<tr>
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<td>No impact</td>
<td>LP</td>
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<td>None required (measures within scheme design).</td>
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</tr>
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</table>

*Key: LP = Legally Protected*
References


14.6 Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention or Wetlands Convention), adopted in Ramsar, Iran in February 1971; came into force in December 1975.


14.31 SDC and WDC. Consultation Draft Hinkley Point C Project Joint Supplementary Planning Document (SPD).


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15. LANDSCAPE AND VISUAL

15.1 Introduction

15.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential landscape and visual impacts associated with the construction, operational and post-operational phases of the proposed park and ride facility at Cannington referred to hereafter as the proposed development on land referred to by EDF Energy as the Cannington park and ride site (the site). Detailed descriptions of the site, proposed development, construction, operational and post-operational phases are provided in Chapters 1 to 5 of this volume of the ES.

15.2 Scope and Objectives of Assessment

15.2.1 The scope of the assessment has been determined through a formal Environmental Impact Assessment (EIA) scoping process undertaken with the Infrastructure Planning Commission (IPC). It has also been informed by ongoing consultation with statutory consultees including Sedgemoor District Council (SDC) and Somerset County Council (SCC), the local community and the general public in response to the Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations.

15.2.2 The assessment of landscape and visual impacts has been undertaken adopting the methodologies described in Section 15.4.

15.2.3 The existing baseline conditions, against which the likely environmental impacts of the proposed development are assessed, have been determined through a desk-based assessment, field surveys and modelling, and are described in Section 15.5.

15.2.4 Impacts to landscape and visual amenity are presented in Section 15.6, and appropriate further mitigation measures are identified to be of significance are identified in Section 15.7. An assessment of residual impacts following implementation of these mitigation measures is presented in Section 15.8.

15.2.5 Cumulative impacts to landscape arising from the proposed development in combination with other elements of the Hinkley Point C (HPC) Project and other relevant plans and projects are identified and assessed in Volume 11 of this ES.

15.2.6 The objectives underlying the assessment were to assess the potential impacts on landscape and visual amenity, including:

- landscape character;
- landscape elements or features;
- landscape designations; and
- visual receptors as represented by a number of representative viewpoints.
15.3 Legislation, Policy and Guidance

15.3.1 This section identified and describes legislation, policy and guidance of relevance to the assessment of potential landscape and visual impacts associated with the construction, operational and post-operational (removal/restoration and final condition) phases of the proposed development.

15.3.2 As stated in Volume 1, Chapter 4 of this ES, the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) when combined with the NPS for Nuclear Power Generation (NPS EN-6) provides the primary basis for decisions by the IPC on applications for nuclear power generation developments that fall within the scope of the NPSs.

15.3.3 Notwithstanding this, the IPC may consider other matters that are both important and relevant to its decision-making. This could include Planning Policy Statements (PPSs), Planning Policy Guidance Notes (PPGs), regional and local policy documents, although, if there is a conflict between these and the NPS, the NPS prevails for the purposes of IPC decision making.

15.3.4 Further, the Planning Act 2008 provides that the IPC must, in making its decision on an application, have regard to any Local Impact Report (LIR) prepared by relevant local authorities. It is anticipated that the LIRs will rely in part on PPSs, PPGs, regional and local policy to provide a context for their assessment. On this basis, regard has been given to these documents (where relevant to the technical assessment) since they are likely to inform the LIRs prepared by the relevant local authorities.

a) International Legislation

i. European Landscape Convention (Ref. 15.1)

15.3.5 The European Landscape Convention (ELC) (Ref. 15.1), which was signed by the UK in February 2006 and became binding in 2007, is the first international convention to focus specifically on landscape issues and aims to protect, manage and plan landscapes in Europe. The ELC “highlights the importance of developing landscape policies dedicated to the protection, management and creation of landscapes, and establishing procedures for the general public and other stakeholders to participate in policy creation and implementation.”

15.3.6 The ELC defines landscape as:

“An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.”

b) National Legislation

15.3.7 This assessment takes into account the following legislation and policy relevant to landscape and visual amenity, ecology and cultural heritage as stated in Guidelines for Landscape and Visual Assessment (GLVIA) produced by the Landscape Institute (LI) and Institute of Environmental Management and Assessment (IEMA) (Ref. 15.2).

“It is important for landscape assessments to consider the ecological, historical or cultural associations that contribute to the character and importance of a landscape.”
“planning policies for nature conservation and landscape are generally linked through a common approach to land use….there are also numerous interrelationships between landscape and cultural heritage and it is important that these links are not overlooked.”

15.3.8 In accordance with best practice guidance, this assessment takes into account legislation and policy relevant to landscape and visual amenity, ecology and cultural heritage, recreation and amenity and transport matters. Reference should also be made to Chapter 14 of this volume (terrestrial ecology and ornithology), Chapter 16 of this volume (historic environment), Chapter 17 of this volume (Amenity and Recreation) and Chapter 8 of this volume (transport) for details on specific heritage, biodiversity, recreation and amenity and transport policy.

15.3.9 The overall legislative and planning policy context for the HPC Project is set out in Volume 1, Chapter 4.

i. Countryside and Rights of Way (CRoW) Act 2000 (Ref. 15.3)

15.3.10 The CRoW Act provides a statutory framework for Areas of Outstanding Natural Beauty (AONB), provides further measures to protect the AONBs, and clarifies the role of local authorities which now includes the preparation of management plans to set out how they will care for their AONBs.

ii. National Parks and Access to the Countryside Act 1949 as Amended by the Environment Act 1995 (Ref. 15.4)

15.3.11 The National Parks and Access to the Countryside Act provides for the designation of National Parks to conserve and enhance their natural beauty, wildlife and cultural heritage and promote opportunities for the understanding and enjoyment of the special qualities of those areas by the public. References in the Act to the preservation or the conservation of the natural beauty of an area are to be construed as including references to the preservation or, as the case may be, the conservation of its flora, fauna and geological and physiographical features.

15.3.12 Areas of Outstanding Natural Beauty (AONB) are designated under the provisions of the 1949 National Parks and Access to the Countryside Act, in order to secure their permanent protection against development that would damage their special qualities. AONBs are designated solely for their landscape qualities, for the purpose of conserving and enhancing their natural beauty.

iii. Hedgerow Regulations 1997 (Ref. 15.5)

15.3.13 The Hedgerow Regulations aim to protect hedgerows, which play an important role in supporting and enhancing biodiversity, as well as defining the character of English countryside.

15.3.14 According to the regulations, a hedgerow is important if it has existed for 30 years or more and it satisfies various wildlife, landscape or historical criteria specified in the regulations.
iv. Ancient Monuments and Archaeological Areas Act 1979 (Ref. 15.6)

15.3.15 Scheduled Monuments are designated under the Ancient Monuments and Archaeological Areas Act for archaeological sites or historic buildings that are considered to be of national importance by English Heritage. They are given protection against unauthorised change including changes to their visual setting.

c) National Planning Policy

i. Planning Policy Statement 1: Delivering Sustainable Development (PPS1) (2005) (Ref 15.7)

15.3.16 PPS1 was published in 2005 and sets out the Government’s overarching planning policies on the delivery of sustainable development through the planning system. It advises that planning should facilitate and promote sustainable and inclusive patterns of urban and rural development by, amongst other things: protecting and enhancing the natural and historic environment, the quality and character of the countryside and existing communities; and ensuring high quality development through good and inclusive design, and the efficient use of resources (paragraph 5).

15.3.17 Paragraph 17 of PPS1 states:

“The Government is committed to protecting and enhancing the quality of the natural and historic environment, in both rural and urban areas. Planning policies should seek to protect and enhance the quality, character and amenity value of the countryside and urban areas as a whole. A high level of protection should be given to most valued townscapes and landscapes, wildlife habitats and natural resources. Those with national and international designations should receive the highest level of protection.”


15.3.18 PPS5 sets out the role of planning in conserving and enhancing the historic environment, and establishes those elements which constitute the historic environment.

15.3.19 Landscapes of historic interest are considered to be ‘heritage assets’ and PPS5 makes reference to ‘historic environment characterisation’, the process of combining assessments of archaeological, architectural and historic landscape character to define the overall historic character of a place or landscape.

iii. Planning Policy Statement 7: Sustainable Development in Rural Areas (PPS7) (2004) (Ref. 15.9)

15.3.20 PPS7 was published in 2004 and sets out Government policy on the conservation of the natural beauty of the landscape and countryside. It sets the Government’s objectives for rural areas. The key objectives of PPS7 in the context of landscape and visual amenity are:

- “good quality, sustainable development that respects and, where possible, enhances local distinctiveness and the intrinsic qualities of the countryside;
- continued protection of the open countryside for the benefit of all, with the highest level of protection for our most valued landscapes and environmental resources.”
15.3.21 PPS7 also states that protection of the countryside for the sake of its intrinsic character and beauty is the Government’s overall aim and that all development in rural areas should be sensitive to the character of the countryside and local distinctiveness.

15.3.22 Paragraph 21 of PPS7 states:

“Nationally designated areas comprising National Parks, the Broads, the New Forest Heritage Area and Areas of Outstanding Natural Beauty (AONB), have been confirmed by the Government as having the highest status of protection in relation to landscape and scenic beauty. The conservation of the natural beauty of the landscape and countryside should therefore be given great weight in planning policies and development control decisions in these areas. The conservation of wildlife and the cultural heritage are important considerations in all these areas. They are a specific purpose for National Parks, where they should also be given great weight in planning policies and development control decisions. As well as reflecting these priorities, planning policies in LDDs and where appropriate, RSS, should also support suitably located and designed development necessary to facilitate the economic and social well-being of these designated areas and their communities, including the provision of adequate housing to meet identified local needs.

15.3.23 Paragraph 22 advises that major developments (including major development proposals that raise issues of national significance) should not take place in these designated areas, except in exceptional circumstances.


15.3.25 At the outset, the document makes clear that in its final form, the PPS would replace paragraphs 21 to 23 in PPS7 which relate to landscape protection.

15.3.26 With specific reference to landscape protection, proposed Policy NE8.5 maintains the approach set out in Paragraph 21 of PPS7. In addition, proposed Policy NE8.5 advises that, in consideration of applications for major development proposals should include an assessment of:

(i) “the need for the development, including in terms of any national considerations, and the impact of permitting it, or refusing it, upon the local economy;”

(ii) the cost of, and scope for, developing elsewhere outside the designated area, or meeting the need for it in some other way; and

(iii) any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated.”
d) Regional Planning Policy

15.3.27 The Government’s revocation of regional strategies was quashed in the High Court on 10 November 2010. However, on that same date the Government reiterated in a letter to Chief Planners its intention to revoke regional strategies through the Localism Bill. This letter was also challenged but, on 7 February 2011, the High Court held that the Government's advice to local authorities that the proposed revocation of regional strategies was to be regarded as a material consideration in their planning development control decisions should stand. The decision of the High Court was upheld by the Court of Appeal on 27 May 2011. Therefore, the regional strategies remain in place but in the case of development control decisions it is for planning decision makers to decide on the weight to attach to the strategies (see Volume 1, Chapter 4 for a full summary of the position regarding the status of regional planning policy).

i. Regional Planning Guidance 10 for the South West 2001-2016 (RPG10) (2001) (Ref. 15.11)

15.3.28 RPG 10 sets out the broad development strategy for the period to 2016 and beyond. With specific reference to landscape character, paragraph 4.5 explains that the Countryside Agency and English Nature have identified and mapped the distinctive “character areas” (as shown on Map 4) for the South West as part of the testing of a new approach to “environmental capital” being promoted by the Countryside Agency, English Heritage, English Nature and the Environment Agency.

15.3.29 Policy EN 1 relates to Landscape and Biodiversity. It states that local authorities and other agencies, in their plans, policies and proposals, should, amongst other things:

- “provide for the strong protection and enhancement of the region’s internationally and nationally important landscape areas and nature conservation sites;

- indicate that the protection and, where possible, enhancement of the landscape and biodiversity should be planned into new development;

- have regard to the significant landscape joint character areas of the region set out in this RPG (Map 4) and aim to conserve and enhance local character;

- take measures to protect the character of the countryside and the environmental features that contribute towards that character, including minimisation of light pollution.”

ii. Draft Revised Regional Spatial Strategy (RSS) for the South West Incorporating the Secretary of State’s Proposed Changes for Public Consultation (July 2008) (Ref. 15.12)

15.3.30 Chapter 7 deals with Enhancing Distinctive and Cultural Life. Policy EN1 states:

- “The quality, character, diversity and local distinctiveness of the natural and historic environment in the South West will be protected and enhanced, and developments which support their positive management will be encouraged. Where development and changes in land use are planned which would affect these assets, Local Authorities will first seek to avoid loss of or
damage to the assets, then mitigate any unavoidable damage, and compensate for loss or damage through offsetting actions. Priority will be given to preserving and enhancing sites of international or national landscape, nature conservation, geological, archaeological or historic importance. Tools such as characterisation and surveys will be used to enhance local sites, features and distinctiveness through development, including the setting of settlements and buildings within the landscape and contributing to the regeneration and restoration of the area.”


15.3.31 The Somerset & Exmoor National Park Joint Structure Plan was adopted in 2000 with relevant policies saved from 27 September 2007. All policies have been saved with the exception of Policy 53 which is unrelated to landscape/townscape and visual impacts. The Plan provides a strategic base for all land use planning within the plan area for the period up to 2011.

15.3.32 Policy 5 relates to Landscape Character and states:

“The distinctive character of the countryside of Somerset and the Exmoor National Park should be safeguarded for its own sake. Particular regard should be had to the distinctive features of the countryside in landscape, cultural heritage and nature conservation terms in the provision for development.”


15.3.33 Whilst not forming part of the statutory development plan for the proposed development site, the Strategy for the Severn Estuary (2001) was published by the Severn Estuary Partnership in 2011 and sets out policies and proposals for action for the estuary. Chapter 12 deals with Landscape and Seascape and aims to conserve, promote and enhance and, where necessary, restore the special and distinctive character and quality of the estuary’s landscape and seascape.

15.3.34 Strategy for the Severn Estuary influences the design of infrastructure and transport projects in relation to the estuary’s landscape and seascape through its Policy L1c, which states:

“Plan and design all new developments including infrastructure and transport so that they conserve and enhance the character of the Severn Estuary landscape and seascape across authority boundaries.”

e) Local Planning Policy


15.3.35 The Sedgemoor District Local Plan forms part of the Development Plan for Sedgemoor. The Local Plan was adopted in 2004 (with relevant policies ‘saved’ from 27 September 2007). The Proposals Map (Map No. 14) indicates that the site is not subject to any landscape designations. The site is bounded to the north by a site identified as Green Wedge, Edge or Strategic Gap (Policy CNE4). The site lies outside of the defined Development Boundary.
15.3.36 The following saved policies are considered to be potentially relevant.

15.3.37 Policy CNE2 (Landscape Character) states:

“Development which adversely affects local landscape character or scenic quality will not be permitted. In particular:

a) siting and landscaping should take account of visibility from publicly accessible vantage points;

b) the form, bulk and design of buildings should have proper regard to their context in respect of both the immediate setting and the defining characteristics of the wider local area.

In determining planning applications the important characteristics of landscape character areas described in the Sedgemoor Landscape Assessment and Countryside Design Summary and/or AONB Landscape Assessments will be a material consideration.”

15.3.38 Policy CNE4 (Countryside Around Settlements) states:

“Areas of land which have particular importance as Green Wedge, Green Edge or Strategic Gap are defined on the Proposals Map. Whatever their individual character and function, these are predominantly open areas, mostly outside development boundaries, which retain a largely rural character and appearance. Positive land management which benefits the landscape, countryside access, amenity, nature conservation or urban area containment/enhancement functions of these areas will be encouraged and developments which would have a detrimental effect on these functions will not be permitted.”

15.3.39 Policy CNE12 (Trees, Hedgerows and Woodlands) states:

“In considering proposals for development, the Council will seek to protect important trees and hedgerows. Planning permission may be refused where these would not be retained, or acceptably replaced. The Council will also encourage the planting and proper management of new trees and shrubs.”

15.3.40 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from September to November 2010. Changes prior to submission proposed as a result of the consultation process were reported and endorsed by the Council’s Executive Committee on 9 February 2011. The Core Strategy (Proposed Submission) was submitted to the Secretary of State on 3 March 2011 and an Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy will form part of the Development Plan for Sedgemoor.

15.3.41 EDF Energy submitted representations objecting to the Core Strategy (Proposed Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1, MIP2 and MIP3 contained in that chapter) and those sections relating to housing and Hinkley Point. EDF Energy also participated at the relevant EiP hearings. See
Volume 1, Chapter 4 for a full summary of the position regarding the status of the Core Strategy.

15.3.42 The following Core Strategy (Proposed Submission) policies are of potential relevance.

15.3.43 Policy S3 (Sustainable Development Principles) states that development proposals will be expected to, amongst other things, protect and enhance the quality of the natural, built and historic environment.

15.3.44 Policy D4 relates to proposals for Renewable or Low Carbon Energy Generation. It states the Council will support proposals that maximise the generation of energy from renewable or low carbon sources, provided that the installation would not have significant adverse impact taking into account, amongst other factors (Ref. 15.16):

"The impact of the scheme, together with any cumulative impact (including associated transmission lines, buildings and access roads), on landscape character, visual amenity, historic features and biodiversity."

15.3.45 Policy D14 (Natural Environment) deals with landscape and visual impacts more generally. It states:

“Development proposals within the Mendip Hills AONB or the Quantock Hills AONB will only be supported where they enhance or maintain the natural beauty, or the exceptional character or quality of the landscape in these areas.

Elsewhere in the District proposals should ensure that they enhance the landscape quality wherever possible or that there is no significant adverse impact on local landscape character, scenic quality and distinctive landscape features as identified in the Sedgemoor Landscape Assessment and Countryside Design Summary. In particular through:

a) siting and landscaping that takes account of visibility from publicly accessible vantage points;

b) the form, bulk and design of buildings having proper regard to their context in respect of both the immediate setting and the defining characteristics of the wider local area.

Where there are reasonable grounds to suggest that a development proposal may result in a significant adverse impact on the landscape, the Council will require planning applications to be supported by landscape impact assessments.

In exceptional circumstances, where development is necessary and could result in significant impact on the landscape, appropriate mitigation and compensation measures should be provided.”

15.3.46 Policy D16 (Pollution Impacts of Development and Protecting Residential Amenity) states that development proposals that are likely to result in, amongst other things, light pollution that would be harmful to other land uses will not be supported. Policy 16 also states that development proposals that would unacceptably impact upon the...
residential amenity of occupants of nearby dwellings and any potential future occupants will not be supported. Particular consideration will be given to the extent that the proposal could result in overshadowing, overlooking and/or visual dominance.

15.3.47 Policy D20 (Green Infrastructure) states that green infrastructure will be safeguarded, maintained, improved, enhanced and added to, as appropriate, to form a multi-functional resource which, amongst other things, maintains or enhances amenity, landscape character and the image of the area.

f) Supplementary Planning Guidance

15.3.48 Sedgemoor District Council and West Somerset Council have jointly prepared draft supplementary planning guidance in relation to the HPC Project. Public consultation on the Consultation Draft version of the Hinkley Point C Project Supplementary Planning Document (the draft HPC SPD) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which object to the draft HPC SPD. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the draft HPC SPD.

15.3.49 In relation to the Cannington Park and Ride site, paragraph 9.20 in the draft HPC SPD advises:

“The HPC project promoter should prepare a masterplan for a park and ride facility at Cannington which should address the following criteria:

- Landscaping, lighting design and the deployment of acoustic fencing should be used to limit the impacts of Park and Ride operation on Cannington Conservation Area and nearby residential properties.
- Development should seek to enhance the Public Rights of Way Network, providing high quality cycling and walking links between locations including the village centre, Park and Ride, Brymore School, Yeo Valley site.
- Landscaping and open spaces should link with surrounding features and aim to serve multiple functions including flood risk mitigation, habitat enhancement, landscape protection and enhancement, and improvements to public access for recreation.
- Access to the Park and Ride should be located to limit disturbance to residential properties and the Cannington Brook County Wildlife Site.”

(page 72)

15.3.50 Further planning policy context is provided in the Legislative Planning Policy Context chapter (Volume 1, Chapter 4) and the Introduction chapter (Volume 6, Chapter 1).

g) Designated Area Management Plans and Guidance


15.3.51 Whilst not forming part of the statutory development plan for the proposed development site, the Quantock Hills Area of Outstanding Natural Beauty (AONB) Management Plan was published by the Quantock Hills AONB Joint Advisory Committee in 2009 and sets out policies, objectives and action points over a range of
subjects, including landscape, wildlife, historic environment and cultural influences and development and planning. Of particular relevance are the following development and planning policies:

Policy D1 – “To protect the wild character, wildlife sites and species, cultural landscape and architectural heritage of the AONB.”

Policy D2 – “To ensure AONB involvement and influence in planning processes affecting the AONB.”

Policy D3 – “To protect the views out from the AONB through involvement in the planning process.”

Policy D4 – “To support the local distinctiveness in AONB settlements.”

h) Other Relevant Guidance

i. Lighting in the Countryside: Towards Good Practice (Ref. 15.18)

15.3.52 The Department for Communities and Local Government (DCLG) and the former Countryside Commission (CC) 1997 guidance on lighting, Lighting in the Countryside: Towards Good Practice (Ref. 15.18) provides advice on developing lighting strategies, lighting design and how to mitigate adverse impacts associated with lighting on landscape and visual amenity.

15.3.53 Guidance relevance to the landscape and visual impact assessment and landscape character assessment is referred to in the methodology section of this chapter (Section 15.4).

15.4 Methodology

15.4.1 The Landscape and Visual Impact Assessment (LVIA) and supporting studies and surveys were conducted for all phases of the proposed development, in accordance with the principles set out by the Landscape Institute (LI) and Institute of Environmental Management Assessment (IEMA) in the Guidelines for LVIA (GLVIA) (Ref. 15.2) and guidance on Landscape Character Assessment from the Countryside Agency (now Natural England) and Scottish Natural Heritage (Ref. 15.19).

a) LVIA Study Area

15.4.2 The LVIA study area defines the geographic extent of the landscape and visual impact assessment of the proposed development site.

15.4.3 The LVIA study area has been defined through a staged process which has included desk study, Zone of Theoretical Visibility (ZTV) analysis (see Appendix 15A), modelling and field survey, including verification and refinement of ZTV results. Consultation has also been undertaken with a range of statutory and non-statutory consultees on the extents of the LVIA study area.

15.4.4 Following the analysis of Bare Ground ZTVs of early iterations of the proposed development, Ordnance Survey mapping at a range of scales, field surveys and consultation, the study area was refined to exclude areas from which the proposed development would not be visible or was judged not to have a potential to cause significant landscape and visual impacts – perhaps due to the screening provided by
landform, vegetation or urban form, or distance from the proposed development, or combination of some of these factors.

15.4.5 A summary of the maximum extents of the study area, which covers an area of 5km from the site, is described below:

- landscape to the north of the proposed development site, around Stockland Bristol;
- landscape to the south of the proposed development site, to Goathurst;
- landscape to the east of the proposed development site, to the River Parrett east of Chilton Trinity; and
- landscape to the west of the proposed development site, to near Halsey Cross.

15.4.6 The final LVIA study area is illustrated on Figure 15.1.

b) Baseline and Assessment Methodology

15.4.7 The approach to assessing and describing the impacts on landscape and visual receptors is similar to that used for other environmental topics in this Environmental Statement and is based on determining impact significance through consideration of the potential magnitude of change in relation to the sensitivity of a particular receptor to change. As such the LVIA is similar to the overall assessment approach set out in Volume 1, Chapter 7.

15.4.8 There are, however, some differences, which largely relate to how the landscape and visual impact assessment applies the methodology set out in Section 15.4b. It includes a combination of objective and subjective elements and adopts a structured and consistent approach, incorporates consultation findings and has been undertaken by experienced landscape architecture and assessment professionals.

15.4.9 The methodology used in the assessment of landscape and visual impacts draws significantly upon professional judgment to accurately establish an understanding of baseline conditions, the sensitivity of landscape and visual receptors, the magnitude of impacts arising from the proposed development and the significance of impacts arising.

15.4.10 The detailed methodology for this assessment, as described below, was subject to consultation with statutory and non-statutory consultees.

15.4.11 There are four key stages in the assessment process:

- Stage 1: Baseline data collection and analysis;
- Stage 2: Assessment of the sensitivity of landscape and visual receptors;
- Stage 3: Assessment of the magnitude, nature and duration of impacts; and
- Stage 4: Assessment of the significance of impacts on landscape and representative visual receptors.
i. Stage 1: Baseline Data Collection and Analysis

15.4.12 This stage establishes the baseline conditions for the LVIA study area and identifies the relevant landscape and visual receptors. Key activities during the baseline data collection and analysis stage included:

- Preparation of ZTV, a theoretical area from which part or all of the proposed development is potentially visible, based on evolving project design.
- Desk study to identify potential representative viewpoints and photomontage locations.
- Desk study of national landscape character within the LVIA study area to understand the broad landscape character context for the project.
- Desk study of local (district and designated landscape) character assessments to gain a detailed understanding of the landscape character context of the LVIA study area.
- Field survey to review the selection of representative viewpoints to gain a broad understanding of the visual context of the LVIA study area.
- Field work to verify the desk study of national and local landscape character assessments and to gain a detailed understanding of the landscape character of the HPC development site and its immediate landscape context, including analysis of landscape elements and features for the HPC development site.
- Consultation to review the findings of initial desk study and field work and baseline descriptions of landscape character and visual context.

15.4.13 Representative viewpoints have been selected on the basis of locations that represent a receptor type (such as a group of residential properties). To ensure that selected viewpoints represent the ‘worst-case scenario’ view for a given receptor, viewpoints were selected which provide the clearest views of the proposed development (e.g. because of their proximity to the proposed development or the absence of visual barriers between the viewpoint and the proposed development) and which are also the most accessible to the public.

15.4.14 A total of 10 were selected. Initial baseline photographs illustrating views from a series of viewpoints were taken using a Nikon D100 digital camera, set to the equivalent of a 35mm focal length, which is the equivalent of 50mm film camera lens (equivalent of human eye). Where viewpoints consisted of more than one frame, the relevant frames were merged together using Photovista software (version 2.0).

15.4.15 For the purpose of the assessment of lighting impacts a Baseline Lighting Report was commissioned (see Appendix 15D). There are additional viewpoints included in this visual assessment that are not included in the Baseline Lighting Report due to ongoing engagement with relevant stakeholders.

15.4.16 The viewpoint panoramas were scaled according to the Advice Note 01/11 from the Landscape Institute, Photography and Photomontage in Landscape and Visual Impact Assessment (Ref. 15.20). The panoramas on the viewpoint sheets have been scaled to be viewed at a distance of 400mm.

15.4.17 Where possible, the selected photographs were taken in winter and show the ‘worst-case scenario’ (views without foliage). For some views, where vegetation does not
obscure views of the proposed development site, or it has limited screening effect, views with foliage were considered sufficient for the purpose of the assessment.

**ii. Stage 2a: Receptor Sensitivity – Landscape**

15.4.18 The determination of landscape sensitivity is an important part of the landscape and visual impact assessment process. Sensitivity combined with the potential magnitude of impact allows assessment of the overall significance of the landscape impacts to be made.

15.4.19 According to the GLVIA, the sensitivity of the landscape resource is described as “The degree to which a particular landscape type or area can accommodate change arising from a particular development without detrimental effects on its character…”. The overall sensitivity of the existing landscape resource will vary with:

- “existing land use;"
- the pattern and scale of the landscape;
- visual enclosure/ openness of the views, and distribution of visual receptors;
- the scope for mitigation, which would be in character with the existing landscape;
- the value placed on the landscape.”

15.4.20 In addition to the above list of considerations, the GLVIA also consider that sensitivity of the landscape resource is based on evaluation of factors such as quality, value, contribution to landscape character and degree to which elements can be replaced or substituted.

15.4.21 Evaluation of value or importance often refers to policy or designations as an indicator. Importance relates to the contribution of the landscape element/feature, character or views within the local area and is a factor of its scenic quality, condition, sense of place, visibility, accessibility and special qualities such as remoteness. Not all characteristics are uniformly spread throughout designated landscapes so the importance of the proposed development site is considered within the designated area.

15.4.22 For assessment purposes, the sensitivity of a landscape receptor is based on the application of the above criteria, informed by field surveys undertaken by landscape professionals, professional judgement of the assessor and consultation with statutory and non-statutory consultees.

15.4.23 Table 15.1 shows the potential gradations of sensitivity of landscape receptors (high, medium, low or very low).
### Table 15.1: Guidelines for the Assessment of Landscape Sensitivity

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Description</th>
</tr>
</thead>
</table>
| High        | A landscape of particularly distinctive character and scenic quality.  
Nationally and regionally designated landscape for its scenic quality and character. |
| Medium      | A landscape of moderately distinctive character and scenic quality.  
Locally designated landscape for its scenic quality and character. |
| Low         | A landscape of no distinctive character and scenic quality.  
A landscape not subject to any form of landscape designation. |
| Very low    | A landscape that is damaged, neglected or poor character and lacking scenic quality.  
A landscape not subject to any form of landscape designation. |

15.4.24 By way of an example, a landscape that is nationally designated, such as an AONB, is regarded as being the most sensitive to change. A landscape that is relatively intact, of some scenic quality, and locally designated would be judged to be of medium sensitivity. A landscape that is neglected and damaged, or lacking scenic quality, such as a brownfield site, might be judged to be of low or very low sensitivity.

### iii. Stage 2b: Receptor Sensitivity – Visual

15.4.25 Visual sensitivity is established in relation to visual receptors. Visual receptors are interest or viewer groups that may experience an effect arising from the proposed development. According to GLVIA, the sensitivity of visual receptors depends on:

- *The location and context of the viewpoint;*
- *The expectations and occupation or activity of the receptor; and*
- *The importance of the view (which may be determined with respect to its popularity or numbers of people affected, its appearance in guidebooks, on tourist maps, and in the facilities provided for its enjoyment and references to it in literature or art).”*

15.4.26 Table 15.2 shows the potential gradations of sensitivity of visual receptors (high, medium, low or very low).

### Table 15.2: Guidelines for the Assessment of Visual Receptor Sensitivity

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Description</th>
</tr>
</thead>
</table>
| High        | Viewers with a proprietary interest, specific interest in the view and prolonged viewing opportunities.  
Examples include:  
Occupiers of residential properties.  
Visitors to tourist attractions.  
Recreational receptors using recreational facilities such as National Cycle Routes, National Trails, and designated long distance footpaths.  
Recreational receptors using Public Rights of Way (PRoW) or viewpoints in nationally or locally designated landscapes. |
<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Description</th>
</tr>
</thead>
</table>
| Medium      | Viewers with a moderate interest in their surroundings such as:
  Users of schools.
  Users of outdoor recreational facilities where landscape appreciation is unlikely to be a primary motive.
  Local viewpoints.
  Users of local PRoW. |
| Low         | Viewers with a passing interest in their surroundings such as:
  Road or other transport users. |
| Very low    | Viewers with no interest in their surroundings such as:
  People at their place of work. |

15.4.12 By way of an example residential receptors are generally considered to be the most sensitive receptor group owing to their propriety interest and their prolonged exposure. Recreational receptors such as people engaged in outdoor sports are considered of medium sensitivity although recreational receptors whose attention or interest is focused on the landscape may also be considered to be highly sensitive.

15.4.27 The least sensitive groups are those with no interest in their surroundings or those that are already affected by similar types of visual impact to that arising from the proposed development or those who have only a passing interest in the surroundings, such as motorists on a busy motorway.

15.4.28 It should be noted that for each of the representative visual receptors used in the assessment, a range of visual receptor types may be represented. In all cases the highest sensitivity will be taken forward to the assessment of significance.

15.4.29 For assessment purposes, the sensitivity of representative visual receptors is based on the application of the above criteria, informed by field surveys undertaken by landscape professionals, based on the professional judgement of the assessor and taking into account consultation.

**iv. Stage 3: Magnitude of Impacts**

15.4.30 According to GLVIA, the magnitude of impacts is a “combination of the scale, extent and duration of an effect.” The magnitude of landscape and visual impacts are judged separately using the criteria set out below.

**v. Stage 3a: Magnitude of Landscape Impacts**

15.4.31 The magnitude of landscape impacts is defined as high, medium, low or very low and depends upon the following factors:

- scale or degree of change to the existing landscape resource;
- nature and duration of the change caused by the proposed development (for example beneficial or adverse); and
- timescale or phasing of the proposed development.
15.4.32 Guidelines for the assessment of the magnitude of landscape impacts are presented in Table 15.3:

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Total or widespread loss or major alteration to key landscape elements/characteristics.</td>
</tr>
<tr>
<td>Medium</td>
<td>Partial loss or alteration to one or more key landscape elements/characteristics.</td>
</tr>
<tr>
<td>Low</td>
<td>Limited loss or alteration to one or more key landscape elements/characteristics.</td>
</tr>
<tr>
<td>Very low</td>
<td>Extremely limited loss or alteration to one or more key landscape elements/characteristics.</td>
</tr>
</tbody>
</table>

vi. Stage 3b: Magnitude of Visual Impacts

15.4.33 The magnitude of visual impacts is defined as high, medium, low or very low and depends upon the following factors (Ref. 15.2) (see Table 15.4):

- the scale of change or proportion of the existing view that would change as a result of the proposed development;
- the loss or addition of features or elements within the view;
- the degree of contrast or integration of the proposed development with the existing or remaining landscape elements and characteristics within the view;
- the nature and duration of the impact and whether it is temporary or permanent, continuous or intermittent;
- the angle of the view in relation to the main activity of the receptor; and
- the distance of the viewpoint from the proposed development.

15.4.34 Guidelines for the assessment of the magnitude of visual impacts are presented in Table 15.4:

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Complete change or widespread alteration to the existing view.</td>
</tr>
<tr>
<td>Medium</td>
<td>Noticeable but localised alteration to the existing view.</td>
</tr>
<tr>
<td>Low</td>
<td>Partial and very localised alteration the existing view.</td>
</tr>
<tr>
<td>Very low</td>
<td>Barely perceptible change to the existing view. It may be difficult to differentiate the proposed development from its surroundings.</td>
</tr>
</tbody>
</table>

vii. Nature and Duration of Impacts

15.4.35 The nature of impacts contributes to the assessment of magnitude of landscape and visual impacts.

15.4.36 The nature of impacts can be adverse, beneficial or neutral. In the situation where no or little change is predicted the impact is assessed as neutral.
15.4.37 With regard to the duration of landscape and visual impacts, short to medium-term impacts are normally considered to be temporary and associated with the construction of a development, and long-term impacts are normally associated with a fully occupied and operational scheme. Permanent impacts are those which result in an irreversible change to baseline conditions or will last for the foreseeable future. For more details see Volume 1, Chapter 7.

15.4.38 The duration of landscape and visual impacts has been categorised for the purposes of this development:

- long-term – 15 years plus;
- medium-term – 5 to 15 years; and
- short-term – 0 to 5 years.

viii. Stage 4: Assessment of Significance

15.4.39 The potential significance of landscape and visual impacts is determined by assessing the magnitude of the identified impacts against the sensitivity of the landscape and visual receptors affected. The significance matrix presented in Volume 1, Chapter 7 provides a guide to decision-making but is not a substitute for professional judgement and interpretation, particularly when sensitivity or impact magnitude levels are not clear or are borderline between categories.

15.4.40 Table 15.5 provides a brief definition of the significance criteria which are specific to landscape and visual impact assessment and are in accordance with the overall EIA sensitivity criteria outline in Volume 1, Chapter 7.

<table>
<thead>
<tr>
<th>Level of Significance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>Very important or substantial change in landscape and visual conditions. Impacts may be adverse or beneficial.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Noteworthy or medium change in landscape and visual conditions. Impacts may be adverse and beneficial.</td>
</tr>
<tr>
<td>Minor</td>
<td>Inconsiderable or small change in landscape and visual conditions. Impacts may be adverse, neutral or beneficial.</td>
</tr>
<tr>
<td>Negligible</td>
<td>No discernible change in landscape and visual conditions. Impact is likely to have a negligible (neutral) influence, irrespective of other impacts.</td>
</tr>
</tbody>
</table>

15.4.13 By way of an example, major landscape and visual impact may occur where a large scale development is proposed within a nationally designated landscape leading to partial loss or alteration to one or more key landscape elements/characteristics. In visual terms, a major impact may arise where large number of residential receptors would experience noticeable but localised alteration to the existing view.

15.4.41 The significance of the impact is judged on the relationship of the magnitude of impact to the assessed sensitivity and/or importance of the receptor. The methodology to assess the predicted significance of impacts, without mitigation, is outlined in Volume 1, Chapter 7 of the ES.
15.4.44 For the purposes of this assessment measures have been proposed where there is an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so.

**ix. Residual Impact Assessment**

15.4.45 The assessment of the residual impacts takes account any proposed mitigation measures and is undertaken using the same assessment methodology as outlined above.

**x. Cumulative Impacts**

15.4.46 This chapter assesses the potential additive and interactive impacts on landscape and visual receptors that may arise as a result of the proposed development (i.e. site-specific cumulative impacts). The methodology for assessing these impacts is described in **Volume 1, Chapter 7**.

15.4.47 Project-wide cumulative impacts and in-combination impacts with other proposed or reasonably foreseeable development or projects are assessed in **Volume 11**.

**c) Consultation**

15.4.48 The consultation process is outlined in the **Consultation Report**. Comments from formal stages of consultation (Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations) have been taken into account within the assessment (see **Consultation Report**).

15.4.49 Consultation undertaken outside of the formal consultation was also carried out and included meetings and correspondence exchanged with a variety of organisations to discuss all stages of the LVIA including specific aspects of the proposed development, such as extents of study area, landscape and visual baseline, landscape and visual impacts including lighting, development footprint and design, and mitigation proposals.

**d) Limitations, Constraints and Assumptions**

15.4.50 The assumptions and limitations for this assessment are described below:

- Landscape and visual surveys that contribute to the assessment were undertaken between December 2008 and May 2011.
- The mitigation of landscape and visual impacts has been considered from an early stage in the Project. As such, consideration of landscape and visual impacts comprising construction, operational and post-operational phases, has been an important part of the design process, including architectural and landscape design, and lighting strategy. Further details of the iterative design process are provided within the alternatives chapter (**Volume 6, Chapter 6**) which describes the alternative design options which have been considered with respect to the potential environmental impact.
- The assessment of the lighting impacts of the proposed development on visual amenity is based on construction, operational and post-operational lighting strategies and health and safety requirements. The lighting strategy is considered inherent mitigation within the design of the proposed development and not part of the further mitigation.
15.5 Baseline Environmental Characteristics

a) Introduction

15.5.1 This section describes the landscape and visual baseline environmental conditions within the study area (Figure 15.1). Additional viewpoints within the ZTV but outside the study area are also included where appropriate, i.e. where more distant receptors occur.

b) Site Description

15.5.2 The site is located on very gently sloping land to the south of the village of Cannington in an area of pasture between the edge of Cannington and the improved A39.

15.5.3 The proposals would all be contained within one field of improved pasture. Of particular importance is a fine oak tree on the site’s western boundary. The hedges around the site are double hedgerows either side of free flowing, steep sided ditches in straight channels. Close to the oak tree on the western boundary there is a small sluice. The visual quality of the hedgerows is fairly poor; they are clipped to around 1.5m and are gappy. In some places they are predominantly bramble.

15.5.4 The site is bounded to the north and east by the edge of the village of Cannington. The settlement is primarily recent late 20th Century in character with some properties having views out over the site and surrounding fields.

15.5.5 The south of the site is bordered by strong screen planting adjacent to the improved A39. The planting screens the road from the south of Cannington and screens the proposed development site from views from the south.

15.5.6 To the west there are fields of pasture with better tree cover. Within approximately 300m of the site lies the meandering Cannington Brook bounded by a strong tree line.

15.5.7 The site is set within an area of land which is enclosed by built development and planting which screens it from the wider landscape. The character of the site and the area immediately around the site is agricultural land, with variable hedgerows. The A39 is generally well screened but there is some visual intrusion from recent development on the edge of Cannington.

c) Statutory Designations

i. International and National

15.5.8 There are no international or national landscape designations within the 5km study area.

15.5.9 Several important international and national designations relevant to this development exist within 5km of the proposed development (Figure 15.2). These designations are:

- Quantock Hills AONB;
- The Severn Estuary Ramsar site;
- The Severn Estuary Special Protection Area (SPA);
- The Severn Estuary Special Area of Conservation (SAC);
• The Bridgwater Bay Site of Special Scientific Interest (SSSI);
• The Bridgwater Bay National Nature Reserve (NNR);
• Scheduled Monuments; and
• Registered Historic Park and Garden.

15.5.10 The Quantock Hills AONB was designated in 1956 under the National Parks and Access to the Countryside Act 1949 and was the first AONB designated in England. It is approximately 9,900ha in area and at its closest is located approximately 3.7km away from the site. Due to the landscape sensitivity of the AONB this assessment includes receptors in this area which is outside the study area. has been extended beyond the 5km boundary where the ZTV suggested the might be views. The AONB falls within the boundary of three local planning authorities, namely: West Somerset Council (WSC), SDC and Taunton Deane Borough Council (TDBC).

15.5.11 The Bridgwater Bay NNR is approximately 5km north of the town of Bridgwater and comprises the lower reaches of the River Parrett and its estuary where it flows into the Bristol Channel. Along the coast the site extends north to the town of Burnham on Sea and as far west as the village of Lilstock. The area is also designated as the Bridgwater Bay SSSI, the Severn Estuary SPA and part of the area is in the process of being designated as a SAC. The area comprises a succession of habitats ranging through extensive intertidal mudflats, saltmarsh, shingle beach and grazing marsh intersected by a complex network of freshwater and brackish ditches. It supports internationally and nationally important numbers of over-wintering and passage migrant waders and waterfowl. The ditches and ponds contain a diverse invertebrate fauna including six nationally rare species and eighteen nationally scarce species. The site is an integral part of the Severn Estuary system and is ecologically linked to the Somerset Levels which provide alternative winter feeding grounds for waders and wildfowl. The impact on ecology has been assessed fully in Chapter 14 of this volume of the ES.

15.5.12 The nearest Scheduled Monuments considered to be of national importance by English Heritage are located to approximately 1.5km north-west of the site at Cannington Park Hill Fort and approximately 1.5km to the south-east at Sandford Farm. The edge of Halswell Park Historic Park and Garden lies on the southern edge of the study area. The Historic Environment chapter, Chapter 16 of this volume gives a full assessment of the impact on the historic environment.

ii. Regional and Local

15.5.13 Regional and Local designations within 5km of the proposed development site are shown in Figure 15.2 and include the following:

• An area designated as Green Wedge (Edge or Strategic Gap) sits to the north-east of the site.
• A Conservation Area is located to the north-east of the site in the centre of Cannington.
• A County Wildlife Site (CNE9) is located to the west of the proposed development site along Cannington Brook.
• Areas of Recreational Open Space (RLT1) within Cannington to the north and east of the site.

• An area of High Archaeological Potential is present to the north-east of the proposed development site in the centre of Cannington.

15.5.14 The Recreation and Amenity chapter, Chapter 17 makes a full assessment of the impact on recreation and amenity.

d) Landscape Character

i. National Landscape Character

15.5.15 At the national level landscape character assessment is defined by the Countryside Agency’s own assessment work, as set out in Countryside Character, Volume 8: South West (Ref. 15.21). This document identifies the proposed development site within the Area 146: Vale of Taunton and Quantock Fringes and is located within 1km of the boundary to Area 142/143: Somerset Levels and Moors/Mid Somerset Hills.

15.5.16 The key characteristics of Area 146: Vale of Taunton and Quantock Fringes are:

• “Lowland farmland qualities in sharp contrast to surrounding upland landscapes.

• Lowland mixed farming landscape, with dense hedges, sparse woodland and frequent settlement.

• Contrast between floodplain, low clay vale and higher sandstone vale edge.

• Scattered settlement of farmsteads and hamlets linked by winding lanes.

• Scattered villages.

• Red sandstone buildings and prominent Perpendicular church towers.

• Cider apple orchards.

• Variable hedgerow tree cover, with some areas of abundant hedgerow oaks.

• Willows on floodplains.

• Open and windswept coast with low cliffs.”

15.5.17 The key characteristics of Area 142/143: Somerset Levels and Moors/Mid Somerset Hills are:

• “Flat, open landscape of wet pasture, arable and wetland divided up by wet ditches or ‘rhynes’.

• Absence of dispersed farmsteads or any buildings on levels and moors. Nucleated settlements on ridges/islands.

• Surrounded, and divided up, by low hills, ridges and islands which form distinctive skylines.”
• Peat working and nature reserves contrasting with the rectilinear planned landscape of the Moors.

• Dramatic and prominent hills such as Brent Knoll, the Isle of Avalon and Barrow Mump, rising above the Levels and Moors.

• Sparse tree cover on Levels and Moors contrasting with woodland, hedges and orchards of surrounding hills.

• Sparsely populated Moors but settlements common on hills, ridges and islands.

• Historic landscape strongly evident in features ranging from prehistoric track ways and lake villages, to post-medieval enclosures and peat working.

• International nature conservation significance for wetland, waders and waterfowl.

• Narrow dune belt fringing Bridgwater Bay.

• Raised rivers and levees, with main roads and causeways flanked by houses. Flooding in Winter over large areas.”

ii. Evaluation of County and District Landscape Character

15.5.18 There are no county level character assessments, but at the more detailed district level, the Sedgemoor Landscape Assessment and Countryside Design Summary (Ref. 15.22) has been reviewed to inform the baseline.

15.5.19 The relevant landscape character areas around the proposed development site are shown in Figure 15.3 and their key characteristics are described below.

Lowland Hills

15.5.20 This landscape character area is a series of hills and isolated knolls which have a close historic and visual association with wetlands. Typically the hills have broad, rolling profiles. The area surrounding the site is made up of a pattern of larger fields and mature hedgerows. Two sub areas have particular relevance to the site:

15.5.21 Quantock Foothills sub-area – characterised by low, broad, rolling, hills forming a transition to the steeply folded AONB; undulating topography; small deciduous woodlands; remnant parkland landscapes; predominantly farmed landscape; hedgerows with hedgerow trees Ash (Fraxinus excelsior) and Oak (Quercus robur); small streams and brooks; M5 and power lines (negative).

15.5.22 Stockland Hills sub-area – similar to Quantock Foothills but more diverse and smaller scale; undulating topography; distinctive due to relationship with the coastal and estuarine areas; small hills (Cannington Park Hill Fort); larger arable and small pasture fields; unmanaged hedgerows; small woodlands; dispersed settlement pattern.

15.5.23 The sensitivity of the Lowland Hills is assessed as medium being of moderately distinctive character and scenic quality.
Levels and Moors

15.5.24 The proposed development site lies on the boundary of the Somerset Levels and Moors landscape character area.

15.5.25 Somerset Levels and Moors are a vast area of drained wetland with limited tree cover and a strong sense of openness. The Moors are an area of Summer pastures criss-crossed with a geometric pattern of rhynes, long straight access droves and distinctive pollarded willows (*Salix spp.*) or hawthorn (*Crataegus monogyna*) hedgerows. The Levels and Moors landscape shows differences, with a pattern of drainage ditches and lanes which is often much less regular and includes more mixed hedgerows. The sub-areas of this landscape character area that are of particular relevance to the proposed development site are:

15.5.26 Levels sub-area – lowland areas, largely flat landscape, irregular field pattern defined by a combination of drainage channels and hedges; hedgerows and hedgerow trees; inhabited and civilised character; sense of quiet and unspoilt rural charm;

15.5.27 Estuarine Levels sub-area – lowland areas, largely flat landscape, irregular filed pattern defined by a combination of drainage channels and sinuous stream and hedges, few hedgerow trees sometimes vast views often disrupted by pylon lines.

15.5.28 The sensitivity of the Levels and Moors landscape character is assessed as high being a landscape of strongly distinctive character and scenic quality.

Quantock Hills

15.5.29 The Quantock Hills area lies at the southern edge of the study area. The section of the study area within the Quantock Hills and Combes sub-area is also within the AONB.

15.5.30 Quantock Hills and Combes sub-area – complex, varied, landform; steep, enclosed combs; some large arable or pasture fields; pastures in small fields with mature hedgerows; dispersed farmhouses; mature trees as prominent skyline features; streams and deciduous woodland; open hilltops with gently rolling landform with long views from gaps or gates in hedge banks.

15.5.31 The Quantock Hills AONB is an area of high sensitivity being a Nationally designated landscape of distinctive character and scenic quality.

iii. Evaluation of Local Landscape Character

15.5.32 The Countryside Agency’s (now Natural England) guidance (Ref. 15.19) on landscape appraisal recommends that landscapes are initially characterised and that judgements about the nature and value of these landscapes are then based on this characterisation process. The guidance recommends that the characterisation process should be based on an assessment of natural factors, cultural social factors and aesthetic and perceptual factors, and has been used to produce the following Local Landscape Character Areas.

15.5.33 Due to the large size of the district character some areas, a further sub-division into smaller local character areas has been deemed necessary. This sub-division is for descriptive purposes for this LVIA and is not intended as a full Landscape Character Assessment. The different landscape character areas can be seen on Figure 15.3.
There are 10 sub-areas in all. The site lies within the Ashford Valley local character area. This local character area is also bordered by the Cannington, Brymore and Woodcock Downs character areas. These have also been included in the detailed assessment.

**Ashford Valley**

15.5.34 Area characterized by gently sloping valley floor sloping from low ground near Cannington towards the Quantocks (from approximately 10m AOD to 50m AOD). The A39 follows the valley floor. The valley is enclosed by the Stockland Hills to the north and the Quantock Foothills to the south. Although predominantly in agricultural use as well as the A39 the valley has more large scale recent development than the surrounding agricultural landscape.

15.5.35 Fields tend to be irregular and of variable size, assessed as recently enclosed land 17th to 21st Century by Somerset Historic Landscape Classification (Ref 15.23). Pasture, grazed by ponies or sheep is common close to Cannington, with arable farming being dominant further away from the village and higher up the valley.

15.5.36 The hedgerows are generally clipped to less than 1.5m in height, and are in good condition. Field boundary tree cover is very variable, with the greatest number of trees found adjacent to the meandering course of the Cannington Brook. There is no woodland of any size but the young woodland screen planting adjacent to the A39 is becoming well established.

15.5.37 Recent development includes improvements to the A39 close to Cannington with associated signage and lighting and several industrial sites including a cold storage depot and a large creamery. Although large the industrial units are generally set within landscaped grounds with good tree cover, reducing their impact on the surrounding landscape allowing it to retain an agricultural character. Similarly the young woodland planting belt adjacent to the A39 south of Cannington helps to reduce the impact of recent housing development. A pylon line crosses the valley on the western side. The greatest visual interest tends to be associated with water bodies and watercourses, particularly Ashford Reservoir and the meandering tree lined route of Cannington Brook. Views are generally contained by landform. In some locations, there are good views up the valley to the wooded slopes of the Quantocks. The underlying geology of the area is valley gravels and head deposits.

15.5.38 The sensitivity of the Ashford Valley is assessed as medium being of moderately distinctive character and scenic quality.

**Woodcock Downs**

15.5.39 The local landscape character area Woodcock Downs is a distinct small steep sided ridge to the south west of Cannington (rising from approximately 25m AOD to 80m AOD). Part of the Quantock Foothills district landscape character area, but on the northern edge of this area and lower than many of the hills closer to the Quantocks. This ridge forms the northern edge of the Quantock Foothills landscape character area before it drops towards to the Ashford Valley and the Levels to the north.

15.5.40 The ridge has a strongly agricultural character with mixed farming but a predominance of arable. Irregular field pattern with variable hedgerows thinly scattered hedgerow trees and few very small woodlands. Ploughed fields show the distinctive reddish
brown soils, which are a feature of the area. A pylon line crosses ridge from north to south on the western end. Narrow meandering country lanes often with hedge banks and high hedges. Blackmore Farm a 15th Century Grade 1 listed manor house is visible from the roads and a notable feature of the area. Other built development is generally associated with farms close to the road but on Charlynch and Woodcock Barn are notable for their location on high ground.

15.5.41 Views out are a characteristic feature of the upper slopes. With the northern slopes having views out over Cannington to the river Parrett and the southern slopes having views towards the Quantocks. The geology of Woodcock Downs is predominantly Rhaetic Beds, Keuper Marls and Sandstone.

15.5.42 The sensitivity of Woodcock Downs is assessed as medium as landscape of moderately distinctive character and scenic quality.

Brymore

15.5.43 Brymore is typically represented by undulating ground sloping down from the Stockland Hills in the west to the edge of Cannington in the east (from approximately 65m AOD to 20m AOD). Historically the area has been strongly influenced by Brymore Park with Brymore House close to the centre of the area. Most of this landscape character area would have at some time been associated with the park. A house was recorded here as early as the 13th Century. It is likely that the present house (Grade 2 Listed, now used as a school) dates from the late 18th Century, with the porch dating from around 1500. Close to the house there remain walled kitchen gardens, a late 18th Century orangery and a canal and an island built between 1775 and 1814. Other landscape features include an avenue. The avenue is a historic landscape feature of the grounds, but the trees have been replanted in the last 40 years (confirm with tree survey). Trees are closely spaced and of mixed species and do not create a great sense of place or grand entrance. Features in the wider landscape include several parkland trees now standing in arable fields, showing significant signs of die-back and parkland style metal fencing close to Withiel Farm. Brymore is not registered as an Historic Park and Garden.

15.5.44 The area is predominantly in agricultural use with irregular, medium sized fields, primarily arable with some smaller fields of pasture in the south. Fields are generally bounded by hedgerows, usually clipped to less than 1.5m. The tree cover in hedgerows is very variable with long sections without any trees. Tree cover is generally strongest around Brymore School. There are several very small woodlands or copses on the western edge of the area. The copse on the top of Bower Hill is an important landscape feature. Recent 20th Century development on the edge of Cannington has a suburbanising influence on the character of the whole area. Views out are possible from the upper slopes towards Cannington Park the face of the Quarry and the levels landscape beyond. The underlying geology of the area is predominantly slates and sandstones.

15.5.45 The sensitivity of Brymore Landscape Character Area is assessed medium as landscape of moderately distinctive character and scenic quality.
Cannington

15.5.46 The village of Cannington lies approximately 3km to the northwest of Bridgwater. It has been settled at least since 1140 when a Benedictine Nunnery was established, Cannington Court retains some of the remains of the Priory.

15.5.47 Cannington is located on the Cannington Brook and at the junction between several landscape character areas. With the low lying Levels and Moors landscape to the north and east and the higher ground of the Quantock Foothills to the south and the Stockland Hills to the west. Most of the town is on gently sloping ground with Cannington Brook flowing through the centre of the village (approximately 10m AOD). On the northern edge the ground rises significantly towards the Stockland Hills with a small ridge running from west to east (approximately 20m AOD) this then drops down to Rodway on the other side.

15.5.48 The historic core of the village is located close to the centre (which is a Conservation Area) and the main roads. Older buildings are notable for the frequent use of distinctive, red sandstone ashlars as a building material. Particularly in some fine houses and frequent high red sandstone walls creating interesting streetscapes and pedestrian routes. The Church of St Mary has a tower, dating from 14th Century. This is also built of the distinctive red sandstone and is a local landmark, seen particularly from the low lying Levels and Moors landscape to the east. The meandering Cannington Brook and associated pedestrian and road stone bridges and green space are an attractive feature of the centre of the village.

15.5.49 Recent 20th Century development has expanded the village particularly to the south of Cannington Brook. This recent expansion does not generally reflect local building styles, materials or settlement pattern. The village is surrounded by agricultural land and a golf course. The underlying geology of the area is predominantly alluvium deposits and valley gravels. Whilst the northern ridge comprises of sandstone, marls and mudstone.

15.5.50 The sensitivity of Cannington is assessed as medium.

15.5.51 Other local landscape character areas included within the study area are:

- Cannington Park;
- Rodway;
- Combwich Estuarine Levels;
- Combwich Village and Harbour;
- Parrett Riverscape; and
- Bridgwater Levels – Industrial.

15.5.52 However, these are all considered to be too far away from the proposed development site to be impacted by the proposed works and so have not been assessed.

iv. Evaluation of Site-specific Landscape

15.5.53 Cannington lies approximately 3km to the north-west of Bridgwater with the settlements of Combwich 2.5km to the north, Charlynch 2km to the south-west and Coultings 3.5km to the north-west. The proposed development site is on the south-western fringe of the village, with the majority of the settlement lying to the north and
north-east and a further area of newer housing to the east. The proposed development site is bounded by the A39 (single carriageway) to the south, a flood relief channel to the west and small agricultural fields to the north and east.

15.5.54 An evaluation of landscape elements within the proposed development has been carried out as set out below.

   **Landform**

15.5.55 The landform of the proposed development site is a transitional area between the flat Levels landscape and the Lowland Hills. The proposed development site is broadly level, rising very gently to the south-western corner. The wider landscape rises steeply to the north-west beyond Cannington Brook, with Cannington Park and densely planted Horn Hill Wood on the horizon. To the south of the A39 the land rises gradually to the south-west. East of the proposed development site and beyond the area of housing the land falls gradually forming a shallow valley through which Cannington Brook flows to join the River Parrett.

   **Land Use/Settlement**

15.5.56 The land within the proposed development site comprises low lying grazed pastureland sub-divided by stock fencing, hedges and a free flowing ditch running from north-west to south-east to form two fields. To the north-east of the proposed development lie further small paddocks sub divided by a stock fence, beyond which lies Denman’s Farm. Immediately to the south of the site is the A39.

15.5.57 The sensitivity of the land use/settlement is assessed as medium.

   **Landcover and Vegetation**

15.5.58 On the southern boundary of the proposed development with the A39 there is an established belt of screen planting which is approximately 15 years old. Along the northern edge of this belt is a mixed native hedgerow, which is tightly clipped. Other hedge lines around the proposed development site are sparse and comprise mostly hawthorn (Crataegus monogyna), blackthorn (Prunus spinosa), elm (Ulmus sp.) and bramble (Rubus fruticosus) with little species diversity. The hedgerow running alongside the east-west public footpath (BW5/22) is tightly clipped and below this is a steep well vegetated bank down to the water line with a wide variety of ground flora. There are two hedgerow trees in the hedgerow to the east of the site and one very fine specimen oak with a low broad crown situated in the hedgerow to but outside of the western boundary. The trees alongside Cannington Brook to the north of the site (outside the site boundary) are of good quality and form a substantial and attractive backdrop to the site. The hedgerows have not been assessed as being Important Hedgerows as specified in the criteria under the Hedgerow Regulations 1997. The ecology chapter, **Chapter 14** has made a detailed assessment of the ecological value.

15.5.59 The sensitivity of the landcover and vegetation is assessed as medium.

   **Watercourses/Water Bodies**

15.5.60 Cannington Brook lies close to the site’s north-western boundary. The hedgerows to the west and east of the site contain free flowing ditches along its boundary with hedgerows on either side. The watercourses on the site are associated with the straight drainage ditches along field boundaries, which run between double
hedgerows. The ditches or rhynes are characteristic features of the level’s landscape but are often unseen in wider views. They are however valued for their detailed visual interest when they are seen and their biodiversity value.

15.5.61 The sensitivity of the watercourses on or close to the site has been assessed to be medium.

*Public Rights of Way*

15.5.62 A public footpath runs along the western edge of the site, just within the site boundary. There is a public footpath from Denman’s Farm (to the north-east of the site) which is just beyond the northern corner of the site. A further footpath, also coming from Denman’s Farm, runs on a north to south axis to the east of the site to continue on the opposite side of the A39.

15.5.63 The PRoW which run close to the boundaries of the site are routes of local importance. They are through good quality agricultural landscape, views tend to be contained by the edge of Cannington and vegetation along the A39. Further details of the PRoW is provided in Chapter 17 of this volume.

15.5.64 The sensitivity of the public PRoW is assessed to be medium.

**e) Visual Receptors**

15.5.65 A combination of desktop study, including ZTV analysis and field survey has confirmed a range of visual receptors, who would be affected by the proposed development.

- Residential and minor road user receptors on the southern and western edge of Cannington;
- PRoW users between the edge of Cannington and the site;
- Drivers, walkers and cyclists on the A39 through gaps in the screen planting;
- PRoW users between proposed development site and High Street and the A39;
- Residential receptors close to High Street;
- Drivers, walkers and cyclists on High Street;
- Distant residential receptors, public rights of way users on the higher levels on Woodcock Downs to the south of the site;
- Possible distant views from Quantock Hills AONB to the south and west of the site; and
- Distant views from visual receptors on public rights of way to the west of the site, including Cynwit Castle or Cannington Camp.

15.5.66 These are represented by a series of viewpoints. The Viewpoint Location Plan for this assessment is shown on Figure 15.4. The viewpoints selected are shown in Figures 15.5 to 15.14.
i. Viewpoint Descriptions

**Viewpoint 1 – Footway Along the A39**

15.5.67 This viewpoint is located on the footway of the A39 looking north-west. The viewpoint is at an elevation of approximately 12.0m (including 1.7m eye level) and is positioned approximately 245m from the proposed development. It is located within the Lowland Hills Landscape Character Area (Quantock Foothills Sub-area). The view is experienced by pedestrians on the footway along A39 and drivers, travelling west. The view shows the southern boundary of the development and a wide belt of mature screen planting along A39 which would obscure the majority of views of the proposed park and ride.

15.5.68 The sensitivity of visual receptors at this viewpoint has been rated as low due to its location on a footway of a local road (Figure 15.5).

**Viewpoint 2 – Edge of the A39**

15.5.69 This viewpoint is located beside the A39m at the existing field entrance gate to the site. This forms a break in the screen planting adjacent to the A39 and is therefore not typical of views but an isolated viewpoint, looking north. The viewpoint is at an elevation of approximately 16.5m (including 1.7m eye level) and is positioned at the site boundary. It is located within the Lowland Hills Landscape Character Area (Quantock Foothills Sub-area). This is representative of the view experienced by farmers accessing the field through the gate, drivers or pedestrians on the A39 have an oblique view and would see much less of the field where the proposals are located. A wooden fence and metal gate, which provides access for the cattle to a large grazing field within the proposed development, are visible in the foreground of the view. The proposed development covers the grazing field up to a well-managed hedgerow, which is visible in the middle of the view. Rich tree planting within the peripheral areas of Cannington and some residential housing provide a background for this view and the landmark tower of the church of St Mary the Virgin dominates the village and punctuates the skyline. Cannington Park is visible in the far distance in the left hand side of the view.

15.5.70 The sensitivity of visual receptors at this viewpoint has been rated as low due to its location at a local road (Figure 15.6).

**Viewpoint 3 – PROW BW 5/22**

15.5.71 This viewpoint is located on the PROW BW 5/22 looking north east. The viewpoint is at an elevation of approximately 18.5m (including 1.7m eye level) and is positioned approximately 60m from the site boundary. It is located within the Lowland Hills Landscape Character Area (Quantock Foothills Sub-area). The view is experienced by PROW users. Open views of the proposed development are available due to a lack of vegetation which could obscure views on the flat topography. The proposed development boundary follows the hedgerow running along the PROW in the left part of the view. Some tree planting within the County Wildlife Site along the Cannington Brook corridor is visible in the left part of the view. The peripheral developments of Cannington, including its older residential development (left) and modern housing area (right) are visible in the background. The tower of the church of St Mary the Virgin dominates the village and as a distinctive landmark.
15.5.72 The sensitivity of visual receptors at this viewpoint has been rated as medium due to its location on a designated footpath of local importance (Figure 15.7). The Recreation and Amenity chapter, Chapter 17 gives further assessment of the local PRoW.

**Viewpoint 4 – PRoW BW 5/22**

15.5.73 This viewpoint is located on the PRoW BW 5/22 looking south. The viewpoint is at an elevation of approximately 16.5m (including 1.7m eye level) and is positioned adjacent to the proposed development site. It is located within the Lowland Hills Landscape Character Area (Quantock Foothills Sub-area). The view is experienced by PRoW users. This simple and open view is dominated by flat grazing fields within the site crossed by low and well managed hedgerows. Tree planting along A39, which marks the southern development site boundary, screens some distant views of rolling hills to the south of the site.

15.5.74 The sensitivity of visual receptors at this viewpoint has been rated as medium due to its location on a designated footpath of local importance (Figure 15.8). The Recreation and Amenity chapter, Chapter 17 gives further assessment of the local PRoW.

**Viewpoint 5 – PRoW BW 5/22**

15.5.75 This viewpoint is located on the PRoW BW 5/22, in the vicinity of residential properties at Mill Close. The viewpoint is at an elevation of approximately 16.0m (including 1.7m eye level) and is positioned approximately 150m from the proposed development. It is located within the Levels and Moors Landscape Character Area (Levels Sub-area). The view is experienced by PRoW users and by the residents of the nearby houses. This view is very similar in character to a view from Viewpoint 4; however, it further north than Viewpoint 4, beside peripheral residential properties on the edge of Cannington. It also shows open grazing fields on flat topography, but low hedgerows screen some views of the fields within the site. An electricity pole (approximately 8m high) punctuates the skyline within the view. Rolling hills within the farmland areas located to the south of the site are visible in the background, a shed within Denman’s Farm and the edge of a residential housing area, to the east of the site, are the only built elements within this view.

15.5.76 The sensitivity of visual receptors at this viewpoint has been rated as high due to its location on a local PRoW (medium sensitivity) but close to residential visual receptors so the sensitivity has been upgraded to high, representing receptors from residential properties as well. (Figure 15.9).

**Viewpoint 6 – High Street, Near the Lodge**

15.5.77 This viewpoint is located on the footway of High Street, looking south east. The viewpoint is at an elevation of approximately 19.5m (including 1.7m eye level) and is positioned approximately 300m from the proposed development. It is located within the Lowland Hills Landscape Character Area at the boundary of Stockland Hills and Quantock Foothills Sub-areas. The view is experienced by pedestrians on the footway and drivers. This rural view across the County Wildlife Site, stretching along Cannington Brook, provides glimpsed views of grazing fields within the development site through trees and shrubs beside the brook. This linear planting, consisting of
predominantly mature trees, also obscures long distance views of the most peripheral Cannington developments and all views of farmland to the east of the village.

15.5.78 The sensitivity of visual receptors at this viewpoint has been rated as low due to its location on a footpath along a local road it is close to some residential properties but the view is not considered to be representative of views from these (Figure 15.10).

**Viewpoint 7 – Residential properties, Oak Tree Way**

15.5.79 This viewpoint is located beside residential properties at Oak Tree Way, looking south west. The viewpoint is at an elevation of approximately 14m (including 1.7m eye level) and is positioned approximately 100m from the proposed development. It is located within the Levels and Moors Landscape Character Area (Levels Sub-area). The view is experienced by the residents of the nearby houses and the users of an adjacent residential car park. The main landscape features within this view include agricultural fields, managed hedgerows and tree planting along A39 and Cannington Brook. Two mature hedgerow trees in the foreground are distinctive in this otherwise simple view. The ridge of the Quantock Hills AONB, visible in the very far distance, creates a backdrop for the planting within the view.

15.5.80 The sensitivity of visual receptors at this viewpoint has been rated as high due to its location in the vicinity of residential properties (Figure 15.11).

**Viewpoint 8 – PRoW BW 7/4**

15.5.81 This viewpoint is located on the PRoW BW 7/4 looking south east. The viewpoint is at an elevation of approximately 72.5m (including 1.7m eye level) and is positioned approximately 1,510m from the proposed development. It is located within the Lowland Hills Landscape Character Area (Quantock Foothills Sub-area). The view is experienced by PRoW users. This panoramic view of the landscape around Cannington shows the undulating agricultural landscape of the Quantock Foothills, where hedgerows and small clumps of trees are dispersed among numerous agricultural fields. Cannington village almost disappears among dense tree planting, except for its most southern housing areas, which are visible in the right hand side of the view. Cannington Park is visible in the far distance in the left hand side of the view. Glimpsed views of the proposed development are available through a gap in planting along the A39, however, the majority of the development site is very well screened in summer, when vegetation is in leaf.

15.5.82 The sensitivity of visual receptors at this viewpoint has been rated as medium due to its location on a designated footpath of local importance (Figure 15.12).

**Viewpoint 9 – PRoW BW 5/17**

15.5.83 This viewpoint is located on the PRoW BW 5/17 within Cannington Park, looking north east. The viewpoint is at an elevation of 45.5m (including 1.7m eye level) and is positioned approximately 1,420m from the proposed development. It is located within the Lowland Hills Landscape Character Area (Stockland Hills Sub-area). The view is experienced by PRoW users and Cannington Park visitors. The view is dominated by large agricultural fields which extend on rolling topography up to the peripheral development within the village of Cannington. The topography, as well as rich planting within and around the village, obscure direct views of the development site, especially in summer when vegetation is in leaf. The Quantock Foothills and the
Quantock Hills AONB create a backdrop to the view. Local farm buildings, as well as residential buildings along Chad’s Hill, are visible in the left hand side of the view.

15.5.84 The sensitivity of visual receptors at this viewpoint has been rated as high due to its location on a PRoW, located near a Scheduled Monument, on a locally important landmark. The impact on Cannington Park Hill Fort is assessed further in the Historic Environment chapter, Chapter 16 (see Figure 15.13 of this chapter).

Viewpoint 10 – Quantock Hills AONB

15.5.85 This viewpoint is located at the edge of the Quantock Hills AONB looking towards the site. Although part of the AONB boundary comes within the 5km study area (Figure 15.2) the ZTV drawing (Figure 15.4) shows that the majority of this area would be screened from views by intervening landform. A viewpoint within the Quantock Hills AONB in this area was difficult to find as most of the slopes facing towards the site are covered in woodland. The location of viewpoints within the Quantock Hills AONB at approximately 184.5m (including 1.7m eye level). This viewpoint is approximately 7880m from the proposed development site at the edge of woodland on the Coleridge Way.

15.5.86 The sensitivity of visual receptors at this viewpoint has been rated as high as it is within the Quantock Hills AONB a designated landscape of high landscape of high value and sensitivity (Figure 15.14).

ii. Summary

15.5.87 The main areas of direct views into the site are located along the PRoW running along the western boundary and close to the site boundary to the north and east of the site. They have clear and open views of the proposed development area, which are illustrated by Viewpoints 3, 4 and 5.

15.5.88 Clear open views across the site are also available from the residential properties situated on the peripheries of Cannington, including the recently built housing estate to the east of the site and back gardens of the properties to the north of the site. Two such views have been recorded which are shown in Viewpoints 5 and 7.

15.5.89 The houses on Mill Close to the north are 160m from the site boundary at the closest point. However, whilst the northern site boundary is visually open, the topography and hedgerows provide some screening of the proposed development.

15.5.90 The existing woodland belt and associated hedgerow along the A39 provide significant screening of the site (see Viewpoint 1). The density and depth of the planting, although primarily deciduous, ensure screening even during winter. Gaps in the planting at the far western and southern boundaries allow limited glimpses into the site from local roads (Viewpoints 2 and 6).

15.5.91 The land between the site and Denman’s farm is open with low cut hedgerows but no hedgerow trees. There are open views of the site from the farmyard and agricultural barns, although these block views to the site from the residential properties.

15.5.92 The small cluster of residential development, along Withiel Drive 375m to the north-west, has their views to the site curtailed by the substantial belt of trees bordering...
Cannington Brook. No views from the centre of Cannington, including the Conservation Area, have been identified during site visits.

15.5.93 The surrounding topography and vegetation provide good screening from long distance viewpoints. Glimpsed views of parts of the site are available from higher topography to the north west of the site (Cannington Park – Viewpoint 9) and south west (PRoW BW 7/4 – Viewpoint 8).

15.5.94 No significant views have been identified from the fringes of Quantock Hills AONB within the study area. A viewpoint has been selected outside the study area due to the sensitivity of the AONB and the need to assess the potential visual impact of lighting the proposed development on the AONB.

15.5.95 The site is therefore well screened from the wider landscape by the residential edge of Cannington, the strong belt of screen planting along the A39 and the trees along the Cannington Brook. Within the triangle of ground within this area there are views across the site, with the ground level often screened by intervening hedgerows.

15.5.96 **Table 15.6** provides a summary of the viewpoints.

<table>
<thead>
<tr>
<th>ID</th>
<th>Viewpoint Name</th>
<th>Figure number</th>
<th>Receptor</th>
<th>Distance from Site</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Footway along A39</td>
<td>15.5</td>
<td>Walkers and drivers on A39</td>
<td>245m</td>
<td>Low</td>
</tr>
<tr>
<td>2</td>
<td>Edge of the A39</td>
<td>15.6</td>
<td>Drivers distant oblique angle, farmer</td>
<td>0m</td>
<td>Low</td>
</tr>
<tr>
<td>3</td>
<td>PRoW BW 5/22</td>
<td>15.7</td>
<td>PRoW user</td>
<td>60m</td>
<td>Medium</td>
</tr>
<tr>
<td>4</td>
<td>PRoW BW 5/22</td>
<td>15.8</td>
<td>PRoW user</td>
<td>0m</td>
<td>Medium</td>
</tr>
<tr>
<td>5</td>
<td>PRoW BW 5/22, Residential properties at Mill Close</td>
<td>15.9</td>
<td>PRoW users, residents of local properties</td>
<td>150m</td>
<td>High</td>
</tr>
<tr>
<td>6</td>
<td>High Street near The Lodge</td>
<td>15.10</td>
<td>Walkers and drivers along High Street</td>
<td>300m</td>
<td>Low</td>
</tr>
<tr>
<td>7</td>
<td>Residential Properties at Oak Tree Way</td>
<td>15.11</td>
<td>Residents of properties, local road users</td>
<td>100m</td>
<td>High</td>
</tr>
<tr>
<td>8</td>
<td>PRoW BW 7/4</td>
<td>15.12</td>
<td>PRoW users</td>
<td>1,510m</td>
<td>Medium</td>
</tr>
<tr>
<td>9</td>
<td>PRoW BW/17; Cannington Park Hill</td>
<td>15.13</td>
<td>PRoW users, visitors to Cannington Park</td>
<td>1,420m</td>
<td>High</td>
</tr>
<tr>
<td>10</td>
<td>Quantock AONB</td>
<td>15.14</td>
<td>AONB visitors, walkers on National Trail</td>
<td>7,880m</td>
<td>High</td>
</tr>
</tbody>
</table>

**15.6 Assessment of Impacts**

**a) Introduction**

15.6.1 This section assesses the potential impacts on landscape character and representative visual receptors, (as identified in **Section 15.5**) which would result from the construction, operational and removal/restoration activities relating to the proposed development.
15.6.2 The proposed development includes measures to mitigate the impacts on landscape and visual amenity within the design, this is described further in Chapter 2 Description, which includes landscape proposals information.

15.6.3 The design (including the temporal nature of the proposed development) has evolved so as to minimise the impacts on landscape and visual amenity, informed by an understanding of the character and visual structure of the landscape and an understanding of the functional and operational objectives of the proposed development.

b) Landscape Impacts

15.6.4 A description of the proposed development including its design is provided in Volume 6, Chapter 2.

Construction Phase

15.6.5 The construction phase of the proposed development would take approximately 11 months. It is therefore considered to be short-term. Ecological mitigation measures would take place before the main works commence. The working hours would be limited to 08:00 to 19:00 Monday to Friday and 08:00 to 13:00 on Saturdays. There would be no working on Sunday, Bank or Public Holidays. It has been assumed for the purposes of this assessment that the main landscape impacts associated with the construction of the proposed development would be:

- Loss of a field of pasture to construction site;
- Site Clearance and Ground Preparation – site clearance and ground preparation works and surfacing works;
- Removal of a small area of recent tree and shrub planting adjacent to the A39 to establish the new site entrance;
- Earthworks and Landform Changes – earthworks including topsoil stripping and site levelling involving the movement of large vehicles on site. The creation of topsoil stockpiles and low bunds to a maximum height of 2m with some vehicle movement at this height;
- Construction of Built Elements – Construction of security fencing up to 1.8m high, constructions of parking areas, roadways, small roundabouts, and small road bridge across proposed flood relief channel. Erection of small buildings to provide bus stops, security and welfare, erection of lighting and CCTV security proposals to a maximum height of 10m;
- Lighting during the hours the site would be under construction in the winter months;
- Traffic moving to and from proposed development; and
- Planting of landscape proposals to the east of the parking area.

15.6.6 Environmental impacts and disturbance arising from construction activities will be managed through a range of control measures and monitoring procedures which are outlined in the Environmental Management and Monitoring Plan (EMMP) and detailed in associated subject-specific management plans (SSMPs) for the proposed development site. The control measures for the protection of the landscape and visual environment including the location of soil storage and spoil mounds and the parking of
large vehicles when not in use and the protection of existing vegetation, are set out in the EMMP.

15.6.7 To safeguard the existing vegetation to be retained, fenced, tree protection zones (as recommended within the Arboriculture Report, (Appendix 15C)) would be created to ensure that development would not encroach onto the root protection area.

**Operation Phase**

15.6.8 The operational phase of the proposed development would last for approximately eight years. The site would be operational seven days a week. There would be no planned arrivals or departures between the hours of 01:30 and 05:00. The perimeter would be required to be lit 24 hours a day. The main landscape impacts associated with the operation phase would be associated:

- the change in land use;
- the landform changes to create parking areas, earth storage bunds and detention pond;
- impacts of built elements including small buildings (maximum height 3.9m), parking area, roads and small roundabout, fencing, lighting columns and CCTV up to a maximum height of 10m;
- movement of vehicles including buses on and off site; and
- the proposed development site would be lit 24 hours a day.

**Post Operational Phase**

15.6.9 During the removal/restoration phase of the proposed development, all building, structures and hard standings for parking area would be removed from the site. The site would then be restored back to agriculture. Further details are provided in Chapter 5 of this Environmental Statement.

15.6.10 The main landscape impacts would be similar to those experienced during construction although some views would benefit from screen planting being in place and well established. The works would be carried out between 08:00 and 19:00 Monday to Friday and 08:00 and 13:00 on Saturdays. There would be no working on Sunday, Bank or Public Holidays.

15.6.11 Activities Impacts during the removal/restoration phase that are particularly relevant to this assessment would include:

- removal of internal roads and parking areas;
- removal of all built structures;
- removal of fencing and access control;
- removal of external lighting, CCTV cameras and signage;
- restoration to original ground levels and grass seeding;
- removal of some tree and shrub planting;
- reinstatement of planting adjacent to the A39;
- associated movement of vehicles; and
- lighting required during working hours.
15.6.12 The final condition phase of the proposed development would begin once the proposed development site had been restored back to its original site condition and is in agricultural use. The landscape would be as it was prior to the development although at the beginning of the phase the planting at the site entrance would be recently planted.

15.6.13 The landscape proposals assessed forming part of the scheme design, are:

- the grassed soil bund to a maximum height of 2m, this would be located to the west of the proposals because of ecological mitigation measures required to the east;
- Planting on the eastern side of the proposed development on a low bund to a maximum height of 1.5 m with planting selected to form a fast growing visual screen;
- the layout of the site which has been designed to minimise the visual impact of built elements and traffic particularly by locating the parking area with the greatest use furthest from residential areas and keeping the buildings as small as possible; and
- Lighting has been designed to have the minimum visual impact possible both in terms of the lighting columns and the light they disperse.

15.6.14 The proposals would also benefit from ecological mitigation to be implemented in particular the ecological zone adjacent to the boundary hedge to the east as this would provide a buffer to existing vegetation and an area of ground, which would be excluded from the ground clearance and disturbance.

15.6.15 The potential impacts of the proposals on the different landscape character and visual receptors have been assessed with summary tables showing sensitivity of receptors, nature, duration, magnitude and significance of impact.

15.6.16 The impact is assessed first with the landscape mitigation proposal outlined above. It is then assessed taking into account further mitigation which takes the form of a 5m wide belt of additional native hedgerow with trees to the west of the existing hedge to the east of the proposed development to help screen views from housing close to Oak Tree Way. The planting would be planted close to an existing hedgerow at the start of the construction phase for maximum screening benefit throughout the proposals. The further mitigation would also strengthen hedgerows by filling gaps with species found in the existing hedgerows. In addition the hedgerow management regime would be changed with less intensive management allowing hedgerows to grow taller to increase their screening.

15.6.17 The above mitigation proposals are shown in Figure 2.4, provided in Chapter 2 of this volume of the ES.

i. National and Regional Landscape Character

15.6.18 The proposed development site lies close to two National Landscape Character Areas just within Vale of Taunton and Quantock Fringes (146) and approximately 1km from the boundary with Somerset Levels and Moors/Mid Somerset Hills (142/143).

15.6.19 The proposals are well screened from the wider landscape and are of a scale compatible with other development in the area. They are also temporary and would
be removed in the medium term. The magnitude of the impact of the proposals on the National Landscape Character Areas is too insignificant to be assessed.

### ii. County and District Landscape Character

15.6.20 The site lies close to the division between two Lowland Hills character areas the Quantock Foothills and the Stockland Hills. The sensitivity of this character area is assessed as medium. The proposed development site lies within the Lowland Hills character area at a lower level than most of the rest of the areas so there are potential views down into the proposed development site, but in effect views to the site are very limited by the vegetation around the site and the undulating landform, particularly Woodcock Downs to the south. The impact of the proposed development on the Lowland Hills character areas is therefore assessed to be adverse, of short and medium-term, of very low magnitude and minor significance at the construction, operational and removal/restoration phases. At final condition the site would be restored to agricultural use. The impact would be neutral, long-term, of very low magnitude and negligible significance.

15.6.21 To the east of the proposed development lies the Levels and Moors Character Area (SDC). The sensitivity of this character area is assessed as high. This is a large character area covering most of the district. This landscape character area is associated with very low ground levels, below 9m views tend to be up to the significantly higher ground of the Quantocks and the Mendips. The nature of the proposed development being low level and well screened by Cannington and planting close to the site means that it is unlikely to have any day time impact on the Levels and Moors character area. The impact is therefore assessed as being adverse, of short and medium-term, of very low magnitude and minor significance during the construction, operation and removal/restoration phases. At final condition the site would be restored to agricultural use. The impact would be neutral, long-term, of very low magnitude and of negligible significance.

15.6.22 The sensitivity of the Quantocks landscape character area is assessed as high. The impact of the proposed development on the district Quantocks landscape character area and the AONB is assessed as being adverse, of short and medium-term, of very low magnitude and of minor significance during the construction, operation and restoration/removal phases. At this distance the proposed development site is difficult to see even from elevated locations and any lighting impact would be seen in the context of lighting within Cannington. At final condition the site would be restored to agricultural use. The impact would be neutral, long-term, of very low magnitude and of negligible significance.

### iii. Local and Site-specific Landscape Character

#### Ashford Valley

15.6.23 The sensitivity of this landscape character area is assessed as medium.

15.6.24 During the construction phase, the impact on the Ashford Valley character area would vary depending on location. For the area close to the site enclosed to the north and east by the edge of Cannington, to the south by structure planting along the A39 and to the west by the tree lined Cannington Brook the impact would include site clearance, landform changes, construction of built elements and the movement of traffic and site lighting. Beyond this the impact reduces significantly and the screening
elements around the site mean that the impact would be limited to the movement of large vehicles and site lighting. The impact is assessed as adverse, short term, of low magnitude and minor significance.

15.6.25 During the operational phase the impact on the landscape character of Ashford Valley would relate to the change in use of the site from pasture to a park and ride facility and the movement of traffic on and off site during the day and the night. Site lighting would have a potential impact on the whole character area. However due to the well screened nature of the site from planting adjacent to Cannington Brook and the A39 the impact would be significantly reduced to a very local area around the site. The potential impact on the character of Ashford Valley is assessed as adverse, medium term during the operational phase. The magnitude of this impact is assessed as adverse, medium-term, of low magnitude, on the local landscape character area as a whole, and of minor significance.

15.6.26 During the removal/restoration phase there would be disturbance to the landscape character from site operations to remove the built elements on site and to restore ground conditions suitable for agricultural use as pasture. This would involve the use of large vehicles on site and some earth moving. This is assessed as being an adverse, short-term impact and of low magnitude on the local character area as a whole with a minor significance.

15.6.27 Once the site was restored and reached final condition the original site conditions would have been reinstated and the impacts are assessed as neutral, long term, of very low magnitude and of negligible significance.

15.6.28 Table 15.7 provides a summary of impacts on Ashford Valley.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Medium</td>
<td>Adverse, medium-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Medium</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

**Woodcock Downs**

15.6.29 The sensitivity of this landscape character area is assessed as medium.

15.6.30 The recent woodland planting provides significant screening from the south and the lower levels of the ridge, limiting the impact to primarily the upper northern slopes. During the construction phase the impact of the proposals on the ridge is considered to be primarily associated with the change in land use, the movement of vehicles and any site lighting required. These are considered to be of an adverse, short-term, of very low magnitude and of minor significance.

15.6.31 During the operational phase the impacts on Woodcock Ridge would be associated with the change of use, the movement of traffic on and off site and the site lighting. The impacts are assessed as being adverse, medium-term. The magnitude of the
impact is assessed as low, resulting in a minor significance to the likely impact on Woodcock Ridge.

15.6.32 During the removal/restoration phase the potential impacts on the ridge are assessed as being primarily associated with the removal of the built structures and the reinstatement of the original landform particularly with regard to the movement of vehicles on site. At this distance this is assessed as being an adverse, short-term impact with a very low magnitude and minor significance to the landscape character.

15.6.33 Once the site was restored and reached final condition, the original site conditions would have been reinstated and the impacts are assessed as neutral, long-term, of very low magnitude and of negligible significance.

15.6.34 Table 15.8 provides a summary of the assessment of impacts on Woodcock Downs.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Medium</td>
<td>Adverse, medium-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Medium</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

Brymore

15.6.35 The sensitivity of this landscape character area is assessed as medium.

15.6.36 During the construction phase of the proposal the landscape impacts are assessed as being primarily associated with the movement of vehicles on the site particularly for earth moving and the creation of the earth bunds. The nature of the impact is assessed as adverse, short-term and the magnitude as low, giving a significance to the impact on Brymore of minor.

15.6.37 During the operational phase the primary impact of the proposals on site is assessed as being a result of the change in use of the site, the movement of traffic on site and the requirement to light the site throughout the night. The nature of the impacts is assessed as of adverse, medium-term, of low magnitude and minor significance.

15.6.38 During the removal/restoration phase the primary landscape impacts of the proposal on Brymore are assessed as being associated with the movement of vehicles removing built elements of the site and restoring the original landform. The nature of the impacts is assessed as adverse, short-term. The magnitude of the impact on the character area is low and the significance, minor.

15.6.39 Once the site was restored and reached final condition the original site conditions would have been reinstated and the impacts are assessed as neutral, long-term, of very low magnitude and of negligible significance.
Table 15.9 provides a summary of impacts on Brymore.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Medium</td>
<td>Adverse, medium-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>3</td>
<td>Removal/ restoration</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Medium</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

Cannington

The sensitivity of this landscape character area is assessed as medium.

During the construction phase the impact on Cannington would be primarily limited to the south western edge of the town, closest to the site and to the landscape setting of the town. The elements of the proposal, which would have an impact include the change in land use, the landform changes the activities to construct the new built elements and vehicle movement and the very limited lighting required. The impacts are assessed as being adverse, short-term, of low magnitude and of minor significance.

During the operational phase the change in land use of the site from pasture to park and ride would have an adverse, medium-term impact on the landscape setting of the town. The elements of the operational phase, which are assessed to have an impact include the change of use of the site, the landform changes, the low level built elements and the movement of vehicles around the site including buses. The impact is assessed as being adverse, medium-term, of low magnitude and minor significance.

During the removal/restoration phase the impact on the landscape character of Cannington would be associated with the removal of the built elements, the landform reinstatement and any required lighting. The impact would be very short-term. The impact is assessed as being of adverse, low magnitude and of minor significance.

Once the site was restored and reached final condition the original site conditions would have been reinstated the impacts are assessed as neutral, long term of very low significance and of negligible significance.

Table 15.10 provides a summary of impacts on Cannington.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Medium</td>
<td>Adverse, medium-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>3</td>
<td>Removal/ restoration</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Medium</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
iv. Site-specific Landscape Elements/Features

**Landform**

15.6.47 The sensitivity of this landscape element is assessed as medium.

15.6.48 The proposals would require a slight change to the landform to create the surfaced parking areas. The landform would also change as a result of the soil storage bunds and the surface water drainage areas. The impact is assessed to continue throughout the works and be adverse, of short and medium-term, of medium magnitude and **moderate** significance. At final condition the site would be restored to the original landform the impact is assessed as being, neutral, long-term very low magnitude and **negligible** significance.

**Land Use/Settlement**

15.6.49 The sensitivity of this landscape element is assessed as medium.

15.6.50 The proposals represent a major change of the land use from agriculture to built development but for a short period of time. During the construction, operation and removal/restoration phase the impact is assessed as adverse of medium magnitude and **moderate** significance. At final condition the site would have been returned to agriculture. The impact is assessed as being neutral, long term, of very low magnitude and **negligible** significance.

**Landcover and Vegetation**

15.6.51 The sensitivity of this landscape element is assessed as medium.

15.6.52 A large proportion of the site is existing grassland, which would be lost for the duration of the works. The proposed development site is located well within the field boundaries to allow adjacent hedgerows to be protected from the works. These hedgerows would be strengthened with additional tree planting and gaps would be filled. Prior to the start of the construction phase the management regime would be changed to allow the hedgerows to grow taller than the current 1.5m they are cut to. The new planted areas and tree groups would be established within the site during the construction phase. There would be the loss of 18 immature trees adjacent to the A39 to create the site entrance, this would be replanted at completion of the works. The impact during the construction phase is assessed as adverse, short-term of medium magnitude and **moderate** significance.

15.6.53 During the operational phase where the proposed planting would start to become established the impact is assessed as being adverse, medium-term of low magnitude and of **minor** significance.

15.6.54 During the removal/restoration phase planting would have become well established and help screen the site. The impact is assessed as being, adverse, short-term of low magnitude and of **minor** significance. At final condition the original site conditions would be reinstated the impact is assessed as neutral, long term, of very low magnitude and of **negligible** significance.
**Watercourses/Water Bodies**

15.6.55 The sensitivity of this landscape element is assessed as medium.

15.6.56 The proposals are designed to stay well back from the site boundaries and the ditches. The proposals make accommodation for possible flooding to minimise the impact on existing landscape features. The impact during the construction, operation and removal/restoration phases is assessed as being adverse, of short and medium-term, of low magnitude and minor significance. At final condition the site would be restored. The impact is assessed as being neutral, long term, of very low magnitude and negligible significance.

**Public Rights of Way**

15.6.57 The sensitivity of this landscape element is assessed as medium.

15.6.58 The PRoW would be maintained throughout the proposals and therefore the impact would primarily be in terms of the change in the landscape character and the views the receptors on the footpaths experience. The landscape proposals would enhance the boundaries of the site and provide visual screening particularly between the footpath running north-south to the east of the proposed development site. During the construction, operation and restoration/removal phases. The impact is assessed as being adverse, of short and medium-term, of medium magnitude and moderate significance.

15.6.59 At final condition the site would be restored. The impact is assessed a neutral, long term, of very low magnitude and negligible significance. The Recreation and Amenity chapter, Chapter 17 of this volume, assesses the impact on PRoW in more detail.

15.6.60 Table 15.11 provides a summary of impacts on landscape elements/features.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Landform</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Construction</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Medium</td>
<td>Adverse, medium-term</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Medium</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td><strong>Land Use/Settlement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Construction</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Medium</td>
<td>Adverse, medium-term</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Medium</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td><strong>Landcover and Vegetation – Trees, Hedgerows, Scrub and Grassland</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Construction</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Medium</td>
<td>Adverse, medium-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Medium</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
### ID | Phase | Sensitivity | Nature | Magnitude | Significance
---|---|---|---|---|---
Watercourses/water bodies
1 | Construction | Medium | Adverse, short-term | Low | Minor
2 | Operation | Medium | Adverse, medium-term | Low | Minor
3 | Removal/restoration | Medium | Adverse, short-term | Low | Minor
4 | Final condition | Medium | Neutral long-term | Very low | Negligible
Public Rights of Way
1 | Construction | Medium | Adverse, short-term | Medium | Moderate
2 | Operation | Medium | Adverse, medium-term | Medium | Moderate
3 | Removal/restoration | Medium | Adverse, short-term | Medium | Moderate
4 | Final condition | Medium | Neutral, long-term | Very low | Negligible

### c) Visual Impacts

15.6.61 The viewpoints can be seen in Figures 15.5 to 15.14. The landscape proposals are shown on the proposed site planting plan and the proposed post-operational state plan.

15.6.62 The potential visual impacts are summarised in tables showing the sensitivity of receptors, nature, duration, magnitude and significance of impact of the proposed development during the day and at night. Each viewpoint is assessed as to whether the impact is beneficial, neutral or adverse. All the assessments during the construction, operation and removal/restoration phase have been taken to be an adverse impact on the landscape of the area, although some of these impacts were assessed to be negligible. At final condition when the site would have been successfully restored to its original use the impact is assessed as neutral. Night time impacts have been assessed with reference to the Baseline Lighting Report, Appendix 15D. There are additional viewpoints included in this visual assessment that are not included in the Baseline Lighting Report due to ongoing engagement with relevant stakeholders.

1. **Viewpoint 1: Footway Along the A39**

15.6.63 The sensitivity of visual receptors at this viewpoint is assessed as low.

15.6.64 During the construction phase the proposed development would be screened from this viewpoint by the belt of existing woodland planting adjacent to the A39, any impact would be associated with the construction of the site entrance, lighting columns and the additional movement of vehicles. The impact is assessed as being adverse, short-term of low magnitude and minor significance. At night the very limited requirements for lighting would be seen in the context of lighting on the A39 and vehicle lights. It is assessed as being adverse, very low magnitude and negligible significance.

15.6.65 During the operational phase the visual impact is assessed as medium-term in duration. The proposed development would remain screened from the development by screen planting adjacent to the A39. The low level of the proposals means nothing would rise above the height of the trees. There would be an oblique view of the new site entrance, lighting columns and vehicles using this access. The impact is assessed as being adverse, of short and medium-term, of low magnitude and of minor significance. During the operational phase the site would be lit throughout the
night and there would be new lighting on the A39 but the viewpoint is located close to the already lit junction and the lighting would be seen in the context of lit vehicles on the road. The impact is assessed as being adverse, medium-term, of low magnitude and minor significance.

15.6.66 During the removal/restoration phase the visual impact is assessed as being short-term. The impacts are assessed as being associated with the movement of vehicles on and off site, the lighting columns and the reinstatement of the ground and planting on the proposed site access. The impact is assessed as adverse, short-term, of low magnitude and minor significance. At night the very limited requirements for lighting would be seen in the context of lighting on the A39 and vehicle lights. It is assessed as being adverse, short-term, of low magnitude and minor significance.

15.6.67 Once reinstatement is complete and the site moves into final condition the original site characteristics would be restored and the impact is assessed to be neutral, long-term, with a very low magnitude and a negligible significance.

15.6.68 **Table 15.12** provides a summary of impacts on Viewpoint 1.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
<th>Magnitude</th>
<th>Significance</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>Low</td>
<td>Adverse, short term</td>
<td>Low</td>
<td>Minor</td>
<td>Very low</td>
<td>Negligible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Low</td>
<td>Adverse, medium-term</td>
<td>Low</td>
<td>Minor</td>
<td>Low</td>
<td>Minor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Removal/ restoration</td>
<td>Low</td>
<td>Adverse, short term</td>
<td>Low</td>
<td>Minor</td>
<td>Low</td>
<td>Minor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Low</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
<td>Very low</td>
<td>Negligible</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ii. Viewpoint 2: Edge of the A39**

15.6.69 The sensitivity of visual receptors at this viewpoint is assessed as low.

15.6.70 During the construction phase, as this viewpoint looks directly onto the site from the existing farm access gateway, the viewpoint experiences the impact of site clearance and level changes, the construction of the built elements and the associated movement of vehicles and lighting. The nature of the impact is assessed as adverse, short-term and of high magnitude and moderate significance. This is not however representative of the view experience by vehicles on the A39 who would be unlikely to see much through the gateway and the adjacent planting would screen most of the site. The drivers on the A39 would be more affected by the proposed new access. It is also unlikely that any pedestrians would ever stand in this position, as there is no footway or PRoW here. At night the very limited requirements for lighting would be seen in the context of lighting from Cannington. It is assessed as being adverse, short-term, of very low magnitude and negligible significance.

15.6.71 During the operational phase the site would be visible from this viewpoint the primarily impact would be associated with the parking areas, small single storey buildings, flat roofed designed to be of low impact and the lighting and CCTV columns.
movement of vehicles would also be evident. As this viewpoint is at a farm access, which would be redundant during the operational phase. From the A39 the view would be oblique with possible glimpses of the site through the gap. The impact is assessed as being adverse, medium-term and of high magnitude and moderate significance. At night the site the lit site would be clearly visible and this would represent a significant change from the current site although the lighting would be seen in the context of light from Cannington which includes some flood lighting. The impact at night is assessed as being adverse, medium-term, of medium magnitude and of minor significance.

15.6.72 During removal/restoration the site would be restored to its original condition and the negative visual impacts would be removed, however the process of removing the built elements and restoring the ground conditions would involve further visual impact and the movement of large vehicles on site. The impact is assessed as adverse, short-term, of high magnitude and moderate significance. At night the very limited requirements for lighting would be seen in the context of lighting from Cannington. It is assessed as being of adverse, short-term very low magnitude and negligible significance.

15.6.73 Once reinstatement is complete and the site moves into final condition the original site characteristics would be restored and the impact is assessed to be neutral, long-term, with a very low magnitude and a negligible significance both during the day and at night.

15.6.74 **Table 15.13** provides a summary of impacts on Viewpoint 2.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
<th>Magnitude (Night)</th>
<th>Significance (Night)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>Low</td>
<td>Adverse, short-term</td>
<td>High</td>
<td>Moderate</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Low</td>
<td>Adverse, medium-term</td>
<td>High</td>
<td>Moderate</td>
<td>Medium</td>
<td>Minor</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>Low</td>
<td>Adverse, short-term</td>
<td>High</td>
<td>Moderate</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Low</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

**iii. Viewpoint 3: PRoW BW 5/22**

15.6.75 The sensitivity of visual receptors at this viewpoint is assessed as medium.

15.6.76 During the construction phase most of the visual impacts would be associated with the site clearance and landform changes, including the construction of the earth bund adjacent to the footpath, the construction of the built elements and the movement of vehicles. The visual impact is assessed as short-term and of high magnitude and major significance as the view would be adjacent to the site under construction. The earth bund would when in place screen part of the site but would be surrounded by badger fencing and would obstruct the original open view from the footpath. At night the very limited requirements for lighting would be seen in the context of lighting from
Cannington. It is assessed as being adverse, very low magnitude and negligible significance.

15.6.77 During the operational phase this viewpoint would be partially screened from the proposed development by the grassed soil bunds surrounded by security and badger fencing. The edge of the southern part of the parking area, and access road would be visible with associated fencing, lighting and CCTV. The access road would be partially screened by vegetation which would become more established as the operational phase progressed. The bund provides screening but as this is a significant change to the view the magnitude of the impact is still assessed as high. The impact is assessed as adverse, medium-term and of high magnitude and major significance. The site requires lighting throughout the night. The lit area would be seen in the context of other lighting in Cannington. The visual impact at night is assessed as being of adverse, medium-term of medium magnitude and moderate significance.

15.6.78 During the removal/restoration phase the visual impact of the activities required to remove the built elements on the site and restore the original ground levels and grass sward would be visible from this viewpoint. The visual impact is assessed as adverse, short-term, of high magnitude and major significance. At night the very limited requirements for lighting would be seen in the context of lighting from Cannington. It is assessed as being of adverse, very low magnitude and negligible significance.

15.6.79 Once reinstatement is complete and the site moves into final condition the original site characteristics would be restored and the impact is assessed to be neutral, long term, of very low magnitude and a negligible significance during both the day and at night.

15.6.80 Table 15.14 provides a summary of impacts on Viewpoint 3.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
<th>Magnitude (Night)</th>
<th>Significance (Night)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>High</td>
<td>Major</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Medium</td>
<td>Adverse, medium-term</td>
<td>High</td>
<td>Major</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>High</td>
<td>Major</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Medium</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

iv. Viewpoint 4: PRoW BW/5/22

15.6.81 The sensitivity of visual receptors at this viewpoint is assessed as medium.

15.6.82 This viewpoint looks out directly over the field where the proposed development would be so during the construction phase it would experience the full range of impacts, including the site clearance, the landform changes, the construction of the built elements and the movement of large vehicles on site. The impact is assessed as
being adverse, short-term with a high magnitude and a major significance. At night the very limited requirements for lighting are assessed as being adverse, short-term, of very low magnitude and minor significance.

15.6.83 During the operational phase this viewpoint would be partially screened from the site by the proposed grassed soil bund and proposed planting. The impact is assessed as being adverse, medium-term and of high magnitude and major significance. The site would require lighting throughout the night the lit lighting columns would be visible to the left of the bund and slightly above the bund with an aura in the sky above the site, the impact is assessed as being adverse, medium-term, of medium magnitude and moderate significance.

15.6.84 During the removal/restoration phase this viewpoint would experience the full range of site activities as the built elements were removed from the site and the original landform restored. The impact is assessed as being adverse, short-term, of high magnitude and major significance. At night the very limited requirements for lighting are assessed as being adverse, short-term, of very low magnitude and minor significance.

15.6.85 Once the site was restored and reached final condition the original site conditions would have been reinstated the impacts are assessed as neutral, long term and of very low magnitude and negligible significance, during the day and at night.

15.6.86 Table 15.15 provides a summary of impacts on Viewpoint 4.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
<th>Magnitude (Night)</th>
<th>Significance (Night)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>High</td>
<td>Major</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Medium</td>
<td>Adverse, medium-term</td>
<td>High</td>
<td>Major</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>High</td>
<td>Major</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
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<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

v. Viewpoint 5: PRoW BW 5/22

15.6.87 The sensitivity of visual receptors at this viewpoint is assessed as high.

15.6.88 The visual impacts from this location during construction are primarily those that appear above the existing hedgerows, which would screen much of the ground level activity. The pre-operation proposals to change hedgerow management regime would help to ensure that they grow taller. The landscape proposals include for gapping up hedgerows and planting trees in hedgerows and field corners. The construction phase impacts would include the levels changes and particularly the movement of large vehicles. The built elements which would be visible include the fencing and lighting and CCTV columns and the tops of the small buildings. The impact is assessed as
adverse, short-term and of medium magnitude and major significance due to the sensitivity of the receptors. At night the very limited requirements for lighting are assessed as being of adverse, short-term, of very low magnitude and minor significance.

15.6.89 During the operational phase the possible visual impact would be associated with the soil bund and tops of the built elements on site particularly fencing, lighting and CCTV columns. The tops of vehicles moving on the site access road would be also visible. The impact is assessed as being adverse, medium-term with a low magnitude and moderate significance. At night the requirement to light the site would introduce some light to the night sky from a viewpoint that normally looks out over fairly dark fields. The impact is assessed as being adverse, medium-term, of low magnitude and moderate significance.

15.6.90 During the removal/restoration phase the higher-level activities would potentially be visible including the removal of built elements and the landform reinstatement activities. It is likely to be primarily the movement of large vehicles, which would have an impact. The impact is assessed as being adverse, short-term and of low magnitude and moderate significance. At night the very limited requirements for lighting are assessed as being adverse, short-term, of very low magnitude and minor significance.

15.6.91 Once the site was restored and reached final condition the original site conditions would have been reinstated the impacts are assessed as neutral, long term and of negligible significance, during the day and at night.

15.6.92 **Table 15.16** provides a summary of impacts on Viewpoint 5.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
<th>Magnitude (Night)</th>
<th>Significance (Night)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>High</td>
<td>Adverse, short-term</td>
<td>Medium</td>
<td>Major</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>High</td>
<td>Adverse, medium-term,</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>High</td>
<td>Adverse, short-term</td>
<td>Low</td>
<td>Moderate</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>High</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

**vi. Viewpoint 6: High Street, Near the Lodge**

15.6.93 The sensitivity of visual receptors at this viewpoint is assessed as low.

15.6.94 This viewpoint has a view of the site filtered by intervening vegetation, particularly bankside trees along Cannington Brook. This view is likely to vary significantly between winter and summer, as when in leaf the trees would provide significant screening. The impact assessment given is based on the worst-case scenario in winter. From this viewpoint there would potentially be a filtered view of the construction activities including the landform changes, the construction of the built elements and the movement of vehicles on site. The impact is assessed as being
adverse, short-term and of low magnitude and minor significance. At night the very limited requirements for lighting is assessed as being adverse, short-term, of very low magnitude and negligible significance.

15.6.95 During the operational phase the majority of the single storey reception buildings, the hard-surfacing and the lighting and security columns and the movement of buses and cars on the proposed development site would be screened by the grassed soil bund, leaving just the higher level elements being glimpsed through the trees. The impact is assessed as being adverse, medium-term, of low magnitude and minor significance. At night upper levels of lit site would be visible in an area where no light is normally present although it would be seen in the context of light from Cannington. The impact is assessed as being adverse, medium-term, of low magnitude and minor significance.

15.6.96 At the removal/restoration phase this viewpoint is assessed to be impacted by the removal of the built elements and the landform reinstatement process including the movement of large vehicles. This would be at some distance and filtered by intervening trees. The impact is assessed as being adverse, short-term, of low magnitude and minor significance. At night the very limited requirements for lighting are assessed as being adverse, short-term, of very low magnitude and negligible significance.

15.6.97 Once the site was restored and reached final condition the original site conditions would have been reinstated the impacts are assessed as neutral, long-term, of very low magnitude and of negligible significance, during the day and at night.

15.6.98 Table 15.17 provides a summary of impacts on Viewpoint 6.

Table 15.17: Impacts on Viewpoint 6

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
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</thead>
<tbody>
<tr>
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<td>Construction</td>
<td>Low</td>
<td>Adverse, short-term</td>
<td>Low</td>
<td>Minor</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>Low</td>
<td>Adverse, medium-term</td>
<td>Low</td>
<td>Minor</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>Low</td>
<td>Adverse, short-term</td>
<td>Low</td>
<td>Minor</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Low</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

vii. Viewpoint 7: Residential properties, Oak Tree Way

15.6.99 The sensitivity of visual receptors at this viewpoint is assessed as high.

15.6.100 During the construction phase this view would look across the proposed development area from the east. The intervening hedgerows would have been allowed to grow up and new planting would be position in and adjacent to the intervening hedgerows would help reduce some of the visual impact of ground level activities but it is assessed that from this viewpoint the site clearance and level change activities would be visible, along with the construction of the built elements. The movement of vehicles would also be visible. The impact is assessed as being adverse, short-term
and of medium magnitude and major significance. At night the very limited requirements for lighting are assessed as being adverse, short-term, of very low magnitude and minor significance.

15.6.101 During the operational phase from this viewpoint it would be possible to see the higher elements on the site particularly the lighting and security columns, the small single storey buildings and vehicles, most notably the buses. The proposed planting and low mounding would provide visual screening, which would be greater in summer and towards the end of the operational phase. The impact is assessed as being adverse, medium-term and of low magnitude and moderate significance. The proposals require the site to be lit throughout the night this would change the night-time view significantly and enable the higher level elements on the site to be dimly seen. The lighting would be in the context of other lighting associated with Cannington and roads in the area. The magnitude of impact is assessed as adverse, medium term of low magnitude and moderate significance.

15.6.102 During the removal/restoration phase the visual impact of the removal of the built elements and the reinstatement of the original ground levels and grass sward would be visible along with the movement of vehicles on site. The impact is assessed as adverse, short-term and of low magnitude and moderate significance. At night the very limited requirements for lighting are assessed as being adverse, short-term, of very low magnitude and minor significance.

15.6.103 Once the site was restored and reached final condition the original site conditions would have been reinstated the impacts are assessed as neutral, long-term, of very low magnitude and of negligible significance, during the day and at night.

15.6.104 Table 15.18 provides a summary of impacts on Viewpoint 7.

Table 15.18: Impacts on Viewpoint 7

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
<th>Magnitude (Night)</th>
<th>Significance (Night)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>High</td>
<td>Adverse, short term</td>
<td>Medium</td>
<td>Major</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>High</td>
<td>Adverse, medium-term</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>High</td>
<td>Adverse, short term</td>
<td>Low</td>
<td>Moderate</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>High</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

viii. Viewpoint 8: PRoW BW 7/4

15.6.105 The sensitivity of visual receptors at this viewpoint is assessed as medium.

15.6.106 This viewpoint is over 1km from the proposed development, it is at an elevated level and has a distant view over the proposed development site. The site is partially screened by planting along the A39 and at this distance and the activities during the construction phase are not of sufficient scale to have a significant impact. The impact is assessed as adverse, short-term, of very low magnitude and minor significance. At
night the very limited requirements for lighting are assessed as being adverse, short-term, of very low magnitude and minor significance

15.6.107 During the operational phase the site would continue to be screened by planting along the A39, the change in use from grass to hard surfacing might be just seen but this is a distant view and the site would be seen in the context of the edge of Cannington. The impact is assessed as adverse, medium-term or very low magnitude and minor significance. At night the site would be lit but this lighting would be seen in the context of other lighting in and around Cannington the impact is assessed as adverse, medium-term, of very low magnitude and of minor significance.

15.6.108 The activities on the partially screened proposed development site during the proposed removal/restoration phase are unlikely to have significant visual impact from this distance. They are assessed as adverse, short-term and of very low magnitude and minor significance. At night the very limited requirements for lighting are assessed as being adverse, short-term, of very low magnitude and minor significance.

15.6.109 Once the site was restored and reached final condition the original site conditions would have been reinstated the impacts are assessed as neutral, long term of very low magnitude and of negligible significance, during the day and at night.

15.6.110 Table 15.19 provides a summary of impacts on Viewpoint 8.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
<th>Magnitude (Night)</th>
<th>Significance (Night)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
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<td>Adverse, short-term</td>
<td>Very low</td>
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<td>Operation</td>
<td>Medium</td>
<td>Adverse, medium-term,</td>
<td>Very low</td>
<td>Minor</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>Medium</td>
<td>Adverse, short-term</td>
<td>Very low</td>
<td>Minor</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>Medium</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

ix. Viewpoint 9: PRoW BW 5/17

15.6.111 The sensitivity of visual receptors at this viewpoint is assessed as high.

15.6.112 This viewpoint is located over 1km from the site. It is in an elevated location, which is considered to be of high sensitivity. The site is not easily visible and if seen in winter would be seen in the context of Cannington. The impact is assessed as being adverse, short-term and of very low magnitude and minor significance. At night the very limited requirements for lighting are assessed as being adverse, short-term, of very low magnitude and minor significance.

15.6.113 During the operational phase the combination of the distance, low level and scale of the proposals and intervening screening means that the visual impact is assessed as adverse, medium-term with a very low magnitude and minor significance. The site lighting required throughout the night might give a slightly different pattern to the
lighting around Cannington. The impact is assessed as adverse, medium-term, of very low magnitude and minor significance.

15.6.114 During the removal/restoration phase the site activities are assessed as being not easily discernible from this distance. The impact is assessed as adverse, short-term and of very low magnitude and minor significance. At night the very limited requirements for lighting are assessed as being adverse, short-term, of very low magnitude and minor significance.

15.6.115 Once the site was restored and reached final condition the original site conditions would have been reinstated the impacts are assessed as neutral, long term, of very low magnitude and of negligible significance, during the day and at night.

15.6.116 Table 15.20 provides a summary of impacts on Viewpoint 9.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
<th>Magnitude (Night)</th>
<th>Significance (Night)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>High</td>
<td>Adverse, short-term</td>
<td>Very low</td>
<td>Minor</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>High</td>
<td>Adverse, medium-term,</td>
<td>Very low</td>
<td>Minor</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>3</td>
<td>Removal/restoration</td>
<td>High</td>
<td>Adverse, short-term</td>
<td>Very low</td>
<td>Minor</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>High</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

x. Viewpoint 10: Quantock Hills AONB

15.6.117 The sensitivity of visual receptors at this viewpoint is assessed as high.

15.6.118 This viewpoint is within the Quantocks AONB on the Coleridge Way a national trail. Viewpoints from the Quantock Hills AONB to the site are limited partly by intervening landform and also by significant areas of woodland on the slopes of the Quantocks. The proposed development site on the southern edge of Cannington is difficult to identify at this distance. The day time impact during construction phase is assessed as being adverse, short term of very low magnitude and minor significance. At night the very low requirements for lighting during the construction phase are assessed as be of adverse, short-term, of very low magnitude and minor significance.

15.6.119 The impact at the operational phase is also assessed as being adverse, medium-term and of very low magnitude and minor significance as the scale of proposals is so small. During the operational phase the requirements to light the site throughout the night could potentially have an impact but the lighting mitigation policies being implemented should reduce the potential impact to be adverse, medium-term, of very low magnitude and minor significance from this distance.

15.6.120 At the removal/restoration phase the impact would be similar to that at the construction phase the impact is assessed to be of adverse, short-term, of very low magnitude and minor significance. At night the very low requirements for lighting
during the reinstatement phase are assessed as be of adverse, short-term, of very low magnitude and minor significance.

15.6.121 Once the site has reached the final condition the site would be restored to its original condition and the impact during the day is assessed as neutral, long-term and of very low magnitude and negligible impact. At night there would be no addition lighting on the site the impact is assessed as neutral, long-term of very low magnitude and negligible significance.

15.6.122 Table 15.21 provides a summary of impacts on Viewpoint 10.

<table>
<thead>
<tr>
<th>ID</th>
<th>Phase</th>
<th>Sensitivity</th>
<th>Nature</th>
<th>Magnitude</th>
<th>Significance</th>
<th>Magnitude (Night)</th>
<th>Significance (Night)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction</td>
<td>High</td>
<td>Adverse, short-term</td>
<td>Very low</td>
<td>Minor</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Operation</td>
<td>High</td>
<td>Adverse, medium-term,</td>
<td>Very low</td>
<td>Minor</td>
<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>3</td>
<td>Removal/ restoration</td>
<td>High</td>
<td>Adverse, short-term</td>
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<td>Very low</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Final condition</td>
<td>High</td>
<td>Neutral, long-term</td>
<td>Very low</td>
<td>Negligible</td>
<td>Very low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

**d) Summary of Visual Impact**

15.6.123 The edge of Cannington restricts views from the north and from the residential edge there are views towards the site. The intervening hedges screen low level parts of the view and the grass covered soil bund provides further substantial screening. The photomontage for viewpoint 5 (Appendix 15E.1) gives a good indication of the parts of the site which would be visible which is predominantly the top of lighting columns and possibly a slight impact from the tops of the very small buildings.

15.6.124 Views from the east are limited by Cannington. A section of recent 20th Century development on the western side of Cannington has views towards the site. Intervening hedgerows and proposed bunding adjacent to the east side of the proposed development would screen some of the lower level views, but the taller elements of the built development and parked and moving vehicles are likely to be seen especially in early years before the planting becomes established. From the footpaths between Cannington and the site there would be views of the proposed development, fencing lighting columns, small buildings and the movement of vehicles would be the most evident elements of the view.

15.6.125 The south of the site is bounded by recent woodland planting adjacent to the A39. This encloses the site well and limits views at the same level as the site to those through the gap in the existing farm gate and the new proposed site entrance. From the viewpoint of motorists on the A39 this would be an oblique view and is likely to give a very limited view of the site. It is assessed that the only other views from the south would be from ground at a significantly higher level than the site.
15.6.126 From the west there is a footpath within the field where the proposed development is located and this would have a clear view of the construction activities until the soil bund is in place. Further west the site is bounded by the woodland planting adjacent to the A39, which, provides a good visual screen, and the tree lined meandering course of Cannington Brook, which filters views. This planting is significant enough to filter all ground level views in summer substantially leaving filtered winter views into the site. It is only at a distance of over a kilometre that sufficient elevation is reached that there are views looking down into the site. At this distance the proposed development is seen in the context of the edge of Cannington and is of negligible significance.

15.6.127 To ensure that assessment was made of potential impacts on the Quantock Hills AONB, following consultation, field surveys were undertaken. The closest part of the Quantocks Hills AONB to the site is screened by intervening vegetation. Viewpoints looking towards the site were difficult to find as many of the slopes are covered in woodland. The assessment from viewpoint 15 indicates there to be negligible impact from the proposed development site, with perhaps just slight additional glow around the edge of Cannington during the operational phase at night.

15.6.128 In summary the site is well screened from the wider landscape by the edge of Cannington to the north and east which restrict views to a small area within 500m of the site. The proposed development is temporary in nature and the landscape proposals ensure that potential impacts are minimised. Within this, very localised, area the proposed development has a moderate to major significance of impact, this impact would decrease over time as planting became established.

15.7 Mitigation of Impact

a) Introduction

15.7.129 This section assesses the potential residual impacts on landscape character and representative visual receptors, (as identified in Section 15.5) which would result from the construction, operational, and removal/restoration activities relating to the proposed development.

15.7.130 The site location and containment of the proposals within one field boundary provides significant landscape mitigation as it allows the existing landscape pattern to be retained and the hedgerows provide low level screening. The proposals have been designed to reduce their landscape impact by keeping all built elements as low as possible. Further details are provided in the Design and Access Statement.

b) Mitigation during Construction

15.7.131 The residual impacts assessed for the construction phase are the same as those described in Section 15.6 as no additional landscape mitigation has been proposed.

c) Mitigation during Operation

15.7.132 Additional further mitigation has not been identified which is considered to be effective due to the temporary nature of the proposals and the landscape character of the area. Accordingly, no further mitigation has been proposed and so residual impacts remain at the same levels as those originally assessed in Section 15.6.
d) Mitigation during Removal/Restoration

15.7.133 The residual impacts assessed for the removal/restoration phase are the same as those described in Section 15.6 as no additional landscape mitigation has been proposed.

e) Mitigation at Final Condition

15.7.134 No mitigation would be required at final condition the site would have been restored to agricultural use and appear in the landscape as it was before the proposed development.

15.8 Residual Impacts

i. Construction impacts

15.8.1 The residual landscape impacts are confined to a small area around the site where it has not been possible to mitigate all impacts, given the temporary change in character of the site as a result of the proposals and the highly localised nature of the impact. The measures to provide manage hedgerows and establish planting prior to the commencement of the construction phase will provide mitigation. No further mitigation is proposed so the impacts are as those described in Section 15.6.

15.8.2 The moderate and major significant impacts at the construction, operational and removal restoration phase impacts are confined to a small area close to the site. The proposed development site is currently in agricultural use the temporary change of use to a park and ride site represents a significant change to the landscape character and inevitable landscape impacts. The mitigation provided inherent within the design has aimed to reduce this impact and achieve an attractive and appropriate landscape setting to the proposal. Additional further mitigation has not been identified which is considered to be effective due to the temporary nature of the proposals and the landscape character of the area. Accordingly, no further mitigation has been proposed and so residual impacts remain at the same levels as those originally assessed in Section 15.6.

ii. Removal/restoration Impacts

15.8.3 The residual impacts assessed for the removal/restoration of the proposed development are the same as those described in Section 15.6 as no additional landscape mitigation has been proposed.

iii. Final condition Impacts

15.8.4 At final condition the proposed development site would have been restored back to its condition prior to any development. No further mitigation is therefore offered during this phase since there would be no residual landscape impacts. Residual impacts are therefore assessed as being of negligible significance.

15.9 Summary of Impacts

15.9.1 Table 15.20 through to Table 15.23 summarise the predicted impacts on the identified landscape and visual receptors.
<table>
<thead>
<tr>
<th></th>
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<th></th>
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<tbody>
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Table 15.25: Summary of Final condition Phase Impacts

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References


15.18 DCLG. Lighting in the Countryside: Towards Good Practice. HMSO. 1997.


15.20 Advice Note 01/11 from the Landscape Institute, Photography and Photomontage in Landscape and Visual Impact Assessment.


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APPENDICES
Appendix 16A: Heritage Gazetteer
16. HISTORIC ENVIRONMENT

16.1 Introduction

16.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential historic environment impacts associated with the construction, operational and post-operational phases of the proposed Cannington park and ride facility (the proposed development) on land referred to by EDF Energy as the Cannington park and ride site (the site).

16.1.2 Detailed descriptions of the site, proposed development, construction, operational and post-operational phases are provided in Chapters 1 to 5 of this volume of the ES.

16.2 Scope and Objectives of Assessment

16.2.1 The scope of the assessment has been determined through a formal Environmental Impact Assessment (EIA) scoping process undertaken with the Infrastructure Planning Commission (IPC). It has also been informed by ongoing consultation with statutory consultees (including Sedgemoor District Council (SDC), West Somerset Council (WSC), Somerset County Council (SCC) and English Heritage), the local community and the general public in response to the Stage 1, Stage 2, Stage 2 Update and M5 Junction 24 and Highway Improvements consultations.

16.2.2 The assessment of the historic environment impacts has been undertaken adopting the methodologies described in Section 16.4 of this chapter.

16.2.3 The existing baseline conditions, against which the potential impacts of the proposed development are assessed, have been determined through a desk-based assessment and field surveys and are described in Section 16.5 of this chapter. The study area for this assessment is illustrated in Figure 16.1.

16.2.4 Impacts to the historic environment are presented in Section 16.6, and appropriate mitigation measures aimed at preventing, reducing or offsetting any potential adverse impacts that are identified to be of significance are identified in Section 16.7 of this chapter. An assessment of residual impacts following implementation of these mitigation measures is presented in Section 16.8 of this chapter.

16.2.5 Cumulative impacts to the historic environment arising from the proposed development in combination with other elements of the Hinkley Point C (HPC) Project and other relevant plans and projects are identified and assessed in Volume 11 of this ES.

16.2.6 The objectives of this assessment were to:

- identify all known heritage assets that may be affected by the proposed development;
• assess the potential for buried archaeological remains to be present and their likely level of preservation;
• assess the likely extent of previous impacts on the historic environment resource;
• assess the potential impact of the proposed development on the historic environment resource;
• propose mitigation strategies aimed at preventing, reducing or offsetting any potential adverse impacts that are identified to be of significance in respect of the proposed development, if necessary; and
• determine the residual impacts, where appropriate.

16.3 Legislation, Policy and Guidance

16.3.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of potential impacts to the historic environment associated with the construction, operational and post-operational phases of the proposed development.

16.3.2 As stated in Volume 1, Chapter 4, the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) when combined with the NPS for Nuclear Power Generation (NPS EN-6) provides the primary basis for decisions by the IPC on applications for nuclear power generation developments that fall within the scope of the NPSs.

16.3.3 Notwithstanding this, the IPC may consider other matters that are both important and relevant to its decision-making. This could include Planning Policy Statements (PPSs), Planning Policy Guidance Notes (PPGs), regional and local policy documents, although, if there is a conflict between these and the NPS, the NPS prevails for the purposes of IPC decision making.

16.3.4 Further, the Planning Act 2008 provides that the IPC must, in making its decision on an application, have regard to any Local Impact Report (LIR) prepared by relevant local authorities. It is anticipated that the LIRs will rely in part on PPSs, PPGs, regional and local policy to provide a context for their assessment. On this basis, regard has been given to these documents where relevant to the technical assessment which are likely to inform the LIRs prepared by the relevant local authorities.

a) International Legislation

16.3.5 The scope of assessment is not affected by European or other international legislation.

b) National Legislation

16.3.6 Aspects of national legislation of relevance to the site and to the historic environment are presented below.
i. **Ancient Monuments and Archaelogical Areas Act 1979 (Ref. 16.1)**

16.3.7 Under the terms of this act an archaeologial site or historic building of national importance can be designated as a Scheduled Monument and is registered with the Department of Culture, Media and Sport (DCMS).

16.3.8 Any development that might affect either the Scheduled Monument or its setting is subject to the granting of Scheduled Monument Consent. English Heritage advises the government on individual cases for consent and offers advice on the management of Scheduled Monuments.

**ii. Planning (Listed Buildings and Conservation Areas) Act 1990 (Ref. 16.2)**

16.3.9 The Planning (Listed Buildings and Conservation Areas) Act 1990 covers the registration of Listed Buildings (that is those buildings that are seen to be of special architectural or historic interest) and designation of Conservation Areas (areas of special architectural or historic interest the character or appearance of which it is desirable to preserve or enhance).

16.3.10 A Listed Building may not be demolished or altered or extended in any manner which would affect its character as a building of special architectural or historic interest without Listed Building Consent being granted. There are three grades of listing (in descending order):

- Grade I: buildings of exceptional interest.
- Grade II*: particularly important buildings of more than special interest.
- Grade II: buildings of special interest, warranting every effort to preserve them.

**iii. The Hedgerows Regulations 1997 (Ref. 16.3)**

16.3.11 Important hedgerows, as defined by the Hedgerows Regulations 1997, enjoy statutory protection.

c) **National Guidance**

i. **English Heritage Register of Parks and Gardens in England**

16.3.12 The Register of Parks and Gardens of Special Historic Interest in England is maintained by English Heritage and divides the sites into three grade bands similar to those used for Listed Buildings.

ii. **English Heritage Register of Historic Battlefields in England**

16.3.13 The English Heritage Register of Historic Battlefields in England presently identifies 43 important English battlefields. Its purpose is to offer them protection and to promote a better understanding of their significance, but it does not offer any statutory protection.
iii. Ancient Woodlands

16.3.14 Ancient woodlands consist of land that has been continuously wooded since AD 1600. Areas of ancient woodland can be protected as nationally important Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SAC) or as Wildlife Sites recognised at a local level.

16.3.15 Ancient woodland is not a statutory designation in that it does not give the wood legal protection. However, increasingly, national, regional and local planning policies mention protection of ancient woodland in planning documents. The Woodland Trust (the UK’s leading woodland conservation charity) acts wherever possible to secure protection of ancient woodland.

d) National Planning Policy

i. Planning Policy Statement 1: Delivering Sustainable Development (PPS1) (January 2005) (Ref. 16.4)

16.3.16 PPS1 sets out the Government’s overarching planning policies on the delivery of sustainable development through the planning system.

16.3.17 Paragraph 5 states that planning should facilitate and promote sustainable and inclusive patterns of urban and rural development by, amongst other things: protecting and enhancing the natural and historic environment, the quality and character of the countryside, and existing communities.

ii. Planning Policy Statement 5: Planning for the Historic Environment (PPS5) (March 2010) (Ref. 16.5)

16.3.18 PPS5 sets out planning policies on the conservation of the historic environment. It states that planning has a central role to play in conserving our heritage assets and utilising the historic environment in creating sustainable places. The policies contained within PPS5 will enable the Government’s vision for the historic environment to be implemented through the planning system.

16.3.19 PPS5 introduces the concept of a “heritage asset”, which is defined as those parts of the historic environment that have significance because of their historic, archaeological, architectural or artistic interest (page 5). Heritage assets include designated heritage assets (World Heritage Sites, Scheduled Monuments, Listed Buildings, Protected Wreck Sites, Registered Parks and Gardens, Registered Battlefields and Conservation Areas) and assets identified by the local planning authority during the process of decision-making or through the plan-making process (including local listing) (page 13).

16.3.20 Policy HE1.3 states that, where conflict between climate change objectives and the conservation of heritage assets is unavoidable, the public benefit of mitigating the effects of climate change should be weighed against any harm to the significance of heritage assets in accordance with the development management principles in this PPS and national planning policy on climate change.
16.3.21 Policy HE6.1 states that local planning authorities should require an applicant to provide a description of the significance of the heritage assets affected and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage asset and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset. Policy HE6.2 states this information together with an assessment of the impact of the proposal should be set out in the application as part of the explanation of the design concept. Policy HE6.3 states that local planning authorities should not validate applications where the extent of the impact of the proposal on the significance of any heritage assets affected cannot adequately be understood from the application and supporting documents.

16.3.22 Policy HE7.2 states that, in considering the impact of a proposal on any heritage asset, local planning authorities should take into account the particular nature of the significance of the heritage asset and the value that it holds for this and future generations.

16.3.23 Policy HE7.7 states that, where loss of significance is justified on the merits of new development, local planning authorities should not permit the new development without taking all reasonable steps to ensure that the new development will actually proceed if the loss of significance occurs by imposing appropriate planning conditions or securing obligations by agreement.

16.3.24 Policy HE8.1 considers non-designated heritage assets and states that the effect of an application on the significance of such a heritage asset or its setting is a material consideration in determining the application.

16.3.25 Policy HE9.1 states that there should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. Loss affecting any designated heritage asset should require clear and convincing justification.

16.3.26 Policy HE9.4 states that, where a proposal has a harmful impact on the significance of a designated heritage asset which is less than substantial harm, in all cases local planning authorities should:

   “(i) weigh the public benefit of the proposal (for example, that it helps to secure the optimum viable use of the heritage asset in the interests of its long-term conservation) against the harm; and

   (ii) recognise that the greater the harm to the significance of the heritage asset the greater the justification will be needed for any loss.”

16.3.27 Policy HE9.6 states that there are many heritage assets with archaeological interest that are not currently designated as Scheduled Monuments, but which are demonstrably of equivalent significance. The absence of designation for such heritage assets does not indicate lower significance and they should be considered subject to the policies in HE9.1 to HE9.4 and HE10.
16.3.28 Policy HE10.1 states that, when considering applications for development that affect the setting of a heritage asset, local planning authorities should treat favourably applications that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset. When considering applications that do not do this, local planning authorities should weigh any such harm against the wider benefits of the application. The greater the negative impact on the significance of the heritage asset, the greater the benefits that will be needed to justify approval.

16.3.29 Policy HE12.3 states that, where the loss of the whole or a material part of a heritage asset’s significance is justified, local planning authorities should require the developer to record and advance understanding of the significance of the heritage asset before it is lost, using planning conditions or obligations as appropriate. The extent of the requirement should be proportionate to the nature and level of the asset’s significance. Developers should publish this evidence and deposit copies of the reports with the relevant historic environment record.

e) Regional Planning Policy

16.3.30 The Government’s revocation of regional strategies was quashed in the High Court on 10 November 2010. However, on that same date the Government reiterated in a letter to Chief Planners its intention to revoke regional strategies through the Localism Bill. This letter was also challenged but, on 7 February 2011, the High Court held that the Government's advice to local authorities that the proposed revocation of regional strategies was to be regarded as a material consideration in their planning development control decisions should stand. The decision of the High Court was upheld by the Court of Appeal on 27 May 2011. Therefore, the regional strategies remain in place but in the case of development control decisions it is for planning decision makers to decide on the weight to attach to the strategies. Volume 1, Chapter 4 of this ES provides a full summary of the position regarding the status of regional planning policy.

i. Regional Planning Guidance 10 for the South West (RPG10) 2001-2016 (2001) (Ref. 16.6)

16.3.31 RPG 10 sets out the broad development strategy for the period to 2016 and beyond. Policy EN 3 (The Historic Environment) seeks the protection of historic and archaeological areas, sites and monuments of international, national and regional importance. This policy also advises that new development should preserve or enhance historic buildings and conservation areas and important archaeological features and their settings.

ii. The Draft Revised Regional Spatial Strategy for the South West Incorporating the Secretary of State’s Proposed Changes 2008-2026 (July 2008) (Ref. 16.7)

16.3.32 The draft Revised Regional Spatial Strategy (RSS) looks forward to 2026 and sets out the Government’s policies in relation to the development of land within the region.

16.3.33 Policy SD3 (The Environment and Natural Resources) seeks to protect and enhance the region’s environment and natural resources by, amongst other things, positive
planning and design to set development within, and to enhance, local character (including setting development within the landscape of the historic environment), and bringing historic buildings back into viable economic use and supporting regeneration.

16.3.34 Policy ENV1 (Protecting and Enhancing the Region’s Natural and Historic Environment) states that, where development and changes in land use are planned which would affect the natural and historic environment, local authorities will first seek to avoid loss of or damage to the assets, then mitigate any unavoidable damage, and compensate for loss or damage through offsetting actions.

16.3.35 Policy ENV5 (Historic Environment) states that the historic environment of the South West will be preserved and enhanced.


16.3.36 The Somerset and Exmoor National Park Joint Structure Plan was adopted in 2000 with relevant policies saved from 27 September 2007. All policies have been saved with the exception of Policy 53 which is unrelated to historic environment impacts. The Plan provides a strategic base for all land use planning within the plan area for the period up to 2011.

16.3.37 Policy 9 (The Built Historic Environment) states that the setting, local distinctiveness and variety of buildings and structures of architectural or historic interest should be maintained and where possible enhanced. The character or appearance of Conservation Areas should be preserved or enhanced.

16.3.38 Policy 11 (Areas of High Archaeological Potential) states that development proposals should take account of identified Areas of High Archaeological Potential or, elsewhere where there is reason to believe that important remains exist, so that appropriate assessment and necessary protection can be afforded to any archaeological remains identified.

16.3.39 Policy 12 (Nationally Important Archaeological Remains) states that there should be a presumption in favour of the physical preservation in situ of nationally important archaeological remains. The setting and amenity value of the archaeological remains should also be protected.

16.3.40 Policy 13 (Locally Important Archaeological Remains) states that development proposals which affect locally important archaeological remains should take account of the relative importance of the remains. If the preservation in situ of the archaeological remains cannot be justified, arrangements should be sought to record those parts of the site that would be destroyed or altered.
f) Local Planning Policy


16.3.41 The Sedgemoor District Local Plan forms part of the Development Plan for Sedgemoor. The Local Plan was adopted in 2004 (with relevant policies 'saved' from 27 September 2007). The Proposals Map (Inset Map No. 14) indicates that the site is not subject to any specific historic environment designations. There are a number of Sites of County Importance (Policies HE9 and HE12) located to the immediate south of the site. The site is within the defined Development Boundary.

16.3.42 The following saved policies are considered to be potentially relevant:

16.3.43 Policy HE9 (Other Archaeological Sites and Areas) states that where development proposals will affect Areas of High Archaeological Potential and elsewhere where there is reason to believe that there may be archaeological remains, an assessment of the nature, character and importance of the site will be sought prior to the determination of any planning application.

16.3.44 Policy HE12 (Other Archaeological Sites and Areas) states that planning permission will not be granted for development which would damage or destroy locally important archaeological remains, unless the importance of the development outweighs the local significance of the remains. Where physical preservation in-situ is not possible, mitigation strategies will be required for the protection and/or recording of the site.

16.3.45 Policy HE13 (Management and Interpretation of Archaeological Sites) states that where development is proposed in the vicinity of important archaeological sites, consideration should be given to the promotion of schemes for their management, interpretation and public access.

ii. Sedgemoor District Local Development Framework Core Strategy (Proposed Submission) (September 2010) (Ref. 16.10)

16.3.46 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from September to November 2010. Changes prior to submission proposed as a result of the consultation process were reported and endorsed by the Council’s Executive Committee on 9 February 2011. The Core Strategy (Proposed Submission) was submitted to the Secretary of State on 3 March 2011 and an Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy will form part of the Development Plan for Sedgemoor.

16.3.47 EDF Energy submitted representations objecting to the Core Strategy (Proposed Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1, MIP2 and MIP3 contained in that chapter) and those sections relating to housing and Hinkley Point. EDF Energy also participated at the relevant EiP hearings. Volume 1, Chapter 4 of this ES provides a full summary of the position regarding the status of the Core Strategy.

16.3.48 The following Core Strategy (Proposed Submission) policies are of potential relevance:
16.3.49 Policy S3 (Sustainable Development Principles) states that development proposals will be expected to, amongst other things, protect and enhance the quality of the historic environment.

16.3.50 Policy D4 (Renewable or Low Carbon Energy Generation) states that the Council will support proposals that maximise the generation of energy from renewable or low carbon sources, provided that the installation would not have significant adverse impact taking into account the impact of the scheme, together with any cumulative impact on, amongst other things, historic features.

16.3.51 Policy D17 (Historic Environment) states that all development proposals should contribute to enhancing and maintaining the historic environment, ensuring a continued role in distinguishing the District’s unique sense of identity and place. In all cases proposals should take into account the need for buildings and landscape (including archaeological remains, battlefields and historic parks and gardens) to adapt to climate change and the positive contribution heritage makes to regeneration. Where development is proposed within the vicinity of historical assets (including archaeological sites) the Council will support schemes that promote management, interpretation and improved public access.

16.3.52 Policy D17 also states that development will be supported where it proposes: appropriate design, including contemporary solutions which positively enhance the character and quality of Conservation Areas; the development of local skills and crafts relevant to the historic environment; a viable use for Listed Buildings, consistent with their historic character, with a clear presumption against their demolition; an emphasis on the importance of the setting of Listed Buildings and other historic assets; appropriate energy efficiency measures where the principles of minimum intervention and reversibility are adopted. Where development resulting in the loss of an historic asset is exceptionally permitted, the Council will require the recording of features of interest that would be destroyed in the course of any proposed work.

g) Supplementary Planning Guidance

16.3.53 Sedgemoor District Council and West Somerset Council have jointly prepared draft supplementary planning guidance in relation to the HPC Project. Public consultation on the Consultation Draft version of the Hinkley Point C Project Supplementary Planning Document (the draft HPC SPD) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which object to the draft HPC SPD. Volume 1, Chapter 4 of this ES provides a full summary of the position regarding the status of the draft HPC SPD.

16.3.54 The draft HPC SPD does not set out any specific guidance in relation to historic environment impacts at the site.

16.3.55 Further planning policy context is provided in the Legislative Planning Policy Context chapter (Volume 1, Chapter 4) and the Introduction chapter (Volume 6, Chapter 1).
16.4 **Methodology**

16.4.1 The baseline assessment has been undertaken in accordance with the published guidelines set out by the Institute for Archaeologists’ (IfA) Standards and Guidance for Archaeological Desk-Based Assessment (DBA) (Ref. 16.11) and Archaeological Field Evaluation (Ref. 16.12).

16.4.2 There is, as yet, no standard or guidance published by the IfA or English Heritage specifically relating to EIAs for the historic environment. In the absence of this, therefore, use has been made (as appropriate) of guidance on assessing the effects of roads schemes on heritage, given in the Design Manual for Roads and Bridges (DMRB), Volume 11: Environmental Assessment, Section 3, Part 2, Cultural Heritage (Ref. 16.13).

16.4.3 Within this chapter, the generic descriptions used to define the level of significance and the likelihood of occurrence are those given in **Volume 1, Chapter 7** of this ES. This provides a matrix comparing the magnitude of an impact with the value and sensitivity (importance) of the receptor, to determine the level of significance of predicted impacts.

**a) Study Area**

16.4.4 The geographical extent of the study area comprises:

- the site; and
- a 500m area around the site.

16.4.5 Where there are known heritage assets of high importance outside of the study area, the setting of which may be impacted upon by the proposed development, the impact of the proposals on the settings of these assets has also been considered, where appropriate.

16.4.6 The study area is illustrated in **Figure 16.1**.

**b) Baseline Assessment**

16.4.7 Heritage assets were identified through:

- a search of the records held at the National Monuments Record (NMR) and the Somerset Historic Environment Record (HER), both conducted in July 2009;
- analysis of the Historic Landscape Characterisation (HLC) data for Somerset, conducted in July 2009;
- a search of historical maps and documentation at the Somerset Record Office, conducted in July 2009;
- an examination of other data sources, including, aerial photographs and the South West Archaeological Research Framework (SWARF) in February 2010 (Ref. 16.14); and
• consultation with Somerset County Council Historic Environment Service (SCC HES) and English.

16.4.8 Non-intrusive site investigations were carried out at the site in order to identify both known and previously unrecorded heritage assets (e.g. historic landscape features, extant earthworks). These surveys included:

- field reconnaissance survey (included within the DBA, Ref. 16.15); and
- detailed geophysical magnetometry survey (Ref. 16.16).

16.4.9 This was followed by a programme of archaeological trial trenching (Ref. 16.17) carried out in order to characterise potential archaeological features identified through the DBA and non-intrusive site investigations.

16.4.10 The programme of trial trenching was designed in consultation with SCC HES and carried out in accordance with a Written Scheme of Investigation (WSI) for archaeological investigation (Ref. 16.18).

16.4.11 The aims of the archaeological trial trenching, defined in the WSI, were to:

- undertake trial trenching on areas of suspected archaeological remains identified by the geophysical survey;
- investigate and record all features of possible archaeological origin uncovered within the trial trenches;
- determine (where possible) the nature, depth, extent, character and date of any archaeological deposits or features;
- determine the likely range, quality and quantity of artefactual and environmental evidence present; and
- inform the design of appropriate archaeological mitigation, as required.

16.4.12 The full list of identified archaeological and historical sites, features and finds identified within the study area are presented in a gazetteer, attached as Appendix 16A.

c) Consultation

16.4.13 Consultation has been undertaken throughout the EIA process and further information is provided in the Consultation Report. Meetings were held with SCC HES and English Heritage to discuss all stages of the assessment including specific aspects of the proposed development such as results of the trial trenching and potential impacts to the settings of heritage assets.

d) Assessment Methodology

16.4.14 Volume 1, Chapter 7 of this ES describes the assessment methodology for this EIA. In addition the following specific methodology was applied for the historic
environment in the determination of receptor value and sensitivity (see Table 16.1) and of impact magnitude (see Table 16.2).

i. Value and Sensitivity

16.4.15 All of the heritage assets that may be impacted by the proposed development have been assigned a level of importance (value) in accordance with those definitions set out in Volume 1, Chapter 7 and with the historic environment definitions given in Table 16.1.

16.4.16 Assessment of the importance, or value, of heritage assets is based upon existing designations, the potential to contribute to the aims of SWARF (Ref. 16.14) and the criteria described in Table 16.1, which is based on the DMRB (Ref. 16.13).

16.4.17 As there are no internationally important sites within the study area (e.g. World Heritage sites) the DMRB category of “Very High Importance” has not been applied.

16.4.18 PPS 5 uses the phrase “significance of a heritage asset” to mean “the value of a heritage asset” (Ref.16.5).

16.4.19 Sensitivity, with regard to the historic environment, is a subjective term which describes the potential for a heritage asset to absorb change. It reflects the current setting of an asset and the extent to which changes to that setting would affect the significance of the asset. The importance of a Scheduled Monument, for example, is always high (as shown in Table 16.1), regardless of its setting. The sensitivity of a Scheduled Monument in a developed or semi-urban environment would usually be lower than the sensitivity of a similar monument in a remote, or unspoilt, setting. Consequently, sensitivity has been taken into account in the assessment of impacts on setting.

16.4.20 Setting is defined in PPS 5 (Ref.16.5) as:

“the surroundings in which an asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.”

16.4.21 In terms of considerations which may affect setting, Paragraph 114 of the PPS 5 Practice Guide (Ref.16.19) highlights that:

“The extent and importance of setting is often expressed by reference to visual considerations. Although views of or from an asset would play an important part, the way in which we experience an asset in its setting is also influenced by other environmental factors such as noise, dust and vibration; by spatial associations; and, by our understanding of the historic relationship between places.”
Table 16.1: Criteria Used to Determine Importance (Value)

<table>
<thead>
<tr>
<th>Importance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Ancient monuments scheduled under the Ancient Monuments and Archaeological Areas Act 1979, or archaeological sites and remains of comparable quality, assessed with reference to the Secretary of State’s non-statutory criteria, as set out in DCMS Guidance on Scheduled Monuments, Annex 1 (Ref. 16.1). Historic buildings that can be shown to have exceptional qualities in their fabric or historical association (for example Grade I or II* Listed Buildings). Well preserved historic landscapes preserving visible elements from medieval or earlier patterns.</td>
</tr>
<tr>
<td>Medium</td>
<td>Archaeological sites and remains which, while not of national importance, fulfil several of the Secretary of State’s criteria and are important remains in their regional context. Historic buildings that can be shown to have important qualities in their fabric or historical association (for example many Grade II Listed Buildings). Averagely well-preserved historic landscapes.</td>
</tr>
<tr>
<td>Low</td>
<td>Archaeological sites and remains that are of low potential or minor importance. Historic buildings of modest quality in their fabric or historical association. Historic landscapes with specific and substantial importance to local interest groups, but with limited wider importance.</td>
</tr>
<tr>
<td>Very low</td>
<td>Buildings of no architectural or historical merit. Areas in which investigative techniques have produced negative or minimal evidence for archaeological remains, or where previous large-scale disturbance or removal of deposits can be demonstrated. Almost wholly modern landscapes created through the removal of historic boundaries.</td>
</tr>
</tbody>
</table>

ii. Magnitude of Impacts

16.4.22 The magnitude of impacts has been based on the consequences that the proposed development would have on the historic environment resource and has been considered in terms of high, medium, low and very low (see Table 16.2, adapted from DMRB (Ref. 16.13)).

16.4.23 Potential impacts have also been considered in terms of permanent or temporary, adverse (negative) or beneficial (positive) and cumulative. The sources of impact may arise during construction, operational and/or post-operational phases.
Table 16.2: Guidelines for the Assessment of Magnitude

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Impact</th>
</tr>
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</table>
| **High**  | Complete removal of an archaeological site.  
            | Severe transformation of the setting or context of a heritage asset or significant loss of key components in a monument group. |
| **Medium** | Removal of a major part of an archaeological site’s area and loss of research potential.  
              | Partial transformation of the setting or context of a heritage asset or partial loss of key components in a monument group.  
              | Introduction of significant noise or vibration levels to a monument leading to changes to amenity use, accessibility or appreciation of a heritage asset.  
              | Diminished capacity for understanding or appreciation (context) of a heritage asset. |
| **Low**    | Removal of a heritage asset where a minor part of its total area is removed, but where the site retains a significant future research potential.  
              | Minor change to the setting of a monument. |
| **Very low** | No significant physical impact or change.  
              | No significant change in setting or context. No impact from changes in use, amenity or access. |

**iii. Significance of Impacts**

16.4.24 The significance of the impact is judged on the relationship of the magnitude of impact to the assessed sensitivity and/or importance of the resource. The methodology for assessing predicted significance of the impacts, without mitigation, is outlined in Volume 1, Chapter 7.

16.4.25 For the purpose of this assessment, mitigation measures have been proposed where there is an impact of greater than minor adverse significance and are appropriate given their magnitude, spatial scope and temporal nature.

**iv. Cumulative Impacts**

16.4.26 Volume 1, Chapter 7 refers to the methodology used to assess cumulative impacts. Additive and interactive effects between impacts generated within the site boundary are assessed within this chapter. Cumulative effects that consider activities and impacts generated at distance from the site are considered in Volume 11; this assesses the project-wide cumulative impacts and in-combination impacts with other proposed, or reasonably foreseeable projects.

**e) Limitations, Constraints and Assumptions**

16.4.27 There are no limitations, constraints or assumptions relevant to the assessment of the historic environment at this site.

**16.5 Baseline Environmental Characteristics**

**a) Introduction**

16.5.1 Baseline environmental information is drawn from the Gazetteer presented in Appendix 16A of this volume of this ES. A total of 30 heritage assets were identified.
within the study area. A further three heritage assets of high importance lying outside of the study area, would also, potentially, be affected by the proposed development. Each asset has been assigned a unique identification number. These are referred to in this section in **bold**, listed in the Gazetteer and shown in **Figure 16.1**. The periods and dates used largely follow the terminology included in the Department for Transport’s (DfT’s) Transport Assessment Guidance (Ref. 16.20).

**b) Site Description and Topography**

16.5.2 The site is located to the immediate south of the village of Cannington, just outside of the settlement boundary. The site is approximately 8km south-east of the HPC development site.

16.5.3 The site covers an area of approximately 5.2ha. It is bounded to the immediate south by the A39 and the remaining boundaries of the proposed development site are with agricultural land.

16.5.4 The site is currently used for agricultural purposes, largely comprising a single closely grazed grassland field.

16.5.5 The site lies in the Sedgemoor District of Somerset, to the south-west of the River Parrett and east of the Quantock Hills. The topography comprises relatively flat land used for pasture surrounded by undulating countryside.

16.5.6 A description of the geology of the site is presented in **Chapter 12** of this volume of the ES.

**c) Statutory Constraints**

16.5.7 Within the site boundary there are no Scheduled Monuments, Conservation Areas, Registered Parks and Gardens, Registered Battlefields, identified important hedgerows or ancient woodlands.

16.5.8 Within the study area there are 15 Listed Buildings and one Conservation Area (**Table 16.3**) encompassing the centre of Cannington (**Can. Con. Area**). The Listed Buildings include two Grade I buildings and 13 Grade II buildings, including the Church of St Mary (6, Grade I) and the walls to Cannington College (29, Grade II). Seven of the Listed Buildings are contained within the Conservation Area.
16.5.9 Outside the study area are: two Scheduled Monuments, settlement earthworks south-east of Cannington Park (1) and Cynwit Castle, an iron hillfort also known as Cannington Camp (2, Plate 16.1); and a Grade I Listed Building, Blackmore Farm (11, Plate 16.2) that would potentially have their settings impacted upon. The hillfort earthworks are located approximately 1.3km to the north-west of the site. Blackmore Farmhouse is located approximately 1.1km to the south-west of the site, beyond the A39 bypass road.
16.5.10 The Scheduled Monuments and Grade I Listed Buildings are deemed to be of high importance (Table 16.3).

16.5.11 Cannington Court (4, Grade I), Church Street, now forms part of the Somerset Farm Institute, but was originally the lay wing of a medieval Benedictine Priory (5, now destroyed). Cannington Court is constructed of red sandstone rubble with a tile roof, but once the priory had been dissolved in 1536, the building was altered by successive families during the post-medieval period.

16.5.12 The Church of St. Mary (6, Grade I), Church Street, Cannington, is predominantly 15th century, but has 12th century architectural fragments and a 14th century tower indicating earlier origins. It is built of coursed red sandstone rubble with a slate roof and prominent gargoyles. It is suggested in the HER record that the Church of St. Mary may have been the former church for the Benedictine Nuns who occupied Cannington Court or that it was originally the site of an early medieval Minster.

16.5.13 Blackmore Farmhouse (11, Grade I, Plate 16.2) is a 15th century manor house with adjoining chapel lying to the south-west of the study area which is externally in good original condition. The two-storey building is constructed of red sandstone rubble and large roughly dressed quoins with a slate roof. The porch is 16th century and there have been 19th century internal alterations though the house retains the original hall, cross-passage and service wing arrangement.

16.5.14 All of the 13 Grade II Listed Buildings are located within Cannington village and are of medium importance as is the Conservation Area.

16.5.15 A medieval outbuilding (3, Grade II) survives to the south of Cannington Court that may have been associated with the priory. The building was much rebuilt in the 19th century to be used as dwellings, though it is now used for storage.

16.5.16 Rogers’ Almshouse (8, Grade II) is a two-storey building in the High Street carrying the date AD 1672. The actual building was originally a 16th century church-house that was later re-used as an almshouse.

16.5.17 Number 28, High Street (18, Grade II), is a late 18th century house built of coursed and squared red sandstone rubble with chamfered quoins and double Roman tile roof.

16.5.18 Number 17, High Street (19, Grade II), is an early 19th century house constructed in the Gothic-style of random red sandstone rubble with a triple Roman tile roof.

16.5.19 Ruscombe House (21, Grade II) is a detached house in the High Street that is set back from the road. It was built in the late 18th or early 19th century of brick with a double Roman tile roof and symmetrical facade.

16.5.20 Court House (22, Grade II), Church Street, is a late 18th century house that has been rendered and colour-washed with a slate roof.

16.5.21 Number 1, Fore Street (23, Grade II), is a mid 18th century house built of red sandstone ashlar with a moulded cornice, elevated centre section and pilasters forming five blank “window” openings.
16.5.22 Number 5 (24, Grade II) and Number 8 (25, Grade II), Church Street, are two 17th century houses with 19th century alterations that are situated west of the church.

16.5.23 The gate and gate piers (26, Grade II) at the west end of the Church of St. Mary are 18th century in date. The gate piers are of dressed red sandstone with pyramidal caps, while the gates are of wrought-iron with scroll decoration and crests.

16.5.24 The William Coles monument (27, Grade II) is a stone chest tomb within the churchyard of St. Mary’s Church. The earliest dated inscription is of 1821, though the chest is of 17th century construction.

16.5.25 Brooklands, Brook Lane (28, Grade II), is an early 19th century house. It has been pebble-dashed with a tile roof and symmetrical frontage, and has been listed primarily for its group value with the neighbouring church.

16.5.26 The wall (29, Grade II) that surrounds the grounds of Cannington College was constructed in the 17th century of red sandstone to a height varying between 3m to 4m with buttresses at regular intervals.

Table 16.3: Statutory Designated Heritage Assets

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Name</th>
<th>Designation</th>
<th>Description</th>
<th>Importance (value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Iron Age settlement</td>
<td>Scheduled monument</td>
<td>The site of two rectangular houses and a small number of preserved fields with lynchets and pottery.</td>
<td>High</td>
</tr>
<tr>
<td>2</td>
<td>Cynwit Castle, Cannington Camp, Iron Age hillfort</td>
<td>Scheduled monument</td>
<td>Earthwork remains at the summit of the limestone outcrop, possible Roman occupation.</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>Outbuilding</td>
<td>Grade II listed building</td>
<td>Right-angles to frontage of Cannington Court, Church Street (east side), Cannington.</td>
<td>Medium</td>
</tr>
<tr>
<td>4</td>
<td>Cannington Court</td>
<td>Grade I listed building</td>
<td>Church Street (east side), Cannington.</td>
<td>High</td>
</tr>
<tr>
<td>6</td>
<td>Church of St. Mary</td>
<td>Grade I listed building</td>
<td>Church Street (east side), Cannington.</td>
<td>High</td>
</tr>
<tr>
<td>8</td>
<td>Almshouse</td>
<td>Grade II Listed Building</td>
<td>High Street (north side), Cannington.</td>
<td>Medium</td>
</tr>
<tr>
<td>11</td>
<td>Blackmore Farmhouse</td>
<td>Grade I listed building</td>
<td>Farmhouse and chapel, Blackmore Lane (south side), Cannington.</td>
<td>High</td>
</tr>
<tr>
<td>18</td>
<td>The Red House (No. 28)</td>
<td>Grade II listed building</td>
<td>Post-medieval house. High Street (south side), Cannington.</td>
<td>Medium</td>
</tr>
<tr>
<td>19</td>
<td>No. 17</td>
<td>Grade II listed building</td>
<td>Post-medieval house. High Street (south side), Cannington.</td>
<td>Medium</td>
</tr>
<tr>
<td>21</td>
<td>Ruscombe House</td>
<td>Grade II listed building</td>
<td>Post-medieval house. High Street (south side), Cannington.</td>
<td>Medium</td>
</tr>
<tr>
<td>22</td>
<td>Court House</td>
<td>Grade II listed building</td>
<td>Post-medieval house. Court House, Church Street (East side), Cannington.</td>
<td>Medium</td>
</tr>
</tbody>
</table>
### Archaeological and Historical Background

**16.5.27** No heritage assets have been identified within the site boundary. The recorded heritage assets within the site and study area are shown in **Figure 16.1**.

#### i. Lower Palaeolithic – Bronze Age (pre 30,000 BC-700 BC)

**16.5.28** There is no evidence that the site was occupied during the Lower Palaeolithic through to the Bronze Age.

**16.5.29** Trial trenching revealed a single large sherd of Bronze Age pottery close to the northern edge site boundary, but outside of the site (Ref. 16.17). However, this artefact was not associated with any features, although it may indicate transitory prehistoric activity in the vicinity.

#### ii. Iron Age and Roman (700 BC-AD 450)

**16.5.30** There are no known heritage assets dating to the Iron Age or Roman periods within the site boundary.

**16.5.31** A Scheduled settlement (1) lies 1.3km to the north-west of the site. A related field system lies to the north-west of the site and the south-east of Cynwit Castle (a Scheduled Iron Age hillfort (2)). This comprises two rectangular house sites and a small number of preserved fields with banks and lynchets. Iron Age and Roman pottery has been recorded at the settlement, which has been predominantly associated with the hillfort, but could also date from either the Roman or early medieval periods.
16.5.32 The summit of the limestone outcrop is occupied by Cynwit Castle (2), also known as Cannington Camp, a Scheduled Iron Age hillfort. The ditch has been quarried out of the rock and a stone bank built up on the inside. The original entrance lies on the south-eastern side though there is a possible second entrance to the north.

iii. Early Medieval and Medieval (AD 450-AD 1540)

16.5.33 There are no known heritage assets dating to the early medieval or medieval periods within the site boundary.

16.5.34 Within the study area four of the Listed Buildings survive from the medieval period (3, 4, 6 and 8) as does Blackmore Farm (11) which is outside the study area. These are described in the statutory constraints section above.

16.5.35 Also within the study area are four undesignated heritage assets of medieval date. These include: the site of the Benedictine Nunnery at Cannington Court (5); Cooks Mill at Brookland’s Farm (7); ditches excavated near Mill Lane (9); and a possible depopulated medieval settlement (10). None of these heritage assets would be impacted by the proposed development and are not assessed further.

iv. Post-medieval (AD 1540 onwards)

16.5.36 There are no known heritage assets dating to the post-medieval period within the site boundary.

16.5.37 Within the study area there are 11 Listed Buildings from the post-medieval period. These include eight houses (18, 19, 21-25, 28), gate piers (26), a chest tomb (27) and a wall (29). These are all described in the statutory constraints section above.

16.5.38 Also within the study area are nine undesignated heritage assets of post-medieval date. These include: the Nether Stowey to Ashcott turnpike road (12); the Brymore House ride (13); the cemetery and chapel in the High Street (14); the Congregational Church (15); 19th century garden features (16); two burials at a former chapel site in the High Street (17); Town Mill/Priory Mill (20); the 20th century bridge in Brook Street (30); and the War Memorial (31).

16.5.39 None of these undesignated heritage assets would be impacted by the proposed development and so they are not assessed further.

e) Historic Buildings

16.5.40 There are no historic or Listed Buildings within the site boundary.

16.5.41 There are 15 Listed Buildings (3, 4, 6, 8, 18, 19, 21-29) within the study area and one Listed Building, Blackmore Farm (11), outside the study area. These are all described in the statutory constraints section above.

f) Historic Landscape

16.5.42 Natural England’s Landscape Character Assessment places the site within Landscape Character Area 146: Vale of Taunton and Quantock Fringes (Ref. 16.21),
described as lowland, mixed farming landscape, with dense hedges, sparse woodland and scattered villages, hamlets and farmsteads linked by winding lanes.

16.5.43 The Somerset Historic Landscape Characterisation (HLC) has characterised the land occupied by the site as ‘Recently Enclosed Land 17th – 18th Century’ (HLC 5), with a general field size of 3 – 6 hectares and less than 50% boundary loss since 1905. To the west of the study area the land around Brymore House has been classified as Historic Landscape Park (HLC 4). This covers the area of landscaped park that originally existed around Brymore House, but which is at least partially now used for arable farming, though elements of the designed landscape, such as the “ride” (13) survive.

16.5.44 Other HLC types within the study area include the pre- and post-tithe map (HLC 14 and HLC 2 respectively) areas of settlement in Cannington.

16.5.45 Historic map regression shows that the site has remained in agricultural use, in a relatively rural area, peripheral to Cannington village. The 1889 Ordnance Survey map shows that the site comprised enclosed irregular fields (Ref. 16.22).

16.5.46 The urban element of Cannington has increased over the last century to occupy more of the study area. Specifically some of the fields to the north and east of the site are now small housing estates constructed after 1931 (Ref. 16.23). The construction of the southern Cannington Bypass (A39) in 1993 also had a considerable impact on the surrounding landscape.

**g) Setting of Designated Heritage Assets**

16.5.47 Fifteen designated heritage assets lie within the study area with a further three outside that may have their setting impacted by the proposed development. These include: two Scheduled Monuments; three Grade I Listed Buildings; and 13 Grade II Listed Buildings. The Cannington Conservation Area also lies within the study area.

16.5.48 The setting of a heritage asset is not considered important in its own right. The importance of setting is the contribution it makes to the significance (value) of a heritage asset.

16.5.49 It has been assessed that the setting contributes to the value of all designated heritage assets identified within the study area and to the three identified outside of the study area.

16.5.50 The site in its baseline condition forms part of the setting of all of the designated heritage assets identified above. This is because the site as agricultural fields contributes to the general rural village atmosphere.

16.5.51 Cynwit Castle (2), occupies an outcrop of rock that dominates the surrounding countryside, particularly to the east, with views over the floodplain and estuary of the River Parrett. The hillfort was almost certainly positioned to be viewed by, and to have a view of, people moving along the river, especially around the natural landing place at Combwich to the north-east.
The majority of Cynwit Castle is heavily overgrown, restricting much of the outlook, though there are specific points that continue to have a wider outlook. From these locations farmsteads, hamlets and small villages can be seen, with the larger nearby village of Cannington being the most prominent to the south-east.

Settlement earthworks (1) lie immediately to the south of Cynwit Castle (Plate 16.3). The Scheduled area has a similar setting to the hillfort in that it is quiet and rural. It lacks the height of the outcrop itself and, due to its location, the views to the monument are predominantly from the south and views from the monument are predominantly oriented southwards.

Plate 16.3: The Scheduled Settlement (1) south of Cynwit Castle Hillfort (2) from the South-east

Blackmore Farm (11) is a medieval manor house that would originally have been positioned within a rural manor estate consisting of agricultural land in the same way that it is currently positioned on farmland. Vehicles using the busy A39 which runs to the north of the house generate noise. To the north-east the trees aligning the A39 are visible, but the road itself is not, and beyond the road lies the village of Cannington. Despite the busy A39, Blackmore Farm retains its rural setting on the outskirts of the village.

The remaining 15 Listed Buildings (3, 4, 6, 8, 18, 19, 21-29) and Conservation Area (Can. Con. Area) are all located within the core of Cannington village. The village is a rural one that has a historic centre with later housing built around the periphery. The traffic along the main road through the village is frequently heavy with traffic with associated noise. Despite this the smaller roads and paths in the village are sheltered from this adding to the rural secluded atmosphere.

h) Previous Impacts

The construction of the 1993 Cannington Bypass which routes the A39 around the south of Cannington would have had a major impact both on any heritage resource
lying along the route and on the historic landscape. No archaeological sites were recorded along the route, but many fields were sub-divided by the new road.

16.5.57 The expansion and development of Cannington as a settlement would have created impacts of a varied size and nature. In most cases this is represented by individual or small-scale house construction or development that may have impacted upon archaeological sites or on extant historical buildings.

16.6 Assessment of Impacts

a) Construction Impacts

16.6.1 This section identifies and assesses the potential effects of the construction phase on the historic environment resource in and around the site. A description of the construction of the proposed development is supplied within Chapter 3 in this volume of the ES.

i. On-site Heritage Assets

16.6.2 Topsoil stripping, site levelling, fencing and vegetation clearance would take place across the site prior to its development. The construction would include further excavation for surface water drainage, a detention pond, and sub-soil disturbance for road access. Invasive developments of this nature impact adversely on any surviving sub-surface archaeological remains.

16.6.3 Desk-based assessment, geophysical survey and subsequent field evaluation (trial trenching) have not revealed the presence of any notable archaeological remains on site. Consequently there would be no impact to buried archaeology.

16.6.4 The portion of the HLC area characterised as ‘Recently enclosed land – 17th to 18th century’ (HLC 5) that lies within the site boundary would be altered, but the established field boundaries would be retained. As this would be a partial loss and the remaining area would not be affected, this would constitute a low magnitude impact to a low importance asset. This would result in the impact being of minor adverse significance.

ii. Off-site Heritage Assets

16.6.5 Heritage assets may be affected not only by a direct physical change, but also by a change to their setting. The setting of a designated site includes elements of the landscape that are of importance to it (Ref. 16.24). ‘Setting’ does not merely relate to views to and from a designated site, but also includes elements that may contribute to the amenity value of a site (Ref. 16.25).

16.6.6 The Iron Age settlement (1) lying to the south-east of the hillfort, and the Iron Age hillfort, Cynwit Castle itself (2) occupy an elevated position, approximately 1.3km to the north-west of the proposal site. The topography of the ridge and the residential properties of Cannington provide screening minimising visual, air quality, lighting and noise impacts from the construction phase. The change to the setting would not be significant and consequently, the magnitude of impact on these assets of high
importance would be very low and temporary. The significance of the impact would therefore be **minor adverse**.

16.6.7 Grade I Listed Blackmore Farmhouse (11) lies beyond the A39 bypass road, outside the study area to the south-west of the site boundary. This building is not visible from the site and it has been assessed that there would be no air quality or noise impact to the setting of the heritage asset from the construction phase, though lighting of the site is likely to be visible. The change to the setting would not be significant and therefore the magnitude of impact is very low and also temporary. As the building is of high importance, the impact to it during the construction phase would therefore be **minor adverse**.

16.6.8 The two Grade I Listed Buildings, Cannington Court (4) and St Mary’s Church (6), within Cannington village are of high importance. They are within a secluded location where there would be no noise or air quality impact, but it would be possible to view the site from the steeple of the church and the construction site would also very slightly affect the rural nature of their setting. Overall the magnitude of the impact to the setting has been assessed as temporary and very low with **minor adverse** significance.

16.6.9 The 13 Grade II Listed Buildings (3, 8, 18, 19, 21-29) and Conservation Area (Can. Con. Area) within the village are also located within the village centre, and have very limited views of the site. They would not be impacted by noise or air quality disturbance, but the presence of the construction site would create a minimal impact to the rural nature of their setting. As the buildings and Conservation Area are of medium importance, this temporary and very low magnitude of impact would be of **minor adverse** significance.

**b) Cumulative Construction Impacts**

16.6.10 There would be no cumulative construction impacts to heritage assets.

**c) Operational Impacts**

16.6.11 This section identifies and assesses the potential effects of the operational phase on the historic environment resource in and around the site. A detailed description of the operation of the proposed development is supplied within **Chapter 4** in this volume of the ES. A summary of the assessment of impacts and their significance is provided in **Table 16.4**.

**i. On-site Heritage Assets**

16.6.12 There are no operational impacts to on-site heritage assets. The part of the HLC area “recently enclosed land 17th to 18th century” (HLC 5) that is on-site would already have been lost during the construction phase and therefore **no impact** would occur during the operational phase.

**ii. Off-site Heritage Assets**

16.6.13 The off-site designated heritage assets would not have any direct impact to them during the operational phase. However their settings would be impacted to a minor
degree by the presence of a temporary park and ride with its associated lighting, noise and air quality issues within their rural environs. This impact would be temporary and of a very low magnitude.

16.6.14 The Iron Age settlement (1), the Cynwit Castle Iron Age hillfort (2), Cannington Court (4), St Mary’s Church (6), and Blackmore farmhouse (11) are all heritage assets of high importance. Therefore the significance of the impact would be **minor adverse**.

16.6.15 The 13 Grade II Listed Buildings (3, 8, 18, 19, 21-29) and Conservation Area (Can. Con. Area) are all of medium importance. The significance of this very low impact would be **minor adverse**.

d) **Cumulative Operational Impacts**

16.6.16 There would be no cumulative operational impacts to heritage assets.

e) **Post-operational Impacts**

16.6.17 During the removal and reinstatement phase, there would be no impacts to on-site heritage assets as the HLC area “recently enclosed land 17th to 18th century” (HLC 5) that is on-site would already have been lost during the construction phase. For off-site heritage assets, impacts would be similar to those for the construction phase and of no greater than **minor adverse** significance.

16.6.18 Once the park and ride has been removed and the site has been restored, the temporary impacts to the setting of the off-site designated heritage assets would cease.

f) **Cumulative Post-operational Impacts**

16.6.19 There would be no cumulative post-operational impacts to heritage assets and therefore post-operational impacts have not been assessed.

16.7 **Mitigation of Impacts**

16.7.1 For the purpose of this assessment, mitigation measures have been proposed where there is an impact of greater than minor adverse significance and are appropriate given their magnitude, spatial scope and temporal nature.

16.7.2 Therefore no direct mitigation relating to the proposed development is considered necessary.

16.8 **Residual Impacts**

a) **Construction Impacts**

16.8.1 Construction impacts relating to heritage assets during the works would be of no greater than minor adverse significance. No mitigation has been proposed and therefore residual impacts are assessed as no greater than minor adverse.
b) Operational Impacts

16.8.2 Operational impacts relating to heritage assets would be of minor adverse significance. No mitigation is proposed and therefore residual impacts are assessed as no greater than minor adverse.

c) Post-operational Impacts

16.8.3 There are no residual impacts associated with the post-operational phase of the proposed development.

16.9 Summary of Impacts

16.9.1 **Table 16.4** provides a summary of assessed impacts prior to mitigation and residual impacts with mitigation in place.

16.9.2 Heritage assets not affected by the works are not considered in this table.
<table>
<thead>
<tr>
<th>ID</th>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Magnitude</th>
<th>Description</th>
<th>Value/Sensitivity</th>
<th>Significance</th>
<th>Proposed Mitigation</th>
<th>Residual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Construction Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HLC 5</td>
<td>On-site Heritage assets: Recently enclosed land 17th to 18th century</td>
<td>Partial loss</td>
<td>Low</td>
<td>Direct Adverse Permanent</td>
<td>Low</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>1</td>
<td>Off-site heritage assets: Iron Age settlement</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>High</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>2</td>
<td>Cynwit Castle, Cannington Camp, Iron Age hillfort</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>High</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>3</td>
<td>Outbuilding</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>4</td>
<td>Cannington Court</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>High</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>6</td>
<td>Church of St. Mary</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>High</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>8</td>
<td>Almshouse</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>11</td>
<td>Blackmore Farmhouse</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>High</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>ID</td>
<td>Receptor</td>
<td>Potential Impact</td>
<td>Magnitude</td>
<td>Description</td>
<td>Value/ Sensitivity</td>
<td>Significance</td>
<td>Proposed Mitigation</td>
<td>Residual Impact</td>
</tr>
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</tr>
<tr>
<td>18</td>
<td>The Red House (No. 28)</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>19</td>
<td>No. 17, High Street</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>21</td>
<td>Ruscombe House</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>22</td>
<td>Court House</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>23</td>
<td>No. 1, Fore Street</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>24</td>
<td>Priory Cottage</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>25</td>
<td>Mulberry Cottage</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>26</td>
<td>Gate Piers and gates</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor adverse</td>
<td>None required</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>27</td>
<td>William Coles monument</td>
<td>Minor change to setting</td>
<td>Very low</td>
<td>Indirect Adverse Temporary</td>
<td>Medium</td>
<td>Minor adverse</td>
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**Operational Phase**

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References

16.1 DCMS. Scheduled Monuments: Identifying, protecting, conserving and investigating nationally important archaeological sites under the Ancient Monuments and Archaeological Areas Act 1979, Department for Culture, Media and Sport, 2010.


16.10 SDC. Sedgemoor District Local Development Framework Core Strategy (Proposed Submission), September 2010.


16.18 AMEC. Hinkley Associated Development, Written Scheme of Investigation: Archaeological Trial Trenching at Cannington, 2010.


16.20 DfT. Transport Assessment Guidance (WebTag) Unit 3.3.9 The Heritage of Historic Resources, Table 2. HMSO, 2003.


16.23 Ordnance Survey, Third Edition County Series, 6 inch to 1 mile, map sheet 38 (revised 1928, surveyed 1885), 1931.


CHAPTER 17: AMENITY AND RECREATION
17. AMENITY AND RECREATION

17.1 Introduction

17.1.1 This chapter of the Environmental Statement (ES) provides an assessment of the potential amenity and recreation impacts associated with the construction, operational and post-operational phases of the proposed Cannington park and ride facility (the proposed development) on land referred to by EDF Energy as the Cannington park and ride site (the site). Detailed descriptions of the site, proposed development, construction, operational and post-operational phases are provided in Chapters 1 to 5 of this volume of the ES.

17.2 Scope and Objectives of Assessment

17.2.1 The scope of the assessment has been determined through a formal Environmental Impact Assessment (EIA) scoping process undertaken with the Infrastructure Planning Commission (IPC). It has also been informed by ongoing consultation with statutory consultees, including Sedgemoor District Council (SDC), Somerset County Council (SCC) and West Somerset Council (WSC), the local community and the general public in response to the Stage 1, Stage 2, Stage 2 Update, Junction 24 and Highway Improvements consultations for the Hinkley Point C Project Development Consent Order (DCO) application.

17.2.2 The assessment of amenity and recreation impacts has been undertaken adopting the methodologies described in Section 17.4 of this chapter.

17.2.3 The existing baseline conditions, against which the likely environmental impacts of the proposed development are assessed, have been determined through desk-based data collation, field surveys and consultation with various sports and recreation organisations, and are described in Section 17.5 of this chapter.

17.2.4 The study area for this assessment is illustrated in Figure 17.1 and comprises:

- the site;
- the surrounding Public Rights of Way (PRoW) network (within a 1km area around the site); and
- the surrounding amenity and recreational resource (within a 1km area around the site).

17.2.5 Section 17.6 of this chapter assesses the potential impacts to amenity and recreation including obstruction to PRoW, sports and recreation facilities, open access land and public open space.

17.2.6 Disturbance to users of PRoW, sports and recreation facilities, open access land and public open space as a result of noise, air quality and visual impacts during the various phases of the development (including construction, operational, and post-operational) is considered in the relevant topic chapters and summarised herein.
17.2.7 The impacts of the construction workforce on amenity and recreation is not considered in this chapter. Chapter 7 (Socio-economics) of this volume of the ES considers impacts of the construction workforce.

17.2.8 Appropriate mitigation measures are presented in Section 17.7 of this chapter. Residual impacts following implementation of these mitigation measures are presented in Section 17.8 of this chapter.

17.2.9 Cumulative impacts to the amenity and recreation resource arising from the proposed development in combination with other elements of the Hinkley Point C Project, and other relevant projects are identified and assessed in Volume 11 of this ES.

17.2.10 The objectives of the assessment were to:

- identify the location and importance of the existing amenity and recreation resource within the study area;
- assess the impacts of the proposed development during the construction, operational, and post-operational phases on the amenity and recreation resource;
- recommend mitigation strategies, if determined necessary, to reduce the impacts of the proposed development on the amenity and recreation resource; and
- assess the residual impacts of the proposed development during the construction, operational and post-operational phases on the amenity and recreation resource, after implementation of the proposed mitigation measures.

17.3 Legislation, Policy and Guidance

17.3.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of potential amenity and recreation impacts associated with the construction, operational and post-operational phases of the proposed development.

17.3.2 As stated in Volume 1, Chapter 4, the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) when combined with the NPS for Nuclear Power Generation (NPS EN-6) provides the primary basis for decisions by the IPC on applications for nuclear power generation developments that fall within the scope of the NPSs. NPS EN-1 Section 5.1 draws attention to the need to identify the impact of nationally significant energy infrastructure on existing land uses near the project including open spaces, green infrastructure and sports and recreation facilities.

17.3.3 In addition, the IPC may consider other matters that are both important and relevant to its decision-making. These could include Planning Policy Statements (PPSs), Planning Policy Guidance Notes (PPGs), regional and local policy documents, although, if there is a conflict between these and the NPS, the NPS prevails for the purposes of IPC decision making.

17.3.4 Further, the Planning Act 2008 provides that the IPC must, in making its decision on an application, have regard to any Local Impact Report (LIR) prepared by relevant local authorities. It is anticipated that the LIRs will rely in part on PPSs, PPGs, regional and local policy to provide a context for their assessment. On this basis, regard has been given to these documents where relevant to the technical assessment which are likely to inform the LIRs prepared by the relevant local authorities.
a) International Legislation

17.3.5 The scope of this assessment is not affected by European or other international legislation.

b) National Legislation

i. The Countryside and Rights of Way (CRoW) Act 2000 (Ref. 17.1)

17.3.6 Part I of the CRoW Act is intended to give greater freedom for people to explore open countryside. It contains provisions to introduce a new statutory right of access for open-air recreation to mountain, moor, heath, down and registered common land. It also includes a power to extend the right to coastal land by order, and enables landowners voluntarily to dedicate irrevocably any land to public access.

17.3.7 Part II of the CRoW Act contains provisions designed to reform and improve rights of way. It introduces measures for the strategic review, planning and reporting of improvements to rights of way, and the promotion of increased access for people with mobility problems. A new category of right of way – restricted byway – having rights for walkers, cyclists, horse riders and horse drawn vehicles, is provided which replaces the previous category of Roads Used as Public Paths. Under Section 69, local authorities are required to have regard to the needs of disabled people when authorising the erection of gates and other barriers across rights of way to control livestock. There is also provision for occupiers of any land to temporarily divert a footpath or bridleway which passes over that land where works are likely to cause danger to users of the right of way.

ii. The Highways Act 1980 (Ref. 17.2)

17.3.8 The statutory provisions for creating, diverting and extinguishing public rights of way are enshrined in the 1980 Act, in order to protect both the public’s rights and the interests of owners and occupiers. The Act also protects the interests of bodies such as statutory undertakers. The requirements for making, confirming and publicising orders are set out in Schedule 6 to the 1980 Act, and include requirements for consulting widely on such changes.

17.3.9 The duty to maintain highways rests with local highway authorities under the 1980 Act, though the authorities may also maintain public rights of way that are not publicly maintainable. Maintenance should be such that ways are capable of meeting the use that is made of them by ordinary traffic at all times of the year (Ref. 17.3), and this can include surfacing.

17.3.10 Under the 1980 Act, landowners are responsible for any structures across the public rights of way, including gates, stiles, and other structures, as well as ensuring that trees, shrubs and hedges do not overhang or obstruct the passage of pedestrians, horse-riders, and vehicles subject to the status of the public right of way.

iii. The Wildlife and Countryside Act 1981 (Ref. 17.4)

17.3.11 In Part III of the Wildlife and Countryside Act 1981 there is a duty on surveying authorities to keep the definitive map and statement under continuous review and to modify the map, for example, if it becomes known to the surveying authority that a right of way, being a public path not shown on the map, subsists over land in the area to which the map relates. It also contains other elements of protection of PRoW,
such as the prohibition against keeping bulls on land crossed by PRoW and the appointment of wardens for PRoW. The Act also includes enactment for making, and confirmation of certain orders creating, extinguishing or diverting footpaths and bridleways.

iv. Equality Act 2010 (Ref. 17.5)

17.3.12 The purpose of the Equality Act 2010 is to harmonise discrimination law and to strengthen the law to support progress on equality. The 2010 Act brings together and re-states domestic discrimination law as contained in a number of pieces of legislation, including the Disability Discrimination Act 1995. The 2010 Act provides that every public authority shall, in carrying out any of its functions, have due regard to the provisions of this Act. It must therefore be taken into account by public authorities when exercising their functions in respect of the provision of public footpaths and other rights of way.

17.3.13 Whilst there are no mandatory specifications laid down in the Equality Act 2010 for structures such as gaps, gates and stiles, the British Standards Institute has developed a comprehensive standard, the current version of which has been published as BS5709:2006 (Ref. 17.6).

c) National Planning Policy

i. Planning Policy Statement 1: Delivering Sustainable Development, (PPS1) 2005 (Ref. 17.7)

17.3.14 PPS1 sets out the Government’s overarching planning policies on the delivery of sustainable development through the planning system.

17.3.15 Paragraph 5 states that planning should facilitate and promote sustainable and inclusive patterns of urban and rural development by, amongst other things: protecting and enhancing the natural and historic environment, the quality and character of the countryside, and existing communities.

ii. Planning Policy Guidance 17: Planning for Open Space, Sport and Recreation, (PPG17) 2002 (Ref. 17.8)

17.3.16 PPG17 sets out the role of the planning system in assessing opportunities and needs for open space, sports and recreation provision in development proposals. It also describes the necessity of safeguarding open space which has recreational value.

17.3.17 Paragraph 10 of PPG17 states that existing open space, sports and recreational buildings and land should not be built on unless an assessment has been undertaken which has clearly shown the open space or the buildings and land to be surplus to requirements.

17.3.18 In respect of planning applications, either within or adjoining open space, paragraph 16 of PPG17 states that local authorities should weigh any benefits being offered to the community against the loss of open space that will occur. It states that planning authorities may wish to allow small scale structures where these would support the existing recreational uses, or would provide facilities for new recreational uses.

17.3.19 Paragraph 32 of PPG17 states that recreational rights of way are an important resource and local authorities should seek opportunities to provide better facilities for
walkers, cyclists and horse-riders (for example by adding links to existing rights of way networks) and to protect and enhance those parts of the rights of way network that might benefit open space.

iii. Consultation Paper on a New Planning Policy Statement – Planning for a Natural and Healthy Environment, 2010 (Ref. 17.9)

17.3.20 In its final form, it is intended that this PPS will replace PPG17. A key objective of this PPS is to bring together related policies on the natural environment and on open space and green spaces in rural and urban areas to ensure that the planning system delivers healthy sustainable communities which adapt to and are resilient to climate change and gives the appropriate level of protection to the natural environment (page 10).

17.3.21 The consultation document explains that the Government continues to support the need to make adequate provision of land and facilities for sport, recreation and children’s play, and intends to maintain the existing policies in PPG17. Local planning authorities will continue to be required to protect from development existing land and facilities unless it can be demonstrated that they are surplus to requirements. Where deficits are identified, local planning authorities should identify opportunities to improve provision either by providing new facilities or by making better use of existing ones (page 11).

d) Regional Planning Policy

17.3.22 The Government’s revocation of regional strategies was quashed in the High Court on 10 November 2010. However, on that same date the Government reiterated in a letter to Chief Planners its intention to revoke regional strategies through the Localism Bill. This letter was also challenged but, on 7 February 2011, the High Court held that the Government's advice to local authorities that the proposed revocation of regional strategies was to be regarded as a material consideration in their planning development control decisions should stand. The decision of the High Court was upheld by the Court of Appeal on 27 May 2011. Therefore, the regional strategies remain in place but in the case of development control decisions it is for planning decision makers to decide on the weight to attach to the strategies (see Volume 1, Chapter 4 for a full summary of the position regarding the status of regional planning policy).

i. Regional Planning Guidance 10 (RPG10) for the South West 2001-2016, 2001 (RPG 10) (Ref. 17.10)

17.3.23 RPG10 sets out the broad development strategy for the period to 2016 and beyond. Policy TCS2 (Culture, Leisure and Sport) states that local authorities and other agencies in their plans, policies and proposals should, amongst other things: identify and protect recreational open spaces and playing fields; identify sites and opportunities for the provision of new cultural, leisure and community sports facilities and ensure that new facilities are readily accessible by sustainable modes of transport.
17.3.24 The draft Revised Regional Spatial Strategy (RSS) looks forward to 2026 and sets out the Government’s policies in relation to the development of land within the region. Policy SD4 (Sustainable Communities) states that growth and development will be planned and managed positively to create and maintain Sustainable Communities throughout the region by, amongst other things, providing networks of accessible green space for people to enjoy.

17.3.25 Policy D (Infrastructure) states that the planning and delivery of development should ensure efficient and effective use of existing infrastructure and should provide for the delivery of new or improved transport, education, health, culture, sports and recreation and green infrastructure in step with development.

17.3.26 The Somerset and Exmoor National Park Joint Structure Plan was adopted in 2000 with relevant policies saved from 27 September 2007. All policies have been saved with the exception of Policy 53 which is unrelated to amenity and recreation impacts. The Plan provides a strategic base for all land use planning within the plan area until 2011.

17.3.27 Policy 38 (Sport and Recreation in the Countryside) states that, outside of settlements, provision may be made for sports and recreation facilities, provided that they are compatible with the amenity, landscape and environment of the area. Additionally, protection should be afforded to land accessible to the public and associated public access routes, including bridleways and green lanes. New developments which would generate substantial transport movements should be accessible by public transport.

17.3.28 Policy 42 (Walking) states that facilities for pedestrians should be improved by maintaining and extending the footpath network, particularly between residential areas, shops, community facilities, workplaces and schools and by ensuring that improvements to the highway provide for safe use.

17.3.29 Somerset’s Future Transport Plan sets out SCC’s long term strategy for delivering the County’s transport priorities for the period between 2011 and 2026.

17.3.30 The document recognises the value of Somerset’s PRoW network and commits to maintain it and to improve the information available for people to use it. The document also states that it will seek to help people make more trips on foot and help people see the benefits of walking.

17.3.31 The SCC Rights of Way Improvement Plan (RoWIP) sets out SCC’s proposals to improve the provision of PRoW in Somerset for walkers, cyclists, equestrians and those with visual or mobility impairments. The RoWIP is based on the following six
key aims which are supported by policy statements and prioritised actions (RoWIP, Section 9):

- raise the strategic profile of the PRoW network;
- improve how the PRoW network is maintained;
- improve how Definitive Map Modification and Public Path Orders are processed;
- improve access information provision;
- work in partnership with key organisations (page 10); and
- develop a safe access network.

17.3.32 The RoWIP recognises that walking is the most popular reason for the general public to visit the countryside in Somerset (page 26).

e) Local Planning Policy


17.3.33 The Sedgemoor District Local Plan forms part of the Development Plan for Sedgemoor. The Local Plan was adopted in 2004 (with relevant policies ‘saved’ from 27 September 2007). The Proposals Map (Inset Map No. 14) indicates that the site is not subject to any specific designations relevant to amenity and recreation impacts. The site is outside of the defined Development Boundary.

17.3.34 There are no relevant saved policies relating to amenity and recreation impacts at the site.

ii. Sedgemoor District Local Development Framework (LDF) Core Strategy (Proposed Submission), September 2010 (Ref. 17.16)

17.3.35 The Sedgemoor LDF Core Strategy (Proposed Submission) was consulted on from September to November 2010. Changes prior to submission proposed as a result of the consultation process were reported and endorsed by the Council’s Executive Committee on 9 February 2011. The Core Strategy (Proposed Submission) was submitted to the Secretary of State on 3 March 2011 and an Examination in Public (EiP) was held in May 2011. Once adopted, the Core Strategy will form part of the Development Plan for Sedgemoor.

17.3.36 EDF Energy submitted representations objecting to the Core Strategy (Proposed Submission), relating to Chapter 4 ‘Major Infrastructure Projects’ (and policies MIP1, MIP2 and MIP3 contained in that chapter) and those sections relating to housing and Hinkley Point. EDF Energy also participated at the relevant EiP hearings. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the Core Strategy.

17.3.37 The following Core Strategy (Proposed Submission) policies are of potential relevance:

17.3.38 Policy S1 (Spatial Strategy for Sedgemoor) states that development proposals will be expected to support the delivery of required infrastructure, including such things as community and cultural facilities and green infrastructure.
17.3.39 Policy S2 (Infrastructure Delivery) states that all new development that generates a demand for infrastructure will only be permitted if the necessary on and off-site infrastructure required to support and mitigate the impact of the development site is either already in place or there is a reliable mechanism to in place to ensure that it will be delivered at the time and in the location it is required.

17.3.40 Policy S3 (Sustainable Development Principles) states that development proposals will be expected to, amongst other things, promote greater self containment of settlements by contributing to communities that are supported by adequate services, cultural, sporting and leisure activities.

17.3.41 Policy D2 (Promoting High Quality and Inclusive Design) states, amongst other things, that development will need to demonstrate high quality, sustainable and inclusive design that responds positively to the characteristics of the site and surrounding area.

17.3.42 Policy D10 (Managing the Transport Impacts of Development) states that development proposals that will have significant transport impacts should, amongst other things, not reduce the convenience and safety of existing rights-of-way, bridle paths and cycle paths, unless suitable alternative routes are provided.

17.3.43 Policy D16 (Pollution Impacts of Development and Protecting Residential Amenity) states, amongst other things, that development proposals that would result in the loss of land of recreational and/ or amenity value will not be supported.

17.3.44 Policy D19 (Healthy Lifestyles) states that development proposals, where appropriate, should promote healthy and active living. Proposals which promote the following will be supported: walking and cycling; accessibility of green spaces and contributing to enhancing the green infrastructure network; enhancement of the quality and quantity of recreational, sport and leisure facilities and children’s play space and access to them.

17.3.45 Policy D20 (Green Infrastructure) states that green infrastructure will be safeguarded, maintained, improved, enhanced and added to, as appropriate, to form a multi-functional resource which, amongst other things, provides an accessible network of green spaces which meet recreational needs, cultural needs including education and interpretation, are safe and secure, and support physical health and mental wellbeing.

17.3.46 Policy D20 goes on to state that development should include green infrastructure of an appropriate type, standard and size, and make appropriate provision for future maintenance. Where on-site provision is not possible, contributions will be sought for appropriate off-site provision. Furthermore, if loss of existing green infrastructure assets is unavoidable in order to accommodate necessary development, appropriate mitigation of the loss will be required.

iii. Supplementary Planning Guidance

17.3.47 Sedgemoor District Council and West Somerset Council have jointly prepared draft supplementary planning guidance in relation to the HPC Project. Public consultation on the Consultation Draft version of the Hinkley Point C Project Supplementary Planning Document (the draft HPC SPD) commenced on 1 March 2011 and concluded on 12 April 2011. EDF Energy has submitted representations which
object to the draft HPC SPD. See Volume 1, Chapter 4 for a full summary of the position regarding the status of the draft HPC SPD.

17.3.48 In relation to PRoW, Box 16 in the draft HPC SPD states that strategic enhancements and maintenance of the PRoW network, which provides links between attractions and points of interest, should be undertaken to mitigate and compensate for cumulative obstruction and disturbance impacts (page 31).

17.3.49 With regards to the approach to Cannington Park & Ride, Box 32 in the draft HPC SPD states that, should the need for a Park and Ride be demonstrated, criteria and guidance will apply which include, amongst other things that:

“A safe and secure pedestrian/cycle route connection to the village centre is secured.

Legacy options are considered with Cannington Parish Council, to meet local needs, and as an integral part of the long term development of the village and the wider area.”

17.3.50 The draft HPC SPD also lists potential legacy use options which the Council’s would like to be considered, which include “enhanced public rights of way” (page 72).

17.3.51 The draft HPC SPD also states that the Hinkley Point C Promoter should produce a Master Plan which should address a number of criteria which include, amongst other things (page 72):

“Development should seek to enhance the Public Rights of Way Network, providing higher quality cycling and walking links between locations including the village centre, Park and Ride, Brymore School, Yeo Valley site.”

17.3.52 Further planning policy context is provided in the Introduction chapter (Volume 6, Chapter 1) and Legislative Planning Policy Context chapter (Volume 1, Chapter 4).

17.4 Methodology

17.4.1 The assessment and all supporting surveys have been undertaken in accordance with the relevant EIA Directive, regulations, and various guidance documents as identified in Volume 1, Chapter 7, in particular the Guidelines for Environmental Impact Assessment (Ref. 17.17). The methodology and criteria adopted for the assessment is described in detail in Volume 1, Chapter 7.

a) Study Area

17.4.2 The geographical extent of the study area for the purposes of this assessment includes the site itself and a 1km area around the site, to ensure that the implications of the proposed development on the wider amenity and recreation resource are identified.

17.4.3 The study area is illustrated in Figure 17.1.
b) Baseline Assessment

17.4.4 Baseline environmental characteristics for the development site and study area with specific reference to amenity and recreation were identified through:

- A Recreational Access Survey, carried out in April 2010 (see Appendix 17A, Volume 6). The survey entailed counts of users of PRoW, both within and outside of the school holiday period, covering the PRoW that run immediately adjacent to the site boundary (see Table 17.4). A questionnaire survey was also undertaken as part of this exercise to gain an understanding of the patterns of use of the PRoW.

- A review of existing information, including Ordnance Survey (OS) maps and relevant websites (Ref. 17.18, 17.19, 17.20, 17.21, 17.22, 17.23, and 17.24) carried out in March 2010.

- A site walkover survey carried out on 10 June 2009 and 15 October 2009.

- Consultation with appropriate statutory consultees and non-statutory consultees including SCC’s Rights of Way Team, the Ramblers Association, users of the local PRoW network, and local sports and recreation facilities that may be affected by, or have an interest in, the proposed development.

c) Consultation

17.4.5 Consultation has been undertaken throughout the EIA process and further information may be found in the Consultation Report. A number of meetings were held with SCC’s Rights of Way Officers between November 2009 and September 2011, in which discussions centred on recreational use of PRoW, the likely impacts of PRoW diversions/closures, and potential mitigation measures for any impacts. Consultation has also been undertaken with:

- the Ramblers Association (meetings held on 25 January 2010 and 13 September 2011), though the earlier meeting did not specifically focus on the proposed works at Cannington due to the limited number of PRoW in the study area; and

- users of the PRoW network (members of the public), through the Recreational Access Survey carried out in April 2010.

d) Assessment Methodology

17.4.6 Volume 1, Chapter 7 of this ES describes the assessment methodology for this EIA. In addition the following specific methodology was applied for the determination of receptor value and sensitivity (see Table 17.1) and impact magnitude (see Table 17.2).

i. Value and Sensitivity

17.4.7 All of the amenity and recreation receptors that may be impacted by the proposed development have been assigned a level of importance in accordance with those definitions set out in Volume 1, Chapter 7 and the Institute of Environmental Management and Assessment (IEMA) guidelines (Ref. 17.17). The value or potential value of a receptor is a function of a variety of factors (including community value or whether it is designated) and can be determined within a defined geographical context.
17.4.8 The sensitivity of an amenity or recreation facility/receptor is defined by its ability to continue to function and or maintain its intrinsic value subject to any change caused by a development and its related activities. Sensitivity is therefore a function of the nature of the amenity or recreation receptor and its current environmental setting. It is also the case that each amenity or recreation receptor will have different sensitivities to differing types of impacts. Hence the nature of direct and indirect impacts is also an important factor in the assessment.

17.4.9 Determination of the sensitivity of an amenity or recreation receptor is based on two basic analyses:

- could the activity or any aspect of the development fundamentally affect the use and function of a facility/receptor? (e.g. obstructing a public right of way or obstructing areas used for formal recreational activities such as angling and wildfowling); and

- could the activity or any aspect of the development significantly reduce the enjoyment of the users of the facility/receptor? (e.g. through visual intrusion in what was an area of open countryside or though increased noise levels in previously quiet and peaceful areas).

17.4.10 In order to help define the importance of relevant receptors, the guidance provided in Table 17.1 has been adopted for the purposes of the evaluation of amenity and recreation assets.

Table 17.1: Criteria Used to Determine Importance

<table>
<thead>
<tr>
<th>Importance/Sensitivity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Feature/receptor possesses key characteristics which contribute significantly to the distinctiveness and character of the site, e.g. PRoW of national significance such as the West Somerset Coast Path, and receptor is identified as having very low capacity to accommodate proposed form of change (i.e. is very highly sensitive). Feature/receptor possesses very significant social/community value. Feature/receptor is extremely rare.</td>
</tr>
<tr>
<td>Medium</td>
<td>Feature/receptor possesses key characteristics which contribute to the distinctiveness and character of the site, e.g. PRoW of regional significance, and receptor is identified as having low capacity to accommodate proposed form of change (i.e. is moderately sensitive). Feature/receptor possesses significant social/community value. Feature/receptor is rare.</td>
</tr>
<tr>
<td>Low</td>
<td>Feature/receptor only possesses characteristics which are locally significant e.g. local PRoW network. Feature/receptor not designated or only designated at a local level. Feature/receptor identified as having some tolerance of the proposed change subject to design and mitigation (i.e. is of low sensitivity). Feature/receptor possesses moderate social/community value. Feature/receptor is relatively common.</td>
</tr>
<tr>
<td>Very low</td>
<td>Feature/receptor characteristics do not make a significant contribution to the character or distinctiveness of the site and surroundings at a local scale. Feature/receptor not designated. Feature/receptor identified as being generally tolerant of the proposed change (i.e. of very low sensitivity). Feature/receptor possesses low social/community value. Feature/receptor is common.</td>
</tr>
</tbody>
</table>
ii. Magnitude

17.4.11 The magnitude of impact has been based on the consequences that the proposed development would have upon the amenity and recreation resource and has been considered in terms of high, medium, low and very low (see Table 17.2). Potential impacts have been considered in terms of permanent or temporary, adverse (negative) or beneficial (positive) and cumulative.

17.4.12 Where an impact could reasonably be placed within more than one magnitude rating, conservative professional judgement has been used to determine which rating would be applicable.

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Significant, permanent loss or obstruction/irreversible changes to key characteristics, features or the function of amenity and recreational assets. Impact may occur over the whole asset. Impact certain or likely to occur.</td>
</tr>
<tr>
<td>Medium</td>
<td>Obstruction or change to key characteristics, features or the function of amenity and recreational assets in the medium term. Impact may occur over the majority of the asset. Impact likely to occur.</td>
</tr>
<tr>
<td>Low</td>
<td>Noticeable but not significant obstruction or change (temporary/potentially reversible), over a part of the asset, to key characteristics, features or the function of amenity and recreational assets in the short-term. Impact possibly would occur.</td>
</tr>
<tr>
<td>Very low</td>
<td>Barely discernible obstruction or changes over a small area, to key characteristics, features or the functions of amenity and recreational assets, which are infrequent or temporary. Impact unlikely to occur.</td>
</tr>
</tbody>
</table>

iii. Significance of Impacts

17.4.13 The significance of the impact is judged on the relationship of the magnitude of impact to the assessed sensitivity and/or importance of the resource. The methodology for assessing predicted significance of the impacts, without mitigation, is outlined in Volume 1, Chapter 7.

17.4.14 For the purpose of this assessment, mitigation measures have been proposed where there is an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so.

iv. Cumulative Impacts

17.4.15 The cumulative influence of changes on the amenity and recreational resource, together with noise, air quality and visual related disturbance, on local communities and users cannot be assessed objectively for the reasons set out in Volume 11 of this ES. That is, there is no established EIA methodology for assessing the interactive or combined impact of ‘change’ or ‘disturbance’ (e.g. the combined effect of increased noise and dust) on human receptors and quality of life. Human receptors tend to respond to different potential disturbances in many different ways and to varying degrees, which typically reflect personal perception and valuation of the relevant amenity and recreation resource. Therefore combined responses cannot be assessed; however, direct cumulative impacts on amenity and recreation are assessed in Volume 11 of this ES.
e) Limitations, Constraints and Assumptions

17.4.16 The assessment does not examine the impact of the construction workforce on the amenity and recreation provision within the study area. Impact of the construction workforce is addressed in Chapter 7 of this volume.

17.4.17 Given the existing volume of traffic on the A39 along the southern boundary of the site, the potential for traffic disturbance (noise, air quality, visual and severance impacts) to users of PRoW, sports and recreation facilities, open access land and public open space has not been assessed.

17.4.18 The assessment of disturbance to users of amenity and recreation assets that may arise from noise, air quality visual impacts is examined, where relevant, in the topic chapters (Chapters 9, 10 and 15 of this volume). This chapter only provides a summary of the disturbance impacts. Sensitivity of receptors and the criteria used in each disturbance assessment is also presented in the relevant environmental topic chapter.

17.5 Baseline Environmental Characteristics

a) Introduction

17.5.1 This section of the ES presents the baseline environmental characteristics for the site and the study area.

b) Study Area Description

17.5.2 The study area is centred to the south-west of Cannington, Somerset and is shown in Figure 17.1.

17.5.3 The site covers an area of 5.2ha. It is bounded to the immediate south by the A39 and to the north, east and west by agricultural land. The site is currently used for agricultural purposes, largely comprising a single, closely grazed grassland field. The closest residential properties to the site are on Mill Close, approximately 160m to the north of the site, and on Oak Tree Way and Brownings Road approximately 250m to the east of the site.

i. Public Rights of Way

17.5.4 Figure 17.1 shows the location and extent of the PRoW within the study area. Two PRoW, BW5/22 and BW5/24, are located partially within the site boundary.

17.5.5 PRoW BW5/22 runs just inside the western site boundary while PRoW BW5/24 is located to the east of the site and cuts through the access strip to the eastern hedgerow planting and a small section of the south east of the site.

17.5.6 In addition, PRoW BW5/25, BW5/26 and BW5/27 are located close to the site boundary but remain outside the site. All PRoW located within a 1km area of the site are listed in Table 17.3, with their distance from the site boundary identified.
Table 17.3: PRoW within the Cannington Park and Ride Study Area

<table>
<thead>
<tr>
<th>PRoW Number (SCC) and Distance from Site Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>BW5/1 – 270m</td>
</tr>
<tr>
<td>BW5/2 – 240m</td>
</tr>
<tr>
<td>BW5/3 – 400m</td>
</tr>
<tr>
<td>BW5/4 – 830m</td>
</tr>
<tr>
<td>BW5/5 – 750m</td>
</tr>
<tr>
<td>BW5/5A – 580m</td>
</tr>
<tr>
<td>BW5/8 – 620m</td>
</tr>
<tr>
<td>BW5/12 – 830m</td>
</tr>
<tr>
<td>BW5/14 – 480m</td>
</tr>
<tr>
<td>BW5/15 – 340m</td>
</tr>
<tr>
<td>BW5/16 – 400m</td>
</tr>
<tr>
<td>BW5/20 – 450m</td>
</tr>
<tr>
<td>BW5/22 – partially within the site</td>
</tr>
<tr>
<td>BW5/23 – 30m</td>
</tr>
<tr>
<td>BW5/24 – partially within the site</td>
</tr>
<tr>
<td>BW5/25 – 110m</td>
</tr>
<tr>
<td>BW5/26 – 110m</td>
</tr>
<tr>
<td>BW5/27 – 5m</td>
</tr>
<tr>
<td>BW5/28 – 800m</td>
</tr>
<tr>
<td>BW5/32 – 360m</td>
</tr>
<tr>
<td>BW5/33 – 420m</td>
</tr>
<tr>
<td>BW5/34 – 810m</td>
</tr>
<tr>
<td>BW7/8 – 570m</td>
</tr>
</tbody>
</table>


17.5.7 There are approximately 12.8km of PRoW within the study area, with an average length for each PRoW sector (i.e. between the start and any connecting link with another footpath) of around 550m. There are no bridleways or restricted byways within the study area.

17.5.8 The views from the PRoW adjacent to the site are limited by hedgerows, trees and residential buildings to the north and east (see Plate 17.1 and Plate 17.2), whilst there are direct views of the site from the PRoW within the site boundary, particularly the PRoW along the western boundary (BW5/22).

Plate 17.1: Looking north to Cannington from the north-west end of the site
17.5.9 The PRoW within the study area comprise a locally important network of footpaths, providing connections to a large number of surrounding settlements. They are sensitive to obstruction that would prevent their use.

ii. Public Rights of Way Survey

17.5.10 The aim of the survey was to obtain information regarding recreational use of the PRoW within and in the vicinity of the site. The survey involved counts of footpath users and use of a questionnaire (see Appendix 17A for further details and the survey results) from a location at the junction of PRoW BW5/24, BW5/26, and BW5/27. This survey also recorded users of BW5/22 which joins with BW5/27 at the northern corner of the site.

17.5.11 The survey methodology incorporated the following:

- counts of footpath users were undertaken during daylight hours between the times of 07:00 and 19:00;
- counts of footpath users were undertaken during and after the school (Easter) holidays, on a weekday as well as on a weekend, for a total of four days; and
- footpath users completed a questionnaire during the counts.

17.5.12 A variety of data was recorded during the surveys based on the questionnaire completion, including:

- whether people arrived by vehicle or on foot, as well as numbers and typical age range;
- recreational activity type (e.g. walking, dog-walking, cycling, going fishing);
- whether people return along the same footpath or whether they travel in a circular route;
- the frequency and extent of use of the footpath; and
- the weather conditions.
17.5.13 The surveys were carried out on the following dates:

- Wednesday 7 April 2010;
- Sunday 11 April 2010;
- Thursday 22 April 2010; and

17.5.14 All completed count and survey sheets along with further details of the survey are presented in Appendix 17A.

17.5.15 In total, 24 people were counted using the footpaths over the four days, of whom 19 (or 79%) completed the questionnaire individually or as a group, with a total of 11 completed questionnaire forms. Plate 17.3 presents the timing of user numbers on the footpath. The collated data from the questionnaire surveys is detailed in Appendix 17A and summarised below.

Plate 17.3: Average total hourly footpath counts over the survey period

<table>
<thead>
<tr>
<th>Hour</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0700 - 0800</td>
<td>1</td>
</tr>
<tr>
<td>0800 - 0900</td>
<td>5</td>
</tr>
<tr>
<td>0900 - 1000</td>
<td>6</td>
</tr>
<tr>
<td>1000 - 1100</td>
<td>5</td>
</tr>
<tr>
<td>1100 - 1200</td>
<td>1</td>
</tr>
<tr>
<td>1200 - 1300</td>
<td>2</td>
</tr>
<tr>
<td>1300 - 1400</td>
<td>3</td>
</tr>
<tr>
<td>1400 - 1500</td>
<td>5</td>
</tr>
<tr>
<td>1500 - 1600</td>
<td>1</td>
</tr>
<tr>
<td>1600 - 1700</td>
<td>4</td>
</tr>
<tr>
<td>1700 - 1800</td>
<td>1</td>
</tr>
<tr>
<td>1800 - 1900</td>
<td>2</td>
</tr>
</tbody>
</table>

17.5.16 The findings of the questionnaire survey were:

- all of the those surveyed live within 560m of the site, mainly in Cannington;
- all of those surveyed walked to the site and reached the footpath within 15 minutes;
- dog walkers accounted for just over a quarter (26%) of those surveyed, the remainder (74%) were walkers;
most of those surveyed walked frequently, around five times a week on average, whilst those using the footpaths closest to the site used them between two and three times a week;

those surveyed were expecting to spend an average of 50 minutes outdoors, with duration outdoors ranging from 20 minutes to over 90 minutes;

the majority (89%) surveyed intended to follow a circular route, whilst the remainder returned the same way;

the main reasons for choosing the route were (with those surveyed being able to choose as many as applied): convenience (100%), views (74%), not many people (68%), wildlife (42%), safety (26%), and being able to let dogs off their leads (21%);

the most desirable characteristics of a footpath for those surveyed were (with those surveyed being able to choose as many as applied): peace and quiet (89%), good views (79%), close to home (79%), well marked footpaths (74%), connections to other footpaths (53%) and far from the roads (53%);

the vast majority (89%) of those surveyed were over 30 years of age, with 84% over 45 years of age, and nearly half (47%) over 60 years of age;

just under half (47%) of those surveyed were in full-time employment, with 16% in part-time employment, and the remaining 37% were retired;

the average number in a household of those surveyed was 1.3, with few or no dependents; and

of those surveyed a small majority were male (53%), with 64% of those surveyed in groups rather than alone, and the average group comprising mixed pairs.

iii. Equestrians

17.5.17 There is no provision for equestrians (bridleways or restricted byways) within the site or within the study area.

iv. Cyclists

17.5.18 There is no provision for cyclists in the form of byways, bridleways, or cycle paths within the site or study area.


17.5.19 A search of the Sport England Active Places database (Ref. 17.19) indicated that the following sports and recreation facilities lie within the study area:

- Brymore School (Site 16 on Figure 17.1) – located approximately 600m west of the site, on land to the west of Cannington. Brymore School’s facilities include an outdoor swimming pool, sports pitches, a walled fruit and vegetable garden, a workshop and a farm.

- Bridgwater College (Site 19 on Figure 17.1) – sports and recreation facilities including golfing and horse riding facilities located on land to the north-east of Cannington, approximately 600m north-east of the site, and sports pitches
accessed via Park Lane at the northern extent of the village, also approximately 600m north of the site boundary.

- Cannington Church of England Primary School (Site 18 on Figure 17.1) – located towards the centre of the village, approximately 400m north-east of the site.
- Cannington Cemetery (Site 15 on Figure 17.1) – located approximately 300m north of the site, on land to the west of Cannington.
- Cannington Grange (Site 17 on Figure 17.1) – a private estate located approximately 250m south-east of the site. The estate has been divided into a series of cottages and apartments for letting purposes and provides a range of recreational facilities, including tennis, badminton and fishing.

17.5.20 A search of the Natural England Common Rights of Way (CRoW) database (Ref. 17.20) indicated that there are no areas of open access land in the study area.

17.5.21 There are a number of areas of public open space, predominantly amenity grassland, located within the study area, as shown on Figure 17.1 which are:

- two areas of amenity grassland on Oak Tree Way (Site 77 and 78 on Figure 17.1) – located 200m to 220m east of the development site;
- an area of amenity grassland on Teals Acre (Site 74 on Figure 17.1) – located 280m east of the development site;
- an area of amenity grassland adjacent to Denmans Lane (Site 73 on Figure 17.1) – located 360m north-east of the development site;
- an area of amenity grassland situated between Brooks Street and Main Road (Site 72 on Figure 17.1) – located 390m north-east of the development site;
- St Mary the Virgin Churchyard (Site 69 on Figure 17.1) – located 380m north-east of the development site;
- an area of amenity grassland on Church Street (Site 68 on Figure 17.1) – located 350m north-east of the development site;
- Cannington Walled Garden (Site 84 on Figure 17.1) – located 400m north of the site;
- Cannington Play Area adjacent to Main Road (Site 70 on Figure 17.1) – located 430m north-east of the development site;
- an area of amenity grassland on Rydon Crescent (Site 75 on Figure 17.1) – located 300m east of the development site;
- an area of amenity grassland on Southbrook Crescent (Site 76 on Figure 17.1) – located 260m east of the development site;
- two areas of amenity grassland on Lonsdale Road (Site 80 and 81 on Figure 17.1) – located 350m to 400m east of the development site;
- an area of amenity grassland on Southbrook Close (Site 79 on Figure 17.1) – located 490m north-east of the development site;
- an area of amenity grassland on Duke Avenue (Site 71 on Figure 17.1) – located 550m north-east of the development site;
• allotments north of East Street (Site 82 on Figure 17.1) – located 710m north-east of the development site; and
• an area of amenity grassland adjacent to Folly Close (Site 67 on Figure 17.1) – located 650m north-east of the development site.

17.6 Assessment of Impacts

a) Introduction

17.6.1 This section identifies and assesses the potential impacts associated with the proposed Cannington park and ride facility throughout its construction, operational, and post-operational phases. A description of these phases is presented in Chapters 3, 4 and 5 of this volume.

b) Construction Phase Impacts

i. Obstruction to Public Rights of Way

17.6.2 Two PRoW, BW5/22 and BW5/24, run partially within the site boundary. However, there would be no construction works on the routes of the PRoW and therefore no obstruction would occur. Consequently, there would be no impact.

ii. Disturbance to Users of Public Rights of Way

17.6.3 The construction works could result in disturbance impacts to PRoW in the study area for up to 11 months. These impacts are considered, where relevant, in Chapters 9, 10, and 15 of this volume and are summarised below.

17.6.4 Chapter 9, Noise and Vibration, identifies PRoW BW5/22, BW5/23, BW5/24, BW5/26, and BW5/27 as the key sensitive receptors, given their proximity to construction activities.

17.6.5 A temporary minor to moderate adverse impact is predicted on the lengths of PRoW closest to the site boundary, with the highest magnitude of impact predicted closest to the construction noise source.

17.6.6 However, people using the PRoW would usually be transient and are, therefore, unlikely to be subject to the same exposure duration as defined for fixed property receptor locations on which the assessment is based. Hence, whilst the predicted noise levels might result in short-term disturbance as walkers pass near to the site, the impact on a person’s enjoyment of the amenity is likely to be less significant than has been assessed.

17.6.7 Chapter 10, Air Quality, considers that the sensitivity of users of PRoW to air quality impacts is low because adverse health impacts are not expected due to the transient short-term exposure to potentially elevated air pollutant concentrations. For this reason air quality impacts upon users of PRoW are scoped out of the Air Quality assessment and consequently from the remainder of this Amenity and Recreation assessment.

17.6.8 Chapter 15, Landscape and Visual, identifies that visual receptors which may be affected by the proposed development include PRoW users between the edge of
Cannington and the site, PRoW users between the site and High Street and the A39 and PRoW users on the higher levels on Woodcock Downs to the south of the site.

17.6.9 The chapter considers impacts on PRoW in terms of reduction in landscape quality and in terms of visual impacts on specific viewpoints, along BW5/22 (Viewpoints 3, 4 and 5), BW7/4 (Viewpoint 8) and BW5/17 (Viewpoint 9).

17.6.10 Impacts on PRoW in terms of reduction in landscape quality are predicted to be moderate adverse while impacts on the viewpoints set out above are predicted to be major adverse on Viewpoints 3, 4, and 5 (BW5/22) and minor adverse on Viewpoints 8 and 9 (BW7/4 and BW5/17).

17.6.11 However, as for the noise assessment above, people using the PRoW would usually be transient and are, therefore, unlikely to be subject to the same exposure duration as defined for fixed receptor locations on which the assessment is based. Hence, whilst the predicted visual impacts might result in short-term disturbance as walkers pass through the zone of influence, the impact on a person’s enjoyment of the amenity is likely to be less significant than has been assessed.

iii. Obstruction to Sports and Recreation Facilities

17.6.12 There are no formal sports and recreation facilities within the site of the proposed development and no physical disturbance or obstruction (either to extent, facilities or access) would occur. Therefore, no impact is predicted.

iv. Disturbance to Users of Sports and Recreation Facilities

17.6.13 As for PRoW, the construction works could result in disturbance impacts to users of sports and recreation facilities in the study area for up to 11 months.

17.6.14 Chapter 9, Noise and Vibration, identifies the Grange (Site 17 on Figure 17.1) and Cannington Primary School playground (Site 18 on Figure 17.1) as the key sensitive receptors, given their proximity (250m and 400m respectively) to construction activities. However, these are considered to be sufficiently distant from the works such that impacts as a result of construction noise are unlikely to be significant.

17.6.15 Chapter 10, Air Quality, does not identify any sports and recreation facilities as sensitive receptors due to the distance of receptors from the site. For this reason air quality impacts upon users of sports and recreation facilities are scoped out of the Air Quality assessment and consequently from the remainder of this assessment.

17.6.16 Chapter 15, Landscape and Visual, does not identify any sports and recreation facilities as sensitive receptors as there are no facilities within the zone of influence. For this reason visual impacts upon users of sports and recreation facilities are scoped out of the Landscape and Visual assessment and consequently from the remainder of this assessment.

v. Obstruction to Open Access Land and Public Open Space

17.6.17 No open access land or public open space is located within the site of the proposed development and no physical disturbance or obstruction (either to extent, facilities or access) would occur. Therefore, no impact is predicted.
vi. Disturbance to Users of Open Access Land and Public Open Space

17.6.18 The construction works could result in disturbance impacts to users of open access land and public open space in the study area for up to 11 months. These impacts are considered, where relevant, in Chapters 9, 10, and 15 of this volume and are summarised below.

17.6.19 **Chapter 9, Noise and Vibration**, identifies the amenity grassland on the west side of Oak Tree Way (Sites 77 and 78 on Figure 17.1) as the key sensitive receptor, given its proximity to construction activities.

17.6.20 However as this is over 250m from the site boundary and benefits from acoustic screening by properties on Oak Tree Way, it is not considered that impacts as a result of construction noise would be significant. Open access land and public open space receptors are scoped out of the remainder of the Noise and Vibration assessment and consequently this assessment.

17.6.21 **Chapter 10, Air Quality**, does not identify any area of open access land or public open space as a sensitive receptor due to the distance of receptors from the site. For this reason air quality impacts upon users of open access land and public open space are scoped out of the Air Quality assessment and consequently from the remainder of this assessment.

17.6.22 **Chapter 15, Landscape and Visual**, also does not identify any area of open access land or public open space as a sensitive receptor, as all the receptors are screened by existing structures / buildings or by vegetation. For this reason visual impacts upon users of open access land and public open space are scoped out of the Landscape and Visual assessment and consequently from the remainder of this assessment.

c) Operational Phase Impacts

i. Obstruction to Public Rights of Way

17.6.23 Neither of the PRoW (BW5/22 and BW5/24) would be obstructed by the operational footprint of the park and ride facility or its activities. Consequently, there would be no impact arising from obstruction.

ii. Disturbance to Users of Public Rights of Way

17.6.24 The operational phase of the proposed development could result in disturbance impacts to users of PRoW in the study area for up to eight years. These impacts are considered, where relevant, in Chapters 9, 10, and 15 of this volume and are summarised below.

17.6.25 **Chapter 9, Noise and Vibration**, has scoped out impacts on PRoW during the operational phase due to the transient nature of walkers passing the site and the times of day when significant noise impacts are likely to occur.

17.6.26 **Chapter 10, Air Quality**, has scoped out disturbance impacts to PRoW (see Construction Phase above).

17.6.27 **Chapter 15, Landscape and Visual**, has predicted that the impact on PRoW in terms of reduction in landscape quality would be moderate adverse while impacts on the
viewpoints described in the Construction Phase section above are predicted to be major adverse on Viewpoints 3 and 4, moderate adverse on Viewpoint 5 (all BW5/22) and minor adverse on Viewpoints 8 and 9 (BW7/4 and BW5/17).

17.6.28 However, as for the construction phase assessment above, people using the PRoW would usually be transient and are, therefore, unlikely to be subject to the same exposure duration as defined for fixed receptor locations on which the assessment is based. Hence, whilst the predicted visual impacts might result in short-term disturbance as walkers pass near to the site, the impact on a person’s enjoyment of the amenity is likely to be less significant than has been assessed.

iii. Obstruction to Sports and Recreation Facilities

17.6.29 There are no formal sports and recreation facilities within the site. Therefore no physical disturbance or obstruction (either to extent, facilities, or access) would occur and no impact is predicted.

iv. Disturbance to Users of Sports and Recreation Facilities

17.6.30 Chapter 9, Noise and Vibration, has scoped out sports and recreational facilities for the operational phase.

17.6.31 Chapter 10, Air Quality, and Chapter 15, Landscape and Visual have scoped out sports and recreation facilities (see Construction Phase above).

v. Obstruction to Open Access Land and Public Open Space

17.6.32 The proposed development would not result in any physical disturbance or obstruction (either to extent, facilities, or access) to any open access land or public open space. Therefore, no impact is predicted.

vi. Disturbance to Users of Open Access Land and Public Open Space

17.6.33 Disturbance impacts to open access land and public open space have been scoped out of the assessment (see Construction Phase above).

d) Post-operational Phase Impacts

i. Obstruction to Public Rights of Way

17.6.34 Neither of the PRoW (BW5/22 and BW5/24) would be obstructed by the post-operational phase works. Consequently, there would be no impact arising from obstruction.

ii. Disturbance to Users of Public Rights of Way

17.6.35 The post-operational phase of the proposed development could result in disturbance impacts to users of PRoW in the study area for up to 12 months. These impacts are considered, where relevant, in Chapters 9, 10, and 15 of this volume and are summarised below.

17.6.36 Chapter 9, Noise and Vibration, identifies PRoW BW5/22, BW5/23, BW5/24, BW5/26, and BW5/27 as the key sensitive receptors, given their proximity to construction activities.
17.6.37 A temporary minor to moderate adverse impact is predicted on the lengths of PRoW closest to the site boundary, with the highest magnitude of impact predicted closest to the noise source.

17.6.38 However, people using the PRoW would usually be transient and are, therefore, unlikely to be subject to the same exposure duration as defined for fixed property receptor locations on which the assessment is based. Hence, whilst the predicted noise levels might result in short-term disturbance as walkers pass near to the site, the impact on a person’s enjoyment of the amenity is likely to be less significant than has been assessed.

17.6.39 Chapter 10, Air Quality, has scoped out disturbance impacts to PRoW (see Construction Phase above).

17.6.40 Chapter 15, Landscape and Visual, has predicted that the impact on PRoW in terms of reduction in landscape quality would be moderate adverse while impacts on the viewpoints described in the Construction Phase section above are predicted to be major adverse on Viewpoints 3 and 4, moderate adverse on Viewpoint 5 (all BW5/22) and minor adverse on Viewpoints 8 and 9 (BW7/4 and BW5/17) during the post-operational phase.

17.6.41 However, as for the noise assessment above, people using the PRoW would usually be transient and are, therefore, unlikely to be subject to the same exposure duration as defined for fixed receptor locations on which the assessment is based. Hence, whilst the predicted visual impacts might result in short-term disturbance as walkers pass near to the site, the impact on a person’s enjoyment of the amenity is likely to be less significant than has been assessed.

17.6.42 Once the site has been restored to its final post-operational condition, that is, back to agricultural use, visual impacts would reduce to negligible significance.

iii. Obstruction to Sports and Recreation Facilities

17.6.43 There are no formal sports and recreation facilities within the site, and no physical disturbance or obstruction (either to extent, facilities, or access) would occur during the post-operational phase. Therefore, no impact is predicted.

iv. Disturbance to Users of Sports and Recreation Facilities

17.6.44 Chapter 9, Noise and Vibration, has scoped out sports and recreational facilities for the operational phase.

17.6.45 Chapter 10, Air Quality, and Chapter 15, Landscape and Visual, have scoped out sports and recreation facilities (see Construction Phase above).

v. Obstruction to Open Access Land and Public Open Space

17.6.46 The post-operational phase activities would result in no obstruction to any open access land or public open space. Therefore, no impact is predicted.

vi. Disturbance to Users of Open Access Land and Public Open Space

17.6.47 Disturbance impacts to open access land and public open space have been scoped out of the assessment (see Construction Phase above).
17.7 Mitigation of Impacts

17.7.1 This section identifies specific mitigation measures in order to avoid, minimise or offset any significant adverse impacts associated with the proposed development throughout its construction, operational, and post-operational phases.

17.7.2 For the purpose of this assessment, mitigation measures have been proposed where there is an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so.

17.7.3 No mitigation has been proposed over and above that inherent in the scheme design. Landscaping, vegetation planting and grassed spoil bunds are proposed around the perimeter of the site in order to provide screening to the PRoW along and outside the site boundary, specifically PRoW BW5/22.

17.7.4 Replacement of a stile with a pedestrian gate at the junction of PRoW BW5/22 and BW5/27 is also to be implemented as an enhancement measure.

17.8 Residual Impacts

17.8.1 The residual impacts of the proposed development throughout the construction, operational, and post-operational phases are presented in this section.

17.8.2 No additional mitigation has been proposed and therefore the impacts would remain as initially assessed.

17.8.3 Although Chapter 9, Noise and Vibration, assesses moderate adverse impacts on PRoW during the construction and post-operational phases, these predicted impact levels are based on a conservative assessment, with all plant working at the closest approach to the receptor. In reality, the nature of the construction and post-operational phases means that the conservative situation predicted may exist for only a matter of days, or even hours over the course of the construction and post-operational phases.

17.8.4 Although Chapter 15, Landscape and Visual, has assessed major and moderate adverse impacts on PRoW (in terms of landscape quality) and on Viewpoints 3, 4 and 5 along BW5/22 during the construction, operational and post-operational phases, these impacts would be transient as users of the PRoW pass through the zone of influence.

17.9 Summary of Impacts

17.9.1 Table 17.4 presents a summary of the potential impacts associated with the proposed park and ride facility at Cannington.
### Table 17.4: Summary of Construction, Operational, and Removal and Reinstatement Impacts on the Amenity and Recreation Resource at Cannington Park and Ride Facility

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Impact</th>
<th>Magnitude</th>
<th>Description</th>
<th>Value/Sensitivity</th>
<th>Significance</th>
<th>Proposed Mitigation</th>
<th>Residual Impact</th>
</tr>
</thead>
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<td><strong>Construction Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Replacement of stile with gate for enhancement</td>
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<tr>
<td></td>
<td>Noise disturbance</td>
<td>Low</td>
<td>Temporary Adverse Reversible</td>
<td>Very low to medium</td>
<td>Minor adverse to moderate adverse</td>
<td>None proposed</td>
<td>Minor adverse to moderate adverse</td>
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<tr>
<td></td>
<td>Air quality disturbance</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Visual disturbance</td>
<td>Very low to high</td>
<td>Short-term Adverse</td>
<td>Medium to high</td>
<td>Minor to major adverse</td>
<td>Design incorporates screening around perimeter</td>
<td>Minor to major adverse</td>
</tr>
<tr>
<td><strong>Sports and recreation facilities</strong></td>
<td>Obstruction</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td>N/A</td>
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<td>N/A</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td></td>
<td></td>
</tr>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td></td>
<td>Visual disturbance</td>
<td>Very low to high</td>
<td>Medium-term Adverse</td>
<td>Medium to high</td>
<td>Minor to major adverse</td>
<td>Design incorporates screening around perimeter</td>
<td>Minor to major adverse</td>
</tr>
<tr>
<td>Receptor</td>
<td>Potential Impact</td>
<td>Magnitude</td>
<td>Description</td>
<td>Value/ Sensitivity</td>
<td>Significance</td>
<td>Proposed Mitigation</td>
<td>Residual Impact</td>
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<td>N/A</td>
<td>N/A</td>
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<td>N/A</td>
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<tr>
<td></td>
<td>Noise disturbance</td>
<td>Low</td>
<td>Temporary Adverse Reversible</td>
<td>Very low to medium</td>
<td>Minor adverse to moderate adverse</td>
<td>None proposed</td>
<td>Minor adverse to moderate adverse</td>
</tr>
<tr>
<td></td>
<td>Air quality disturbance</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Visual disturbance</td>
<td>Very low to high</td>
<td>Short-term Adverse</td>
<td>Medium to high</td>
<td>Minor to major adverse reducing to negligible once site is restored</td>
<td>None proposed</td>
<td>Minor to major adverse reducing to negligible once site is restored</td>
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<td><strong>Sports and recreation facilities</strong></td>
<td>Obstruction</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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CHAPTER 18: SUMMARY OF ENVIRONMENTAL MITIGATION
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18. SUMMARY OF ENVIRONMENTAL MITIGATION

18.1 Introduction

18.1.1 This chapter of the Environmental Statement (ES) provides a summary of environmental mitigation measures proposed for the construction, operational and post-operational phases of the proposed Cannington park and ride development (the proposed development) at the Cannington park and ride site (the site) (see Chapters 1 to 5 of this volume of the ES for details).

18.1.2 This chapter summarises the significant environmental impacts predicted as a result of the construction, operational and post-operational phases of the proposed development. A summary of predicted impacts on local residents ('community impacts', in terms of transport, amenity and recreation, noise, air quality impacts, landscape and visual, and socio-economics), and a summary of proposed mitigation measures, is provided in the Community Impact Report (see Volume 2, Chapter 27, Appendix 27A). This report describes the impacts of the HPC Project on the community (e.g. Cannington).

18.1.3 Environmental impacts which are predicted to be negligible or minor have, for the purposes of this ES, been considered to be not significant and therefore no additional mitigation is proposed. Protective measures and a number of iterations and refinements to the design have been built into the proposed development which, in many cases, prevent, reduce or offset potential impacts to a not significant level.

18.1.4 Measures incorporated in the proposed development includes:

- Provision of a number of landscaping screening measures, including: substantial landscaped planting to the east of the site, to limit views from the residential properties at Oak Tree Way and Brownings Road; a tree screen to the west of the existing hedgerow to the east of the site; provision of grassed bunds to the west, north-west and east of the proposed parking area; screen planting to the east and north of the proposed parking area; hedgerow screen planting to the east and west of the proposed internal access road and the provision of new tree and hedgerow planting to the north and east of the site.

- Provision of a number of ecological measures, including the presence of an Ecological Clerk of Works on site, a badger tunnel under the proposed internal access road and additional slow worm habitat to the eastern boundary of the site.

- Incorporation of SuDS techniques, including permeable paving to maximise the permeable area of the site forming part of a drainage strategy for surface and foul water drainage.

- Incorporation of lighting shields to minimise light spill to the surrounding area.

18.1.5 The proposed development would be implemented in accordance with regulatory requirements and standard good construction and operational practices which are not generally considered to be mitigation. For brevity, impacts which are assessed as not significant are not included in this summary.
Implementation of the proposed development would, where appropriate, also be controlled through the overarching **Environmental Management and Monitoring Plan (EMMP)** and the following subject-specific management plans, submitted with the application for Development Consent:

- Land Contamination Management Plan (LCMP);
- Noise and Vibration Management Plan (NVMP);
- Air Quality Management Plan (AQMP);
- Materials Management Plan (MMP);
- Soil Management Plan (SMP);
- Water Management Plan (WMP);
- Ecology Mitigation and Monitoring Plan (EcMMP); and
- Environmental Pollution Incident Control Plan (EICP).

The **Framework Travel Plan**, appended to the **Transport Assessment**, has been developed to minimise vehicle movements during the construction and operational phases of the HPC Project. The transport strategy includes the proposed development at Cannington, which in itself would reduce road traffic and the associated impacts from vehicle noise, vibration and exhaust emissions to air. Other measures would include, but would not be limited to, car sharing schemes bus transport for the workforce and highway improvements.

Mitigation measures have been proposed where there is likely to be an adverse impact of greater than minor significance and the impact magnitude, spatial scope and temporal nature make it appropriate to do so. Significant impacts predicted and the corresponding proposed mitigation measures are summarised in this chapter and are identified by phase: construction, operation or post-operation, as applicable. All impacts listed are adverse unless otherwise stated.

The environmental impact assessment for all topics except air quality, noise and vibration, and soils and land use has been based on measures included in the design, best practices and regulatory compliance. However, for these three topics, best practice and site-specific measures are considered as mitigation.

No significant impacts have been predicted in the following topics:

- Socio-economics;
- Transport;
- Geology, Land contamination and Groundwater;
- Surface Water;
- Terrestrial Ecology and Ornithology; and
- Historic Environment.

These topics are therefore not discussed further in this chapter.
18.2 Noise and Vibration

18.2.1 Users of public footpaths in proximity to the proposed development would potentially be exposed to higher noise levels for a short period if construction works are ongoing nearby at that time. The overall noise impact on these footpaths during site construction and deconstruction (post-operational) works, based on predicted construction noise levels, is therefore assessed to range from not significant to significant. However, the exposure period would be limited due to the transient nature of users of the footpaths (i.e. walkers) who would not be subject to the same exposure duration as defined for fixed property receptor locations. Therefore, whilst the predicted noise levels might result in short-term disturbance, the impact on a person’s enjoyment of the amenity is likely to be less significant than has been assessed.

18.2.2 The nature of both the construction and deconstruction phases means that the conservative situation predicted may exist for only a matter of days, or even hours. The impacts are not predicted to continue to be significant during the operational phase.

18.2.3 A number of standard good working practices would be implemented as part of the NVMP for the site. Measures would include restricted working hours during construction/de-construction and operational phases, and good working practices, including a large number of measures such as: loading/unloading away from residential properties, use of physical barriers to provide screening attenuation, use of electrical rather than diesel plant where possible, use of acoustic enclosures for continuous noisy plant, noisy activities and plant start-up would be staggered, all plant and vehicles would be switched off when not in use, haul roads would be located away from residential properties as far as is practicable and would be well maintained. Furthermore a formal system would be put in place during the works which identifies the roles and responsibilities of site staff regarding the procedures to be applied to respond to any complaints relating to noise quality and the action to be taken.

18.3 Air Quality

18.3.1 Prior to mitigation, significant impacts are predicted on local air quality and amenity at assessed human receptors (on Brownings Road) living near the site from fugitive dust and PM$_{10}$ originating from construction and post-operational activities. Best practice guidance control methods and mitigation measures would be implemented to manage fugitive nuisance dust and PM$_{10}$ emissions during the construction works, and to ensure associated impacts are prevented in areas in proximity to the site.

18.3.2 EDF Energy is committed to implementing best practice measures to minimise dust impacts, especially in the vicinity of sensitive receptors. These measures would be used during construction/deconstruction and in this sense are part of the proposed development. However, the risk based methodology for assessing dust impacts requires that such measures must be taken into account as mitigation. These measures would be managed through implementation of the AQMP and are described below.

18.3.3 A range of good practice measures for managing fugitive dust and PM$_{10}$, implemented via the AQMP, would be employed during construction and...
deconstruction, including: vehicles carrying loose aggregate would be covered over during periods of dry and windy weather, completed earthworks/stockpiles would be covered or seeded as soon as is practicable, mobile or fixed spray units would be used to dampen surfaces as dictated by weather conditions; wheel washing facilities would be used at all exits; effective cleaning and inspection of vehicles, including total vehicle washing and ticketing of vehicles; use of dust-suppressed tools for all operations; and use of dust extraction techniques where available.

18.3.4 Best practice methods and mitigation measures implemented via the AQMP to control on-site exhaust emissions from plant and machinery (NRMM) during construction/deconstruction would include: minimising idling times of plant and machinery; ensuring all equipment is in good working order and working efficiently; use of ultra low sulphur diesel (ULSD) in all equipment and plant, where practicable; and ensuring that all equipment is fitted with appropriate particulate filters or any other appropriate exhaust after-treatments. A formal system would be put in place during the works which identifies the roles and responsibilities of site staff regarding the procedures to be applied to respond to any complaints relating to air quality. Site logs would be maintained, detailing any complaints received relating to air quality, investigations of the complaints, and the corresponding action taken including the response made to each complainant.

18.3.5 The extent to which dust mitigation measures would be implemented on site during the construction and deconstruction works would be flexible and responsive, with additional recommendations and measures introduced especially during particularly dust generating activities, sensitive periods, or upon receipt of substantiated dust complaints. Working practices will be systematically audited and revised where necessary in order to ensure fugitive dust impacts are mitigated to an acceptable level at the identified sensitive receptor locations.

18.4 Soils and Land Use

18.4.1 Prior to mitigation during the construction and post-operational phases, significant impacts are predicted on soil quality within the site during site clearance and earthworks. Significant impacts on field drainage are also predicted due to disruption to or loss of drainage infrastructure.

18.4.2 Specific mitigation, in relation to site-specific soil types and soil profile conditions at the time of site preparation, would also be implemented to protect soils during earthworks, including the adoption of appropriate stockpiling of stripped soil, and reinstatement of in situ subsoil physical conditions prior to restoration of the site for post-operational use. Access routes and working areas would also be clearly delimited during site preparation works to prevent trafficking of on-site topsoils. These measures would be implemented via the SMP. In addition, scheme design would include installation of on-site drainage management systems. Mitigation measures to protect adjacent land drains would also be implemented. With the proposed mitigation measures in place, no significant impacts are predicted to soils or land use.

18.5 Landscape and Visual

18.5.1 During the construction phase there is assessed to be significant impacts on landscape/townscape elements and features. These impacts would be upon
landform, land use/settlement, land cover and vegetation and Public Right of Way (PRoW). The impacts to landform, land use/settlement and landcover and vegetation are due to the change in nature of the site from agriculture to a park and ride. The impacts to the PRoW are mainly confined to PRoW BW5/22, which runs along the western site boundary, just inside the site, and are therefore highly localised. During the operational and post-operational phases impacts upon landform, land use/settlement and PRoW remain the same as those predicted at the construction phase with impacts on land cover reducing to a not significant level.

18.5.2 Users at viewpoints are predicted to experience significant impacts at five viewpoints during construction and operational phases. Mitigation is incorporated into the scheme design, including significant planting to the eastern and northern edges of the proposed park and ride area, and as such is taken into account during the assessment process. These result in a reduced impact at some viewpoints, particularly the residential properties to the east of the site at Oak Tree Way and Brownings Road, as proposed screen planting grows to maturity, although these impacts are still predicted to be significant. The measures which are intrinsic to the proposed development are considered to mitigate the landscape and visual impacts of the scheme as far as possible, they would mature during the operational phase to provide additional screening, and therefore no additional mitigation is proposed.

18.6 Amenity and Recreation

18.6.1 Significant impacts have been predicted to users of PRoW during the construction, operational, and post-operational phases. These impacts would be created as a result of construction noise and would range from not significant to significant, depending upon the location of the user. Similarly there would be a visual impact which would be negligible to significant, depending upon the location of the user of the PRoW. Such impacts should be considered in the context that they would be experienced by users of the PRoW who would be transient and therefore unlikely to be experiencing the impact for any prolonged period of time.

18.6.2 Mitigation in the form of landscaping and vegetation planting, which would have been planted during the construction phase, would mature during the operational phase and would provide some element of visual mitigation. Nevertheless it is predicted that the residual impact of the development upon users of PRoW would remain significant. Such impacts should be considered in the context that the users of the PRoW would be transient and therefore unlikely to be experiencing the impact for any prolonged period of time.